Appendix C

Data Validation Reports

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Sovereign Consulting Inc.
16 Chestnut Street, Suite 520
Foxborough, MA 02035
ATTN: Mr. Steven Passafaro
spassafaro@sovcon.com

January 22, 2020

SUBJECT: Shepley's Hill, Data Validation

Dear Mr. Passafaro,

Enclosed is the final validation report for the fraction listed below. This SDG was received on January 16, 2020. Attachment 1 is a summary of the samples that were reviewed for analysis.

LDC Project #47083:

SDG #	Fraction
JD1172	Arsenic

The data validation was performed under Stage 2A guidelines. The analyses were validated using the following documents, as applicable to each method:

- Quality Assurance Project Plan for Shepley's Hill Landfill Treatment System O&M Services, Devens, Massachusetts; March 2015
- USEPA National Functional Guidelines for Inorganic Superfund Data Review; January 2017
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

251 pages-ADV (no worksheets) Attachment 1

ADR (Stage 2A) **LDC #47083 (Sovereign Consulting, Inc., Foxborough, MA / Shepley's Hill)**

LDC	SDG#	DATE REC'D	(3) DATE DUE	As (6020B)																															
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	JD1172	01/16/20	02/06/20	1	0																														
Total	T/PG			1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Shaded cells indicate Stage 4 validation (all other cells are ADR review). These sample counts do not include MS, MSD, or DUP's.

L:\Sovereign\Shepleys Hill\47083ST.wpd

Data Validation Report
Shepley's Hill

SDG: JD1172

Prepared for

Sovereign Consulting
16 Chestnut Street, Suite 520
Foxborough, MA 02035

Prepared by

Laboratory Data Consultants, Inc
2701 Loker Ave West, Suite 220
Carlsbad, California 92010

January 21, 2020

INTRODUCTION

This Data Validation Report (DVR) presents Stage 2A data validation results for samples collected during the January 2020 sampling period. Data validation was performed in accordance with the Quality Assurance Project Plan (QAPP) for Shepley's Hill Landfill Treatment System O&M Services, Devens, Massachusetts (March 2015), and the US Environmental Protection Agency (EPA) National Functional Guidelines (NFG) for Inorganic Superfund Data Review (January 2017). Where specific guidance is not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Arsenic by EPA SW 846 Method 6020B

The sample identification and methods of analyses performed on each sample is presented in Attachment 1. Overall data qualification summary is presented in Attachment 2. Stage 2A Automated Data Review outliers are presented in Enclosure I.

All sample results were subjected to Stage 2A data validation, which comprises an evaluation of quality control (QC) summary results for sample holding times, and laboratory control samples (LCS), laboratory blanks.

Automated data review was performed on all QC summary results using the Automated Data Review (ADR) software program (LDC, 2013). Quality assurance (QA)/QC criteria specified in the QAPP and NFG were incorporated with the program's reference library to assess compliance with project requirements.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

NJ Presumptive evidence of presence of the compound at an estimated quantity.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

I. Sample Receipt and Technical Holding Time

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Laboratory Blanks

Laboratory blanks were performed as required by the methods. No contaminant concentrations were detected in the laboratory blanks reviewed by the ADR software program.

III. Field Blank Samples

No field blanks were identified in this SDG.

IV. Surrogate Spikes

Surrogate spikes were not required by the methods.

V. Matrix Spike

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed.

VI. Laboratory Duplicate Sample

The laboratory has indicated that there were no laboratory duplicate (DUP) analyses specified for the samples in this SDG, and therefore laboratory duplicate analyses were not performed for this SDG.

VII. Serial Dilution

Serial dilution was not performed for this SDG.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Field Duplicate Samples

No field duplicates were identified in this SDG.

X. Compound Quantitation

The laboratory reporting limits were evaluated. All laboratory reporting limits met the specified requirements.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable.

Attachment 1

Sample Cross Reference

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
03-Jan-2020	EFFLUENT	JD1172-1	N	3010A	6020B	S2AVE

N = Normal Sample *S2AVE = Stage 2A Validation*

Attachment 2

Overall Data Qualification Summary

Data Qualifier Summary

Lab Reporting Batch ID: JD1172

Laboratory: ACTD

EDD Filename: JD1172-SEDD_2a_1

eQAPP Name: Sovereign_Shepley'sHillLandfill_180924

No Data Review Qualifiers Applied.

Quality Control Outlier Reports

JD1172

(No Outliers)

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Sovereign Consulting Inc.
16 Chestnut Street, Suite 520
Foxborough, MA 02035
ATTN: Mr. Steven Passafaro
spassafaro@sovcon.com

February 28, 2020

SUBJECT: Shepley's Hill, Data Validation

Dear Mr. Passafaro,

Enclosed is the final validation report for the fraction listed below. This SDG was received on February 14, 2020. Attachment 1 is a summary of the samples that were reviewed for analysis.

LDC Project #47306:

SDG #	Fraction
JD2951	Arsenic

The data validation was performed under Stage 2A guidelines. The analyses were validated using the following documents, as applicable to each method:

- Quality Assurance Project Plan for Shepley's Hill Landfill Treatment System O&M Services, Devens, Massachusetts; March 2015
- USEPA National Functional Guidelines for Inorganic Superfund Data Review; January 2017
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

196 pages-ADV (no worksheets) Attachment 1

ADR (Stage 2A)	LDC #47306 (Sovereign Consulting, Inc., Foxborough, MA / Shepley's Hill)																																				
LDC	SDG#	DATE REC'D	(3) DATE DUE	As (6020B)																																	
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	JD2951	02/14/20	03/09/20	1	0																																
Total	T/PG			1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Shaded cells indicate Stage 4 validation (all other cells are ADR review). These sample counts do not include MS, MSD, or DUP's.

Data Validation Report
Shepley's Hill

SDG: JD2951

Prepared for

Sovereign Consulting
16 Chestnut Street, Suite 520
Foxborough, MA 02035

Prepared by

Laboratory Data Consultants, Inc
2701 Loker Ave West, Suite 220
Carlsbad, California 92010

February 27, 2020

INTRODUCTION

This Data Validation Report (DVR) presents Stage 2A data validation results for samples collected during the February 2020 sampling period. Data validation was performed in accordance with the Quality Assurance Project Plan (QAPP) for Shepley's Hill Landfill Treatment System O&M Services, Devens, Massachusetts (March 2015), and the US Environmental Protection Agency (EPA) National Functional Guidelines (NFG) for Inorganic Superfund Data Review (January 2017). Where specific guidance is not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Arsenic by EPA SW 846 Method 6020B

The sample identification and methods of analyses performed on each sample is presented in Attachment 1. Overall data qualification summary is presented in Attachment 2. Stage 2A Automated Data Review outliers are presented in Enclosure I.

All sample results were subjected to Stage 2A data validation, which comprises an evaluation of quality control (QC) summary results for sample holding times, matrix spike/matrix spike duplicates (MS/MSD), laboratory control samples (LCS), and laboratory blanks.

Automated data review was performed on all QC summary results using the Automated Data Review (ADR) software program (LDC, 2013). Quality assurance (QA)/QC criteria specified in the QAPP and NFG were incorporated with the program's reference library to assess compliance with project requirements.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

NJ Presumptive evidence of presence of the compound at an estimated quantity.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

I. Sample Receipt and Technical Holding Time

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Laboratory Blanks

Laboratory blanks were performed as required by the methods. No contaminant concentrations were detected in the laboratory blanks reviewed by the ADR software program.

III. Field Blank Samples

No field blanks were identified in this SDG.

IV. Surrogate Spikes

Surrogate spikes were not required by the methods.

V. Matrix Spike

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VI. Laboratory Duplicate Sample

The laboratory has indicated that there were no laboratory duplicate (DUP) analyses specified for the samples in this SDG, and therefore laboratory duplicate analyses were not performed for this SDG.

VII. Serial Dilution

Serial dilution analysis was performed on an associated project sample. Percent differences (%D) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Field Duplicate Samples

No field duplicates were identified in this SDG.

X. Compound Quantitation

The laboratory reporting limits were evaluated. All laboratory reporting limits met the specified requirements.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable.

Attachment 1

Sample Cross Reference

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
07-Feb-2020	EFFLEUNT	JD2951-1	N	3010A	6020B	S2AVE
07-Feb-2020	EFFLEUNTMS	MP19751-S1	MS	3010A	6020B	S2AVE
07-Feb-2020	EFFLEUNTMSD	MP19751-S2	MSD	3010A	6020B	S2AVE

N = Normal Sample MS = Matrix Spike MSD = Matrix Spike Duplicate
S2AVE = EPA Level II Validation

Attachment 2
Overall Data Qualification Summary

Data Qualifier Summary

Lab Reporting Batch ID: JD2951

Laboratory: ACTD

EDD Filename: JD2951-SEDD_2a_1

eQAPP Name: Sovereign_Shepley'sHillLandfill_180924

No Data Review Qualifiers Applied.

Enclosure I

Stage 2A ADR Outliers

Quality Control
Outlier Reports

JD2951

(No Outliers)

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Sovereign Consulting Inc.
16 Chestnut Street, Suite 520
Foxborough, MA 02035
ATTN: Mr. Steven Passafaro
spassafaro@sovcon.com

April 15, 2020

SUBJECT: Shepley's Hill, Data Validation

Dear Mr. Passafaro,

Enclosed are the final validation reports for the fractions listed below. This SDG was received on March 25, 2020. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #47638:

SDG #	Fraction
JD4297	Metals, Wet Chemistry

The data validation was performed under Stage 2A guidelines. The analyses were validated using the following documents, as applicable to each method:

- Quality Assurance Project Plan for Shepley's Hill Landfill Treatment System O&M Services, Devens, Massachusetts; March 2015
- USEPA National Functional Guidelines for Inorganic Superfund Data Review; January 2017
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

922 pages-ADV (no worksheets)

Attachment 1

ADR (Stage 2A)	LDC #47638 (Sovereign Consulting, Inc., Foxborough, MA / Shepley's Hill)																																				
LDC	**SDG#**	**DATE REC'D**	**(3) DATE DUE**	**(3) Metals (6010D)**		**Fe,Mn (6010D)**		**As (6020B)**		**Cl,SO_4 (300.0 /9056A)**		**NO_3N (353.2)**		**NO_3/ NO_2-N (353.2)**																							
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	JD4297	03/25/20	04/15/20	1	0	2	0	3	0	1	0	1	0	1	0																						
Total	J/PG			1	0	2	0	3	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9

Shaded cells indicate Stage 4 validation (all other cells are ADR review). These sample counts do not include MS, MSD, or DUP's.

Data Validation Report
Shepley's Hill

SDG: JD4297

Prepared for

Sovereign Consulting
16 Chestnut Street, Suite 520
Foxborough, MA 02035

Prepared by

Laboratory Data Consultants, Inc
2701 Loker Ave West, Suite 220
Carlsbad, California 92010

April 15, 2020

INTRODUCTION

This Data Validation Report (DVR) presents Stage 2A data validation results for samples collected during the March 2020 sampling period. Data validation was performed in accordance with the Quality Assurance Project Plan (QAPP) for Shepley's Hill Landfill Treatment System O&M Services, Devens, Massachusetts (March 2015), and the US Environmental Protection Agency (EPA) National Functional Guidelines (NFG) for Inorganic Superfund Data Review (January 2017). Where specific guidance is not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Metals by EPA SW 846 Method 6010D and 6020B
Nitrate as Nitrogen and Nitrate/Nitrite as Nitrogen by EPA Method 353.2
Chloride and Sulfate by EPA Method 300.0/SW 846 Method 9056A
Nitrite

The sample identification and methods of analyses performed on each sample is presented in Attachment 1. Overall data qualification summary is presented in Attachment 2. Stage 2A Automated Data Review outliers are presented in Enclosure I.

All sample results were subjected to Stage 2A data validation, which comprises an evaluation of quality control (QC) summary results for sample holding times, laboratory control samples (LCS), and laboratory blanks.

Automated data review was performed on all QC summary results using the Automated Data Review (ADR) software program (LDC, 2013). Quality assurance (QA)/QC criteria specified in the QAPP and NFG were incorporated with the program's reference library to assess compliance with project requirements.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

NJ Presumptive evidence of presence of the compound at an estimated quantity.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

I. Sample Receipt and Technical Holding Time

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Laboratory Blanks

Laboratory blanks were performed as required by the methods. No contaminant concentrations were detected in the laboratory blanks reviewed by the ADR software program.

III. Field Blank Samples

No field blanks were identified in this SDG.

IV. Matrix Spike/Matrix Spike Duplicate

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the exception of one MS/MSD pair for arsenic. No data were qualified since sample concentrations were significantly greater (>4x) than the spike amount. The details are presented in Enclosure I.

V. Duplicate Sample Analysis

The laboratory has indicated that there were no laboratory duplicate (DUP) analyses specified for the samples in this SDG, and therefore laboratory duplicate analyses were not performed for this SDG.

VI. Serial Dilution

Serial dilution analysis was performed on an associated project sample. The analysis criteria were met with the following exceptions:

SDG/ Method	Diluted Sample	Analyte	%D (Limits)	Associated Samples	Flag	A or P
JD4297/ 6020B	EW-4	Arsenic	25.9 (≤10)	EW-4	J (all detects)	A

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

VIII. Field Duplicate Samples

No field duplicates were identified in this SDG.

IX. Compound Quantitation

The laboratory reporting limits were evaluated. All laboratory reporting limits met the specified requirements.

All compounds reported below the LOQ as detected by the laboratory were qualified as detected estimated (J). The details regarding the qualification of data are provided in Enclosure I.

X. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to serial dilution %D, data were qualified as estimated in one sample.

Due to results reported as detected below the LOQ, data was qualified as estimated in one sample.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable.

Data flags are summarized and are presented as Attachment 2

Attachment 1

Sample Cross Reference

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
06-Mar-2020	EFFLUENT	JD4297-1	N	3010A	6010D	S2AVE
06-Mar-2020	EFFLUENT	JD4297-1	N	3010A	6020B	S2AVE
06-Mar-2020	EFFLUENT	JD4297-1	N	Gen Prep	300.0	S2AVE
06-Mar-2020	EFFLUENT	JD4297-1	N	Gen Prep	353.2	S2AVE
06-Mar-2020	EFFLUENT	JD4297-1	N	Gen Prep	353.2_CALC	S2AVE
06-Mar-2020	EW-1	JD4297-2	N	3010A	6010D	S2AVE
06-Mar-2020	EW-1	JD4297-2	N	3010A	6020B	S2AVE
06-Mar-2020	EW-4	JD4297-3	N	3010A	6010D	S2AVE
06-Mar-2020	EW-4	JD4297-3	N	3010A	6020B	S2AVE
06-Mar-2020	EW-4MS	MP20175A-S3	MS	3010A	6020B	S2AVE
06-Mar-2020	EW-4MSD	MP20175A-S4	MSD	3010A	6020B	S2AVE
06-Mar-2020	EW-4MS	MP20175-S1	MS	3010A	6010D	S2AVE
06-Mar-2020	EW-4MSD	MP20175-S2	MSD	3010A	6010D	S2AVE

III = EPA Level 3 Data Review *N = Normal Sample* *TB = Trip Blank* *MS = Matrix Spike*
IV = EPA Level 4 Data Validation *FD = Field Duplicate* *FB = Field Blank* *MSD = Matrix Spike Duplicate*

Attachment 2
Overall Data Qualification Summary

Data Qualifier Summary

Lab Reporting Batch ID: JD4297 **Laboratory: ACTD**

EDD Filename: JD4297-SEDD_2a_1 **eQAPP Name: Sovereign_Shepley'sHillLandfill_180924**

Method Category: METALS
Method: 6010D ***Matrix:*** Water

Sample ID: EFFLUENT ***Collected:*** 3/6/2020 6:05:00 AM ***Analysis Type:*** Initial/TOT ***Dilution:*** 1

Analyte	Lab Result	Lab Qual	DL	DL Type	RL	RL Type	Units	Data Review Qual	Reason Code
BARIUM	15.6	J	100	LOD	200	LOQ	ug/L	J	TR

Method Category: METALS
Method: 6020B ***Matrix:*** Water

Sample ID: EW-4 ***Collected:*** 3/6/2020 7:38:00 AM ***Analysis Type:*** Initial/TOT ***Dilution:*** 50

Analyte	Lab Result	Lab Qual	DL	DL Type	RL	RL Type	Units	Data Review Qual	Reason Code
ARSENIC	3670		50	LOD	75	LOQ	ug/L	J	SD

* denotes a non-reportable result

Project Name and Number: - USACE Project: Shepley's Hill (SHL), Devens, MA

Data Qualifier Summary

Lab Reporting Batch ID: JD4297 **Laboratory: ACTD**

EDD Filename: JD4297-SEDD_2a_1 **eQAPP Name: Sovereign_Shepley'sHillLandfill_180924**

Reason Code Legend

Reason Code	*Description*
PJ	Professional Judgment
Q	Matrix Spike Lower Rejection
SD	Professional Judgment
TR	Reporting Limit Trace Value

* denotes a non-reportable result

Project Name and Number: - USACE Project: Shepley's Hill (SHL), Devens, MA

Enclosure I

Stage 2A ADR Outliers

Quality Control Outlier Reports

JD4297

Matrix Spike/Matrix Spike Duplicate Outlier Report

Lab Reporting Batch ID: JD4297 **Laboratory: ACTD**

EDD Filename: JD4297-SEDD_2a_1 **eQAPP Name: Sovereign_Shepley'sHillLandfill_180924**

Method: **6020B**
Matrix: **Water**

QC Sample ID (Associated Samples)	*Compound*	*MS %R*	*MSD %R*	*%R Limits*	*RPD (Limits)*	*Affected Compounds*	*Flag*
EW-4MS (Total) (EW-1 EW-4)	ARSENIC	-425	-	80.00-120.00	-	ARSENIC	No Qualifiers Applied Native > 4x

Project Name and Number: - USACE Project: Shepley's Hill (SHL), Devens, MA

Reporting Limit Outliers

Lab Reporting Batch ID: JD4297 **Laboratory: ACTD**

EDD Filename: JD4297-SEDD_2a_1 **eQAPP Name: Sovereign_Shepley'sHillLandfill_180924**

Method: **6010D**

Matrix: **Water**

SampleID	*Analyte*	*Lab Qual*	*Result*	*Reporting Limit*	*RL Type*	*Units*	*Flag*
EFFLUENT	BARIUM	J	15.6	200	LOQ	ug/L	J (all detects)

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Sovereign Consulting Inc.
16 Chestnut Street, Suite 520
Foxborough, MA 02035
ATTN: Mr. Steven Passafaro
spassafaro@sovcon.com

April 28, 2020

SUBJECT: Shepley's Hill, Data Validation

Dear Mr. Passafaro,

Enclosed is the final validation report for the fraction listed below. This SDG was received on April 21, 2020. Attachment 1 is a summary of the samples that were reviewed for analysis.

LDC Project #47863:

SDG #	Fraction
JD5642	Arsenic

The data validation was performed under Stage 2A guidelines. The analyses were validated using the following documents, as applicable to each method:

- Quality Assurance Project Plan for Shepley's Hill Landfill Treatment System O&M Services, Devens, Massachusetts; March 2015
- USEPA National Functional Guidelines for Inorganic Superfund Data Review; January 2017
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

51 pages-ADV (no worksheets) Attachment 1

ADR (Stage 2A) **LDC #47863 (Sovereign Consulting, Inc., Foxborough, MA / Shepley's Hill)**

LDC	SDG#	DATE REC'D	(3) DATE DUE	As (6020B)																															
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	JD5642	04/21/20	05/12/20	1	0																														
Total	T/PG			1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Shaded cells indicate Stage 4 validation (all other cells are ADR review). These sample counts do not include MS, MSD, or DUP's.

L:\Sovereign\Shepleys Hill\47863ST.wpd

Data Validation Report
Shepley's Hill

SDG: JD5642

Prepared for

Sovereign Consulting
16 Chestnut Street, Suite 520
Foxborough, MA 02035

Prepared by

Laboratory Data Consultants, Inc
2701 Loker Ave West, Suite 220
Carlsbad, California 92010

April 28, 2020

INTRODUCTION

This Data Validation Report (DVR) presents Stage 2A data validation results for samples collected during the April 2020 sampling period. Data validation was performed in accordance with the Quality Assurance Project Plan (QAPP) for Shepley's Hill Landfill Treatment System O&M Services, Devens, Massachusetts (March 2015), and the US Environmental Protection Agency (EPA) National Functional Guidelines (NFG) for Inorganic Superfund Data Review (January 2017). Where specific guidance is not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Arsenic by EPA SW 846 Method 6020B

The sample identification and methods of analyses performed on each sample is presented in Attachment 1. Overall data qualification summary is presented in Attachment 2. Stage 2A Automated Data Review outliers are presented in Enclosure I.

All sample results were subjected to Stage 2A data validation, which comprises an evaluation of quality control (QC) summary results for sample holding times, matrix spike/matrix spike duplicates (MS/MSD), laboratory control samples (LCS), serial dilutions, and laboratory blanks.

Automated data review was performed on all QC summary results using the Automated Data Review (ADR) software program (LDC, 2013). Quality assurance (QA)/QC criteria specified in the QAPP and NFG were incorporated with the program's reference library to assess compliance with project requirements.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

NJ Presumptive evidence of presence of the compound at an estimated quantity.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

I. Sample Receipt and Technical Holding Time

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Laboratory Blanks

Laboratory blanks were performed as required by the methods. No contaminant concentrations were detected in the laboratory blanks reviewed by the ADR software program.

III. Field Blank Samples

No field blanks were identified in this SDG.

IV. Surrogate Spikes

Surrogate spikes were not required by the methods.

V. Matrix Spike

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VI. Laboratory Duplicate Sample

The laboratory has indicated that there were no laboratory duplicate (DUP) analyses specified for the samples in this SDG, and therefore laboratory duplicate analyses were not performed for this SDG.

VII. Serial Dilution

Serial dilution analysis was performed on an associated project sample. Percent differences (%D) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Field Duplicate Samples

No field duplicates were identified in this SDG.

X. Compound Quantitation

The laboratory reporting limits were evaluated. All laboratory reporting limits met the specified requirements.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable.

Attachment 1

Sample Cross Reference

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
03-Apr-2020	EFFLUENT	JD5642-1	N	3010A	6020B	S2AVE
03-Apr-2020	EFFLUENTMS	MP20630-S1	MS	3010A	6020B	S2AVE
03-Apr-2020	EFFLUENTMSD	MP20630-S2	MSD	3010A	6020B	S2AVE

N = Normal Sample MS = Matrix Spike MSD = Matrix Spike Duplicate
S2AVE = EPA Level II Validation

Attachment 2

Overall Data Qualification Summary

Data Qualifier Summary

Lab Reporting Batch ID: JD5642

Laboratory: ACTD

EDD Filename: JD5642-SEDD_2a_1

eQAPP Name: Sovereign_Shepley'sHillLandfill_180924

No Data Review Qualifiers Applied.

Enclosure I

Stage 2A ADR Outliers

Quality Control
Outlier Reports

JD5642

(No Outliers)

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Sovereign Consulting Inc.
16 Chestnut Street, Suite 520
Foxborough, MA 02035
ATTN: Mr. Steven Passafaro
spassafaro@sovcon.com

June 3, 2020

SUBJECT: Shepley's Hill, Data Validation

Dear Mr. Passafaro,

Enclosed is the final validation report for the fraction listed below. This SDG was received on May 18, 2020. Attachment 1 is a summary of the samples that were reviewed for analysis.

LDC Project #48081:

SDG #	Fraction
JD7050	Arsenic

The data validation was performed under Stage 2A guidelines. The analyses were validated using the following documents, as applicable to each method:

- Quality Assurance Project Plan for Shepley's Hill Landfill Treatment System O&M Services, Devens, Massachusetts; March 2015
- USEPA National Functional Guidelines for Inorganic Superfund Data Review; January 2017
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

ADR (Stage 2A)

LDC #48081 (Sovereign Consulting, Inc., Foxborough, MA / Shepley's Hill)

LDC	SDG#	DATE REC'D	(3) DATE DUE	As (6020B)																															
Matrix: Water/Sediment				W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	JD7050	05/18/20	06/09/20	1	0																														
Total	T/PG			1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Shaded cells indicate Stage 4 validation (all other cells are ADR review). These sample counts do not include MS, MSD, or DUP's.

Data Validation Report
Shepley's Hill

SDG: JD7050

Prepared for

Sovereign Consulting
16 Chestnut Street, Suite 520
Foxborough, MA 02035

Prepared by

Laboratory Data Consultants, Inc
2701 Loker Ave West, Suite 220
Carlsbad, California 92010

June 3, 2020

INTRODUCTION

This Data Validation Report (DVR) presents Stage 2A data validation results for samples collected during the May 2020 sampling period. Data validation was performed in accordance with the Quality Assurance Project Plan (QAPP) for Shepley's Hill Landfill Treatment System O&M Services, Devens, Massachusetts (March 2015), and the US Environmental Protection Agency (EPA) National Functional Guidelines (NFG) for Inorganic Superfund Data Review (January 2017). Where specific guidance is not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Arsenic by EPA SW 846 Method 6020B

The sample identification and methods of analyses performed on each sample is presented in Attachment 1. Overall data qualification summary is presented in Attachment 2. Stage 2A Automated Data Review outliers are presented in Enclosure I.

All sample results were subjected to Stage 2A data validation, which comprises an evaluation of quality control (QC) summary results for sample holding times, matrix spike/matrix spike duplicates (MS/MSD), laboratory control samples (LCS), serial dilutions, and laboratory blanks.

Automated data review was performed on all QC summary results using the Automated Data Review (ADR) software program (LDC, 2013). Quality assurance (QA)/QC criteria specified in the QAPP and NFG were incorporated with the program's reference library to assess compliance with project requirements.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

NJ Presumptive evidence of presence of the compound at an estimated quantity.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

I. Sample Receipt and Technical Holding Time

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Laboratory Blanks

Laboratory blanks were performed as required by the methods. No contaminant concentrations were detected in the laboratory blanks reviewed by the ADR software program.

III. Field Blank Samples

No field blanks were identified in this SDG.

IV. Surrogate Spikes

Surrogate spikes were not required by the method.

V. Matrix Spike

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

VI. Laboratory Duplicate Sample

The laboratory has indicated that there were no laboratory duplicate (DUP) analyses specified for the samples in this SDG, and therefore laboratory duplicate analyses were not performed for this SDG.

VII. Serial Dilution

Serial dilution analysis was performed on an associated project sample. Percent differences (%D) were within QC limits.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Field Duplicate Samples

No field duplicates were identified in this SDG.

X. Compound Quantitation

The laboratory reporting limits were evaluated. All laboratory reporting limits met the specified requirements.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable.

Attachment 1

Sample Cross Reference

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
08-May-2020	EFFLUENT	JD7050-1	N	3010A	6020B	S2AVE
08-May-2020	EFFLUENTMS	MP21063-S1	MS	3010A	6020B	S2AVE
08-May-2020	EFFLUENTMSD	MP21063-S2	MSD	3010A	6020B	S2AVE

N = Normal Sample MS = Matrix Spike MSD = Matrix Spike Duplicate
S2AVE = Stage 2A Validation

Attachment 2
Overall Data Qualification Summary

Data Qualifier Summary

Lab Reporting Batch ID: JD7050

Laboratory: ACTD

EDD Filename: JD7050-SEDD_2a_1

eQAPP Name: Sovereign_Shepley'sHillLandfill_180924

No Data Review Qualifiers Applied.

Enclosure I

Stage 2A ADR Outliers

Quality Control Outlier Reports

JD7050

(No Outliers)

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Sovereign Consulting Inc.
16 Chestnut Street, Suite 520
Foxborough, MA 02035
ATTN: Mr. Steven Passafaro
spassafaro@sovcon.com

July 13, 2020

SUBJECT: Shepley's Hill, Data Validation

Dear Mr. Passafaro,

Enclosed are the final validation reports for the fractions listed below. This SDG was received on June 19, 2020. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #48392:

SDG #	Fraction
JD8253	Metals, Wet Chemistry

The data validation was performed under Stage 2A guidelines. The analyses were validated using the following documents, as applicable to each method:

- Quality Assurance Project Plan for Shepley's Hill Landfill Treatment System O&M Services, Devens, Massachusetts; March 2015
- USEPA National Functional Guidelines for Inorganic Superfund Data Review; January 2017
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

155 pages-ADV (no worksheets)

Attachment 1

ADR (Stage 2A)

LDC #48392 (Sovereign Consulting, Inc., Foxborough, MA / Shepley's Hill)

LDC	SDG#	DATE REC'D	(3) DATE DUE	(3) Metals (6010D)		Fe,Mn (6010D)		As (6020B)		Cl,SO_4 (300.0 /9056A)		NO_3N (353.2)		NO_3/ NO_2-N (353.2)		NO_2-N (4500-NO2B)																					
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	JD8253	06/19/20	07/13/20	1	0	2	0	3	0	1	0	1	0	1	0	1	0																				
Total	J/PG			1	0	2	0	3	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10

Shaded cells indicate Stage 4 validation (all other cells are ADR review). These sample counts do not include MS, MSD, or DUP's.

L:\Sovereign\Shepleys Hill\48392ST.wpd

Data Validation Report
Shepley's Hill

SDG: JD8253

Prepared for

Sovereign Consulting
16 Chestnut Street, Suite 520
Foxborough, MA 02035

Prepared by

Laboratory Data Consultants, Inc
2701 Loker Ave West, Suite 220
Carlsbad, California 92010

July 13, 2020

INTRODUCTION

This Data Validation Report (DVR) presents Stage 2A data validation results for samples collected during the June 2020 sampling period. Data validation was performed in accordance with the Quality Assurance Project Plan (QAPP) for Shepley's Hill Landfill Treatment System O&M Services, Devens, Massachusetts (March 2015), and the US Environmental Protection Agency (EPA) National Functional Guidelines (NFG) for Inorganic Superfund Data Review (January 2017). Where specific guidance is not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Metals by EPA SW 846 Method 6010D and 6020B
Nitrate as Nitrogen and Nitrate/Nitrite as Nitrogen by EPA Method 353.2
Nitrite as Nitrogen by Standard Method 4500 NO2-B
Chloride and Sulfate by EPA Method 300.0/SW 846 Method 9056A
Nitrite

The sample identification and methods of analyses performed on each sample is presented in Attachment 1. Overall data qualification summary is presented in Attachment 2. Stage 2A Automated Data Review outliers are presented in Enclosure I.

All sample results were subjected to Stage 2A data validation, which comprises an evaluation of quality control (QC) summary results for sample holding times, matrix spike/matrix spike duplicates (MS/MSD), serial dilutions, laboratory control samples (LCS), and laboratory blanks.

Automated data review was performed on all QC summary results using the Automated Data Review (ADR) software program (LDC, 2013). Quality assurance (QA)/QC criteria specified in the QAPP and NFG were incorporated with the program's reference library to assess compliance with project requirements.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

NJ Presumptive evidence of presence of the compound at an estimated quantity.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

I. Sample Receipt and Technical Holding Time

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Laboratory Blanks

Laboratory blanks were performed as required by the methods. No contaminant concentrations were detected in the laboratory blanks reviewed by the ADR software program.

III. Field Blank Samples

No field blanks were identified in this SDG.

IV. Matrix Spike/Matrix Spike Duplicate

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

V. Duplicate Sample Analysis

The laboratory has indicated that there were no laboratory duplicate (DUP) analyses specified for the samples in this SDG, and therefore laboratory duplicate analyses were not performed for this SDG.

VI. Serial Dilution

Serial dilution analysis was performed on an associated project sample. The analysis criteria were met.

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

VIII. Field Duplicate Samples

No field duplicates were identified in this SDG.

IX. Compound Quantitation

The laboratory reporting limits were evaluated. All laboratory reporting limits met the specified requirements.

All compounds reported below the limit of quantitation (LOQ) as detected by the laboratory were qualified as detected estimated (J). The details regarding the qualification of data are provided in Enclosure I.

X. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to results reported as detected below the LOQ, data was qualified as estimated in one sample.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable.

Data flags are summarized and are presented as Attachment 2.

Attachment 1

Sample Cross Reference

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
05-Jun-2020	EW-01	JD8253-2	N	3010A	6010D	S2AVE
05-Jun-2020	EW-01	JD8253-2	N	3010A	6020B	S2AVE
05-Jun-2020	EW-04	JD8253-3	N	3010A	6010D	S2AVE
05-Jun-2020	EW-04	JD8253-3	N	3010A	6020B	S2AVE
05-Jun-2020	EFFLUENT	JD8253-1	N	3010A	6010D	S2AVE
05-Jun-2020	EFFLUENT	JD8253-1	N	3010A	6020B	S2AVE
05-Jun-2020	EFFLUENT	JD8253-1	N	Gen Prep	300.0	S2AVE
05-Jun-2020	EFFLUENT	JD8253-1	N	Gen Prep	353.2	S2AVE
05-Jun-2020	EFFLUENT	JD8253-1	N	Gen Prep	353.2_CALC	S2AVE
05-Jun-2020	EFFLUENTMS	MP21388-S1	MS	3010A	6020B	S2AVE
05-Jun-2020	EFFLUENTMSD	MP21388-S2	MSD	3010A	6020B	S2AVE
05-Jun-2020	EFFLUENTMS	MP21415-S1	MS	3010A	6010D	S2AVE
05-Jun-2020	EFFLUENTMSD	MP21415-S2	MSD	3010A	6010D	S2AVE

N = Normal Sample MS = Matrix Spike MSD = Matrix Spike Duplicate
S2AVE = EPA Level II Validation

Attachment 2
Overall Data Qualification Summary

Data Qualifier Summary

Lab Reporting Batch ID: JD8253 **Laboratory: ACTD**

EDD Filename: JD8253-SEDD_2a_1 **eQAPP Name: Sovereign_Shepley'sHillLandfill_180924**

Method Category: **METALS**

Method: **6010D** ***Matrix:*** **Water**

Sample ID: **EFFLUENT** ***Collected:*** **6/5/2020 8:47:00 AM** ***Analysis Type:*** **Initial/TOT** ***Dilution:*** **1**

Analyte	*Lab Result*	*Lab Qual*	*DL*	*DL Type*	*RL*	*RL Type*	*Units*	*Data Review Qual*	*Reason Code*
BARIUM	14.5	J	100	LOD	200	LOQ	ug/L	J	TR

* denotes a non-reportable result

Project Name and Number: - USACE Project: Shepley's Hill (SHL), Devens, MA

Data Qualifier Summary

Lab Reporting Batch ID: JD8253 **Laboratory: ACTD**

EDD Filename: JD8253-SEDD_2a_1 **eQAPP Name: Sovereign_Shepley'sHillLandfill_180924**

Reason Code Legend

Reason Code	*Description*
TR	Reporting Limit Trace Value

* denotes a non-reportable result

Project Name and Number: - USACE Project: Shepley's Hill (SHL), Devens, MA

Enclosure I

Stage 2A ADR Outliers

Quality Control
Outlier Reports

JD8253

Reporting Limit Outliers

Lab Reporting Batch ID: JD8253 **Laboratory: ACTD**

EDD Filename: JD8253-SEDD_2a_1 **eQAPP Name: Sovereign_Shepley'sHillLandfill_180924**

Method: **6010D**

Matrix: **Water**

SampleID	*Analyte*	*Lab Qual*	*Result*	*Reporting Limit*	*RL Type*	*Units*	*Flag*
EFFLUENT	BARIUM	J	14.5	200	LOQ	ug/L	J (all detects)

Project Name and Number: - USACE Project: Shepley's Hill (SHL), Devens, MA

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Sovereign Consulting Inc.
16 Chestnut Street, Suite 520
Foxborough, MA 02035
ATTN: Mr. Steven Passafaro
spassafaro@sovcon.com

August 5, 2020

SUBJECT: Shepley's Hill, Data Validation

Dear Mr. Passafaro,

Enclosed is the final validation report for the fraction listed below. This SDG was received on July 17, 2020. Attachment 1 is a summary of the samples that were reviewed for analysis.

LDC Project #48649:

SDG #	Fraction
JD9969	Metals

The data validation was performed under Stage 2A guidelines. The analyses were validated using the following documents, as applicable to each method:

- Quality Assurance Project Plan for Shepley's Hill Landfill Treatment System O&M Services, Devens, Massachusetts; March 2015
- USEPA National Functional Guidelines for Inorganic Superfund Data Review; January 2017
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

53 pages-ADV (no worksheets) Attachment 1

ADR (Stage 2A)

LDC #48649 (Sovereign Consulting, Inc., Foxborough, MA / Shepley's Hill)

LDC	SDG#	DATE REC'D	(3) DATE DUE	As (6020B)																																	
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	JD9969	07/17/20	08/07/20	1	0																																
Total	T/PG			1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Shaded cells indicate Stage 4 validation (all other cells are ADR review). These sample counts do not include MS, MSD, or DUP's.

Data Validation Report
Shepley's Hill

SDG: JD9969

Prepared for

Sovereign Consulting
16 Chestnut Street, Suite 520
Foxborough, MA 02035

Prepared by

Laboratory Data Consultants, Inc
2701 Loker Ave West, Suite 220
Carlsbad, California 92010

August 5, 2020

INTRODUCTION

This Data Validation Report (DVR) presents Stage 2A data validation results for samples collected during the July 2020 sampling period. Data validation was performed in accordance with the Quality Assurance Project Plan (QAPP) for Shepley's Hill Landfill Treatment System O&M Services, Devens, Massachusetts (March 2015), and the US Environmental Protection Agency (EPA) National Functional Guidelines (NFG) for Inorganic Superfund Data Review (January 2017). Where specific guidance is not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Arsenic by EPA SW 846 Method 6020B

The sample identification and methods of analyses performed on each sample is presented in Attachment 1. Overall data qualification summary is presented in Attachment 2. Stage 2A Automated Data Review outliers are presented in Enclosure I.

All sample results were subjected to Stage 2A data validation, which comprises an evaluation of quality control (QC) summary results for sample holding times, laboratory control samples (LCS), and laboratory blanks.

Automated data review was performed on all QC summary results using the Automated Data Review (ADR) software program (LDC, 2013). Quality assurance (QA)/QC criteria specified in the QAPP and NFG were incorporated with the program's reference library to assess compliance with project requirements.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

NJ Presumptive evidence of presence of the compound at an estimated quantity.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

I. Sample Receipt and Technical Holding Time

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Laboratory Blanks

Laboratory blanks were performed as required by the methods. No contaminant concentrations were detected in the laboratory blanks reviewed by the ADR software program.

III. Field Blank Samples

No field blanks were identified in this SDG.

IV. Matrix Spike

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed.

V. Laboratory Duplicate Sample

The laboratory has indicated that there were no laboratory duplicate (DUP) analyses specified for the samples in this SDG, and therefore laboratory duplicate analyses were not performed for this SDG.

VI. Serial Dilution

Serial dilution was not performed for this SDG.

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

VIII. Field Duplicate Samples

No field duplicates were identified in this SDG.

IX. Compound Quantitation

The laboratory reporting limits were evaluated. All laboratory reporting limits met the specified requirements.

X. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG. The quality control criteria reviewed were met and are considered acceptable.

Attachment 1

Sample Cross Reference

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
10-Jul-2020	EFFLUENT	JD9969-1	N	3010A	6020B	S2AVE

N = Normal Sample
S2AVE = EPA Level II Validation

Attachment 2
Overall Data Qualification Summary

Data Qualifier Summary

Lab Reporting Batch ID: JD9969

Laboratory: ACTD

EDD Filename: JD9969-SEDD_2a_1

eQAPP Name: Sovereign_Shepley'sHillLandfill_180924

No Data Review Qualifiers Applied.

Enclosure I

Stage 2A ADR Outliers

Quality Control
Outlier Reports

JD9969

(No Outliers)

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Sovereign Consulting Inc.
16 Chestnut Street, Suite 520
Foxborough, MA 02035
ATTN: Mr. Steven Passafaro
spassafaro@sovcon.com

September 3, 2020

SUBJECT: Shepley's Hill, Data Validation

Dear Mr. Passafaro,

Enclosed is the final validation report for the fraction listed below. This SDG was received on August 13, 2020. Attachment 1 is a summary of the samples that were reviewed for analysis.

LDC Project #48857:

SDG #	Fraction
JD11438	Arsenic

The data validation was performed under Stage 2A guidelines. The analyses were validated using the following documents, as applicable to each method:

- Quality Assurance Project Plan for Shepley's Hill Landfill Treatment System O&M Services, Devens, Massachusetts; March 2015
- USEPA National Functional Guidelines for Inorganic Superfund Data Review; January 2017
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

46 pages-ADV (no worksheets) Attachment 1

ADR (Stage 2A) **LDC #48857 (Sovereign Consulting, Inc., Foxborough, MA / Shepley's Hill)**

LDC	SDG#	DATE REC'D	(3) DATE DUE	As (6020B)																															
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	JD11438	08/13/20	09/03/20	1	0																														
Total	T/PG			1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Shaded cells indicate Stage 4 validation (all other cells are ADR review). These sample counts do not include MS, MSD, or DUP's.

L:\Sovereign\Shepleys Hill\48857ST.wpd

Data Validation Report
Shepley's Hill

SDG: JD11438

Prepared for

Sovereign Consulting
16 Chestnut Street, Suite 520
Foxborough, MA 02035

Prepared by

Laboratory Data Consultants, Inc
2701 Loker Ave West, Suite 220
Carlsbad, California 92010

September 2, 2020

INTRODUCTION

This Data Validation Report (DVR) presents Stage 2A data validation results for samples collected during the August 2020 sampling period. Data validation was performed in accordance with the Quality Assurance Project Plan (QAPP) for Shepley's Hill Landfill Treatment System O&M Services, Devens, Massachusetts (March 2015), and the US Environmental Protection Agency (EPA) National Functional Guidelines (NFG) for Inorganic Superfund Data Review (January 2017). Where specific guidance is not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Arsenic by EPA SW 846 Method 6020B

The sample identification and methods of analyses performed on each sample is presented in Attachment 1. Overall data qualification summary is presented in Attachment 2. Stage 2A Automated Data Review outliers are presented in Enclosure I.

All sample results were subjected to Stage 2A data validation, which comprises an evaluation of quality control (QC) summary results for sample holding times, laboratory control samples (LCS), and laboratory blanks.

Automated data review was performed on all QC summary results using the Automated Data Review (ADR) software program (LDC, 2013). Quality assurance (QA)/QC criteria specified in the QAPP and NFG were incorporated with the program's reference library to assess compliance with project requirements.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

NJ Presumptive evidence of presence of the compound at an estimated quantity.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

I. Sample Receipt and Technical Holding Time

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Laboratory Blanks

Laboratory blanks were performed as required by the methods. No contaminant concentrations were detected in the laboratory blanks reviewed by the ADR software program.

III. Field Blank Samples

No field blanks were identified in this SDG.

IV. Surrogate Spikes

Surrogate spikes were not required by the method.

V. Matrix Spike

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed.

VI. Laboratory Duplicate Sample

The laboratory has indicated that there were no laboratory duplicate (DUP) analyses specified for the samples in this SDG, and therefore laboratory duplicate analyses were not performed for this SDG.

VII. Serial Dilution

Serial dilution was not performed for this SDG.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Field Duplicate Samples

No field duplicates were identified in this SDG.

X. Compound Quantitation

The laboratory reporting limits were evaluated. All laboratory reporting limits met the specified requirements.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable.

Attachment 1

Sample Cross Reference

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
07-Aug-2020	EFFLUENT	JD11438-1	N	3010A	6020B	S2AVE

N = Normal Sample
S2AVE = EPA Level II Validation

Attachment 2
Overall Data Qualification Summary

Data Qualifier Summary

Lab Reporting Batch ID: JD11438

Laboratory: ACTD

EDD Filename: JD11438-SEDD_2a_1

eQAPP Name: Sovereign_Shepley'sHillLandfill_180924

No Data Review Qualifiers Applied.

Enclosure I

Stage 2A ADR Outliers

Quality Control Outlier Reports

JD11438

(No Outliers)

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Sovereign Consulting Inc.
16 Chestnut Street, Suite 520
Foxborough, MA 02035
ATTN: Mr. Steven Passafaro
spassafaro@sovcon.com

November 3, 2020

SUBJECT: Shepley's Hill, Data Validation

Dear Mr. Passafaro,

Enclosed are the final validation reports for the fractions listed below. This SDG was received on October 13, 2020. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #49391:

SDG #	Fraction
JD12771	Volatiles, Semivolatiles, Chlorinated Pesticides, Metals, Wet Chemistry

The data validation was performed under Stage 2A guidelines. The analyses were validated using the following documents, as applicable to each method:

- Quality Assurance Project Plan for Shepley's Hill Landfill Treatment System O&M Services, Devens, Massachusetts; March 2015
- USEPA National Functional Guidelines for Organic Superfund Methods Data Review; January 2017
- USEPA National Functional Guidelines for Inorganic Superfund Data Review; January 2017
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

377 pages-ADV (no worksheets) Attachment 1

ADR (Stage 2A) **LDC #49391 (Sovereign Consulting, Inc., Foxborough, MA / Shepley's Hill)**

LDC	SDG#	DATE REC'D	(3) DATE DUE	VOA (8260C)		VOA (624.1)		SVOA (625.1)		Pest. PCBs (608.3)		Metals (6010D /7470A)		Fe,Mn (6010D)		As (6020B)		Methane Ethane (175)		Cl,SO_4 (300.0 /9056A)		NO_3N (353.2)		NO_3/ NO_2-N (353.2)		NO_2-N (4500-NO2B)		HEM (1664A)									
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	JD12771	10/13/20	11/03/20	2	0	1	0	1	0	1	0	1	0	2	0	3	0	2	0	1	0	1	0	1	0	1	0	1	0	1	0								
Total	T/PG			2	0	1	0	1	0	1	0	1	0	2	0	3	0	2	0	1	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	18

Shaded cells indicate Stage 4 validation (all other cells are ADR review). These sample counts do not include MS, MSD, or DUP's.

L:\Sovereign\Shepleys Hill\49391ST.wpd

Data Validation Report
Shepley's Hill

SDG: JD12771

Prepared for

Sovereign Consulting
16 Chestnut Street, Suite 520
Foxborough, MA 02035

Prepared by

Laboratory Data Consultants, Inc
2701 Loker Ave West, Suite 220
Carlsbad, CA 92010

November 2, 2020

INTRODUCTION

This Data Validation Report (DVR) presents Stage 2A data validation results for samples collected during the September 2020 sampling period. Data validation was performed in accordance with the Quality Assurance Project Plan (QAPP) for Shepley's Hill Landfill Treatment System O&M Services, Devens, Massachusetts (March 2015), the US Environmental Protection Agency (EPA) National Functional Guidelines (NFG) for Inorganic Superfund Data Review (January 2017), and the US EPA NFG for Organic Superfund Methods Data Review (January 2017). Where specific guidance is not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Volatile Organic Compounds (VOCs) by Environmental Protection Agency (EPA) SW 846 Method 8260C and EPA Method 624.1
Semivolatile Organic Compounds (SVOCs) by EPA Method 625.1
Chlorinated Pesticides and Polychlorinated Biphenyls (PCBs) by EPA Method 608.3
Metals by EPA SW 846 Method 6010D/6020B
Mercury by EPA SW 846 Method 7470A
N-Hexane Extractable Material (HEM) by EPA Method 1664A

Wet Chemistry:
Chloride and Sulfate by EPA Method 300.0/SW 846 Method 9056A
Nitrate as Nitrogen (N) and Nitrate-Nitrite as N by EPA Method 353.2
Nitrite as N by Standard Method 4500NO2 B-11

The sample identification and methods of analyses performed on each sample is presented in Attachment 1. Overall data qualification summary is presented in Attachment 2. Stage 2A Automated Data Review outliers are presented in Enclosure I.

All sample results were subjected to Stage 2A data validation, which comprises an evaluation of quality control (QC) summary results for sample holding times, surrogates, matrix spike/matrix spike duplicates (MS/MSD), serial dilutions, laboratory control sample/laboratory control sample duplicates (LCS/LCSD), and laboratory blanks.

Automated data review was performed on all QC summary results using the Automated Data Review (ADR) software program (LDC, 2013) with the exception of serial dilutions, which were validated manually. Quality assurance (QA)/QC criteria specified in the QAPP and NFGs were incorporated with the program's reference library to assess compliance with project requirements.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detect): The compound or analyte was analyzed for and positively identified by the laboratory; however the analyte should be considered non-detect at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not applicable): Data did not warrant qualification since detected results only are affected and the compound was not detected in the associated samples.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt & Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Laboratory Blanks

Laboratory blanks were performed as required by the methods. No contaminant concentrations were detected in the laboratory blanks reviewed by the ADR software program with the exception of one blank for selenium. The associated sample results were qualified as non-detected (U) due to laboratory blank contamination as applicable. The sample results that were not detected or were significantly greater than the concentrations found in the associated blanks were not qualified. The details regarding the qualification of data are provided in Enclosure I.

III. Field Blank Samples

No field blanks were identified in this SDG.

IV. Surrogate Spikes

Surrogates were added to all samples as required by the methods. All surrogate recoveries (%R) were within QC limits.

V. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VI. Duplicate Sample Analysis

The laboratory has indicated that there were no laboratory duplicate (DUP) analyses specified for the samples in this SDG, and therefore laboratory duplicate analyses were not performed for this SDG.

VII. Serial Dilution

Serial dilution analysis was performed on an associated project sample. The analysis criteria were met.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control sample duplicates (LCSD) were analyzed as required by the methods. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the exception of one LCS for tetrachloroethene and one LCS for methane. The associated sample results were qualified as detected estimated (J) or non-detected estimated (UJ) as applicable. No data were qualified due to high %Rs when the associated results were non-detected. The details regarding the qualification of data are provided in Enclosure I.

IX. Field Duplicate Samples

No field duplicates were identified in this SDG.

X. Compound Quantitation

The laboratory reporting limits were evaluated. All laboratory reporting limits met the specified requirements.

All compounds reported below the limit of quantitation (LOQ) as detected by the laboratory were qualified as detected estimated (J). The details regarding the qualification of data are provided in Enclosure I.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the methods. No results were rejected in this SDG.

Due to LCS/LCSD %R, data were qualified as estimated in two samples.

Due to results below the LOQ, data were qualified as estimated in two samples.

Due to laboratory blank contamination, data were qualified as not detected in one sample.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable.

Data flags are summarized and are presented as Attachment 2.

Attachment 1

Sample Cross Reference

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
04-Sep-2020	EW-04	JD12771-3	N		RSK 175	S2AVE
04-Sep-2020	EW-04	JD12771-3	N	3010A	6010D	S2AVE
04-Sep-2020	EW-04	JD12771-3	N	3010A	6020B	S2AVE
04-Sep-2020	EW-04	JD12771-3	N	5030B	8260C	S2AVE
04-Sep-2020	EW-01	JD12771-2	N		RSK 175	S2AVE
04-Sep-2020	EW-01	JD12771-2	N	3010A	6010D	S2AVE
04-Sep-2020	EW-01	JD12771-2	N	3010A	6020B	S2AVE
04-Sep-2020	EW-01	JD12771-2	N	5030B	8260C	S2AVE
04-Sep-2020	EFFLUENT	JD12771-1	N		624	S2AVE
04-Sep-2020	EFFLUENT	JD12771-1	N	3010A	6010D	S2AVE
04-Sep-2020	EFFLUENT	JD12771-1	N	3010A	6020B	S2AVE
04-Sep-2020	EFFLUENT	JD12771-1	N	7470A	7470A	S2AVE
04-Sep-2020	EFFLUENT	JD12771-1	N	EPA 608	608-PCB	S2AVE
04-Sep-2020	EFFLUENT	JD12771-1	N	EPA 608	608-PEST	S2AVE
04-Sep-2020	EFFLUENT	JD12771-1	N	EPA 625	625	S2AVE
04-Sep-2020	EFFLUENT	JD12771-1	N	Gen Prep	1664	S2AVE
04-Sep-2020	EFFLUENT	JD12771-1	N	Gen Prep	300.0	S2AVE
04-Sep-2020	EFFLUENT	JD12771-1	N	Gen Prep	353.2	S2AVE
04-Sep-2020	EFFLUENT	JD12771-1	N	Gen Prep	353.2_CALC	S2AVE
04-Sep-2020	EFFLUENTMS	MP22721A-S3	MS	3010A	6020B	S2AVE
04-Sep-2020	EFFLUENTMSD	MP22721A-S4	MSD	3010A	6020B	S2AVE
04-Sep-2020	EFFLUENTMS	MP22721-S1	MS	3010A	6010D	S2AVE
04-Sep-2020	EFFLUENTMSD	MP22721-S2	MSD	3010A	6010D	S2AVE
04-Sep-2020	EFFLUENTMS	MP22761-S1	MS	7470A	7470A	S2AVE
04-Sep-2020	EFFLUENTMSD	MP22761-S2	MSD	7470A	7470A	S2AVE

N = Normal Sample MS = Matrix Spike MSD = Matrix Spike Duplicate
S2AVE = EPA Level II Validation

Attachment 2

Overall Data Qualification Summary

Data Qualifier Summary

Lab Reporting Batch ID: JD12771 **Laboratory: ACTD**

EDD Filename: jd12771-sedd_2a_1 **eQAPP Name: Sovereign_Shepley'sHillLandfill_180924**

Method Category: METALS
Method: 6010D **Matrix:** Water

Sample ID: EFFLUENT **Collected:** 9/4/2020 10:50:00 AM **Analysis Type:** Initial/TOT **Dilution:** 1

Analyte	Lab Result	Lab Qual	DL	DL Type	RL	RL Type	Units	Data Review Qual	Reason Code
SELENIUM	6.1	J	8.0	LOD	10	LOQ	ug/L	U	B
BARIUM	15.4	J	100	LOD	200	LOQ	ug/L	J	TR

Method Category: VOA
Method: 624 **Matrix:** Water

Sample ID: EFFLUENT **Collected:** 9/4/2020 10:50:00 AM **Analysis Type:** Initial/TOT **Dilution:** 1

Analyte	Lab Result	Lab Qual	DL	DL Type	RL	RL Type	Units	Data Review Qual	Reason Code
ACETONE	3.4	J	3.0	LOD	5.0	LOQ	ug/L	J	TR
BENZENE	0.67	J	0.50	LOD	1.0	LOQ	ug/L	J	TR
CHLOROBENZENE	0.52	J	0.50	LOD	1.0	LOQ	ug/L	J	TR
P/M-XYLENE	0.95	J	0.90	LOD	1.0	LOQ	ug/L	J	TR
XYLENES (TOTAL)	0.95	J	0.50	LOD	1.0	LOQ	ug/L	J	TR

Method Category: VOA
Method: 8260C **Matrix:** Water

Sample ID: EW-01 **Collected:** 9/4/2020 10:00:00 AM **Analysis Type:** Initial/TOT **Dilution:** 1

Analyte	Lab Result	Lab Qual	DL	DL Type	RL	RL Type	Units	Data Review Qual	Reason Code
CHLOROBENZENE	0.71	J	0.75	LOD	1.0	LOQ	ug/L	J	TR
CIS-1,2-DICHLOROETHENE	0.66	J	0.75	LOD	1.0	LOQ	ug/L	J	TR

Method Category: VOA
Method: RSK 175 **Matrix:** Water

Sample ID: EW-01 **Collected:** 9/4/2020 10:00:00 AM **Analysis Type:** Dilution-1/TOT **Dilution:** 25

Analyte	Lab Result	Lab Qual	DL	DL Type	RL	RL Type	Units	Data Review Qual	Reason Code
METHANE	1370		2.3	LOD	2.8	LOQ	ug/L	J	L

* denotes a non-reportable result

Project Name and Number: - USACE Project: Shepley's Hill (SHL), Devens, MA

Data Qualifier Summary

Lab Reporting Batch ID: JD12771 **Laboratory: ACTD**

EDD Filename: jd12771-sedd_2a_1 **eQAPP Name: Sovereign_Shepley'sHillLandfill_180924**

Method Category: VOA

Method: RSK 175 ***Matrix:*** Water

Sample ID: **EW-04** ***Collected:*** **9/4/2020 9:45:00 AM** ***Analysis Type:*** **Dilution-1/TOT** ***Dilution:*** **10**

Analyte	*Lab Result*	*Lab Qual*	*DL*	*DL Type*	*RL*	*RL Type*	*Units*	*Data Review Qual*	*Reason Code*
METHANE	671		0.90	LOD	1.1	LOQ	ug/L	J	L

* denotes a non-reportable result

Project Name and Number: - USACE Project: Shepley's Hill (SHL), Devens, MA

Data Qualifier Summary

Lab Reporting Batch ID: JD12771 **Laboratory: ACTD**

EDD Filename: jd12771-sedd_2a_1 **eQAPP Name: Sovereign_Shepley'sHillLandfill_180924**

Reason Code Legend

Reason Code	*Description*
B	Method Blank Contamination
L	Laboratory Control Spike Lower Estimation
L	Laboratory Control Spike Upper Estimation
TR	Reporting Limit Trace Value

* denotes a non-reportable result

Project Name and Number: - USACE Project: Shepley's Hill (SHL), Devens, MA

Enclosure I

Stage 2A ADR Outliers

Quality Control
Outlier Reports

JD12771

Method Blank Outlier Report

Lab Reporting Batch ID: JD12771 **Laboratory: ACTD**

EDD Filename: jd12771-sedd_2a_1 **eQAPP Name: Sovereign_Shepley'sHillLandfill_180924**

Method: **6010D**
Matrix: **Water**

Method Blank Sample ID	Analysis Date	Analyte	Result	Associated Samples
MP22721-MB1	9/11/2020 11:17:00 AM	SELENIUM	5.2 ug/L	EFFLUENT EW-01 EW-04

The following samples and their listed target analytes were qualified due to contamination reported in this blank

Sample ID	Analyte	Reported Result	Modified Final Result
EFFLUENT(Initial/TOT)	SELENIUM	6.1 ug/L	6.1U ug/L

Project Name and Number: - USACE Project: Shepley's Hill (SHL), Devens, MA

Lab Control Spike/Lab Control Spike Duplicate Outlier Report

Lab Reporting Batch ID: JD12771 **Laboratory: ACTD**

EDD Filename: jd12771-sedd_2a_1 **eQAPP Name: Sovereign_Shepley'sHillLandfill_180924**

Method: RSK 175
Matrix: Water

QC Sample ID (Associated Samples)	Compound	LCS %R	LCSD %R	%R Limits	RPD (Limits)	Affected Compounds	Flag
GAA2113-LCS (EW-01 EW-04)	METHANE	78	-	80.00-120.00	-	METHANE	J (all detects) UJ (all non-detects)

Method: 8260C
Matrix: Water

QC Sample ID (Associated Samples)	Compound	LCS %R	LCSD %R	%R Limits	RPD (Limits)	Affected Compounds	Flag
V4D4630-BS (EW-01 EW-04)	TETRACHLOROETHENE	140	-	74.00-129.00	-	TETRACHLOROETHENE	J(all detects)

Reporting Limit Outliers

Lab Reporting Batch ID: JD12771 **Laboratory: ACTD**

EDD Filename: jd12771-sedd_2a_1 **eQAPP Name: Sovereign_Shepley'sHillLandfill_180924**

Method: **6010D**

Matrix: **Water**

SampleID	*Analyte*	*Lab Qual*	*Result*	*Reporting Limit*	*RL Type*	*Units*	*Flag*
EFFLUENT	BARIUM	J	15.4	200	LOQ	ug/L	J (all detects)
	SELENIUM	J	6.1	10	LOQ	ug/L	

Method: **624**

Matrix: **Water**

SampleID	*Analyte*	*Lab Qual*	*Result*	*Reporting Limit*	*RL Type*	*Units*	*Flag*
EFFLUENT	ACETONE	J	3.4	5.0	LOQ	ug/L	J (all detects)
	BENZENE	J	0.67	1.0	LOQ	ug/L	
	CHLOROBENZENE	J	0.52	1.0	LOQ	ug/L	
	P/M-XYLENE	J	0.95	1.0	LOQ	ug/L	
	XYLENES (TOTAL)	J	0.95	1.0	LOQ	ug/L	

Method: **8260C**

Matrix: **Water**

SampleID	*Analyte*	*Lab Qual*	*Result*	*Reporting Limit*	*RL Type*	*Units*	*Flag*
EW-01	CHLOROBENZENE	J	0.71	1.0	LOQ	ug/L	J (all detects)
	CIS-1,2-DICHLOROETHENE	J	0.66	1.0	LOQ	ug/L	

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Sovereign Consulting Inc.
16 Chestnut Street, Suite 520
Foxborough, MA 02035
ATTN: Mr. Steven Passafaro
spassafaro@sovcon.com

November 11, 2020

SUBJECT: Shepley's Hill, Data Validation

Dear Mr. Passafaro,

Enclosed is the final validation report for the fraction listed below. This SDG was received on October 22, 2020. Attachment 1 is a summary of the samples that were reviewed for analysis.

LDC Project #49481:

SDG #	Fraction
JD14544	Arsenic

The data validation was performed under Stage 2A guidelines. The analyses were validated using the following documents, as applicable to each method:

- Quality Assurance Project Plan for Shepley's Hill Landfill Treatment System O&M Services, Devens, Massachusetts; March 2015
- USEPA National Functional Guidelines for Inorganic Superfund Data Review; January 2017
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

50 pages-ADV (no worksheets) Attachment 1

ADR (Stage 2A) **LDC #49481 (Sovereign Consulting, Inc., Foxborough, MA / Shepley's Hill)**

LDC	SDG#	DATE REC'D	(3) DATE DUE	As (6020B)																															
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	JD14544	10/22/20	11/12/20	1	0																														
Total	T/PG			1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Shaded cells indicate Stage 4 validation (all other cells are ADR review). These sample counts do not include MS, MSD, or DUP's.

L:\Sovereign\Shepleys Hill\49481ST.wpd

Data Validation Report
Shepley's Hill

SDG: JD14544

Prepared for

Sovereign Consulting
16 Chestnut Street, Suite 520
Foxborough, MA 02035

Prepared by

Laboratory Data Consultants, Inc
2701 Loker Ave West, Suite 220
Carlsbad, California 92010

November 11, 2020

INTRODUCTION

This Data Validation Report (DVR) presents Stage 2A data validation results for samples collected during the October 2020 sampling period. Data validation was performed in accordance with the Quality Assurance Project Plan (QAPP) for Shepley's Hill Landfill Treatment System O&M Services, Devens, Massachusetts (March 2015), and the US Environmental Protection Agency (EPA) National Functional Guidelines (NFG) for Inorganic Superfund Data Review (January 2017). Where specific guidance is not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Arsenic by EPA SW 846 Method 6020B

The sample identification and methods of analyses performed on each sample is presented in Attachment 1. Overall data qualification summary is presented in Attachment 2. Stage 2A Automated Data Review outliers are presented in Enclosure I.

All sample results were subjected to Stage 2A data validation, which comprises an evaluation of quality control (QC) summary results for sample holding times, laboratory control samples (LCS), and laboratory blanks.

Automated data review was performed on all QC summary results using the Automated Data Review (ADR) software program (LDC, 2013). Quality assurance (QA)/QC criteria specified in the QAPP and NFG were incorporated with the program's reference library to assess compliance with project requirements.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

NJ Presumptive evidence of presence of the compound at an estimated quantity.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

I. Sample Receipt and Technical Holding Time

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Laboratory Blanks

Laboratory blanks were performed as required by the methods. No contaminant concentrations were detected in the laboratory blanks reviewed by the ADR software program.

III. Field Blank Samples

No field blanks were identified in this SDG.

IV. Surrogate Spikes

Surrogate spikes were not required by the method.

V. Matrix Spike

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed.

VI. Laboratory Duplicate Sample

The laboratory has indicated that there were no laboratory duplicate (DUP) analyses specified for the samples in this SDG, and therefore laboratory duplicate analyses were not performed for this SDG.

VII. Serial Dilution

Serial dilution was not performed for this SDG.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Field Duplicate Samples

No field duplicates were identified in this SDG.

X. Compound Quantitation

The laboratory reporting limits were evaluated. All laboratory reporting limits met the specified requirements.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable.

Attachment 1

Sample Cross Reference

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
09-Oct-2020	EFFLUENT	JD14544-1	N	3010A	6020B	S2AVE

N = Normal Sample
S2AVE = EPA Level II Validation

Attachment 2
Overall Data Qualification Summary

Data Qualifier Summary

Lab Reporting Batch ID: JD14544

Laboratory: ACTD

EDD Filename: jd14544-sedd_2a_1

eQAPP Name: Sovereign_Shepley'sHillLandfill_180924

No Data Review Qualifiers Applied.

Enclosure I

Stage 2A ADR Outliers

Quality Control
Outlier Reports

JD14544

(No Outliers)

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Sovereign Consulting Inc.
16 Chestnut Street, Suite 520
Foxborough, MA 02035
ATTN: Mr. Steven Passafaro
spassafaro@sovcon.com

December 7, 2020

SUBJECT: Shepley's Hill, Data Validation

Dear Mr. Passafaro,

Enclosed is the final validation report for the fraction listed below. This SDG was received on November 16, 2020. Attachment 1 is a summary of the samples that were reviewed for analysis.

LDC Project #49685:

SDG #	Fraction
JD15728	Arsenic

The data validation was performed under Stage 2A guidelines. The analyses were validated using the following documents, as applicable to each method:

- Quality Assurance Project Plan for Shepley's Hill Landfill Treatment System O&M Services, Devens, Massachusetts; March 2015
- USEPA National Functional Guidelines for Inorganic Superfund Data Review; January 2017
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

76 pages-ADV (no worksheets) Attachment 1

ADR (Stage 2A) **LDC #49685 (Sovereign Consulting, Inc., Foxborough, MA / Shepley's Hill)**

LDC	SDG#	DATE REC'D	(3) DATE DUE	As (6020B)																															
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	JD15728	11/16/20	12/09/20	1	0																														
Total	T/PG			1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

Shaded cells indicate Stage 4 validation (all other cells are ADR review). These sample counts do not include MS, MSD, or DUP's.

L:\Sovereign\Shepleys Hill\49685ST.wpd

Data Validation Report
Shepley's Hill

SDG: JD15728

Prepared for

Sovereign Consulting
16 Chestnut Street, Suite 520
Foxborough, MA 02035

Prepared by

Laboratory Data Consultants, Inc
2701 Loker Ave West, Suite 220
Carlsbad, California 92010

December 7, 2020

INTRODUCTION

This Data Validation Report (DVR) presents Stage 2A data validation results for samples collected during the November 2020 sampling period. Data validation was performed in accordance with the Quality Assurance Project Plan (QAPP) for Shepley's Hill Landfill Treatment System O&M Services, Devens, Massachusetts (March 2015), and the US Environmental Protection Agency (EPA) National Functional Guidelines (NFG) for Inorganic Superfund Data Review (January 2017). Where specific guidance is not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Arsenic by EPA SW 846 Method 6020B

The sample identification and methods of analyses performed on each sample is presented in Attachment 1. Overall data qualification summary is presented in Attachment 2. Stage 2A Automated Data Review outliers are presented in Enclosure I.

All sample results were subjected to Stage 2A data validation, which comprises an evaluation of quality control (QC) summary results for sample holding times, matrix spike/matrix spike duplicates, serial dilutions, laboratory control samples (LCS), and laboratory blanks.

Automated data review was performed on all QC summary results using the Automated Data Review (ADR) software program (LDC, 2013). Quality assurance (QA)/QC criteria specified in the QAPP and NFG were incorporated with the program's reference library to assess compliance with project requirements.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

NJ Presumptive evidence of presence of the compound at an estimated quantity.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

I. Sample Receipt and Technical Holding Time

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Laboratory Blanks

Laboratory blanks were performed as required by the methods. No contaminant concentrations were detected in the laboratory blanks reviewed by the ADR software program.

III. Field Blank Samples

No field blanks were identified in this SDG.

IV. Surrogate Spikes

Surrogate spikes were not required by the method.

V. Matrix Spike

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits.

VI. Laboratory Duplicate Sample

The laboratory has indicated that there were no laboratory duplicate (DUP) analyses specified for the samples in this SDG, and therefore laboratory duplicate analyses were not performed for this SDG.

VII. Serial Dilution

Serial dilution analysis was performed on an associated project sample. The analysis criteria were met.

VIII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

IX. Field Duplicate Samples

No field duplicates were identified in this SDG.

X. Compound Quantitation

The laboratory reporting limits were evaluated. All laboratory reporting limits met the specified requirements.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable.

Attachment 1

Sample Cross Reference

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
04-Nov-2020	EFFLUENT	JD15728-1	N	3010A	6020B	S2AVE
04-Nov-2020	EFFLUENTMS	MP23696-S1	MS	3010A	6020B	S2AVE
04-Nov-2020	EFFLUENTMSD	MP23696-S2	MSD	3010A	6020B	S2AVE

N = Normal Sample MS = Matrix Spike MSD = Matrix Spike Duplicate
S2AVE = EPA Level II Validation

Attachment 2
Overall Data Qualification Summary

Data Qualifier Summary

Lab Reporting Batch ID: JD15728

Laboratory: ACTD

EDD Filename: jd15728-sedd_2a_1

eQAPP Name: Sovereign_Shepley'sHillLandfill_180924

No Data Review Qualifiers Applied.

Enclosure I

Stage 2A ADR Outliers

Quality Control Outlier Reports

JD15728

(No Outliers)

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Sovereign Consulting Inc.
16 Chestnut Street, Suite 520
Foxborough, MA 02035
ATTN: Mr. Steven Passafaro
spassafaro@sovcon.com

January 12, 2021

SUBJECT: Shepley's Hill, Data Validation

Dear Mr. Passafaro,

Enclosed are the final validation reports for the fractions listed below. This SDG was received on December 18, 2020. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #50044:

SDG #	Fraction
JD17277	Metals,

The data validation was performed under Stage 2A guidelines. The analyses were validated using the following documents, as applicable to each method:

- Quality Assurance Project Plan for Shepley's Hill Landfill Treatment System O&M Services, Devens, Massachusetts; March 2015
- USEPA National Functional Guidelines for Inorganic Superfund Data Review; January 2017
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

133 pages-ADV (no worksheets) Attachment 1

ADR (Stage 2A) **LDC #50044 (Sovereign Consulting, Inc., Foxborough, MA / Shepley's Hill)**

LDC	SDG#	DATE REC'D	(3) DATE DUE	(3) Metals (6010D)		Fe,Mn (6010D)		As (6020B)		Cl,SO_4 (300.0 /9056A)		NO_3N (353.2)		NO_2-N (4500-NO2B)		NO_3/ NO_2-N (353.2)																					
Matrix: Water/Sediment				W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	JD17277	12/18/20	01/12/21	1	0	2	0	3	0	1	0	1	0	1	0	1	0																						
Total	T/PG			1	0	2	0	3	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10

Shaded cells indicate Stage 4 validation (all other cells are ADR review). These sample counts do not include MS, MSD, or DUP's.

L:\Sovereign\Shepleys Hill\50044ST.wpd

Data Validation Report
Shepley's Hill

SDG: JD17277

Prepared for

Sovereign Consulting
16 Chestnut Street, Suite 520
Foxborough, MA 02035

Prepared by

Laboratory Data Consultants, Inc
2701 Loker Ave West, Suite 220
Carlsbad, California 92010

January 11, 2021

INTRODUCTION

This Data Validation Report (DVR) presents Stage 2A data validation results for samples collected during the December 2020 sampling period. Data validation was performed in accordance with the Quality Assurance Project Plan (QAPP) for Shepley's Hill Landfill Treatment System O&M Services, Devens, Massachusetts (March 2015), and the US Environmental Protection Agency (EPA) National Functional Guidelines (NFG) for Inorganic Superfund Data Review (January 2017). Where specific guidance is not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Metals by EPA SW 846 Method 6010D and 6020B
Nitrate as Nitrogen and Nitrate/Nitrite as Nitrogen by EPA Method 353.2
Nitrite as Nitrogen by Standard Method 4500 NO2-B
Chloride and Sulfate by EPA Method 300.0/SW 846 Method 9056A

The sample identification and methods of analyses performed on each sample is presented in Attachment 1. Overall data qualification summary is presented in Attachment 2. Stage 2A Automated Data Review outliers are presented in Enclosure I.

All sample results were subjected to Stage 2A data validation, which comprises an evaluation of quality control (QC) summary results for sample holding times, matrix spike/matrix spike duplicates (MS/MSD), duplicate sample analysis (DUP), serial dilutions, laboratory control samples (LCS), and laboratory blanks.

Automated data review was performed on all QC summary results using the Automated Data Review (ADR) software program (LDC, 2013). Quality assurance (QA)/QC criteria specified in the QAPP and NFG were incorporated with the program's reference library to assess compliance with project requirements.

The following are definitions of the data qualifiers:

U Indicates the compound or analyte was analyzed for but not detected.

J Indicates an estimated value.

R Quality control indicates the data is not usable.

NJ Presumptive evidence of presence of the compound at an estimated quantity.

UJ Indicates the compound or analyte was analyzed for but not detected. The sample detection limit is an estimated value.

I. Sample Receipt and Technical Holding Time

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Laboratory Blanks

Laboratory blanks were performed as required by the methods. No contaminant concentrations were detected in the laboratory blanks reviewed by the ADR software program.

III. Field Blank Samples

No field blanks were identified in this SDG.

IV. Matrix Spike/Matrix Spike Duplicate

Matrix spike (MS) and matrix spike duplicate (MSD) sample analysis was performed on an associated project sample. Percent recoveries (%R) and relative percent differences (RPD) were within QC limits with the exception of one MS/MSD pair for arsenic. No data were qualified since sample concentrations were significantly greater (>4x) than the spike amount. The details are presented in Enclosure I.

V. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

VI. Serial Dilution

Serial dilution analysis was performed on an associated project sample. The analysis criteria were met.

VII. Laboratory Control Samples (LCS)

Laboratory control samples were reviewed for each matrix as applicable. Percent recoveries (%R) were within QC limits.

VIII. Field Duplicate Samples

No field duplicates were identified in this SDG.

IX. Compound Quantitation

The laboratory reporting limits were evaluated. All laboratory reporting limits met the specified requirements.

All compounds reported below the limit of quantitation (LOQ) as detected by the laboratory were qualified as detected estimated (J). The details regarding the qualification of data are provided in Enclosure I.

X. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

Due to results reported as detected below the LOQ, data was qualified as estimated in one sample.

The quality control criteria reviewed, other than those discussed above, were met and are considered acceptable.

Data flags are summarized and are presented as Attachment 2.

Attachment 1

Sample Cross Reference

Sample Cross Reference

Date Collected	Field Sample ID	Lab Sample ID	Sample Type	Prep Method	Analytical Method	Review Level
04-Dec-2020	EFFLUENTDUP	GP31260-D1	DUP	Gen Prep	300.0	S2AVE
04-Dec-2020	EFFLUENTMS	GP31260-S1	MS	Gen Prep	300.0	S2AVE
04-Dec-2020	EFFLUENTMS	GP31436-S2	MS	Gen Prep	353.2	S2AVE
04-Dec-2020	EFFLUENT	JD17277-1	N	3010A	6010D	S2AVE
04-Dec-2020	EFFLUENT	JD17277-1	N	3010A	6020B	S2AVE
04-Dec-2020	EFFLUENT	JD17277-1	N	Gen Prep	300.0	S2AVE
04-Dec-2020	EFFLUENT	JD17277-1	N	Gen Prep	353.2	S2AVE
04-Dec-2020	EFFLUENT	JD17277-1	N	Gen Prep	353.2_CALC	S2AVE
04-Dec-2020	EW-04	JD17277-3	N	3010A	6010D	S2AVE
04-Dec-2020	EW-04	JD17277-3	N	3010A	6020B	S2AVE
04-Dec-2020	EW-01	JD17277-2	N	3010A	6010D	S2AVE
04-Dec-2020	EW-01	JD17277-2	N	3010A	6020B	S2AVE
04-Dec-2020	EW-01MS	MP24191-S1	MS	3010A	6020B	S2AVE
04-Dec-2020	EW-01MSD	MP24191-S2	MSD	3010A	6020B	S2AVE
04-Dec-2020	EW-01MS	MP24238-S1	MS	3010A	6010D	S2AVE
04-Dec-2020	EW-01MSD	MP24238-S2	MSD	3010A	6010D	S2AVE

N = Normal Sample DUP = Laboratory Duplicate MS = Matrix Spike MSD = Matrix Spike Duplicate
S2AVE = EPA Level II Validation

Attachment 2
Overall Data Qualification Summary

Data Qualifier Summary

Lab Reporting Batch ID: JD17277 **Laboratory: ACTD**

EDD Filename: jd17277-sedd_2a_1 **eQAPP Name: Sovereign_Shepley'sHillLandfill_180924**

Method Category: **METALS**

Method: **6010D** ***Matrix:*** **Water**

Sample ID: **EFFLUENT** ***Collected:*** **12/4/2020 12:30:00 PM** ***Analysis Type:*** **Initial/TOT** ***Dilution:*** **1**

Analyte	*Lab Result*	*Lab Qual*	*DL*	*DL Type*	*RL*	*RL Type*	*Units*	*Data Review Qual*	*Reason Code*
BARIUM	13.5	J	100	LOD	200	LOQ	ug/L	J	TR
MAGNESIUM	4660	J	500	LOD	5000	LOQ	ug/L	J	TR

* denotes a non-reportable result

Project Name and Number: - USACE Project: Shepley's Hill (SHL), Devens, MA

Data Qualifier Summary

Lab Reporting Batch ID: JD17277 **Laboratory: ACTD**

EDD Filename: jd17277-sedd_2a_1 **eQAPP Name: Sovereign_Shepley'sHillLandfill_180924**

Reason Code Legend

Reason Code	*Description*
Q	Matrix Spike Upper Estimation
TR	Reporting Limit Trace Value

* denotes a non-reportable result

Project Name and Number: - USACE Project: Shepley's Hill (SHL), Devens, MA

Enclosure I

Stage 2A ADR Outliers

Quality Control
Outlier Reports

JD17277

Matrix Spike/Matrix Spike Duplicate Outlier Report

Lab Reporting Batch ID: JD17277 **Laboratory: ACTD**

EDD Filename: jd17277-sedd_2a_1_rev **eQAPP Name: Sovereign_Shepley'sHillLandfill_180924**

Method: **6020B**
Matrix: **Water**

QC Sample ID (Associated Samples)	*Compound*	*MS %R*	*MSD %R*	*%R Limits*	*RPD (Limits)*	*Affected Compounds*	*Flag*
EW-01MS (Total) EW-01MSD (Total) (EFFLUENT EW-01 EW-04)	ARSENIC	175	150	80.00-120.00	-	ARSENIC	No Qual, >4x

Project Name and Number: - USACE Project: Shepley's Hill (SHL), Devens, MA

Reporting Limit Outliers

Lab Reporting Batch ID: JD17277 **Laboratory: ACTD**

EDD Filename: jd17277-sedd_2a_1 **eQAPP Name: Sovereign_Shepley'sHillLandfill_180924**

Method: **6010D**

Matrix: **Water**

SampleID	*Analyte*	*Lab Qual*	*Result*	*Reporting Limit*	*RL Type*	*Units*	*Flag*
EFFLUENT	BARIUM	J	13.5	200	LOQ	ug/L	J (all detects)
	MAGNESIUM	J	4660	5000	LOQ	ug/L	

Project Name and Number: - USACE Project: Shepley's Hill (SHL), Devens, MA

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

ARCADIS U.S., Inc.
3109 West Martin Luther King Jr. Blvd, Suite 350
Tampa, FL 33607
ATTN: Mr. Nathan Mullens
nrmullens@seres-es.com

March 16, 2021

SUBJECT: Fort Devens, Data Validation

Dear Mr. Mullens,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on June 10, 2020. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #48291:

SDG #	Fraction
680-183899-1, 680-183912-1 680-183912-2/SN3820 680-183916-2/SN3818, 680-183925-1 680-183925-2/SN3819, 680-183926-1 680-183965-1, 680-184026-1 680-184098-1, 680-184215-1 680-184220-1, 680-183916-1	Volatiles, Chlorinated Pesticides, Metals, Wet Chemistry, Volatile Petroleum Hydrocarbons, Extractable Petroleum Hydrocarbons

The data validation was performed under Level II guidelines. The analyses were validated using the following documents and variances, as applicable to each method:

- Former Fort Devens Army Installation – BRAC Legacy Sites, Devens, MA; October 2020
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

518 pages-ADV R1 (added M) Attachment 1

Stage 2B EQUIS EDD

LDC #48291 (Arcadis-Millersville, MD / Fort Devens)

LDC	SDG#	DATE REC'D	(3) DATE DUE	VOA (8260B)		Pest. (8081B)		Metals (6010C /6020A /7470A)		(3) Metals (6010C/ 6020A)		(3)Diss Metals (6010C/ 6020A)		VPH (MADEP -VPH)		EPH (MADEP -EPH)		Alk. (2320B)		COD (410.4)		Cl,SO_4 (9056A)		CN- (9012B)		DOC (9060A)		NO_3 /NO_2-N (353.2)		TDS (2540C)							
Matrix: Water/Soil				W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	680-183899-1	06/10/20	07/01/20	-	-	-	-	-	-	4	0	4	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
B	680-183912-1	06/10/20	07/01/20	-	-	4	0	4	0	-	-	-	-	-	-	-	-	4	0	4	0	4	0	4	0	-	-	4	0	4	0						
C	680-183912-2/SN3820	06/10/20	07/01/20	-	-	-	-	-	-	-	-	-	-	5	0	4	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
D	680-183916-2/SN3818	06/10/20	07/01/20	-	-	-	-	-	-	-	-	-	-	8	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
E	680-183925-1	06/10/20	07/01/20	-	-	1	0	1	0	-	-	-	-	-	-	-	-	1	0	1	0	1	0	1	0	-	-	1	0	1	0						
F	680-183925-2/SN3819	06/10/20	07/01/20	-	-	-	-	-	-	-	-	-	-	1	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
G	680-183926-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	7	0	-	-	-	-	7	0	-	-	7	0	-	-	7	0	-	-	-	-						
H	680-183965-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	10	0	-	-	-	-	10	0	-	-	10	0	-	-	10	0	-	-	-	-						
I	680-184026-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	17	0	-	-	-	-	17	0	-	-	17	0	-	-	17	0	-	-	-	-						
J	680-184098-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	12	0	-	-	-	-	12	0	-	-	12	0	-	-	12	0	-	-	-	-						
K	680-184215-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	15	0	-	-	-	-	15	0	-	-	15	0	-	-	15	0	-	-	-	-						
L	680-184220-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	8	0	-	-	-	-	8	0	-	-	8	0	-	-	8	0	-	-	-	-						
M	680-183916-1	06/17/20	07/09/20	6	0	-	-	-	-	5	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
Total	T/PG			6	0	5	0	5	0	9	0	73	0	14	0	5	0	74	0	5	0	74	0	5	0	69	0	5	0	5	0	0	0	0	0	0	354

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS/MSD, and DUPs

L:\Arcadis\Fort Devens\48291ST.wpd

Data Validation Report for 6801839261

Facility:	Former Fort Devens, Long Term Monitoring
Event:	Seres-Arcadis JV, Long Term Monitoring, SHL, Spring 2020
SDG:	6801839261
Guidance Document:	Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020
Prime Contractor:	Seres-Arcadis JV
Project Manager:	Jennifer Singer
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	Laboratory Data Consultants, Inc.
Data Review Level:	2B
Primary Data Reviewer:	Kevin Kha, Environmental Scientist
Second Reviewer:	Pei Geng, Senior Scientist
Date Submitted:	June 30, 2020

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	A2320B	SW6010C - Dissolved	SW6020A - Dissolved	SW9056A	SW9060A - Dissolved
PZ-12-02-SPR20	680-183926-1	Water	Field Sample/N	X	X	X	X	X
PZ-12-07-SPR20	680-183926-2	Water	Field Sample/N	X	X	X	X	X
PZ-12-09-SPR20	680-183926-3	Water	Field Sample/N	X	X	X	X	X
PZ-12-09-SPR20 MS	680-183926-3	Water	Field Sample/N		X	X	X	X
PZ-12-09-SPR20 MSD	680-183926-3	Water	Field Sample/N		X	X	X	X
PZ-12-10-SPR20	680-183926-4	Water	Field Sample/N	X	X	X	X	X
PZ-12-10-SPR20 MS	680-183926-4	Water	Field Sample/N		X	X	X	X
PZ-12-10-SPR20 MSD	680-183926-4	Water	Field Sample/N		X	X	X	X
SHM-07-03-SPR20	680-183926-5	Water	Field Sample/N	X	X	X	X	X
SHP-2016-07B-SPR20	680-183926-6	Water	Field Sample/N	X	X	X	X	X
SHP-2016-1A-SPR20	680-183926-7	Water	Field Sample/N	X	X	X	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at 2B data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by Seres-Arcadis JV; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 6801839261. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Calibration Blank
- Calibration Blank - Negative
- Continuing Calibration Verification
- Interference Check Sample A
- Interference Check Sample A - Negative
- Interference Check Sample AB
- Lab Blank
- LCS Recovery
- LCS RPD
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 2 results (2.74%) out of the 73 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

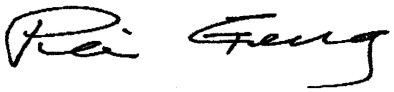
Narrative Comments

Analytical Method	Data Reviewer Comment
A2320B	No additional comments; see Checklist for detail.
SW6010C	No additional comments; see Checklist for detail.
SW6020A	No additional comments; see Checklist for detail.
SW9056A	No additional comments; see Checklist for detail.
SW9060A	No additional comments; see Checklist for detail.

June 30, 2020

Reviewed by Kevin Kha, Environmental Scientist, Laboratory Data Consultants, Inc.

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.



Reviewed by Pei Geng, Senior Scientist, Laboratory Data Consultants, Inc.

March 16, 2021

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW6010C, Dissolved, Calibration Blank

The purpose of calibration blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in calibration blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
CCB 680-619543/113 (CB)/ CCB 680-619543/113	Iron	20.30	< 17	< 50	ug/l	U/None	B2	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6010C, Dissolved, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB 680-619231/1-A (LB)/ MB 680-619231/1-A	Manganese	1.210	< 1	< 10	ug/l	U/None	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Lab Blank for SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
PZ-12-10-SPR20	N	Manganese	10.0	1.50 J	10.0 U		ug/l	L
SHP-2016-1A-SPR20	N	Manganese	10.0	2.30 J	10.0 U		ug/l	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Table of All Qualified Results

Test Method: SW6010C	**Extraction Method: Dissolved**							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
PZ-12-10-SPR20	N	Manganese	10.0	1.50 J	10.0 U		ug/l	L
SHP-2016-1A-SPR20	N	Manganese	10.0	2.30 J	10.0 U		ug/l	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition
B2	CCB
L	Lab Blank
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

Review Questions

Method: A2320B (Alkalinity by Titrimetric Method)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?		•		MS/MSD not performed.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Due to method blank contamination, two manganese results were qualified as non-detected (U) at the LOQ. Iron was detected in one calibration blank, however the associated sample results were either not detected or significantly greater than the concentration found in the calibration blank.
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported or as qualified during data validation.

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW9056A (Anion Chromatography)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?		•		A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Data Validation Report for 6801839261

Review Questions

Method: SW9060A (Total Organic Carbon)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?		•		A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

ARCADIS U.S., Inc.
3109 West Martin Luther King Jr. Blvd, Suite 350
Tampa, FL 33607
ATTN: Mr. Nathan Mullens
nrmullens@seres-es.com

March 16, 2021

SUBJECT: Fort Devens, Data Validation

Dear Mr. Mullens,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on June 10, 2020. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #48291:

SDG #	Fraction
680-183899-1, 680-183912-1 680-183912-2/SN3820 680-183916-2/SN3818, 680-183925-1 680-183925-2/SN3819, 680-183926-1 680-183965-1, 680-184026-1 680-184098-1, 680-184215-1 680-184220-1, 680-183916-1	Volatiles, Chlorinated Pesticides, Metals, Wet Chemistry, Volatile Petroleum Hydrocarbons, Extractable Petroleum Hydrocarbons

The data validation was performed under Level II guidelines. The analyses were validated using the following documents and variances, as applicable to each method:

- Former Fort Devens Army Installation – BRAC Legacy Sites, Devens, MA; October 2020
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

518 pages-ADV R1 (added M) Attachment 1

Stage 2B EQUIS EDD

LDC #48291 (Arcadis-Millersville, MD / Fort Devens)

LDC	SDG#	DATE REC'D	(3) DATE DUE	VOA (8260B)		Pest. (8081B)		Metals (6010C /6020A /7470A)		(3) Metals (6010C/ 6020A)		(3)Diss Metals (6010C/ 6020A)		VPH (MADEP -VPH)		EPH (MADEP -EPH)		Alk. (2320B)		COD (410.4)		Cl,SO_4 (9056A)		CN- (9012B)		DOC (9060A)		NO_3 /NO_2-N (353.2)		TDS (2540C)							
Matrix: Water/Soil				W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	680-183899-1	06/10/20	07/01/20	-	-	-	-	-	-	4	0	4	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
B	680-183912-1	06/10/20	07/01/20	-	-	4	0	4	0	-	-	-	-	-	-	-	-	4	0	4	0	4	0	4	0	-	-	4	0	4	0						
C	680-183912-2/SN3820	06/10/20	07/01/20	-	-	-	-	-	-	-	-	-	-	5	0	4	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
D	680-183916-2/SN3818	06/10/20	07/01/20	-	-	-	-	-	-	-	-	-	-	8	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
E	680-183925-1	06/10/20	07/01/20	-	-	1	0	1	0	-	-	-	-	-	-	-	-	1	0	1	0	1	0	1	0	-	-	1	0	1	0						
F	680-183925-2/SN3819	06/10/20	07/01/20	-	-	-	-	-	-	-	-	-	-	1	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
G	680-183926-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	7	0	-	-	-	-	7	0	-	-	7	0	-	-	7	0	-	-	-	-						
H	680-183965-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	10	0	-	-	-	-	10	0	-	-	10	0	-	-	10	0	-	-	-	-						
I	680-184026-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	17	0	-	-	-	-	17	0	-	-	17	0	-	-	17	0	-	-	-	-						
J	680-184098-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	12	0	-	-	-	-	12	0	-	-	12	0	-	-	12	0	-	-	-	-						
K	680-184215-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	15	0	-	-	-	-	15	0	-	-	15	0	-	-	15	0	-	-	-	-						
L	680-184220-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	8	0	-	-	-	-	8	0	-	-	8	0	-	-	8	0	-	-	-	-						
M	680-183916-1	06/17/20	07/09/20	6	0	-	-	-	-	5	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
Total	T/PG			6	0	5	0	5	0	9	0	73	0	14	0	5	0	74	0	5	0	74	0	5	0	69	0	5	0	5	0	0	0	0	0	0	354

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS/MSD, and DUPs

L:\Arcadis\Fort Devens\48291ST.wpd

Data Validation Report for 6801839651

Facility:	Former Fort Devens, Long Term Monitoring
Event:	Seres-Arcadis JV, Long Term Monitoring, SHL, Spring 2020
SDG:	6801839651
Guidance Document:	Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020
Prime Contractor:	Seres-Arcadis JV
Project Manager:	Jennifer Singer
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	Laboratory Data Consultants, Inc.
Data Review Level:	2B
Primary Data Reviewer:	Kevin Kha, Environmental Scientist
Second Reviewer:	Pei Geng, Senior Scientist
Date Submitted:	June 30, 2020

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	A2320B	SW6010C - Dissolved	SW6020A - Dissolved	SW9056A	SW9060A - Dissolved
EW-01-SPR20	680-183965-1	Water	Field Sample/N	X	X	X	X	X
EW-04-SPR20	680-183965-2	Water	Field Sample/N	X	X	X	X	X
PZ-12-01-SPR20	680-183965-3	Water	Field Sample/N	X	X	X	X	X
PZ-12-03-SPR20	680-183965-4	Water	Field Sample/N	X	X	X	X	X
PZ-12-04-SPR20	680-183965-5	Water	Field Sample/N	X	X	X	X	X
PZ-12-06-SPR20	680-183965-6	Water	Field Sample/N	X	X	X	X	X
SHL-11-SPR20	680-183965-7	Water	Field Sample/N	X	X	X	X	X
SHL-20-SPR20	680-183965-8	Water	Field Sample/N	X	X	X	X	X
SHL-DUP01-SPR20	680-183965-9	Water	Field Duplicate/FD	X	X	X	X	X
SHL-DUP02-SPR20	680-183965-10	Water	Field Duplicate/FD	X	X	X	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at 2B data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by Seres-Arcadis JV; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 6801839651. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Calibration Blank
- Calibration Blank - Negative
- Continuing Calibration Verification
- Field Duplicate RPD
- Interference Check Sample A
- Interference Check Sample A - Negative
- Interference Check Sample AB
- Lab Blank
- Lab Replicate RPD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 0 results (0.00%) out of the 70 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

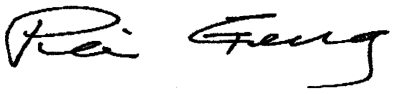
Narrative Comments

Analytical Method	Data Reviewer Comment
A2320B	No additional comments; see Checklist for detail.
SW6010C	No additional comments; see Checklist for detail.
SW6020A	No additional comments; see Checklist for detail.
SW9056A	No additional comments; see Checklist for detail.
SW9060A	No additional comments; see Checklist for detail.

June 30, 2020

Reviewed by Kevin Kha, Environmental Scientist, Laboratory Data Consultants, Inc.

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.



Reviewed by Pei Geng, Senior Scientist, Laboratory Data Consultants, Inc.

March 16, 2021

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW6010C, Dissolved, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
SHL-20-SPR20 (MS)/ 680-183965-8	Iron	26.00	87 - 115	10 - 125	percent	J/UJ	M	Spike amount Insignificant
SHL-20-SPR20 (MS)/ 680-183965-8	Manganese	35.00	90 - 114	10 - 125	percent	J/UJ	M	Spike amount Insignificant
SHL-20-SPR20 (SD)/ 680-183965-8	Iron	56.00	87 - 115	10 - 125	percent	J/UJ	M	Spike amount Insignificant
SHL-20-SPR20 (SD)/ 680-183965-8	Manganese	62.50	90 - 114	10 - 125	percent	J/UJ	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6020A, Dissolved, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
SHL-20-SPR20 (MS)/ 680-183965-8	Arsenic	62.00	84 - 116	10 - 125	percent	J/UJ	M	Spike amount Insignificant
SHL-20-SPR20 (SD)/ 680-183965-8	Arsenic	68.00	84 - 116	10 - 125	percent	J/UJ	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW9056A, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
PZ-12-01-SPR20 (MS)/ 680-183965-3	Chloride	88.00	90 - 110	10 - 110	percent	J/UJ	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Qualified Results

No results associated with this sample delivery group required qualification.

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition
M	MS Recovery
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

Review Questions

Method: A2320B (Alkalinity by Titrimetric Method)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?		•		MS/MSD not performed.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?	•			The laboratory duplicate RPD was within project acceptance limits.
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Although iron and manganese were not within project acceptance limits, the parent results were greater than 4x the spike amount, therefore no qualification was necessary.
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Although arsenic was not within project acceptance limits, the parent results were greater than 4x the spike amount, therefore no qualification was necessary.
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Data Validation Report for 6801839651

Review Questions

Method: SW9056A (Anion Chromatography)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			The chloride parent result was greater than 4x the spike amount and was within project acceptance limits.
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW9060A (Total Organic Carbon)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Field Duplicate Report By SDG
Former Fort Devens, Long Term Monitoring
Seres-Arcadis JV, Long Term Monitoring, SHL, Spring 2020
Field Duplicates for SDG: 6801839651

Location	Analysis
PZ-12-06	A2320B

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
PZ-12-06-SPR20 / SHL-DUP02-SPR20	680-183965-6 / 680-183965-10	Alkalinity, Total (as CaCO3)	74.0	73.0	10.0	1.36	30	OK	NA

Location	Analysis
PZ-12-06	SW6010C

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
PZ-12-06-SPR20 / SHL-DUP02-SPR20	680-183965-6 / 680-183965-10	Iron (FLDFLT)	4200	4500	50.0	6.90	30	OK	NA
PZ-12-06-SPR20 / SHL-DUP02-SPR20	680-183965-6 / 680-183965-10	Manganese (FLDFLT)	1200	1200	10.0	0.00	30	OK	NA

Location	Analysis
PZ-12-06	SW6020A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
PZ-12-06-SPR20 / SHL-DUP02-SPR20	680-183965-6 / 680-183965-10	Arsenic (FLDFLT)	5.20	5.50	3.00	5.61	30	NA	OK

Location	Analysis
PZ-12-06	SW9056A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
PZ-12-06-SPR20 / SHL-DUP02-SPR20	680-183965-6 / 680-183965-10	Chloride	3.30	3.30	0.500	0.00	30	OK	NA
PZ-12-06-SPR20 / SHL-DUP02-SPR20	680-183965-6 / 680-183965-10	Sulfate	62.0	62.0	1.00	0.00	30	OK	NA

FD = Field Duplicate
RL = Reporting Limit
RPD = Relative Percent Difference

RL Check = If either the primary sample or field duplicate result is less than 5 times the RL then the criteria used to determine if the field duplicate is outside QC limits is +/- RL for Water and +/- 2 times RL for Soil"

Field Duplicate Report By SDG
Former Fort Devens, Long Term Monitoring
Seres-Arcadis JV, Long Term Monitoring, SHL, Spring 2020
Field Duplicates for SDG: 6801839651

Location	Analysis
PZ-12-06	SW9060A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
PZ-12-06-SPR20 / SHL-DUP02-SPR20	680-183965-6 / 680-183965-10	Dissolved Organic Carbon (FLDFLT)	1.00	1.00	1.00	0.00	30	NA	OK

Location	Analysis
SHL-20	A2320B

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHL-20-SPR20 / SHL-DUP01-SPR20	680-183965-8 / 680-183965-9	Alkalinity, Total (as CaCO3)	110	110	10.0	0.00	30	OK	NA

Location	Analysis
SHL-20	SW6010C

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHL-20-SPR20 / SHL-DUP01-SPR20	680-183965-8 / 680-183965-9	Iron (FLDFLT)	37000	36000	50.0	2.74	30	OK	NA
SHL-20-SPR20 / SHL-DUP01-SPR20	680-183965-8 / 680-183965-9	Manganese (FLDFLT)	2600	2500	10.0	3.92	30	OK	NA

Location	Analysis
SHL-20	SW6020A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHL-20-SPR20 / SHL-DUP01-SPR20	680-183965-8 / 680-183965-9	Arsenic (FLDFLT)	810	810	3.00	0.00	30	OK	NA

FD = Field Duplicate
RL = Reporting Limit
RPD = Relative Percent Difference

RL Check = If either the primary sample or field duplicate result is less than 5 times the RL then the criteria used to determine if the field duplicate is outside QC limits is +/- RL for Water and +/- 2 times RL for Soil"

Field Duplicate Report By SDG
Former Fort Devens, Long Term Monitoring
Seres-Arcadis JV, Long Term Monitoring, SHL, Spring 2020
Field Duplicates for SDG: 6801839651

Location	Analysis
SHL-20	SW9056A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHL-20-SPR20 / SHL-DUP01-SPR20	680-183965-8 / 680-183965-9	Chloride	60.0	60.0	0.500	0.00	30	OK	NA
SHL-20-SPR20 / SHL-DUP01-SPR20	680-183965-8 / 680-183965-9	Sulfate	36.0	37.0	1.00	2.74	30	OK	NA

Location	Analysis
SHL-20	SW9060A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHL-20-SPR20 / SHL-DUP01-SPR20	680-183965-8 / 680-183965-9	Dissolved Organic Carbon (FLDFLT)	1.30	1.30	1.00	0.00	30	NA	OK

FD = Field Duplicate
RL = Reporting Limit
RPD = Relative Percent Difference

RL Check = If either the primary sample or field duplicate result is less than 5 times the RL then the criteria used to determine if the field duplicate is outside QC limits is +/- RL for Water and +/- 2 times RL for Soil"

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

ARCADIS U.S., Inc.
3109 West Martin Luther King Jr. Blvd, Suite 350
Tampa, FL 33607
ATTN: Mr. Nathan Mullens
nrmullens@seres-es.com

March 16, 2021

SUBJECT: Fort Devens, Data Validation

Dear Mr. Mullens,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on June 10, 2020. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #48291:

SDG #	Fraction
680-183899-1, 680-183912-1 680-183912-2/SN3820 680-183916-2/SN3818, 680-183925-1 680-183925-2/SN3819, 680-183926-1 680-183965-1, 680-184026-1 680-184098-1, 680-184215-1 680-184220-1, 680-183916-1	Volatiles, Chlorinated Pesticides, Metals, Wet Chemistry, Volatile Petroleum Hydrocarbons, Extractable Petroleum Hydrocarbons

The data validation was performed under Level II guidelines. The analyses were validated using the following documents and variances, as applicable to each method:

- Former Fort Devens Army Installation – BRAC Legacy Sites, Devens, MA; October 2020
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

518 pages-ADV R1 (added M) Attachment 1

Stage 2B EQUIS EDD

LDC #48291 (Arcadis-Millersville, MD / Fort Devens)

LDC	SDG#	DATE REC'D	(3) DATE DUE	VOA (8260B)		Pest. (8081B)		Metals (6010C /6020A /7470A)		(3) Metals (6010C/ 6020A)		(3)Diss Metals (6010C/ 6020A)		VPH (MADEP -VPH)		EPH (MADEP -EPH)		Alk. (2320B)		COD (410.4)		Cl,SO_4 (9056A)		CN- (9012B)		DOC (9060A)		NO_3 /NO_2-N (353.2)		TDS (2540C)							
Matrix: Water/Soil				W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	680-183899-1	06/10/20	07/01/20	-	-	-	-	-	-	4	0	4	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
B	680-183912-1	06/10/20	07/01/20	-	-	4	0	4	0	-	-	-	-	-	-	-	-	4	0	4	0	4	0	4	0	-	-	4	0	4	0						
C	680-183912-2/SN3820	06/10/20	07/01/20	-	-	-	-	-	-	-	-	-	-	5	0	4	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
D	680-183916-2/SN3818	06/10/20	07/01/20	-	-	-	-	-	-	-	-	-	-	8	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
E	680-183925-1	06/10/20	07/01/20	-	-	1	0	1	0	-	-	-	-	-	-	-	-	1	0	1	0	1	0	1	0	-	-	1	0	1	0						
F	680-183925-2/SN3819	06/10/20	07/01/20	-	-	-	-	-	-	-	-	-	-	1	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
G	680-183926-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	7	0	-	-	-	-	7	0	-	-	7	0	-	-	7	0	-	-	-	-						
H	680-183965-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	10	0	-	-	-	-	10	0	-	-	10	0	-	-	10	0	-	-	-	-						
I	680-184026-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	17	0	-	-	-	-	17	0	-	-	17	0	-	-	17	0	-	-	-	-						
J	680-184098-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	12	0	-	-	-	-	12	0	-	-	12	0	-	-	12	0	-	-	-	-						
K	680-184215-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	15	0	-	-	-	-	15	0	-	-	15	0	-	-	15	0	-	-	-	-						
L	680-184220-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	8	0	-	-	-	-	8	0	-	-	8	0	-	-	8	0	-	-	-	-						
M	680-183916-1	06/17/20	07/09/20	6	0	-	-	-	-	5	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
Total	T/PG			6	0	5	0	5	0	9	0	73	0	14	0	5	0	74	0	5	0	74	0	5	0	69	0	5	0	5	0	0	0	0	0	0	354

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS/MSD, and DUPs

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Data Validation Report for 6801840261

Facility:	Former Fort Devens, Long Term Monitoring
Event:	Seres-Arcadis JV, Long Term Monitoring, SHL, Spring 2020
SDG:	6801840261
Guidance Document:	Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020
Prime Contractor:	Seres-Arcadis JV
Project Manager:	Jennifer Singer
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	Laboratory Data Consultants, Inc.
Data Review Level:	2B
Primary Data Reviewer:	Kevin Kha, Environmental Scientist
Second Reviewer:	Pei Geng, Senior Scientist
Date Submitted:	June 30, 2020

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	A2320B	SW6010C - Dissolved	SW6020A - Dissolved	SW9056A	SW9060A - Dissolved
EPA-PZ-2012-1A-SPR20	680-184026-1	Water	Field Sample/N	X	X	X	X	X
EPA-PZ-2012-1B-SPR20	680-184026-2	Water	Field Sample/N	X	X	X	X	X
EPA-PZ-2012-2A-SPR20	680-184026-3	Water	Field Sample/N	X	X	X	X	X
EPA-PZ-2012-4A-SPR20	680-184026-4	Water	Field Sample/N	X	X	X	X	X
EPA-PZ-2012-4B-SPR20	680-184026-5	Water	Field Sample/N	X	X	X	X	X
PZ-12-05-SPR20	680-184026-6	Water	Field Sample/N	X	X	X	X	X
PZ-12-08-SPR20	680-184026-7	Water	Field Sample/N	X	X	X	X	X
SHL-10-SPR20	680-184026-8	Water	Field Sample/N	X	X	X	X	X
SHL-19-SPR20	680-184026-9	Water	Field Sample/N	X	X	X	X	X
SHL-DUP05-SPR20	680-184026-10	Water	Field Duplicate/FD	X	X	X	X	X
SHL-DUP06-SPR20	680-184026-11	Water	Field Duplicate/FD	X	X	X	X	X
SHM-05-40X-SPR20	680-184026-12	Water	Field Sample/N	X	X	X	X	X
SHM-07-05X-SPR20	680-184026-13	Water	Field Sample/N	X	X	X	X	X
SHM-11-02-SPR20	680-184026-14	Water	Field Sample/N	X	X	X	X	X
SHM-13-06-SPR20	680-184026-15	Water	Field Sample/N	X	X	X	X	X
SHM-96-5B-SPR20	680-184026-16	Water	Field Sample/N	X	X	X	X	X
SHP-2016-1B-SPR20	680-184026-17	Water	Field Sample/N	X	X	X	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at 2B data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by Seres-Arcadis JV; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 6801840261. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Calibration Blank
- Calibration Blank - Negative
- Continuing Calibration Verification
- Field Duplicate RPD
- Interference Check Sample A
- Interference Check Sample A - Negative
- Interference Check Sample AB
- Lab Blank
- Lab Replicate RPD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 0 results (0.00%) out of the 119 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

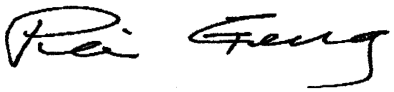
Narrative Comments

Analytical Method	Data Reviewer Comment
A2320B	No additional comments; see Checklist for detail.
SW6010C	No additional comments; see Checklist for detail.
SW6020A	No additional comments; see Checklist for detail.
SW9056A	No additional comments; see Checklist for detail.
SW9060A	No additional comments; see Checklist for detail.

June 30, 2020

Reviewed by Kevin Kha, Environmental Scientist, Laboratory Data Consultants, Inc.

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.



Reviewed by Pei Geng, Senior Scientist, Laboratory Data Consultants, Inc.

March 16, 2021

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

No Outliers were associated with this sample delivery group.

Qualified Results

No results associated with this sample delivery group required qualification.

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

Review Questions

Method: A2320B (Alkalinity by Titrimetric Method)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?		•		MS/MSD not performed.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?	•			Laboratory duplicate RPD was within project acceptance limits.
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?		•		MS/MSD not performed.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?		•		MS/MSD not performed.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW9056A (Anion Chromatography)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Data Validation Report for 6801840261

Review Questions

Method: SW9060A (Total Organic Carbon)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Field Duplicate Report By SDG
Former Fort Devens, Long Term Monitoring
Seres-Arcadis JV, Long Term Monitoring, SHL, Spring 2020
Field Duplicates for SDG: 6801840261

Location	Analysis
EPA-PZ-2012-4B	A2320B

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
EPA-PZ-2012-4B-SPR20 / SHL-DUP05-SPR20	680-184026-5 / 680-184026-10	Alkalinity, Total (as CaCO3)	160	160	10.0	0.00	30	OK	NA

Location	Analysis
EPA-PZ-2012-4B	SW6010C

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
EPA-PZ-2012-4B-SPR20 / SHL-DUP05-SPR20	680-184026-5 / 680-184026-10	Iron (FLDFLT)	66000	60000	50.0	9.52	30	OK	NA
EPA-PZ-2012-4B-SPR20 / SHL-DUP05-SPR20	680-184026-5 / 680-184026-10	Manganese (FLDFLT)	640	590	10.0	8.13	30	OK	NA

Location	Analysis
EPA-PZ-2012-4B	SW6020A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
EPA-PZ-2012-4B-SPR20 / SHL-DUP05-SPR20	680-184026-5 / 680-184026-10	Arsenic (FLDFLT)	1800	2000	3.00	10.5	30	OK	NA

Location	Analysis
EPA-PZ-2012-4B	SW9056A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
EPA-PZ-2012-4B-SPR20 / SHL-DUP05-SPR20	680-184026-5 / 680-184026-10	Chloride	25.0	25.0	2.50	0.00	30	OK	NA
EPA-PZ-2012-4B-SPR20 / SHL-DUP05-SPR20	680-184026-5 / 680-184026-10	Sulfate	12.0	11.0	5.00	8.70	30	NA	OK

FD = Field Duplicate
RL = Reporting Limit
RPD = Relative Percent Difference

RL Check = If either the primary sample or field duplicate result is less than 5 times the RL then the criteria used to determine if the field duplicate is outside QC limits is +/- RL for Water and +/- 2 times RL for Soil"

Field Duplicate Report By SDG
Former Fort Devens, Long Term Monitoring
Seres-Arcadis JV, Long Term Monitoring, SHL, Spring 2020
Field Duplicates for SDG: 6801840261

Location	Analysis
EPA-PZ-2012-4B	SW9060A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
EPA-PZ-2012-4B-SPR20 / SHL-DUP05-SPR20	680-184026-5 / 680-184026-10	Dissolved Organic Carbon (FLDFLT)	2.60	2.60	1.00	0.00	30	NA	OK

Location	Analysis
SHM-05-40X	A2320B

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHM-05-40X-SPR20 / SHL-DUP06-SPR20	680-184026-12 / 680-184026-11	Alkalinity, Total (as CaCO3)	110	110	10.0	0.00	30	OK	NA

Location	Analysis
SHM-05-40X	SW6010C

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHM-05-40X-SPR20 / SHL-DUP06-SPR20	680-184026-12 / 680-184026-11	Iron (FLDFLT)	23000	23000	50.0	0.00	30	OK	NA
SHM-05-40X-SPR20 / SHL-DUP06-SPR20	680-184026-12 / 680-184026-11	Manganese (FLDFLT)	700	700	10.0	0.00	30	OK	NA

Location	Analysis
SHM-05-40X	SW6020A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHM-05-40X-SPR20 / SHL-DUP06-SPR20	680-184026-12 / 680-184026-11	Arsenic (FLDFLT)	1900	1900	3.00	0.00	30	OK	NA

FD = Field Duplicate
RL = Reporting Limit
RPD = Relative Percent Difference

RL Check = If either the primary sample or field duplicate result is less than 5 times the RL then the criteria used to determine if the field duplicate is outside QC limits is +/- RL for Water and +/- 2 times RL for Soil"

Field Duplicate Report By SDG
Former Fort Devens, Long Term Monitoring
Seres-Arcadis JV, Long Term Monitoring, SHL, Spring 2020
Field Duplicates for SDG: 6801840261

Location	Analysis
SHM-05-40X	SW9056A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHM-05-40X-SPR20 / SHL-DUP06-SPR20	680-184026-12 / 680-184026-11	Chloride	27.0	27.0	2.50	0.00	30	OK	NA
SHM-05-40X-SPR20 / SHL-DUP06-SPR20	680-184026-12 / 680-184026-11	Sulfate	3.10	3.20	5.00	3.17	30	NA	OK

Location	Analysis
SHM-05-40X	SW9060A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHM-05-40X-SPR20 / SHL-DUP06-SPR20	680-184026-12 / 680-184026-11	Dissolved Organic Carbon (FLDFLT)	1.70	1.60	1.00	6.06	30	NA	OK

FD = Field Duplicate
RL = Reporting Limit
RPD = Relative Percent Difference

RL Check = If either the primary sample or field duplicate result is less than 5 times the RL then the criteria used to determine if the field duplicate is outside QC limits is +/- RL for Water and +/- 2 times RL for Soil"

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

ARCADIS U.S., Inc.
3109 West Martin Luther King Jr. Blvd, Suite 350
Tampa, FL 33607
ATTN: Mr. Nathan Mullens
nrmullens@seres-es.com

March 16, 2021

SUBJECT: Fort Devens, Data Validation

Dear Mr. Mullens,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on June 10, 2020. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #48291:

SDG #	Fraction
680-183899-1, 680-183912-1 680-183912-2/SN3820 680-183916-2/SN3818, 680-183925-1 680-183925-2/SN3819, 680-183926-1 680-183965-1, 680-184026-1 680-184098-1, 680-184215-1 680-184220-1, 680-183916-1	Volatiles, Chlorinated Pesticides, Metals, Wet Chemistry, Volatile Petroleum Hydrocarbons, Extractable Petroleum Hydrocarbons

The data validation was performed under Level II guidelines. The analyses were validated using the following documents and variances, as applicable to each method:

- Former Fort Devens Army Installation – BRAC Legacy Sites, Devens, MA; October 2020
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

518 pages-ADV R1 (added M) Attachment 1

Stage 2B EQUIS EDD

LDC #48291 (Arcadis-Millersville, MD / Fort Devens)

LDC	SDG#	DATE REC'D	(3) DATE DUE	VOA (8260B)		Pest. (8081B)		Metals (6010C /6020A /7470A)		(3) Metals (6010C/ 6020A)		(3)Diss Metals (6010C/ 6020A)		VPH (MADEP -VPH)		EPH (MADEP -EPH)		Alk. (2320B)		COD (410.4)		Cl,SO_4 (9056A)		CN- (9012B)		DOC (9060A)		NO_3 /NO_2-N (353.2)		TDS (2540C)							
Matrix: Water/Soil				W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	680-183899-1	06/10/20	07/01/20	-	-	-	-	-	-	4	0	4	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
B	680-183912-1	06/10/20	07/01/20	-	-	4	0	4	0	-	-	-	-	-	-	-	-	4	0	4	0	4	0	4	0	-	-	4	0	4	0						
C	680-183912-2/SN3820	06/10/20	07/01/20	-	-	-	-	-	-	-	-	-	-	5	0	4	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
D	680-183916-2/SN3818	06/10/20	07/01/20	-	-	-	-	-	-	-	-	-	-	8	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
E	680-183925-1	06/10/20	07/01/20	-	-	1	0	1	0	-	-	-	-	-	-	-	-	1	0	1	0	1	0	1	0	-	-	1	0	1	0						
F	680-183925-2/SN3819	06/10/20	07/01/20	-	-	-	-	-	-	-	-	-	-	1	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
G	680-183926-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	7	0	-	-	-	-	7	0	-	-	7	0	-	-	7	0	-	-	-	-						
H	680-183965-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	10	0	-	-	-	-	10	0	-	-	10	0	-	-	10	0	-	-	-	-						
I	680-184026-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	17	0	-	-	-	-	17	0	-	-	17	0	-	-	17	0	-	-	-	-						
J	680-184098-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	12	0	-	-	-	-	12	0	-	-	12	0	-	-	12	0	-	-	-	-						
K	680-184215-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	15	0	-	-	-	-	15	0	-	-	15	0	-	-	15	0	-	-	-	-						
L	680-184220-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	8	0	-	-	-	-	8	0	-	-	8	0	-	-	8	0	-	-	-	-						
M	680-183916-1	06/17/20	07/09/20	6	0	-	-	-	-	5	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
Total	T/PG			6	0	5	0	5	0	9	0	73	0	14	0	5	0	74	0	5	0	74	0	5	0	69	0	5	0	5	0	0	0	0	0	0	354

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS/MSD, and DUPs

L:\Arcadis\Fort Devens\48291ST.wpd

Data Validation Report for 6801840981

Facility:	Former Fort Devens, Long Term Monitoring
Event:	Seres-Arcadis JV, Long Term Monitoring, SHL, Spring 2020
SDG:	6801840981
Guidance Document:	Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020
Prime Contractor:	Seres-Arcadis JV
Project Manager:	Jennifer Singer
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	Laboratory Data Consultants, Inc.
Data Review Level:	2B
Primary Data Reviewer:	Kevin Kha, Environmental Scientist
Second Reviewer:	Pei Geng, Senior Scientist
Date Submitted:	June 30, 2020

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	A2320B	SW6010C - Dissolved	SW6020A - Dissolved	SW9056A	SW9060A - Dissolved
EPA-PZ-2012-2B-SPR20	680-184098-4	Water	Field Sample/N	X	X	X	X	X
SHL-4-SPR20	680-184098-5	Water	Field Sample/N	X	X	X	X	X
SHL-DUP03-SPR20	680-184098-6	Water	Field Duplicate/FD	X	X	X	X	X
SHM-11-06-SPR20	680-184098-7	Water	Field Sample/N	X	X	X	X	X
SHM-13-04-SPR20	680-184098-8	Water	Field Sample/N	X	X	X	X	X
SHP-01-36X-SPR20	680-184098-9	Water	Field Sample/N	X	X	X	X	X
SHP-01-37X-SPR20	680-184098-10	Water	Field Sample/N	X	X	X	X	X
SHP-2016-07A-SPR20	680-184098-11	Water	Field Sample/N	X	X	X	X	X
SHP-2016-2A-SPR20	680-184098-12	Water	Field Sample/N	X	X	X	X	X
SHP-2016-2B-SPR20	680-184098-13	Water	Field Sample/N	X	X	X	X	X
SHP-2016-3A-SPR20	680-184098-14	Water	Field Sample/N	X	X	X	X	X
SHP-2016-3B-SPR20	680-184098-15	Water	Field Sample/N	X	X	X	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at 2B data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by Seres-Arcadis JV; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 6801840981. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Calibration Blank
- Calibration Blank - Negative
- Continuing Calibration Verification
- Field Duplicate RPD
- Interference Check Sample A
- Interference Check Sample A - Negative
- Interference Check Sample AB
- Lab Blank
- Lab Replicate RPD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 0 results (0.00%) out of the 84 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

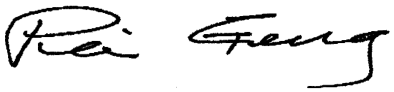
Narrative Comments

Analytical Method	Data Reviewer Comment
A2320B	No additional comments; see Checklist for detail.
SW6010C	No additional comments; see Checklist for detail.
SW6020A	No additional comments; see Checklist for detail.
SW9056A	No additional comments; see Checklist for detail.
SW9060A	No additional comments; see Checklist for detail.

June 30, 2020

Reviewed by Kevin Kha, Environmental Scientist, Laboratory Data Consultants, Inc.

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.



Reviewed by Pei Geng, Senior Scientist, Laboratory Data Consultants, Inc.

March 16, 2021

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

No Outliers were associated with this sample delivery group.

Qualified Results

No results associated with this sample delivery group required qualification.

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

Review Questions

Method: A2320B (Alkalinity by Titrimetric Method)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?				
Was the Calibration within acceptance criteria?				
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?				
Were all reported analytes for the ICV within the required criteria?				
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?		•		MS/MSD not performed.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?	•			Laboratory duplicate RPD was within project acceptance limits.
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?		•		MS/MSD not performed.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?		•		MS/MSD not performed.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW9056A (Anion Chromatography)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Data Validation Report for 6801840981

Review Questions

Method: SW9060A (Total Organic Carbon)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Field Duplicate Report By SDG
Former Fort Devens, Long Term Monitoring
Seres-Arcadis JV, Long Term Monitoring, SHL, Spring 2020
Field Duplicates for SDG: 6801840981

Location	Analysis
SHM-11-06	A2320B

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHM-11-06-SPR20 / SHL-DUP03-SPR20	680-184098-7 / 680-184098-6	Alkalinity, Total (as CaCO3)	220	200	10.0	9.52	30	OK	NA

Location	Analysis
SHM-11-06	SW6010C

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHM-11-06-SPR20 / SHL-DUP03-SPR20	680-184098-7 / 680-184098-6	Iron (FLDFLT)	77000	79000	50.0	2.56	30	OK	NA
SHM-11-06-SPR20 / SHL-DUP03-SPR20	680-184098-7 / 680-184098-6	Manganese (FLDFLT)	2000	2000	10.0	0.00	30	OK	NA

Location	Analysis
SHM-11-06	SW6020A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHM-11-06-SPR20 / SHL-DUP03-SPR20	680-184098-7 / 680-184098-6	Arsenic (FLDFLT)	750	720	3.00	4.08	30	OK	NA

Location	Analysis
SHM-11-06	SW9056A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHM-11-06-SPR20 / SHL-DUP03-SPR20	680-184098-7 / 680-184098-6	Chloride	50.0	50.0	0.500	0.00	30	OK	NA
SHM-11-06-SPR20 / SHL-DUP03-SPR20	680-184098-7 / 680-184098-6	Sulfate	4.70	4.80	1.00	2.11	30	NA	OK

FD = Field Duplicate
RL = Reporting Limit
RPD = Relative Percent Difference

RL Check = If either the primary sample or field duplicate result is less than 5 times the RL then the criteria used to determine if the field duplicate is outside QC limits is +/- RL for Water and +/- 2 times RL for Soil"

Field Duplicate Report By SDG
Former Fort Devens, Long Term Monitoring
Seres-Arcadis JV, Long Term Monitoring, SHL, Spring 2020
Field Duplicates for SDG: 6801840981

Location	Analysis
SHM-11-06	SW9060A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHM-11-06-SPR20 / SHL-DUP03-SPR20	680-184098-7 / 680-184098-6	Dissolved Organic Carbon (FLDFLT)	2.10	1.90	1.00	10.0	30	NA	OK

FD = Field Duplicate
RL = Reporting Limit
RPD = Relative Percent Difference

RL Check = If either the primary sample or field duplicate result is less than 5 times the RL then the criteria used to determine if the field duplicate is outside QC limits is +/- RL for Water and +/- 2 times RL for Soil"

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

ARCADIS U.S., Inc.
3109 West Martin Luther King Jr. Blvd, Suite 350
Tampa, FL 33607
ATTN: Mr. Nathan Mullens
nrmullens@seres-es.com

March 16, 2021

SUBJECT: Fort Devens, Data Validation

Dear Mr. Mullens,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on June 10, 2020. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #48291:

SDG #	Fraction
680-183899-1, 680-183912-1 680-183912-2/SN3820 680-183916-2/SN3818, 680-183925-1 680-183925-2/SN3819, 680-183926-1 680-183965-1, 680-184026-1 680-184098-1, 680-184215-1 680-184220-1, 680-183916-1	Volatiles, Chlorinated Pesticides, Metals, Wet Chemistry, Volatile Petroleum Hydrocarbons, Extractable Petroleum Hydrocarbons

The data validation was performed under Level II guidelines. The analyses were validated using the following documents and variances, as applicable to each method:

- Former Fort Devens Army Installation – BRAC Legacy Sites, Devens, MA; October 2020
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

518 pages-ADV R1 (added M) Attachment 1

Stage 2B EQUIS EDD

LDC #48291 (Arcadis-Millersville, MD / Fort Devens)

LDC	SDG#	DATE REC'D	(3) DATE DUE	VOA (8260B)		Pest. (8081B)		Metals (6010C /6020A /7470A)		(3) Metals (6010C/ 6020A)		(3)Diss Metals (6010C/ 6020A)		VPH (MADEP -VPH)		EPH (MADEP -EPH)		Alk. (2320B)		COD (410.4)		Cl,SO_4 (9056A)		CN- (9012B)		DOC (9060A)		NO_3 /NO_2-N (353.2)		TDS (2540C)							
Matrix: Water/Soil				W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	680-183899-1	06/10/20	07/01/20	-	-	-	-	-	-	4	0	4	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
B	680-183912-1	06/10/20	07/01/20	-	-	4	0	4	0	-	-	-	-	-	-	-	-	4	0	4	0	4	0	4	0	-	-	4	0	4	0						
C	680-183912-2/SN3820	06/10/20	07/01/20	-	-	-	-	-	-	-	-	-	-	5	0	4	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
D	680-183916-2/SN3818	06/10/20	07/01/20	-	-	-	-	-	-	-	-	-	-	8	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
E	680-183925-1	06/10/20	07/01/20	-	-	1	0	1	0	-	-	-	-	-	-	-	-	1	0	1	0	1	0	1	0	-	-	1	0	1	0						
F	680-183925-2/SN3819	06/10/20	07/01/20	-	-	-	-	-	-	-	-	-	-	1	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
G	680-183926-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	7	0	-	-	-	-	7	0	-	-	7	0	-	-	7	0	-	-	-	-						
H	680-183965-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	10	0	-	-	-	-	10	0	-	-	10	0	-	-	10	0	-	-	-	-						
I	680-184026-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	17	0	-	-	-	-	17	0	-	-	17	0	-	-	17	0	-	-	-	-						
J	680-184098-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	12	0	-	-	-	-	12	0	-	-	12	0	-	-	12	0	-	-	-	-						
K	680-184215-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	15	0	-	-	-	-	15	0	-	-	15	0	-	-	15	0	-	-	-	-						
L	680-184220-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	8	0	-	-	-	-	8	0	-	-	8	0	-	-	8	0	-	-	-	-						
M	680-183916-1	06/17/20	07/09/20	6	0	-	-	-	-	5	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
Total	T/PG			6	0	5	0	5	0	9	0	73	0	14	0	5	0	74	0	5	0	74	0	5	0	69	0	5	0	5	0	0	0	0	0	0	354

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS/MSD, and DUPs

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Data Validation Report for 6801842151

Facility:	Former Fort Devens, Long Term Monitoring
Event:	Seres-Arcadis JV, Long Term Monitoring, SHL, Spring 2020
SDG:	6801842151
Guidance Document:	Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020
Prime Contractor:	Seres-Arcadis JV
Project Manager:	Jennifer Singer
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	Laboratory Data Consultants, Inc.
Data Review Level:	2B
Primary Data Reviewer:	Kevin Kha, Environmental Scientist
Second Reviewer:	Pei Geng, Senior Scientist
Date Submitted:	June 30, 2020

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	A2320B	SW6010C - Dissolved	SW6020A - Dissolved	SW9056A	SW9060A - Dissolved
EPA-PZ-2012-3A-SPR20	680-184215-1	Water	Field Sample/N	X	X	X	X	X
EPA-PZ-2012-3B-SPR20	680-184215-2	Water	Field Sample/N	X	X	X	X	X
SHL-DUP04-SPR20	680-184215-3	Water	Field Duplicate/FD	X	X	X	X	X
SHM-05-41B-SPR20	680-184215-4	Water	Field Sample/N	X	X	X	X	X
SHM-05-41C-SPR20	680-184215-5	Water	Field Sample/N	X	X	X	X	X
SHM-13-03-SPR20	680-184215-6	Water	Field Sample/N	X	X	X	X	X
SHM-93-22B-SPR20	680-184215-7	Water	Field Sample/N	X	X	X	X	X
SHP-01-38A-SPR20	680-184215-8	Water	Field Sample/N	X	X	X	X	X
SHP-2016-06A-SPR20	680-184215-9	Water	Field Sample/N	X	X	X	X	X
SHP-2016-06B-SPR20	680-184215-10	Water	Field Sample/N	X	X	X	X	X
SHP-2016-06C-SPR20	680-184215-11	Water	Field Sample/N	X	X	X	X	X
SHP-2016-4A-SPR20	680-184215-12	Water	Field Sample/N	X	X	X	X	X
SHP-2016-4B-SPR20	680-184215-13	Water	Field Sample/N	X	X	X	X	X
SHP-2016-5A-SPR20	680-184215-14	Water	Field Sample/N	X	X	X	X	X
SHP-2016-5B-SPR20	680-184215-15	Water	Field Sample/N	X	X	X	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at 2B data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by Seres-Arcadis JV; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 6801842151. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Calibration Blank
- Calibration Blank - Negative
- Continuing Calibration Verification
- Field Duplicate RPD
- Interference Check Sample A
- Interference Check Sample A - Negative
- Interference Check Sample AB
- Lab Blank
- Lab Replicate RPD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 0 results (0.00%) out of the 105 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

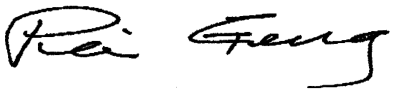
Narrative Comments

Analytical Method	Data Reviewer Comment
A2320B	No additional comments; see Checklist for detail.
SW6010C	No additional comments; see Checklist for detail.
SW6020A	No additional comments; see Checklist for detail.
SW9056A	No additional comments; see Checklist for detail.
SW9060A	No additional comments; see Checklist for detail.

June 30, 2020

Reviewed by Kevin Kha, Environmental Scientist, Laboratory Data Consultants, Inc.

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.



Reviewed by Pei Geng, Senior Scientist, Laboratory Data Consultants, Inc.

March 16, 2021

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW6010C, Dissolved, Calibration Blank

The purpose of calibration blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in calibration blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
CCB 680-620833/154 (CB)/ CCB 680-620833/154	Iron	18.90	< 17	< 50	ug/l	U/None	B2	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6010C, Dissolved, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB 680-621071/1-A (LB)/ MB 680-621071/1-A	Manganese	8.570	< 1	< 10	ug/l	U/None	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6010C, Dissolved, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
EPA-PZ-2012-3B-SPR20 (MS)/ 680-184215-2	Manganese	32.50	90 - 114	10 - 125	percent	J/UJ	M	Spike amount Insignificant
EPA-PZ-2012-3B-SPR20 (SD)/ 680-184215-2	Manganese	50.00	90 - 114	10 - 125	percent	J/UJ	M	Spike amount Insignificant
EPA-PZ-2012-3B-SPR20 (MS)/ 680-184215-2	Iron	76.00	87 - 115	10 - 125	percent	J/UJ	M	Spike amount Insignificant
EPA-PZ-2012-3B-SPR20 (SD)/ 680-184215-2	Iron	86.00	87 - 115	10 - 125	percent	J/UJ	M	Spike amount Insignificant
SHM-05-41C-SPR20 (MS)/ 680-184215-5	Manganese	75.00	90 - 114	10 - 125	percent	J/UJ	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6020A, Dissolved, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
EPA-PZ-2012-3B-SPR20 (SD)/ 680-184215-2	Arsenic	-350.0	84 - 116	10 - 125	percent	J/X	M	Spike amount Insignificant
EPA-PZ-2012-3B-SPR20 (MS)/ 680-184215-2	Arsenic	-400.0	84 - 116	10 - 125	percent	J/X	M	Spike amount Insignificant
SHM-05-41C-SPR20 (SD)/ 680-184215-5	Arsenic	179.0	84 - 116	10 - 125	percent	J/None	M	Spike amount Insignificant
SHM-05-41C-SPR20 (MS)/ 680-184215-5	Arsenic	80.00	84 - 116	10 - 125	percent	J/UJ	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW9056A, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
SHM-05-41C-SPR20 (MS)/ 680-184215-5	Chloride	-500.0	90 - 110	10 - 110	percent	J/X	M	Spike amount Insignificant
SHM-05-41C-SPR20 (SD)/ 680-184215-5	Chloride	-500.0	90 - 110	10 - 110	percent	J/X	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Qualified Results

No results associated with this sample delivery group required qualification.

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
EPA-PZ-2012-3A-SPR20	N	Manganese	10.0	890	890 J	890	
EPA-PZ-2012-3B-SPR20	N	Manganese	10.0	5600 J	5600 J	5600	
SHL-DUP04-SPR20	FD	Manganese	10.0	1300	1300 J	1300	
SHM-05-41B-SPR20	N	Manganese	10.0	740	740 J	740	
SHM-05-41C-SPR20	N	Iron	50.0	14000	14000 J	14000	
SHM-05-41C-SPR20	N	Manganese	10.0	2400 J	2400 J	2400	
SHM-13-03-SPR20	N	Manganese	10.0	11000	11000 J	11000	
SHM-93-22B-SPR20	N	Manganese	10.0	9300	9300 J	9300	
SHP-01-38A-SPR20	N	Manganese	10.0	1200	1200 J	1200	
SHP-2016-06A-SPR20	N	Manganese	10.0	920	920 J	920	
SHP-2016-06B-SPR20	N	Manganese	10.0	430	430 J	430	
SHP-2016-06C-SPR20	N	Manganese	10.0	200	200 J	200	
SHP-2016-4A-SPR20	N	Iron	50.0	68.0	50.0 U	68.0	
SHP-2016-4A-SPR20	N	Manganese	10.0	70.0	70.0 J	70.0	
SHP-2016-4B-SPR20	N	Manganese	10.0	1900	1900 J	1900	
SHP-2016-5B-SPR20	N	Manganese	10.0	2500	2500 J	2500	

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
B2	CCB
L	Lab Blank
M	MS Recovery
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

Review Questions

Method: A2320B (Alkalinity by Titrimetric Method)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?		•		MS/MSD not performed.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?	•			The laboratory duplicate RPD was within project acceptance limits.
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Manganese was detected in a method blank. The associated sample results were either not detected or significantly greater than the concentration in the method blank, therefore no data were qualified. Iron was detected in a calibration blank. The affected samples were reanalyzed for iron and no contamination was found in the calibration blanks.
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Although iron and manganese were not within project acceptance limits, the parent results were greater than 4x the spike amount, therefore no qualification was necessary.
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Although arsenic was not within project acceptance limits, the parent results were greater than 4x the spike amount, therefore no qualification was necessary.
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Data Validation Report for 6801842151

Review Questions

Method: SW9056A (Anion Chromatography)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Although chloride was not within project acceptance limits, the parent result was greater than 4x the spike amount, therefore no qualification was necessary.
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Data Validation Report for 6801842151

Review Questions

Method: SW9060A (Total Organic Carbon)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Field Duplicate Report By SDG
Former Fort Devens, Long Term Monitoring
Seres-Arcadis JV, Long Term Monitoring, SHL, Spring 2020
Field Duplicates for SDG: 6801842151

Location	Analysis
SHP-01-38A	A2320B

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHP-01-38A-SPR20 / SHL-DUP04-SPR20	680-184215-8 / 680-184215-3	Alkalinity, Total (as CaCO3)	60.0	60.0	10.0	0.00	30	OK	NA

Location	Analysis
SHP-01-38A	SW6010C

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHP-01-38A-SPR20 / SHL-DUP04-SPR20	680-184215-8 / 680-184215-3	Iron (FLDFLT)	13000	15000	50.0	14.3	30	OK	NA
SHP-01-38A-SPR20 / SHL-DUP04-SPR20	680-184215-8 / 680-184215-3	Manganese (FLDFLT)	1200	1300	10.0	8.00	30	OK	NA

Location	Analysis
SHP-01-38A	SW6020A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHP-01-38A-SPR20 / SHL-DUP04-SPR20	680-184215-8 / 680-184215-3	Arsenic (FLDFLT)	87.0	86.0	3.00	1.16	30	OK	NA

Location	Analysis
SHP-01-38A	SW9056A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHP-01-38A-SPR20 / SHL-DUP04-SPR20	680-184215-8 / 680-184215-3	Chloride	0.490	0.480	0.500	2.06	30	NA	OK
SHP-01-38A-SPR20 / SHL-DUP04-SPR20	680-184215-8 / 680-184215-3	Sulfate	16.0	16.0	1.00	0.00	30	OK	NA

FD = Field Duplicate
RL = Reporting Limit
RPD = Relative Percent Difference

RL Check = If either the primary sample or field duplicate result is less than 5 times the RL then the criteria used to determine if the field duplicate is outside QC limits is +/- RL for Water and +/- 2 times RL for Soil"

Field Duplicate Report By SDG
Former Fort Devens, Long Term Monitoring
Seres-Arcadis JV, Long Term Monitoring, SHL, Spring 2020
Field Duplicates for SDG: 6801842151

Location	Analysis
SHP-01-38A	SW9060A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHP-01-38A-SPR20 / SHL-DUP04-SPR20	680-184215-8 / 680-184215-3	Dissolved Organic Carbon (FLDFLT)	1.10	1.10	1.00	0.00	30	NA	OK

FD = Field Duplicate
RL = Reporting Limit
RPD = Relative Percent Difference

RL Check = If either the primary sample or field duplicate result is less than 5 times the RL then the criteria used to determine if the field duplicate is outside QC limits is +/- RL for Water and +/- 2 times RL for Soil"

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

ARCADIS U.S., Inc.
3109 West Martin Luther King Jr. Blvd, Suite 350
Tampa, FL 33607
ATTN: Mr. Nathan Mullens
nrmullens@seres-es.com

March 16, 2021

SUBJECT: Fort Devens, Data Validation

Dear Mr. Mullens,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on June 10, 2020. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #48291:

SDG #	Fraction
680-183899-1, 680-183912-1 680-183912-2/SN3820 680-183916-2/SN3818, 680-183925-1 680-183925-2/SN3819, 680-183926-1 680-183965-1, 680-184026-1 680-184098-1, 680-184215-1 680-184220-1, 680-183916-1	Volatiles, Chlorinated Pesticides, Metals, Wet Chemistry, Volatile Petroleum Hydrocarbons, Extractable Petroleum Hydrocarbons

The data validation was performed under Level II guidelines. The analyses were validated using the following documents and variances, as applicable to each method:

- Former Fort Devens Army Installation – BRAC Legacy Sites, Devens, MA; October 2020
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

518 pages-ADV R1 (added M) Attachment 1

Stage 2B EQUIS EDD

LDC #48291 (Arcadis-Millersville, MD / Fort Devens)

LDC	SDG#	DATE REC'D	(3) DATE DUE	VOA (8260B)		Pest. (8081B)		Metals (6010C /6020A /7470A)		(3) Metals (6010C/ 6020A)		(3)Diss Metals (6010C/ 6020A)		VPH (MADEP -VPH)		EPH (MADEP -EPH)		Alk. (2320B)		COD (410.4)		Cl,SO_4 (9056A)		CN- (9012B)		DOC (9060A)		NO_3 /NO_2-N (353.2)		TDS (2540C)							
Matrix: Water/Soil				W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	680-183899-1	06/10/20	07/01/20	-	-	-	-	-	-	4	0	4	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
B	680-183912-1	06/10/20	07/01/20	-	-	4	0	4	0	-	-	-	-	-	-	-	-	4	0	4	0	4	0	4	0	-	-	4	0	4	0						
C	680-183912-2/SN3820	06/10/20	07/01/20	-	-	-	-	-	-	-	-	-	-	5	0	4	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
D	680-183916-2/SN3818	06/10/20	07/01/20	-	-	-	-	-	-	-	-	-	-	8	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
E	680-183925-1	06/10/20	07/01/20	-	-	1	0	1	0	-	-	-	-	-	-	-	-	1	0	1	0	1	0	1	0	-	-	1	0	1	0						
F	680-183925-2/SN3819	06/10/20	07/01/20	-	-	-	-	-	-	-	-	-	-	1	0	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
G	680-183926-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	7	0	-	-	-	-	7	0	-	-	7	0	-	-	7	0	-	-	-	-						
H	680-183965-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	10	0	-	-	-	-	10	0	-	-	10	0	-	-	10	0	-	-	-	-						
I	680-184026-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	17	0	-	-	-	-	17	0	-	-	17	0	-	-	17	0	-	-	-	-						
J	680-184098-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	12	0	-	-	-	-	12	0	-	-	12	0	-	-	12	0	-	-	-	-						
K	680-184215-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	15	0	-	-	-	-	15	0	-	-	15	0	-	-	15	0	-	-	-	-						
L	680-184220-1	06/10/20	07/01/20	-	-	-	-	-	-	-	-	8	0	-	-	-	-	8	0	-	-	8	0	-	-	8	0	-	-	-	-						
M	680-183916-1	06/17/20	07/09/20	6	0	-	-	-	-	5	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-						
Total	T/PG			6	0	5	0	5	0	9	0	73	0	14	0	5	0	74	0	5	0	74	0	5	0	69	0	5	0	5	0	0	0	0	0	0	354

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS/MSD, and DUPs

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Data Validation Report for 6801842201

Facility:	Former Fort Devens, Long Term Monitoring
Event:	Seres-Arcadis JV, Long Term Monitoring, SHL, Spring 2020
SDG:	6801842201
Guidance Document:	Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020
Prime Contractor:	Seres-Arcadis JV
Project Manager:	Jennifer Singer
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	Laboratory Data Consultants, Inc.
Data Review Level:	2B
Primary Data Reviewer:	Kevin Kha, Environmental Scientist
Second Reviewer:	Pei Geng, Senior Scientist
Date Submitted:	June 30, 2020

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	A2320B	SW6010C - Dissolved	SW6020A - Dissolved	SW9056A	SW9060A - Dissolved
EPA-PZ-2012-5A-SPR20	680-184220-3	Water	Field Sample/N	X	X	X	X	X
EPA-PZ-2012-5B-SPR20	680-184220-4	Water	Field Sample/N	X	X	X	X	X
EPA-PZ-2012-6A-SPR20	680-184220-5	Water	Field Sample/N	X	X	X	X	X
EPA-PZ-2012-6B-SPR20	680-184220-6	Water	Field Sample/N	X	X	X	X	X
EPA-PZ-2012-7A-SPR20	680-184220-7	Water	Field Sample/N	X	X	X	X	X
EPA-PZ-2012-7B-SPR20	680-184220-8	Water	Field Sample/N	X	X	X	X	X
SHM-13-07-SPR20	680-184220-2	Water	Field Sample/N	X	X	X	X	X
SHM-13-08-SPR20	680-184220-1	Water	Field Sample/N	X	X	X	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at 2B data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by Seres-Arcadis JV; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 6801842201. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Calibration Blank
- Calibration Blank - Negative
- Continuing Calibration Verification
- Interference Check Sample A
- Interference Check Sample A - Negative
- Interference Check Sample AB
- Lab Blank
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 1 results (1.79%) out of the 56 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

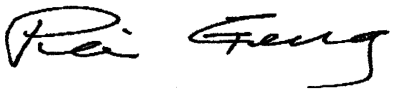
Narrative Comments

Analytical Method	Data Reviewer Comment
A2320B	No additional comments; see Checklist for detail.
SW6010C	No additional comments; see Checklist for detail.
SW6020A	No additional comments; see Checklist for detail.
SW9056A	No additional comments; see Checklist for detail.
SW9060A	No additional comments; see Checklist for detail.

June 30, 2020

Reviewed by Kevin Kha, Environmental Scientist, Laboratory Data Consultants, Inc.

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.



Reviewed by Pei Geng, Senior Scientist, Laboratory Data Consultants, Inc.

March 16, 2021

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW6010C, Dissolved, Calibration Blank

The purpose of calibration blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in calibration blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
CCB 680-621030/180 (CB)/ CCB 680-621030/180	Iron	21.10	< 17	< 50	ug/l	U/None	B2	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6010C, Dissolved, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB 680-620848/1-A (LB)/ MB 680-620848/1-A	Iron	19.60	< 17	< 50	ug/l	U/None	L	
MB 680-621071/1-A (LB)/ MB 680-621071/1-A	Manganese	8.570	< 1	< 10	ug/l	U/None	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Lab Blank for SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
EPA-PZ-2012-7A-SPR20	N	Manganese	10.0	10.0 B	10.0 U		ug/l	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Table of All Qualified Results

Test Method: SW6010C	**Extraction Method: Dissolved**							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
EPA-PZ-2012-7A-SPR20	N	Manganese	10.0	10.0 B	10.0 U		ug/l	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition
B2	CCB
L	Lab Blank
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

Review Questions

Method: A2320B (Alkalinity by Titrimetric Method)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?		•		MS/MSD was not performed.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Due to method blank contamination, one manganese result was qualified non-detected (U) at the LOQ. Iron was detected in a method blank and a calibration balnk, however the associated sample results were either not detected or significantly greater than the concentration found in the blanks, therefore no iron results were qualified.
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?		•		MS/MSD not performed.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported or as qualified during data validation.

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed
Was a MS/MSD pair prepared with each batch?		•		MS/MSD not performed
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW9056A (Anion Chromatography)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?		•		MS/MSD not performed.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Data Validation Report for 6801842201

Review Questions

Method: SW9060A (Total Organic Carbon)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

ARCADIS U.S., Inc.
3109 West Martin Luther King Jr. Blvd, Suite 350
Tampa, FL 33607
ATTN: Mr. Nathan Mullens
nrmullens@seres-es.com

February 19, 2021

SUBJECT: Fort Devens, Data Validation

Dear Mr. Mullens,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on December 1, 2020. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #49830:

SDG #	Fraction
680-190620-1, 680-190870-1 680-190885-1, 680-190931-1 680-191084-1, 680-190870-2 680-191084-2, 680-191377-2	Volatiles, Organochlorine Pesticides, Dissolved Metals, Alkalinity, Wet Chemistry

The data validation was performed under Stage 2B guidelines. The analyses were validated using the following documents and variances, as applicable to each method:

- Former Fort Devens Army Installation – BRAC Legacy Sites, Devens, MA; October 2020
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

262 pages-ADV 2 WEEK TAT Attachment 1

Stage 2B EQUIS EDD

LDC #49830 (Arcadis-Millersville, MD / Fort Devens)

LDC	SDG#	DATE REC'D	(3) DATE DUE	VOA (8260B)		Pest. (8081B)		Metals (6010C/ 6020A)		Alk. (2320B)		DOC (9060A)		Cl,SO_4 (9056A)		COD (410.4)		CN (9012B)																					
Matrix: Water/Soil				W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	680-190620-1	12/01/20	12/15/20	-	-	-	-	8	0	8	0	8	0	8	0	-	-	-	-																				
B	680-190870-1	12/01/20	12/15/20	-	-	-	-	13	0	13	0	13	0	13	0	-	-	-	-																				
C	680-190885-1	12/01/20	12/15/20	-	-	-	-	6	0	6	0	6	0	6	0	-	-	-	-																				
D	680-190931-1	12/01/20	12/15/20	-	-	-	-	12	0	12	0	12	0	12	0	-	-	-	-																				
E	680-191084-1	12/01/20	12/15/20	-	-	-	-	12	0	12	0	12	0	12	0	-	-	-	-																				
F	680-190870-2	12/01/20	12/15/20	2	0	-	-	-	-	-	-	-	-	-	-	1	0	1	0																				
G	680-191084-2	12/01/20	12/15/20	-	-	1	0	-	-	-	-	-	-	-	-	-	-	-	-																				
H	680-191377-2	12/01/20	12/15/20	-	-	-	-	5	0	5	0	-	-	5	0	-	-	-	-																				
Total	J/PG			2	0	1	0	56	0	56	0	51	0	56	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	224

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS/MSD, and DUPs

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Data Validation Report for 6801906201

Facility:	Former Fort Devens, Long Term Monitoring
Event:	Seres-Arcadis JV, Long Term Monitoring, SHL, Fall 2020
SDG:	6801906201
Guidance Document:	Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020
Prime Contractor:	Seres-Arcadis JV
Project Manager:	Jennifer Singer
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	Laboratory Data Consultants, Inc.
Data Review Level:	2B
Primary Data Reviewer:	Kevin Kha, Environmental Scientist
Second Reviewer:	Pei Geng, Senior Scientist
Date Submitted:	December 14, 2020

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	A2320B	SW6010C - Dissolved	SW6020A - Dissolved	SW9056A	SW9060A - Dissolved
PZ-12-09-FAL20	680-190620-1	Water	Field Sample/N	X	X	X	X	X
PZ-12-10-FAL20	680-190620-2	Water	Field Sample/N	X	X	X	X	X
SHL-19-FAL20	680-190620-3	Water	Field Sample/N	X	X	X	X	X
SHL-24-FAL20	680-190620-5	Water	Field Sample/N	X	X	X	X	X
SHL-DUP09-FAL20	680-190620-6	Water	Field Duplicate/FD	X	X	X	X	X
SHM-05-39A-FAL20	680-190620-7	Water	Field Sample/N	X	X	X	X	X
SHM-05-39B-FAL20	680-190620-8	Water	Field Sample/N	X	X	X	X	X
SHM-93-24A-FAL20	680-190620-4	Water	Field Sample/N	X	X	X	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at 2B data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by Seres-Arcadis JV; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 6801906201. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Calibration Blank
- Calibration Blank - Negative
- Continuing Calibration Verification
- Field Duplicate RPD
- Interference Check Sample A
- Interference Check Sample A - Negative
- Interference Check Sample AB
- Lab Blank
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 2 results (3.57%) out of the 56 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

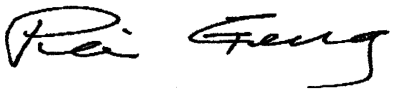
Narrative Comments

Analytical Method	Data Reviewer Comment
SW6010C	No additional comments; see Checklist for detail.
SW9060A	No additional comments; see Checklist for detail.
SW6020A	No additional comments; see Checklist for detail.
SW9056A	No additional comments; see Checklist for detail.
A2320B	No additional comments; see Checklist for detail.

December 14, 2020

Reviewed by Kevin Kha, Environmental Scientist, Laboratory Data Consultants, Inc.

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.



Reviewed by Pei Geng, Senior Scientist, Laboratory Data Consultants, Inc.

March 16, 2021

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW6010C, Dissolved, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB6806414251A (LB)/ MB6806414251A	Iron	19.70	< 17	< 50	ug/l	U/None	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6010C, Dissolved, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
PZ-12-10-FAL20 (SD)/ 680-190620-2	Iron	85.20	87 - 115	10 - 125	percent	J/UJ	M	
PZ-12-10-FAL20 (SD)/ 680-190620-2	Manganese	86.25	90 - 114	10 - 125	percent	J/UJ	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
PZ-12-10-FAL20	N	Iron	50.0	50.0 U J	50.0 UJ		ug/l	M
PZ-12-10-FAL20	N	Manganese	10.0	3.00 U J	3.00 UJ		ug/l	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Table of All Qualified Results

Test Method: SW6010C	**Extraction Method: Dissolved**							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
PZ-12-10-FAL20	N	Iron	50.0	50.0 U J	50.0 UJ		ug/l	M
PZ-12-10-FAL20	N	Manganese	10.0	3.00 U J	3.00 UJ		ug/l	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition
L	Lab Blank
M	MS Recovery
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

Review Questions

Method: A2320B (Alkalinity by Titrimetric Method)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			Although a LCS was not prepared with batch 515502, a CCV was prepared and analyzed with the batch. CCV recoveries were within acceptance criteria.
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?		•		MS/MSD not performed.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Although iron was detected in the method blank, the associated sample results were not detected or were significantly greater than the concentrations found in the blanks, therefore no data were qualified.
Were target analytes reported in the field blank(s) less than MDL?			•	A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Due to low MSD %R, iron and manganese results were qualified as non-detected estimated (UJ) as applicable in sample PZ-12-10-FAL20.
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported or as qualified during data validation.

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW9056A (Anion Chromatography)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Data Validation Report for 6801906201

Review Questions

Method: SW9060A (Total Organic Carbon)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes reported in the field blank(s) less than MDL?			•	A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

ARCADIS U.S., Inc.
3109 West Martin Luther King Jr. Blvd, Suite 350
Tampa, FL 33607
ATTN: Mr. Nathan Mullens
nrmullens@seres-es.com

February 19, 2021

SUBJECT: Fort Devens, Data Validation

Dear Mr. Mullens,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on December 1, 2020. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #49830:

SDG #	Fraction
680-190620-1, 680-190870-1 680-190885-1, 680-190931-1 680-191084-1, 680-190870-2 680-191084-2, 680-191377-2	Volatiles, Organochlorine Pesticides, Dissolved Metals, Alkalinity, Wet Chemistry

The data validation was performed under Stage 2B guidelines. The analyses were validated using the following documents and variances, as applicable to each method:

- Former Fort Devens Army Installation – BRAC Legacy Sites, Devens, MA; October 2020
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

262 pages-ADV 2 WEEK TAT Attachment 1

Stage 2B EQUIS EDD

LDC #49830 (Arcadis-Millersville, MD / Fort Devens)

LDC	SDG#	DATE REC'D	(3) DATE DUE	VOA (8260B)		Pest. (8081B)		Metals (6010C/ 6020A)		Alk. (2320B)		DOC (9060A)		Cl,SO_4 (9056A)		COD (410.4)		CN (9012B)																					
Matrix: Water/Soil				W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	680-190620-1	12/01/20	12/15/20	-	-	-	-	8	0	8	0	8	0	8	0	-	-	-	-																				
B	680-190870-1	12/01/20	12/15/20	-	-	-	-	13	0	13	0	13	0	13	0	-	-	-	-																				
C	680-190885-1	12/01/20	12/15/20	-	-	-	-	6	0	6	0	6	0	6	0	-	-	-	-																				
D	680-190931-1	12/01/20	12/15/20	-	-	-	-	12	0	12	0	12	0	12	0	-	-	-	-																				
E	680-191084-1	12/01/20	12/15/20	-	-	-	-	12	0	12	0	12	0	12	0	-	-	-	-																				
F	680-190870-2	12/01/20	12/15/20	2	0	-	-	-	-	-	-	-	-	-	-	1	0	1	0																				
G	680-191084-2	12/01/20	12/15/20	-	-	1	0	-	-	-	-	-	-	-	-	-	-	-	-																				
H	680-191377-2	12/01/20	12/15/20	-	-	-	-	5	0	5	0	-	-	5	0	-	-	-	-																				
Total	J/PG			2	0	1	0	56	0	56	0	51	0	56	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	224

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS/MSD, and DUPs

L:\Arcadis\Fort Devens\49830ST.wpd

Data Validation Report for 6801908701

Facility:	Former Fort Devens, Long Term Monitoring
Event:	Seres-Arcadis JV, Long Term Monitoring, SHL, Fall 2020
SDG:	6801908701
Guidance Document:	Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020
Prime Contractor:	Seres-Arcadis JV
Project Manager:	Jennifer Singer
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	Laboratory Data Consultants, Inc.
Data Review Level:	2B
Primary Data Reviewer:	Kevin Kha, Environmental Scientist
Second Reviewer:	Pei Geng, Senior Scientist
Date Submitted:	December 14, 2020

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	A2320B	SW6010C - Dissolved	SW6020A - Dissolved	SW9056A	SW9060A - Dissolved
EPA-PZ-2012-1A-FAL20	680-190870-8	Water	Field Sample/N	X	X	X	X	X
EPA-PZ-2012-1B-FAL20	680-190870-9	Water	Field Sample/N	X	X	X	X	X
EPA-PZ-2012-4A-FAL20	680-190870-10	Water	Field Sample/N	X	X	X	X	X
EPA-PZ-2012-4B-FAL20	680-190870-11	Water	Field Sample/N	X	X	X	X	X
EW-01-FAL20	680-190870-12	Water	Field Sample/N	X	X	X	X	X
EW-04-FAL20	680-190870-13	Water	Field Sample/N	X	X	X	X	X
N5-P1-FAL20	680-190870-14	Water	Field Sample/N	X	X	X	X	X
SHL-DUP05-FAL20	680-190870-7	Water	Field Duplicate/FD	X	X	X	X	X
SHM-10-06-FAL20	680-190870-4	Water	Field Sample/N	X	X	X	X	X
SHM-10-13-FAL20	680-190870-5	Water	Field Sample/N	X	X	X	X	X
SHM-99-31B-FAL20	680-190870-1	Water	Field Sample/N	X	X	X	X	X
SHM-99-31C-FAL20	680-190870-2	Water	Field Sample/N	X	X	X	X	X
SHM-99-32X-FAL20	680-190870-3	Water	Field Sample/N	X	X	X	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at 2B data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by Seres-Arcadis JV; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 6801908701. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Calibration Blank
- Calibration Blank - Negative
- Continuing Calibration Verification
- Field Duplicate RPD
- Interference Check Sample A
- Interference Check Sample A - Negative
- Interference Check Sample AB
- Lab Blank
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 7 results (7.69%) out of the 91 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

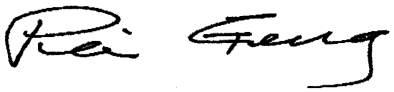
Narrative Comments

Analytical Method	Data Reviewer Comment
SW6020A	No additional comments; see Checklist for detail.
SW6010C	No additional comments; see Checklist for detail.
SW9056A	No additional comments; see Checklist for detail.
A2320B	No additional comments; see Checklist for detail.
SW9060A	No additional comments; see Checklist for detail.

December 14, 2020

Reviewed by Kevin Kha, Environmental Scientist, Laboratory Data Consultants, Inc.

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.



Reviewed by Pei Geng, Senior Scientist, Laboratory Data Consultants, Inc.

March 16, 2021

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

No Outliers were associated with this sample delivery group.

Qualified Results

No results associated with this sample delivery group required qualification.

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW9060A, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
EPA-PZ-2012-1A-FAL20	N	Dissolved Organic Carbon	1.80	1.80	1.80	1.80 U	B2
EPA-PZ-2012-4A-FAL20	N	Dissolved Organic Carbon	1.80	1.80	1.80	1.80 U	B2
EW-04-FAL20	N	Dissolved Organic Carbon	1.90	1.90	1.90	1.90 U	B2
N5-P1-FAL20	N	Dissolved Organic Carbon	1.20	1.20	1.20	1.20 U	B2
SHM-10-06-FAL20	N	Dissolved Organic Carbon	1.90	1.90	1.90	1.90 U	B2
SHM-99-31C-FAL20	N	Dissolved Organic Carbon	1.90	1.90	1.90	1.90 U	B2
SHM-99-32X-FAL20	N	Dissolved Organic Carbon	1.20	1.20	1.20	1.20 U	B2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
B2	CCB
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

Review Questions

Method: A2320B (Alkalinity by Titrimetric Method)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes reported in the field blank(s) less than MDL?			•	A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?		•		MS/MSD not performed.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes reported in the field blank(s) less than MDL?			•	A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW9056A (Anion Chromatography)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported

Review Questions

Method: SW9060A (Total Organic Carbon)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Due to CCB contamination, seven Dissolved Organic Carbon results were qualified as non-detected (U).
Were target analytes reported in the field blank(s) less than MDL?			•	A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported or as qualified during data validation.

Field Duplicate Report By SDG
Former Fort Devens, Long Term Monitoring
Seres-Arcadis JV, Long Term Monitoring, SHL, Fall 2020
Field Duplicates for SDG: 6801908701

Location	Analysis
EPA-PZ-2012-4B	A2320B

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
EPA-PZ-2012-4B-FAL20 / SHL-DUP05-FAL20	680-190870-11 / 680-190870-7	Alkalinity, Total (as CaCO3)	140	160	10.0	13.3	30	OK	NA

Location	Analysis
EPA-PZ-2012-4B	SW6010C

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
EPA-PZ-2012-4B-FAL20 / SHL-DUP05-FAL20	680-190870-11 / 680-190870-7	Iron (FLDFLT)	59000	57000	50.0	3.45	30	OK	NA
EPA-PZ-2012-4B-FAL20 / SHL-DUP05-FAL20	680-190870-11 / 680-190870-7	Manganese (FLDFLT)	780	760	10.0	2.60	30	OK	NA

Location	Analysis
EPA-PZ-2012-4B	SW6020A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
EPA-PZ-2012-4B-FAL20 / SHL-DUP05-FAL20	680-190870-11 / 680-190870-7	Arsenic (FLDFLT)	2000	1900	3.00	5.13	30	OK	NA

FD = Field Duplicate
RL = Reporting Limit
RPD = Relative Percent Difference

RL Check = If either the primary sample or field duplicate result is less than 5 times the RL then the criteria used to determine if the field duplicate is outside QC limits is +/- RL for Water and +/- 2 times RL for Soil"

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

ARCADIS U.S., Inc.
3109 West Martin Luther King Jr. Blvd, Suite 350
Tampa, FL 33607
ATTN: Mr. Nathan Mullens
nrmullens@seres-es.com

February 19, 2021

SUBJECT: Fort Devens, Data Validation

Dear Mr. Mullens,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on December 1, 2020. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #49830:

SDG #	Fraction
680-190620-1, 680-190870-1 680-190885-1, 680-190931-1 680-191084-1, 680-190870-2 680-191084-2, 680-191377-2	Volatiles, Organochlorine Pesticides, Dissolved Metals, Alkalinity, Wet Chemistry

The data validation was performed under Stage 2B guidelines. The analyses were validated using the following documents and variances, as applicable to each method:

- Former Fort Devens Army Installation – BRAC Legacy Sites, Devens, MA; October 2020
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

262 pages-ADV 2 WEEK TAT Attachment 1

Stage 2B EQUIS EDD

LDC #49830 (Arcadis-Millersville, MD / Fort Devens)

LDC	SDG#	DATE REC'D	(3) DATE DUE	VOA (8260B)		Pest. (8081B)		Metals (6010C/ 6020A)		Alk. (2320B)		DOC (9060A)		Cl,SO_4 (9056A)		COD (410.4)		CN (9012B)																					
Matrix: Water/Soil				W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	680-190620-1	12/01/20	12/15/20	-	-	-	-	8	0	8	0	8	0	8	0	-	-	-	-																				
B	680-190870-1	12/01/20	12/15/20	-	-	-	-	13	0	13	0	13	0	13	0	-	-	-	-																				
C	680-190885-1	12/01/20	12/15/20	-	-	-	-	6	0	6	0	6	0	6	0	-	-	-	-																				
D	680-190931-1	12/01/20	12/15/20	-	-	-	-	12	0	12	0	12	0	12	0	-	-	-	-																				
E	680-191084-1	12/01/20	12/15/20	-	-	-	-	12	0	12	0	12	0	12	0	-	-	-	-																				
F	680-190870-2	12/01/20	12/15/20	2	0	-	-	-	-	-	-	-	-	-	-	1	0	1	0																				
G	680-191084-2	12/01/20	12/15/20	-	-	1	0	-	-	-	-	-	-	-	-	-	-	-	-																				
H	680-191377-2	12/01/20	12/15/20	-	-	-	-	5	0	5	0	-	-	5	0	-	-	-	-																				
Total	J/PG			2	0	1	0	56	0	56	0	51	0	56	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	224

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS/MSD, and DUPs

L:\Arcadis\Fort Devens\49830ST.wpd

Data Validation Report for 6801908851

Facility:	Former Fort Devens, Long Term Monitoring
Event:	Seres-Arcadis JV, Long Term Monitoring, SHL, Fall 2020
SDG:	6801908851
Guidance Document:	Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020
Prime Contractor:	Seres-Arcadis JV
Project Manager:	Jennifer Singer
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	Laboratory Data Consultants, Inc.
Data Review Level:	2B
Primary Data Reviewer:	Kevin Kha, Environmental Scientist
Second Reviewer:	Pei Geng, Senior Scientist
Date Submitted:	December 14, 2020

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	A2320B	SW6010C - Dissolved	SW6020A - Dissolved	SW9056A	SW9060A - Dissolved
SHL-11-FAL20	680-190885-1	Water	Field Sample/N	X	X	X	X	X
SHL-20-FAL20	680-190885-2	Water	Field Sample/N	X	X	X	X	X
SHM-13-03-FAL20	680-190885-3	Water	Field Sample/N	X	X	X	X	X
SHM-13-14D-FAL20	680-190885-4	Water	Field Sample/N	X	X	X	X	X
SHM-13-14S-FAL20	680-190885-5	Water	Field Sample/N	X	X	X	X	X
SHM-13-15-FAL20	680-190885-6	Water	Field Sample/N	X	X	X	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at 2B data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by Seres-Arcadis JV; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 6801908851. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Calibration Blank
- Calibration Blank - Negative
- Continuing Calibration Verification
- Interference Check Sample A
- Interference Check Sample A - Negative
- Interference Check Sample AB
- Lab Blank
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 1 results (2.38%) out of the 42 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

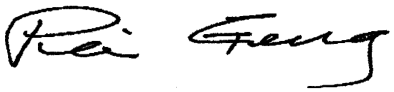
Narrative Comments

Analytical Method	Data Reviewer Comment
SW6020A	No additional comments; see Checklist for detail.
SW9060A	No additional comments; see Checklist for detail.
A2320B	No additional comments; see Checklist for detail.
SW9056A	No additional comments; see Checklist for detail.
SW6010C	No additional comments; see Checklist for detail.

December 14, 2020

Reviewed by Kevin Kha, Environmental Scientist, Laboratory Data Consultants, Inc.

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.



Reviewed by Pei Geng, Senior Scientist, Laboratory Data Consultants, Inc.

March 16, 2021

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW6010C, Dissolved, Calibration Blank

The purpose of calibration blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in calibration blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
CCB680642498244 (CB)/ CCB680642498244	Iron	18.10	< 17	< 50	ug/l	U/None	B2	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Calibration Blank for SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHM-13-14D-FAL20	N	Iron	50.0	37.0 J	50.0 U		ug/l	B2/L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6010C, Dissolved, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB6806421291A (LB)/ MB6806421291A	Iron	18.20	< 17	< 50	ug/l	U/None	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Lab Blank for SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHM-13-14D-FAL20	N	Iron	50.0	37.0 J	50.0 U		ug/l	B2/L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6010C, Dissolved, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
SHL-11-FAL20 (SD)/ 680-190885-1	Manganese	115.0	90 - 114	10 - 125	percent	J/None	M	Spike amount Insignificant
SHL-11-FAL20 (MS)/ 680-190885-1	Manganese	125.0	90 - 114	10 - 125	percent	J/None	M	Spike amount Insignificant
SHL-11-FAL20 (SD)/ 680-190885-1	Iron	132.0	87 - 115	10 - 125	percent	J/None	M	Spike amount Insignificant
SHL-11-FAL20 (MS)/ 680-190885-1	Iron	148.0	87 - 115	10 - 125	percent	J/None	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6020A, Dissolved, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
SHL-11-FAL20 (SD)/ 680-190885-1	Arsenic	150.0	84 - 116	10 - 125	percent	J/None	M	Spike amount Insignificant
SHL-11-FAL20 (MS)/ 680-190885-1	Arsenic	70.00	84 - 116	10 - 125	percent	J/UJ	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Table of All Qualified Results

Test Method: SW6010C	**Extraction Method: Dissolved**							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHM-13-14D-FAL20	N	Iron	50.0	37.0 J	50.0 U		ug/l	B2/L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition
B2	CCB
L	Lab Blank
M	MS Recovery
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

Review Questions

Method: A2320B (Alkalinity by Titrimetric Method)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes reported in the field blank(s) less than MDL?			•	A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?		•		MS/MSD not performed.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Due to method blank and calibration blank contamination, the iron result in sample SHM-13 -14D-FAL20 was qualified as non-detected (U).
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Although iron and manganese %R were not within acceptance limits, no data were qualified since parent sample concentrations were significantly greater (>4X) than the spike amount.
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Data Validation Report for 6801908851

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Although arsenic %R was not within acceptance limits, no data were qualified since parent sample concentrations were significantly greater (>4X) than the spike amount.
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Data Validation Report for 6801908851

Review Questions

Method: SW9056A (Anion Chromatography)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?		•		MS/MSD not performed.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Data Validation Report for 6801908851

Review Questions

Method: SW9060A (Total Organic Carbon)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

ARCADIS U.S., Inc.
3109 West Martin Luther King Jr. Blvd, Suite 350
Tampa, FL 33607
ATTN: Mr. Nathan Mullens
nrmullens@seres-es.com

February 19, 2021

SUBJECT: Fort Devens, Data Validation

Dear Mr. Mullens,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on December 1, 2020. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #49830:

SDG #	Fraction
680-190620-1, 680-190870-1 680-190885-1, 680-190931-1 680-191084-1, 680-190870-2 680-191084-2, 680-191377-2	Volatiles, Organochlorine Pesticides, Dissolved Metals, Alkalinity, Wet Chemistry

The data validation was performed under Stage 2B guidelines. The analyses were validated using the following documents and variances, as applicable to each method:

- Former Fort Devens Army Installation – BRAC Legacy Sites, Devens, MA; October 2020
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

262 pages-ADV 2 WEEK TAT Attachment 1

Stage 2B EQUIS EDD

LDC #49830 (Arcadis-Millersville, MD / Fort Devens)

LDC	SDG#	DATE REC'D	(3) DATE DUE	VOA (8260B)		Pest. (8081B)		Metals (6010C/ 6020A)		Alk. (2320B)		DOC (9060A)		Cl,SO_4 (9056A)		COD (410.4)		CN (9012B)																					
Matrix: Water/Soil				W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	680-190620-1	12/01/20	12/15/20	-	-	-	-	8	0	8	0	8	0	8	0	-	-	-	-																				
B	680-190870-1	12/01/20	12/15/20	-	-	-	-	13	0	13	0	13	0	13	0	-	-	-	-																				
C	680-190885-1	12/01/20	12/15/20	-	-	-	-	6	0	6	0	6	0	6	0	-	-	-	-																				
D	680-190931-1	12/01/20	12/15/20	-	-	-	-	12	0	12	0	12	0	12	0	-	-	-	-																				
E	680-191084-1	12/01/20	12/15/20	-	-	-	-	12	0	12	0	12	0	12	0	-	-	-	-																				
F	680-190870-2	12/01/20	12/15/20	2	0	-	-	-	-	-	-	-	-	-	-	1	0	1	0																				
G	680-191084-2	12/01/20	12/15/20	-	-	1	0	-	-	-	-	-	-	-	-	-	-	-	-																				
H	680-191377-2	12/01/20	12/15/20	-	-	-	-	5	0	5	0	-	-	5	0	-	-	-	-																				
Total	J/PG			2	0	1	0	56	0	56	0	51	0	56	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	224

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS/MSD, and DUPs

L:\Arcadis\Fort Devens\49830ST.wpd

Data Validation Report for 6801909311

Facility:	Former Fort Devens, Long Term Monitoring
Event:	Seres-Arcadis JV, Long Term Monitoring, SHL, Fall 2020
SDG:	6801909311
Guidance Document:	Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020
Prime Contractor:	Seres-Arcadis JV
Project Manager:	Jennifer Singer
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	Laboratory Data Consultants, Inc.
Data Review Level:	2B
Primary Data Reviewer:	Kevin Kha, Environmental Scientist
Second Reviewer:	Pei Geng, Senior Scientist
Date Submitted:	December 14, 2020

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	A2320B	SW6010C - Dissolved	SW6020A - Dissolved	SW9056A	SW9060A - Dissolved
EPA-PZ-2012-3A-FAL20	680-190931-1	Water	Field Sample/N	X	X	X	X	X
EPA-PZ-2012-3B-FAL20	680-190931-2	Water	Field Sample/N	X	X	X	X	X
PZ-12-01-FAL20	680-190931-3	Water	Field Sample/N	X	X	X	X	X
PZ-12-02-FAL20	680-190931-4	Water	Field Sample/N	X	X	X	X	X
PZ-12-03-FAL20	680-190931-5	Water	Field Sample/N	X	X	X	X	X
SHL-15-FAL20	680-190931-6	Water	Field Sample/N	X	X	X	X	X
SHL-DUP03-FAL20	680-190931-7	Water	Field Duplicate/FD	X	X	X	X	X
SHM-10-15-FAL20	680-190931-8	Water	Field Sample/N	X	X	X	X	X
SHM-11-06-FAL20	680-190931-9	Water	Field Sample/N	X	X	X	X	X
SHM-99-31A-FAL20	680-190931-10	Water	Field Sample/N	X	X	X	X	X
SHP-2016-3A-FAL20	680-190931-11	Water	Field Sample/N	X	X	X	X	X
SHP-99-29X-FAL20	680-190931-12	Water	Field Sample/N	X	X	X	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at 2B data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by Seres-Arcadis JV; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 6801909311. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Calibration Blank
- Calibration Blank - Negative
- Continuing Calibration Verification
- Field Duplicate RPD
- Interference Check Sample A
- Interference Check Sample A - Negative
- Interference Check Sample AB
- Lab Blank
- Lab Replicate RPD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 3 results (3.57%) out of the 84 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW6020A	No additional comments; see Checklist for detail.
SW9056A	No additional comments; see Checklist for detail.
A2320B	No additional comments; see Checklist for detail.
SW9060A	No additional comments; see Checklist for detail.
SW6010C	Due to serial dilution %D, iron and manganese in sample SHM-11-06-FAL20 were qualified as detected estimated (J).

December 14, 2020

Reviewed by Kevin Kha, Environmental Scientist, Laboratory Data Consultants, Inc.

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

Reviewed by Pei Geng, Senior Scientist, Laboratory Data Consultants, Inc.

March 16, 2021

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method A2320B, Calibration Blank

The purpose of calibration blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in calibration blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
CCB28051638717 (CB)/ CCB28051638717	Alkalinity, Total (as CaCO3)	4.740	< 3.1	< 10	mg/l	U/None	B2	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method A2320B, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB28051638731 (LB)/ MB28051638731	Alkalinity, Total (as CaCO3)	5.110	< 3.1	< 10	mg/l	U/None	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Lab Blank for A2320B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHM-99-31A-FAL20	N	Alkalinity, Total (as CaCO3)	14.0	14.0 B	14.0 U		mg/l	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6010C, Dissolved, Calibration Blank

The purpose of calibration blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in calibration blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
CCB68064297059 (CB)/ CCB68064297059	Iron	20.80	< 17	< 50	ug/l	U/None	B2	
CCB680643776142 (CB)/ CCB680643776142	Iron	23.90	< 17	< 50	ug/l	U/None	B2	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6010C, Dissolved, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
SHM-11-06-FAL20 (MS)/ 680-190931-9	Iron	80.00	87 - 115	10 - 125	percent	J/UJ	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6020A, Dissolved, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
SHM-11-06-FAL20 (SD)/ 680-190931-9	Arsenic	129.0	84 - 116	10 - 125	percent	J/None	M	Spike amount Insignificant
SHM-11-06-FAL20 (MS)/ 680-190931-9	Arsenic	136.0	84 - 116	10 - 125	percent	J/None	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Table of All Qualified Results

Test Method: A2320B	**Extraction Method: NONE**							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHM-99-31A-FAL20	N	Alkalinity, Total (as CaCO3)	14.0	14.0 B	14.0 U		mg/l	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of Results with Modified Qualifiers

Modified Qualifiers for test method A2320B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
SHM-99-31A-FAL20	N	Alkalinity, Total (as CaCO3)	14.0	14.0 B	14.0 J	14.0 U	L

Modified Qualifiers for test method SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
SHM-11-06-FAL20	N	Iron	50.0	62000 J	62000	62000 J	A
SHM-11-06-FAL20	N	Manganese	10.0	1600	1600	1600 J	A

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
A	Serial dilution
B2	CCB
L	Lab Blank
M	MS Recovery
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

Review Questions

Method: A2320B (Alkalinity by Titrimetric Method)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Due to method blank contamination, 1 alkalinity result was qualified as not detected (U).
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?		•		
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?	•			A DUP was prepared and analyzed for alkalinity. RPD was within project limits.
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported or as qualified during data validation.

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Although iron was detected in the calibration blanks, the associated sample results were significantly greater than the concentration found in the calibration blanks, therefore no data were qualified.
Were target analytes reported in the field blank(s) less than MDL?			•	A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Although iron %R was not within acceptance limits, no data were qualified since sample concentrations were significantly greater (>4X) than the spike amount.
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported or as qualified during data validation.

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes reported in the field blank(s) less than MDL?			•	A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Although arsenic %R was not within acceptance limits, no data were qualified since sample concentrations were significantly greater (>4X) than the spike amount.
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW9056A (Anion Chromatography)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Data Validation Report for 6801909311

Review Questions

Method: SW9060A (Total Organic Carbon)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes reported in the field blank(s) less than MDL?			•	A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Field Duplicate Report By SDG
Former Fort Devens, Long Term Monitoring
Seres-Arcadis JV, Long Term Monitoring, SHL, Fall 2020
Field Duplicates for SDG: 6801909311

Location	Analysis
SHM-11-06	A2320B

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHM-11-06-FAL20 / SHL-DUP03-FAL20	680-190931-9 / 680-190931-7	Alkalinity, Total (as CaCO3)	150	150	10.0	0.00	30	OK	NA

Location	Analysis
SHM-11-06	SW6010C

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHM-11-06-FAL20 / SHL-DUP03-FAL20	680-190931-9 / 680-190931-7	Iron (FLDFLT)	62000	56000	50.0	10.2	30	OK	NA
SHM-11-06-FAL20 / SHL-DUP03-FAL20	680-190931-9 / 680-190931-7	Manganese (FLDFLT)	1600	1400	10.0	13.3	30	OK	NA

Location	Analysis
SHM-11-06	SW6020A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHM-11-06-FAL20 / SHL-DUP03-FAL20	680-190931-9 / 680-190931-7	Arsenic (FLDFLT)	620	680	3.00	9.23	30	OK	NA

Location	Analysis
SHM-11-06	SW9056A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHM-11-06-FAL20 / SHL-DUP03-FAL20	680-190931-9 / 680-190931-7	Chloride	55.0	55.0	0.500	0.00	30	OK	NA
SHM-11-06-FAL20 / SHL-DUP03-FAL20	680-190931-9 / 680-190931-7	Sulfate	9.60	9.30	1.00	3.17	30	OK	NA

FD = Field Duplicate
RL = Reporting Limit
RPD = Relative Percent Difference

RL Check = If either the primary sample or field duplicate result is less than 5 times the RL then the criteria used to determine if the field duplicate is outside QC limits is +/- RL for Water and +/- 2 times RL for Soil"

Field Duplicate Report By SDG
Former Fort Devens, Long Term Monitoring
Seres-Arcadis JV, Long Term Monitoring, SHL, Fall 2020
Field Duplicates for SDG: 6801909311

Location	Analysis
SHM-11-06	SW9060A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHM-11-06-FAL20 / SHL-DUP03-FAL20	680-190931-9 / 680-190931-7	Dissolved Organic Carbon (FLDFLT)	1.80	1.70	1.00	5.71	30	NA	OK

FD = Field Duplicate
RL = Reporting Limit
RPD = Relative Percent Difference

RL Check = If either the primary sample or field duplicate result is less than 5 times the RL then the criteria used to determine if the field duplicate is outside QC limits is +/- RL for Water and +/- 2 times RL for Soil"

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

ARCADIS U.S., Inc.
3109 West Martin Luther King Jr. Blvd, Suite 350
Tampa, FL 33607
ATTN: Mr. Nathan Mullens
nrmullens@seres-es.com

February 19, 2021

SUBJECT: Fort Devens, Data Validation

Dear Mr. Mullens,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on December 1, 2020. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #49830:

SDG #	Fraction
680-190620-1, 680-190870-1 680-190885-1, 680-190931-1 680-191084-1, 680-190870-2 680-191084-2, 680-191377-2	Volatiles, Organochlorine Pesticides, Dissolved Metals, Alkalinity, Wet Chemistry

The data validation was performed under Stage 2B guidelines. The analyses were validated using the following documents and variances, as applicable to each method:

- Former Fort Devens Army Installation – BRAC Legacy Sites, Devens, MA; October 2020
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

262 pages-ADV 2 WEEK TAT Attachment 1

Stage 2B EQUIS EDD

LDC #49830 (Arcadis-Millersville, MD / Fort Devens)

LDC	SDG#	DATE REC'D	(3) DATE DUE	VOA (8260B)		Pest. (8081B)		Metals (6010C/ 6020A)		Alk. (2320B)		DOC (9060A)		Cl,SO_4 (9056A)		COD (410.4)		CN (9012B)																					
Matrix: Water/Soil				W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	680-190620-1	12/01/20	12/15/20	-	-	-	-	8	0	8	0	8	0	8	0	-	-	-	-																				
B	680-190870-1	12/01/20	12/15/20	-	-	-	-	13	0	13	0	13	0	13	0	-	-	-	-																				
C	680-190885-1	12/01/20	12/15/20	-	-	-	-	6	0	6	0	6	0	6	0	-	-	-	-																				
D	680-190931-1	12/01/20	12/15/20	-	-	-	-	12	0	12	0	12	0	12	0	-	-	-	-																				
E	680-191084-1	12/01/20	12/15/20	-	-	-	-	12	0	12	0	12	0	12	0	-	-	-	-																				
F	680-190870-2	12/01/20	12/15/20	2	0	-	-	-	-	-	-	-	-	-	-	1	0	1	0																				
G	680-191084-2	12/01/20	12/15/20	-	-	1	0	-	-	-	-	-	-	-	-	-	-	-	-																				
H	680-191377-2	12/01/20	12/15/20	-	-	-	-	5	0	5	0	-	-	5	0	-	-	-	-																				
Total	J/PG			2	0	1	0	56	0	56	0	51	0	56	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	224

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS/MSD, and DUPs

L:\Arcadis\Fort Devens\49830ST.wpd

Data Validation Report for 6801910841

Facility:	Former Fort Devens, Long Term Monitoring
Event:	Seres-Arcadis JV, Long Term Monitoring, SHL, Fall 2020
SDG:	6801910841
Guidance Document:	Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020
Prime Contractor:	Seres-Arcadis JV
Project Manager:	Jennifer Singer
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	Laboratory Data Consultants, Inc.
Data Review Level:	2B
Primary Data Reviewer:	Kevin Kha, Environmental Scientist
Second Reviewer:	Pei Geng, Senior Scientist
Date Submitted:	December 14, 2020

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	A2320B	SW6010C - Dissolved	SW6020A - Dissolved	SW9056A	SW9060A - Dissolved
PZ-12-04-FAL20	680-191084-1	Water	Field Sample/N	X	X	X	X	X
PZ-12-05-FAL20	680-191084-2	Water	Field Sample/N	X	X	X	X	X
PZ-12-06-FAL20	680-191084-3	Water	Field Sample/N	X	X	X	X	X
SHL-12-FAL20	680-191084-4	Water	Field Sample/N	X	X	X	X	X
SHL-22-FAL20	680-191084-5	Water	Field Sample/N	X	X	X	X	X
SHL-7-FAL20	680-191084-6	Water	Field Sample/N	X	X	X	X	X
SHL-9-FAL20	680-191084-7	Water	Field Sample/N	X	X	X	X	X
SHL-DUP07-FAL20	680-191084-8	Water	Field Duplicate/FD	X	X	X	X	X
SHM-11-02-FAL20	680-191084-9	Water	Field Sample/N	X	X	X	X	X
SHM-93-22B-FAL20	680-191084-10	Water	Field Sample/N	X	X	X	X	X
SHM-93-22C-FAL20	680-191084-11	Water	Field Sample/N	X	X	X	X	X
SHP-2016-3B-FAL20	680-191084-12	Water	Field Sample/N	X	X	X	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at 2B data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by Seres-Arcadis JV; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 6801910841. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Calibration Blank
- Calibration Blank - Negative
- Continuing Calibration Verification
- Field Duplicate RPD
- Interference Check Sample A
- Interference Check Sample A - Negative
- Interference Check Sample AB
- Lab Blank
- Lab Replicate RPD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 15 results (17.86%) out of the 84 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

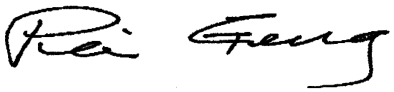
Narrative Comments

Analytical Method	Data Reviewer Comment
SW6020A	No additional comments; see Checklist for detail.
SW9056A	No additional comments; see Checklist for detail.
SW9060A	No additional comments; see Checklist for detail.
A2320B	No additional comments; see Checklist for detail.
SW6010C	No additional comments; see Checklist for detail.

December 14, 2020

Reviewed by Kevin Kha, Environmental Scientist, Laboratory Data Consultants, Inc.

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.



Reviewed by Pei Geng, Senior Scientist, Laboratory Data Consultants, Inc.

March 16, 2021

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW6010C, Dissolved, Calibration Blank

The purpose of calibration blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in calibration blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
CCB68064352710 (CB)/ CCB68064352710	Iron	24.50	< 17	< 50	ug/l	U/None	B2	
CCB68064352722 (CB)/ CCB68064352722	Iron	24.50	< 17	< 50	ug/l	U/None	B2	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Calibration Blank for SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHL-22-FAL20	N	Iron	50.0	40.0 J	50.0 U		ug/l	B2/L
SHL-DUP07-FAL20	FD	Iron	50.0	46.0 J	50.0 U		ug/l	B2/L
SHM-93-22C-FAL20	N	Iron	50.0	30.0 J	50.0 U		ug/l	B2/L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6010C, Dissolved, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB6806429361A (LB)/ MB6806429361A	Iron	17.10	< 17	< 50	ug/l	U/None	L	
MB6806429361A (LB)/ MB6806429361A	Manganese	2.740	< 1	< 10	ug/l	U/None	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Lab Blank for SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHL-22-FAL20	N	Iron	50.0	40.0 J	50.0 U		ug/l	B2/L
SHL-DUP07-FAL20	FD	Iron	50.0	46.0 J	50.0 U		ug/l	B2/L
SHM-93-22C-FAL20	N	Iron	50.0	30.0 J	50.0 U		ug/l	B2/L
SHM-93-22C-FAL20	N	Manganese	10.0	3.20 J	10.0 U		ug/l	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6010C, Dissolved, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
PZ-12-04-FAL20 (MS)/ 680-191084-1	Iron	72.00	87 - 115	10 - 125	percent	J/UJ	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6020A, Dissolved, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
PZ-12-04-FAL20 (MS)/ 680-191084-1	Arsenic	39.00	84 - 116	10 - 125	percent	J/UJ	M	Spike amount Insignificant
PZ-12-04-FAL20 (SD)/ 680-191084-1	Arsenic	5.000	84 - 116	10 - 125	percent	J/X	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Table of All Qualified Results

Test Method: SW6010C	**Extraction Method: Dissolved**							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHL-22-FAL20	N	Iron	50.0	40.0 J	50.0 U		ug/l	B2/L
SHL-DUP07-FAL20	FD	Iron	50.0	46.0 J	50.0 U		ug/l	B2/L
SHM-93-22C-FAL20	N	Iron	50.0	30.0 J	50.0 U		ug/l	B2/L
SHM-93-22C-FAL20	N	Manganese	10.0	3.20 J	10.0 U		ug/l	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW9060A, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
PZ-12-04-FAL20	N	Dissolved Organic Carbon	2.30	2.30	2.30	2.30 U	B2
PZ-12-05-FAL20	N	Dissolved Organic Carbon	2.30	2.30	2.30	2.30 U	B2
PZ-12-06-FAL20	N	Dissolved Organic Carbon	1.50	1.50	1.50	1.50 U	B2
SHL-12-FAL20	N	Dissolved Organic Carbon	1.70	1.70	1.70	1.70 U	B2
SHL-22-FAL20	N	Dissolved Organic Carbon	1.50	1.50	1.50	1.50 U	B2
SHL-7-FAL20	N	Dissolved Organic Carbon	1.00	1.00	1.00	1.00 U	B2
SHL-DUP07-FAL20	FD	Dissolved Organic Carbon	1.40	1.40	1.40	1.40 U	B2
SHM-11-02-FAL20	N	Dissolved Organic Carbon	1.30	1.30	1.30	1.30 U	B2
SHM-93-22B-FAL20	N	Dissolved Organic Carbon	1.40	1.40	1.40	1.40 U	B2
SHM-93-22C-FAL20	N	Dissolved Organic Carbon	2.80	2.80	2.80	2.80 U	B2
SHP-2016-3B-FAL20	N	Dissolved Organic Carbon	1.90	1.90	1.90	1.90 U	B2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
B2	CCB
L	Lab Blank
M	MS Recovery
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

Review Questions

Method: A2320B (Alkalinity by Titrimetric Method)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?			•	A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?		•		MS/MSD not performed.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?	•			A DUP was prepared and analyzed for Alkalinity. The RPD was within project acceptance limits.
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Data Validation Report for 6801910841

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Due to method blank and calibration blank contamination, three iron results and one manganese result were qualified as not detected (U).
Were target analytes reported in the field blank(s) less than MDL?			•	A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Although iron and manganese %R were not within acceptance limits, no data were qualified since sample concentrations were significantly greater (>4X) than the spike amount.
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported or as qualified during data validation.

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Although arsenic %R was not within project acceptance limits, no data were qualified since sample concentrations were significantly greater (>4X) than the spike amount.
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW9056A (Anion Chromatography)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Data Validation Report for 6801910841

Review Questions

Method: SW9060A (Total Organic Carbon)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Due to calibration blank contamination, 11 DOC results were qualified as not detected (U).
Were target analytes reported in the field blank(s) less than MDL?			•	A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported or as qualified during data validation.

Field Duplicate Report By SDG
Former Fort Devens, Long Term Monitoring
Seres-Arcadis JV, Long Term Monitoring, SHL, Fall 2020
Field Duplicates for SDG: 6801910841

Location	Analysis
SHL-22	A2320B

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHL-22-FAL20 / SHL-DUP07-FAL20	680-191084-5 / 680-191084-8	Alkalinity, Total (as CaCO3)	320	320	10.0	0.00	30	OK	NA

Location	Analysis
SHL-22	SW6010C

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHL-22-FAL20 / SHL-DUP07-FAL20	680-191084-5 / 680-191084-8	Iron (FLDFLT)	ND	ND	50.0	NA	30	NA	OK
SHL-22-FAL20 / SHL-DUP07-FAL20	680-191084-5 / 680-191084-8	Manganese (FLDFLT)	7700	8200	10.0	6.29	30	OK	NA

Location	Analysis
SHL-22	SW6020A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHL-22-FAL20 / SHL-DUP07-FAL20	680-191084-5 / 680-191084-8	Arsenic (FLDFLT)	2.40	2.20	3.00	8.70	30	NA	OK

Location	Analysis
SHL-22	SW9056A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHL-22-FAL20 / SHL-DUP07-FAL20	680-191084-5 / 680-191084-8	Chloride	29.0	29.0	0.500	0.00	30	OK	NA
SHL-22-FAL20 / SHL-DUP07-FAL20	680-191084-5 / 680-191084-8	Sulfate	8.90	8.90	1.00	0.00	30	OK	NA

FD = Field Duplicate
RL = Reporting Limit
RPD = Relative Percent Difference

RL Check = If either the primary sample or field duplicate result is less than 5 times the RL then the criteria used to determine if the field duplicate is outside QC limits is +/- RL for Water and +/- 2 times RL for Soil"

Field Duplicate Report By SDG
Former Fort Devens, Long Term Monitoring
Seres-Arcadis JV, Long Term Monitoring, SHL, Fall 2020
Field Duplicates for SDG: 6801910841

Location	Analysis
SHL-22	SW9060A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHL-22-FAL20 / SHL-DUP07-FAL20	680-191084-5 / 680-191084-8	Dissolved Organic Carbon (FLDFLT)	ND	ND	1.50	NA	30	NA	OK

FD = Field Duplicate
RL = Reporting Limit
RPD = Relative Percent Difference

RL Check = If either the primary sample or field duplicate result is less than 5 times the RL then the criteria used to determine if the field duplicate is outside QC limits is +/- RL for Water and +/- 2 times RL for Soil"

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

ARCADIS U.S., Inc.
3109 West Martin Luther King Jr. Blvd, Suite 350
Tampa, FL 33607
ATTN: Mr. Nathan Mullens
nrmullens@seres-es.com

February 19, 2021

SUBJECT: Fort Devens, Data Validation

Dear Mr. Mullens,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on December 1, 2020. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #49830:

SDG #	Fraction
680-190620-1, 680-190870-1 680-190885-1, 680-190931-1 680-191084-1, 680-190870-2 680-191084-2, 680-191377-2	Volatiles, Organochlorine Pesticides, Dissolved Metals, Alkalinity, Wet Chemistry

The data validation was performed under Stage 2B guidelines. The analyses were validated using the following documents and variances, as applicable to each method:

- Former Fort Devens Army Installation – BRAC Legacy Sites, Devens, MA; October 2020
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

262 pages-ADV 2 WEEK TAT Attachment 1

Stage 2B EQUIS EDD

LDC #49830 (Arcadis-Millersville, MD / Fort Devens)

LDC	SDG#	DATE REC'D	(3) DATE DUE	VOA (8260B)		Pest. (8081B)		Metals (6010C/ 6020A)		Alk. (2320B)		DOC (9060A)		Cl,SO_4 (9056A)		COD (410.4)		CN (9012B)																					
Matrix: Water/Soil				W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	680-190620-1	12/01/20	12/15/20	-	-	-	-	8	0	8	0	8	0	8	0	-	-	-	-																				
B	680-190870-1	12/01/20	12/15/20	-	-	-	-	13	0	13	0	13	0	13	0	-	-	-	-																				
C	680-190885-1	12/01/20	12/15/20	-	-	-	-	6	0	6	0	6	0	6	0	-	-	-	-																				
D	680-190931-1	12/01/20	12/15/20	-	-	-	-	12	0	12	0	12	0	12	0	-	-	-	-																				
E	680-191084-1	12/01/20	12/15/20	-	-	-	-	12	0	12	0	12	0	12	0	-	-	-	-																				
F	680-190870-2	12/01/20	12/15/20	2	0	-	-	-	-	-	-	-	-	-	-	1	0	1	0																				
G	680-191084-2	12/01/20	12/15/20	-	-	1	0	-	-	-	-	-	-	-	-	-	-	-	-																				
H	680-191377-2	12/01/20	12/15/20	-	-	-	-	5	0	5	0	-	-	5	0	-	-	-	-																				
Total	J/PG			2	0	1	0	56	0	56	0	51	0	56	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	224

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS/MSD, and DUPs

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Data Validation Report for 6801913772

Facility:	Former Fort Devens, Long Term Monitoring
Event:	Seres-Arcadis JV, Long Term Monitoring, SHL, Fall 2020
SDG:	6801913772
Guidance Document:	Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020
Prime Contractor:	Seres-Arcadis JV
Project Manager:	Jennifer Singer
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	Laboratory Data Consultants, Inc.
Data Review Level:	2B
Primary Data Reviewer:	Kevin Kha, Environmental Scientist
Second Reviewer:	Pei Geng, Senior Scientist
Date Submitted:	December 14, 2020

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	A2320B	SW6010C - Dissolved	SW6020A - Dissolved	SW9056A
EPA-PZ-2012-5A-FAL20	680-191377-1	Water	Field Sample/N	X	X	X	X
EPA-PZ-2012-5B-FAL20	680-191377-2	Water	Field Sample/N	X	X	X	X
SHL-DUP08-FAL20	680-191377-5	Water	Field Duplicate/FD	X	X	X	X
SHM-96-5B-FAL20	680-191377-12	Water	Field Sample/N	X	X	X	X
SHM-96-5C-FAL20	680-191377-13	Water	Field Sample/N	X	X	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at 2B data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by Seres-Arcadis JV; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 6801913772. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Calibration Blank
- Calibration Blank - Negative
- Continuing Calibration Verification
- Field Duplicate RPD
- Interference Check Sample A
- Interference Check Sample A - Negative
- Interference Check Sample AB
- Lab Blank
- Lab Replicate RPD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 1 results (3.33%) out of the 30 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

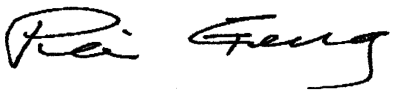
Narrative Comments

Analytical Method	Data Reviewer Comment
SW6020A	No additional comments; see Checklist for detail.
SW6010C	No additional comments; see Checklist for detail.
SW9056A	No additional comments; see Checklist for detail.
A2320B	No additional comments; see Checklist for detail.

December 14, 2020

Reviewed by Kevin Kha, Environmental Scientist, Laboratory Data Consultants, Inc.

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.



Reviewed by Pei Geng, Senior Scientist, Laboratory Data Consultants, Inc.

March 16, 2021

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method A2320B, Calibration Blank

The purpose of calibration blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in calibration blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
CCB28051729929 (CB)/ CCB28051729929	Alkalinity, Total (as CaCO3)	3.700	< 3.1	< 10	mg/l	U/None	B2	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6010C, Dissolved, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
EPA-PZ-2012-5A-FAL20 (SD)/ 680-191377-1	Iron	81.80	87 - 115	10 - 125	percent	J/UJ	M	
EPA-PZ-2012-5A-FAL20 (MS)/ 680-191377-1	Iron	86.00	87 - 115	10 - 125	percent	J/UJ	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
EPA-PZ-2012-5A-FAL20	N	Iron	50.0	5800 J	5800 J	-	ug/l	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Table of All Qualified Results

Test Method: SW6010C	**Extraction Method: Dissolved**							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
EPA-PZ-2012-5A-FAL20	N	Iron	50.0	5800 J	5800 J	-	ug/l	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition
B2	CCB
M	MS Recovery
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

Review Questions

Method: A2320B (Alkalinity by Titrimetric Method)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Although the calibration blank had detections for alkalinity, the associated sample results were significantly greater than the concentration found in the calibration blank, therefore no data were qualified.
Were target analytes reported in the field blank(s) less than MDL?			•	A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?		•		MS/MSD not performed.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?	•			A DUP was prepared and analyzed for alkalinity. The RPD was within project acceptance limits.
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Due to MS/MSD %R below acceptance limits, one iron result was qualified as detected estimated (J) with a low bias (-).
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported or as qualified during data validation.

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW9056A (Anion Chromatography)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Field Duplicate Report By SDG
Former Fort Devens, Long Term Monitoring
Seres-Arcadis JV, Long Term Monitoring, SHL, Fall 2020
Field Duplicates for SDG: 6801913772

Location	Analysis
SHM-96-5B	A2320B

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHM-96-5B-FAL20 / SHL-DUP08-FAL20	680-191377-12 / 680-191377-5	Alkalinity, Total (as CaCO3)	210	210	10.0	0.00	30	OK	NA

Location	Analysis
SHM-96-5B	SW6010C

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHM-96-5B-FAL20 / SHL-DUP08-FAL20	680-191377-12 / 680-191377-5	Iron (FLDFLT)	8600	8000	50.0	7.23	30	OK	NA
SHM-96-5B-FAL20 / SHL-DUP08-FAL20	680-191377-12 / 680-191377-5	Manganese (FLDFLT)	7900	7900	10.0	0.00	30	OK	NA

Location	Analysis
SHM-96-5B	SW6020A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHM-96-5B-FAL20 / SHL-DUP08-FAL20	680-191377-12 / 680-191377-5	Arsenic (FLDFLT)	720	640	3.00	11.8	30	OK	NA

Location	Analysis
SHM-96-5B	SW9056A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHM-96-5B-FAL20 / SHL-DUP08-FAL20	680-191377-12 / 680-191377-5	Chloride	35.0	35.0	0.500	0.00	30	OK	NA
SHM-96-5B-FAL20 / SHL-DUP08-FAL20	680-191377-12 / 680-191377-5	Sulfate	16.0	16.0	1.00	0.00	30	OK	NA

FD = Field Duplicate
RL = Reporting Limit
RPD = Relative Percent Difference

RL Check = If either the primary sample or field duplicate result is less than 5 times the RL then the criteria used to determine if the field duplicate is outside QC limits is +/- RL for Water and +/- 2 times RL for Soil"

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

ARCADIS U.S., Inc.
3109 West Martin Luther King Jr. Blvd, Suite 350
Tampa, FL 33607
ATTN: Mr. Nathan Mullens
nrmullens@seres-es.com

February 19, 2021

SUBJECT: Fort Devens, Data Validation

Dear Mr. Mullens,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on December 2, 2020. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #49841:

SDG #	Fraction
680-191150-1, 680-191218-1 680-191554-1	Dissolved Metals, Wet Chemistry

The data validation was performed under Stage 2B guidelines. The analyses were validated using the following documents and variances, as applicable to each method:

- Former Fort Devens Army Installation – BRAC Legacy Sites, Devens, MA; October 2020
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

116 pages-ADV

Attachment 1

Stage 2B EQUIS EDD

LDC #49841 (Arcadis-Millersville, MD / Fort Devens)

LDC	SDG#	DATE REC'D	(2) DATE DUE	3 D.Metal (6010C/ 6020A)		Alk. (2320B)		DOC (9060A)		Cl,SO_4 (9056A)																											
Matrix: Water/Soil				W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	680-191150-1	12/02/20	12/16/20	4	0	4	0	4	0	4	0																										
B	680-191218-1	12/02/20	12/16/20	15	0	15	0	15	0	15	0																										
C	680-191554-1	12/02/20	12/16/20	15	0	14	0	14	0	14	0																										
Total	T/PG			34	0	33	0	33	0	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	133

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS/MSD, and DUPs

L:\Arcadis\Fort Devens\49841ST.wpd

Data Validation Report for 6801911501

Facility:	Former Fort Devens, Long Term Monitoring
Event:	Seres-Arcadis JV, Long Term Monitoring, SHL, Fall 2020
SDG:	6801911501
Guidance Document:	Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020
Prime Contractor:	Seres-Arcadis JV
Project Manager:	Jennifer Singer
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	Laboratory Data Consultants, Inc.
Data Review Level:	2B
Primary Data Reviewer:	Kevin Kha, Environmental Scientist
Second Reviewer:	Pei Geng, Senior Scientist
Date Submitted:	December 15, 2020

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	A2320B	SW6010C - Dissolved	SW6020A - Dissolved	SW9056A	SW9060A - Dissolved
EPA-PZ-2012-2A-FAL20	680-191150-4	Water	Field Sample/N	X	X	X	X	X
EPA-PZ-2012-2B-FAL20	680-191150-5	Water	Field Sample/N	X	X	X	X	X
PZ-12-07-FAL20	680-191150-6	Water	Field Sample/N	X	X	X	X	X
PZ-12-08-FAL20	680-191150-7	Water	Field Sample/N	X	X	X	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at 2B data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by Seres-Arcadis JV; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 6801911501. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Calibration Blank
- Calibration Blank - Negative
- Continuing Calibration Verification
- Interference Check Sample A
- Interference Check Sample A - Negative
- Interference Check Sample AB
- Lab Blank
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 5 results (17.86%) out of the 28 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

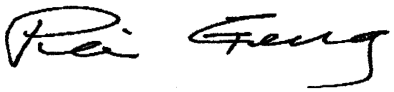
Narrative Comments

Analytical Method	Data Reviewer Comment
SW6020A	No additional comments; see Checklist for detail.
SW9060A	No additional comments; see Checklist for detail.
SW9056A	No additional comments; see Checklist for detail.
SW6010C	No additional comments; see Checklist for detail.
A2320B	No additional comments; see Checklist for detail.

December 15, 2020

Reviewed by Kevin Kha, Environmental Scientist, Laboratory Data Consultants, Inc.

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.



Reviewed by Pei Geng, Senior Scientist, Laboratory Data Consultants, Inc.

March 16, 2021

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW6010C, Dissolved, Calibration Blank

The purpose of calibration blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in calibration blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
CCB680643527226 (CB)/ CCB680643527226	Iron	19.80	< 17	< 50	ug/l	U/None	B2	
CCB680643527250 (CB)/ CCB680643527250	Iron	17.30	< 17	< 50	ug/l	U/None	B2	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Calibration Blank for SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
EPA-PZ-2012-2A-FAL20	N	Iron	50.0	27.0 J	50.0 U		ug/l	B2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6010C, Dissolved, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
EPA-PZ-2012-2B-FAL20 (MS)/ 680-191150-5	Manganese	60.00	90 - 114	10 - 125	percent	J/UJ	M	Spike amount Insignificant
EPA-PZ-2012-2B-FAL20 (SD)/ 680-191150-5	Manganese	65.00	90 - 114	10 - 125	percent	J/UJ	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6020A, Dissolved, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
EPA-PZ-2012-2B-FAL20 (SD)/ 680-191150-5	Arsenic	122.0	84 - 116	10 - 125	percent	J/None	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW9060A, Dissolved, Calibration Blank

The purpose of calibration blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in calibration blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
CCB (CB)	Dissolved Organic Carbon	0.4890	< 0	< 0	mg/l	None/None	B2	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Calibration Blank for SW9060A, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
EPA-PZ-2012-2A-FAL20	N	Dissolved Organic Carbon	1.00	0.740 J	1.00 U		mg/l	B2
EPA-PZ-2012-2B-FAL20	N	Dissolved Organic Carbon	1.40	1.40	1.40 U		mg/l	B2
PZ-12-07-FAL20	N	Dissolved Organic Carbon	1.40	1.40	1.40 U		mg/l	B2
PZ-12-08-FAL20	N	Dissolved Organic Carbon	1.70	1.70 B	1.70 U		mg/l	L/B2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW9060A, Dissolved, Calibration Blank

The purpose of calibration blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in calibration blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
CCB (CB)/ 680-191150-7	Dissolved Organic Carbon	0.5600	< 0	< 0	mg/l	None/None	B2	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Calibration Blank for SW9060A, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
EPA-PZ-2012-2A-FAL20	N	Dissolved Organic Carbon	1.00	0.740 J	1.00 U		mg/l	B2
EPA-PZ-2012-2B-FAL20	N	Dissolved Organic Carbon	1.40	1.40	1.40 U		mg/l	B2
PZ-12-07-FAL20	N	Dissolved Organic Carbon	1.40	1.40	1.40 U		mg/l	B2
PZ-12-08-FAL20	N	Dissolved Organic Carbon	1.70	1.70 B	1.70 U		mg/l	L/B2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW9060A, Dissolved, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB28051734870 (LB)/ MB28051734870	Dissolved Organic Carbon	0.6210	< 0.35	< 1	mg/l	U/None	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Lab Blank for SW9060A, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
PZ-12-08-FAL20	N	Dissolved Organic Carbon	1.70	1.70 B	1.70 U		mg/l	L/B2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Table of All Qualified Results

Test Method: SW6010C	Extraction Method: Dissolved							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
EPA-PZ-2012-2A-FAL20	N	Iron	50.0	27.0 J	50.0 U		ug/l	B2

Test Method: SW9060A	Extraction Method: Dissolved							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
EPA-PZ-2012-2A-FAL20	N	Dissolved Organic Carbon	1.00	0.740 J	1.00 U		mg/l	B2
EPA-PZ-2012-2B-FAL20	N	Dissolved Organic Carbon	1.40	1.40	1.40 U		mg/l	B2
PZ-12-07-FAL20	N	Dissolved Organic Carbon	1.40	1.40	1.40 U		mg/l	B2
PZ-12-08-FAL20	N	Dissolved Organic Carbon	1.70	1.70 B	1.70 U		mg/l	L/B2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW9060A, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
EPA-PZ-2012-2A-FAL20	N	Dissolved Organic Carbon	1.00	0.740 J	0.740 J	1.00 U	B2
EPA-PZ-2012-2B-FAL20	N	Dissolved Organic Carbon	1.40	1.40	1.40	1.40 U	B2
PZ-12-07-FAL20	N	Dissolved Organic Carbon	1.40	1.40	1.40	1.40 U	B2
PZ-12-08-FAL20	N	Dissolved Organic Carbon	1.70	1.70 B	1.70 U	1.70 U	L/B2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
B2	CCB
L	Lab Blank
M	MS Recovery
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

Review Questions

Method: A2320B (Alkalinity by Titrimetric Method)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes reported in the field blank(s) less than MDL?			•	A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?		•		MS/MSD not performed.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Due to calibration blank contamination, 1 iron result was qualified as not detected (U).
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Although manganese was not within acceptance limits, no data were qualified since sample concentrations were significantly greater (>4X) than the spike amount.
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported or as qualified during data validation.

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Although arsenic %R was above acceptance limits, the associated sample result was not detected, therefore no data were qualified.
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW9056A (Anion Chromatography)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?		•		MS/MSD not performed,
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Data Validation Report for 6801911501

Review Questions

Method: SW9060A (Total Organic Carbon)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Due to method blank and calibration blank contamination, 4 DOC results were qualified as not detected (U).
Were target analytes reported in the field blank(s) less than MDL?			•	A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?		•		MS/MSD not performed,
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported or as qualified during data validation.

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

ARCADIS U.S., Inc.
3109 West Martin Luther King Jr. Blvd, Suite 350
Tampa, FL 33607
ATTN: Mr. Nathan Mullens
nrmullens@seres-es.com

February 19, 2021

SUBJECT: Fort Devens, Data Validation

Dear Mr. Mullens,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on December 2, 2020. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #49841:

SDG #	Fraction
680-191150-1, 680-191218-1 680-191554-1	Dissolved Metals, Wet Chemistry

The data validation was performed under Stage 2B guidelines. The analyses were validated using the following documents and variances, as applicable to each method:

- Former Fort Devens Army Installation – BRAC Legacy Sites, Devens, MA; October 2020
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

116 pages-ADV

Attachment 1

Stage 2B EQUIS EDD

LDC #49841 (Arcadis-Millersville, MD / Fort Devens)

LDC	SDG#	DATE REC'D	(2) DATE DUE	3 D.Metal (6010C/ 6020A)		Alk. (2320B)		DOC (9060A)		Cl,SO_4 (9056A)																											
Matrix: Water/Soil				W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	680-191150-1	12/02/20	12/16/20	4	0	4	0	4	0	4	0																										
B	680-191218-1	12/02/20	12/16/20	15	0	15	0	15	0	15	0																										
C	680-191554-1	12/02/20	12/16/20	15	0	14	0	14	0	14	0																										
Total	T/PG			34	0	33	0	33	0	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	133

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS/MSD, and DUPs

L:\Arcadis\Fort Devens\49841ST.wpd

Data Validation Report for 6801912181

Facility:	Former Fort Devens, Long Term Monitoring
Event:	Seres-Arcadis JV, Long Term Monitoring, SHL, Fall 2020
SDG:	6801912181
Guidance Document:	Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020
Prime Contractor:	Seres-Arcadis JV
Project Manager:	Jennifer Singer
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	Laboratory Data Consultants, Inc.
Data Review Level:	2B
Primary Data Reviewer:	Kevin Kha, Environmental Scientist
Second Reviewer:	Pei Geng, Senior Scientist
Date Submitted:	December 15, 2020

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	A2320B	SW6010C - Dissolved	SW6020A - Dissolved	SW9056A	SW9060A - Dissolved
EPA-PZ-2012-7A-FAL20	680-191218-14	Water	Field Sample/N	X	X	X	X	X
EPA-PZ-2012-7B-FAL20	680-191218-15	Water	Field Sample/N	X	X	X	X	X
SHM-05-41A-FAL20	680-191218-11	Water	Field Sample/N	X	X	X	X	X
SHM-05-41B-FAL20	680-191218-12	Water	Field Sample/N	X	X	X	X	X
SHM-05-41C-FAL20	680-191218-13	Water	Field Sample/N	X	X	X	X	X
SHM-13-02-FAL20	680-191218-1	Water	Field Sample/N	X	X	X	X	X
SHM-13-04-FAL20	680-191218-2	Water	Field Sample/N	X	X	X	X	X
SHM-13-05-FAL20	680-191218-3	Water	Field Sample/N	X	X	X	X	X
SHM-13-07-FAL20	680-191218-4	Water	Field Sample/N	X	X	X	X	X
SHP-2016-1A-FAL20	680-191218-5	Water	Field Sample/N	X	X	X	X	X
SHP-2016-1B-FAL20	680-191218-6	Water	Field Sample/N	X	X	X	X	X
SHP-2016-2A-FAL20	680-191218-7	Water	Field Sample/N	X	X	X	X	X
SHP-2016-2B-FAL20	680-191218-8	Water	Field Sample/N	X	X	X	X	X
SHP-2016-4A-FAL20	680-191218-9	Water	Field Sample/N	X	X	X	X	X
SHP-2016-4B-FAL20	680-191218-10	Water	Field Sample/N	X	X	X	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at 2B data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by Seres-Arcadis JV; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 6801912181. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Calibration Blank
- Calibration Blank - Negative
- Continuing Calibration Verification
- Interference Check Sample A
- Interference Check Sample A - Negative
- Interference Check Sample AB
- Lab Blank
- Lab Replicate RPD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 18 results (17.14%) out of the 105 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

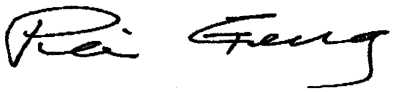
Narrative Comments

Analytical Method	Data Reviewer Comment
SW6020A	No additional comments; see Checklist for detail.
A2320B	No additional comments; see Checklist for detail.
SW6010C	No additional comments; see Checklist for detail.
SW9056A	No additional comments; see Checklist for detail.
SW9060A	No additional comments; see Checklist for detail.

December 15, 2020

Reviewed by Kevin Kha, Environmental Scientist, Laboratory Data Consultants, Inc.

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.



Reviewed by Pei Geng, Senior Scientist, Laboratory Data Consultants, Inc.

March 16, 2021

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW6010C, Dissolved, Calibration Blank

The purpose of calibration blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in calibration blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
CCB680643527106 (CB)/ CCB680643527106	Iron	25.20	< 17	< 50	ug/l	U/None	B2	
CCB680643527118 (CB)/ CCB680643527118	Iron	18.50	< 17	< 50	ug/l	U/None	B2	
CCB68064352794 (CB)/ CCB68064352794	Iron	26.40	< 17	< 50	ug/l	U/None	B2	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Calibration Blank for SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHM-13-02-FAL20	N	Iron	50.0	34.0 J	50.0 U		ug/l	B2
SHP-2016-2A-FAL20	N	Iron	120	120	120 U		ug/l	B2
SHP-2016-4B-FAL20	N	Iron	50.0	33.0 J	50.0 U		ug/l	B2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6010C, Dissolved, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
SHM-05-41C-FAL20 (MS)/ 680-191218-13	Manganese	70.00	90 - 114	10 - 125	percent	J/UJ	M	Spike amount Insignificant
SHM-05-41C-FAL20 (SD)/ 680-191218-13	Manganese	70.00	90 - 114	10 - 125	percent	J/UJ	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6020A, Dissolved, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
SHM-05-41C-FAL20 (MS)/ 680-191218-13	Arsenic	145.0	84 - 116	10 - 125	percent	J/None	M	Spike amount Insignificant
SHM-13-04-FAL20 (SD)/ 680-191218-2	Arsenic	196.0	84 - 116	10 - 125	percent	J/None	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW6020A, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHM-13-04-FAL20	N	Arsenic	3.00	260 J	260 J	+	ug/l	M/D

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6020A, Dissolved, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
SHM-13-04-FAL20 (SD)/ 680-191218-2	Arsenic	24.35	< 20	< 20	rpd	J/UJ	D	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS RPD for SW6020A, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHM-13-04-FAL20	N	Arsenic	3.00	260 J	260 J	+	ug/l	M/D

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW9060A, Dissolved, Calibration Blank

The purpose of calibration blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in calibration blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
CCB (CB)	Dissolved Organic Carbon	0.4890	< 0	< 0	mg/l	None/None	B2	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Calibration Blank for SW9060A, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
EPA-PZ-2012-7A-FAL20	N	Dissolved Organic Carbon	1.00	0.970 J	1.00 U		mg/l	B2
EPA-PZ-2012-7B-FAL20	N	Dissolved Organic Carbon	1.10	1.10	1.10 U		mg/l	B2
SHM-05-41A-FAL20	N	Dissolved Organic Carbon	1.00	0.860 J	1.00 U		mg/l	B2
SHM-05-41B-FAL20	N	Dissolved Organic Carbon	1.70	1.70	1.70 U		mg/l	B2
SHM-13-02-FAL20	N	Dissolved Organic Carbon	1.50	1.50	1.50 U		mg/l	B2
SHM-13-04-FAL20	N	Dissolved Organic Carbon	1.00	0.930 J	1.00 U		mg/l	B2
SHM-13-05-FAL20	N	Dissolved Organic Carbon	2.00	2.00	2.00 U		mg/l	B2
SHM-13-07-FAL20	N	Dissolved Organic Carbon	1.00	0.970 J	1.00 U		mg/l	B2
SHP-2016-1A-FAL20	N	Dissolved Organic Carbon	1.00	0.600 J	1.00 U		mg/l	B2
SHP-2016-1B-FAL20	N	Dissolved Organic Carbon	1.80	1.80	1.80 U		mg/l	B2
SHP-2016-2A-FAL20	N	Dissolved Organic Carbon	1.00	0.690 J	1.00 U		mg/l	B2
SHP-2016-2B-FAL20	N	Dissolved Organic Carbon	1.80	1.80	1.80 U		mg/l	B2
SHP-2016-4A-FAL20	N	Dissolved Organic Carbon	1.70	1.70	1.70 U		mg/l	B2
SHP-2016-4B-FAL20	N	Dissolved Organic Carbon	1.00	0.840 J	1.00 U		mg/l	B2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Table of All Qualified Results

Test Method: SW6010C	**Extraction Method: Dissolved**							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHM-13-02-FAL20	N	Iron	50.0	34.0 J	50.0 U		ug/l	B2
SHP-2016-2A-FAL20	N	Iron	120	120	120 U		ug/l	B2
SHP-2016-4B-FAL20	N	Iron	50.0	33.0 J	50.0 U		ug/l	B2

Test Method: SW6020A	**Extraction Method: Dissolved**							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHM-13-04-FAL20	N	Arsenic	3.00	260 J	260 J	+	ug/l	M/D

Test Method: SW9060A	**Extraction Method: Dissolved**							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
EPA-PZ-2012-7A-FAL20	N	Dissolved Organic Carbon	1.00	0.970 J	1.00 U		mg/l	B2
EPA-PZ-2012-7B-FAL20	N	Dissolved Organic Carbon	1.10	1.10	1.10 U		mg/l	B2
SHM-05-41A-FAL20	N	Dissolved Organic Carbon	1.00	0.860 J	1.00 U		mg/l	B2
SHM-05-41B-FAL20	N	Dissolved Organic Carbon	1.70	1.70	1.70 U		mg/l	B2
SHM-13-02-FAL20	N	Dissolved Organic Carbon	1.50	1.50	1.50 U		mg/l	B2
SHM-13-04-FAL20	N	Dissolved Organic Carbon	1.00	0.930 J	1.00 U		mg/l	B2
SHM-13-05-FAL20	N	Dissolved Organic Carbon	2.00	2.00	2.00 U		mg/l	B2
SHM-13-07-FAL20	N	Dissolved Organic Carbon	1.00	0.970 J	1.00 U		mg/l	B2
SHP-2016-1A-FAL20	N	Dissolved Organic Carbon	1.00	0.600 J	1.00 U		mg/l	B2
SHP-2016-1B-FAL20	N	Dissolved Organic Carbon	1.80	1.80	1.80 U		mg/l	B2
SHP-2016-2A-FAL20	N	Dissolved Organic Carbon	1.00	0.690 J	1.00 U		mg/l	B2
SHP-2016-2B-FAL20	N	Dissolved Organic Carbon	1.80	1.80	1.80 U		mg/l	B2
SHP-2016-4A-FAL20	N	Dissolved Organic Carbon	1.70	1.70	1.70 U		mg/l	B2
SHP-2016-4B-FAL20	N	Dissolved Organic Carbon	1.00	0.840 J	1.00 U		mg/l	B2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW9056A

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
SHM-05-41B-FAL20	N	Sulfate	5.00	2.50 J	2.50 J	2.50 J	TR
SHM-13-02-FAL20	N	Sulfate	1.00	4.40	4.40 J	4.40	
SHM-13-04-FAL20	N	Sulfate	1.00	10.0	10.0 J	10.0	
SHM-13-05-FAL20	N	Sulfate	1.00	7.90	7.90 J	7.90	
SHM-13-07-FAL20	N	Sulfate	1.00	8.40	8.40 J	8.40	
SHP-2016-1A-FAL20	N	Sulfate	1.00	4.50	4.50 J	4.50	

Modified Qualifiers for test method SW9060A, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
EPA-PZ-2012-7A-FAL20	N	Dissolved Organic Carbon	1.00	0.970 J	0.970 J	1.00 U	B2
EPA-PZ-2012-7B-FAL20	N	Dissolved Organic Carbon	1.10	1.10	1.10	1.10 U	B2
SHM-05-41A-FAL20	N	Dissolved Organic Carbon	1.00	0.860 J	0.860 J	1.00 U	B2
SHM-05-41B-FAL20	N	Dissolved Organic Carbon	1.70	1.70	1.70	1.70 U	B2
SHM-13-02-FAL20	N	Dissolved Organic Carbon	1.50	1.50	1.50	1.50 U	B2
SHM-13-04-FAL20	N	Dissolved Organic Carbon	1.00	0.930 J	0.930 J	1.00 U	B2
SHM-13-05-FAL20	N	Dissolved Organic Carbon	2.00	2.00	2.00	2.00 U	B2
SHM-13-07-FAL20	N	Dissolved Organic Carbon	1.00	0.970 J	0.970 J	1.00 U	B2
SHP-2016-1A-FAL20	N	Dissolved Organic Carbon	1.00	0.600 J	0.600 J	1.00 U	B2
SHP-2016-1B-FAL20	N	Dissolved Organic Carbon	1.80	1.80	1.80	1.80 U	B2
SHP-2016-2A-FAL20	N	Dissolved Organic Carbon	1.00	0.690 J	0.690 J	1.00 U	B2
SHP-2016-2B-FAL20	N	Dissolved Organic Carbon	1.80	1.80	1.80	1.80 U	B2
SHP-2016-4A-FAL20	N	Dissolved Organic Carbon	1.70	1.70	1.70	1.70 U	B2
SHP-2016-4B-FAL20	N	Dissolved Organic Carbon	1.00	0.840 J	0.840 J	1.00 U	B2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
B2	CCB
D	MS RPD
M	MS Recovery
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

Review Questions

Method: A2320B (Alkalinity by Titrimetric Method)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes reported in the field blank(s) less than MDL?			•	A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?		•		MS/MSD not performed.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?	•			A DUP was prepared and analyzed in batch 516966. The DUP RPD was within project acceptance limits.
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Due to calibration blank contamination, 3 iron results were qualified as non-detected (U).
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Although manganese was not within acceptance limits, no data were qualified since sample concentrations were significantly greater (>4X) than the spike amount.
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported or as qualified during data validation.

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes reported in the field blank(s) less than MDL?			•	
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Although arsenic %R in samples SHM-13-04-FAL20MS/MSD were not within acceptance limits, no data were qualified since sample concentrations were significantly greater (>4X) than the spike amount. Due to arsenic %R above acceptance limits in samples SHM-05-41C-FAL20MS/MSD, 1 arsenic result was qualified as detected estimated (J) with a high bias (+).
Was the MS/MSD RPD within project acceptance limits?		•		Due to arsenic RPD outside of acceptance limits in sample SHM-05-41C-FAL20MSD, 1 arsenic result was qualified as detected estimated (J).
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported or as qualified during data validation.

Review Questions

Method: SW9056A (Anion Chromatography)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Data Validation Report for 6801912181

Review Questions

Method: SW9060A (Total Organic Carbon)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Due to calibration blank contamination, 14 DOC results were qualified as non-detected (U).
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported or as qualified during data validation.

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

ARCADIS U.S., Inc.
3109 West Martin Luther King Jr. Blvd, Suite 350
Tampa, FL 33607
ATTN: Mr. Nathan Mullens
nrmullens@seres-es.com

February 19, 2021

SUBJECT: Fort Devens, Data Validation

Dear Mr. Mullens,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on December 2, 2020. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #49841:

SDG #	Fraction
680-191150-1, 680-191218-1 680-191554-1	Dissolved Metals, Wet Chemistry

The data validation was performed under Stage 2B guidelines. The analyses were validated using the following documents and variances, as applicable to each method:

- Former Fort Devens Army Installation – BRAC Legacy Sites, Devens, MA; October 2020
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

116 pages-ADV

Attachment 1

Stage 2B EQUIS EDD

LDC #49841 (Arcadis-Millersville, MD / Fort Devens)

LDC	SDG#	DATE REC'D	(2) DATE DUE	3 D.Metal (6010C/ 6020A)		Alk. (2320B)		DOC (9060A)		Cl,SO_4 (9056A)																											
Matrix: Water/Soil				W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	680-191150-1	12/02/20	12/16/20	4	0	4	0	4	0	4	0																										
B	680-191218-1	12/02/20	12/16/20	15	0	15	0	15	0	15	0																										
C	680-191554-1	12/02/20	12/16/20	15	0	14	0	14	0	14	0																										
Total	T/PG			34	0	33	0	33	0	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	133

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS/MSD, and DUPs

L:\Arcadis\Fort Devens\49841ST.wpd

Data Validation Report for 6801915541

Facility:	Former Fort Devens, Long Term Monitoring
Event:	Seres-Arcadis JV, Long Term Monitoring, SHL, Fall 2020
SDG:	6801915541
Guidance Document:	Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020
Prime Contractor:	Seres-Arcadis JV
Project Manager:	Jennifer Singer
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	Laboratory Data Consultants, Inc.
Data Review Level:	2B
Primary Data Reviewer:	Kevin Kha, Environmental Scientist
Second Reviewer:	Pei Geng, Senior Scientist
Date Submitted:	December 15, 2020

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	A2320B	SW6010C - Dissolved	SW6020A - Dissolved	SW9056A	SW9060A - Dissolved
SHL-23-FAL20	680-191554-5	Water	Field Sample/N	X	X	X	X	X
SHL-4-FAL20	680-191554-6	Water	Field Sample/N	X	X	X	X	X
SHL-DUP06-FAL20	680-191554-1	Water	Field Duplicate/FD	X	X	X	X	X
SHL-RB3-FAL20	680-191554-15	Water	Equipment Blank/EB		X	X		
SHL-RB4-FAL20	680-191554-3	Water	Equipment Blank/EB		X	X		
SHM-10-04-FAL20	680-191554-7	Water	Field Sample/N	X	X	X	X	X
SHM-10-05A-FAL20	680-191554-8	Water	Field Sample/N	X	X	X	X	X
SHM-10-06A-FAL20	680-191554-2	Water	Field Sample/N	X	X	X	X	X
SHM-10-11-FAL20	680-191554-9	Water	Field Sample/N	X	X	X	X	X
SHM-10-16-FAL20	680-191554-10	Water	Field Sample/N	X	X	X	X	X
SHM-93-18B-FAL20	680-191554-11	Water	Field Sample/N	X	X	X	X	X
SHP-2016-06A-FAL20	680-191554-12	Water	Field Sample/N	X	X	X	X	X
SHP-2016-06B-FAL20	680-191554-13	Water	Field Sample/N	X	X	X	X	X
SHP-2016-06C-FAL20	680-191554-14	Water	Field Sample/N	X	X	X	X	X
SHP-2016-07B-FAL20	680-191554-4	Water	Field Sample/N	X	X	X	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at 2B data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by Seres-Arcadis JV; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 6801915541. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Calibration Blank
- Calibration Blank - Negative
- Continuing Calibration Verification
- Equipment Blank
- Field Duplicate RPD
- Interference Check Sample A
- Interference Check Sample A - Negative
- Interference Check Sample AB
- Lab Blank
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 6 results (6.19%) out of the 97 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW9056A	No additional comments; see Checklist for detail.
SW9060A	No additional comments; see Checklist for detail.
SW6010C	Due to serial dilution %D outside of acceptance limits, the manganese result in sample SHM-10-04-FAL20 was qualified as detected estimated (J).
A2320B	No additional comments; see Checklist for detail.
SW6020A	No additional comments; see Checklist for detail.

December 15, 2020

Reviewed by Kevin Kha, Environmental Scientist, Laboratory Data Consultants, Inc.

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

Reviewed by Pei Geng, Senior Scientist, Laboratory Data Consultants, Inc.

March 16, 2021

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW6010C, Dissolved, Calibration Blank

The purpose of calibration blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in calibration blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
CCB680644415194 (CB)/ CCB680644415194	Iron	20.00	< 17	< 50	ug/l	U/None	B2	
CCB680644415218 (CB)/ CCB680644415218	Iron	22.40	< 17	< 50	ug/l	U/None	B2	
CCB68064441572 (CB)/ CCB68064441572	Iron	17.60	< 17	< 50	ug/l	U/None	B2	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Calibration Blank for SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHL-RB4-FAL20	EB	Iron	60.0	60.0	60.0 U		ug/l	B2
SHM-10-05A-FAL20	N	Iron	96.0	96.0	96.0 U		ug/l	B2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6010C, Dissolved, Equipment Blank

The purpose of equipment blanks is to determine the existence and magnitude of cross-contamination problems resulting from the process during sampling. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in equipment blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
SHL-RB4-FAL20 (EB)/ 680-191554-3	Iron	60.00	< 17	< 50	ug/l	U/None	V	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6010C, Dissolved, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB6806442051A (LB)/ MB6806442051A	Manganese	2.490	< 1	< 10	ug/l	U/None	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Lab Blank for SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHL-23-FAL20	N	Manganese	11.0	11.0	11.0 U		ug/l	L
SHM-10-05A-FAL20	N	Manganese	10.0	3.50 J	10.0 U		ug/l	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6010C, Dissolved, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
SHM-10-04-FAL20 (MS)/ 680-191554-7	Manganese	87.75	90 - 114	10 - 125	percent	J/UJ	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHM-10-04-FAL20	N	Manganese	10.0	280 J	280 J		ug/l	M/A

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW9060A, Dissolved, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB28051815736 (LB)/ MB28051815736	Dissolved Organic Carbon	0.5890	< 0.35	< 1	mg/l	U/None	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Lab Blank for SW9060A, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHP-2016-06C-FAL20	N	Dissolved Organic Carbon	1.00	0.840 J B	1.00 U		mg/l	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Table of All Qualified Results

Test Method: SW6010C	**Extraction Method: Dissolved**							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHL-23-FAL20	N	Manganese	11.0	11.0	11.0 U		ug/l	L
SHL-RB4-FAL20	EB	Iron	60.0	60.0	60.0 U		ug/l	B2
SHM-10-04-FAL20	N	Manganese	10.0	280 J	280 J		ug/l	M/A
SHM-10-05A-FAL20	N	Iron	96.0	96.0	96.0 U		ug/l	B2
SHM-10-05A-FAL20	N	Manganese	10.0	3.50 J	10.0 U		ug/l	L

Test Method: SW9060A	**Extraction Method: Dissolved**							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHP-2016-06C-FAL20	N	Dissolved Organic Carbon	1.00	0.840 J B	1.00 U		mg/l	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
SHL-23-FAL20	N	Manganese	11.0	11.0	11.0 J	11.0 U	L
SHM-10-04-FAL20	N	Manganese	10.0	280 J	280 J	280 J	M/A

Modified Qualifiers for test method SW9056A

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
SHM-10-04-FAL20	N	Sulfate	1.00	17.0	17.0 J	17.0	

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
A	Serial dilution
B2	CCB
L	Lab Blank
M	MS Recovery
TR	Trace Level Detect
V	Equipment Blank

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

Review Questions

Method: A2320B (Alkalinity by Titrimetric Method)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?		•		MS/MSD not performed.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Due to method blank and calibration blank contamination, 2 iron and 2 manganese results were qualified as non-detected (U).
Were field blanks (EBs or FBs) submitted with these samples?	•			
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Due to manganese %R below the acceptance limits, 1 manganese result was qualified as detected estimated (J) with a low bias (-).
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported or as qualified during data validation.

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?	•			
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW9056A (Anion Chromatography)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Data Validation Report for 6801915541

Review Questions

Method: SW9060A (Total Organic Carbon)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?		•		Due to calibration blank contamination, 1 DOC result was qualified as non-detected (U).
Were target analytes in the method blank less than MDL?	•			
Were target analytes reported in the field blank(s) less than MDL?			•	A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported or as qualified during data validation.

Field Duplicate Report By SDG
Former Fort Devens, Long Term Monitoring
Seres-Arcadis JV, Long Term Monitoring, SHL, Fall 2020
Field Duplicates for SDG: 6801915541

Location	Analysis
SHP-2016-07B	A2320B

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHP-2016-07B-FAL20 / SHL-DUP06-FAL20	680-191554-4 / 680-191554-1	Alkalinity, Total (as CaCO3)	110	130	10.0	16.7	30	OK	NA

Location	Analysis
SHP-2016-07B	SW6010C

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHP-2016-07B-FAL20 / SHL-DUP06-FAL20	680-191554-4 / 680-191554-1	Iron (FLDFLT)	460	500	50.0	8.33	30	OK	NA
SHP-2016-07B-FAL20 / SHL-DUP06-FAL20	680-191554-4 / 680-191554-1	Manganese (FLDFLT)	580	610	10.0	5.04	30	OK	NA

Location	Analysis
SHP-2016-07B	SW6020A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHP-2016-07B-FAL20 / SHL-DUP06-FAL20	680-191554-4 / 680-191554-1	Arsenic (FLDFLT)	65.0	71.0	3.00	8.82	30	OK	NA

Location	Analysis
SHP-2016-07B	SW9056A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHP-2016-07B-FAL20 / SHL-DUP06-FAL20	680-191554-4 / 680-191554-1	Chloride	2.60	2.70	0.500	3.77	30	OK	NA
SHP-2016-07B-FAL20 / SHL-DUP06-FAL20	680-191554-4 / 680-191554-1	Sulfate	30.0	33.0	1.00	9.52	30	OK	NA

FD = Field Duplicate
RL = Reporting Limit
RPD = Relative Percent Difference

RL Check = If either the primary sample or field duplicate result is less than 5 times the RL then the criteria used to determine if the field duplicate is outside QC limits is +/- RL for Water and +/- 2 times RL for Soil"

Field Duplicate Report By SDG
Former Fort Devens, Long Term Monitoring
Seres-Arcadis JV, Long Term Monitoring, SHL, Fall 2020
Field Duplicates for SDG: 6801915541

Location	Analysis
SHP-2016-07B	SW9060A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHP-2016-07B-FAL20 / SHL-DUP06-FAL20	680-191554-4 / 680-191554-1	Dissolved Organic Carbon (FLDFLT)	1.60	1.80	1.00	11.8	30	NA	OK

FD = Field Duplicate
RL = Reporting Limit
RPD = Relative Percent Difference

RL Check = If either the primary sample or field duplicate result is less than 5 times the RL then the criteria used to determine if the field duplicate is outside QC limits is +/- RL for Water and +/- 2 times RL for Soil"

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

ARCADIS U.S., Inc.
3109 West Martin Luther King Jr. Blvd, Suite 350
Tampa, FL 33607
ATTN: Mr. Nathan Mullens
nrmullens@seres-es.com

February 19, 2021

SUBJECT: Fort Devens, Data Validation

Dear Mr. Mullens,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on December 7, 2020. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #49902:

SDG #	Fraction
680-191150-2, 680-191377-1 680-191519-1	Volatiles, Dissolved Metals, Alkalinity, Wet Chemistry, Methane, Ethane & Ethene

The data validation was performed under Stage 2B guidelines. The analyses were validated using the following documents and variances, as applicable to each method:

- Former Fort Devens Army Installation – BRAC Legacy Sites, Devens, MA; October 2020
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

127 pages-ADV

Attachment 1

Stage 2B EQUIS EDD

LDC #49902 (Arcadis-Millersville, MD / Fort Devens)

LDC	SDG#	DATE REC'D	(2) DATE DUE	VOA (8260B)		3 D.Metal (6010C/ 6020A)		Methane Ethane Ethene		Alk. (2320B)		DOC (9060A)		Cl, SO_4 (9056A)		NO_3/ NO_2-N (353.2)		SO_4 (9056A)		S= (9034)		TOC (9060A)																	
Matrix: Water/Soil				W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	680-191150-2	12/07/20	12/21/20	4	0	3	0	1	0	1	0	-	-	-	-	1	0	1	0	1	0	1	0															
B	680-191377-1	12/07/20	12/21/20	-	-	8	0	-	-	8	0	13	0	8	0	-	-	-	-	-	-	-	-															
C	680-191519-1	12/07/20	12/21/20	-	-	13	0	-	-	12	0	12	0	12	0	-	-	-	-	-	-	-	-															
Total	T/PG			4	0	24	0	1	0	21	0	25	0	20	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	99

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS/MSD, and DUPs

L:\Arcadis\Fort Devens\49902ST.wpd

Data Validation Report for 6801913771

Facility:	Former Fort Devens, Long Term Monitoring
Event:	Seres-Arcadis JV, Long Term Monitoring, SHL, Fall 2020
SDG:	6801913771
Guidance Document:	Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020
Prime Contractor:	Seres-Arcadis JV
Project Manager:	Jennifer Singer
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	Laboratory Data Consultants, Inc.
Data Review Level:	2B
Primary Data Reviewer:	Kevin Kha, Environmental Scientist
Second Reviewer:	Pei Geng, Senior Scientist
Date Submitted:	December 21, 2020

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	A2320B	SW6010C - Dissolved	SW6020A - Dissolved	SW9056A	SW9060A - Dissolved
EPA-PZ-2012-5A-FAL20	680-191377-1	Water	Field Sample/N					X
EPA-PZ-2012-5B-FAL20	680-191377-2	Water	Field Sample/N					X
SHL-8D-FAL20	680-191377-3	Water	Field Sample/N	X	X	X	X	X
SHL-8S-FAL20	680-191377-4	Water	Field Sample/N	X	X	X	X	X
SHL-DUP08-FAL20	680-191377-5	Water	Field Duplicate/FD					X
SHM-10-02-FAL20	680-191377-6	Water	Field Sample/N	X	X	X	X	X
SHM-10-03-FAL20	680-191377-7	Water	Field Sample/N	X	X	X	X	X
SHM-10-07-FAL20	680-191377-8	Water	Field Sample/N	X	X	X	X	X
SHM-10-08-FAL20	680-191377-9	Water	Field Sample/N	X	X	X	X	X
SHM-10-14-FAL20	680-191377-10	Water	Field Sample/N	X	X	X	X	X
SHM-13-08-FAL20	680-191377-11	Water	Field Sample/N	X	X	X	X	X
SHM-96-5B-FAL20	680-191377-12	Water	Field Sample/N					X
SHM-96-5C-FAL20	680-191377-13	Water	Field Sample/N					X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at 2B data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by Seres-Arcadis JV; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 6801913771. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Calibration Blank
- Calibration Blank - Negative
- Continuing Calibration Verification
- Field Duplicate RPD
- Interference Check Sample A
- Interference Check Sample A - Negative
- Interference Check Sample AB
- Lab Blank
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 6 results (9.84%) out of the 61 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

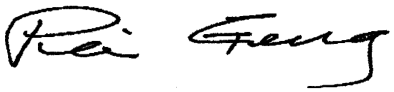
Narrative Comments

Analytical Method	Data Reviewer Comment
SW9056A	No additional comments; see Checklist for detail.
SW6020A	No additional comments; see Checklist for detail.
SW6010C	No additional comments; see Checklist for detail.
A2320B	No additional comments; see Checklist for detail.
SW9060A	No additional comments; see Checklist for detail.

December 21, 2020

Reviewed by Kevin Kha, Environmental Scientist, Laboratory Data Consultants, Inc.

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.



Reviewed by Pei Geng, Senior Scientist, Laboratory Data Consultants, Inc.

March 16, 2021

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method A2320B, Calibration Blank

The purpose of calibration blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in calibration blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
CCB28051729929 (CB)/ CCB28051729929	Alkalinity, Total (as CaCO3)	3.700	< 3.1	< 10	mg/l	U/None	B2	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6010C, Dissolved, Calibration Blank

The purpose of calibration blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in calibration blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
CCB68064441524 (CB)/ CCB68064441524	Iron	20.90	< 17	< 50	ug/l	U/None	B2	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Calibration Blank for SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHL-8D-FAL20	N	Iron	100	100	100 U		ug/l	B2
SHL-8S-FAL20	N	Iron	70.0	70.0	70.0 U		ug/l	B2
SHM-10-02-FAL20	N	Iron	62.0	62.0	62.0 U		ug/l	B2
SHM-10-03-FAL20	N	Iron	75.0	75.0	75.0 U		ug/l	B2
SHM-10-08-FAL20	N	Iron	53.0	53.0	53.0 U		ug/l	B2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6010C, Dissolved, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
SHM-10-07-FAL20 (SD)/ 680-191377-8	Iron	56.00	87 - 115	10 - 125	percent	J/UJ	M	Spike amount Insignificant
SHM-10-07-FAL20 (MS)/ 680-191377-8	Iron	72.00	87 - 115	10 - 125	percent	J/UJ	M	Spike amount Insignificant
SHM-10-07-FAL20 (SD)/ 680-191377-8	Manganese	80.00	90 - 114	10 - 125	percent	J/UJ	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6020A, Dissolved, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
SHM-10-07-FAL20 (MS)/ 680-191377-8	Arsenic	120.0	84 - 116	10 - 125	percent	J/None	M	Spike amount Insignificant
SHM-10-07-FAL20 (SD)/ 680-191377-8	Arsenic	80.00	84 - 116	10 - 125	percent	J/UJ	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW9060A, Dissolved, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB28051815736 (LB)/ MB28051815736	Dissolved Organic Carbon	0.5890	< 0.35	< 1	mg/l	U/None	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Lab Blank for SW9060A, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHL-8S-FAL20	N	Dissolved Organic Carbon	1.00	0.610 J B	1.00 U		mg/l	L/B2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Table of All Qualified Results

Test Method: SW6010C	**Extraction Method: Dissolved**							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHL-8D-FAL20	N	Iron	100	100	100 U		ug/l	B2
SHL-8S-FAL20	N	Iron	70.0	70.0	70.0 U		ug/l	B2
SHM-10-02-FAL20	N	Iron	62.0	62.0	62.0 U		ug/l	B2
SHM-10-03-FAL20	N	Iron	75.0	75.0	75.0 U		ug/l	B2
SHM-10-08-FAL20	N	Iron	53.0	53.0	53.0 U		ug/l	B2

Test Method: SW9060A	**Extraction Method: Dissolved**							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHL-8S-FAL20	N	Dissolved Organic Carbon	1.00	0.610 J B	1.00 U		mg/l	L/B2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW9060A, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
SHL-8S-FAL20	N	Dissolved Organic Carbon	1.00	0.610 J B	1.00 U	1.00 U	L/B2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
B2	CCB
L	Lab Blank
M	MS Recovery
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

Review Questions

Method: A2320B (Alkalinity by Titrimetric Method)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Although alkalinity was detected in a calibration blank, no client samples bracketed the affected blank, therefore no data were qualified.
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?		•		MS/MSD not performed.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Due to method blank and calibration blank contamination, 5 iron results were qualified as non-detected (U).
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Although iron and manganese were not within project acceptance limits, no data were qualified since the sample concentrations were significantly greater (>4X) than the spike amount.
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported or as qualified during data validation.

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes reported in the field blank(s) less than MDL?			•	A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Although arsenic %R was not within project limits, no data were qualified since sample concentrations were significantly greater (>4X) than the spike amount.
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Data Validation Report for 6801913771

Review Questions

Method: SW9056A (Anion Chromatography)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?		•		MS/MSD not performed.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Data Validation Report for 6801913771

Review Questions

Method: SW9060A (Total Organic Carbon)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Due to method blank and calibration blank contamination, 1 DOC result was qualified as non-detected (U).
Were target analytes reported in the field blank(s) less than MDL?			•	A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?		•		MS/MSD not performed.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported or as qualified during data validation.

Field Duplicate Report By SDG
Former Fort Devens, Long Term Monitoring
Seres-Arcadis JV, Long Term Monitoring, SHL, Fall 2020
Field Duplicates for SDG: 6801913771

Location	Analysis
SHM-96-5C	SW9060A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHM-96-5C-FAL20 / SHL-DUP08-FAL20	680-191377-13 / 680-191377-5	Dissolved Organic Carbon (FLDFLT)	2.40	1.70	1.00	34.1	30	NA	OK

FD = Field Duplicate
RL = Reporting Limit
RPD = Relative Percent Difference

RL Check = If either the primary sample or field duplicate result is less than 5 times the RL then the criteria used to determine if the field duplicate is outside QC limits is +/- RL for Water and +/- 2 times RL for Soil"

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

ARCADIS U.S., Inc.
3109 West Martin Luther King Jr. Blvd, Suite 350
Tampa, FL 33607
ATTN: Mr. Nathan Mullens
nrmullens@seres-es.com

February 19, 2021

SUBJECT: Fort Devens, Data Validation

Dear Mr. Mullens,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on December 7, 2020. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #49902:

SDG #	Fraction
680-191150-2, 680-191377-1 680-191519-1	Volatiles, Dissolved Metals, Alkalinity, Wet Chemistry, Methane, Ethane & Ethene

The data validation was performed under Stage 2B guidelines. The analyses were validated using the following documents and variances, as applicable to each method:

- Former Fort Devens Army Installation – BRAC Legacy Sites, Devens, MA; October 2020
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

127 pages-ADV

Attachment 1

Stage 2B EQUIS EDD

LDC #49902 (Arcadis-Millersville, MD / Fort Devens)

LDC	SDG#	DATE REC'D	(2) DATE DUE	VOA (8260B)		3 D.Metal (6010C/ 6020A)		Methane Ethane Ethene		Alk. (2320B)		DOC (9060A)		Cl, SO_4 (9056A)		NO_3/ NO_2-N (353.2)		SO_4 (9056A)		S= (9034)		TOC (9060A)																	
Matrix: Water/Soil				W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	680-191150-2	12/07/20	12/21/20	4	0	3	0	1	0	1	0	-	-	-	-	1	0	1	0	1	0	1	0															
B	680-191377-1	12/07/20	12/21/20	-	-	8	0	-	-	8	0	13	0	8	0	-	-	-	-	-	-	-	-															
C	680-191519-1	12/07/20	12/21/20	-	-	13	0	-	-	12	0	12	0	12	0	-	-	-	-	-	-	-	-															
Total	T/PG			4	0	24	0	1	0	21	0	25	0	20	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	99

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS/MSD, and DUPs

L:\Arcadis\Fort Devens\49902ST.wpd

Data Validation Report for 6801915191

Facility:	Former Fort Devens, Long Term Monitoring
Event:	Seres-Arcadis JV, Long Term Monitoring, SHL, Fall 2020
SDG:	6801915191
Guidance Document:	Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020
Prime Contractor:	Seres-Arcadis JV
Project Manager:	Jennifer Singer
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	Laboratory Data Consultants, Inc.
Data Review Level:	2B
Primary Data Reviewer:	Kevin Kha, Environmental Scientist
Second Reviewer:	Pei Geng, Senior Scientist
Date Submitted:	December 21, 2020

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	A2320B	SW6010C - Dissolved	SW6020A - Dissolved	SW9056A	SW9060A - Dissolved
EPA-PZ-2012-6A-FAL20	680-191519-1	Water	Field Sample/N	X	X	X	X	X
EPA-PZ-2012-6B-FAL20	680-191519-2	Water	Field Sample/N	X	X	X	X	X
SHL-DUP04-FAL20	680-191519-3	Water	Field Duplicate/FD	X	X	X	X	X
SHL-DUP10-FAL20	680-191519-4	Water	Field Duplicate/FD	X	X	X	X	X
SHL-RB2-FAL20	680-191519-9	Water	Equipment Blank/EB		X	X		
SHM-05-40X-FAL20	680-191519-5	Water	Field Sample/N	X	X	X	X	X
SHM-07-03-FAL20	680-191519-6	Water	Field Sample/N	X	X	X	X	X
SHM-07-05X-FAL20	680-191519-7	Water	Field Sample/N	X	X	X	X	X
SHM-10-12-FAL20	680-191519-8	Water	Field Sample/N	X	X	X	X	X
SHM-93-10D-FAL20	680-191519-10	Water	Field Sample/N	X	X	X	X	X
SHP-01-36X-FAL20	680-191519-11	Water	Field Sample/N	X	X	X	X	X
SHP-01-37X-FAL20	680-191519-12	Water	Field Sample/N	X	X	X	X	X
SHP-01-38A-FAL20	680-191519-13	Water	Field Sample/N	X	X	X	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at 2B data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by Seres-Arcadis JV; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 6801915191. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Calibration Blank
- Calibration Blank - Negative
- Continuing Calibration Verification
- Equipment Blank
- Field Duplicate RPD
- Interference Check Sample A
- Interference Check Sample A - Negative
- Interference Check Sample AB
- Lab Blank
- Lab Replicate RPD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 2 results (2.30%) out of the 87 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

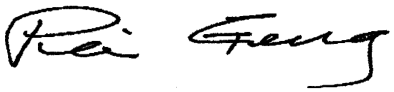
Narrative Comments

Analytical Method	Data Reviewer Comment
A2320B	No additional comments; see Checklist for detail.
SW6020A	No additional comments; see Checklist for detail.
SW6010C	No additional comments; see Checklist for detail.
SW9060A	No additional comments; see Checklist for detail.
SW9056A	No additional comments; see Checklist for detail.

December 21, 2020

Reviewed by Kevin Kha, Environmental Scientist, Laboratory Data Consultants, Inc.

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.



Reviewed by Pei Geng, Senior Scientist, Laboratory Data Consultants, Inc.

March 16, 2021

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method A2320B, Calibration Blank

The purpose of calibration blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in calibration blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
CCB28051729929 (CB)/ CCB28051729929	Alkalinity, Total (as CaCO3)	3.700	< 3.1	< 10	mg/l	U/None	B2	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method A2320B, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB2805174765 (LB)/ MB2805174765	Alkalinity, Total (as CaCO3)	3.600	< 3.1	< 10	mg/l	U/None	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Lab Blank for A2320B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHM-07-03-FAL20	N	Alkalinity, Total (as CaCO3)	15.0	15.0	15.0 U		mg/l	L

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6010C, Dissolved, Calibration Blank

The purpose of calibration blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in calibration blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
CCB68064441572 (CB)/ CCB68064441572	Iron	17.60	< 17	< 50	ug/l	U/None	B2	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Calibration Blank for SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHL-RB2-FAL20	EB	Iron	50.0	18.0 J	50.0 U		ug/l	B2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6010C, Dissolved, Equipment Blank

The purpose of equipment blanks is to determine the existence and magnitude of cross-contamination problems resulting from the process during sampling. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in equipment blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
SHL-RB2-FAL20 (EB)/ 680-191519-9	Manganese	1.100	< 1	< 10	ug/l	U/None	V	
SHL-RB2-FAL20 (EB)/ 680-191519-9	Iron	18.00	< 17	< 50	ug/l	U/None	V	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6010C, Dissolved, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
SHM-10-12-FAL20 (SD)/ 680-191519-8	Iron	42.00	87 - 115	10 - 125	percent	J/UJ	M	Spike amount Insignificant
SHM-10-12-FAL20 (SD)/ 680-191519-8	Manganese	65.00	90 - 114	10 - 125	percent	J/UJ	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW6020A, Dissolved, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
SHM-10-12-FAL20 (MS)/ 680-191519-8	Arsenic	-150.0	84 - 116	10 - 125	percent	J/X	M	Spike amount Insignificant
SHM-10-12-FAL20 (SD)/ 680-191519-8	Arsenic	170.0	84 - 116	10 - 125	percent	J/None	M	Spike amount Insignificant

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Table of All Qualified Results

Test Method: A2320B	**Extraction Method: NONE**							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHM-07-03-FAL20	N	Alkalinity, Total (as CaCO3)	15.0	15.0	15.0 U		mg/l	L

Test Method: SW6010C	**Extraction Method: Dissolved**							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHL-RB2-FAL20	EB	Iron	50.0	18.0 J	50.0 U		ug/l	B2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of Results with Modified Qualifiers

Modified Qualifiers for test method A2320B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
SHM-07-03-FAL20	N	Alkalinity, Total (as CaCO3)	15.0	15.0	15.0 J	15.0 U	L

Modified Qualifiers for test method SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
SHM-07-03-FAL20	N	Manganese	10.0	8.90 J	10.0 U	8.90 J	TR
SHM-93-10D-FAL20	N	Manganese	10.0	9.90 J	10.0 U	9.90 J	TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
B2	CCB
L	Lab Blank
M	MS Recovery
TR	Trace Level Detect
V	Equipment Blank

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

Review Questions

Method: A2320B (Alkalinity by Titrimetric Method)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Due to method blank contamination, 1 alkalinity result was qualified as non-detected (U). Although alkalinity was detected in the calibration blanks, the associated sample results were significantly greater than the concentration found in the calibration blank, therefore no data were qualified.
Were target analytes reported in the field blank(s) less than MDL?			•	
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	
Was a MS/MSD pair prepared with each batch?		•		MS/MSD not performed.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?	•			A DUP was submitted with these samples. The DUP RPD was within project limits.
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported or as qualified during data validation.

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Due to calibration blank contamination, 1 iron result was qualified as non-detected (U).
Were target analytes reported in the field blank(s) less than MDL?		•		Iron and manganese were detected in the equipment blank SHL-RB2-FAL20.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Although iron and manganese were not within acceptance limits, no data were qualified since sample concentrations were significantly greater (>4X) than the spike amount.
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported or as qualified during data validation.

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?	•			
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Although arsenic was not within acceptance limits, no data were qualified since sample concentrations were significantly greater (>4X) than the spike amount.
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Data Validation Report for 6801915191

Review Questions

Method: SW9056A (Anion Chromatography)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?		•		A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Data Validation Report for 6801915191

Review Questions

Method: SW9060A (Total Organic Carbon)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes reported in the field blank(s) less than MDL?			•	A field blank was not submitted with these samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?		•		MS/MSD not performed.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Field Duplicate Report By SDG
Former Fort Devens, Long Term Monitoring
Seres-Arcadis JV, Long Term Monitoring, SHL, Fall 2020
Field Duplicates for SDG: 6801915191

Location	Analysis
SHM-05-40X	A2320B

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHM-05-40X-FAL20 / SHL-DUP10-FAL20	680-191519-5 / 680-191519-4	Alkalinity, Total (as CaCO3)	150	140	10.0	6.90	30	OK	NA

Location	Analysis
SHM-05-40X	SW6010C

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHM-05-40X-FAL20 / SHL-DUP10-FAL20	680-191519-5 / 680-191519-4	Iron (FLDFLT)	24000	24000	50.0	0.00	30	OK	NA
SHM-05-40X-FAL20 / SHL-DUP10-FAL20	680-191519-5 / 680-191519-4	Manganese (FLDFLT)	670	680	10.0	1.48	30	OK	NA

Location	Analysis
SHM-05-40X	SW6020A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHM-05-40X-FAL20 / SHL-DUP10-FAL20	680-191519-5 / 680-191519-4	Arsenic (FLDFLT)	2100	2300	3.00	9.09	30	OK	NA

Location	Analysis
SHM-05-40X	SW9056A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHM-05-40X-FAL20 / SHL-DUP10-FAL20	680-191519-5 / 680-191519-4	Chloride	11.0	11.0	0.500	0.00	30	OK	NA
SHM-05-40X-FAL20 / SHL-DUP10-FAL20	680-191519-5 / 680-191519-4	Sulfate	3.80	3.80	1.00	0.00	30	NA	OK

FD = Field Duplicate
RL = Reporting Limit
RPD = Relative Percent Difference

RL Check = If either the primary sample or field duplicate result is less than 5 times the RL then the criteria used to determine if the field duplicate is outside QC limits is +/- RL for Water and +/- 2 times RL for Soil"

Field Duplicate Report By SDG
Former Fort Devens, Long Term Monitoring
Seres-Arcadis JV, Long Term Monitoring, SHL, Fall 2020
Field Duplicates for SDG: 6801915191

Location	Analysis
SHM-05-40X	SW9060A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHM-05-40X-FAL20 / SHL-DUP10-FAL20	680-191519-5 / 680-191519-4	Dissolved Organic Carbon (FLDFLT)	1.60	1.60	1.00	0.00	30	NA	OK

Location	Analysis
SHP-01-38A	A2320B

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHP-01-38A-FAL20 / SHL-DUP04-FAL20	680-191519-13 / 680-191519-3	Alkalinity, Total (as CaCO3)	90.0	91.0	10.0	1.10	30	OK	NA

Location	Analysis
SHP-01-38A	SW6010C

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHP-01-38A-FAL20 / SHL-DUP04-FAL20	680-191519-13 / 680-191519-3	Iron (FLDFLT)	24000	25000	50.0	4.08	30	OK	NA
SHP-01-38A-FAL20 / SHL-DUP04-FAL20	680-191519-13 / 680-191519-3	Manganese (FLDFLT)	2200	2300	10.0	4.44	30	OK	NA

Location	Analysis
SHP-01-38A	SW6020A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHP-01-38A-FAL20 / SHL-DUP04-FAL20	680-191519-13 / 680-191519-3	Arsenic (FLDFLT)	150	140	3.00	6.90	30	OK	NA

FD = Field Duplicate
RL = Reporting Limit
RPD = Relative Percent Difference

RL Check = If either the primary sample or field duplicate result is less than 5 times the RL then the criteria used to determine if the field duplicate is outside QC limits is +/- RL for Water and +/- 2 times RL for Soil"

Field Duplicate Report By SDG
Former Fort Devens, Long Term Monitoring
Seres-Arcadis JV, Long Term Monitoring, SHL, Fall 2020
Field Duplicates for SDG: 6801915191

Location	Analysis
SHP-01-38A	SW9056A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHP-01-38A-FAL20 / SHL-DUP04-FAL20	680-191519-13 / 680-191519-3	Chloride	14.0	14.0	0.500	0.00	30	OK	NA
SHP-01-38A-FAL20 / SHL-DUP04-FAL20	680-191519-13 / 680-191519-3	Sulfate	8.00	8.10	1.00	1.24	30	OK	NA

Location	Analysis
SHP-01-38A	SW9060A

Field ID - Primary/Field Dup	Lab ID - Primary/Field Dup	Analyte	Primary Result	FD Result	RL	RPD	RPD Criteria	RPD Check	RL Check
SHP-01-38A-FAL20 / SHL-DUP04-FAL20	680-191519-13 / 680-191519-3	Dissolved Organic Carbon (FLDFLT)	1.40	1.40	1.00	0.00	30	NA	OK

FD = Field Duplicate
RL = Reporting Limit
RPD = Relative Percent Difference

RL Check = If either the primary sample or field duplicate result is less than 5 times the RL then the criteria used to determine if the field duplicate is outside QC limits is +/- RL for Water and +/- 2 times RL for Soil"

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

ARCADIS U.S., Inc.
3109 West Martin Luther King Jr. Blvd, Suite 350
Tampa, FL 33607
ATTN: Mr. Nathan Mullens
nrmullens@seres-es.com

February 19, 2021

SUBJECT: Fort Devens, Data Validation

Dear Mr. Mullens,

Enclosed are the final validation reports for the fractions listed below. These SDGs were received on December 15, 2020. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #50005:

SDG #	Fraction
680-190497-1, 680-191327-1	Dissolved Metals, Wet Chemistry

The data validation was performed under Stage 2B guidelines. The analyses were validated using the following documents and variances, as applicable to each method:

- Former Fort Devens Army Installation – BRAC Legacy Sites, Devens, MA; October 2020
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Pei Geng
pgeng@lab-data.com
Project Manager/Senior Chemist

60 pages-ADV

Attachment 1

Stage 2B EQUIS EDD

LDC #50005 (Arcadis-Millersville, MD / Fort Devens)

LDC	SDG#	DATE REC'D	(2) DATE DUE	3 D.Metal (6010C/ 6020A)		Alk. (2320B)		DOC (9060A)		Cl,SO_4 (9056A)																											
Matrix: Water/Soil				W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	680-190497-1	12/15/20	12/30/20	11	0	-	-	-	-	-	-																										
B	680-191327-1	12/15/20	12/30/20	11	0	11	0	11	0	11	0																										
Total	T/PG			22	0	11	0	11	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS/MSD, and DUPs

L:\Arcadis\Fort Devens\50005ST.wpd

Data Validation Report for 6801913271

Facility:	Former Fort Devens, Long Term Monitoring
Event:	Seres-Arcadis JV, Long Term Monitoring, SHL, Fall 2020
SDG:	6801913271
Guidance Document:	Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020
Prime Contractor:	Seres-Arcadis JV
Project Manager:	Jennifer Singer
Contract Laboratory(ies):	Eurofins Environment Testing TestAmerica, Arvada, CO
Data Review Contractor:	Laboratory Data Consultants, Inc.
Data Review Level:	2B
Primary Data Reviewer:	Kevin Kha, Environmental Scientist
Second Reviewer:	Pei Geng, Senior Scientist
Date Submitted:	December 30, 2020

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	A2320B	SW6010C - Dissolved	SW6020A - Dissolved	SW9056A	SW9060A - Dissolved
SHL-10-FAL20	680-191327-1	Water	Field Sample/N	X	X	X	X	X
SHL-3-FAL20	680-191327-3	Water	Field Sample/N	X	X	X	X	X
SHL-5-FAL20	680-191327-4	Water	Field Sample/N	X	X	X	X	X
SHL-RB1-FAL20	680-191327-2	Water	Equipment Blank/EB	X	X	X	X	X
SHM-05-42A-FAL20	680-191327-5	Water	Field Sample/N	X	X	X	X	X
SHM-05-42B-FAL20	680-191327-6	Water	Field Sample/N	X	X	X	X	X
SHM-10-10-FAL20	680-191327-7	Water	Field Sample/N	X	X	X	X	X
SHM-13-01-FAL20	680-191327-8	Water	Field Sample/N	X	X	X	X	X
SHM-13-06-FAL20	680-191327-9	Water	Field Sample/N	X	X	X	X	X
SHP-2016-5A-FAL20	680-191327-10	Water	Field Sample/N	X	X	X	X	X
SHP-2016-5B-FAL20	680-191327-11	Water	Field Sample/N	X	X	X	X	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page at 2B data validation level. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Quality Assurance Project Plan, Long Term Monitoring Program, Former Fort Devens, 2020 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by Seres-Arcadis JV; analyses were performed by Eurofins Environment Testing TestAmerica, Arvada, CO and were reported under sample delivery group (SDG) 6801913271. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank - Negative
- Calibration Blank
- Calibration Blank - Negative
- Continuing Calibration Verification
- Equipment Blank
- Interference Check Sample A
- Interference Check Sample A - Negative
- Interference Check Sample AB
- Lab Blank
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 15 results (19.48%) out of the 77 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected or deemed a serious deficiency. Trace values, defined as results that are qualified as estimated because they fall between the detection limit and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

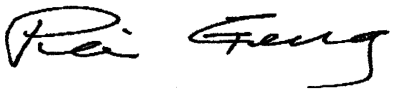
Narrative Comments

Analytical Method	Data Reviewer Comment
SW6020A	No additional comments; see Checklist for detail.
A2320B	No additional comments; see Checklist for detail.
SW6010C	No additional comments; see Checklist for detail.
SW9056A	No additional comments; see Checklist for detail.
SW9060A	No additional comments; see Checklist for detail.

December 30, 2020

Reviewed by Kevin Kha, Environmental Scientist, Laboratory Data Consultants, Inc.

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.



Reviewed by Pei Geng, Senior Scientist, Laboratory Data Consultants, Inc.

March 16, 2021

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW6010C, Dissolved, Calibration Blank

The purpose of calibration blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in calibration blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
CCB680643859346 (CB)/ CCB680643859346	Iron	27.40	< 17	< 50	ug/l	U/None	B2	
CCB680643859358 (CB)/ CCB680643859358	Iron	21.10	< 17	< 50	ug/l	U/None	B2	
CCB680644236150 (CB)/ CCB680644236150	Iron	17.10	< 17	< 50	ug/l	U/None	B2	
CCB680644236162 (CB)/ CCB680644236162	Iron	23.00	< 17	< 50	ug/l	U/None	B2	
CCB680644236174 (CB)/ CCB680644236174	Iron	24.20	< 17	< 50	ug/l	U/None	B2	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Calibration Blank for SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHM-05-42A-FAL20	N	Iron	50.0	49.0 J	50.0 U		ug/l	B2
SHM-13-01-FAL20	N	Iron	50.0	31.0 J	50.0 U		ug/l	B2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6010C, Dissolved, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB6806436641A (LB)/ MB6806436641A	Manganese	5.660	< 1	< 10	ug/l	U/None	L	
MB6806437181A (LB)/ MB6806437181A	Manganese	3.770	< 1	< 10	ug/l	U/None	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Lab Blank for SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHL-10-FAL20	N	Manganese	23.0	23.0 B	23.0 U		ug/l	L
SHL-3-FAL20	N	Manganese	10.0	9.10 J	10.0 U		ug/l	L
SHM-13-01-FAL20	N	Manganese	10.0	4.30 J	10.0 UJ		ug/l	L/D/M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6010C, Dissolved, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
SHM-13-01-FAL20 (SD)/ 680-191327-8	Manganese	1818	90 - 114	10 - 125	percent	J/None	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHM-13-01-FAL20	N	Manganese	10.0	4.30 J	10.0 UJ		ug/l	L/D/M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6010C, Dissolved, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
SHM-13-01-FAL20 (SD)/ 680-191327-8	Manganese	179.0	< 20	< 20	rpd	J/UJ	D	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS RPD for SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHM-13-01-FAL20	N	Manganese	10.0	4.30 J	10.0 UJ		ug/l	L/D/M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6020A, Dissolved, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
SHM-13-01-FAL20 (SD)/ 680-191327-8	Arsenic	146.0	84 - 116	10 - 125	percent	J/None	M	
SHM-13-01-FAL20 (MS)/ 680-191327-8	Arsenic	57.70	84 - 116	10 - 125	percent	J/UJ	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW6020A, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHM-13-01-FAL20	N	Arsenic	3.00	3.00 U J	3.00 UJ		ug/l	M/D

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW6020A, Dissolved, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
SHM-13-01-FAL20 (SD)/ 680-191327-8	Arsenic	86.70	< 20	< 20	rpd	J/UJ	D	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS RPD for SW6020A, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHM-13-01-FAL20	N	Arsenic	3.00	3.00 U J	3.00 UJ		ug/l	M/D

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW9060A, Dissolved, Equipment Blank

The purpose of equipment blanks is to determine the existence and magnitude of cross-contamination problems resulting from the process during sampling. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in equipment blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
SHL-RB1-FAL20 (EB)/ 680-191327-2	Dissolved Organic Carbon	0.5900	< 0.35	< 1	mg/l	U/None	V	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Equipment Blank for SW9060A, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHL-10-FAL20	N	Dissolved Organic Carbon	1.70	1.70	1.70 U		mg/l	L/V
SHL-3-FAL20	N	Dissolved Organic Carbon	1.60	1.60	1.60 U		mg/l	L/V
SHM-05-42A-FAL20	N	Dissolved Organic Carbon	1.10	1.10	1.10 U		mg/l	L/V
SHM-05-42B-FAL20	N	Dissolved Organic Carbon	1.80	1.80	1.80 U		mg/l	L/V
SHM-10-10-FAL20	N	Dissolved Organic Carbon	2.80	2.80	2.80 U		mg/l	V
SHM-13-01-FAL20	N	Dissolved Organic Carbon	1.20	1.20	1.20 U		mg/l	L/V
SHM-13-06-FAL20	N	Dissolved Organic Carbon	1.70	1.70	1.70 U		mg/l	L/V
SHP-2016-5B-FAL20	N	Dissolved Organic Carbon	2.70	2.70	2.70 U		mg/l	V

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Quality Control Outliers for test method SW9060A, Dissolved, Lab Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB28051764135 (LB)/ MB28051764135	Dissolved Organic Carbon	0.4080	< 0.35	< 1	mg/l	U/None	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Lab Blank for SW9060A, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHL-10-FAL20	N	Dissolved Organic Carbon	1.70	1.70	1.70 U		mg/l	L/V
SHL-3-FAL20	N	Dissolved Organic Carbon	1.60	1.60	1.60 U		mg/l	L/V
SHL-RB1-FAL20	EB	Dissolved Organic Carbon	1.00	0.590 J	1.00 U		mg/l	L
SHM-05-42A-FAL20	N	Dissolved Organic Carbon	1.10	1.10	1.10 U		mg/l	L/V
SHM-05-42B-FAL20	N	Dissolved Organic Carbon	1.80	1.80	1.80 U		mg/l	L/V
SHM-13-01-FAL20	N	Dissolved Organic Carbon	1.20	1.20	1.20 U		mg/l	L/V
SHM-13-06-FAL20	N	Dissolved Organic Carbon	1.70	1.70	1.70 U		mg/l	L/V

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.

Table of All Qualified Results

Test Method: SW6010C	**Extraction Method: Dissolved**							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHL-10-FAL20	N	Manganese	23.0	23.0 B	23.0 U		ug/l	L
SHL-3-FAL20	N	Manganese	10.0	9.10 J	10.0 U		ug/l	L
SHM-05-42A-FAL20	N	Iron	50.0	49.0 J	50.0 U		ug/l	B2
SHM-13-01-FAL20	N	Manganese	10.0	4.30 J	10.0 UJ		ug/l	L/D/M
SHM-13-01-FAL20	N	Iron	50.0	31.0 J	50.0 U		ug/l	B2

Test Method: SW6020A	**Extraction Method: Dissolved**							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHM-13-01-FAL20	N	Arsenic	3.00	3.00 U J	3.00 UJ		ug/l	M/D

Test Method: SW9060A	**Extraction Method: Dissolved**							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
SHL-10-FAL20	N	Dissolved Organic Carbon	1.70	1.70	1.70 U		mg/l	L/V
SHL-3-FAL20	N	Dissolved Organic Carbon	1.60	1.60	1.60 U		mg/l	L/V
SHL-RB1-FAL20	EB	Dissolved Organic Carbon	1.00	0.590 J	1.00 U		mg/l	L
SHM-05-42A-FAL20	N	Dissolved Organic Carbon	1.10	1.10	1.10 U		mg/l	L/V
SHM-05-42B-FAL20	N	Dissolved Organic Carbon	1.80	1.80	1.80 U		mg/l	L/V
SHM-10-10-FAL20	N	Dissolved Organic Carbon	2.80	2.80	2.80 U		mg/l	V
SHM-13-01-FAL20	N	Dissolved Organic Carbon	1.20	1.20	1.20 U		mg/l	L/V
SHM-13-06-FAL20	N	Dissolved Organic Carbon	1.70	1.70	1.70 U		mg/l	L/V
SHP-2016-5B-FAL20	N	Dissolved Organic Carbon	2.70	2.70	2.70 U		mg/l	V

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW6010C, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
SHL-10-FAL20	N	Manganese	23.0	23.0 B	23.0 J	23.0 U	L
SHM-13-01-FAL20	N	Manganese	10.0	4.30 J	10.0 UJ	10.0 UJ	L/D/M

Modified Qualifiers for test method SW9060A, Dissolved

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
SHL-10-FAL20	N	Dissolved Organic Carbon	1.70	1.70	1.70 U	1.70 U	L/V
SHL-3-FAL20	N	Dissolved Organic Carbon	1.60	1.60	1.60 U	1.60 U	L/V
SHM-05-42A-FAL20	N	Dissolved Organic Carbon	1.10	1.10	1.10 U	1.10 U	L/V
SHM-05-42B-FAL20	N	Dissolved Organic Carbon	1.80	1.80	1.80 U	1.80 U	L/V
SHM-10-10-FAL20	N	Dissolved Organic Carbon	2.80	2.80	2.80	2.80 U	V
SHM-13-01-FAL20	N	Dissolved Organic Carbon	1.20	1.20	1.20 U	1.20 U	L/V
SHM-13-06-FAL20	N	Dissolved Organic Carbon	1.70	1.70	1.70 U	1.70 U	L/V
SHP-2016-5B-FAL20	N	Dissolved Organic Carbon	2.70	2.70	2.70	2.70 U	V

Analytes not found in project samples are reported as not detected at the limit of detection (LOD) unless blank contamination occurs and then the sample may be reported as not detected at the (LOQ) based on the sample concentration.
In instances where no LOD is provided, results are reported down to the LOQ.
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
B2	CCB
D	MS RPD
L	Lab Blank
M	MS Recovery
TR	Trace Level Detect
V	Equipment Blank

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.
X	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Acceptance or rejection of the data should be decided by the project team (which should include a project chemist), but exclusion of the data is recommended.

Review Questions

Method: A2320B (Alkalinity by Titrimetric Method)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were target analytes reported in the field blank(s) less than MDL?	•			
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?		•		MS/MSD not performed.
Were MS/MSD recoveries within project acceptance limits?			•	
Was the MS/MSD RPD within project acceptance limits?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

Review Questions

Method: SW6010C (Trace Metals by Inductively Coupled Plasma/Atomic Emission Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Due to method blank contamination, 3 manganese results were qualified as non-detected (U). Due to calibration blank contamination, 2 iron results were qualified as non-detected (U).
Were field blanks (EBs or FBs) submitted with these samples?	•			
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Due to MS %R above criteria, 1 manganese result was qualified as detected estimated (J).
Was the MS/MSD RPD within project acceptance limits?		•		Due to MS/MSD RPD, 1 manganese result was qualified as detected estimated (J).
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported or as qualified during data validation.

Review Questions

Method: SW6020A (Trace Metals by Inductively Coupled Plasma/Mass Spectrometry)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?	•			
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?		•		Due to MS/MSD %R above and below criteria, 1 arsenic result was qualified as non-detected estimated (UJ).
Was the MS/MSD RPD within project acceptance limits?		•		Due to MSD RPD above criteria, 1 arsenic result was qualified as non-detected estimated (UJ).
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported or as qualified during data validation.

Review Questions

Method: SW9056A (Anion Chromatography)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?	•			
Were field blanks (EBs or FBs) submitted with these samples?	•			
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported.

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Review Questions

Method: SW9060A (Total Organic Carbon)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were all requested target analytes reported?	•			
Was the Calibration within acceptance criteria?	•			
Was either analysis of an ICV performed after each ICAL or a second source standard prior to sample analysis?	•			
Were all reported analytes for the ICV within the required criteria?	•			
Were CCVs run at the required frequency and within acceptance criteria?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than MDL?		•		Due to method blank contamination, 7 DOC results were qualified as non-detected (U).
Were target analytes reported in the field blank(s) less than MDL?		•		Due to equipment blank contamination, 8 DOC results were qualified as non-detected (U).
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were LCS/LCSD recoveries within project acceptance limits?	•			
Was the LCS/LCSD RPD within project acceptance limits?			•	Only a LCS was performed.
Was a MS/MSD pair prepared with each batch?	•			
Were MS/MSD recoveries within project acceptance limits?	•			
Was the MS/MSD RPD within project acceptance limits?	•			
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not submitted with these samples.
Were QAPP specified laboratory LOQs/RLs achieved?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were any data rejected during the verification process?		•		All data is acceptable as reported or as qualified during data validation.

Appendix D

Site-Wide Hydraulic Monitoring Results from 2016 to 2020

Well ID	Ref. Elev.		May 2020	November 2020
N1-P1	-	DTW (ft)	-	14.85
	229.92	GW/SW Elev. (ft)	-	215.07
N1-P2	-	DTW (ft)	-	14.28
	229.93	GW/SW Elev. (ft)	-	215.65
N1-P3	-	DTW (ft)	-	13.71
	230.08	GW/SW Elev. (ft)	-	216.37
N2-P1	-	DTW (ft)	-	5.24
	222.01	GW/SW Elev. (ft)	-	216.77
N2-P2	-	DTW (ft)	-	5.26
	222.16	GW/SW Elev. (ft)	-	216.90
N3-P1	-	DTW (ft)	-	4.86
	220.83	GW/SW Elev. (ft)	-	215.97
N3-P2	-	DTW (ft)	-	4.14
	220.84	GW/SW Elev. (ft)	-	216.70
N5-P1	-	DTW (ft)	-	24.70
	242.65	GW/SW Elev. (ft)	-	217.95
N6-P1	-	DTW (ft)	-	24.80
	242.69	GW/SW Elev. (ft)	-	217.89
N6-P1	-	DTW (ft)	-	37.52
	258.60	GW/SW Elev. (ft)	-	221.08
N7-P1	-	DTW (ft)	-	32.00
	255.59	GW/SW Elev. (ft)	-	223.59
N7-P2	-	DTW (ft)	-	32.10
	256.04	GW/SW Elev. (ft)	-	223.94
SHL-3	-	DTW (ft)	-	30.55
	246.95	GW/SW Elev. (ft)	-	216.40
SHL-4	-	DTW (ft)	10.13	10.68
	227.48	GW/SW Elev. (ft)	217.35	216.80
SHL-5	-	DTW (ft)	-	6.55
	217.60	GW/SW Elev. (ft)	-	211.05
SHL-7	-	DTW (ft)	-	17.60
	236.33	GW/SW Elev. (ft)	-	218.73
SHL-8S	-	DTW (ft)	-	8.56
	220.97	GW/SW Elev. (ft)	-	212.41
SHL-8D	-	DTW (ft)	-	8.40
	220.78	GW/SW Elev. (ft)	-	212.38
SHL-9	-	DTW (ft)	-	11.74
	221.95	GW/SW Elev. (ft)	-	210.21
SHL-10	-	DTW (ft)	30.67	31.20
	248.02	GW/SW Elev. (ft)	217.35	216.82
SHL-11	-	DTW (ft)	18.36	18.67
	235.47	GW/SW Elev. (ft)	217.11	216.80
SHL-12	-	DTW (ft)	-	23.35
	248.62	GW/SW Elev. (ft)	-	225.27
SHL-13	-	DTW (ft)	-	7.17
	220.71	GW/SW Elev. (ft)	-	213.54
SHL-15	-	DTW (ft)	16.32	21.00
	259.92	GW/SW Elev. (ft)	243.60	238.92
SHL-17	-	DTW (ft)	-	8.20
	233.79	GW/SW Elev. (ft)	-	225.59
SHL-18	-	DTW (ft)	-	19.55
	237.56	GW/SW Elev. (ft)	-	218.01
SHL-19	-	DTW (ft)	23.15	22.68
	240.50	GW/SW Elev. (ft)	217.35	217.82
SHL-20	-	DTW (ft)	17.11	18.80
	235.95	GW/SW Elev. (ft)	218.84	217.15
SHL-22	-	DTW (ft)	-	9.15
	219.58	GW/SW Elev. (ft)	-	210.43
SHL-23	-	DTW (ft)	-	30.36
	241.29	GW/SW Elev. (ft)	-	210.93
SHL-24	-	DTW (ft)	-	16.35
	238.75	GW/SW Elev. (ft)	-	222.40

Well ID	Ref. Elev.		May 2020	November 2020
SHL-25	-	DTW (ft)	24.62	28.82
	258.01	GW/SW Elev. (ft)	233.39	229.19
SHM-05-39A	-	DTW (ft)	-	12.25
	221.53	GW/SW Elev. (ft)	-	209.28
SHP-05-39B	-	DTW (ft)	-	12.99
	221.51	GW/SW Elev. (ft)	-	208.52
SHM-05-40X	-	DTW (ft)	13.66	14.99
	223.19	GW/SW Elev. (ft)	209.53	208.20
SHM-05-41a	-	DTW (ft)	-	12.01
	222.48	GW/SW Elev. (ft)	-	210.47
SHM-05-41B	-	DTW (ft)	9.96	11.68
	222.33	GW/SW Elev. (ft)	212.37	210.65
SHM-05-41C	-	DTW (ft)	10.31	12.12
	222.57	GW/SW Elev. (ft)	212.26	210.45
SHM-05-42A	-	DTW (ft)	-	5.90
	216.81	GW/SW Elev. (ft)	-	210.91
SHM-05-42B	-	DTW (ft)	-	6.00
	216.80	GW/SW Elev. (ft)	-	210.80
SHM-93-10D	-	DTW (ft)	-	30.71
	248.01	GW/SW Elev. (ft)	-	217.30
SHM-93-18B	-	DTW (ft)	-	19.25
	237.31	GW/SW Elev. (ft)	-	218.06
SHM-93-22B	-	DTW (ft)	6.67	9.73
	219.39	GW/SW Elev. (ft)	212.72	209.66
SHM-93-22C	-	DTW (ft)	-	11.35
	220.69	GW/SW Elev. (ft)	-	209.34
SHM-96-5B	-	DTW (ft)	5.79	7.63
	218.92	GW/SW Elev. (ft)	213.13	211.29
SHM-96-5C	-	DTW (ft)	-	7.08
	218.39	GW/SW Elev. (ft)	-	211.31
SHM-99-31A	-	DTW (ft)	-	1.67
	214.34	GW/SW Elev. (ft)	-	212.67
SHM-99-31B	-	DTW (ft)	-	4.57
	214.39	GW/SW Elev. (ft)	-	209.82
SHM-99-31C	-	DTW (ft)	-	4.87
	214.60	GW/SW Elev. (ft)	-	209.73
SHM-99-32X	-	DTW (ft)	-	10.42
	221.28	GW/SW Elev. (ft)	-	210.86
SHP-01-36X	-	DTW (ft)	7.56	7.35
	223.95	GW/SW Elev. (ft)	216.39	216.60
SHP-01-37X	-	DTW (ft)	6.36	6.04
	222.79	GW/SW Elev. (ft)	216.43	216.75
SHP-01-38A	-	DTW (ft)	3.59	3.96
	220.86	GW/SW Elev. (ft)	217.27	216.90
SHP-01-38B	-	DTW (ft)	-	4.08
	221.03	GW/SW Elev. (ft)	-	216.95
SHP-05-43	-	DTW (ft)	-	45.61
	260.17	GW/SW Elev. (ft)	-	215.10
SHP-05-44	-	DTW (ft)	-	42.19
	258.55	GW/SW Elev. (ft)	-	215.95
SHP-05-45A	-	DTW (ft)	-	17.90
	228.48	GW/SW Elev. (ft)	-	210.58
SHP-05-45B	-	DTW (ft)	-	18.31
	229.11	GW/SW Elev. (ft)	-	210.80
SHP-05-46A	-	DTW (ft)	-	17.11
	228.18	GW/SW Elev. (ft)	-	211.07
SHP-05-46B	-	DTW (ft)	-	16.38
	227.60	GW/SW Elev. (ft)	-	211.22
SHP-05-47A	-	DTW (ft)	-	3.54
	217.39	GW/SW Elev. (ft)	-	213.85
SHP-05-47B	-	DTW (ft)	-	2.28
	215.40	GW/SW Elev. (ft)	-	213.12

Well ID	Ref. Elev.		May 2020	November 2020
SHP-05-48A	-	DTW (ft)	-	4.45
	217.31	GW/SW Elev. (ft)	-	212.86
SHP-05-48B	-	DTW (ft)	-	3.07
	215.96	GW/SW Elev. (ft)	-	212.89
SHP-05-49A	-	DTW (ft)	-	5.57
	216.67	GW/SW Elev. (ft)	-	211.10
SHP-05-49B	-	DTW (ft)	-	3.32
	215.14	GW/SW Elev. (ft)	-	211.82
SHP-95-27X	-	DTW (ft)	-	31.90
	237.45	GW/SW Elev. (ft)	-	205.55
SHP-99-29X	-	DTW (ft)	-	25.85
	243.34	GW/SW Elev. (ft)	-	217.49
SHP-99-34B	-	DTW (ft)	-	13.80
	224.91	GW/SW Elev. (ft)	-	211.11
SHP-99-35X	-	DTW (ft)	-	36.80
	258.23	GW/SW Elev. (ft)	-	221.43
PZ-12-01	-	DTW (ft)	20.20	20.80
	237.55	GW/SW Elev. (ft)	217.35	216.75
PZ-12-02	-	DTW (ft)	19.29	20.81
	237.79	GW/SW Elev. (ft)	218.50	216.98
PZ-12-03	-	DTW (ft)	19.36	19.55
	236.40	GW/SW Elev. (ft)	217.04	216.85
PZ-12-04	-	DTW (ft)	18.73	20.71
	238.20	GW/SW Elev. (ft)	219.47	217.49
PZ-12-05	-	DTW (ft)	21.10	21.78
	238.73	GW/SW Elev. (ft)	217.63	216.95
PZ-12-06	-	DTW (ft)	22.46	24.44
	242.18	GW/SW Elev. (ft)	219.72	217.74
PZ-12-07	-	DTW (ft)	27.35	27.75
	244.59	GW/SW Elev. (ft)	217.24	216.84
PZ-12-08	-	DTW (ft)	23.88	27.35
	244.83	GW/SW Elev. (ft)	220.95	217.48
PZ-12-09	-	DTW (ft)	23.29	24.60
	241.93	GW/SW Elev. (ft)	218.64	217.33
PZ-12-10	-	DTW (ft)	21.02	23.45
	242.28	GW/SW Elev. (ft)	221.26	218.83
SHM-10-01	-	DTW (ft)	-	4.23
	209.65	GW/SW Elev. (ft)	-	205.42
SHM-10-02	-	DTW (ft)	-	18.31
	223.03	GW/SW Elev. (ft)	-	204.72
SHM-10-03	-	DTW (ft)	-	27.03
	232.05	GW/SW Elev. (ft)	-	205.02
SHM-10-04	-	DTW (ft)	-	6.52
	212.61	GW/SW Elev. (ft)	-	206.09
SHM-10-05A	-	DTW (ft)	-	25.28
	235.09	GW/SW Elev. (ft)	-	209.81
SHM-10-06	-	DTW (ft)	-	20.31
	232.91	GW/SW Elev. (ft)	-	212.60
SHM-10-06A	-	DTW (ft)	-	36.11
	248.54	GW/SW Elev. (ft)	-	212.43
SHM-10-07	-	DTW (ft)	-	27.85
	246.82	GW/SW Elev. (ft)	-	218.97
SHM-10-08	-	DTW (ft)	-	9.78
	214.36	GW/SW Elev. (ft)	-	204.58
SHM-10-10	-	DTW (ft)	-	10.92
	217.11	GW/SW Elev. (ft)	-	206.19
SHM-10-11	-	DTW (ft)	-	41.24
	263.76	GW/SW Elev. (ft)	-	222.52
SHM-10-12	-	DTW (ft)	-	34.70
	255.17	GW/SW Elev. (ft)	-	220.47
SHM-10-13	-	DTW (ft)	-	26.80
	244.77	GW/SW Elev. (ft)	-	217.97

Well ID	Ref. Elev.		May 2020	November 2020
SHM-10-14	-	DTW (ft)	-	21.11
	237.62	GW/SW Elev. (ft)	-	216.51
SHM-10-15	-	DTW (ft)	-	25.30
	243.68	GW/SW Elev. (ft)	-	218.38
SHM-10-16	-	DTW (ft)	-	8.63
	219.23	GW/SW Elev. (ft)	-	210.60
SHM-11-02	-	DTW (ft)	21.55	23.90
	240.73	GW/SW Elev. (ft)	219.18	216.83
SHM-11-06	-	DTW (ft)	18.97	20.75
	236.17	GW/SW Elev. (ft)	217.20	215.42
SHM-11-07	-	DTW (ft)	-	23.24
	240.83	GW/SW Elev. (ft)	-	217.59
SHM-13-01	-	DTW (ft)	-	3.28
	208.08	GW/SW Elev. (ft)	-	204.80
SHM-13-02	-	DTW (ft)	-	13.04
	218.72	GW/SW Elev. (ft)	-	205.68
SHM-13-03	-	DTW (ft)	5.11	5.39
	212.05	GW/SW Elev. (ft)	206.94	206.66
SHM-13-04	-	DTW (ft)	18.54	19.65
	227.02	GW/SW Elev. (ft)	208.48	207.37
SHM-13-05	-	DTW (ft)	-	16.96
	225.14	GW/SW Elev. (ft)	-	208.18
SHM-13-06	-	DTW (ft)	17.07	17.63
	223.89	GW/SW Elev. (ft)	206.82	206.26
SHM-13-07	-	DTW (ft)	18.54	19.11
	225.64	GW/SW Elev. (ft)	207.10	206.53
SHM-13-08	-	DTW (ft)	20.06	20.68
	227.90	GW/SW Elev. (ft)	207.84	207.22
SHM-13-14S	-	DTW (ft)	-	3.65
	210.55	GW/SW Elev. (ft)	-	206.90
SHM-13-14D	-	DTW (ft)	-	3.63
	210.48	GW/SW Elev. (ft)	-	206.85
SHM-13-15	-	DTW (ft)	-	4.03
	210.58	GW/SW Elev. (ft)	-	206.55
SHM-07-03	-	DTW (ft)	19.03	20.70
	227.90	GW/SW Elev. (ft)	208.87	207.20
SHM-07-05X	-	DTW (ft)	2.75	14.95
	223.40	GW/SW Elev. (ft)	220.65	208.45
SHP-99-01C	-	DTW (ft)	-	24.95
	274.15	GW/SW Elev. (ft)	-	249.20
SHM-93-24A	-	DTW (ft)	-	16.68
	238.42	GW/SW Elev. (ft)	-	221.74
PSP-01	-	DTW (ft)	-	Destroyed
	218.14	GW/SW Elev. (ft)	-	-
SHSG-13-01G	-	DTW (ft)	-	Dry
	205.53	GW/SW Elev. (ft)	-	-
SHSG-13-02G	-	DTW (ft)	-	2.85
	208.25	GW/SW Elev. (ft)	-	202.16
SHSG-13-03G	-	DTW (ft)	-	-
	209.99	GW/SW Elev. (ft)	-	-
SHSG-14-01G	-	DTW (ft)	-	2.47
	213.71	GW/SW Elev. (ft)	-	210.54
EPA-PZ-2012-1A	-	DTW (ft)	10.38	12.27
	223.79	GW/SW Elev. (ft)	213.41	211.52
EPA-PZ-2012-1B	-	DTW (ft)	10.09	11.93
	223.53	GW/SW Elev. (ft)	213.44	211.60
EPA-PZ-2012-2A	-	DTW (ft)	9.94	11.51
	223.38	GW/SW Elev. (ft)	213.44	211.87
EPA-PZ-2012-2B	-	DTW (ft)	9.98	11.51
	223.37	GW/SW Elev. (ft)	213.39	211.86
EPA-PZ-2012-3A	-	DTW (ft)	9.81	11.76
	222.65	GW/SW Elev. (ft)	212.84	210.89

Well ID	Ref. Elev.		May 2020	November 2020
EPA-PZ-2012-3B	-	DTW (ft)	9.68	11.70
	222.57	GW/SW Elev. (ft)	212.89	210.87
EPA-PZ-2012-4A	-	DTW (ft)	13.94	16.00
	226.60	GW/SW Elev. (ft)	212.66	210.60
EPA-PZ-2012-4B	-	DTW (ft)	13.85	15.90
	226.39	GW/SW Elev. (ft)	212.54	210.49
EPA-PZ-2012-5A	-	DTW (ft)	7.42	9.05
	220.01	GW/SW Elev. (ft)	212.59	210.96
EPA-PZ-2012-5B	-	DTW (ft)	6.63	8.32
	219.38	GW/SW Elev. (ft)	212.75	211.06
EPA-PZ-2012-6A	-	DTW (ft)	21.49	23.70
	234.25	GW/SW Elev. (ft)	212.76	210.55
EPA-PZ-2012-6B	-	DTW (ft)	21.39	23.63
	234.08	GW/SW Elev. (ft)	212.69	210.45
EPA-PZ-2012-7A	-	DTW (ft)	21.32	23.58
	234.16	GW/SW Elev. (ft)	212.84	210.58
EPA-PZ-2012-7B	-	DTW (ft)	21.37	23.45
	234.03	GW/SW Elev. (ft)	212.66	210.58
SHP-2016-1A	-	DTW (ft)	14.30	16.62
	227.27	GW/SW Elev. (ft)	212.97	210.65
SHP-2016-1B	-	DTW (ft)	16.19	18.00
	227.24	GW/SW Elev. (ft)	211.05	209.24
SHP-2016-2A	-	DTW (ft)	14.37	15.28
	225.93	GW/SW Elev. (ft)	212.66	210.65
SHP-2016-2B	-	DTW (ft)	13.35	15.30
	225.95	GW/SW Elev. (ft)	212.60	210.65
SHP-2016-3A	-	DTW (ft)	10.81	11.52
	223.18	GW/SW Elev. (ft)	212.37	211.66
SHP-2016-3B	-	DTW (ft)	10.55	12.47
	223.18	GW/SW Elev. (ft)	212.63	210.71
SHP-2016-4A	-	DTW (ft)	17.41	19.17
	229.97	GW/SW Elev. (ft)	212.56	210.80
SHP-2016-4B	-	DTW (ft)	17.13	19.45
	229.75	GW/SW Elev. (ft)	212.62	210.30
SHP-2016-5A	-	DTW (ft)	14.35	16.35
	227.01	GW/SW Elev. (ft)	212.66	210.66
SHP-2016-5B	-	DTW (ft)	14.29	16.38
	226.95	GW/SW Elev. (ft)	212.66	210.57
SHP-2016-06A	-	DTW (ft)	26.31	29.98
	241.90	GW/SW Elev. (ft)	215.59	211.92
SHP-2016-06B	-	DTW (ft)	19.68	24.65
	241.89	GW/SW Elev. (ft)	222.21	217.24
SHP-2016-06C	-	DTW (ft)	19.74	24.35
	241.92	GW/SW Elev. (ft)	222.18	217.57
SHP-2016-07A	-	DTW (ft)	14.91	31.46
	265.30	GW/SW Elev. (ft)	250.39	233.84
SHP-2016-07B	-	DTW (ft)	21.74	35.54
	265.33	GW/SW Elev. (ft)	243.59	229.79
20-1	-	DTW (ft)	-	45.35
	278.52	GW/SW Elev. (ft)	-	233.17
27-1	-	DTW (ft)	-	42.85
	270.66	GW/SW Elev. (ft)	-	227.81
27-2	-	DTW (ft)	-	51.50
	275.15	GW/SW Elev. (ft)	-	223.65
CAP-2B	-	DTW (ft)	-	23.70
	250.21	GW/SW Elev. (ft)	-	226.51
CH-1D	-	DTW (ft)	-	21.77
	250.59	GW/SW Elev. (ft)	-	228.82
CH-1S	-	DTW (ft)	-	21.87
	250.63	GW/SW Elev. (ft)	-	228.76
MW-1	-	DTW (ft)	-	Dry
	251.84	GW/SW Elev. (ft)	-	-

Well ID	Ref. Elev.		May 2020	November 2020
MW-11A	-	DTW (ft)	-	Dry
	258.57	GW/SW Elev. (ft)	-	-
MW-14	-	DTW (ft)	-	Dry
	256.61	GW/SW Elev. (ft)	-	-
MW-16	-	DTW (ft)	-	Dry
	270.23	GW/SW Elev. (ft)	-	-
MW-22	-	DTW (ft)	-	Dry
	267.64	GW/SW Elev. (ft)	-	-
MW-4-1	-	DTW (ft)	-	7.60
	247.33	GW/SW Elev. (ft)	-	239.73
MW-7	-	DTW (ft)	-	Dry
	249.10	GW/SW Elev. (ft)	-	-
MW-9	-	DTW (ft)	-	Dry
	243.91	GW/SW Elev. (ft)	-	-
Q4-1	-	DTW (ft)	-	35.10
	268.38	GW/SW Elev. (ft)	-	233.28
Q5-1	-	DTW (ft)	-	31.15
	260.99	GW/SW Elev. (ft)	-	229.84
3-2	-	DTW (ft)	-	40.00
	268.20	GW/SW Elev. (ft)	-	228.20
32M-01-14XBR	-	DTW (ft)	-	25.88
	256.06	GW/SW Elev. (ft)	-	230.18
32M-01-14XOB	-	DTW (ft)	-	27.05
	256.56	GW/SW Elev. (ft)	-	229.51
32M-01-15XBR	-	DTW (ft)	-	22.32
	257.70	GW/SW Elev. (ft)	-	235.38
32M-01-16XBR	-	DTW (ft)	-	26.94
	257.50	GW/SW Elev. (ft)	-	230.56
32M-92-01X	-	DTW (ft)	-	20.96
	260.17	GW/SW Elev. (ft)	-	239.21
32Z-01-07XOB	-	DTW (ft)	-	19.55
	259.48	GW/SW Elev. (ft)	-	239.93
RSK-7	-	DTW (ft)	-	5.24
	222.01	GW/SW Elev. (ft)	-	216.77
RSK-15	-	DTW (ft)	-	8.73
	225.54	GW/SW Elev. (ft)	-	216.81
RSK-19	-	DTW (ft)	-	1.99
	218.76	GW/SW Elev. (ft)	-	216.77
RSK-25	-	DTW (ft)	-	Destroyed
	239.21	GW/SW Elev. (ft)	-	-
RSK-27	-	DTW (ft)	-	23.55
	241.45	GW/SW Elev. (ft)	-	217.90
RSK-28	-	DTW (ft)	-	21.66
	239.24	GW/SW Elev. (ft)	-	217.58
RSK-32	-	DTW (ft)	-	19.41
	236.91	GW/SW Elev. (ft)	-	217.50
RSK-34	-	DTW (ft)	-	Destroyed
	233.16	GW/SW Elev. (ft)	-	-
RSK-35	-	DTW (ft)	-	17.76
	233.64	GW/SW Elev. (ft)	-	215.88
RSK-37	-	DTW (ft)	-	3.97
	220.55	GW/SW Elev. (ft)	-	216.58
SHP-2017-01	-	DTW (ft)	17.62	20.31
	229.63	GW/SW Elev. (ft)	212.01	209.32
SHP-2017-02	-	DTW (ft)	18.58	20.90
	230.05	GW/SW Elev. (ft)	211.47	209.15

Notes:
ft = feet
DTW = Depth to Water
GW = Groundwater
SW = Surface water
Elev. = Elevation in feet

Appendix E

2020 Barrier Wall Analysis

United States Army Corps of Engineers
New England District

Final

Barrier Wall Analysis

Shepley's Hill Landfill
Former Fort Devens Army Installation
Devens, Massachusetts

Contract No. W912WJ-19-D-0014

Contract Delivery Order No. W912WJ-20-F-0022

August 2021

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Acronyms and Abbreviations

3PE	three-point estimation
mg/day-m^2	milligrams per day per meter squared
ORD	Office of Research and Development
S-A JV	SERES-Arcadis 8(a) Joint Venture 2, LLC
SHL	Shepley's Hill Landfill
USEPA	United States Environmental Protection Agency

1 Objective

SERES-Arcadis 8(a) Joint Venture 2, LLC (S-A JV) prepared this barrier wall analysis to assess whether the barrier wall at Shepley's Hill Landfill (SHL) is meeting its purpose of reducing the flux of arsenic in groundwater to Red Cove of Plow Shop Pond, thereby reducing potential risk to environmental receptors. The S-A JV prepared this report on behalf of the United States Army Corps of Engineering – New England District, under contract number W912WJ-19-D-0014.

The objective of the barrier wall analysis is outlined in the 2015 SHL Long-Term Monitoring and Maintenance Plan Update (Sovereign Consulting, Inc. 2015). The analyses and calculations presented herein use 2020 groundwater elevation and dissolved arsenic concentration data to assess barrier wall performance. Additional activities to evaluate barrier wall performance, including sampling of sediment and surface water in Red Cove, are planned for 2021. The activities to be performed in 2021 will provide additional data to assess barrier wall performance.

2 Hydraulic Performance

In total, 10 monitoring wells (two pairs of five) were installed to evaluate the effectiveness of the barrier wall. Five piezometers were installed on the western (upgradient) side of the wall (PZ-12-02, PZ-12-04, PZ-12-06, PZ-12-08, and PZ-12-10) and five wells were installed on the on the eastern (downgradient) side of the wall (PZ-12-01, PZ-12-03, PZ-12-05, PZ-12-07, and PZ-12-9) as shown on Figure E-1.

Data from hydraulic head measurements collected on either side of the barrier wall during the fall 2020 synoptic gauging event were used to evaluate the hydraulic gradient and calculate the directions of groundwater flow along the length of the barrier wall using three-point estimation (3PE) vector analysis (United States Environmental Protection Agency [USEPA] 2014). The field measurement collected from well PZ-12-08 during the synoptic gauging event was determined to be erroneous when compared to previous gauging events. A water level was taken on the following day and used for this analysis. Data were used to draw groundwater elevation contours included in Figures 6 and 7 of the Annual Report. Results are discussed in the sections below.

2.1 Hydraulic Head Analysis

The results of the seasonal monitoring events demonstrate a difference in hydraulic head at each paired piezometer location along the barrier wall. The groundwater elevation at the upgradient (west of the barrier wall) piezometers was consistently higher than the groundwater elevation at the downgradient (east of the barrier wall) piezometer for each pair. The maximum hydraulic head differential for May 18, 2020 was 3.71 feet in piezometer pair PZ-12-07 and PZ-12-08 (located in the southern half of the barrier wall). The maximum hydraulic head differential for November 4, 2020 was 1.50 feet in piezometer pair PZ-12-09 and PZ-12-10 (located at the southern end of the barrier wall). These observations are generally consistent with historical monitoring results. Hydraulic head data are summarized in Table E-1.

2.2 3PE Vector Analysis

The fall 2020 groundwater elevations measurements were used to estimate the hydraulic gradient direction and magnitude for areas east and west of the barrier wall. The gradients were calculated using the EPA 3PE spreadsheet tool and are presented in Attachment E-1. The results of the 3PE gradient analysis are tabulated in Table E-2 and presented on Figure E-1. The length of the vectors shown on Figure E-1 are representative of the magnitude of the gradient. The vectors were scaled to a common value of 10,000 (in the middle of the 3PE suggested scaling factors) to facilitate comparison between the triangles.

Most of the hydraulic gradient vectors to the west of the barrier wall are oriented to the northwest. East of the barrier wall, most of the hydraulic gradient vectors north of well PZ-12-01 are oriented to the northwest. South of well PZ-12-01, most of the hydraulic gradient vectors are oriented in an easterly direction.

2.3 Groundwater Elevation Contours

Groundwater elevation contours calculated from the fall 2020 groundwater elevation data are included on Figure 7 of the Annual Report. These contours show some mounding of groundwater upgradient of the barrier wall (to the west) as compared to downgradient of the wall (to the east). This is expected based on the low hydraulic conductivity of the materials of construction. The contours also show groundwater moving to the north along the

upgradient (western) side of the barrier wall, which effectively reduces the amount of groundwater flow from the Landfill Area to Plow Shop Pond. The contours presented on Figure 7 are in general agreement with the results of the 3PE vector analysis and indicate that the barrier wall is effectively reducing groundwater flow from the Landfill Area to Red Cove/Plow Shop Pond.

3 Arsenic Flux

To evaluate the effect of the barrier wall on arsenic mass flux from SHL toward Red Cove, the arsenic mass discharge across the barrier wall itself and to Red Cove/Plow Shop Pond was estimated by calculation. The flux across the barrier wall was calculated using Darcy's law, spring and fall 2020 piezometer pair groundwater elevation data, and 2020 dissolved arsenic concentration data from the upgradient barrier wall piezometers (PZ-12-02, PZ-12-04, PZ-12-06, PZ-12-08, and PZ-12-10). The arsenic mass discharge to Red Cove/Plow Shop Pond calculated using 3PE vector analysis results and 2020 dissolved arsenic concentration data.

3.1 Arsenic Flux Across the Barrier Wall

An estimate of arsenic flux across the barrier wall was performed by calculating the volumetric flux across the barrier wall using Darcy's law and multiplying the result by the arsenic concentrations measured on the west (upgradient) side of the wall. Site water level and dissolved arsenic data collected in 2020 were used for the calculation. The Darcy flux was calculated using the head difference between paired piezometers installed on either side of the wall (e.g., PZ-12-01 and PZ-12-02), the distance from the barrier wall to the downgradient piezometer (e.g. PZ-12-01; assuming the groundwater elevation at PZ-12-02 could represent the groundwater elevation at the barrier wall itself), an estimated hydraulic conductivity of 2.83×10^{-4} feet per day (1×10^{-7} centimeters per second; Sovereign Consulting, Inc. 2013), and representative overburden cross-sectional areas for each piezometer pair along the barrier wall transect (see Figure E-2). The mass discharge was calculated as the product of the Darcy flux and the dissolved arsenic concentrations observed in the piezometers upgradient (i.e., west) from the wall in the spring and fall 2020. This conservative calculation assumes that groundwater flows from across the barrier wall from west to east, rather than to the northwest as the 3PE analysis indicates.

The results of the barrier wall arsenic flux are summarized in Table E-3. The arsenic mass discharge across the barrier wall in the spring and fall of 2020 is estimated to be 0.0054 pounds (2.4 grams) per year and 0.0014 pounds (0.6 grams) per year, respectively. These values are about three orders of magnitude lower than the pre-wall estimate of 1.51 pounds per year.

3.2 Arsenic Flux to Red Cove/Plow Shop Pond

The rate of arsenic flux from SHL to Red Cove was calculated by the USEPA Office of Research and Development (ORD) and shared in a 2018 presentation (Ford et. al. 2018). The arsenic flux calculated by the ORD for September 14, 2011 (pre-barrier wall installation) was 108 milligrams per day per meter squared (mg/day-m^2). Following barrier wall installation, estimates of arsenic flux to Red Cove by ORD using the same method ranged from approximately 5 to 25 mg/day-m^2.

The ORD used a 3PE triangle that included RSK12, RSK15, and a staff gage ("Middle Cove") for their calculations. In 2020, data for RSK12 and the Middle Cove staff gage were not available. To estimate arsenic flux to Red Cove, Triangle 14 from the fall 2020 3PE analysis (Figure E-1) was used, along with the hydraulic conductivity used by the ORD in their calculations (65 feet per day). Triangle 14 is located in generally the same upland area as the 3PE triangle used in the calculation by ORD. There are likely other triangles contributing to flux (Triangles 12, 16, and 17) but the majority of the flux is from Triangle 14. The arsenic flux calculation and

results are attached in Table E-4. At 3.57 mg/day-m^2, the calculated arsenic flux is in line with historical values presented by ORD for post-installation conditions (Ford et. al. 2018).

4 Arsenic Trend Analysis

ProUCL Mann-Kendall statistical software for environmental applications was used to perform arsenic concentration trend analyses for piezometers and monitoring wells located west (upgradient) and east (downgradient) of the barrier wall. For example, a statistically significant increasing trend at both piezometers in a pair (upgradient and downgradient of the barrier wall) may indicate that additional work should be performed to evaluate wall performance in that area. Results are included below in Table E-5. Trend graphs are provided in Attachment E-2.

Concentrations of dissolved arsenic measured in groundwater in the barrier wall indicator wells installed on the western (upgradient) side of the wall are generally higher in the northern section of the wall (PZ-12-02, PZ-12-04, and PZ-12-06), compared to the southern section (PZ-12-08 and PZ-12-10). The statistical analysis shows that arsenic concentrations are decreasing in monitoring wells PZ-12-02, PZ-12-05, and PZ-12-06 over the monitoring period from 2013 to 2020. Since the barrier wall was constructed within an area where groundwater exceeded the cleanup level for arsenic (10 µg/L), concentrations of dissolved arsenic at these locations are not anticipated to vary significantly because of barrier wall installation.

Table E-5. Mann-Kendall Trend Analysis Results

Western Piezometer ID	Trend	Eastern Piezometer ID	Trend
PZ-12-02	Decreasing	PZ-12-01	No significant trend
PZ-12-04	Increasing	PZ-12-03	No significant trend
PZ-12-06	Decreasing	PZ-12-05	Decreasing
PZ-12-08	No significant trend	PZ-12-07	No significant trend
PZ-12-10	No significant trend	PZ-12-09	No significant trend

Arsenic concentration trends were also analyzed in two additional monitoring wells located to the east of the barrier wall (Attachment E-2):

- SHP-01-38A located to the east of piezometer pair PZ-12-03 and PZ-12-04 has exhibited a decrease in arsenic concentrations since startup of the ATP in March 2006 and the barrier construction in September 2012.
- SHL-4 located to the east of piezometer pair PZ-12-05 and PZ-12-06 exhibited an increase in arsenic concentrations after startup of the ATP in March 2006 and the barrier wall construction in September 2012, but arsenic concentrations detected in fall 2020 are less than the historical maximum at this location in 1991.

Variability in concentrations is expected due to a heterogeneous distribution of arsenic in the subsurface and variation in groundwater geochemistry.

5 Conclusions and Recommendations

The calculations and evaluations above indicate the barrier wall is performing as designed by diverting groundwater that historically flowed toward Red Cove to the north, thereby reducing arsenic flux to Red Cove. The 3PE analysis and mass flux calculations indicate that flow across the wall is minimal. The analysis of dissolved arsenic flux from the landfill across the barrier wall estimates a reduction in arsenic mass discharge from 1.51 pounds per year before the installation of the barrier wall to 0.0054 pound per year. The estimated arsenic flux to Red Cove in fall 2020 is in line with values calculated by the ORD and presented in 2018 for barrier wall post-installation conditions (Ford et. al. 2018). Dissolved arsenic concentrations in piezometers on the east side of the wall are generally decreasing or do not have a statistically significant trend.

These conclusions are consistent with the 2018 ORD presentation demonstrating a decrease in groundwater flow and arsenic flux into Red Cove since construction of the barrier wall (Ford et.al. 2018). Exceedances of the ambient water quality criteria for arsenic in surface water decreased over the same monitoring period and will be assessed again in 2021. Additional activities to evaluate barrier wall performance, including sampling of sediment and surface water in Red Cove, are planned for 2021. The activities to be performed in 2021 will provide additional data to assess barrier wall performance.

6 References

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Sovereign Consulting, Inc. 2013. Removal Action Completion Report for Shepley's Hill Landfill Barrier Wall, Shepley's Hill Landfill, Former Fort Devens Army Installation, Devens, Massachusetts. July.

Sovereign Consulting, Inc. 2015. Long Term Monitoring and Maintenance Plan Update, Former Fort Devens Army Installation, Devens, Massachusetts. August.

USEPA. 2014. 3PE: A Tool for Estimating Groundwater Flow Vectors. EPA 600/R-14/273. September.

Tables

Table E-1
2020 Barrier Wall Area Hydraulic Monitoring Data
Appendix E - Barrier Wall Analysis
Shepley's Hill Landfill, Former Fort Devens Army Installation, Massachusetts

		5/18/2020			11/4/2020		
Well Identification	Top of Riser Elevation	DTW (feet bTOR)	Water Table Elevation (feet bTOR)	Differential	DTW (feet bTOR)	Water Table Elevation (feet bTOR)	Differential
PZ-12-01	237.55	20.20	217.35	1.15	20.80	216.75	0.23
PZ-12-02	237.79	19.29	218.50		20.81	216.98	
PZ-12-03	236.40	19.36	217.04	2.43	19.55	216.85	0.64
PZ-12-04	238.20	18.73	219.47		20.71	217.49	
PZ-12-05	238.73	21.10	217.63	2.09	21.78	216.95	0.79
PZ-12-06	242.18	22.46	219.72		24.44	217.74	
PZ-12-07	244.59	27.35	217.24	3.71	27.75	216.84	0.64
PZ-12-08	244.83	23.88	220.95		27.35	217.48	
PZ-12-09	241.93	23.29	218.64	2.62	24.60	217.33	1.50
PZ-12-10	242.28	21.02	221.26		23.45	218.83	

Notes:
All measurements are in feet.
Even-numbered piezometers - west of the barrier wall
Odd-numbered piezometers - east of the barrier wall

Acronyms and Abbreviations:
bTOR = below top of riser
DTW = depth to water

Table E-2
2020 Barrier Wall Area Vectors
Appendix E - Barrier Wall Analysis
Shepley's Hill Landfill, Former Fort Devens Army Installation, Massachusetts

Triangle No.	Well Identification	Massachusetts State Planar Coordinate System		Water Levels (feet)	Hydraulic Gradient		Groundwater Velocity	
		Northing	Easting	Fall 2020	Magnitude	Direction (degrees)	Magnitude	Direction (degrees)
West of Barrier Wall								
1	PZ-12-08	3,026,962.31	630,546.08	217.48	0.011	16.468	1.788	16.468
	SHM-10-07	3,026,889.79	630,301.42	218.97				
	PZ-12-10	3,026,778.49	630,723.97	218.83				
2	PZ-12-08	3,026,962.31	630,546.08	217.48	0.006	62.574	0.991	62.574
	SHM-10-07	3,026,889.79	630,301.42	218.97				
	RSK27	3,027,048.54	630,421.76	217.90				
3	PZ-12-08	3,026,962.31	630,546.08	217.48	0.004	77.787	0.678	77.787
	PZ-12-06	3,027,081.85	630,454.80	217.74				
	RSK27	3,027,048.54	630,421.76	217.90				
4	RSK28	3,027,126.34	630,418.55	217.58	0.004	9.166	0.699	9.166
	PZ-12-06	3,027,081.85	630,454.80	217.74				
	RSK27	3,027,048.54	630,421.76	217.90				
5	RSK28	3,027,126.34	630,418.55	217.58	0.003	322.227	0.465	322.227
	PZ-12-06	3,027,081.85	630,454.80	217.74				
	PZ-12-04	3,027,193.77	630,452.88	217.5				
6	RSK28	3,027,126.34	630,418.55	217.58	0.001	46.465	0.210	46.465
	RSK32	3,027,211.48	630,425.12	217.50				
	PZ-12-04	3,027,193.77	630,452.88	217.5				
7	SHL-20	3,027,329.59	630,463.33	217.15	0.003	38.331	0.501	38.331
	RSK32	3,027,211.48	630,425.12	217.50				
	PZ-12-04	3,027,193.77	630,452.88	217.5				
8	SHL-20	3,027,329.59	630,463.33	217.15	0.003	347.983	0.542	347.983
	PZ-12-02	3,027,383.95	630,467.76	216.98				
	RSK32	3,027,211.48	630,425.12	217.50				
9	PZ-12-02	3,027,383.95	630,467.76	216.98	0.012	297.843	2.023	297.843
	RSK32	3,027,211.48	630,425.12	217.50				
	RSK35	3,027,522.23	630,438.29	215.88				
	RSK35	3,027,522.23	630,438.29	215.88				
10	SHM-11-06	3,027,590.05	630,411.30	215.42	0.006	326.399	1.073	326.399
	RSK32	3,027,211.48	630,425.12	217.50				
East of Barrier Wall								
11	PZ-12-09	3,026,801.42	630,740.93	217.33	0.002	288.963	0.374	288.963
	PZ-12-07	3,026,971.84	630,568.49	216.84				
	RSK15	3,027,062.01	630,585.33	216.81				
12	PZ-12-09	3,026,801.42	630,740.93	217.33	0.003	16.358	0.420	16.358
	RSK37	3,027,114.54	630,730.23	216.58				
	RSK15	3,027,062.01	630,585.33	216.81				
13	RSK15	3,027,062.01	630,585.33	216.81	0.001	86.498	0.224	86.498
	PZ-12-05	3,027,087.34	630,479.44	216.95				
	PZ-12-07	3,026,971.84	630,568.49	216.84				
14	PZ-12-05	3,027,087.34	630,479.44	216.95	0.001	106.883	0.215	106.883
	SHP-01-38A	3,027,171.48	630,545.54	216.90				
	RSK15	3,027,062.01	630,585.33	216.81				
15	SHP-01-38A	3,027,171.48	630,545.54	216.90	0.001	351.205	0.114	351.205
	PZ-12-05	3,027,087.34	630,479.44	216.95				
	PZ-12-01	3,027,384.39	630,488.47	216.75				
16	SHP-01-38A	3,027,171.48	630,545.54	216.90	0.004	64.770	0.639	64.770
	RSK19	3,027,219.54	630,560.38	216.77				
	PZ-12-01	3,027,384.39	630,488.47	216.75				
17	RSK7	3,027,270.38	630,635.71	216.77	0.0001	325.985	0.019	325.985
	RSK19	3,027,219.54	630,560.38	216.77				
	PZ-12-01	3,027,384.39	630,488.47	216.75				
18	RSK7	3,027,270.38	630,635.71	216.77	0.003	219.927	0.471	219.927
	N2-P2	3,027,311.05	630,658.72	216.90				
	PZ-12-01	3,027,384.39	630,488.47	216.75				
19	SHP-01-37X	3,027,498.37	630,696.92	216.75	0.001	331.330	0.171	331.330
	N2-P2	3,027,311.05	630,658.72	216.90				
	PZ-12-01	3,027,384.39	630,488.47	216.75				
20	SHP-01-37X	3,027,498.37	630,696.92	216.75	0.006	331.330	1.000	331.330
	RSK35	3,027,522.23	630,438.29	215.88				
	PZ-12-01	3,027,384.39	630,488.47	216.75				
21	SHP-01-37X	3,027,498.37	630,696.92	216.75	0.006	332.060	1.019	332.060
	RSK35	3,027,522.23	630,438.29	215.88				
	SHP-05-44	3,027,588.48	630,587.63	215.95				
	SHP-01-37X	3,027,498.37	630,696.92	216.75				

Table E-2
2020 Barrier Wall Area Vectors
Appendix E - Barrier Wall Analysis
Shepley's Hill Landfill, Former Fort Devens Army Installation, Massachusetts

Triangle No.	Well Identification	Massachusetts State Planar Coordinate System		Water Levels (feet)	Hydraulic Gradient		Groundwater Velocity	
		Northing	Easting	Fall 2020	Magnitude	Direction (degrees)	Magnitude	Direction (degrees)
22	SHP-01-36X	3,027,688.84	630,737.88	216.60	0.006	289.496	1.002	289.496
	SHP-05-44	3,027,588.48	630,587.63	215.95				
23	SHM-11-06	3,027,590.05	630,411.30	215.42	0.006	332.201	1.056	332.201
	RSK35	3,027,522.23	630,438.29	215.88				
	SHP-05-44	3,027,588.48	630,587.63	215.95				

Notes:

1.Hydraulic gradient and groundwater velocity calculated using EPA 2014 3PE Interactive spreadsheet analysis tool (ORD-009717_3PE Spreadsheet, 10-Sep-14)

2.Direction measured clockwise from 0 to 360 degrees.

Table E-3
2020 Barrier Wall Groundwater Flux Calculation
Appendix E - Barrier Wall Analysis
Shepley's Hill Landfill, Former Fort Devens Army Installation, Massachusetts

Area Number	Cross-Sectional Area (ft^2)	Barrier Wall Piezometer	Groundwater Elevations			Horizontal Hydraulic Gradient			Darcy Flux		Upgradient Dissolved Arsenic Concentrations		Arsenic Flux Calculation	
			Spring 2020 (ft NAVD88)	Fall 2020 (ft NAVD88)	2020 Piezometer-Pair Average (ft NAVD88)	Distance to Downgradient Piezometer from Barrier Wall (ft)	Spring 2020 (ft/ft)	Fall 2020 (ft/ft)	Spring Flow Rate (gpm)	Fall Flow Rate (gpm)	Spring 2020 (µg/L)	Fall 2020 (µg/L)	Spring 2020 (lbs./year)	Fall 2020 (lbs./year)
1	5000	PZ-12-01	217.35	216.75	217.40	12.72	0.090	0.018	0.0007	0.0001	210	270	0.0006	0.0002
		PZ-12-02	218.50	216.98										
2	3920	PZ-12-03	217.04	216.85	217.71	9.64	0.252	0.066	0.0015	0.0004	750	710	0.0048	0.0012
		PZ-12-04	219.47	217.49										
3	2785	PZ-12-05	217.63	216.95	218.01	12.27	0.170	0.064	0.0007	0.0003	5.4	13	0.0000	0.0000
		PZ-12-06	219.72	217.74										
4	2750	PZ-12-07	217.24	216.84	218.13	17.31	0.214	0.037	0.0009	0.0001	1.7	24	0.0000	0.0000
		PZ-12-08	220.95	217.48										
5	1200	PZ-12-09	218.64	217.33	219.02	14.04	0.187	0.107	0.0003	0.0002	*1.5*	*1.5*	0.0000	0.0000
		PZ-12-10	221.26	218.83										
								Total	0.0040	0.0011		**Total**	0.0054	0.0014

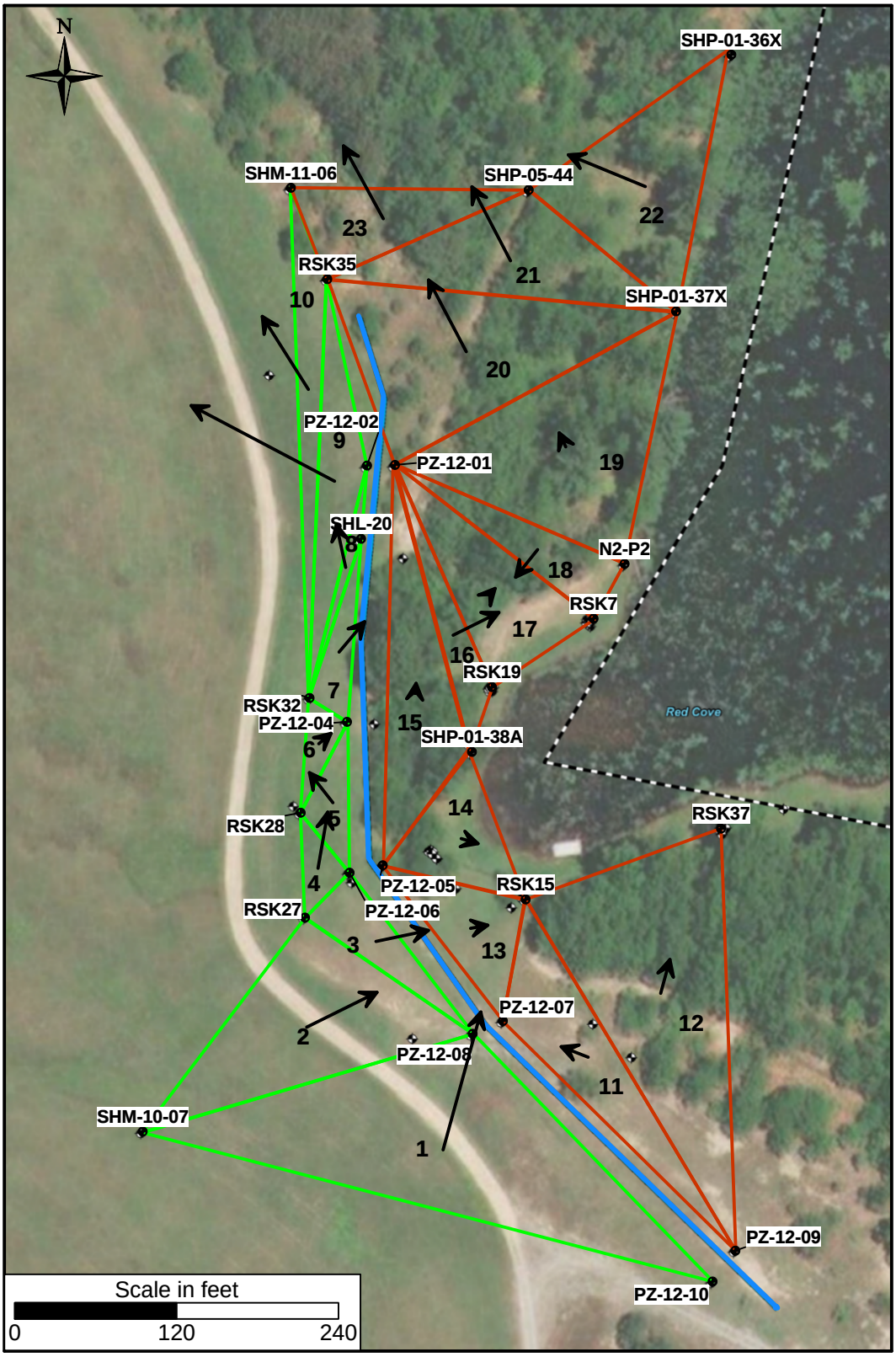
Notes:
1. Areas are illustrated on Figure E-2 and were delineated horizontally from midpoints between piezometer pairs and vertically from the 2020 piezometer-pair average groundwater elevation to bedrock.
2. Groundwater elevations are from Table 4 of the Annual Report.
3. The Distance to Downgradient Piezometer from Barrier Wall information is from Figure E-2.
4.Gradient calculated as the head difference between the upgradient and downgradient piezometers divided by the distance from the barrier wall to the downgradient piezometer.
5. Darcy Flux = hydraulic conductivity*gradient*area. Hydraulic conductivity of the barrier wall = 0.000283 feet per day.
6. 2020 dissolved arsenic concentrations are reported on Tables 6 and 7 of the Annual Report.
7. Values in italics were not detected and are shown at half of the limit of detection.
8. µg/L = micrograms per liter; ft^2 = square feet; ft NAVD88 = feet North American Vertical Datum of 1988; gpm = gallons per minute; lbs./year = pounds per year

Table E-4
2020 Estimate of Arsenic Flux to Red Cove
Appendix E - Barrier Wall Analysis
Shepley's Hill Landfill, Former Fort Devens Army Installation, Massachusetts

Triangle Number	Hydraulic Conductivity (ft/day)	Locations Used in 3PE Gradient Analysis	Fall 2020 Dissolved Arsenic Concentration at PZ-12-05 (µg/L)	Fall 2020 Dissolved Arsenic Concentration at SHP-01-38A (µg/L)	Fall 2020 Dissolved Arsenic Concentration at SHL-4 (µg/L)	Median Fall 2020 Dissolved As Concentration (µg/L)	Hydraulic Gradient (i)	GW Flux (ft/day)	GW Flux (m/day)	Mass Flux (mg/day-m^2)
14	65	PZ-12-05, SHP-01-38A, RSK-15	140	150	110	140	0.00129	0.08	0.03	3.57

Notes:
3PE = three-point estimation
µg/L = micrograms per day
ft/day = feet per day
GW - groundwater
i = hydraulic gradient
m/day = meters per day
mg/day-m2 = milligrams per day per meter squared

Figures



Legend

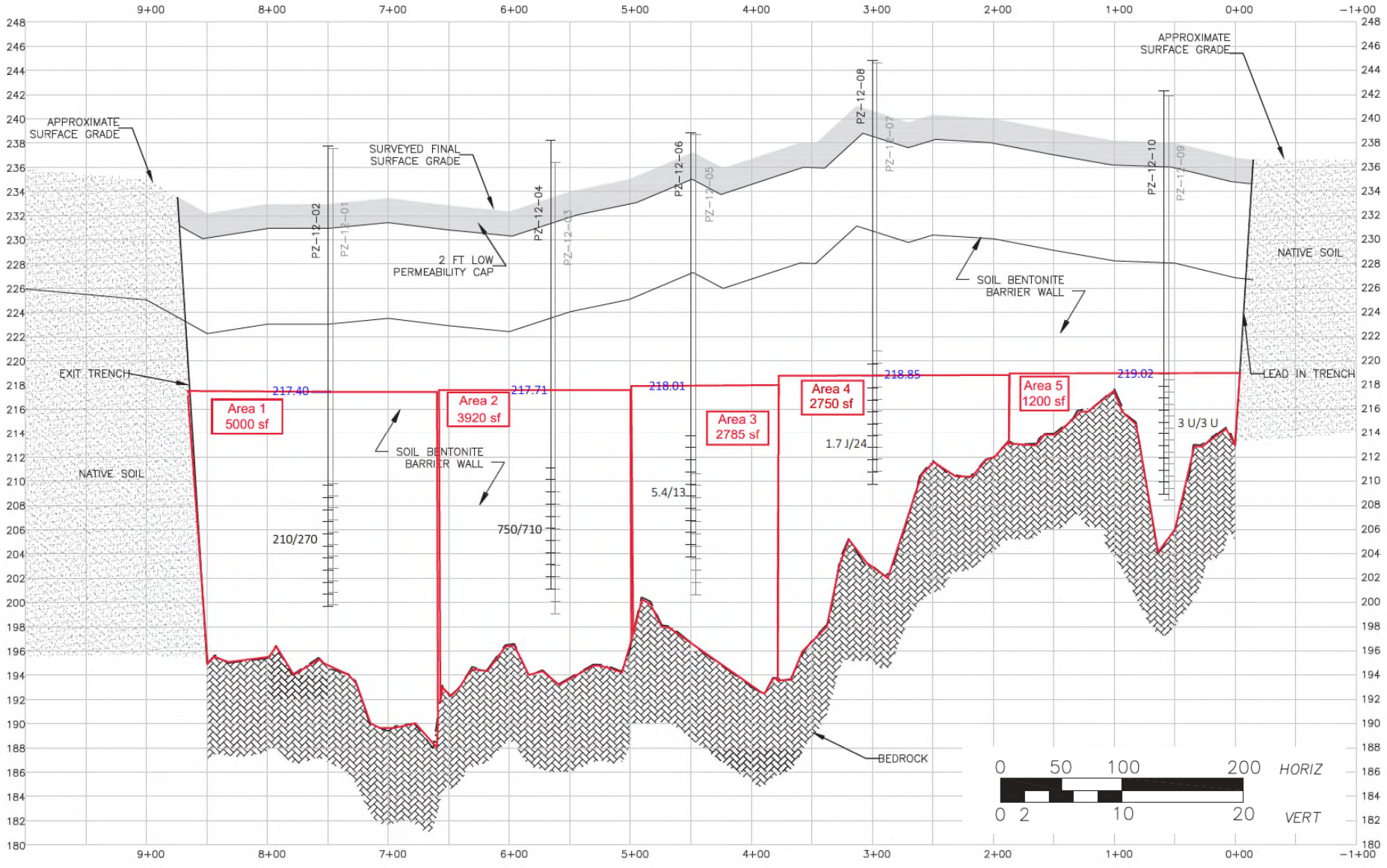
- Well Location
- Hydraulic Gradient Direction and Magnitude (Scale Factor = 10,000)
- West of Barrier Wall Triangle for Vector Analysis
- East of Barrier Wall Triangle for Vector Analysis
- Barrier Wall
- Former Fort Devens Boundary

FORMER FORT DEVENS ARMY INSTALLATION
DEVENS, MASSACHUSETTS

2020 BARRIER WALL AREA HYDRAULIC VECTORS

SERES Engineering & Services, LLC
ARCADIS
a joint venture

FIGURE
E-1



Notes:

1. Cross section reference: KOMAN Government Solutions, LLC. May 2020 Draft 2019 Annual Operations, Maintenance, and Monitoring Report, Shepley's Hill Landfill.
2. Black numbers adjacent to well screens are the dissolved arsenic concentration in spring 2020/fall 2020 in micrograms per liter for the upgradient piezometer (even #s).
3. The average 2020 groundwater elevation for each piezometer pair is shown in blue at the top of each Area.

LEGEND

PIEZOMETER SCREEN

PZ-12-01 PIEZOMETER LOCATION

200 ELEVATION

0+00 STATION NUMBER

STA	WELL	OFFSET FROM CENTER LINE (FT)	DIRECTION
7+50	PZ-12-01	12.72	E
7+50	PZ-12-02	8.21	W
5+70	PZ-12-03	9.64	E
5+70	PZ-12-04	11.70	W
4+50	PZ-12-05	12.27	E
4+50	PZ-12-06	13.82	W
3+00	PZ-12-07	17.31	E
3+00	PZ-12-08	6.51	W
0+60	PZ-12-09	14.04	E
0+60	PZ-12-10	14.78	W

2020 ANNUAL OPERATIONS, MAINTENANCE, AND MONITORING REPORT
SHEPLEY'S HILL LANDFILL
FORMER FORT DEVENS ARMY INSTALLATION
DEVENS, MASSACHUSETTS

BARRIER WALL CROSS SECTION FOR 2020 ARSENIC FLUX CALCULATION

SERES Engineering & Services, LLC | ARCADIS a joint venture

FIGURE E-2

Attachment E-1

3PE Vector Analysis Calculations

Project:	Shepley's Hill Landfill
Location:	Barrier Wall, Triangle 1
Date:	4/9/2021

Well Location			
Well Name	X Coordinate (L)	Y Coordinate (L)	
PZ-12-08	630,546.08	3,026,962.31	1
SHM-10-07	630,301.42	3,026,889.79	1
PZ-12-10	630,723.97	3,026,778.49	1

Principal Hydraulic Conductivity Components		
K_{max} =	50.0000	(L/T)
K_{min} =	50.0000	(L/T)
Orientation of K_{max} =	90.00	(degrees from N)
θ =	0.00	(degrees from X axis)

Effective Porosity =	0.30	(-)

User input cells are shaded green.

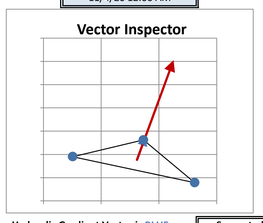
HYDRAULIC HEAD DATA SET MUST NOT CONTAIN BLANK LINES

Vector Inspector Row of Interest:	22
Must be between 22 and 22	

Statistics			
Head (L)	PZ-12-08	SHM-10-07	PZ-12-10
Maximum =	217.48	218.97	218.83
Minimum =	217.48	218.97	218.83
Average =	217.48	218.97	218.83
Range =	0.00	0.00	0.00

	Hyd. Grad. (L/L)	Velocity (L/T)
Maximum =	0.010727	1.787834
Minimum =	0.010727	1.787834
Average =	0.010727	1.787834

11/4/20 12:00 AM



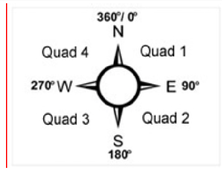
Hydraulic Gradient Vector is BLUE
Groundwater Velocity Vector is RED

		Suggested Scaling Factors
Hyd. Grad. Scale Factor =	10,000.00	20,367.40
Velocity Scale Factor =	250.00	122.20

Number of Measurements	
Date/Time	1
PZ-12-08	1
SHM-10-07	1
PZ-12-10	1

Vector Inspector Arrow Coordinates			
Plotted Hydraulic Gradient Arrow Coordinates			
x_start	y_start	x_end	y_end
630,523.82	3,026,876.86	630,554.23	3,026,979.73
Plotted Groundwater Velocity Arrow Coordinates			
x_start	y_start	x_end	y_end
630,523.82	3,026,876.86	630,650.53	3,027,305.49

	Number of Vectors	
Orientation (deg)	i-vector	V-vector
0 - 90	1	1
90 -180	0	0
180 -270	0	0
270 - 360	0	0



Hydraulic Conductivity Components		
K_{xx} =	50.0000	(L/T)
K_{yy} =	50.0000	(L/T)
K_{xy} = K_{yx} =	0.0000	(L/T)

Triangle Information				
Triangle Centroid (x,y)	630,523.82	3,026,876.86		
Triangle Area	28,936.99	(L^2)	Angle of Triangle (degrees) @	
Distance #1 - #2	255.18	(L)	PZ-12-08	117.55
Distance #2 - #3	436.96	(L)	SHM-10-07	31.27
Distance #1 - #3	255.80	(L)	PZ-12-10	31.18

Triangle Plot Coordinates				
Triangle Sides	x_start	y_start	x_end	y_end
Nodes #1-#2	630,546.08	3,026,962.31	630,301.42	3,026,889.79
Nodes #2-#3	630,301.42	3,026,889.79	630,723.97	3,026,778.49
Nodes #1-#3	630,546.08	3,026,962.31	630,723.97	3,026,778.49

	Hydraulic Head (L)			Hydraulic Gradient		Groundwater Velocity		Angle Between Vectors
Date/Time	PZ-12-08	SHM-10-07	PZ-12-10	Magnitude (L/L)	Direction (deg)	Magnitude (L/T)	Direction (deg)	(deg)
11/4/20 0:00	217.48	218.97	218.83	0.010727	16.47	1.787834	16.47	0.00

Planar Equation Constants			Hydraulic Gradient Vector Components			Groundwater Velocity Vector Components			Hydraulic Gradient Arrow Plot Coordinates				Groundwater Velocity Arrow Plot Coordinates			
A	B	C	i_x	i_y	i-Quad	V_x	V_y	V-Quad	x_start	y_start	x_end	y_end	x_start	y_start	x_end	y_end
-0.003040914	-0.010286956	33273.143	0.003041	0.010287	1	0.506819	1.714493	1	630,523.82	3,026,876.86	630,554.23	3,026,979.73	630,523.82	3,026,876.86	630,650.53	3,027,305.49

Project:	Shepley's Hill Landfill
Location:	Barrier Wall, Triangle 2
Date:	4/9/2021

Well Location			
Well Name	X Coordinate (L)	Y Coordinate (L)	
PZ-12-08	630,546.08	3,026,962.31	1
SHM-10-07	630,301.42	3,026,889.79	1
RSK27	630,421.76	3,027,048.54	1

Principal Hydraulic Conductivity Components		
K_{max} =	50.0000	(L/T)
K_{min} =	50.0000	(L/T)
Orientation of K_{max} =	90.00	(degrees from N)
θ =	0.00	(degrees from X axis)

Effective Porosity =	0.30	(-)

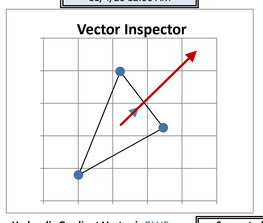
User input cells are shaded green.

HYDRAULIC HEAD DATA SET MUST NOT CONTAIN BLANK LINES

Vector Inspector Row of Interest:	22
Must be between 22 and 22	

Statistics			
Head (L)	PZ-12-08	SHM-10-07	RSK27
Maximum =	217.48	218.97	217.90
Minimum =	217.48	218.97	217.90
Average =	217.48	218.97	217.90
Range =	0.00	0.00	0.00
	Hyd. Grad. (L/L)	Velocity (L/T)	
Maximum =	0.005947	0.991095	
Minimum =	0.005947	0.991095	
Average =	0.005947	0.991095	

11/4/20 12:00 AM



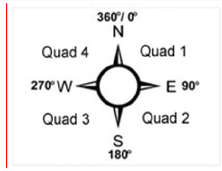
Hydraulic Gradient Vector is BLUE
Groundwater Velocity Vector is RED

		Suggested Scaling Factors
Hyd. Grad. Scale Factor =	10,000.00	21,456.19
Velocity Scale Factor =	250.00	128.74

Number of Measurements	
Date/Time	1
PZ-12-08	1
SHM-10-07	1
RSK27	1

Vector Inspector Arrow Coordinates			
Plotted Hydraulic Gradient Arrow Coordinates			
x_start	y_start	x_end	y_end
630,423.09	3,026,966.88	630,475.87	3,026,994.27
Plotted Groundwater Velocity Arrow Coordinates			
x_start	y_start	x_end	y_end
630,423.09	3,026,966.88	630,643.01	3,027,081.01

	Number of Vectors	
Orientation (deg)	i-vector	V-vector
0 - 90	1	1
90 -180	0	0
180 -270	0	0
270 - 360	0	0



Hydraulic Conductivity Components		
K_{xx} =	50.0000	(L/T)
K_{yy} =	50.0000	(L/T)
K_{xy} = K_{yx} =	0.0000	(L/T)

Triangle Information				
Triangle Centroid (x,y)	630,423.09	3,026,966.88		
Triangle Area	15,056.36	(L^2)	Angle of Triangle (degrees) @	
Distance #1 - #2	255.18	(L)	PZ-12-08	51.26
Distance #2 - #3	199.21	(L)	SHM-10-07	36.33
Distance #1 - #3	151.30	(L)	RSK27	92.42

Triangle Plot Coordinates				
Triangle Sides	x_start	y_start	x_end	y_end
Nodes #1-#2	630,546.08	3,026,962.31	630,301.42	3,026,889.79
Nodes #2-#3	630,301.42	3,026,889.79	630,421.76	3,027,048.54
Nodes #1-#3	630,546.08	3,026,962.31	630,421.76	3,027,048.54

	Hydraulic Head (L)			Hydraulic Gradient		Groundwater Velocity		Angle Between Vectors
Date/Time	PZ-12-08	SHM-10-07	RSK27	Magnitude (L/L)	Direction (deg)	Magnitude (L/T)	Direction (deg)	(deg)
11/4/20 0:00	217.48	218.97	217.90	0.005947	62.57	0.991095	62.57	0.00

Planar Equation Constants			Hydraulic Gradient Vector Components			Groundwater Velocity Vector Components			Hydraulic Gradient Arrow Plot Coordinates				Groundwater Velocity Arrow Plot Coordinates			
A	B	C	i_x	i_y	i-Quad	V_x	V_y	V-Quad	x_start	y_start	x_end	y_end	x_start	y_start	x_end	y_end
-0.005278205	-0.002739029	11836.568	0.005278	0.002739	1	0.879701	0.456505	1	630,423.09	3,026,966.88	630,475.87	3,026,994.27	630,423.09	3,026,966.88	630,643.01	3,027,081.01

Project:	Shepley's Hill Landfill
Location:	Barrier Wall, Triangle 3
Date:	4/9/2021

Well Location			
Well Name	X Coordinate (L)	Y Coordinate (L)	
PZ-12-08	630,546.08	3,026,962.31	1
PZ-12-06	630,454.80	3,027,081.85	1
RSK27	630,421.76	3,027,048.54	1

Principal Hydraulic Conductivity Components		
K_{max} =	50.0000	(L/T)
K_{min} =	50.0000	(L/T)
Orientation of K_{max} =	90.00	(degrees from N)
θ =	0.00	(degrees from X axis)

Effective Porosity =	0.30	(-)

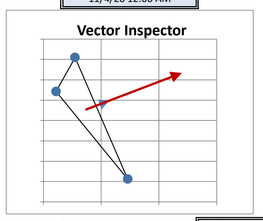
User input cells are shaded green.

HYDRAULIC HEAD DATA SET MUST NOT CONTAIN BLANK LINES

Vector Inspector Row of Interest:	22
Must be between 22 and 22	

Statistics			
Head (L)	PZ-12-08	PZ-12-06	RSK27
Maximum =	217.48	217.74	217.90
Minimum =	217.48	217.74	217.90
Average =	217.48	217.74	217.90
Range =	0.00	0.00	0.00
	Hyd. Grad. (L/L)	Velocity (L/T)	
Maximum =	0.004067	0.677870	
Minimum =	0.004067	0.677870	
Average =	0.004067	0.677870	

11/4/20 12:00 AM



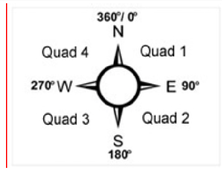
Hydraulic Gradient Vector is BLUE
Groundwater Velocity Vector is RED

		Suggested Scaling Factors
Hyd. Grad. Scale Factor =	10,000.00	18,599.67
Velocity Scale Factor =	250.00	111.60

Number of Measurements	
Date/Time	1
PZ-12-08	1
PZ-12-06	1
RSK27	1

Vector Inspector Arrow Coordinates			
Plotted Hydraulic Gradient Arrow Coordinates			
x_start	y_start	x_end	y_end
630,474.21	3,027,030.90	630,513.97	3,027,039.50
Plotted Groundwater Velocity Arrow Coordinates			
x_start	y_start	x_end	y_end
630,474.21	3,027,030.90	630,639.85	3,027,066.75

	Number of Vectors	
Orientation (deg)	i-vector	V-vector
0 - 90	1	1
90 -180	0	0
180 -270	0	0
270 - 360	0	0



Hydraulic Conductivity Components		
K_{xx} =	50.0000	(L/T)
K_{yy} =	50.0000	(L/T)
K_{xy} = K_{yx} =	0.0000	(L/T)

Triangle Information				
Triangle Centroid (x,y)	630,474.21	3,027,030.90		
Triangle Area	3,495.07	(L^2)	Angle of Triangle (degrees) @	
Distance #1 - #2	150.41	(L)	PZ-12-08	17.89
Distance #2 - #3	46.92	(L)	PZ-12-06	82.13
Distance #1 - #3	151.30	(L)	RSK27	79.98

Triangle Plot Coordinates				
Triangle Sides	x_start	y_start	x_end	y_end
Nodes #1-#2	630,546.08	3,026,962.31	630,454.80	3,027,081.85
Nodes #2-#3	630,454.80	3,027,081.85	630,421.76	3,027,048.54
Nodes #1-#3	630,546.08	3,026,962.31	630,421.76	3,027,048.54

	Hydraulic Head (L)			Hydraulic Gradient		Groundwater Velocity		Angle Between Vectors
Date/Time	PZ-12-08	PZ-12-06	RSK27	Magnitude (L/L)	Direction (deg)	Magnitude (L/T)	Direction (deg)	(deg)
11/4/20 0:00	217.48	217.74	217.90	0.004067	77.79	0.677870	77.79	0.00

Planar Equation Constants			Hydraulic Gradient Vector Components			Groundwater Velocity Vector Components			Hydraulic Gradient Arrow Plot Coordinates				Groundwater Velocity Arrow Plot Coordinates			
A	B	C	i_x	i_y	i-Quad	V_x	V_y	V-Quad	x_start	y_start	x_end	y_end	x_start	y_start	x_end	y_end
-0.003975172	-0.000860412	5328.444	0.003975	0.000860	1	0.662529	0.143402	1	630,474.21	3,027,030.90	630,513.97	3,027,039.50	630,474.21	3,027,030.90	630,639.85	3,027,066.75

Project:	Shepley's Hill Landfill
Location:	Barrier Wall, Triangle 4
Date:	1/25/2021

Well Location			
Well Name	X Coordinate (L)	Y Coordinate (L)	
RSK28	630,418.55	3,027,126.34	1
PZ-12-06	630,454.80	3,027,081.85	1
RSK27	630,421.76	3,027,048.54	1

Principal Hydraulic Conductivity Components		
K_{max} =	50.0000	(L/T)
K_{min} =	50.0000	(L/T)
Orientation of K_{max} =	90.00	(degrees from N)
θ =	0.00	(degrees from X axis)

Effective Porosity =	0.30	(-)

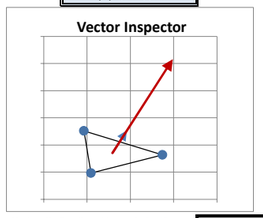
User input cells are shaded green.

HYDRAULIC HEAD DATA SET MUST NOT CONTAIN BLANK LINES

Vector Inspector Row of Interest:	22
Must be between 22 and 22	

Statistics			
Head (L)	RSK28	PZ-12-06	RSK27
Maximum =	217.58	217.74	217.90
Minimum =	217.58	217.74	217.90
Average =	217.58	217.74	217.90
Range =	0.00	0.00	0.00
	Hyd. Grad. (L/L)	Velocity (L/T)	
Maximum =	0.004194	0.699038	
Minimum =	0.004194	0.699038	
Average =	0.004194	0.699038	

11/4/20 12:00 AM



Hydraulic Gradient Vector is BLUE

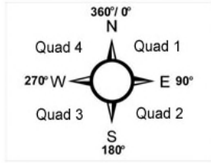
Groundwater Velocity Vector is RED

		Suggested Scaling Factors
Hyd. Grad. Scale Factor =	10,000.00	9,282.54
Velocity Scale Factor =	250.00	55.70

Number of Measurements	
Date/Time	1
RSK28	1
PZ-12-06	1
RSK27	1

Vector Inspector Arrow Coordinates			
Plotted Hydraulic Gradient Arrow Coordinates			
x_start	y_start	x_end	y_end
630,431.70	3,027,085.58	630,438.38	3,027,126.98
Plotted Groundwater Velocity Arrow Coordinates			
x_start	y_start	x_end	y_end
630,431.70	3,027,085.58	630,459.54	3,027,258.10

Orientation (deg)	Number of Vectors i-vector	V-vector
0 - 90	1	1
90 -180	0	0
180 -270	0	0
270 - 360	0	0



Hydraulic Conductivity Components		
K_{xx} =	50.0000	(L/T)
K_{yy} =	50.0000	(L/T)
K_{xy} = K_{yx} =	0.0000	(L/T)

Triangle Information				
Triangle Centroid (x,y)	630,431.70	3,027,085.58		
Triangle Area	1,338.72	(L^2)	Angle of Triangle (degrees) @	
Distance #1 - #2	57.39	(L)	RSK28	36.81
Distance #2 - #3	46.92	(L)	PZ-12-06	96.06
Distance #1 - #3	77.87	(L)	RSK27	47.13

Triangle Plot Coordinates				
Triangle Sides	x_start	y_start	x_end	y_end
Nodes #1-#2	630,418.55	3,027,126.34	630,454.80	3,027,081.85
Nodes #2-#3	630,454.80	3,027,081.85	630,421.76	3,027,048.54
Nodes #1-#3	630,418.55	3,027,126.34	630,421.76	3,027,048.54

	Hydraulic Head (L)			Hydraulic Gradient		Groundwater Velocity		Angle Between Vectors
Date/Time	RSK28	PZ-12-06	RSK27	Magnitude (L/L)	Direction (deg)	Magnitude (L/T)	Direction (deg)	(deg)
11/4/20 0:00	217.58	217.74	217.90	0.004194	9.17	0.699038	9.17	0.00

Planar Equation Constants			Hydraulic Gradient Vector Components			Groundwater Velocity Vector Components			Hydraulic Gradient Arrow Plot Coordinates				Groundwater Velocity Arrow Plot Coordinates			
A	B	C	i_x	i_y	i-Quad	V_x	V_y	V-Quad	x_start	y_start	x_end	y_end	x_start	y_start	x_end	y_end
-0.000668102	-0.004140676	13173.114	0.000668	0.004141	1	0.111350	0.690113	1	630,431.70	3,027,085.58	630,438.38	3,027,126.98	630,431.70	3,027,085.58	630,459.54	3,027,258.10

Project:	Shepley's Hill Landfill
Location:	Barrier Wall, Triangle 5
Date:	1/25/2021

Well Location			
Well Name	X Coordinate (L)	Y Coordinate (L)	
RSK28	630,418.55	3,027,126.34	1
PZ-12-06	630,454.80	3,027,081.85	1
PZ-12-04	630,452.88	3,027,193.77	1

Principal Hydraulic Conductivity Components		
K_{max} =	50.0000	(L/T)
K_{min} =	50.0000	(L/T)
Orientation of K_{max} =	90.00	(degrees from N)
θ =	0.00	(degrees from X axis)

Effective Porosity =	0.30	(-)

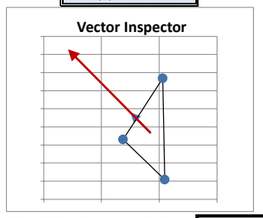
User input cells are shaded green.

HYDRAULIC HEAD DATA SET MUST NOT CONTAIN BLANK LINES

Vector Inspector Row of Interest:	22
Must be between 22 and 22	

Statistics			
Head (L)	RSK28	PZ-12-06	PZ-12-04
Maximum =	217.58	217.74	217.49
Minimum =	217.58	217.74	217.49
Average =	217.58	217.74	217.49
Range =	0.00	0.00	0.00
	Hyd. Grad. (L/L)	Velocity (L/T)	
Maximum =	0.002789	0.464809	
Minimum =	0.002789	0.464809	
Average =	0.002789	0.464809	

11/4/20 12:00 AM



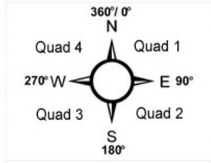
Hydraulic Gradient Vector is BLUE
Groundwater Velocity Vector is RED

		Suggested Scaling Factors
Hyd. Grad. Scale Factor =	10,000.00	20,068.54
Velocity Scale Factor =	250.00	120.41

Number of Measurements	
Date/Time	1
RSK28	1
PZ-12-06	1
PZ-12-04	1

Vector Inspector Arrow Coordinates			
Plotted Hydraulic Gradient Arrow Coordinates			
x_start	y_start	x_end	y_end
630,442.08	3,027,133.99	630,424.99	3,027,156.03
Plotted Groundwater Velocity Arrow Coordinates			
x_start	y_start	x_end	y_end
630,442.08	3,027,133.99	630,370.90	3,027,225.84

Number of Vectors		
Orientation (deg)	i-vector	V-vector
0 - 90	0	0
90 -180	0	0
180 -270	0	0
270 - 360	1	1



Hydraulic Conductivity Components		
K_{xx} =	50.0000	(L/T)
K_{yy} =	50.0000	(L/T)
K_{xy} = K_{yx} =	0.0000	(L/T)

Triangle Information			
Triangle Centroid (x,y)	630,442.08	3,027,133.99	
Triangle Area	1,985.84	(L^2)	Angle of Triangle (degrees) @
Distance #1 - #2	57.39	(L)	RSK28 113.85
Distance #2 - #3	111.94	(L)	PZ-12-06 38.19
Distance #1 - #3	75.67	(L)	PZ-12-04 27.96

Triangle Plot Coordinates				
Triangle Sides	x_start	y_start	x_end	y_end
Nodes #1-#2	630,418.55	3,027,126.34	630,454.80	3,027,081.85
Nodes #2-#3	630,454.80	3,027,081.85	630,452.88	3,027,193.77
Nodes #1-#3	630,418.55	3,027,126.34	630,452.88	3,027,193.77

	Hydraulic Head (L)			Hydraulic Gradient		Groundwater Velocity		Angle Between Vectors
Date/Time	RSK28	PZ-12-06	PZ-12-04	Magnitude (L/L)	Direction (deg)	Magnitude (L/T)	Direction (deg)	(deg)
11/4/20 0:00	217.58	217.74	217.49	0.002789	322.23	0.464809	322.23	0.00

Planar Equation Constants			Hydraulic Gradient Vector Components			Groundwater Velocity Vector Components			Hydraulic Gradient Arrow Plot Coordinates				Groundwater Velocity Arrow Plot Coordinates			
A	B	C	i_x	i_y	i-Quad	V_x	V_y	V-Quad	x_start	y_start	x_end	y_end	x_start	y_start	x_end	y_end
0.00170827	-0.002204433	5813.7516	-0.001708	0.002204	4	-0.284712	0.367405	4	630,442.08	3,027,133.99	630,424.99	3,027,156.03	630,442.08	3,027,133.99	630,370.90	3,027,225.84

Project:	Shepley's Hill Landfill
Location:	Barrier Wall, Triangle 6
Date:	1/25/2021

Well Location			
Well Name	X Coordinate (L)	Y Coordinate (L)	
RSK28	630,418.55	3,027,126.34	1
RSK32	630,425.12	3,027,211.48	1
PZ-12-04	630,452.88	3,027,193.77	1

Principal Hydraulic Conductivity Components		
K_{max} =	50.0000	(L/T)
K_{min} =	50.0000	(L/T)
Orientation of K_{max} =	90.00	(degrees from N)
θ =	0.00	(degrees from X axis)

Effective Porosity =	0.30	(-)

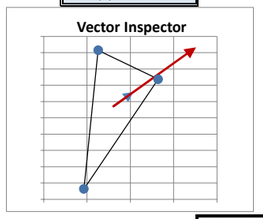
User input cells are shaded green.

HYDRAULIC HEAD DATA SET MUST NOT CONTAIN BLANK LINES

Vector Inspector Row of Interest:	22
Must be between 22 and 22	

Statistics			
Head (L)	RSK28	RSK32	PZ-12-04
Maximum =	217.58	217.50	217.49
Minimum =	217.58	217.50	217.49
Average =	217.58	217.50	217.49
Range =	0.00	0.00	0.00
	Hyd. Grad. (L/L)	Velocity (L/T)	
Maximum =	0.001262	0.210280	
Minimum =	0.001262	0.210280	
Average =	0.001262	0.210280	

11/4/20 12:00 AM



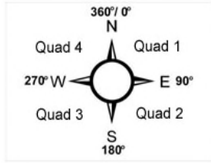
Hydraulic Gradient Vector is BLUE
Groundwater Velocity Vector is RED

		Suggested Scaling Factors
Hyd. Grad. Scale Factor =	10,000.00	33,841.02
Velocity Scale Factor =	250.00	203.05

Number of Measurements	
Date/Time	1
RSK28	1
RSK32	1
PZ-12-04	1

Vector Inspector Arrow Coordinates			
Plotted Hydraulic Gradient Arrow Coordinates			
x_start	y_start	x_end	y_end
630,432.18	3,027,177.20	630,441.33	3,027,185.89
Plotted Groundwater Velocity Arrow Coordinates			
x_start	y_start	x_end	y_end
630,432.18	3,027,177.20	630,470.29	3,027,213.41

Number of Vectors		
Orientation (deg)	i-vector	V-vector
0 - 90	1	1
90 -180	0	0
180 -270	0	0
270 - 360	0	0



Hydraulic Conductivity Components		
K_{xx} =	50.0000	(L/T)
K_{yy} =	50.0000	(L/T)
K_{xy} = K_{yx} =	0.0000	(L/T)

Triangle Information				
Triangle Centroid (x,y)	630,432.18	3,027,177.20		
Triangle Area	1,239.92	(L^2)	Angle of Triangle (degrees) @	
Distance #1 - #2	85.39	(L)	RSK28	22.57
Distance #2 - #3	32.93	(L)	RSK32	61.88
Distance #1 - #3	75.67	(L)	PZ-12-04	95.56

Triangle Plot Coordinates				
Triangle Sides	x_start	y_start	x_end	y_end
Nodes #1-#2	630,418.55	3,027,126.34	630,425.12	3,027,211.48
Nodes #2-#3	630,425.12	3,027,211.48	630,452.88	3,027,193.77
Nodes #1-#3	630,418.55	3,027,126.34	630,452.88	3,027,193.77

	Hydraulic Head (L)			Hydraulic Gradient		Groundwater Velocity		Angle Between Vectors
Date/Time	RSK28	RSK32	PZ-12-04	Magnitude (L/L)	Direction (deg)	Magnitude (L/T)	Direction (deg)	(deg)
11/4/20 0:00	217.58	217.50	217.49	0.001262	46.46	0.210280	46.46	0.00

Planar Equation Constants			Hydraulic Gradient Vector Components			Groundwater Velocity Vector Components			Hydraulic Gradient Arrow Plot Coordinates				Groundwater Velocity Arrow Plot Coordinates			
A	B	C	i_x	i_y	i-Quad	V_x	V_y	V-Quad	x_start	y_start	x_end	y_end	x_start	y_start	x_end	y_end
-0.000914655	-0.000869048	3424.9127	0.000915	0.000869	1	0.152443	0.144841	1	630,432.18	3,027,177.20	630,441.33	3,027,185.89	630,432.18	3,027,177.20	630,470.29	3,027,213.41

Project:	Shepley's Hill Landfill
Location:	Barrier Wall, Triangle 7
Date:	1/25/2021

Well Location			
Well Name	X Coordinate (L)	Y Coordinate (L)	
SHL-20	630,463.33	3,027,329.59	1
RSK32	630,425.12	3,027,211.48	1
PZ-12-04	630,452.88	3,027,193.77	1

Principal Hydraulic Conductivity Components		
K_{max} =	50.0000	(L/T)
K_{min} =	50.0000	(L/T)
Orientation of K_{max} =	90.00	(degrees from N)
θ =	0.00	(degrees from X axis)

Effective Porosity =	0.30	(-)

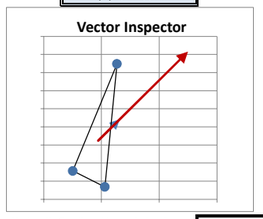
User input cells are shaded green.

HYDRAULIC HEAD DATA SET MUST NOT CONTAIN BLANK LINES

Vector Inspector Row of Interest:	22
Must be between 22 and 22	

Statistics			
Head (L)	SHL-20	RSK32	PZ-12-04
Maximum =	217.15	217.50	217.49
Minimum =	217.15	217.50	217.49
Average =	217.15	217.50	217.49
Range =	0.00	0.00	0.00
	Hyd. Grad. (L/L)	Velocity (L/T)	
Maximum =	0.003008	0.501367	
Minimum =	0.003008	0.501367	
Average =	0.003008	0.501367	

11/4/20 12:00 AM



Hydraulic Gradient Vector is BLUE

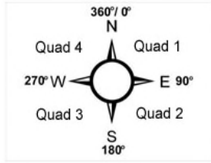
Groundwater Velocity Vector is RED

		Suggested Scaling Factors
Hyd. Grad. Scale Factor =	10,000.00	22,641.65
Velocity Scale Factor =	250.00	135.85

Number of Measurements	
Date/Time	1
SHL-20	1
RSK32	1
PZ-12-04	1

Vector Inspector Arrow Coordinates			
Plotted Hydraulic Gradient Arrow Coordinates			
x_start	y_start	x_end	y_end
630,447.11	3,027,244.95	630,465.77	3,027,268.54
Plotted Groundwater Velocity Arrow Coordinates			
x_start	y_start	x_end	y_end
630,447.11	3,027,244.95	630,524.85	3,027,343.27

Orientation (deg)	Number of Vectors	
	i-vector	V-vector
0 - 90	1	1
90 -180	0	0
180 -270	0	0
270 - 360	0	0



Hydraulic Conductivity Components		
K_{xx} =	50.0000	(L/T)
K_{yy} =	50.0000	(L/T)
K_{xy} = K_{yx} =	0.0000	(L/T)

Triangle Information				
Triangle Centroid (x,y)	630,447.11	3,027,244.95		
Triangle Area	1,977.72	(L^2)	Angle of Triangle (degrees) @	
Distance #1 - #2	124.14	(L)	SHL-20	13.53
Distance #2 - #3	32.93	(L)	RSK32	104.61
Distance #1 - #3	136.22	(L)	PZ-12-04	61.86

Triangle Plot Coordinates				
Triangle Sides	x_start	y_start	x_end	y_end
Nodes #1-#2	630,463.33	3,027,329.59	630,425.12	3,027,211.48
Nodes #2-#3	630,425.12	3,027,211.48	630,452.88	3,027,193.77
Nodes #1-#3	630,463.33	3,027,329.59	630,452.88	3,027,193.77

	Hydraulic Head (L)			Hydraulic Gradient		Groundwater Velocity		Angle Between Vectors
Date/Time	SHL-20	RSK32	PZ-12-04	Magnitude (L/L)	Direction (deg)	Magnitude (L/T)	Direction (deg)	(deg)
11/4/20 0:00	217.15	217.50	217.49	0.003008	38.33	0.501367	38.33	0.00

Planar Equation Constants			Hydraulic Gradient Vector Components			Groundwater Velocity Vector Components			Hydraulic Gradient Arrow Plot Coordinates				Groundwater Velocity Arrow Plot Coordinates			
A	B	C	i_x	i_y	i-Quad	V_x	V_y	V-Quad	x_start	y_start	x_end	y_end	x_start	y_start	x_end	y_end
-0.001865687	-0.002359767	8537.1901	0.001866	0.002360	1	0.310948	0.393295	1	630,447.11	3,027,244.95	630,465.77	3,027,268.54	630,447.11	3,027,244.95	630,524.85	3,027,343.27

Project:	Shepley's Hill Landfill
Location:	Barrier Wall, Triangle 8
Date:	1/25/2021

Well Location			
Well Name	X Coordinate (L)	Y Coordinate (L)	
SHL-20	630,463.33	3,027,329.59	1
PZ-12-02	630,467.76	3,027,383.95	1
RSK32	630,425.12	3,027,211.48	1

Principal Hydraulic Conductivity Components		
K_{max} =	50.0000	(L/T)
K_{min} =	50.0000	(L/T)
Orientation of K_{max} =	90.00	(degrees from N)
θ =	0.00	(degrees from X axis)

Effective Porosity =	0.30	(-)

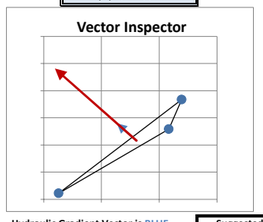
User input cells are shaded green.

HYDRAULIC HEAD DATA SET MUST NOT CONTAIN BLANK LINES

Vector Inspector Row of Interest:	22
Must be between 22 and 22	

Statistics			
Head (L)	SHL-20	PZ-12-02	RSK32
Maximum =	217.15	216.98	217.50
Minimum =	217.15	216.98	217.50
Average =	217.15	216.98	217.50
Range =	0.00	0.00	0.00
	Hyd. Grad. (L/L)	Velocity (L/T)	
Maximum =	0.003254	0.542303	
Minimum =	0.003254	0.542303	
Average =	0.003254	0.542303	

11/4/20 12:00 AM



Hydraulic Gradient Vector is BLUE

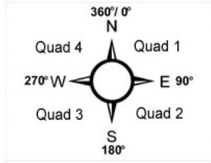
Groundwater Velocity Vector is RED

		Suggested Scaling Factors
Hyd. Grad. Scale Factor =	10,000.00	27,300.67
Velocity Scale Factor =	250.00	163.80

Number of Measurements	
Date/Time	1
SHL-20	1
PZ-12-02	1
RSK32	1

Vector Inspector Arrow Coordinates			
Plotted Hydraulic Gradient Arrow Coordinates			
x_start	y_start	x_end	y_end
630,452.07	3,027,308.34	630,445.30	3,027,340.17
Plotted Groundwater Velocity Arrow Coordinates			
x_start	y_start	x_end	y_end
630,452.07	3,027,308.34	630,423.84	3,027,440.94

Orientation (deg)	Number of Vectors i-vector	V-vector
0 - 90	0	0
90 -180	0	0
180 -270	0	0
270 - 360	1	1



Hydraulic Conductivity Components		
K_{xx} =	50.0000	(L/T)
K_{yy} =	50.0000	(L/T)
K_{xy} = K_{yx} =	0.0000	(L/T)

Triangle Information				
Triangle Centroid (x,y)	630,452.07	3,027,308.34		
Triangle Area	776.93	(L^2)	Angle of Triangle (degrees) @	
Distance #1 - #2	54.54	(L)	SHL-20	166.73
Distance #2 - #3	177.66	(L)	PZ-12-02	9.23
Distance #1 - #3	124.14	(L)	RSK32	4.04

Triangle Plot Coordinates				
Triangle Sides	x_start	y_start	x_end	y_end
Nodes #1-#2	630,463.33	3,027,329.59	630,467.76	3,027,383.95
Nodes #2-#3	630,467.76	3,027,383.95	630,425.12	3,027,211.48
Nodes #1-#3	630,463.33	3,027,329.59	630,425.12	3,027,211.48

	Hydraulic Head (L)			Hydraulic Gradient		Groundwater Velocity		Angle Between Vectors
Date/Time	SHL-20	PZ-12-02	RSK32	Magnitude (L/L)	Direction (deg)	Magnitude (L/T)	Direction (deg)	(deg)
11/4/20 0:00	217.15	216.98	217.50	0.003254	347.98	0.542303	347.98	0.00

Planar Equation Constants			Hydraulic Gradient Vector Components			Groundwater Velocity Vector Components			Hydraulic Gradient Arrow Plot Coordinates				Groundwater Velocity Arrow Plot Coordinates			
A	B	C	i_x	i_y	i-Quad	V_x	V_y	V-Quad	x_start	y_start	x_end	y_end	x_start	y_start	x_end	y_end
0.000677471	-0.003182509	9424.5336	-0.000677	0.003183	4	-0.112912	0.530418	4	630,452.07	3,027,308.34	630,445.30	3,027,340.17	630,452.07	3,027,308.34	630,423.84	3,027,440.94

Project:	Shepley's Hill Landfill
Location:	Barrier Wall, Triangle 9
Date:	1/25/2021

Well Location			
Well Name	X Coordinate (L)	Y Coordinate (L)	
PZ-12-02	630,467.76	3,027,383.95	1
RSK32	630,425.12	3,027,211.48	1
RSK35	630,438.29	3,027,522.23	1

Principal Hydraulic Conductivity Components		
K_{max} =	50.0000	(L/T)
K_{min} =	50.0000	(L/T)
Orientation of K_{max} =	90.00	(degrees from N)
θ =	0.00	(degrees from X axis)

Effective Porosity =	0.30	(-)

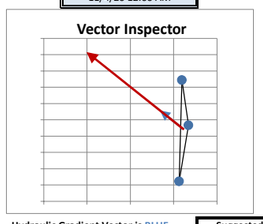
User input cells are shaded green.

HYDRAULIC HEAD DATA SET MUST NOT CONTAIN BLANK LINES

Vector Inspector Row of Interest:	22
Must be between 22 and 22	

Statistics			
Head (L)	PZ-12-02	RSK32	RSK35
Maximum =	216.98	217.50	215.88
Minimum =	216.98	217.50	215.88
Average =	216.98	217.50	215.88
Range =	0.00	0.00	0.00
	Hyd. Grad. (L/L)	Velocity (L/T)	
Maximum =	0.012136	2.022602	
Minimum =	0.012136	2.022602	
Average =	0.012136	2.022602	

11/4/20 12:00 AM



Hydraulic Gradient Vector is BLUE

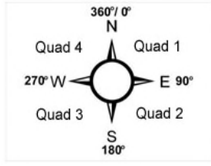
Groundwater Velocity Vector is RED

		Suggested Scaling Factors
Hyd. Grad. Scale Factor =	10,000.00	12,814.72
Velocity Scale Factor =	250.00	76.89

Number of Measurements	
Date/Time	1
PZ-12-02	1
RSK32	1
RSK35	1

Vector Inspector Arrow Coordinates			
Plotted Hydraulic Gradient Arrow Coordinates			
x_start	y_start	x_end	y_end
630,443.72	3,027,372.55	630,336.42	3,027,429.23
Plotted Groundwater Velocity Arrow Coordinates			
x_start	y_start	x_end	y_end
630,443.72	3,027,372.55	629,996.61	3,027,608.72

	Number of Vectors	
Orientation (deg)	i-vector	V-vector
0 - 90	0	0
90 -180	0	0
180 -270	0	0
270 - 360	1	1



Hydraulic Conductivity Components		
K_{xx} =	50.0000	(L/T)
K_{yy} =	50.0000	(L/T)
K_{xy} = K_{yx} =	0.0000	(L/T)

Triangle Information				
Triangle Centroid (x,y)	630,443.72	3,027,372.55		
Triangle Area	5,489.48	(L^2)	Angle of Triangle (degrees) @	
Distance #1 - #2	177.66	(L)	PZ-12-02	154.08
Distance #2 - #3	311.03	(L)	RSK32	11.46
Distance #1 - #3	141.39	(L)	RSK35	14.46

Triangle Plot Coordinates				
Triangle Sides	x_start	y_start	x_end	y_end
Nodes #1-#2	630,467.76	3,027,383.95	630,425.12	3,027,211.48
Nodes #2-#3	630,425.12	3,027,211.48	630,438.29	3,027,522.23
Nodes #1-#3	630,467.76	3,027,383.95	630,438.29	3,027,522.23

	Hydraulic Head (L)			Hydraulic Gradient		Groundwater Velocity		Angle Between Vectors
Date/Time	PZ-12-02	RSK32	RSK35	Magnitude (L/L)	Direction (deg)	Magnitude (L/T)	Direction (deg)	(deg)
11/4/20 0:00	216.98	217.50	215.88	0.012136	297.84	2.022602	297.84	0.00

Planar Equation Constants			Hydraulic Gradient Vector Components			Groundwater Velocity Vector Components			Hydraulic Gradient Arrow Plot Coordinates				Groundwater Velocity Arrow Plot Coordinates			
A	B	C	i_x	i_y	i-Quad	V_x	V_y	V-Quad	x_start	y_start	x_end	y_end	x_start	y_start	x_end	y_end
0.010730662	-0.005667974	10610.776	-0.010731	0.005668	4	-1.788444	0.944662	4	630,443.72	3,027,372.55	630,336.42	3,027,429.23	630,443.72	3,027,372.55	629,996.61	3,027,608.72

Project:	Shepley's Hill Landfill
Location:	Barrier Wall, Triangle 10
Date:	1/25/2021

Well Location			
Well Name	X Coordinate (L)	Y Coordinate (L)	
RSK35	630,438.29	3,027,522.23	1
SHM-11-06	630,411.30	3,027,590.05	1
RSK32	630,425.12	3,027,211.48	1

Principal Hydraulic Conductivity Components		
K_{max} =	50.0000	(L/T)
K_{min} =	50.0000	(L/T)
Orientation of K_{max} =	90.00	(degrees from N)
θ =	0.00	(degrees from X axis)

Effective Porosity =	0.30	(-)

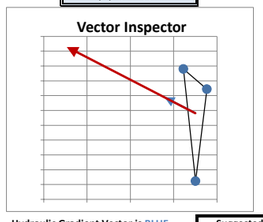
User input cells are shaded green.

HYDRAULIC HEAD DATA SET MUST NOT CONTAIN BLANK LINES

Vector Inspector Row of Interest:	22
Must be between 22 and 22	

Statistics			
Head (L)	RSK35	SHM-11-06	RSK32
Maximum =	215.88	215.42	217.50
Minimum =	215.88	215.42	217.50
Average =	215.88	215.42	217.50
Range =	0.00	0.00	0.00
	Hyd. Grad. (L/L)	Velocity (L/T)	
Maximum =	0.006440	1.073395	
Minimum =	0.006440	1.073395	
Average =	0.006440	1.073395	

11/4/20 12:00 AM



Hydraulic Gradient Vector is BLUE

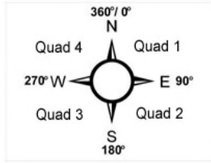
Groundwater Velocity Vector is RED

		Suggested Scaling Factors
Hyd. Grad. Scale Factor =	10,000.00	29,409.96
Velocity Scale Factor =	250.00	176.46

Number of Measurements	
Date/Time	1
RSK35	1
SHM-11-06	1
RSK32	1

Vector Inspector Arrow Coordinates			
Plotted Hydraulic Gradient Arrow Coordinates			
x_start	y_start	x_end	y_end
630,424.90	3,027,441.25	630,389.26	3,027,494.90
Plotted Groundwater Velocity Arrow Coordinates			
x_start	y_start	x_end	y_end
630,424.90	3,027,441.25	630,276.40	3,027,664.76

Number of Vectors		
Orientation (deg)	i-vector	V-vector
0 - 90	0	0
90 -180	0	0
180 -270	0	0
270 - 360	1	1



Hydraulic Conductivity Components		
K_{xx} =	50.0000	(L/T)
K_{yy} =	50.0000	(L/T)
K_{xy} = K_{yx} =	0.0000	(L/T)

Triangle Information			
Triangle Centroid (x,y)	630,424.90	3,027,441.25	
Triangle Area	4,640.17	(L^2)	Angle of Triangle (degrees) @
Distance #1 - #2	72.99	(L)	RSK35 155.87
Distance #2 - #3	378.82	(L)	SHM-11-06 19.61
Distance #1 - #3	311.03	(L)	RSK32 4.52

Triangle Plot Coordinates				
Triangle Sides	x_start	y_start	x_end	y_end
Nodes #1-#2	630,438.29	3,027,522.23	630,411.30	3,027,590.05
Nodes #2-#3	630,411.30	3,027,590.05	630,425.12	3,027,211.48
Nodes #1-#3	630,438.29	3,027,522.23	630,425.12	3,027,211.48

	Hydraulic Head (L)			Hydraulic Gradient		Groundwater Velocity		Angle Between Vectors
Date/Time	RSK35	SHM-11-06	RSK32	Magnitude (L/L)	Direction (deg)	Magnitude (L/T)	Direction (deg)	(deg)
11/4/20 0:00	215.88	215.42	217.50	0.006440	326.40	1.073395	326.40	0.00

Planar Equation Constants			Hydraulic Gradient Vector Components			Groundwater Velocity Vector Components			Hydraulic Gradient Arrow Plot Coordinates				Groundwater Velocity Arrow Plot Coordinates			
A	B	C	i_x	i_y	i-Quad	V_x	V_y	V-Quad	x_start	y_start	x_end	y_end	x_start	y_start	x_end	y_end
0.003564161	-0.005364248	14209.276	-0.003564	0.005364	4	-0.594027	0.894041	4	630,424.90	3,027,441.25	630,389.26	3,027,494.90	630,424.90	3,027,441.25	630,276.40	3,027,664.76

Project:	Shepley's Hill Landfill
Location:	Barrier Wall, Triangle 11
Date:	1/25/2021

Well Location			
Well Name	X Coordinate (L)	Y Coordinate (L)	
PZ-12-09	630,740.93	3,026,801.42	1
PZ-12-07	630,568.49	3,026,971.84	1
RSK15	630,585.33	3,027,062.01	1

Principal Hydraulic Conductivity Components		
K_{max} =	50.0000	(L/T)
K_{min} =	50.0000	(L/T)
Orientation of K_{max} =	90.00	(degrees from N)
θ =	0.00	(degrees from X axis)

Effective Porosity =	0.30	(-)

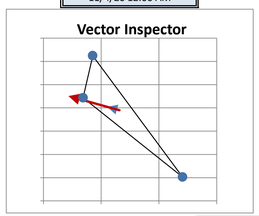
User input cells are shaded green.

HYDRAULIC HEAD DATA SET MUST NOT CONTAIN BLANK LINES

Vector Inspector Row of Interest:	22
Must be between 22 and 22	

Statistics			
Head (L)	PZ-12-09	PZ-12-07	RSK15
Maximum =	217.33	216.84	216.81
Minimum =	217.33	216.84	216.81
Average =	217.33	216.84	216.81
Range =	0.00	0.00	0.00
	Hyd. Grad. (L/L)	Velocity (L/T)	
Maximum =	0.002243	0.373828	
Minimum =	0.002243	0.373828	
Average =	0.002243	0.373828	

11/4/20 12:00 AM



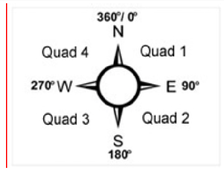
Hydraulic Gradient Vector is BLUE
Groundwater Velocity Vector is RED

		Suggested Scaling Factors
Hyd. Grad. Scale Factor =	10,000.00	67,658.16
Velocity Scale Factor =	250.00	405.95

Number of Measurements	
Date/Time	1
PZ-12-09	1
PZ-12-07	1
RSK15	1

Vector Inspector Arrow Coordinates			
Plotted Hydraulic Gradient Arrow Coordinates			
x_start	y_start	x_end	y_end
630,631.58	3,026,945.09	630,610.37	3,026,952.38
Plotted Groundwater Velocity Arrow Coordinates			
x_start	y_start	x_end	y_end
630,631.58	3,026,945.09	630,543.20	3,026,975.46

	Number of Vectors	
Orientation (deg)	i-vector	V-vector
0 - 90	0	0
90 -180	0	0
180 -270	0	0
270 - 360	1	1



Hydraulic Conductivity Components		
K_{xx} =	50.0000	(L/T)
K_{yy} =	50.0000	(L/T)
K_{xy} = K_{yx} =	0.0000	(L/T)

Triangle Information				
Triangle Centroid (x,y)	630,631.58	3,026,945.09		
Triangle Area	9,209.39	(L^2)	Angle of Triangle (degrees) @	
Distance #1 - #2	242.44	(L)	PZ-12-09	14.50
Distance #2 - #3	91.73	(L)	PZ-12-07	124.08
Distance #1 - #3	303.51	(L)	RSK15	41.42

Triangle Plot Coordinates				
Triangle Sides	x_start	y_start	x_end	y_end
Nodes #1-#2	630,740.93	3,026,801.42	630,568.49	3,026,971.84
Nodes #2-#3	630,568.49	3,026,971.84	630,585.33	3,027,062.01
Nodes #1-#3	630,740.93	3,026,801.42	630,585.33	3,027,062.01

	Hydraulic Head (L)			Hydraulic Gradient		Groundwater Velocity		Angle Between Vectors
Date/Time	PZ-12-09	PZ-12-07	RSK15	Magnitude (L/L)	Direction (deg)	Magnitude (L/T)	Direction (deg)	(deg)
11/4/20 0:00	217.33	216.84	216.81	0.002243	288.96	0.373828	288.96	0.00

Planar Equation Constants			Hydraulic Gradient Vector Components			Groundwater Velocity Vector Components			Hydraulic Gradient Arrow Plot Coordinates				Groundwater Velocity Arrow Plot Coordinates			
A	B	C	i_x	i_y	i-Quad	V_x	V_y	V-Quad	x_start	y_start	x_end	y_end	x_start	y_start	x_end	y_end
0.002121242	-0.000728864	1085.5041	-0.002121	0.000729	4	-0.353540	0.121477	4	630,631.58	3,026,945.09	630,610.37	3,026,952.38	630,631.58	3,026,945.09	630,543.20	3,026,975.46

Project:	Shepley's Hill Landfill
Location:	Barrier Wall, Triangle 12
Date:	1/25/2021

Well Location			
Well Name	X Coordinate (L)	Y Coordinate (L)	
PZ-12-09	630,740.93	3,026,801.42	1
RSK37	630,730.23	3,027,114.54	1
RSK15	630,585.33	3,027,062.01	1

Principal Hydraulic Conductivity Components		
K_{max} =	50.0000	(L/T)
K_{min} =	50.0000	(L/T)
Orientation of K_{max} =	90.00	(degrees from N)
θ =	0.00	(degrees from X axis)

Effective Porosity =	0.30	(-)

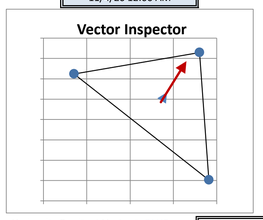
User input cells are shaded green.

HYDRAULIC HEAD DATA SET MUST NOT CONTAIN BLANK LINES

Vector Inspector Row of Interest:	22
Must be between 22 and 22	

Statistics			
Head (L)	PZ-12-09	RSK37	RSK15
Maximum =	217.33	216.58	216.81
Minimum =	217.33	216.58	216.81
Average =	217.33	216.58	216.81
Range =	0.00	0.00	0.00
	Hyd. Grad. (L/L)	Velocity (L/T)	
Maximum =	0.002522	0.420264	
Minimum =	0.002522	0.420264	
Average =	0.002522	0.420264	

11/4/20 12:00 AM



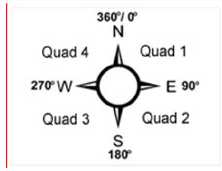
Hydraulic Gradient Vector is BLUE
Groundwater Velocity Vector is RED

		Suggested Scaling Factors
Hyd. Grad. Scale Factor =	10,000.00	62,124.18
Velocity Scale Factor =	250.00	372.75

Number of Measurements	
Date/Time	1
PZ-12-09	1
RSK37	1
RSK15	1

Vector Inspector Arrow Coordinates			
Plotted Hydraulic Gradient Arrow Coordinates			
x_start	y_start	x_end	y_end
630,685.50	3,026,992.66	630,692.60	3,027,016.85
Plotted Groundwater Velocity Arrow Coordinates			
x_start	y_start	x_end	y_end
630,685.50	3,026,992.66	630,715.09	3,027,093.47

	Number of Vectors	
Orientation (deg)	i-vector	V-vector
0 - 90	1	1
90 -180	0	0
180 -270	0	0
270 - 360	0	0



Hydraulic Conductivity Components		
K_{xx} =	50.0000	(L/T)
K_{yy} =	50.0000	(L/T)
K_{xy} = K_{yx} =	0.0000	(L/T)

Triangle Information			
Triangle Centroid (x,y)	630,685.50	3,026,992.66	
Triangle Area	22,966.58	(L^2)	Angle of Triangle (degrees) @
Distance #1 - #2	313.30	(L)	PZ-12-09 28.88
Distance #2 - #3	154.13	(L)	RSK37 72.03
Distance #1 - #3	303.51	(L)	RSK15 79.09

Triangle Plot Coordinates				
Triangle Sides	x_start	y_start	x_end	y_end
Nodes #1-#2	630,740.93	3,026,801.42	630,730.23	3,027,114.54
Nodes #2-#3	630,730.23	3,027,114.54	630,585.33	3,027,062.01
Nodes #1-#3	630,740.93	3,026,801.42	630,585.33	3,027,062.01

	Hydraulic Head (L)			Hydraulic Gradient		Groundwater Velocity		Angle Between Vectors
Date/Time	PZ-12-09	RSK37	RSK15	Magnitude (L/L)	Direction (deg)	Magnitude (L/T)	Direction (deg)	(deg)
11/4/20 0:00	217.33	216.58	216.81	0.002522	16.36	0.420264	16.36	0.00

Planar Equation Constants			Hydraulic Gradient Vector Components			Groundwater Velocity Vector Components			Hydraulic Gradient Arrow Plot Coordinates				Groundwater Velocity Arrow Plot Coordinates			
A	B	C	i_x	i_y	i-Quad	V_x	V_y	V-Quad	x_start	y_start	x_end	y_end	x_start	y_start	x_end	y_end
-0.000710165	-0.002419516	7988.6534	0.000710	0.002420	1	0.118361	0.403253	1	630,685.50	3,026,992.66	630,692.60	3,027,016.85	630,685.50	3,026,992.66	630,715.09	3,027,093.47

Project:	Shepley's Hill Landfill
Location:	Barrier Wall, Triangle 13
Date:	1/25/2021

Well Location			
Well Name	X Coordinate (L)	Y Coordinate (L)	
RSK15	630,585.33	3,027,062.01	1
PZ-12-05	630,479.44	3,027,087.34	1
PZ-12-07	630,568.49	3,026,971.84	1

Principal Hydraulic Conductivity Components		
K_{max} =	50.0000	(L/T)
K_{min} =	50.0000	(L/T)
Orientation of K_{max} =	90.00	(degrees from N)
θ =	0.00	(degrees from X axis)

Effective Porosity =	0.30	(-)

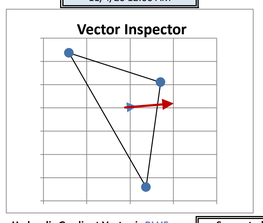
User input cells are shaded green.

HYDRAULIC HEAD DATA SET MUST NOT CONTAIN BLANK LINES

Vector Inspector Row of Interest:	22
Must be between 22 and 22	

Statistics			
Head (L)	RSK15	PZ-12-05	PZ-12-07
Maximum =	216.81	216.95	216.84
Minimum =	216.81	216.95	216.84
Average =	216.81	216.95	216.84
Range =	0.00	0.00	0.00
	Hyd. Grad. (L/L)	Velocity (L/T)	
Maximum =	0.001344	0.224047	
Minimum =	0.001344	0.224047	
Average =	0.001344	0.224047	

11/4/20 12:00 AM



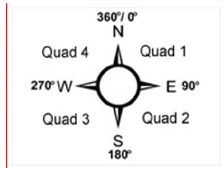
Hydraulic Gradient Vector is BLUE
Groundwater Velocity Vector is RED

		Suggested Scaling Factors
Hyd. Grad. Scale Factor =	10,000.00	54,245.70
Velocity Scale Factor =	250.00	325.47

Number of Measurements	
Date/Time	1
RSK15	1
PZ-12-05	1
PZ-12-07	1

Vector Inspector Arrow Coordinates			
Plotted Hydraulic Gradient Arrow Coordinates			
x_start	y_start	x_end	y_end
630,544.42	3,027,040.40	630,557.84	3,027,041.22
Plotted Groundwater Velocity Arrow Coordinates			
x_start	y_start	x_end	y_end
630,544.42	3,027,040.40	630,600.33	3,027,043.82

	Number of Vectors	
Orientation (deg)	i-vector	V-vector
0 - 90	1	1
90 -180	0	0
180 -270	0	0
270 - 360	0	0



Hydraulic Conductivity Components		
K_{xx} =	50.0000	(L/T)
K_{yy} =	50.0000	(L/T)
K_{xy} = K_{yx} =	0.0000	(L/T)

Triangle Information				
Triangle Centroid (x,y)	630,544.42	3,027,040.40		
Triangle Area	4,987.33	(L^2)	Angle of Triangle (degrees) @	
Distance #1 - #2	108.88	(L)	RSK15	92.87
Distance #2 - #3	145.84	(L)	PZ-12-05	38.91
Distance #1 - #3	91.73	(L)	PZ-12-07	48.21

Triangle Plot Coordinates				
Triangle Sides	x_start	y_start	x_end	y_end
Nodes #1-#2	630,585.33	3,027,062.01	630,479.44	3,027,087.34
Nodes #2-#3	630,479.44	3,027,087.34	630,568.49	3,026,971.84
Nodes #1-#3	630,585.33	3,027,062.01	630,568.49	3,026,971.84

	Hydraulic Head (L)			Hydraulic Gradient		Groundwater Velocity		Angle Between Vectors
Date/Time	RSK15	PZ-12-05	PZ-12-07	Magnitude (L/L)	Direction (deg)	Magnitude (L/T)	Direction (deg)	(deg)
11/4/20 0:00	216.81	216.95	216.84	0.001344	86.50	0.224047	86.50	0.00

Planar Equation Constants			Hydraulic Gradient Vector Components			Groundwater Velocity Vector Components			Hydraulic Gradient Arrow Plot Coordinates				Groundwater Velocity Arrow Plot Coordinates			
A	B	C	i_x	i_y	i-Quad	V_x	V_y	V-Quad	x_start	y_start	x_end	y_end	x_start	y_start	x_end	y_end
-0.00134177	-8.21181E-05	1311.4872	0.001342	0.000082	1	0.223628	0.013686	1	630,544.42	3,027,040.40	630,557.84	3,027,041.22	630,544.42	3,027,040.40	630,600.33	3,027,043.82

Project:	Shepley's Hill Landfill
Location:	Barrier Wall, Triangle 14
Date:	1/25/2021

Well Location			
Well Name	X Coordinate (L)	Y Coordinate (L)	
PZ-12-05	630,479.44	3,027,087.34	1
SHP-01-38A	630,545.54	3,027,171.48	1
RSK15	630,585.33	3,027,062.01	1

Principal Hydraulic Conductivity Components		
K_{max} =	50.0000	(L/T)
K_{min} =	50.0000	(L/T)
Orientation of K_{max} =	90.00	(degrees from N)
θ =	0.00	(degrees from X axis)

Effective Porosity =	0.30	(-)

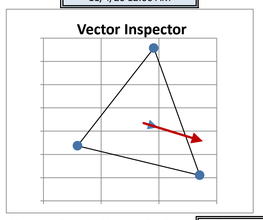
User input cells are shaded green.

HYDRAULIC HEAD DATA SET MUST NOT CONTAIN BLANK LINES

Vector Inspector Row of Interest:	22
Must be between 22 and 22	

Statistics			
Head (L)	PZ-12-05	SHP-01-38A	RSK15
Maximum =	216.95	216.90	216.81
Minimum =	216.95	216.90	216.81
Average =	216.95	216.90	216.81
Range =	0.00	0.00	0.00
	Hyd. Grad. (L/L)	Velocity (L/T)	
Maximum =	0.001288	0.214693	
Minimum =	0.001288	0.214693	
Average =	0.001288	0.214693	

11/4/20 12:00 AM



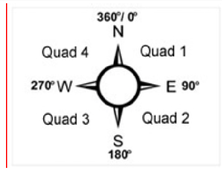
Hydraulic Gradient Vector is BLUE
Groundwater Velocity Vector is RED

		Suggested Scaling Factors
Hyd. Grad. Scale Factor =	10,000.00	45,210.77
Velocity Scale Factor =	250.00	271.26

Number of Measurements	
Date/Time	1
PZ-12-05	1
SHP-01-38A	1
RSK15	1

Vector Inspector Arrow Coordinates			
Plotted Hydraulic Gradient Arrow Coordinates			
x_start	y_start	x_end	y_end
630,536.77	3,027,106.94	630,549.10	3,027,103.20
Plotted Groundwater Velocity Arrow Coordinates			
x_start	y_start	x_end	y_end
630,536.77	3,027,106.94	630,588.13	3,027,091.36

	Number of Vectors	
Orientation (deg)	i-vector	V-vector
0 - 90	0	0
90 -180	1	1
180 -270	0	0
270 - 360	0	0



Hydraulic Conductivity Components		
K_{xx} =	50.0000	(L/T)
K_{yy} =	50.0000	(L/T)
K_{xy} = K_{yx} =	0.0000	(L/T)

Triangle Information				
Triangle Centroid (x,y)	630,536.77	3,027,106.94		
Triangle Area	5,291.95	(L^2)	Angle of Triangle (degrees) @	
Distance #1 - #2	107.00	(L)	PZ-12-05	65.30
Distance #2 - #3	116.48	(L)	SHP-01-38A	58.13
Distance #1 - #3	108.88	(L)	RSK15	56.57

Triangle Plot Coordinates				
Triangle Sides	x_start	y_start	x_end	y_end
Nodes #1-#2	630,479.44	3,027,087.34	630,545.54	3,027,171.48
Nodes #2-#3	630,545.54	3,027,171.48	630,585.33	3,027,062.01
Nodes #1-#3	630,479.44	3,027,087.34	630,585.33	3,027,062.01

	Hydraulic Head (L)			Hydraulic Gradient		Groundwater Velocity		Angle Between Vectors
Date/Time	PZ-12-05	SHP-01-38A	RSK15	Magnitude (L/L)	Direction (deg)	Magnitude (L/T)	Direction (deg)	(deg)
11/4/20 0:00	216.95	216.90	216.81	0.001288	106.88	0.214693	106.88	0.00

Planar Equation Constants			Hydraulic Gradient Vector Components			Groundwater Velocity Vector Components			Hydraulic Gradient Arrow Plot Coordinates				Groundwater Velocity Arrow Plot Coordinates			
A	B	C	i_x	i_y	i-Quad	V_x	V_y	V-Quad	x_start	y_start	x_end	y_end	x_start	y_start	x_end	y_end
-0.001232637	0.000374106	-138.34959	0.001233	-0.000374	2	0.205439	-0.062351	2	630,536.77	3,027,106.94	630,549.10	3,027,103.20	630,536.77	3,027,106.94	630,588.13	3,027,091.36

Project:	Shepley's Hill Landfill
Location:	Barrier Wall, Triangle 15
Date:	1/25/2021

Well Location			
Well Name	X Coordinate (L)	Y Coordinate (L)	
SHP-01-38A	630,545.54	3,027,171.48	1
PZ-12-05	630,479.44	3,027,087.34	1
PZ-12-01	630,488.47	3,027,384.39	1

Principal Hydraulic Conductivity Components		
K_{max} =	50.0000	(L/T)
K_{min} =	50.0000	(L/T)
Orientation of K_{max} =	90.00	(degrees from N)
θ =	0.00	(degrees from X axis)

Effective Porosity =	0.30	(-)

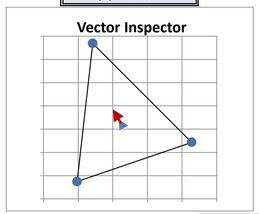
User input cells are shaded green.

HYDRAULIC HEAD DATA SET MUST NOT CONTAIN BLANK LINES

Vector Inspector Row of Interest:	22
Must be between 22 and 22	

Statistics			
Head (L)	SHP-01-38A	PZ-12-05	PZ-12-01
Maximum =	216.90	216.95	216.75
Minimum =	216.90	216.95	216.75
Average =	216.90	216.95	216.75
Range =	0.00	0.00	0.00
	Hyd. Grad. (L/L)	Velocity (L/T)	
Maximum =	0.000685	0.114086	
Minimum =	0.000685	0.114086	
Average =	0.000685	0.114086	

11/4/20 12:00 AM



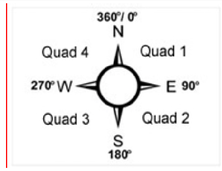
Hydraulic Gradient Vector is BLUE
Groundwater Velocity Vector is RED

		Suggested Scaling Factors
Hyd. Grad. Scale Factor =	10,000.00	217,077.90
Velocity Scale Factor =	250.00	1,302.47

Number of Measurements	
Date/Time	1
SHP-01-38A	1
PZ-12-05	1
PZ-12-01	1

Vector Inspector Arrow Coordinates			
Plotted Hydraulic Gradient Arrow Coordinates			
x_start	y_start	x_end	y_end
630,504.48	3,027,214.40	630,503.44	3,027,221.17
Plotted Groundwater Velocity Arrow Coordinates			
x_start	y_start	x_end	y_end
630,504.48	3,027,214.40	630,500.12	3,027,242.59

	Number of Vectors	
Orientation (deg)	i-vector	V-vector
0 - 90	0	0
90 -180	0	0
180 -270	0	0
270 - 360	1	1



Hydraulic Conductivity Components		
K_{xx} =	50.0000	(L/T)
K_{yy} =	50.0000	(L/T)
K_{xy} = K_{yx} =	0.0000	(L/T)

Triangle Information				
Triangle Centroid (x,y)	630,504.48	3,027,214.40		
Triangle Area	9,437.61	(L^2)	Angle of Triangle (degrees) @	
Distance #1 - #2	107.00	(L)	SHP-01-38A	126.84
Distance #2 - #3	297.19	(L)	PZ-12-05	36.41
Distance #1 - #3	220.43	(L)	PZ-12-01	16.75

Triangle Plot Coordinates				
Triangle Sides	x_start	y_start	x_end	y_end
Nodes #1-#2	630,545.54	3,027,171.48	630,479.44	3,027,087.34
Nodes #2-#3	630,479.44	3,027,087.34	630,488.47	3,027,384.39
Nodes #1-#3	630,545.54	3,027,171.48	630,488.47	3,027,384.39

	Hydraulic Head (L)			Hydraulic Gradient		Groundwater Velocity		Angle Between Vectors
Date/Time	SHP-01-38A	PZ-12-05	PZ-12-01	Magnitude (L/L)	Direction (deg)	Magnitude (L/T)	Direction (deg)	(deg)
11/4/20 0:00	216.90	216.95	216.75	0.000685	351.21	0.114086	351.21	0.00

Planar Equation Constants			Hydraulic Gradient Vector Components			Groundwater Velocity Vector Components			Hydraulic Gradient Arrow Plot Coordinates				Groundwater Velocity Arrow Plot Coordinates			
A	B	C	i_x	i_y	i-Quad	V_x	V_y	V-Quad	x_start	y_start	x_end	y_end	x_start	y_start	x_end	y_end
0.000104661	-0.000676469	2198.6938	-0.000105	0.000676	4	-0.017444	0.112745	4	630,504.48	3,027,214.40	630,503.44	3,027,221.17	630,504.48	3,027,214.40	630,500.12	3,027,242.59

Project:	**Shepley's Hill Landfill**
Location:	**Barrier Wall, Triangle 16**
Date:	**1/25/2021**

Well Location			
Well Name	**X Coordinate (L)**	**Y Coordinate (L)**	
SHP-01-38A	630,545.54	3,027,171.48	1
RSK19	630,560.38	3,027,219.54	1
PZ-12-01	630,488.47	3,027,384.39	1

Principal Hydraulic Conductivity Components		
K_{max} =	50.0000	(L/T)
K_{min} =	50.0000	(L/T)
Orientation of K_{max} =	90.00	(degrees from N)
θ =	0.00	(degrees from X axis)

Effective Porosity =	0.30	(-)

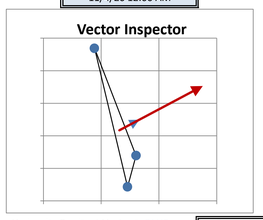
User input cells are shaded green.

HYDRAULIC HEAD DATA SET MUST NOT CONTAIN BLANK LINES

Vector Inspector Row of Interest:	22
Must be between 22 and 22	

Statistics			
Head (L)	**SHP-01-38A**	**RSK19**	**PZ-12-01**
Maximum =	216.90	216.77	216.75
Minimum =	216.90	216.77	216.75
Average =	216.90	216.77	216.75
Range =	0.00	0.00	0.00
	Hyd. Grad. (L/L)	**Velocity (L/T)**	
Maximum =	0.003834	0.638949	
Minimum =	0.003834	0.638949	
Average =	0.003834	0.638949	

11/4/20 12:00 AM



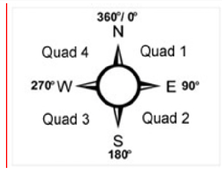
Hydraulic Gradient Vector is BLUE
Groundwater Velocity Vector is RED

		Suggested Scaling Factors
Hyd. Grad. Scale Factor =	10,000.00	28,748.54
Velocity Scale Factor =	250.00	172.49

Number of Measurements	
Date/Time	1
SHP-01-38A	1
RSK19	1
PZ-12-01	1

Vector Inspector Arrow Coordinates			
Plotted Hydraulic Gradient Arrow Coordinates			
x_start	**y_start**	**x_end**	**y_end**
630,531.46	3,027,258.47	630,566.14	3,027,274.81
Plotted Groundwater Velocity Arrow Coordinates			
x_start	**y_start**	**x_end**	**y_end**
630,531.46	3,027,258.47	630,675.96	3,027,326.56

	Number of Vectors	
Orientation (deg)	**i-vector**	**V-vector**
0 - 90	1	1
90 -180	0	0
180 -270	0	0
270 - 360	0	0



Hydraulic Conductivity Components		
K_{xx} =	50.0000	(L/T)
K_{yy} =	50.0000	(L/T)
K_{xy} = K_{yx} =	0.0000	(L/T)

Triangle Information				
Triangle Centroid (x,y)	630,531.46	3,027,258.47		
Triangle Area	2,951.18	(L^2)	**Angle of Triangle (degrees) @**	
Distance #1 - #2	50.30	(L)	SHP-01-38A	32.16
Distance #2 - #3	179.85	(L)	RSK19	139.27
Distance #1 - #3	220.43	(L)	PZ-12-01	8.56

Triangle Plot Coordinates				
Triangle Sides	**x_start**	**y_start**	**x_end**	**y_end**
Nodes #1-#2	630,545.54	3,027,171.48	630,560.38	3,027,219.54
Nodes #2-#3	630,560.38	3,027,219.54	630,488.47	3,027,384.39
Nodes #1-#3	630,545.54	3,027,171.48	630,488.47	3,027,384.39

	Hydraulic Head (L)			**Hydraulic Gradient**		**Groundwater Velocity**		**Angle Between Vectors**
Date/Time	**SHP-01-38A**	**RSK19**	**PZ-12-01**	**Magnitude (L/L)**	**Direction (deg)**	**Magnitude (L/T)**	**Direction (deg)**	**(deg)**
11/4/20 0:00	216.90	216.77	216.75	0.003834	64.77	0.638949	64.77	0.00

Planar Equation Constants			**Hydraulic Gradient Vector Components**			**Groundwater Velocity Vector Components**			**Hydraulic Gradient Arrow Plot Coordinates**				**Groundwater Velocity Arrow Plot Coordinates**			
A	**B**	**C**	**i_x**	**i_y**	**i-Quad**	**V_x**	**V_y**	**V-Quad**	**x_start**	**y_start**	**x_end**	**y_end**	**x_start**	**y_start**	**x_end**	**y_end**
-0.003467981	-0.001634107	7350.3409	0.003468	0.001634	1	0.577997	0.272351	1	630,531.46	3,027,258.47	630,566.14	3,027,274.81	630,531.46	3,027,258.47	630,675.96	3,027,326.56

Project:	Shepley's Hill Landfill
Location:	Barrier Wall, Triangle 17
Date:	1/25/2021

Well Location			
Well Name	X Coordinate (L)	Y Coordinate (L)	
RSK7	630,635.71	3,027,270.38	1
RSK19	630,560.38	3,027,219.54	1
PZ-12-01	630,488.47	3,027,384.39	1

Principal Hydraulic Conductivity Components		
K_{max} =	50.0000	(L/T)
K_{min} =	50.0000	(L/T)
Orientation of K_{max} =	90.00	(degrees from N)
θ =	0.00	(degrees from X axis)

Effective Porosity =	0.30	(-)

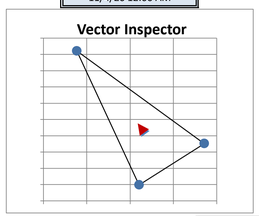
User input cells are shaded green.

HYDRAULIC HEAD DATA SET MUST NOT CONTAIN BLANK LINES

Vector Inspector Row of Interest:	22
Must be between 22 and 22	

Statistics			
Head (L)	RSK7	RSK19	PZ-12-01
Maximum =	216.77	216.77	216.75
Minimum =	216.77	216.77	216.75
Average =	216.77	216.77	216.75
Range =	0.00	0.00	0.00
	Hyd. Grad. (L/L)	Velocity (L/T)	
Maximum =	0.000113	0.018846	
Minimum =	0.000113	0.018846	
Average =	0.000113	0.018846	

11/4/20 12:00 AM



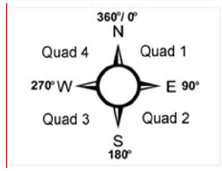
Hydraulic Gradient Vector is BLUE
Groundwater Velocity Vector is RED

		Suggested Scaling Factors
Hyd. Grad. Scale Factor =	10,000.00	823,417.01
Velocity Scale Factor =	250.00	4,940.50

Number of Measurements	
Date/Time	1
RSK7	1
RSK19	1
PZ-12-01	1

Vector Inspector Arrow Coordinates			
Plotted Hydraulic Gradient Arrow Coordinates			
x_start	y_start	x_end	y_end
630,561.52	3,027,291.44	630,560.89	3,027,292.37
Plotted Groundwater Velocity Arrow Coordinates			
x_start	y_start	x_end	y_end
630,561.52	3,027,291.44	630,558.88	3,027,295.34

	Number of Vectors	
Orientation (deg)	i-vector	V-vector
0 - 90	0	0
90 -180	0	0
180 -270	0	0
270 - 360	1	1



Hydraulic Conductivity Components		
K_{xx} =	50.0000	(L/T)
K_{yy} =	50.0000	(L/T)
K_{xy} = K_{yx} =	0.0000	(L/T)

Triangle Information				
Triangle Centroid (x,y)	630,561.52	3,027,291.44		
Triangle Area	8,037.03	(L^2)	Angle of Triangle (degrees) @	
Distance #1 - #2	90.88	(L)	RSK7	71.77
Distance #2 - #3	179.85	(L)	RSK19	79.55
Distance #1 - #3	186.22	(L)	PZ-12-01	28.68

Triangle Plot Coordinates				
Triangle Sides	x_start	y_start	x_end	y_end
Nodes #1-#2	630,635.71	3,027,270.38	630,560.38	3,027,219.54
Nodes #2-#3	630,560.38	3,027,219.54	630,488.47	3,027,384.39
Nodes #1-#3	630,635.71	3,027,270.38	630,488.47	3,027,384.39

	Hydraulic Head (L)			Hydraulic Gradient		Groundwater Velocity		Angle Between Vectors
Date/Time	RSK7	RSK19	PZ-12-01	Magnitude (L/L)	Direction (deg)	Magnitude (L/T)	Direction (deg)	(deg)
11/4/20 0:00	216.77	216.77	216.75	0.000113	325.98	0.018846	325.98	0.00

Planar Equation Constants			Hydraulic Gradient Vector Components			Groundwater Velocity Vector Components			Hydraulic Gradient Arrow Plot Coordinates				Groundwater Velocity Arrow Plot Coordinates			
A	B	C	i_x	i_y	i-Quad	V_x	V_y	V-Quad	x_start	y_start	x_end	y_end	x_start	y_start	x_end	y_end
6.32572E-05	-9.37287E-05	460.61981	-0.000063	0.000094	4	-0.010543	0.015621	4	630,561.52	3,027,291.44	630,560.89	3,027,292.37	630,561.52	3,027,291.44	630,558.88	3,027,295.34

Project:	Shepley's Hill Landfill
Location:	Barrier Wall, Triangle 18
Date:	1/25/2021

Well Location			
Well Name	X Coordinate (L)	Y Coordinate (L)	
RSK7	630,635.71	3,027,270.38	1
N2-P2	630,658.72	3,027,311.05	1
PZ-12-01	630,488.47	3,027,384.39	1

Principal Hydraulic Conductivity Components		
K_{max} =	50.0000	(L/T)
K_{min} =	50.0000	(L/T)
Orientation of K_{max} =	90.00	(degrees from N)
θ =	0.00	(degrees from X axis)

Effective Porosity =	0.30	(-)

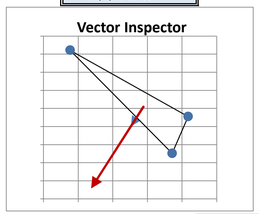
User input cells are shaded green.

HYDRAULIC HEAD DATA SET MUST NOT CONTAIN BLANK LINES

Vector Inspector Row of Interest:	22
Must be between 22 and 22	

Statistics			
Head (L)	RSK7	N2-P2	PZ-12-01
Maximum =	216.77	216.90	216.75
Minimum =	216.77	216.90	216.75
Average =	216.77	216.90	216.75
Range =	0.00	0.00	0.00
	Hyd. Grad. (L/L)	Velocity (L/T)	
Maximum =	0.002829	0.471462	
Minimum =	0.002829	0.471462	
Average =	0.002829	0.471462	

11/4/20 12:00 AM



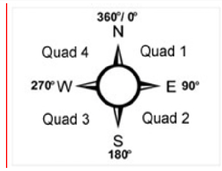
Hydraulic Gradient Vector is BLUE
Groundwater Velocity Vector is RED

		Suggested Scaling Factors
Hyd. Grad. Scale Factor =	10,000.00	32,915.38
Velocity Scale Factor =	250.00	197.49

Number of Measurements	
Date/Time	1
RSK7	1
N2-P2	1
PZ-12-01	1

Vector Inspector Arrow Coordinates			
Plotted Hydraulic Gradient Arrow Coordinates			
x_start	y_start	x_end	y_end
630,594.30	3,027,321.94	630,576.14	3,027,300.25
Plotted Groundwater Velocity Arrow Coordinates			
x_start	y_start	x_end	y_end
630,594.30	3,027,321.94	630,518.65	3,027,231.55

	Number of Vectors	
Orientation (deg)	i-vector	V-vector
0 - 90	0	0
90 -180	0	0
180 -270	1	1
270 - 360	0	0



Hydraulic Conductivity Components		
K_{xx} =	50.0000	(L/T)
K_{yy} =	50.0000	(L/T)
K_{xy} = K_{yx} =	0.0000	(L/T)

Triangle Information				
Triangle Centroid (x,y)	630,594.30	3,027,321.94		
Triangle Area	4,305.81	(L^2)	Angle of Triangle (degrees) @	
Distance #1 - #2	46.73	(L)	RSK7	81.75
Distance #2 - #3	185.37	(L)	N2-P2	83.81
Distance #1 - #3	186.22	(L)	PZ-12-01	14.45

Triangle Plot Coordinates				
Triangle Sides	x_start	y_start	x_end	y_end
Nodes #1-#2	630,635.71	3,027,270.38	630,658.72	3,027,311.05
Nodes #2-#3	630,658.72	3,027,311.05	630,488.47	3,027,384.39
Nodes #1-#3	630,635.71	3,027,270.38	630,488.47	3,027,384.39

	Hydraulic Head (L)			Hydraulic Gradient		Groundwater Velocity		Angle Between Vectors
Date/Time	RSK7	N2-P2	PZ-12-01	Magnitude (L/L)	Direction (deg)	Magnitude (L/T)	Direction (deg)	(deg)
11/4/20 0:00	216.77	216.90	216.75	0.002829	219.93	0.471462	219.93	0.00

Planar Equation Constants			Hydraulic Gradient Vector Components			Groundwater Velocity Vector Components			Hydraulic Gradient Arrow Plot Coordinates				Groundwater Velocity Arrow Plot Coordinates			
A	B	C	i_x	i_y	i-Quad	V_x	V_y	V-Quad	x_start	y_start	x_end	y_end	x_start	y_start	x_end	y_end
0.001815535	0.002169278	-7495.1624	-0.001816	-0.002169	3	-0.302589	-0.361546	3	630,594.30	3,027,321.94	630,576.14	3,027,300.25	630,594.30	3,027,321.94	630,518.65	3,027,231.55

Project:	Shepley's Hill Landfill
Location:	Barrier Wall, Triangle 19
Date:	1/25/2021

Well Location			
Well Name	X Coordinate (L)	Y Coordinate (L)	
SHP-01-37X	630,696.92	3,027,498.37	1
N2-P2	630,658.72	3,027,311.05	1
PZ-12-01	630,488.47	3,027,384.39	1

Principal Hydraulic Conductivity Components		
K_{max} =	50.0000	(L/T)
K_{min} =	50.0000	(L/T)
Orientation of K_{max} =	90.00	(degrees from N)
θ =	0.00	(degrees from X axis)

Effective Porosity =	0.30	(-)

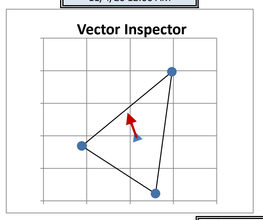
User input cells are shaded green.

HYDRAULIC HEAD DATA SET MUST NOT CONTAIN BLANK LINES

Vector Inspector Row of Interest:	22
Must be between 22 and 22	

Statistics			
Head (L)	SHP-01-37X	N2-P2	PZ-12-01
Maximum =	216.75	216.90	216.75
Minimum =	216.75	216.90	216.75
Average =	216.75	216.90	216.75
Range =	0.00	0.00	0.00
	Hyd. Grad. (L/L)	Velocity (L/T)	
Maximum =	0.001027	0.171200	
Minimum =	0.001027	0.171200	
Average =	0.001027	0.171200	

11/4/20 12:00 AM



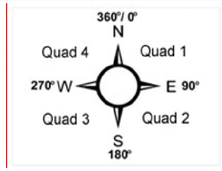
Hydraulic Gradient Vector is BLUE
Groundwater Velocity Vector is RED

		Suggested Scaling Factors
Hyd. Grad. Scale Factor =	10,000.00	115,642.73
Velocity Scale Factor =	250.00	693.86

Number of Measurements	
Date/Time	1
SHP-01-37X	1
N2-P2	1
PZ-12-01	1

Vector Inspector Arrow Coordinates			
Plotted Hydraulic Gradient Arrow Coordinates			
x_start	y_start	x_end	y_end
630,614.70	3,027,397.94	630,609.78	3,027,406.95
Plotted Groundwater Velocity Arrow Coordinates			
x_start	y_start	x_end	y_end
630,614.70	3,027,397.94	630,594.17	3,027,435.49

	Number of Vectors	
Orientation (deg)	i-vector	V-vector
0 - 90	0	0
90 -180	0	0
180 -270	0	0
270 - 360	1	1



Hydraulic Conductivity Components		
K_{xx} =	50.0000	(L/T)
K_{yy} =	50.0000	(L/T)
K_{xy} = K_{yx} =	0.0000	(L/T)

Triangle Information				
Triangle Centroid (x,y)	630,614.70	3,027,397.94		
Triangle Area	17,346.41	(L^2)	Angle of Triangle (degrees) @	
Distance #1 - #2	191.18	(L)	SHP-01-37X	49.80
Distance #2 - #3	185.37	(L)	N2-P2	78.22
Distance #1 - #3	237.58	(L)	PZ-12-01	51.98

Triangle Plot Coordinates				
Triangle Sides	x_start	y_start	x_end	y_end
Nodes #1-#2	630,696.92	3,027,498.37	630,658.72	3,027,311.05
Nodes #2-#3	630,658.72	3,027,311.05	630,488.47	3,027,384.39
Nodes #1-#3	630,696.92	3,027,498.37	630,488.47	3,027,384.39

	Hydraulic Head (L)			Hydraulic Gradient		Groundwater Velocity		Angle Between Vectors
Date/Time	SHP-01-37X	N2-P2	PZ-12-01	Magnitude (L/L)	Direction (deg)	Magnitude (L/T)	Direction (deg)	(deg)
11/4/20 0:00	216.75	216.90	216.75	0.001027	331.33	0.171200	331.33	0.00

Planar Equation Constants			Hydraulic Gradient Vector Components			Groundwater Velocity Vector Components			Hydraulic Gradient Arrow Plot Coordinates				Groundwater Velocity Arrow Plot Coordinates			
A	B	C	i_x	i_y	i-Quad	V_x	V_y	V-Quad	x_start	y_start	x_end	y_end	x_start	y_start	x_end	y_end
0.000492811	-0.000901267	2634.5207	-0.000493	0.000901	4	-0.082135	0.150211	4	630,614.70	3,027,397.94	630,609.78	3,027,406.95	630,614.70	3,027,397.94	630,594.17	3,027,435.49

Project:	Shepley's Hill Landfill
Location:	Barrier Wall, Triangle 20
Date:	1/25/2021

Well Location			
Well Name	X Coordinate (L)	Y Coordinate (L)	
SHP-01-37X	630,696.92	3,027,498.37	1
RSK35	630,438.29	3,027,522.23	1
PZ-12-01	630,488.47	3,027,384.39	1

Principal Hydraulic Conductivity Components		
K_{max} =	50.0000	(L/T)
K_{min} =	50.0000	(L/T)
Orientation of K_{max} =	90.00	(degrees from N)
θ =	0.00	(degrees from X axis)

Effective Porosity =	0.30	(-)

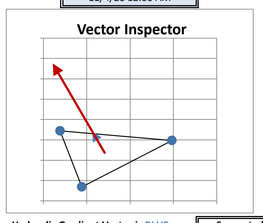
User input cells are shaded green.

HYDRAULIC HEAD DATA SET MUST NOT CONTAIN BLANK LINES

Vector Inspector Row of Interest:	22
Must be between 22 and 22	

Statistics			
Head (L)	SHP-01-37X	RSK35	PZ-12-01
Maximum =	216.75	215.88	216.75
Minimum =	216.75	215.88	216.75
Average =	216.75	215.88	216.75
Range =	0.00	0.00	0.00
	Hyd. Grad. (L/L)	Velocity (L/T)	
Maximum =	0.005999	0.999896	
Minimum =	0.005999	0.999896	
Average =	0.005999	0.999896	

11/4/20 12:00 AM



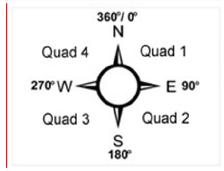
Hydraulic Gradient Vector is BLUE
Groundwater Velocity Vector is RED

		Suggested Scaling Factors
Hyd. Grad. Scale Factor =	10,000.00	21,646.28
Velocity Scale Factor =	250.00	129.88

Number of Measurements	
Date/Time	1
SHP-01-37X	1
RSK35	1
PZ-12-01	1

Vector Inspector Arrow Coordinates			
Plotted Hydraulic Gradient Arrow Coordinates			
x_start	y_start	x_end	y_end
630,541.23	3,027,468.33	630,512.44	3,027,520.97
Plotted Groundwater Velocity Arrow Coordinates			
x_start	y_start	x_end	y_end
630,541.23	3,027,468.33	630,421.30	3,027,687.66

Number of Vectors		
Orientation (deg)	i-vector	V-vector
0 - 90	0	0
90 -180	0	0
180 -270	0	0
270 - 360	1	1



Hydraulic Conductivity Components		
K_{xx} =	50.0000	(L/T)
K_{yy} =	50.0000	(L/T)
K_{xy} = K_{yx} =	0.0000	(L/T)

Triangle Information				
Triangle Centroid (x,y)	630,541.23	3,027,468.33		
Triangle Area	17,226.13	(L^2)	Angle of Triangle (degrees) @	
Distance #1 - #2	259.73	(L)	SHP-01-37X	33.94
Distance #2 - #3	146.69	(L)	RSK35	64.73
Distance #1 - #3	237.58	(L)	PZ-12-01	81.33

Triangle Plot Coordinates				
Triangle Sides	x_start	y_start	x_end	y_end
Nodes #1-#2	630,696.92	3,027,498.37	630,438.29	3,027,522.23
Nodes #2-#3	630,438.29	3,027,522.23	630,488.47	3,027,384.39
Nodes #1-#3	630,696.92	3,027,498.37	630,488.47	3,027,384.39

	Hydraulic Head (L)			Hydraulic Gradient		Groundwater Velocity		Angle Between Vectors
Date/Time	SHP-01-37X	RSK35	PZ-12-01	Magnitude (L/L)	Direction (deg)	Magnitude (L/T)	Direction (deg)	(deg)
11/4/20 0:00	216.75	215.88	216.75	0.005999	331.33	0.999896	331.33	0.00

Planar Equation Constants			Hydraulic Gradient Vector Components			Groundwater Velocity Vector Components			Hydraulic Gradient Arrow Plot Coordinates				Groundwater Velocity Arrow Plot Coordinates			
A	B	C	i_x	i_y	i-Quad	V_x	V_y	V-Quad	x_start	y_start	x_end	y_end	x_start	y_start	x_end	y_end
0.002878261	-0.005263848	14337.733	-0.002878	0.005264	4	-0.479710	0.877308	4	630,541.23	3,027,468.33	630,512.44	3,027,520.97	630,541.23	3,027,468.33	630,421.30	3,027,687.66

Project:	Shepley's Hill Landfill
Location:	Barrier Wall, Triangle 21
Date:	1/25/2021

Well Location			
Well Name	X Coordinate (L)	Y Coordinate (L)	
SHP-01-37X	630,696.92	3,027,498.37	1
RSK35	630,438.29	3,027,522.23	1
SHP-05-44	630,587.63	3,027,588.48	1

Principal Hydraulic Conductivity Components		
K_{max} =	50.0000	(L/T)
K_{min} =	50.0000	(L/T)
Orientation of K_{max} =	90.00	(degrees from N)
θ =	0.00	(degrees from X axis)

Effective Porosity =	0.30	(-)

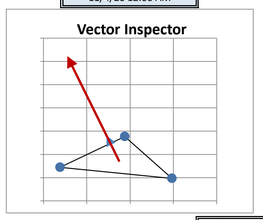
User input cells are shaded green.

HYDRAULIC HEAD DATA SET MUST NOT CONTAIN BLANK LINES

Vector Inspector Row of Interest:	22
Must be between 22 and 22	

Statistics			
Head (L)	SHP-01-37X	RSK35	SHP-05-44
Maximum =	216.75	215.88	215.95
Minimum =	216.75	215.88	215.95
Average =	216.75	215.88	215.95
Range =	0.00	0.00	0.00
	Hyd. Grad. (L/L)	Velocity (L/T)	
Maximum =	0.006116	1.019254	
Minimum =	0.006116	1.019254	
Average =	0.006116	1.019254	

11/4/20 12:00 AM



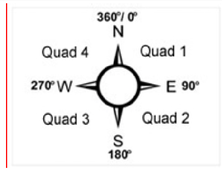
Hydraulic Gradient Vector is BLUE
Groundwater Velocity Vector is RED

		Suggested Scaling Factors
Hyd. Grad. Scale Factor =	10,000.00	21,235.15
Velocity Scale Factor =	250.00	127.41

Number of Measurements	
Date/Time	1
SHP-01-37X	1
RSK35	1
SHP-05-44	1

Vector Inspector Arrow Coordinates			
Plotted Hydraulic Gradient Arrow Coordinates			
x_start	y_start	x_end	y_end
630,574.28	3,027,536.36	630,545.63	3,027,590.39
Plotted Groundwater Velocity Arrow Coordinates			
x_start	y_start	x_end	y_end
630,574.28	3,027,536.36	630,454.89	3,027,761.47

	Number of Vectors	
Orientation (deg)	i-vector	V-vector
0 - 90	0	0
90 -180	0	0
180 -270	0	0
270 - 360	1	1



Hydraulic Conductivity Components		
K_{xx} =	50.0000	(L/T)
K_{yy} =	50.0000	(L/T)
K_{xy} = K_{yx} =	0.0000	(L/T)

Triangle Information				
Triangle Centroid (x,y)	630,574.28	3,027,536.36		
Triangle Area	10,348.74	(L^2)	Angle of Triangle (degrees) @	
Distance #1 - #2	259.73	(L)	SHP-01-37X	34.23
Distance #2 - #3	163.38	(L)	RSK35	29.19
Distance #1 - #3	141.65	(L)	SHP-05-44	116.57

Triangle Plot Coordinates				
Triangle Sides	x_start	y_start	x_end	y_end
Nodes #1-#2	630,696.92	3,027,498.37	630,438.29	3,027,522.23
Nodes #2-#3	630,438.29	3,027,522.23	630,587.63	3,027,588.48
Nodes #1-#3	630,696.92	3,027,498.37	630,587.63	3,027,588.48

	Hydraulic Head (L)			Hydraulic Gradient		Groundwater Velocity		Angle Between Vectors
Date/Time	SHP-01-37X	RSK35	SHP-05-44	Magnitude (L/L)	Direction (deg)	Magnitude (L/T)	Direction (deg)	(deg)
11/4/20 0:00	216.75	215.88	215.95	0.006116	332.06	1.019254	332.06	0.00

Planar Equation Constants			Hydraulic Gradient Vector Components			Groundwater Velocity Vector Components			Hydraulic Gradient Arrow Plot Coordinates				Groundwater Velocity Arrow Plot Coordinates			
A	B	C	i_x	i_y	i-Quad	V_x	V_y	V-Quad	x_start	y_start	x_end	y_end	x_start	y_start	x_end	y_end
0.002865454	-0.00540267	14766.091	-0.002865	0.005403	4	-0.477576	0.900445	4	630,574.28	3,027,536.36	630,545.63	3,027,590.39	630,574.28	3,027,536.36	630,454.89	3,027,761.47

Project:	Shepley's Hill Landfill
Location:	Barrier Wall, Triangle 22
Date:	1/25/2021

Well Location			
Well Name	X Coordinate (L)	Y Coordinate (L)	
SHP-01-37X	630,696.92	3,027,498.37	1
SHP-01-36X	630,737.88	3,027,688.84	1
SHP-05-44	630,587.63	3,027,588.48	1

Principal Hydraulic Conductivity Components		
K_{max} =	50.0000	(L/T)
K_{min} =	50.0000	(L/T)
Orientation of K_{max} =	90.00	(degrees from N)
θ =	0.00	(degrees from X axis)

Effective Porosity =	0.30	(-)

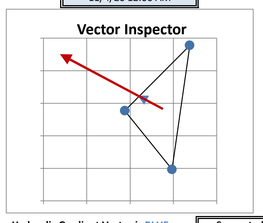
User input cells are shaded green.

HYDRAULIC HEAD DATA SET MUST NOT CONTAIN BLANK LINES

Vector Inspector Row of Interest:	22
Must be between 22 and 22	

Statistics			
Head (L)	SHP-01-37X	SHP-01-36X	SHP-05-44
Maximum =	216.75	216.60	215.95
Minimum =	216.75	216.60	215.95
Average =	216.75	216.60	215.95
Range =	0.00	0.00	0.00
	Hyd. Grad. (L/L)	Velocity (L/T)	
Maximum =	0.006011	1.001775	
Minimum =	0.006011	1.001775	
Average =	0.006011	1.001775	

11/4/20 12:00 AM



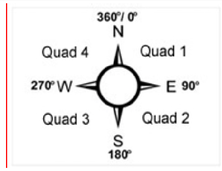
Hydraulic Gradient Vector is BLUE
Groundwater Velocity Vector is RED

		Suggested Scaling Factors
Hyd. Grad. Scale Factor =	10,000.00	16,206.61
Velocity Scale Factor =	250.00	97.24

Number of Measurements	
Date/Time	1
SHP-01-37X	1
SHP-01-36X	1
SHP-05-44	1

Vector Inspector Arrow Coordinates			
Plotted Hydraulic Gradient Arrow Coordinates			
x_start	y_start	x_end	y_end
630,674.14	3,027,591.90	630,617.48	3,027,611.96
Plotted Groundwater Velocity Arrow Coordinates			
x_start	y_start	x_end	y_end
630,674.14	3,027,591.90	630,438.06	3,027,675.48

	Number of Vectors	
Orientation (deg)	i-vector	V-vector
0 - 90	0	0
90 -180	0	0
180 -270	0	0
270 - 360	1	1



Hydraulic Conductivity Components		
K_{xx} =	50.0000	(L/T)
K_{yy} =	50.0000	(L/T)
K_{xy} = K_{yx} =	0.0000	(L/T)

Triangle Information				
Triangle Centroid (x,y)	630,674.14	3,027,591.90		
Triangle Area	12,253.69	(L^2)	Angle of Triangle (degrees) @	
Distance #1 - #2	194.82	(L)	SHP-01-37X	62.63
Distance #2 - #3	180.69	(L)	SHP-01-36X	44.12
Distance #1 - #3	141.65	(L)	SHP-05-44	73.25

Triangle Plot Coordinates				
Triangle Sides	x_start	y_start	x_end	y_end
Nodes #1-#2	630,696.92	3,027,498.37	630,737.88	3,027,688.84
Nodes #2-#3	630,737.88	3,027,688.84	630,587.63	3,027,588.48
Nodes #1-#3	630,696.92	3,027,498.37	630,587.63	3,027,588.48

	Hydraulic Head (L)			Hydraulic Gradient		Groundwater Velocity		Angle Between Vectors
Date/Time	SHP-01-37X	SHP-01-36X	SHP-05-44	Magnitude (L/L)	Direction (deg)	Magnitude (L/T)	Direction (deg)	(deg)
11/4/20 0:00	216.75	216.60	215.95	0.006011	289.50	1.001775	289.50	0.00

Planar Equation Constants			Hydraulic Gradient Vector Components			Groundwater Velocity Vector Components			Hydraulic Gradient Arrow Plot Coordinates				Groundwater Velocity Arrow Plot Coordinates			
A	B	C	i_x	i_y	i-Quad	V_x	V_y	V-Quad	x_start	y_start	x_end	y_end	x_start	y_start	x_end	y_end
0.00566603	-0.002005988	2716.3286	-0.005666	0.002006	4	-0.944338	0.334331	4	630,674.14	3,027,591.90	630,617.48	3,027,611.96	630,674.14	3,027,591.90	630,438.06	3,027,675.48

Project:	Shepley's Hill Landfill
Location:	Barrier Wall, Triangle 23
Date:	1/25/2021

Well Location			
Well Name	X Coordinate (L)	Y Coordinate (L)	
SHM-11-06	630,411.30	3,027,590.05	1
RSK35	630,438.29	3,027,522.23	1
SHP-05-44	630,587.63	3,027,588.48	1

Principal Hydraulic Conductivity Components		
K_{max} =	50.0000	(L/T)
K_{min} =	50.0000	(L/T)
Orientation of K_{max} =	90.00	(degrees from N)
θ =	0.00	(degrees from X axis)

Effective Porosity =	0.30	(-)

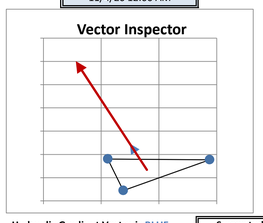
User input cells are shaded green.

HYDRAULIC HEAD DATA SET MUST NOT CONTAIN BLANK LINES

Vector Inspector Row of Interest:	22
Must be between 22 and 22	

Statistics			
Head (L)	SHM-11-06	RSK35	SHP-05-44
Maximum =	215.42	215.88	215.95
Minimum =	215.42	215.88	215.95
Average =	215.42	215.88	215.95
Range =	0.00	0.00	0.00
	Hyd. Grad. (L/L)	Velocity (L/T)	
Maximum =	0.006338	1.056304	
Minimum =	0.006338	1.056304	
Average =	0.006338	1.056304	

11/4/20 12:00 AM



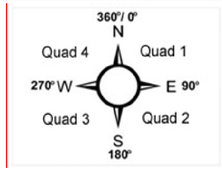
Hydraulic Gradient Vector is BLUE
Groundwater Velocity Vector is RED

		Suggested Scaling Factors
Hyd. Grad. Scale Factor =	10,000.00	13,911.48
Velocity Scale Factor =	250.00	83.47

Number of Measurements	
Date/Time	1
SHM-11-06	1
RSK35	1
SHP-05-44	1

Vector Inspector Arrow Coordinates			
Plotted Hydraulic Gradient Arrow Coordinates			
x_start	y_start	x_end	y_end
630,479.07	3,027,566.92	630,449.52	3,027,622.98
Plotted Groundwater Velocity Arrow Coordinates			
x_start	y_start	x_end	y_end
630,479.07	3,027,566.92	630,355.91	3,027,800.52

	Number of Vectors	
Orientation (deg)	i-vector	V-vector
0 - 90	0	0
90 -180	0	0
180 -270	0	0
270 - 360	1	1



Hydraulic Conductivity Components		
K_{xx} =	50.0000	(L/T)
K_{yy} =	50.0000	(L/T)
K_{xy} = K_{yx} =	0.0000	(L/T)

Triangle Information				
Triangle Centroid (x,y)	630,479.07	3,027,566.92		
Triangle Area	5,958.16	(L^2)	Angle of Triangle (degrees) @	
Distance #1 - #2	72.99	(L)	SHM-11-06	67.79
Distance #2 - #3	163.38	(L)	RSK35	87.78
Distance #1 - #3	176.34	(L)	SHP-05-44	24.43

Triangle Plot Coordinates				
Triangle Sides	x_start	y_start	x_end	y_end
Nodes #1-#2	630,411.30	3,027,590.05	630,438.29	3,027,522.23
Nodes #2-#3	630,438.29	3,027,522.23	630,587.63	3,027,588.48
Nodes #1-#3	630,411.30	3,027,590.05	630,587.63	3,027,588.48

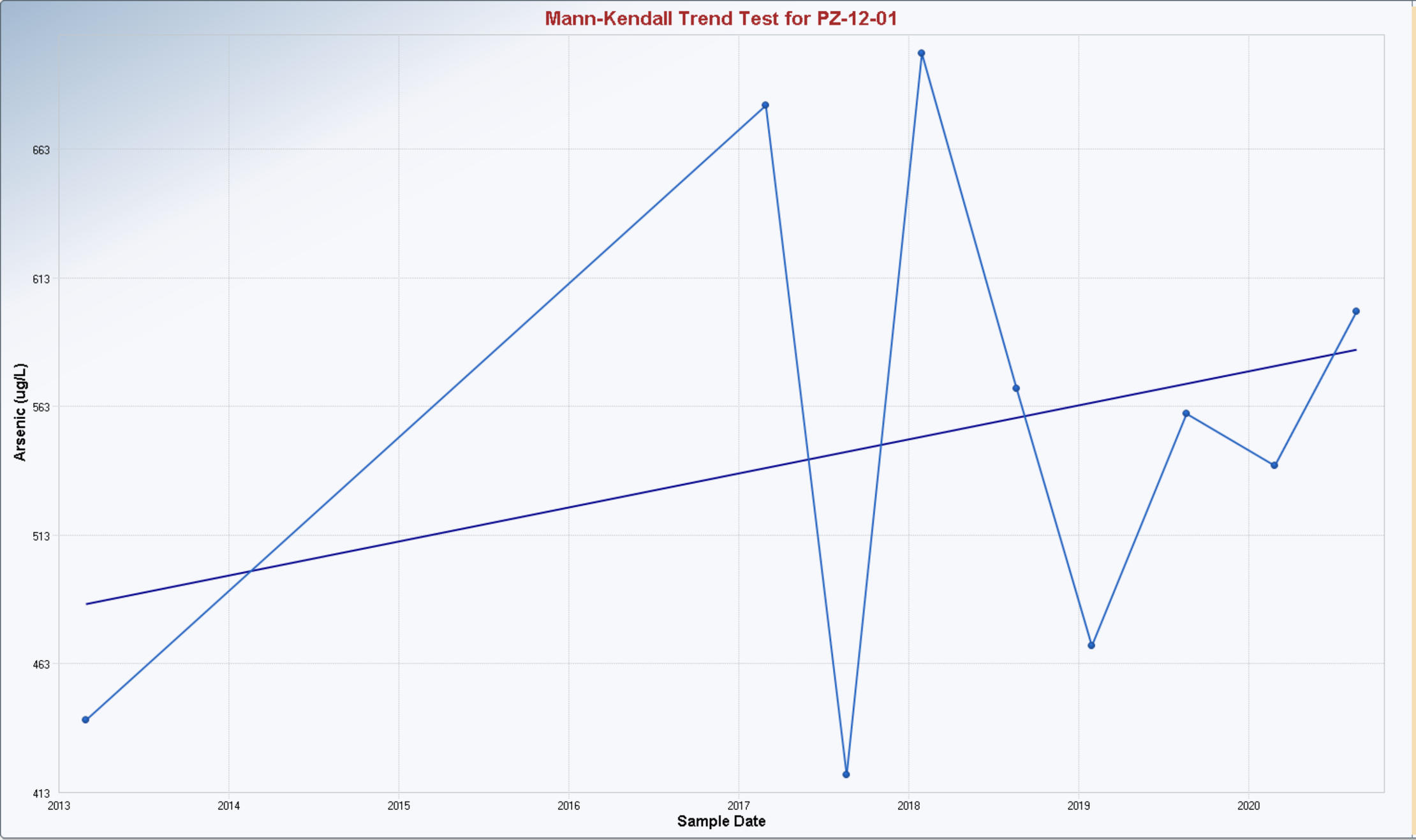
	Hydraulic Head (L)			Hydraulic Gradient		Groundwater Velocity		Angle Between Vectors
Date/Time	SHM-11-06	RSK35	SHP-05-44	Magnitude (L/L)	Direction (deg)	Magnitude (L/T)	Direction (deg)	(deg)
11/4/20 0:00	215.42	215.88	215.95	0.006338	332.20	1.056304	332.20	0.00

Planar Equation Constants			Hydraulic Gradient Vector Components			Groundwater Velocity Vector Components			Hydraulic Gradient Arrow Plot Coordinates				Groundwater Velocity Arrow Plot Coordinates			
A	B	C	i_x	i_y	i-Quad	V_x	V_y	V-Quad	x_start	y_start	x_end	y_end	x_start	y_start	x_end	y_end
0.00295581	-0.00560635	15325.774	-0.002956	0.005606	4	-0.492635	0.934392	4	630,479.07	3,027,566.92	630,449.52	3,027,622.98	630,479.07	3,027,566.92	630,355.91	3,027,800.52

Attachment E-2

Mann-Kendall Trend Analyses

Mann-Kendall Trend Test for PZ-12-01



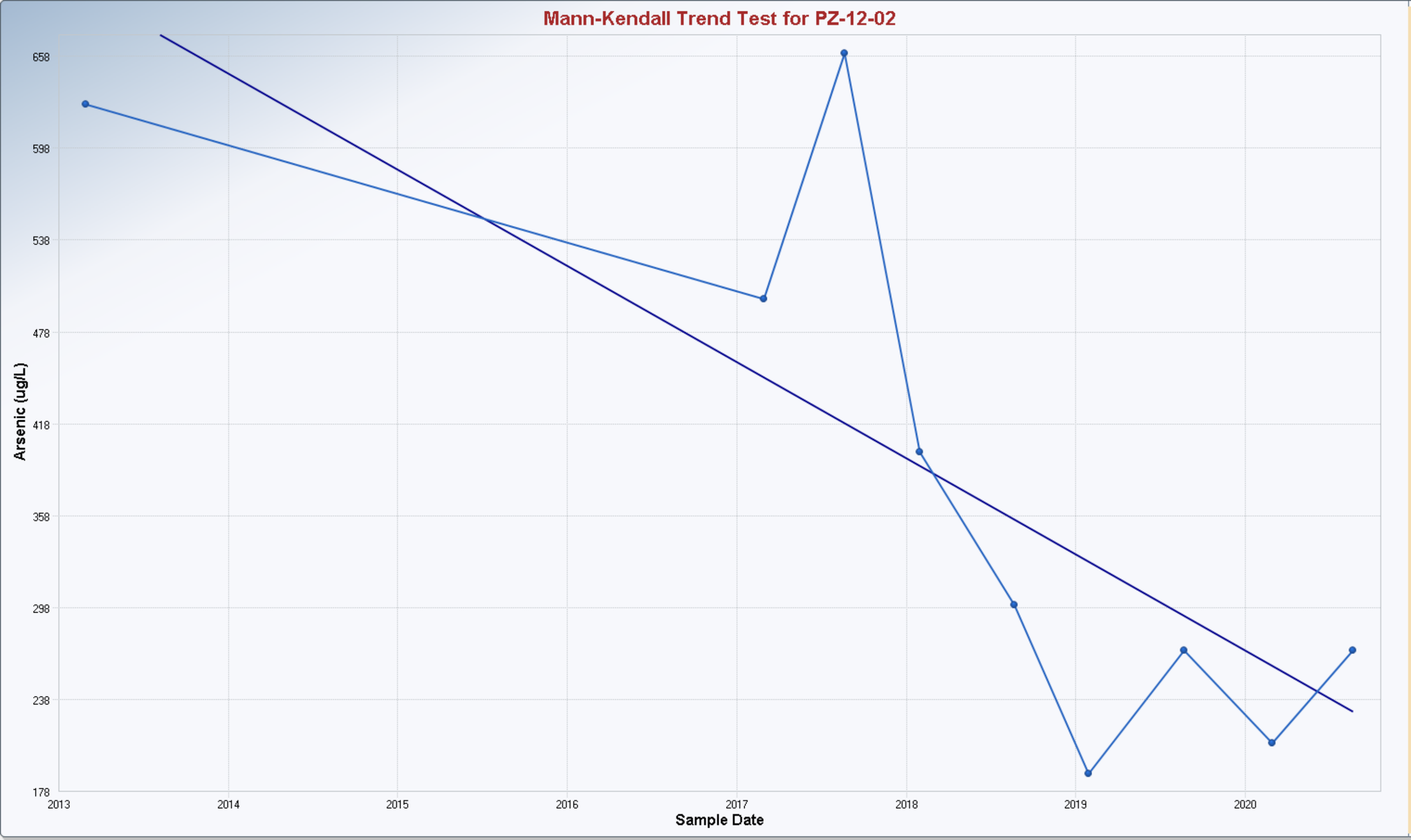
Mann-Kendall Trend Analysis

n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	0.3128
M-K Test Value (S)	4
Tabulated p-value	0.3810
Approximate p-value	0.3772

OLS Regression Line (Blue)

OLS Regression Slope	13.1915
OLS Regression Intercept	-26,073.4005

Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis

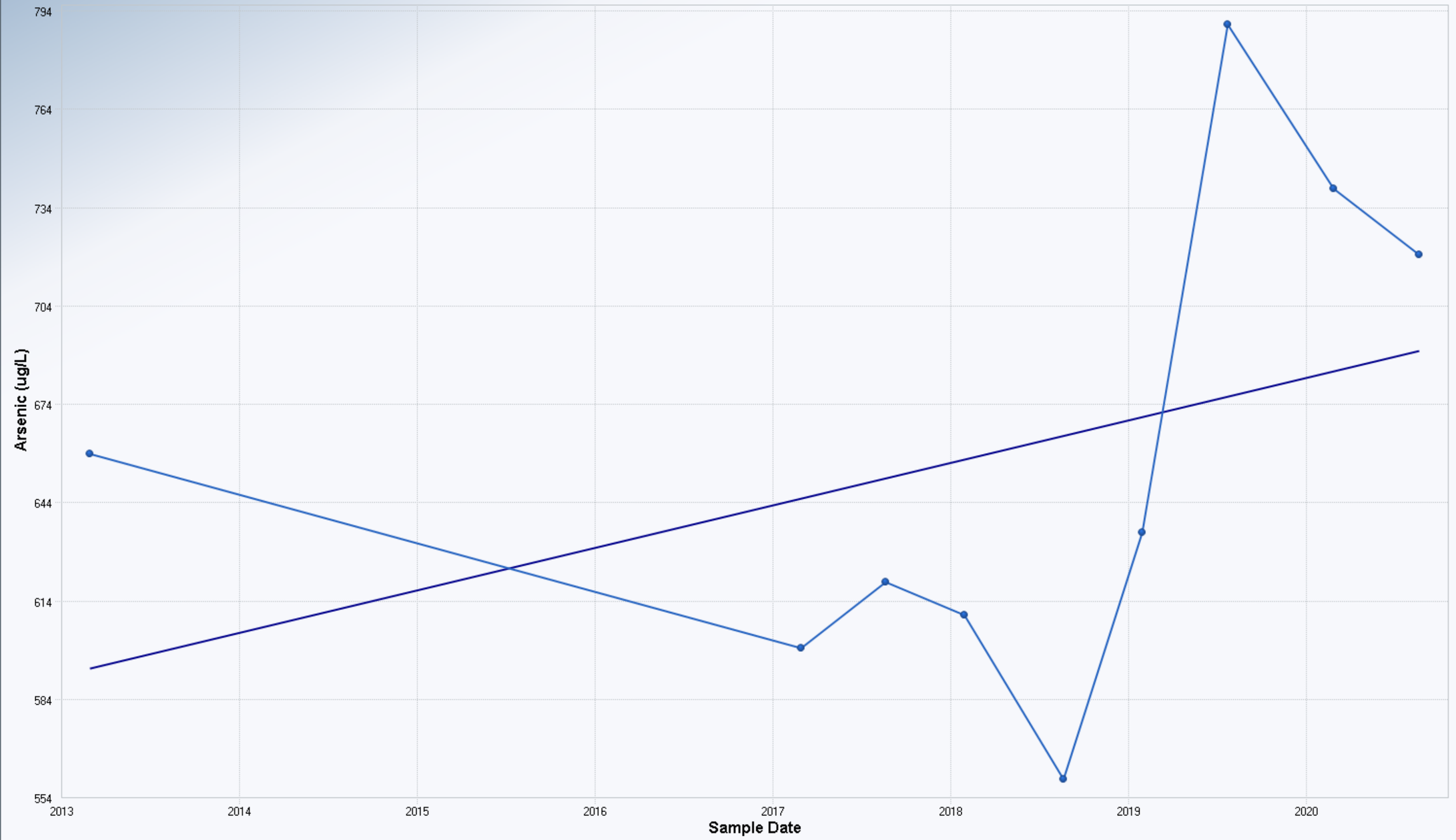
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5394
Standardized Value of S	-2.3062
M-K Test Value (S)	-23
Tabulated p-value	0.0120
Approximate p-value	0.0105

OLS Regression Line (Blue)

OLS Regression Slope	-62.8710
OLS Regression Intercept	127,284.8832

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test for PZ-12-03



Mann-Kendall Trend Analysis

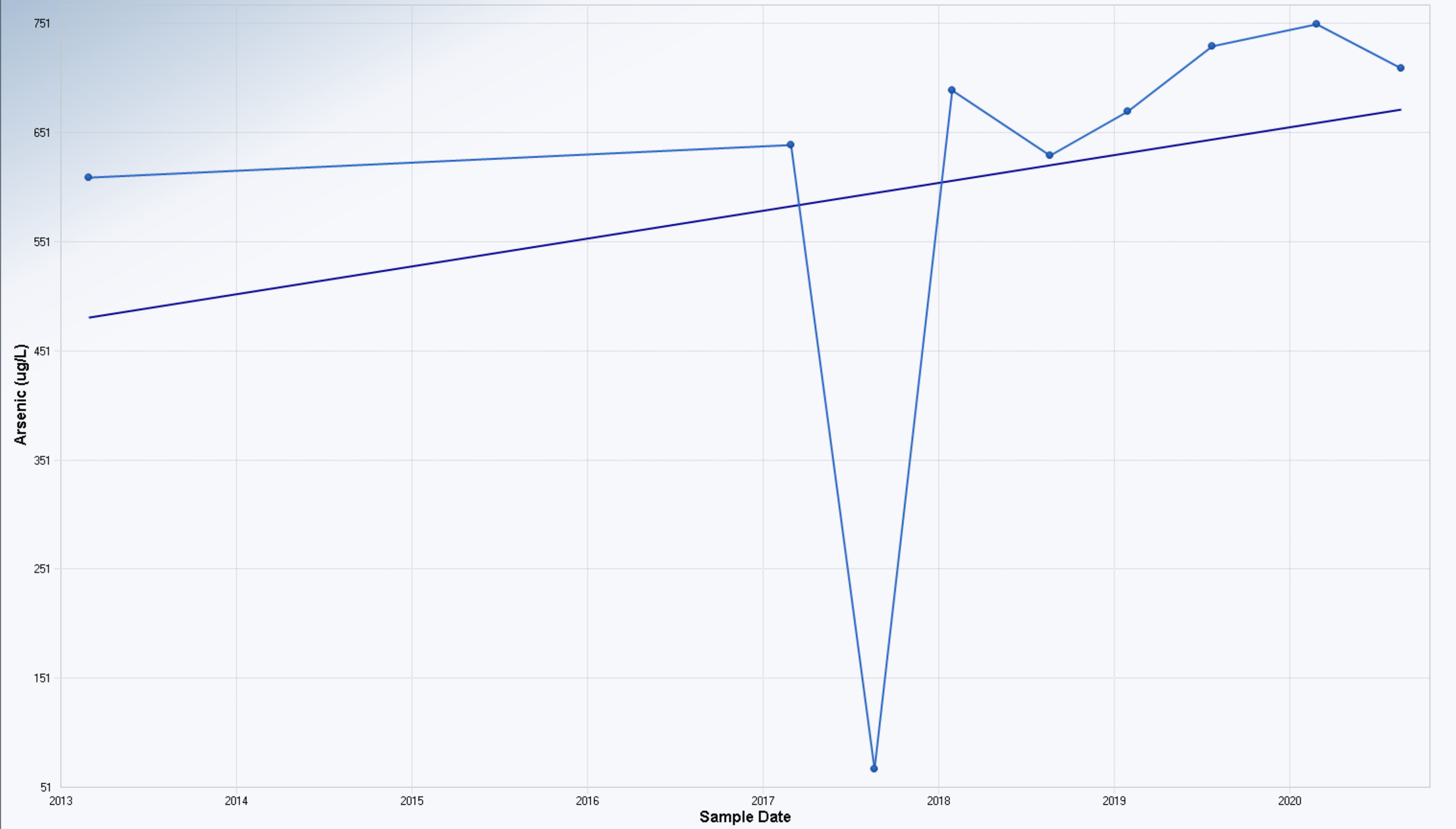
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	1.1468
M-K Test Value (S)	12
Tabulated p-value	0.1300
Approximate p-value	0.1257

OLS Regression Line (Blue)

OLS Regression Slope	12.9414
OLS Regression Intercept	-25,462.5060

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test for PZ-12-04



Mann-Kendall Trend Analysis

n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	2.1894
M-K Test Value (S)	22
Tabulated p-value	0.0120
Approximate p-value	0.0143

OLS Regression Line (Blue)

OLS Regression Slope	25.5156
OLS Regression Intercept	-50,891.6672

Statistically significant evidence of an increasing trend at the specified level of significance.

Mann-Kendall Trend Test for PZ-12-05

Mann-Kendall Trend Analysis

n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.4868
Standardized Value of S	-2.4244
M-K Test Value (S)	-24
Tabulated p-value	0.0060
Approximate p-value	0.0077

OLS Regression Line (Blue)

OLS Regression Slope	-77.6392
OLS Regression Intercept	156,970.7154

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Analysis

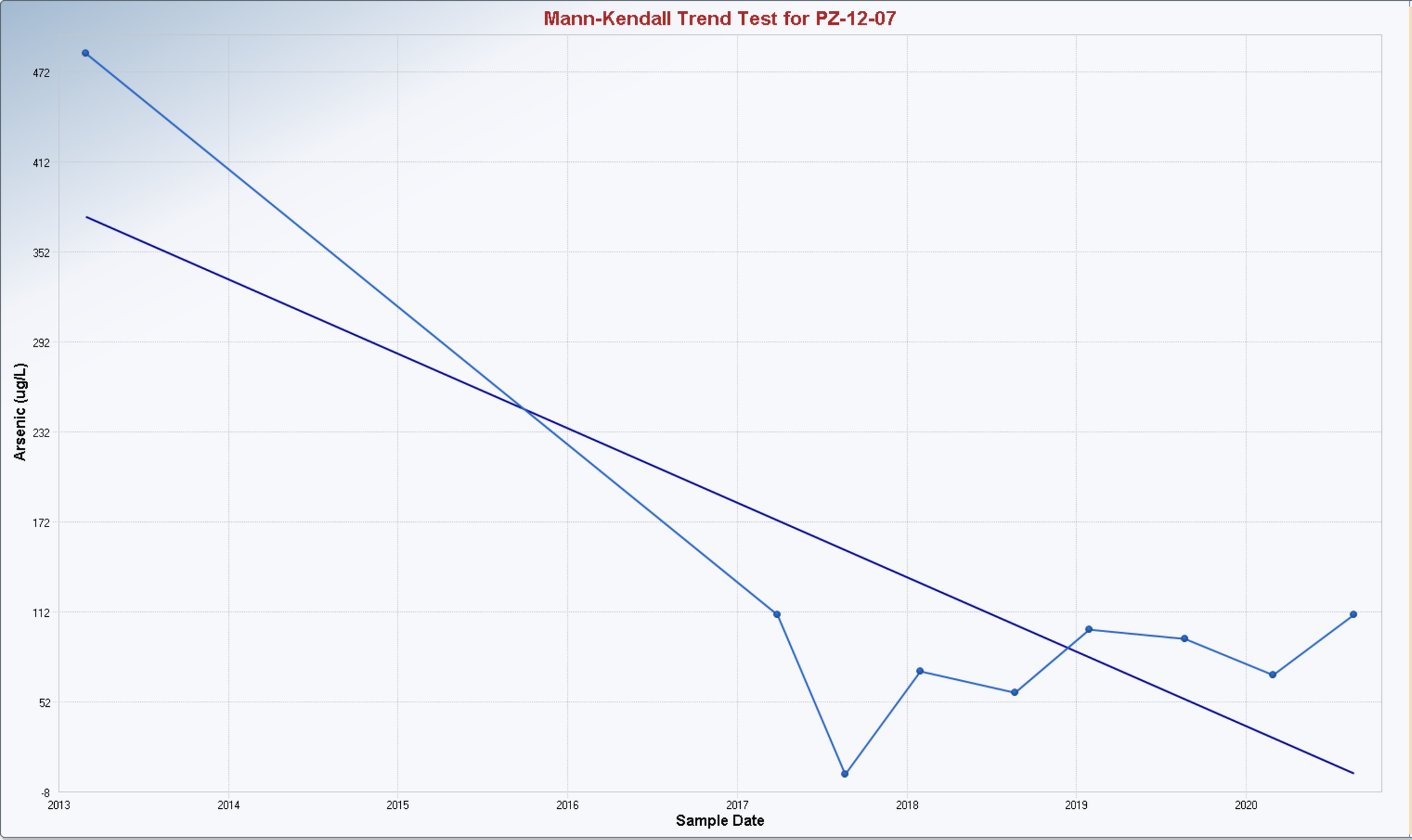
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5917
Standardized Value of S	-1.9809
M-K Test Value (S)	-20
Tabulated p-value	0.0220
Approximate p-value	0.0238

OLS Regression Line (Blue)

OLS Regression Slope	-29.8154
OLS Regression Intercept	60,236.7499

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test for PZ-12-07



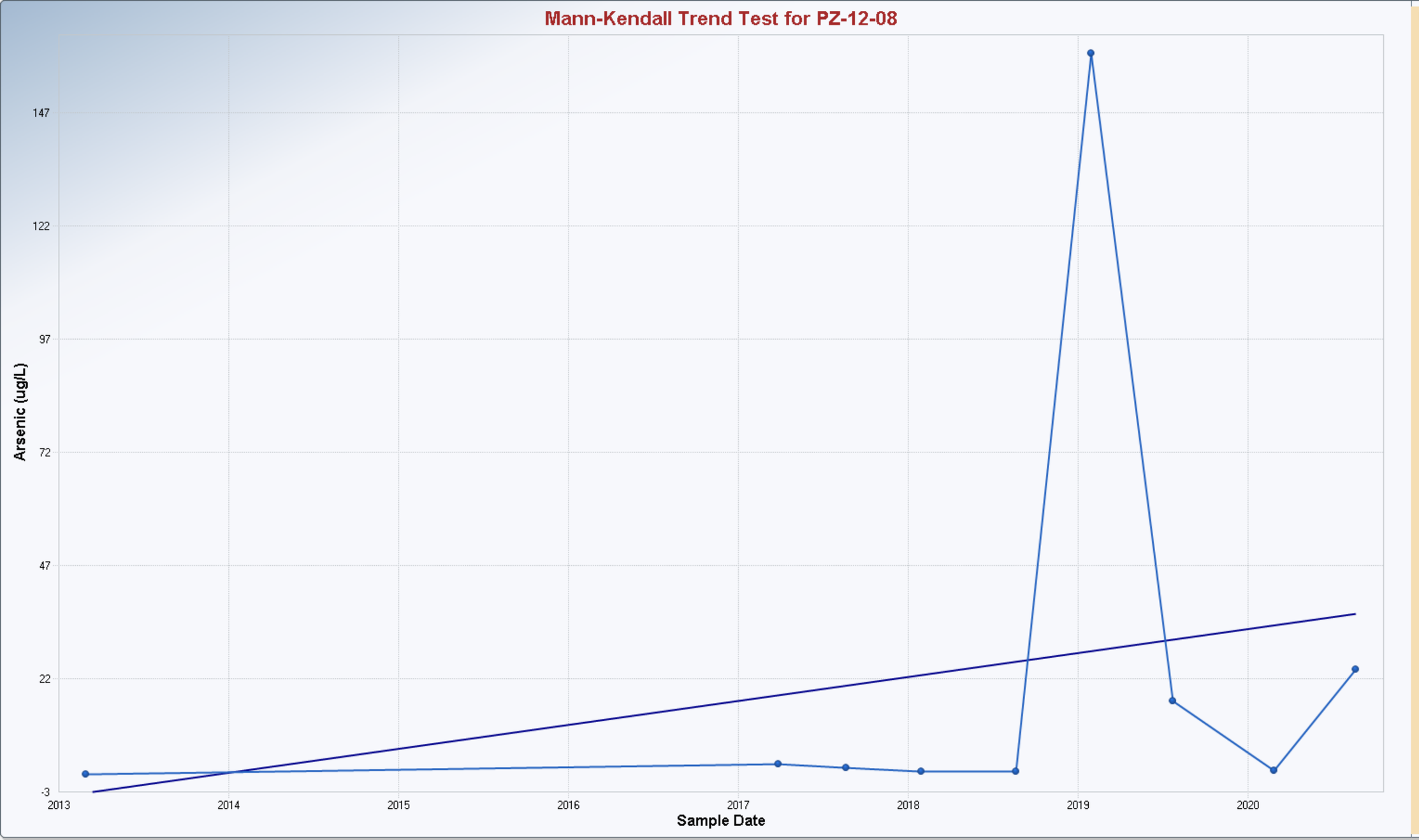
Mann-Kendall Trend Analysis

n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5394
Standardized Value of S	-0.2097
M-K Test Value (S)	-3
Tabulated p-value	0.4600
Approximate p-value	0.4170

OLS Regression Line (Blue)

OLS Regression Slope	-49.6678
OLS Regression Intercept	100,376.5493

Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis

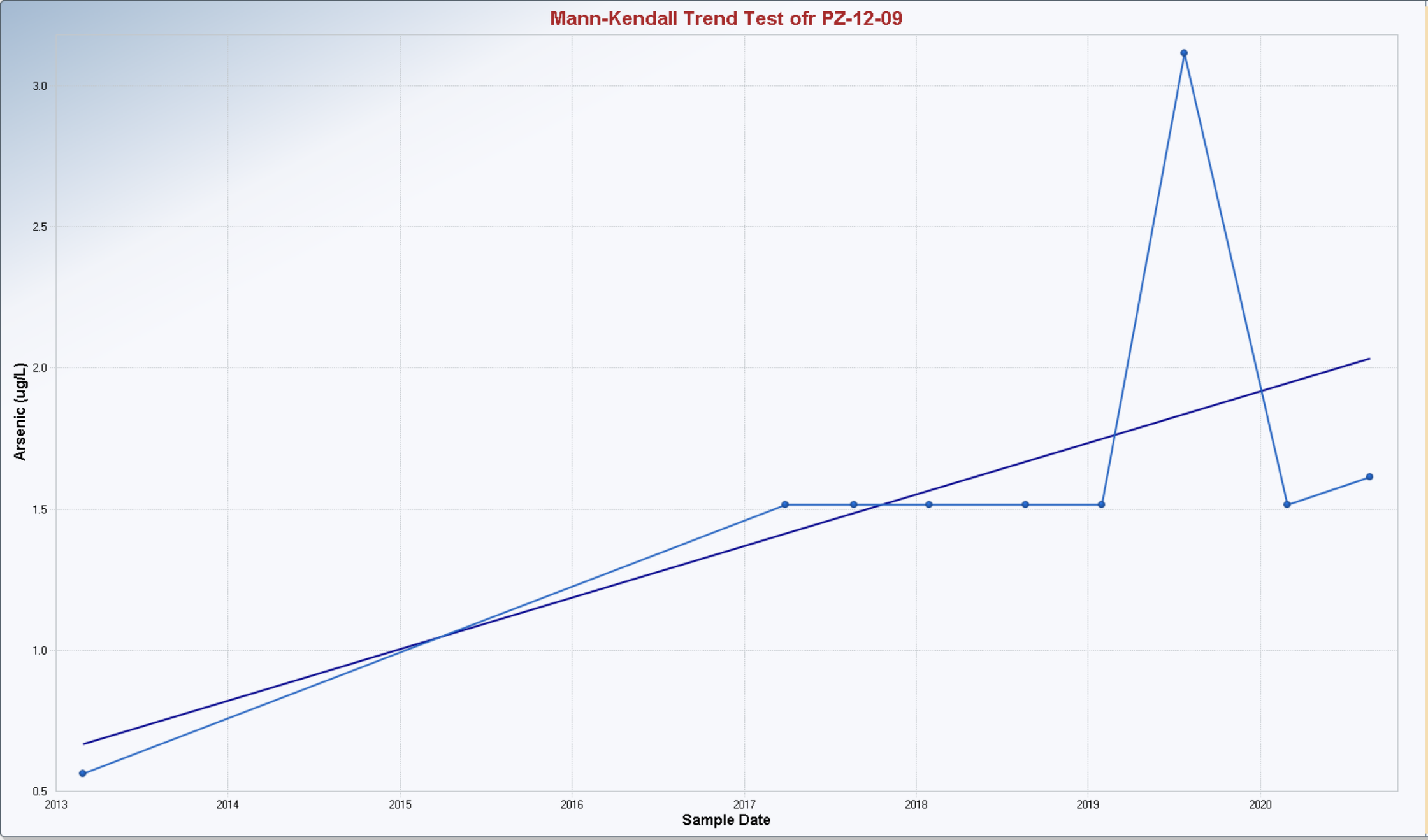
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	9.5394
Standardized Value of S	1.2579
M-K Test Value (S)	13
Tabulated p-value	0.1300
Approximate p-value	0.1042

OLS Regression Line (Blue)

OLS Regression Slope	5.2952
OLS Regression Intercept	-10,664.6642

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test ofr PZ-12-09



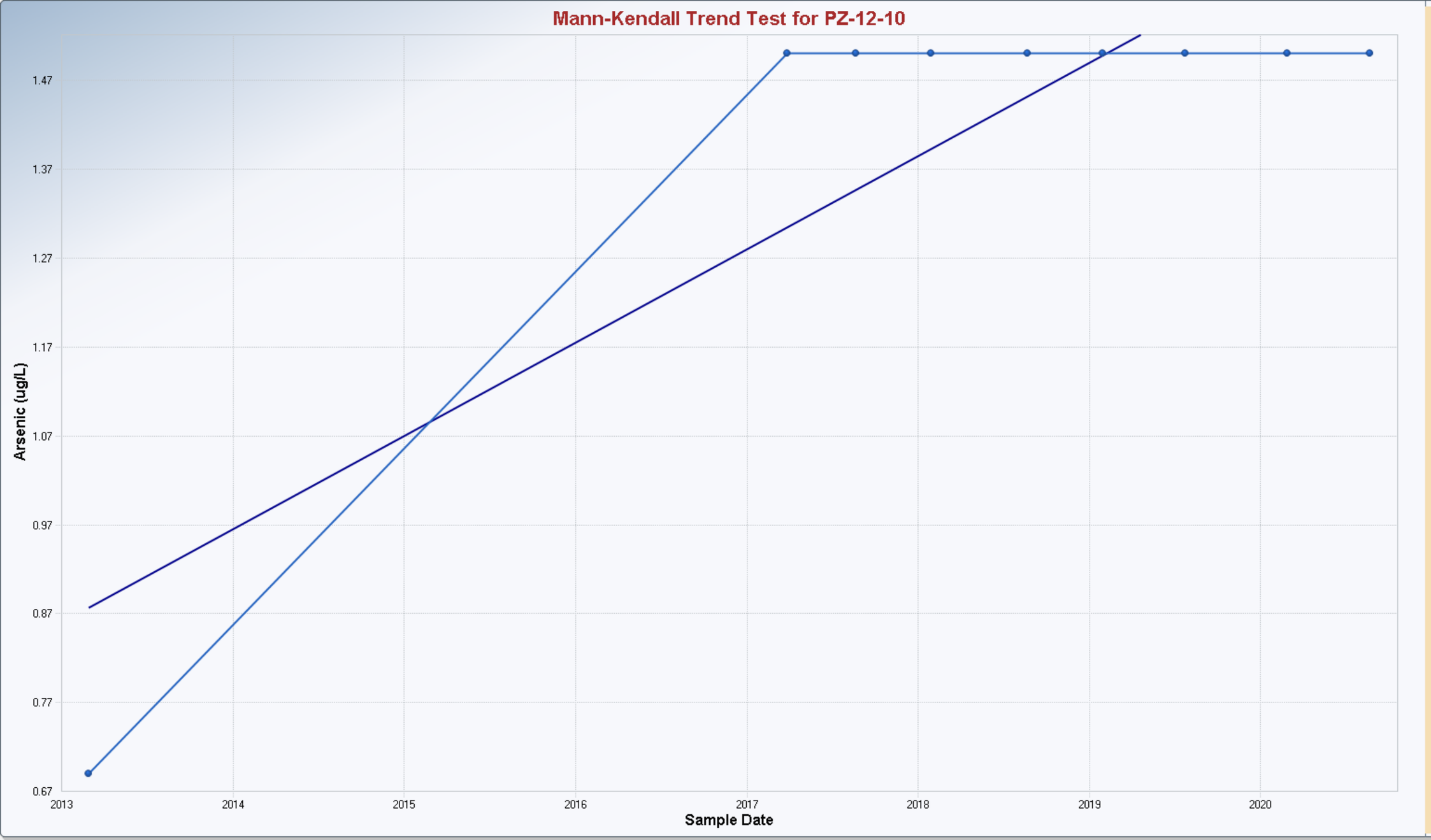
Mann-Kendall Trend Analysis

n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	7.9791
Standardized Value of S	2.0052
M-K Test Value (S)	17
Tabulated p-value	0.0600
Approximate p-value	0.0225

OLS Regression Line (Blue)

OLS Regression Slope	0.1828
OLS Regression Intercept	-367.4191

Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis

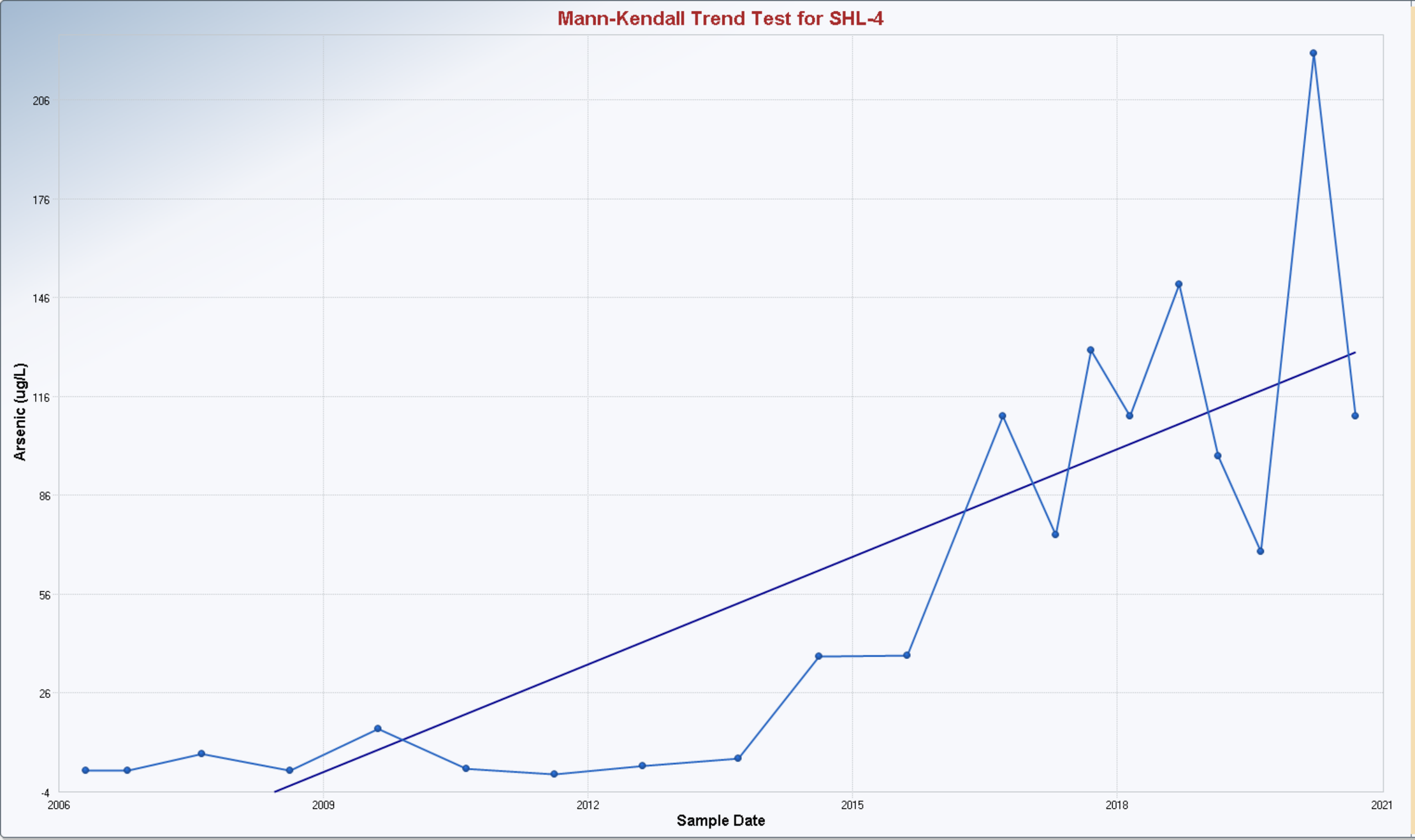
n	9
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	5.1640
Standardized Value of S	1.3555
M-K Test Value (S)	8
Tabulated p-value	0.2380
Approximate p-value	0.0876

OLS Regression Line (Blue)

OLS Regression Slope	0.1049
OLS Regression Intercept	-210.4047

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test for SHL-4



Mann-Kendall Trend Analysis

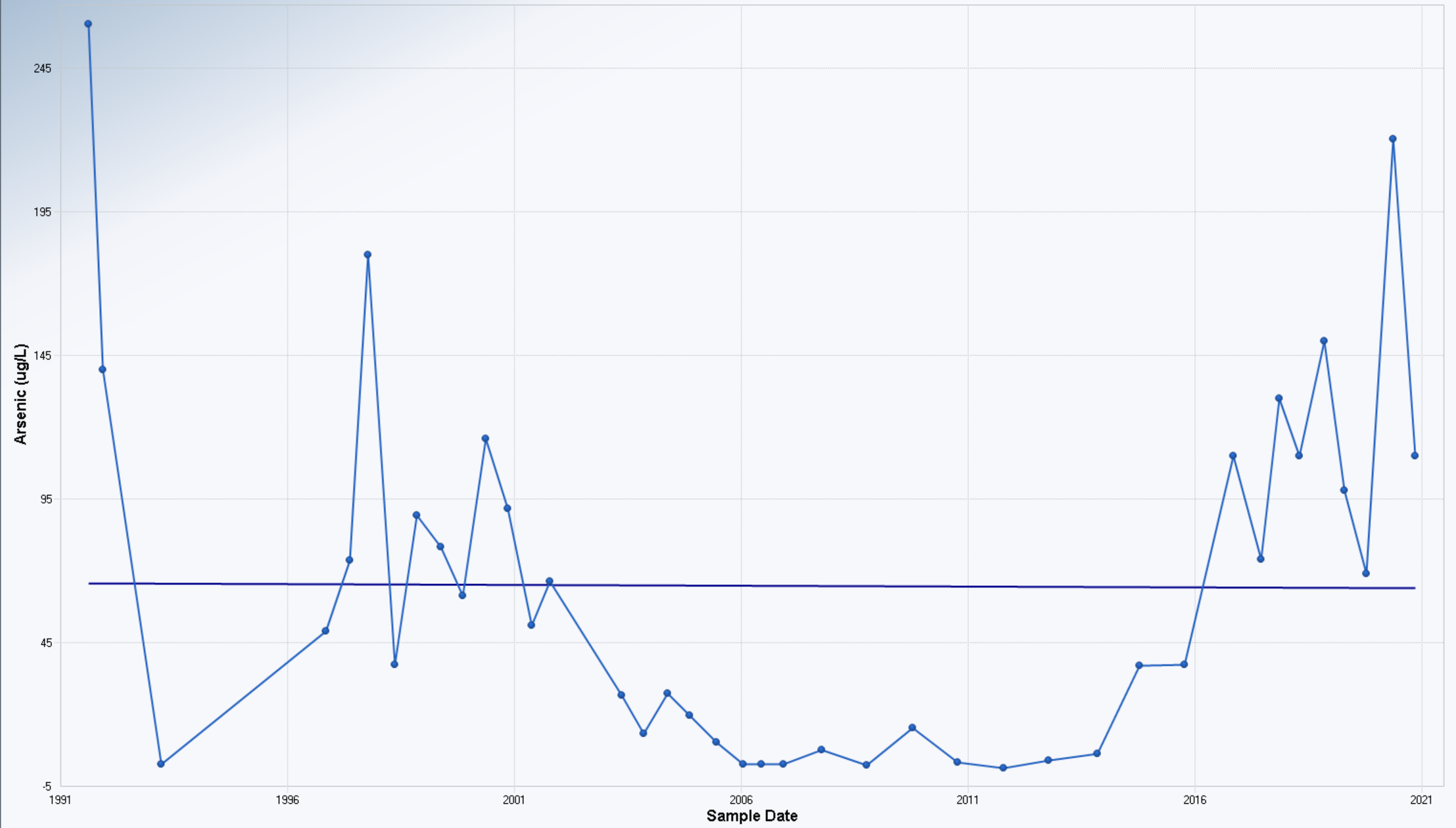
n	20
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	30.7463
Standardized Value of S	4.0655
M-K Test Value (S)	126
Tabulated p-value	0.0000
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	10.9034
OLS Regression Intercept	-21,905.1638

Statistically significant evidence of an increasing trend at the specified level of significance.

Mann-Kendall Trend Test for SHL-4



Mann-Kendall Trend Analysis

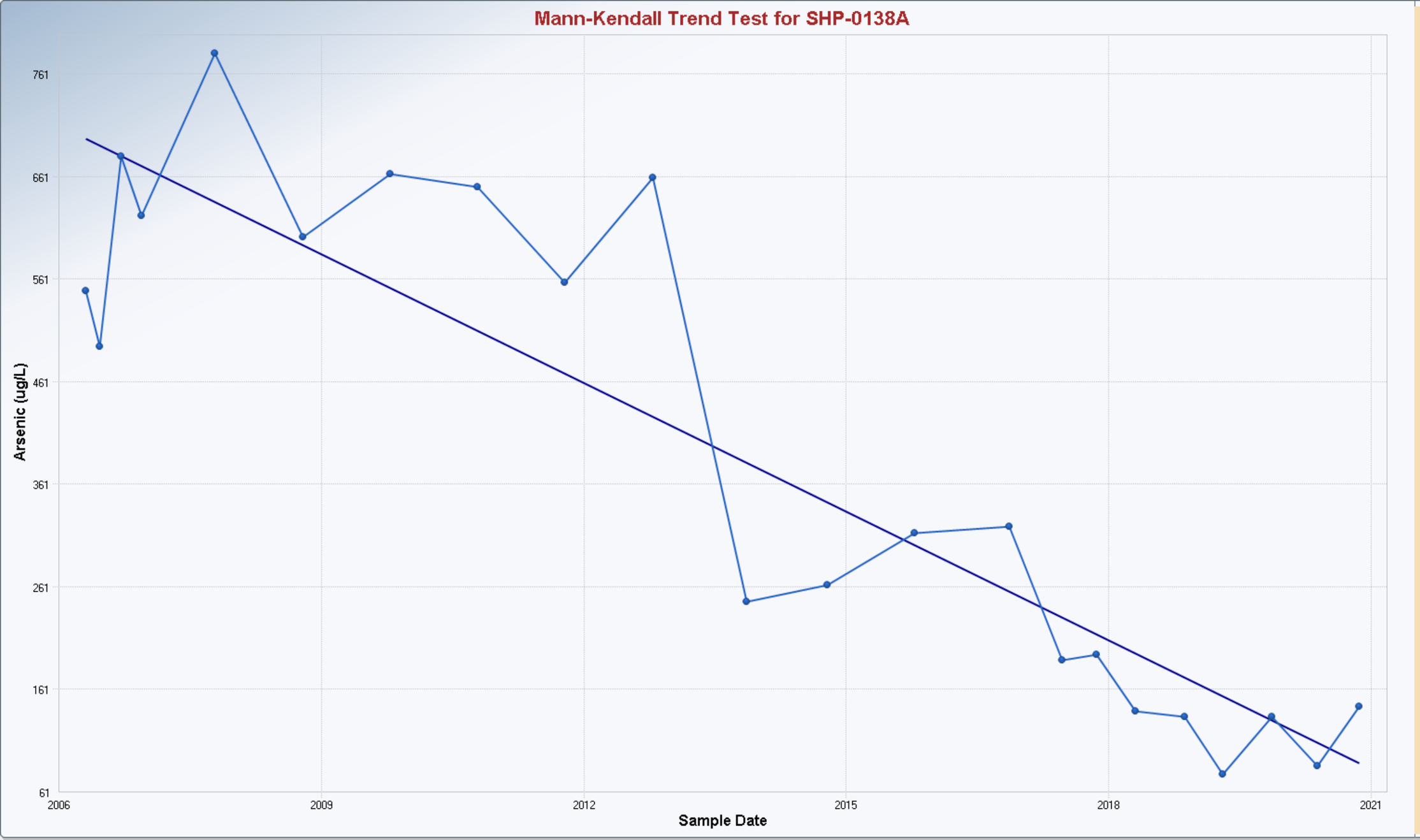
n	40
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	85.7807
Standardized Value of S	-0.2798
M-K Test Value (S)	-25
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.3898

OLS Regression Line (Blue)

OLS Regression Slope	-0.0550
OLS Regression Intercept	175.0964

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test for SHP-0138A



Mann-Kendall Trend Analysis

n	22
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	35.4495
Standardized Value of S	-4.2032
M-K Test Value (S)	-150
Tabulated p-value	0.0000
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	-41.8495
OLS Regression Intercept	84,661.8641

Statistically significant evidence of a decreasing trend at the specified level of significance.

Appendix F

Historical Groundwater Monitoring Well and Gas Vent Analytical Results

Table F-1: Summary of Historical Total Arsenic Results in Groundwater (1991 - 2012)
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

Well ID	Total Arsenic	N-5, P-1 (T)	N-5, P-2 (T)	SHL-3 (T)	SHL-4 (T)	SHL-5 (T)	SHL-8S (T)	SHL-8D (T)	SHL-9 (T)	SHL-10 (T)	SHL-11 (T)	SHL-13 (T)	SHL-15 (T)	SHL-19 (T)	SHL-20 (T)	SHL-21 (T)	SHL-22 (T)	SHL-23 (T)	SHM-93-10C (T)	SHM-93-10D (T)	SHM-93-22B (T)
Sample Month-Year	**Units**																				
Aug-91	µg/L			**35**	**260**	**23**			**37**	**67**	**320**			**340**	**98**		**27**				
Dec-91	µg/L			**120**	**140**	**38**			**67**	**120**	**320**			**710**	**89**		**25**				
Mar-93	µg/L			6.5	2.54	**11.4**			**42.4**	**280**	**340**			**390**	**330**		**32.9**		**21.3**		
Jun-93	µg/L																		**18.1**		
Nov-96	µg/L			NS	**48.8**	**12**			**46.9**	3.4 B	**332**			**138**	**244**		**24.8**		**12.4**		**324**
May-97	µg/L			**10 U**	**73.6 J**	**10 U**			**16.1 J**	**10 U**	**252 J**			**10 U**	**10 U**		**10 U**		**10 U**		**318 J**
Oct-97	µg/L			**10 U**	**180**	**10 U**			**25.2**	**209**	**366**			**298**	**227**		**34.8**		**10.5**		**352**
May-98	µg/L			5 U	**37.4**	5 U			**15**	5 U	**346**			**77.5**	**238**		**10.6**		7.5		**365**
Nov-98	µg/L			5.4 U	**89.1**	**11.5**			**27.2**	5.4 U	**376**			**145**	**218**		5.4 U		**10.2**		**406**
May-99	µg/L			2.7 B	**78.2**	5.0 B			**71.3**	2.7 B	**431**			**156**	**216**		**12.2 B**		**10.8 B**		**707**
Nov-99	µg/L	**5800**	**30.1**	1.9 U	**61.3**	6.5			**28.5**	1.9 U	**492**		**215**	**176**	**215**		7.3		8.7		**1440**
May-00	µg/L			2.5 U	**116**	2.5 U			**15**	2.5 U	**404**			**41.4**	**216**		**14.6**		5.9 J		**1360**
Nov-00	µg/L			**17.4**	**91.5**	**13.8**			**31.4**	4.2 U	**523**			**154**	**172**		**45**		8.8		**1180**
May-01	µg/L			4.1 U	**50.8**	**13.8**			**15.1**	4.1 U	**487**			**129**	**186**		**47.6**		6.9		**1540**
Oct-01	µg/L			1.5 U	**66**	**14.8**			**28.1**	1.5 U	**573**			**183**	**165**		**44.2**		**10.1**		**1670**
Nov-01	µg/L	**5800**	**43**				5 U	5 U				5 U				5 U		5 U			
May-02	µg/L			2.8 B	**47.8 B**	**11.9 B**			**144**	4.0 B	**469**			**66.9**	**154**		**55.9 B**		**11.0 B**		**2040**
Oct-02	µg/L			3.2 U	**66.1**	3.2 U			**29**	3.2 U	**648**			**164**	**175**		**77.1**		7.1		**159**
May-03	µg/L			4.7 U	**26.6**	7.3			**13.4**	4.7 U	**498**			**36.1**	**197**		**101**		9.8		**2070**
Nov-03	µg/L			4.1 U	**13.4**	4.7 B			**30.6**	4.1 U	**639**			**83.6**	**194**		**76.4**		5.2 U		**2500**
May-04	µg/L			2.6 U	**27.2**	7.4 B			**19.8**	2.6 U	**502**			**75**	**136**		**88.1**		7.2 B		**1690**
Nov-04	µg/L			5.8 U	**19.5**	6.8 B			**32.2**	5.8 U	**617**			**121**	**156**		**65.4**		**10.6 B**		**2360**
Jun-05	µg/L			4.5 U	**10.1**	7.0 B				4.5 U	**524**			**26.3**	**159**				8.1 B		
Jan-06	µg/L				5 U	5 U			**18**	5 U	**567**			**156**	**189**		**154**		**11**		**3320**
Apr-06	µg/L	**4940**	**22**				5 U	5 U	**21**			5 U	**18**			5 U	**171**	5 U		**14**	**3690**
Jun-06	µg/L	**5970**	**46**	5 U	5 U	6	5 U	5 U	**21**	5 U	**700**	5 U	**16**	**1790**	**346**		**167**	5 U	**12**		**3440**
Sep-06	µg/L	**4560**	**22**				5 U	5 U	**46**			5 U	**44**			5 U	**109**	5 U		**14**	**3110**
Dec-06	µg/L	**1930**	**30**	5 U	5 U	8	5 U	5 U	**51**	5 U	**668**	5 U	**93**	**142**	**361**	5 U	**115**	5 U	**10**	**12**	**3100**
Apr-07	µg/L						3 U	3 U	**26**							3 U	**98**	3 U			**2800**
May-07	µg/L					6.2															
Oct-07	µg/L	**4856**	**28.1**		7.5	**16.2**	**22.6**	**11.8**	**34.1**	0.59 J	**686.5**	1.6	**42**	**885.1**	**336.2**	0.81 J	**55.1**	0.73 J	9.8	**10.3**	**1978**
Apr-08	µg/L					4.1	0.5 U	0.5 U	**14.6**							1.1	**106.2**	0.19 J			**1721**
Oct-08	µg/L	**1748**	**26.8**		2.3	4.9	1 UJ	1 UJ	**40.7**	1 UJ	**663.5**	3.3	**75**	**173.6**	7.9	1 U	**81**	1 UJ	**10.1**	**23.4**	**1374**
Jan-09	µg/L																				
Apr-09	µg/L					3.6	0.5 U	0.5 U	**18.1**							1.2	**98.7**	0.5 U			**1128**
Oct-09	µg/L	**4429**	**30.5**		**15.1**	**12.3**	0.5 U	0.5 U	**37.6**		**709.1**	0.5 U	**26.7**	**136.9**	**23.8**		**48.3**				**832.3**
Apr-10	µg/L					3.4	0.6	0.6	**25.2**								**69.6**				**947.5**
Jul-10	µg/L																				
Aug-10	µg/L																				
Sep-10	µg/L																				
Oct-10	µg/L	**3488**	**24.5**		3.1	4.8	0.5 U	0.5 U	**38.4**	0.9	**694**	0.5 U	**25**	**234.8**	4.4	0.9	**46.5**	0.5 U	8.7		**827.6**
Apr-11	µg/L					1	0.5 U	0.5 U	**25.7**								**57.9**				**1039**
Oct-11	µg/L	**4942**	**27.4**		1.4	5.5	0.5 U	0.5 U	**39.8**		**654.9**	2.8	**70.4**	**62.9**	7.3		**45.7**				**1072**
Apr-12	µg/L					3.7	0.6	0.5 U	**29.5**								**41.9**				**1271**
Oct-12	µg/L	**2286**	**26.1**		3.8	4.5	0.5 U	0.5 U	**36.4**	0.7	**647**	1.0	**24.2**	**138.3**	**139.3**	1.1	**43.6**	0.5 U	8.1		**879**

Notes:
Shaded and bolded values exceed the MCL Standards for Arsenic of 10 µg/L.
µg/L = microgram per liter
U = non detect
UJ = estimated non detect
J = estimated result

Table F-1: Summary of Historical Total Arsenic Results in Groundwater (1991 - 2012)
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

Well ID	Total Arsenic	SHM-93-22C (T)	SHM-96-5B (T)	SHM-96-5C (T)	SHP-99-29X (T)	SHM-99-31A (T)	SHM-99-31B (T)	SHM-99-31C (T)	SHM-99-32X (T)	SHP-01-36X (T)	SHP-01-37X (T)	SHP-01-38A (T)	SHM-05-39A (T)	SHM-05-39B (T)	SHM-05-40X (T)	SHM-05-41A (T)	SHM-05-41B (T)	SHM-05-41C (T)	SHM-05-42A (T)	SHM-05-42B (T)
Sample Month-Year	**Units**																			
Aug-91	µg/L																			
Dec-91	µg/L																			
Mar-93	µg/L	**68.9**																		
Jun-93	µg/L	**49.8**																		
Nov-96	µg/L	**44.6**	**1440**	**71**																
May-97	µg/L	**40.4**	**3,300 J**	**43.2**																
Oct-97	µg/L	**10 U**	**2040**	**43.1**																
May-98	µg/L	**31.6**	**4300**	**49.5**																
Nov-98	µg/L	**51.1**	**3080**	**46.8**																
May-99	µg/L	**42.8**	**3490**	**57**																
Nov-99	µg/L	**33.2**	**2700**	**44.8**	**4380**															
May-00	µg/L	**34.4**	**5110**	**52.2**																
Nov-00	µg/L	**47.8**	**2500**	**40.3**																
May-01	µg/L	**19.7**	**3800**	**80.5**																
Oct-01	µg/L	**31.6**	**1850**	**41.1**																
Nov-01	µg/L				**3800**															
May-02	µg/L	**30.5 B**	**3800**	**50.4 B**																
Oct-02	µg/L	**30.1**	**1970**	**41.3**																
May-03	µg/L	**21**	**3920**	**55.1**																
Nov-03	µg/L	**29.8**	**3380**	**48.3**																
May-04	µg/L	**27.8**	**3950**	**47.1**																
Nov-04	µg/L	**34.9**	**2110**	**49.5**																
Jun-05	µg/L	**15.8**																		
Jan-06	µg/L	**23**	**4130**	**43**																
Apr-06	µg/L		**2110**	**47**		**9**	**56**	**270**	**168**	**24**	**41**	**550**	**289**	**590**	**3610**	**54**	**2420**	**626**	5 U	**266**
Jun-06	µg/L	**17**	**2760**	**51**		**12**	**53**	**273**	**186**	**22**	**49**	**496**	**288**	**634**	**3420**	**52**	**2720**	**614**	5 U	**241**
Sep-06	µg/L		**1570**	**37**		**23**	**74**	**305**	**202**	**30**	**46**	**681**	**270**	**415**	**3510**	**41**	**2730**	**640**	5 U	**276**
Dec-06	µg/L	**73**	**2980**	**24**		**16**	**72**	**301**	**176**	**19**	**46**	**623**	**248**	**412**	**4070**	**36**	**2280**	**666**	5 U	**296**
Apr-07	µg/L	**76**	**2030**	**47**												**30**	**1990**	**627**	3 U	**249**
May-07	µg/L																			
Oct-07	µg/L	**72.5**	**750**	**61.1**	**2953**	**22.7**	**85.5**	**292.1**	**206.2**	**16.7**	**26.6**	**781.4**	**241.5**	**309.4**	**4445**	**24.9**	**2591**	**684.5**	1.01 J	**304.4**
Apr-08	µg/L	**29.4**	**1597**	**54.7**												**26.9**	**2349**	**662.2**	2.5	**266.2**
Oct-08	µg/L	**17.7**	**747.8**	**51.8**	**2106**	**16.2**	**79.5**	**260.3**	**203.9**	**27.9**	**38.1**	**602.4**	**275.6**	**241.2**	**4920**	**18.7**	**1910**	**789.3**	1 U	**256**
Jan-09	µg/L																			
Apr-09	µg/L	**21.7**	**1401**	**44.2**												**22.1**	**1497**	**895.3**	2	**255.7**
Oct-09	µg/L	**74.7**	**776.3**	**27.5**	**1686**	**20.4**	**56.7**	**223.5**	**196.8**	**18.7**	**35.1**	**663.7**	**259.5**	**338.8**	**3833**	**16.3**	**1464**	**828.7**	1 U	**211.4**
Apr-10	µg/L	**14.6**	**1504 J**	**31.2**												**26.9**	**1372**	**896**	2.5	**72.2**
Jul-10	µg/L																			
Aug-10	µg/L																			
Sep-10	µg/L																			
Oct-10	µg/L	**15.8**	**846.2**	**26.4**	**3156**	**17.4**	**39.2**	**239.4**	**173.4**	**14.2**	**22.5**	**651.8**	**246.3**	**162**	**3637**	**66.7**	**1036**	**787**	1.2	**197.2**
Apr-11	µg/L	**13.9**	**2030**	**35**												**20.9**	**1045**	**749.8**	1.1	**188.9**
Oct-11	µg/L	**13.9**	**1895**	**24.5**	**1457**	**18.4**	**59.3**	**244**	**172.8**	**30.8**	**20.2**	**557.9**	**227.1**	**308.1**	**3703**	**18.4**	**1369**	**917**	0.8	**230**
Apr-12	µg/L	**25.4**	**1681**	8.7												**15.5**	**770.8**	**764.8**	2.3	**238.7**
Oct-12	µg/L	**21.7**	**1376**	7.7	**2739**	**17.7**	**60.1**	**206.4**	**130.6**	**17.8**	**10.2**	**660.5**	**76.3**	**364.4**	**2974**	**10.3**	**859.5**	**782.2**	0.7	**240.6**

Notes:

Shaded and bolded values exceed the MCL Standards for Arsenic of 10 µg/L.

µg/L = microgram per liter

U = non detect

UJ = estimated non detect

J = estimated result

Table F-1: Summary of Historical Total Arsenic Results in Groundwater (1991 - 2012)
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

Well ID	Total Arsenic	SHM-07-05 (T)	SHM-10-01 (T)	SHM-10-02 (T)	SHM-10-03 (T)	SHM-10-04 (T)	SHM-10-05A (T)	SHM-10-06 (T)	SHM-10-06A (T)	SHM-10-07 (T)	SHM-10-08 (T)	SHM-10-10 (T)	SHM-10-11 (T)	SHM-10-12 (T)	SHM-10-13 (T)	SHM-10-14 (T)	SHM-10-15 (T)	SHM-10-16 (T)
Sample Month-Year	**Units**																	
Aug-91	µg/L																	
Dec-91	µg/L																	
Mar-93	µg/L																	
Jun-93	µg/L																	
Nov-96	µg/L																	
May-97	µg/L																	
Oct-97	µg/L																	
May-98	µg/L																	
Nov-98	µg/L																	
May-99	µg/L																	
Nov-99	µg/L																	
May-00	µg/L																	
Nov-00	µg/L																	
May-01	µg/L																	
Oct-01	µg/L																	
Nov-01	µg/L																	
May-02	µg/L																	
Oct-02	µg/L																	
May-03	µg/L																	
Nov-03	µg/L																	
May-04	µg/L																	
Nov-04	µg/L																	
Jun-05	µg/L																	
Jan-06	µg/L																	
Apr-06	µg/L																	
Jun-06	µg/L																	
Sep-06	µg/L																	
Dec-06	µg/L																	
Apr-07	µg/L																	
May-07	µg/L																	
Oct-07	µg/L	**14.7**																
Apr-08	µg/L																	
Oct-08	µg/L																	
Jan-09	µg/L																	
Apr-09	µg/L																	
Oct-09	µg/L																	
Apr-10	µg/L																	
Jul-10	µg/L		1.16 J	0.74	2.36	1.62	4.7	**2210 J**	**64.8**	**816 J**	2.72	2.0 J						
Aug-10	µg/L												**356**	**2880**				
Sep-10	µg/L		8.15	1.11	1.47 J	1.0 J	5.68	**2580**	**102**	**979**	1.4	2.57 J			**619 J**	**4280**	**7930**	**487**
Oct-10	µg/L												**470**	**2980**	**700**	**5990 J**	**6090**	**1180**
Apr-11	µg/L																	
Oct-11	µg/L																	
Apr-12	µg/L																	
Oct-12	µg/L																	

Notes:

Shaded and bolded values exceed the MCL Standards for Arsenic of 10 µg/L.

µg/L = microgram per liter

U = non detect

UJ = estimated non detect

J = estimated result

Table F-2: Historical Groundwater Monitoring Well Analytical Results (2006 - 2020)
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

Analytical Method		Dissolved Metals			Anions		General Chemistry		Field Parameters					
Analyte		Arsenic	Iron	Manganese	Alkalinity	Chloride	DOC	Sulfate	DO	ORP	pH	SPC	Temp	Turbidity
Unit		(µg/L)	(µg/L)	(µg/L)	mg/L	mg/L	mg/L	mg/L	mg/L	mV	SU	µS/cm	°C	NTU
Screening Limit*		10	9,100	1,715										
Well ID	Date													
EPA-PZ-2012-1A	10/13/2014	2.0 U	121	937	40	22	2.2	5.1 J	0.38	109.0	5.93	145	10.09	0.36
	10/22/2015	4.0 U	149	470	39	52	2.3	12	0.27	71.6	5.44	290	10.51	1.28
	11/17/2016	3.0 U	200	380	25	61	1.7	2.7	0.17	127.2	6.13	263	10.27	9.09
	5/25/2017	3.0 U	210	240	36	27	2.6	7.6	0.54	36.2	5.99	219	7.97	7.59
	11/14/2017	3.0 U	110	160	43	5.3	2.8	11	--	167.0	6.79	1,690	8.78	1.60
	04/16/2018	3.0 U	83	110	40	5.8	3.0	4.9	1.46	99.0	6.06	101	7.24	3.16
	11/13/2018	3.0 U	160	190	51	6.9	2.3	3.8	0.15	-11.3	5.67	203	10.20	1.22
	04/16/2019	3.0 U	270	250	51	3.3	2.4	3.2	0.59	140.0	6.10	120	7.40	2.30
	11/07/2019	3.0 U	190	240	43	11	3.0	3.6	0.24	79.0	6.10	120	9.60	4.10
	05/19/2020	3.0 U	270	290	44	15	1.7	1.2	4.10	91.5	6.06	122	9.42	3.04
	10/30/2020	3.0 U	140	170	39	3.7	1.8 U	1.8	0.78	88.8	6.59	81	7.20	37.2
EPA-PZ-2012-1B	10/13/2014	**160**	**21,500**	**6,900**	304	17	2.4	3.8 J	0.14	-58.8	6.54	587	10.92	28.2
	10/22/2015	**288**	**19,200**	**9,450**	266	19	2.2	6.7 J	0.60	-59.0	5.91	635	11.01	8.66
	11/17/2016	**260**	**16,000**	**9,600**	250	22	1.8	5.5	0.13	3.7	6.58	519	10.43	0.92
	5/25/2017	**240**	**14,000**	**9,700**	260	26	1.9	6.7	0.52	-23.5	6.37	665	9.44	26.1
	11/14/2017	**200**	**13,000**	**11,000**	220	30	1.7	6.6	3.06	22.5	7.22	540	9.08	3.57
	04/16/2018	**170**	**13,000**	**10,000**	210	37	1.7	11	0.94	0.3	6.75	519	7.07	1.98
	11/13/2018	**170**	**13,000**	**9,700**	200	34	1.6 U	11	0.35	-72.7	6.39	648	10.70	54.7
	04/16/2019	**160**	**15,000**	**13,000**	240	26	2.1	3.4	0.68	11.0	6.50	590	8.30	35.0
	11/07/2019	**220**	**13,000**	**9,400**	190	30	2.7	20	0.28	-33.0	6.40	480	9.80	18.0
	05/19/2020	**150**	**9,600**	**9,000**	200	36	1.5	14	2.30	-52.5	6.31	496	11.80	3.08
	10/30/2020	3.6	5,800	790	74	48	7.5	1.7	0.89	72.4	6.38	431	6.70	8.77
EPA-PZ-2012-2A	10/14/2014	2.0 U	50 U	7.5 U	7.6	1.5	1.2	7.7 J	5.63	223.4	5.89	40	10.64	0.69
	10/22/2015	4.0 U	100 U	15 U	9.3	1.8	0.42 J	7.5 J	5.18	130.1	4.85	47	13.12	0.85
	11/17/2016	3.0 U	28 J	1.7 J	7.5	9.1	0.58 J	5.5	5.11	172.4	6.04	60	10.63	0.94
	5/31/2017	3.0 U	50 U	1.8 J	9.0	5.6	1.0 U	5.7	3.01	36.7	5.99	79	8.91	6.73
	11/8/2017	3.0 U	75 U	2.0 J	8.6 U	8.5	0.45 J	4.6	4.72	59.3	6.26	58	9.96	6.96
	4/16/2018	3.0 U	50 U	3.0 J	7.6	6.8	1.0 J	5.5	5.96	126.9	6.04	53	6.88	2.95
	11/13/2018	1.9 J	160	160	8.9	8.3	1.0 U	5.4	2.63	32.5	5.43	121	11.20	0.99
	04/12/2019	3.0 U	50 U	1.5 J	10	2.6	0.50 U	5.8	5.30	190.0	5.80	47	7.10	0.72
	10/24/2019	3.0 U	50 U	1.6 J	9.4 J	4.4	0.46 J	6.9	6.60	160.0	5.40	51	10.00	1.40
	05/19/2020	3.0 U	50 U	1.1 J	11	2.8	0.74 J	6.3	3.61	410.0	4.47	40	12.10	0.22
	11/05/2020	3.0 U	50 U	1.5 J	13	6.9	1.0 U	6.2	5.79	264.0	5.55	47	12.40	1.90
EPA-PZ-2012-2B	10/14/2014	2.0 U	52 J	**5,910**	152	12	2.2	3.5 J	0.56	112.9	6.37	298	11.50	0.55
	10/22/2015	4.0 U	100 U	**7,080**	159	17	1.8	7.5	0.51	79.1	5.40	380	13.34	0.67
	11/17/2016	3.0 U	44 J	**6,100**	150	18	1.8	4.9	0.17	114.7	6.27	324	10.44	0.69
	5/31/2017	3.3	59	**6,800**	160	21	1.7	4.6	0.66	14.6	6.09	400	10.91	8.45
	11/8/2017	3.0 U	26 J	**7,400**	180	31	1.7	5.1	0.97	22.9	6.46	386	9.78	3.97
	4/16/2018	3.0 U	21 J	**6,000**	140	27	1.8	7.0	0.94	87.9	6.32	354	8.19	2.29
	11/13/2018	3.0 U	50 U	**6,600**	130	36	1.6 U	9.2	0.28	-24.9	6.92	506	10.30	3.98
	04/12/2019	3.0 U	97	**6,400**	130	35	1.7	13	0.57	150.0	6.20	390	8.40	12.0
	10/24/2019	3.0 U	250	**6,200**	140	35	1.6	10	0.35	180.0	5.90	380	11.00	27.0
	05/20/2020	3.0 U	680	**4,700**	110	31	1.2	5.9	3.81	46.8	6.28	292	9.58	20.9
	11/05/2020	3.0 U	4,300	**6,000**	130	45	1.4 U	10	0.81	54.2	5.93	288	12.40	12.4
EPA-PZ-2012-3A	10/8/2014	**21**	**19,200**	730	108	15	8.4	1.2 J	0.50	0.4	5.86	299	11.68	0.00
	10/26/2015	**16**	**16,400**	674	105	40	9.1	1.1 J	0.01	-11.5	5.19	392	12.80	1.14
	11/18/2016	**23**	**14,000**	710	75	66	8.7	0.56 J	1.60	-16.0	6.09	416	9.76	3.36
	5/25/2017	**19**	**17,000**	850	73	94	8.7	0.50 J	1.08	-11.5	5.85	534	10.01	9.78
	11/8/2017	**12**	**14,000**	670	80	67	8.6	0.57 J	0.02	8.1	6.16	371	11.22	1.83

Table F-2: Historical Groundwater Monitoring Well Analytical Results (2006 - 2020)
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

Analytical Method		Dissolved Metals			Anions		General Chemistry		Field Parameters					
Analyte		Arsenic	Iron	Manganese	Alkalinity	Chloride	DOC	Sulfate	DO	ORP	pH	SPC	Temp	Turbidity
Unit		(µg/L)	(µg/L)	(µg/L)	mg/L	mg/L	mg/L	mg/L	mg/L	mV	SU	µS/cm	°C	NTU
Screening Limit*		10	9,100	1,715										
Well ID	Date													
	4/24/2018	**13**	**12,000**	600	92	48	10	1.2	0.69	-18.4	6.29	389	11.82	3.40
	11/14/2018	**15**	**13,000**	690	100	44	9.9	1.2	0.81	42.7	5.51	373	9.66	5.50
	04/16/2019	**15**	**16,000**	920	89	32	11	1.0 U	0.51	16.0	6.10	340	11.00	8.00
	10/28/2019	**16**	**17,000**	950	96	34	9.7	0.94 J	0.38	50.0	5.60	320	11.00	1.90
	05/21/2020	**17**	**14,000**	890	100	27	9.4	10 U	3.50	-11.0	6.14	258	10.30	0.02
	11/02/2020	**12**	**13,000**	720	97	27	9.8	1.0 U	0.92	223.0	5.76	195	10.60	8.40
EPA-PZ-2012-3B	10/9/2014	**3,830**	**62,100**	**5,930**	265	16	2.5	49	0.21	-113.9	6.70	658	11.18	12.1
	10/26/2015	**4,070**	**63,400**	**6,620**	260	17	3.3	4.5 J	0.26	-109.4	5.41	701	12.71	4.61
	11/18/2016	**3,600**	**52,000**	**5,600**	220	19	2.0	6.7	1.67	-106.6	6.76	626	10.61	16.5
	5/25/2017	**4,000**	**49,000**	**5,600**	200	22	2.3	8.5	2.41	-65.7	6.55	658	10.31	22.0
	11/9/2017	**3,400**	**53,000**	**6,300**	220	23	2.1	8.6	0.38	-92.2	6.98	496	10.70	11.0
	4/24/2018	**2,900**	**45,000**	**5,500**	210	25	1.6	12	0.77	-96.2	6.98	638	11.60	7.26
	11/14/2018	**3,000**	**44,000**	**5,600**	200	27	1.8 U	11	0.18	-53.6	6.34	577	8.77	14.4
	04/16/2019	**2,700**	**45,000**	**5,800**	180	28	1.9	12	0.42	-80.0	6.70	610	12.00	33.0
	10/28/2019	**3,200**	**49,000**	**5,900**	180	29	1.7	15	0.27	-54.0	6.50	560	10.00	9.70
	05/21/2020	**3,200**	**44,000**	**5,600**	180	27	1.7	15	3.72	-97.8	6.64	533	11.60	0.02
	11/02/2020	**2,700**	**37,000**	**5,300**	170	29	1.4	16	0.88	131.0	6.42	311	9.50	35.5
EPA-PZ-2012-4A	10/8/2014	4.8	**16,500**	**2,740**	46	145	6.3	10	0.03	-26.8	6.03	690	13.04	0.47
	10/26/2015	5.6	**14,300**	**2,000**	48	210	7.6	6.1	0.35	-33.1	6.43	769	12.94	1.02
	11/17/2016	5.1	5,200	710	69	110	12	9.4	1.13	5.6	6.21	525	13.20	0.91
	5/25/2017	2.9 J	3,100	400	67	49	15	5.4	0.38	-4.0	6.34	368	9.84	6.42
	11/8/2017	3.4	4,800	610	74	63	11	4.2	0.12	-2.3	6.45	347	12.40	1.73
	4/16/2018	2.5 J	3,700	500	83	39	11	5.9	0.79	-15.9	6.43	324	6.73	0.72
	11/13/2018	**2,000**	**75,000**	880	190	21	2.9	3.2	0.30	-42.4	6.30	614	10.00	3.10
	04/15/2019	2.5 J	4,100	560	79	29	11	3.4	0.71	2.0	6.40	290	11.00	2.70
	10/31/2019	4.5	7,000	920	79	55	8.9	2.7	0.30	-33.0	6.20	360	13.00	2.70
	05/19/2020	2.7 J	4,900	640	75	39	9.4	1.5	3.84	-52.6	6.45	279	13.10	0.02
	10/30/2020	**210**	**11,000**	**8,000**	170	35	1.8 U	18	2.95	9.1	6.47	282	7.30	10.2
EPA-PZ-2012-4B	10/6/2014	**2,680**	**76,800**	784	208	16	2.6	4.9 J	0.35	-118.5	6.60	578	12.92	3.33
	10/26/2015	**3,520**	**85,600**	984	224	17	4.0	11	0.45	-119.2	6.68	515	11.71	14.1
	11/17/2016	**2,200**	**70,000**	640	210	18	2.7	0.90 J	1.46	-70.9	6.36	569	11.81	13.2
	5/25/2017	**2,300**	**73,000**	850	200	19	3.1	1.1	0.52	-64.2	6.45	670	10.25	10.5
	11/8/2017	**2,300**	**71,000**	890	220	21	2.5	2.2	0.22	-73.2	6.76	550	10.66	2.09
	4/16/2018	**1,900**	**72,000**	790	200	23	2.8	3.7	1.04	-65.1	6.63	632	6.70	14.1
	11/13/2018	**2,000**	**75,000**	880	190	21	2.9	3.2	0.30	-42.4	6.30	614	10.00	3.10
	04/15/2019	**2,000**	**72,000**	880	140	22	2.9	6.8	0.60	-63.0	6.60	600	12.00	14.0
	10/31/2019	**2,100**	**62,000**	690	130	26	2.1	17	1.70	-98.0	6.50	510	12.00	9.50
	05/19/2020	**1,800**	**66,000**	640	160	25	2.6	12	3.86	-104.0	6.69	505	14.60	0.02
	10/29/2020	**2,000**	**59,000**	780	140	28	2.6	12	3.51	5.4	6.46	468	9.10	33.3
EPA-PZ-2012-5A	10/14/2014	2.0 U	6,450	86	24	17	6.0	7.2 J	0.07	71.1	5.57	93	11.27	2.68
	10/26/2015	4.0 U	6,560	90	22	9.5	5.8	5.5	0.48	35.9	5.51	101	10.25	1.08
	11/17/2016	3.0 U	6,300	79	22	12	5.5	4.3	0.22	48.9	5.90	84	10.68	0.88
	5/31/2017	3.0 U	6,400	83	23	12	6.0	4.3	0.48	25.9	5.45	133	10.49	9.13
	11/10/2017	3.0 U	6,300	84	22	13	5.5	3.5	0.56	56.7	5.82	85	9.50	2.78
	4/23/2018	1.5 J	6,500	87	23	14	6.2	5.1	0.85	6.2	5.71	111	9.44	7.72
	11/15/2018	1.5 J	6,200	90	18	14	5.9	3.9	0.27	112.0	6.42	71	7.73	1.94
	04/12/2019	1.5 J	7,200	96	22	15	6.5	4.2	0.39	36.0	5.70	120	7.90	5.20
	11/05/2019	2.2 J	6,800	96	24	16	6.3	5.1	0.20	80.0	5.20	110	9.50	3.30
	05/22/2020	3.0 U	6,700	88	26	15	6.7	4.0	3.73	52.3	5.57	106	9.57	2.78

Table F-2: Historical Groundwater Monitoring Well Analytical Results (2006 - 2020)
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

Analytical Method		Dissolved Metals			Anions		General Chemistry		Field Parameters					
Analyte		Arsenic	Iron	Manganese	Alkalinity	Chloride	DOC	Sulfate	DO	ORP	pH	SPC	Temp	Turbidity
Unit		(µg/L)	(µg/L)	(µg/L)	mg/L	mg/L	mg/L	mg/L	mg/L	mV	SU	µS/cm	°C	NTU
Screening Limit*		10	9,100	1,715										
Well ID	Date													
	11/10/2020	3.0 U	5,800 J	87	22	15	6.3	4.4	0.82	74.7	6.17	333	13.20	9.60
EPA-PZ-2012-5B	10/14/2014	3.2 J	471	**11,900**	311	6.5	1.9	3.6 J	0.16	34.3	6.44	598	11.01	0.01
	10/26/2015	3.7	181	**12,300**	286	18	2.2	1.7 J	0.33	24.4	6.13	626	10.72	1.42
	11/17/2016	2.4 J	130	**11,000**	250	20	1.7	2.7	0.19	21.4	6.62	501	10.15	0.83
	5/31/2017	1.6 J	130	**11,000**	230	24	1.7	2.7	0.90	108.9	7.00	534	7.76	3.14
	11/10/2017	3.0 U	290	**10,000**	220	30	1.6	3.5	0.18	86.3	6.69	435	9.32	3.24
	4/23/2018	3.0 U	100	**9,600**	220	35	1.8	7.2	0.78	18.3	6.39	539	10.27	3.74
	11/15/2018	**12**	910	**10,000**	200	40	1.6	7.1	0.54	16.1	6.35	344	7.53	10.4
	04/12/2019	2.7 J	390	**11,000**	200	42	1.7	8.9	0.33	38.0	6.40	530	8.80	4.40
	11/05/2019	**14**	940	**9,800**	190	40	1.3	12	0.28	-22.0	6.20	450	9.40	2.00
	05/22/2020	2.4 J	300	**9,600**	190	37	1.4	10	3.69	24.8	6.81	464	10.80	23.1
	11/10/2020	2.5 J	230	**9,000**	180	42	1.5	11	7.13	65.7	6.40	116	16.80	4.23
EPA-PZ-2012-6A	10/9/2014	2.0 U	50 U	7.5 U	32	41	0.87 J	22	7.40	177.3	6.28	323	9.37	0.97
	10/26/2015	4.0 U	100 U	15 U	26	67	1.6	13	8.50	37.2	6.64	289	8.76	5.19
	11/17/2016	1.6 J	34 J	3.0 U	24	3.4	0.98 J	4.0	6.32	202.8	7.02	71	8.81	6.51
	5/24/2017	3.0 U	50 U	1.5 J	21	72	1.2	34	11.98	18.3	5.98	407	8.71	13.5
	11/9/2017	3.0 U	29 J	5.0 U	37	9.7	1.5	14	5.17	43.8	6.81	112	9.23	3.35
	4/20/2018	3.0 U	50 U	2.9 J	39	150	1.3	28	7.95	38.2	6.54	588	8.09	2.63
	11/09/2018	3.0 U	50 U	3.0 U	62	14	2.0	19	8.56	37.0	6.68	216	10.10	3.60
	04/22/2019	1.6 J	50 U	7.8 J	25	58	0.50 U	3.7	9.20	160.0	6.30	260	12.00	5.00
	10/25/2019	3.0 U	50 U	3.0 U	32	4.7	0.85 J	4.0	7.00	180.0	6.10	88	9.70	13.0
	05/22/2020	3.0 U	50 U	3.0 U	37	3.3	0.71 J	2.8	8.01	282.0	6.30	84	13.70	4.04
	11/11/2020	3.0 U	50 U	3.0 U	38	9.3	0.97 J	3.9	0.46	-1.6	6.45	150	15.40	2.34
EPA-PZ-2012-6B	10/9/2014	**515**	**18,000**	1,020	49	1.5	9.5	3.7 J	0.54	-123.2	6.94	158	9.84	0.73
	10/26/2015	**386**	**19,600**	667	46	5.0	1.4	3.5 J	0.75	10.3	6.31	102	8.36	2.81
	11/17/2016	**370**	**24,000**	870	67	5.7	1.2	4.5	0.75	-30.0	6.55	166	8.99	12.0
	5/24/2017	**430**	**27,000**	900	57	16	1.5	3.1	0.66	-38.7	6.42	268	9.45	9.46
	11/9/2017	**350**	**21,000**	1,000	53	9.4	1.4	3.6	0.20	-97.7	7.14	165	9.34	4.55
	4/20/2018	**96**	4,900	760	44	6.4	1.5	4.6	0.87	-69.7	6.98	159	8.83	2.90
	11/09/2018	**300**	**18,000**	890	48	3.4	1.4 U	3.4	1.76	4.5	6.74	100	9.18	37.4
	04/22/2019	**350**	**19,000**	950	39	17	1.6	12	6.80	-55.0	6.80	200	12.00	36.0
	10/25/2019	**370**	**17,000**	960	47	10	1.3	9.4	0.15	-60.0	6.60	190	10.00	9.90
	05/22/2020	**220**	**14,000**	720	36	8.8	1.1	3.5	0.45	52.3	6.46	117	11.20	6.99
	11/11/2020	**300**	**16,000**	970	42	3.7	1.3	2.8	4.94	123.0	7.97	375	12.70	3.24
EPA-PZ-2012-7A	10/14/2014	2.0 U	50 U	121	60	150	--	9.3 J	1.80	97.0	6.60	604	13.19	1.04
	10/27/2015	4.0 U	100 U	5.9 J	40	145	0.80 J	7.9	2.72	136.1	3.95	654	11.19	0.82
	11/21/2016	3.0 U	28 J	49	28	320	0.77 J	6.8	4.93	123.1	6.31	815	10.03	2.49
	5/24/2017	3.0 U	19 J	16	22	210	1.0	8.2	8.35	38.0	6.01	812	11.82	8.70
	11/17/2017	3.0 U	75 U	22	25	160	0.50 U	4.0	3.01	161.3	6.41	549	10.19	4.52
	4/18/2018	3.0 U	50 U	6.4 J	25	160	1.0 U	6.1	4.82	87.5	6.15	608	10.69	0.95
	11/16/2018	3.0 U	50 U	8.0 J	30	89	0.66 J	9.7	5.60	14.5	6.08	373	8.85	0.68
	04/19/2019	3.0 U	50 U	3.0 U	21	180	0.50 U	2.1	6.00	120.0	5.70	660	10.00	1.80
	10/31/2019	2.3 J	50 U	47	22	120	0.67 J	5.0	3.60	94.0	6.00	450	12.00	2.80
	05/22/2020	3.0 U	50 U	10 U	18	160	0.96 J	3.0	5.64	291.0	5.79	626	16.50	2.61
	11/06/2020	3.0 U	200	3.0 J	24	100	1.0 U	8.2	0.46	44.4	8.12	145	12.60	3.48
EPA-PZ-2012-7B	10/14/2014	**1,250**	**34,800**	1,460	77	0.77 U	2.4	4.9 J	0.20	-92.9	6.67	229	12.90	3.18
	10/27/2015	**1,330**	**36,900**	1,380	773	3.0	3.6	12	0.95	-115.4	5.59	275	11.69	0.68
	11/21/2016	**1,000**	**26,000**	930	45	34	1.5	0.50 U	7.04	-55.2	6.60	202	10.13	17.2
	5/24/2017	**1,500**	**18,000**	930	39	1.8	1.4	3.5	0.41	-58.1	6.45	175	11.50	11.4

Table F-2: Historical Groundwater Monitoring Well Analytical Results (2006 - 2020)
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

Analytical Method		Dissolved Metals			Anions		General Chemistry		Field Parameters					
Analyte		Arsenic	Iron	Manganese	Alkalinity	Chloride	DOC	Sulfate	DO	ORP	pH	SPC	Temp	Turbidity
Unit		(µg/L)	(µg/L)	(µg/L)	mg/L	mg/L	mg/L	mg/L	mg/L	mV	SU	µS/cm	°C	NTU
Screening Limit*		10	9,100	1,715										
Well ID	Date													
	11/17/2017	**1,200**	**19,000**	830	44	1.7	1.3	3.5	0.33	-94.1	6.91	140	9.99	389
	4/18/2018	**1,300**	**20,000**	1,200	46	2.3	1.5	3.5	1.01	-83.3	6.81	161	9.40	5.97
	11/16/2018	**1,100**	**16,000**	1,000	40	1.2	1.5	3.4 J	0.57	-65.1	6.54	138	10.00	15.8
	04/19/2019	**1,500**	**22,000**	**2,700**	52	9.6	0.50 U	5.0	0.77	-34.0	6.20	210	11.00	1.00
	11/05/2019	**1,300**	**23,000**	**1,900**	50	1.3	1.3	4.7	0.23	-93.0	6.70	150	9.80	6.40
	05/22/2020	**1,400**	**16,000**	**2,700**	38	1.2	1.1	3.3	0.37	38.6	6.56	117	13.60	5.06
	11/06/2020	**1,300**	**21,000**	**2,500**	52	1.4	1.1 U	2.8	1.05	96.1	6.50	505	9.90	4.23
EW-01	8/29/2016	**1,500**	**62,000**	**2,100**	260	16	4.8	2.0	--	--	--	--	--	--
	6/14/2017	**1,900**	**63,000**	**2,200**	170	15	4.5	3.7	--	--	--	--	--	--
	11/28/2017	**1,800**	**71,000**	**2,200**	180	15	4.2	3.8	--	--	--	--	--	--
	04/19/2018	**1,500**	**60,000**	**2,100**	190 J	15	4.7	4.1	--	--	--	--	--	--
	12/18/2018	**1,900**	**75,000**	**2,500**	240	15	4.3	4.2	--	--	--	--	--	--
	04/12/2019	**1,500**	**64,000**	**2,100**	200	15	4.4	4.0	--	--	--	--	--	--
	11/05/2019	**1,600**	**65,000**	**2,100**	210	18	4.2	6.6	--	--	--	--	--	--
	05/18/2020	**1,600**	**65,000**	**2,100**	250	17	4.8	5.1	9.26	-43.3	6.62	569	11.80	40.0
	10/30/2020	**1,400**	**56,000**	**1,800**	210	18	4.1	4.8	2.11	74.7	6.76	284	6.70	6.18
EW-04	8/29/2016	**2,400**	**35,000**	**2,200**	130	9.1	2.0	4.2	--	--	--	--	--	--
	6/14/2017	**3,500**	**42,000**	**2,700**	100	8.1	2.0	4.4	--	--	--	--	--	--
	11/28/2017	**3,500**	**45,000**	**2,700**	98	7.5	1.9	4.5	--	--	--	--	--	--
	04/19/2018	**3,300**	**37,000**	**2,300**	110 J	6.4	2.2	4.6	--	--	--	--	--	--
	12/18/2018	**4,000**	**56,000**	**3,200**	160	6.8	2.4	5.0	--	--	--	--	--	--
	04/12/2019	**2,900**	**41,000**	**2,400**	100	5.2	1.9	4.4	--	--	--	--	--	--
	11/05/2019	**3,200**	**38,000**	**2,100**	110	6.8	1.7	6.4	--	--	--	--	--	--
	05/18/2020	**3,300**	**39,000**	**2,400**	130	5.8	1.9	5.3	9.54	-65.3	7.73	317	11.90	39.3
	10/30/2020	**3,000**	**33,000**	**2,100**	100	6.7	1.9 U	4.5	0.68	-38.3	6.78	171	9.10	6.00
N5-P1	10/12/2010	--	--	--	300	20	--	11 U	0.31	-61.8	6.06	1,353	12.27	1.00
	10/10/2011	--	--	--	280	16	--	9.5	0.18	-60.0	6.60	548	12.71	2.00
	10/18/2012	--	--	--	270	20	--	11	0.55	-100.0	6.79	386	11.67	18.0
	10/22/2013	**2,500**	7,520	**8,570**	313	18	--	11	0.57	-69.5	6.73	620	13.56	0.46
	10/8/2014	**327**	563	**2,010**	230	20	2.4	17	0.25	-108.3	7.20	303	13.75	0.61
	10/23/2015	**2,170**	3,440	**7,250**	250	16	2.7	14	0.51	-25.0	6.25	560	11.50	1.52
	12/22/2016	**4,200**	**35,000**	**9,000**	110 J	18	2.3	14	1.35	-41.0	6.26	887	10.71	3.57
	6/15/2017	**4,700**	**20,000**	**9,400**	220	220	2.4	220	0.48	-82.1	7.12	269	13.97	6.97
	11/9/2017	**4,700**	**44,000**	**6,800**	230	16	2.7	9.0	0.85	-23.0	6.81	381	11.10	4.18
	11/14/2018	**540**	570	**2,000**	140	19	1.2 U	16	2.25	-50.4	7.66	337	8.39	21.5
	11/06/2019	**4,400**	**43,000**	**6,200**	240	21	2.6	12	0.55	-43.0	6.60	590	11.00	9.90
	10/30/2020	**520**	510	980	130	19	1.2 U	17	0.63	10.7	6.81	527	9.20	11.7
N5-P2	10/12/2010	--	--	--	700	14	--	1.0	0.35	-60.7	6.43	519	12.08	1.00
	10/10/2011	--	--	--	690	14	--	1.0	0.17	-32.0	6.20	1,080	12.83	2.00
	10/17/2012	--	--	--	640	13	--	2.0 U	1.21	-132.4	6.25	850	14.87	82.0
	10/22/2013	**21**	**75,400**	459	652	15	--	0.67 J	0.72	-71.6	6.34	1,271	14.15	3.36
	10/23/2015	**26**	**38,200**	426	574	15	13	4.2	0.39	-57.2	5.64	1,340	12.20	1.29
	11/22/2016	**35**	**72,000**	490	610	13	12	1.0 U	1.35	-41.0	6.26	887	10.71	3.57
PZ-12-01	5/28/2013	**441**	**27,100**	**3,930**	201	38	2.4	14	0.23	-86.3	6.50	421	12.41	4.19
	05/25/2017	**680**	**41,000**	**3,100**	190	49	2.6	5.2	0.52	-18.6	5.89	416	10.49	12.1
	11/3/2017	**420**	**53,000**	670	150	14	2.1	2.9	0.52	-63.1	6.43	532	14.09	7.93
	4/12/2018	**700**	**55,000**	**2,800**	180	45	2.4	8.4	0.94	-0.3	6.36	544	10.96	7.18
	11/6/2018	**570**	**59,000**	**1,800**	140	48	2.2	5.9	1.01	-38.4	6.27	583	11.20	23.4
	04/18/2019	**470**	**54,000**	1,700	170	58	3.3	11	0.71	-54.0	6.50	660	10.00	9.60

Table F-2: Historical Groundwater Monitoring Well Analytical Results (2006 - 2020)
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

Analytical Method		Dissolved Metals			Anions		General Chemistry		Field Parameters					
Analyte		Arsenic	Iron	Manganese	Alkalinity	Chloride	DOC	Sulfate	DO	ORP	pH	SPC	Temp	Turbidity
Unit		(µg/L)	(µg/L)	(µg/L)	mg/L	mg/L	mg/L	mg/L	mg/L	mV	SU	µS/cm	°C	NTU
Screening Limit*		10	9,100	1,715										
Well ID	Date													
	11/01/2019	**560**	**52,000**	**1,800**	140	62	2.0	14	0.36	-64.0	6.40	600	11.00	4.50
	05/18/2020	**540**	**54,000**	**2,000**	190	60	2.4	16	0.43	-1.4	6.49	602	11.30	0.81
	11/02/2020	**600**	**52,000**	**1,900**	160	57	1.9	19	0.69	-8.5	6.56	621	10.20	1.96
PZ-12-02	5/21/2013	**627**	**58,600**	1,330	213	42	2.8	4.5 U	0.15	-87.0	6.37	665	12.33	4.58
	05/26/2017	**500**	**56,000**	840	180	33	2.6	1.3	0.34	-34.6	6.01	378	10.18	10.3
	11/3/2017	**660**	**45,000**	**2,200**	150	46	2.7	6.1	0.33	-63.7	6.31	477	13.14	1.72
	4/12/2018	**400**	**60,000**	780	160	34	2.5	4.2	0.93	36.0	6.91	466	11.90	4.07
	11/6/2018	**300**	**64,000**	930	180	41	3.5	0.55 J	0.35	-58.1	6.17	621	11.70	23.7
	04/18/2019	**190**	**73,000**	1,300	240	47	5.8	6.0	1.20	-57.0	6.40	780	9.80	5.50
	11/01/2019	**270**	**74,000**	1,200	220	68	3.9	2.8	1.50	-64.0	6.40	770	12.00	3.10
	05/15/2020	**210**	**74,000**	1,400	260	54	4.3	5 U	0.56	99.1	5.49	710	13.70	7.77
	11/02/2020	**270**	**64,000**	1,100	200	64	3.0	1.0 U	0.37	-17.6	6.63	504	8.50	30.0
PZ-12-03	5/24/2013	**659**	**40,100**	**2,950**	227	53	3.3	21	0.23	-105.4	6.60	563	12.21	1.94
	05/26/2017	**600**	**39,000**	**2,700**	170	33	2.3	5.6	0.30	-64.1	6.35	359	10.04	10.9
	11/6/2017	**620**	**41,000**	**3,800**	140	12	2.8	48	0.47	-60.1	6.44	416	13.07	9.32
	4/19/2018	**610**	**32,000**	**3,000**	140 J	40	2.0	7.4	1.12	-75.6	6.63	511	7.94	2.15
	11/7/2018	**560**	**31,000**	**3,300**	150	47	1.8	5.1	0.43	-59.2	6.35	537	13.30	31.7
	04/18/2019	**630**	**39,000**	**3,900**	170	--	2.0	--	0.64	-65.0	6.70	600	10.00	12.0
	10/30/2019	**790**	**63,000**	**4,600**	190	51	1.9	20	0.29	-80.0	6.30	630	11.00	2.70
	05/18/2020	**740**	**42,000**	**3,600**	180	57	2.3	4.2	0.32	9.8	6.29	574	12.20	39.2
	11/02/2020	**720**	**50,000**	**3,300**	170	47	1.7	3.0	0.52	-2.3	6.50	572	8.20	24.2
PZ-12-04	5/24/2013	**610**	**56,300**	1,310	171	51	3.5	5.0	0.29	-86.9	6.53	447	13.29	4.29
	05/26/2017	**640**	**47,000**	850	110	10	2.1	1.9	0.29	-61.9	6.30	258	10.43	9.69
	11/6/2017	**68**	3,700	1,200	150	23	2.0	1.0	0.33	-78.2	6.22	474	13.31	9.42
	4/19/2018	**690**	**53,000**	1,300	130 J	13	2.2	2.8	2.96	-58.1	6.45	451	8.61	1.38
	11/7/2018	**630**	**56,000**	1,600	99 J	39	1.8	0.96 J	0.55	-65.0	7.22	461	13.30	16.3
	04/18/2019	**670**	**66,000**	1,700	150	44	2.2	1.8	0.52	-61.0	6.50	580	11.00	4.00
	10/30/2019	**730**	**78,000**	**2,000**	180	62	2.2	2.4	0.26	-72.0	6.40	630	12.00	5.20
	05/18/2020	**750**	**73,000**	**1,900**	230	40	2.4	3.8	0.32	17.9	6.10	585	12.60	7.99
	11/02/2020	**710**	**75,000**	**1,900**	160	61	2.3 U	1.0 U	0.91	43.8	6.51	277	9.40	3.37
PZ-12-05	5/22/2013	**741**	**67,700**	1,710	188	31	2.4	4.5 U	0.31	-99.6	6.46	571	12.24	0.87
	05/26/2017	**260**	**24,000**	1,300	55	2.4	1.3	12	0.27	-44.7	6.27	128	10.05	6.91
	11/6/2017	**260**	**32,000**	**1,900**	86	2.0	1.1	8.0	0.16	-43.1	6.12	225	12.48	0.29
	4/13/2018	**190**	**29,000**	**2,000**	76	2.1	1.3	8.8	0.36	-68.7	6.41	204	12.39	1.09
	11/7/2018	**140**	**33,000**	**2,200**	57 J	1.8	1.3 U	13 J	0.22	-8.0	5.80	215	12.60	15.2
	04/16/2019	**220**	**56,000**	**3,600**	59	9.1	1.4	23	0.65	-66.0	6.20	340	12.00	4.80
	10/30/2019	**210**	**38,000**	**2,500**	120	7.7	1.1	13	2.00	-39.0	6.20	290	12.00	3.50
	05/18/2020	**160**	**19,000**	1,400	76	4.4	1.0	7.0	0.34	46.7	6.08	166	13.60	5.31
	11/03/2020	**140**	**38,000**	**3,500**	120	12	2.3 U	7.0	0.60	58.9	6.24	243	10.30	3.11
PZ-12-06	5/24/2013	**244**	**54,600**	1,350	293	51	30	10	1.57	-71.6	6.23	700	13.02	2.90
	05/26/2017	**41 J**	**20,000**	**2,000**	65	1.4	1.1	7.8	0.32	-24.3	6.38	129	9.98	8.46
	11/6/2017	**49**	**27,000**	**2,600**	90	1.6	1.4	36	0.57	-39.7	6.08	279	13.10	6.97
	4/13/2018	**25**	**19,000**	**2,400**	100	3.1	1.1	14	0.73	-52.3	6.14	254	11.99	2.12
	11/7/2018	**48**	**16,000**	**1,900**	58 J	0.56	1.2 U	17 J	0.29	-21.7	6.17	188	13.50	15.8
	4/16/2019	**31**	**23,000**	**6,800**	100	7.6	2.8	70	0.56	-9.6	5.90	430	12.00	5.70
	10/29/2019	**40**	**16,000**	**2,900**	100	2.0	0.96 J	15	0.31	-29.0	6.00	230	16.00	6.60
	05/18/2020	5.2	4,200	1,200	74	3.3	1.0	62	0.27	70.6	5.52	289	12.10	8.55
	11/03/2020	**13**	7,100	**2,400**	110	7.5	1.5 U	23	3.85	100.0	7.69	241	12.90	331
PZ-12-07	5/24/2013	**484**	**29,000**	1,620	105	6.3	2.2	13	0.29	-390.0	6.41	276	11.54	18.0

Table F-2: Historical Groundwater Monitoring Well Analytical Results (2006 - 2020)
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

Analytical Method		Dissolved Metals			Anions		General Chemistry		Field Parameters					
Analyte		Arsenic	Iron	Manganese	Alkalinity	Chloride	DOC	Sulfate	DO	ORP	pH	SPC	Temp	Turbidity
Unit		(µg/L)	(µg/L)	(µg/L)	mg/L	mg/L	mg/L	mg/L	mg/L	mV	SU	µS/cm	°C	NTU
Screening Limit*		10	9,100	1,715										
Well ID	Date													
	06/03/2017	**110**	7,500	1,300	59	2.5	1.3	33	4.64	14.6	5.93	109	11.00	8.86
	11/6/2017	3.8	75 U	1,200	75	2.3	1.2	32	3.26	22.9	6.37	212	13.14	17.9
	4/12/2018	**72**	3,200	850	64	1.9	1.2	30	3.42	3.8	6.61	200	12.25	1.97
	11/9/2018	3.0 U	35 J	19	13	0.82	2.8	1.4	6.63	78.3	6.13	37	13.50	25.5
	4/16/2019	**100**	4,500	1,500	120	2.2	1.7	44	2.50	-14.0	6.70	350	11.00	9.70
	11/01/2019	**94**	5,100	1,400	94	4.2	2.2	99	2.90	47.0	6.40	440	12.00	8.70
	05/15/2020	**70**	3,500	1,000	85	1.3	1.5	32	7.78	274.0	5.44	227	12.50	7.46
	11/05/2020	**110**	3,800	1,100	87	2.2	1.4 U	50	0.42	89.7	7.49	167	13.60	29.8
PZ-12-08	5/24/2013	1.9	174	361	46	5.8	6.9	7.4	2.68	131.7	5.90	125	10.63	9.20
	06/03/2017	3.1	590	44	21	0.67	2.5	3.7	8.60	23.9	7.38	39	10.36	14.8
	11/6/2017	2.3 J	2,200	1,600	55	1.3	1.9	21	0.48	68.0	5.82	194	13.94	24.2
	4/13/2018	1.5 J	420	790	30	1.0	1.8	7.4	7.68	94.8	6.01	90	9.79	1.02
	11/9/2018	3.0 U	35 J	19	13	0.82	2.8	1.4	6.63	78.3	6.13	37	13.50	25.5
	4/12/2019	**160**	**23,000**	1,200	70	1.0	0.50 U	26	3.90	52.0	6.10	240	10.00	89.0
	10/31/2019	**17**	**14,000**	**2,600**	88	5.6	1.2	13	0.35	64.0	5.80	230	13.00	26.0
	05/19/2020	1.7 J	5,200	1,200	58	0.60	1.3	16	4.90	99.7	6.06	127	10.70	18.9
	11/05/2020	**24**	**17,000**	1,700	85	1.1	1.7 U	8.8	1.39	122.0	6.99	182	9.80	39.6
PZ-12-09	5/21/2013	1.1	30 U	176	55	4.3	1.1	27	3.83	112.6	6.34	187	13.24	3.46
	06/08/2017	3.0 U	50 U	30	80	3.1	1.1	34	3.02	63.0	6.53	177	10.48	6.88
	11/7/2017	3.0 U	75 U	2.4 J	55	1.6	0.81 J	21	7.48	83.4	6.91	131	11.87	1.95
	4/12/2018	3.0 U	50 U	17	80	2.1	1.0 U	26	4.12	79.5	6.88	233	11.38	2.22
	11/6/2018	3.0 U	26 J	10 U	76 J	1.5	1.0 U	16	0.97	55.8	6.21	200	11.80	3.95
	4/16/2019	3.0 U	50 U	37	72	1.3	0.50 U	13	1.90	120.0	6.80	200	11.00	8.70
	10/31/2019	3.1	50 U	12	69	1.4	0.64 J	20	0.86	160.0	6.30	180	12.00	10.0
	05/15/2020	3.0 U	50 U	17	84	1.1	0.52 J	13	5.94	285.0	4.70	177	12.40	4.89
	10/26/2020	1.6 J	50 U	14	110	1.1	0.46 J	10	4.47	165.0	6.82	71	9.20	2.43
PZ-12-10	5/22/2013	0.69 J	30 U	2.5 U	16	1.8	2.0	4.5 U	10.37	191.3	5.88	43	10.19	1.10
	06/08/2017	3.0 U	50 U	3.0 U	25	0.99	1.1	6.7	9.67	131.6	5.67	46	9.47	6.50
	11/7/2017	3.0 U	75 U	5.0 U	36	0.81	0.89 J	8.1	7.24	129.9	6.30	74	12.02	1.95
	4/12/2018	3.0 U	21 J	1.4 J	17	0.86	1.0 U	2.0	10.04	121.5	6.24	44	9.67	1.57
	11/6/2018	3.0 U	50 U	3.0 U	38 J	0.98	1.0 U	2.3	3.50	74.3	5.35	88	13.10	2.98
	04/16/2019	3.0 U	790	8.8	44	0.91	0.50 U	6.1	3.50	170.0	6.10	97	9.10	2.60
	10/31/2019	3.0 U	50 U	1.2 J	36	0.86	0.69 J	11	6.80	180.0	5.20	95	13.00	1.90
	05/15/2020	3.0 U	50 U	10 U	33	0.46 J	0.64 J	7.2	10.90	122.0	6.23	68	11.20	2.46
	10/26/2020	3.0 U	50 U	3.0 U	30	0.44 J	0.94 J	9.7	2.27	120.0	8.24	44	16.30	1.53
SHL-10	10/14/2010	--	--	--	31	1.3	--	6.0	9.16	136.9	6.51	89	12.80	1.00
	10/16/2012	--	--	--	26	1.1	--	4.2	0.87	59.1	6.89	73	9.75	0.36
	5/22/2013	1.2	30 J	2.5 U	24	5.8	1.6	4.6 J	10.05	149.8	6.62	55	11.46	1.22
	10/8/2014	2.0 U	50 U	7.5 U	34	2.8	0.57 J	9.8 J	8.68	173.6	6.54	76	10.90	8.11
	10/23/2015	4.0 U	100 U	15 U	36	3.0	1.0 U	10	7.74	86.6	6.59	84	11.28	1.53
	12/1/2016	3.0 U	18 J	2.6 J	11	1.4	0.96 J	2.7	7.29	43.6	6.59	81	10.45	16.2
	6/1/2017	3.0 U	50	3.0 U	5.4	1.1	9.1	1.5	9.14	184.2	6.53	22	9.52	8.67
	11/29/2017	3.0 U	75 U	5.0 U	7.5 U	0.95	0.50 U	2.1	9.24	104.9	6.25	30	10.81	1.42
	4/19/2018	3.0 U	85	1.2 J	12	1.1	1.0 U	2.0	9.74	46.8	6.57	32	10.27	2.18
	11/6/2018	3.0 U	50 U	3.0 U	9.3 J	0.78 J	1.0 U	1.1 J	0.94	103.0	5.46	32	10.60	4.71
	4/12/2019	3.0 U	50 U	3.0 U	14	0.97 J	0.50 U	2.5	5.70	170.0	6.30	41	10.00	3.90
	10/29/2019	3.0 U	50 U	3.0 U	28	1.4	0.58 J	6.8	8.80	150.0	6.80	75	11.00	9.80
	05/19/2020	3.0 U	50 U	10 U	9.2 J	1.0	0.38 J	1.6	9.55	164.0	5.79	22	13.50	3.50
	11/09/2020	3.0 U	50 U	23 U	20	1.1	1.7 U	4.0	0.52	21.5	6.53	534	10.60	35.8

Table F-2: Historical Groundwater Monitoring Well Analytical Results (2006 - 2020)
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

SERES Engineering & Services, LLC
ARCADIS a joint venture

Analytical Method		Dissolved Metals			Anions		General Chemistry		Field Parameters					
Analyte		Arsenic	Iron	Manganese	Alkalinity	Chloride	DOC	Sulfate	DO	ORP	pH	SPC	Temp	Turbidity
Unit		(µg/L)	(µg/L)	(µg/L)	mg/L	mg/L	mg/L	mg/L	mg/L	mV	SU	µS/cm	°C	NTU
Screening Limit*		10	9,100	1,715										
Well ID	Date													
SHL-11	10/13/2010	--	--	--	230	19	--	6.1	0.24	-70.0	6.38	580	12.66	0.72
	10/6/2011	--	--	--	240	15	--	1.6	0.30	-41.2	6.20	597	13.13	4.00
	10/15/2012	--	--	--	200	20	--	19	0.35	-108.2	6.71	365	14.82	79.0
	5/23/2013	**496**	**19,800**	**2,430**	160	41	2.1	20	0.18	-96.0	6.75	462	12.24	8.50
	10/22/2013	**752**	**27,600**	**3,610**	164	43	--	20	0.42	-97.6	6.54	530	12.75	0.43
	4/23/2014	**587**	**25,100**	**3,950**	157	48	1.9	20	0.26	-54.9	6.45	390	10.27	4.94
	10/8/2014	**793**	**44,700**	**4,320**	242	43	2.8	70	0.44	-90.3	6.61	623	12.39	5.51
	6/4/2015	**925**	**53,400**	**3,310**	187	64	1.6	0.95 J	0.31	-134.2	7.01	676	11.64	11.3
	10/23/2015	**642**	**45,800**	**3,560 J**	173	41	3.0	527	1.12	-78.4	6.32	630	11.52	8.17
	6/27/2016	**970**	**57,000**	**3,500**	200	63	2.5	0.80 U	13.26	-73.0	6.28	696	0.21	10.2
	11/16/2016	**520**	**32,000**	**1,900**	160	45	1.9	3.3	1.10	-49.1	6.34	492	11.70	11.5
	5/31/2017	**880**	**47,000**	**3,000**	170	51	2.1	2.8	0.38	70.9	6.23	404	10.25	12.8
	11/3/2017	**870**	**57,000**	**2,500**	150	57	2.0	2.2	0.17	-79.0	6.61	590	13.19	14.2
	4/12/2018	**820**	**53,000**	**2,300**	160	54	2.1	3.6	0.65	55.0	7.32	504	11.46	9.62
	11/7/2018	**910**	**51,000**	1,600	130	61	1.9	0.96 J	0.42	-91.4	7.33	585	12.10	20.6
	4/22/2019	**960**	**58,000**	1,700	140	65	2.0	4.7	0.84	-82.0	6.70	640	11.00	32.0
	10/30/2019	**920**	**50,000**	**1,900**	140	64	1.7	14	0.23	-110.0	6.60	550	12.00	3.80
	05/18/2020	**900**	**68,000**	1,700	220	67	2.0	2.3	0.32	9.3	6.30	637	12.00	14.1
	10/29/2020	**900**	**48,000**	**2,000**	120	66	2.4	16	2.96	71.3	6.05	247	8.50	6.30
SHL-12	6/8/2015	2.0 J	50 U	15 J	63	24	1.8	92	--	--	--	--	--	--
	11/21/2016	1.6 J	20 J	**2,000**	92	62	2.6	100	1.07	81.0	6.17	457	11.16	2.04
	11/29/2017	2.4 J	120	**2,100**	78	61	2.1	92	0.69	144.4	6.86	640	12.73	2.96
	11/26/2018	1.9 J	50 U	150	76	19	2.3	61	3.88	105.0	6.00	340	11.60	3.23
	11/7/2019	7.4	660	890	69	40	3.2	98	3.14	105.0	5.90	439	10.40	12.2
	11/02/2020	2.3 J	130	180	63	57	1.7 U	90	0.69	-1.4	5.95	161	10.70	12.1
SHL-13	10/11/2010	--	--	--	19	82	--	6.5	2.54	169.0	5.62	317	15.52	3.08
	10/6/2011	--	--	--	18	66	--	4.7	0.25	42.0	5.72	273	14.61	0.00
	10/15/2012	--	--	--	23	61	--	5.5	0.67	61.5	5.91	254	16.26	0.23
	10/22/2013	2.0 U	43 J	30	23	61	--	8.0 J	0.35	127.0	6.08	269	13.87	0.20
	10/22/2015	2.9 J	1,210	549	23	90	2.0	5.3 J	0.41	28.8	5.32	338	17.82	0.26
SHL-15	10/14/2010	--	--	--	70	11	--	20	0.21	-0.3	5.73	241	11.49	1.00
	10/6/2011	--	--	--	140	22	--	14	0.27	66.1	6.17	403	12.36	0.90
	10/16/2012	--	--	--	84	26	--	14	3.27	-18.7	5.98	348	13.11	1.30
	10/22/2013	**35**	6,610	437	91	17	--	10	0.31	-23.6	5.91	266	13.48	2.08
	6/9/2015	**32**	3,570	198	75	120	8.5	14	0.24	-151.5	5.82	392	10.22	23.8
	1/21/2016	**19**	4,100	230	93	100	3.3	22	1.89	-10.7	6.16	565	11.30	2.25
	11/15/2017	**200**	**11,000**	820	130	4.6	8.8	1.0	0.34	13.2	6.36	271	13.25	4.79
	11/12/2018	**44**	**15,000**	670	100	2.5	6.2	2.4	0.72	12.9	5.84	268	12.50	4.35
	11/01/2019	**110**	1,500	540	100	7.0	2.6	29	0.21	71.0	5.80	290	12.00	2.90
	11/02/2020	**26**	4,500	250	100	19	2.8	9.1	4.35	142.0	6.74	178	9.90	15.9
SHL-19	10/14/2010	--	--	--	80	2.2	--	22	0.57	22.0	5.86	240	11.03	40.0
	10/7/2011	--	--	--	38	1.2	--	13	3.66	128.0	4.97	107	13.12	13.0
	10/16/2012	--	--	--	66	2.3	--	22	0.27	22.0	5.67	194	10.52	79.0
	5/24/2013	3.8	1,460	580	55	1.0	1.8	13	1.01	98.9	5.86	137	10.83	17.0
	10/24/2013	**34**	8,380	1,630	65	2.8	--	17	0.50	-85.9	6.76	110	11.54	123
	10/8/2014	3.1 J	5,640	**2,210 J**	62	2.5	2.4	18	0.52	29.6	6.09	180	12.78	30.7
	10/27/2015	3.1 J	8,850	**2,770**	334	75	1.0	17	0.59	-50.2	6.13	167	11.08	50.7
	11/21/2016	3.0 U	50 U	9.8 J	45	2.3	0.69 J	17	9.39	161.0	6.56	147	10.53	28.4
	6/2/2017	1.6 J	50 U	3.0 U	14	0.67	1.0	2.9	9.83	117.9	5.72	300	10.16	11.0

Table F-2: Historical Groundwater Monitoring Well Analytical Results (2006 - 2020)
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

Analytical Method		Dissolved Metals			Anions		General Chemistry		Field Parameters					
Analyte		Arsenic	Iron	Manganese	Alkalinity	Chloride	DOC	Sulfate	DO	ORP	pH	SPC	Temp	Turbidity
Unit		(µg/L)	(µg/L)	(µg/L)	mg/L	mg/L	mg/L	mg/L	mg/L	mV	SU	µS/cm	°C	NTU
Screening Limit*		10	9,100	1,715										
Well ID	Date													
	11/7/2017	3.0 U	75 U	2.2 J	47	2.6	1.0	33	7.25	90.9	6.51	156	12.63	2.74
	4/19/2018	3.0 U	21 J	3.0 U	39 J	1.1	1.0 U	15	8.38	53.7	6.57	112	15.29	1.19
	11/7/2018	**20 J**	1,400	18 J	39	1.1	1.0 U	11	8.26	58.2	6.71	107	13.10	49.4
	04/12/2019	3.0 U	23 J	3.0 U	71	1.3	0.50 U	26	5.60	170.0	6.40	210	8.20	26.0
	10/29/2019	4.4	100	56	90	1.1	0.74 J	23	9.00	110.0	6.20	210	11.00	15.0
	05/19/2020	**20**	1,400	62	33	0.31 J	0.68 J	3.2	10.30	112.0	6.45	56	13.30	7.99
	10/26/2020	3.0 U	50 U	15	88	0.92	1.0	19	3.37	17.1	6.45	513	10.40	10.7
SHL-20	10/13/2010	--	--	--	140	20	--	8.8	0.20	88.0	6.43	395	12.04	1.71
	10/6/2011	--	--	--	140	22	--	14	0.27	66.1	6.17	403	12.36	1.60
	10/15/2012	--	--	--	120	22	--	22	2.43	50.1	6.36	277	12.74	16.0
	5/22/2013	**621**	**17,700**	**2,150**	111	36	1.4	31	0.19	-85.6	6.75	414	12.18	0.54
	10/22/2013	**641**	**38,500**	1,590	81	50	--	23	1.87	-93.6	6.51	443	12.80	4.10
	4/23/2014	**701**	**40,700 J**	**1,760**	120	50	1.6	26	0.85	-58.7	6.21	499	10.96	6.31
	10/8/2014	**763**	**52,500**	1,700	153	61	2.0	4.0 J	0.43	-87.8	6.40	620	12.94	2.43
	6/5/2015	**794**	**53,400**	**3,310**	118	59	1.5	15	0.47	-86.4	6.61	530	12.69	9.24
	10/23/2015	**855**	**59,300**	**2,060**	139	62	2.2	3.5 J	0.57	-119.0	6.46	606	10.78	7.31
	6/27/2016	**880**	**63,000**	**2,400**	210	63	2.6	0.80 U	16.36	-67.6	6.46	719	0.25	9.08
	11/16/2016	**830**	**45,000**	1,500	140	50	2.0	2.0	0.91	-89.0	6.58	505	11.56	3.24
	5/31/2017	**860**	**54,000**	**2,300**	150	61	2.1	3.8	0.32	-84.9	6.43	449	11.39	11.9
	11/7/2017	**860**	**71,000**	**2,300**	170	59	2.3	1.0 U	0.32	-62.3	6.52	474	11.73	9.82
	4/12/2018	**830**	**56,000**	**2,100**	160	61	2.2	1.0 U	0.64	11.0	7.34	610	12.31	1.33
	11/7/2018	**970**	**43,000**	**1,800**	72 J	58	1.8	37	3.47	-70.6	7.32	500	11.80	3.02
	04/22/2019	**770**	**41,000**	**2,200**	80	61	1.7	40	0.42	-68.0	6.20	520	9.20	3.90
	11/01/2019	**830**	**45,000**	**1,900**	99	62	1.3	29	0.17	-91.0	6.60	550	11.00	3.00
	11/11/2019	1.8	50	2.1	--	--	--	--	2.60	67.0	6.00	340	11.00	14.0
	5/5/2020	1.9 J	50 U	26	--	--	--	--	2.60	170.0	6.50	370	10.00	9.80
	05/18/2020	**810**	**37,000**	**2,600**	110	60	1.3	36	0.40	3.4	6.54	511	11.70	17.6
	10/29/2020	**760**	**52,000**	**2,100**	110	63	1.8	28	1.17	97.8	6.67	35	8.70	2.40
SHL-22	4/21/2010	--	--	--	340	21	--	5.9	0.10	-40.0	6.77	933	9.19	0.05
	10/12/2010	--	--	--	380	23	--	5.9	0.31	-14.1	6.47	783	9.75	0.03
	4/6/2011	--	--	--	370	22	--	5.3 U	0.22	-43.6	6.67	750	8.16	0.00
	10/7/2011	--	--	--	380	22	--	5.3	0.27	15.3	6.54	776	11.06	0.00
	4/10/2012	--	--	--	380	22	--	2.2 U	2.13	-20.6	6.42	981	8.80	2,000
	10/17/2012	--	--	--	360	21	--	6.0	0.45	-20.2	6.72	705	9.76	0.85
	5/28/2013	**34**	453	**9,200**	400	20	2.2	5.8	1.28	18.7	6.68	492	9.22	0.91
	10/23/2013	**53**	615	**9,700**	388	20	--	6.6 J	0.39	-6.9	6.70	511	10.60	0.00
	4/24/2014	**49**	564	**9,430**	393	20	2.2	5.9 J	0.16	7.1	6.71	757	8.19	0.18
	10/9/2014	**45**	436	**8,820**	378	20	1.8	7.2 J	0.31	5.8	6.67	526	10.21	1.99
	10/26/2015	**16**	123	**10,200**	362	195	2.2	5.8	0.44	0.3	6.03	557	9.78	0.19
	11/17/2016	9.4	110	**8,900**	230	20	1.8	5.2	1.54	60.0	6.62	700	10.40	1.01
	11/13/2017	6.1	110	**9,400**	330	20	1.9	4.7	0.26	37.9	6.74	497	10.36	5.96
	11/12/2018	5.0	47 J	**8,500**	330	23	2.7	5.3	0.31	-140.0	6.50	763	10.40	1.17
	11/04/2019	6.2	74	**8,900**	320	26	1.5	10	0.55	47.0	6.60	680	9.80	4.00
	11/03/2020	2.4 J	50 U	**7,700**	320	29	1.5 U	8.9	10.10	200.0	6.52	43	10.60	1.06
SHL-23	8/12/2010	0.14 J	17 J	6.9	4.3	1.3	1.0 U	4.9	10.06	209.8	6.45	25	10.42	--
	10/13/2010	--	--	--	4.3	1.9	--	5.5	10.43	264.1	4.98	31	11.53	1.00
	10/15/2012	--	--	--	4.8	2.1	--	4.8	11.55	290.1	5.32	24	11.31	1.1
	6/10/2015	2.0 U	50 U	22	3.9 U	2.5	0.36 J	26	8.59	134.6	5.22	26	9.59	3.25
	10/26/2015	4.0 U	100 U	9.3 J	4.1 J	3.0	1.6	5.4	10.09	165.1	4.78	24	10.56	1.06

Table F-2: Historical Groundwater Monitoring Well Analytical Results (2006 - 2020)
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

Analytical Method		Dissolved Metals			Anions		General Chemistry		Field Parameters					
Analyte		Arsenic	Iron	Manganese	Alkalinity	Chloride	DOC	Sulfate	DO	ORP	pH	SPC	Temp	Turbidity
Unit		(µg/L)	(µg/L)	(µg/L)	mg/L	mg/L	mg/L	mg/L	mg/L	mV	SU	µS/cm	°C	NTU
Screening Limit*		10	9,100	1,715										
Well ID	Date													
	11/22/2016	3.0 U	50 U	8.3 J	4.2 J	3.4	0.67 J	4.2	10.20	210.2	5.50	36	9.22	1.38
	11/27/2017	3.0 U	75 U	24	5.0 U	7.1	0.50 U	5.3	8.90	102.9	4.96	45	9.25	0.84
	11/8/2018	3.0 U	50 U	25	5.0 U	8.8	1.0 U	5.6	5.52	105.0	4.46	59	9.87	1.18
	11/13/2019	3.0 U	50 U	14	4.5	4.8	1.0 U	6.7	7.50	250.0	4.50	44	8.60	4.60
	11/12/2020	3.0 U	50 U	11 U	5.8 J	4.3	1.6	6.2	2.66	159.0	6.97	202	11.40	0.00
SHL-24	6/9/2015	4.9	50 U	7.5 U	46	33	0.36 U	26	--	--	--	--	--	--
	10/27/2015	6.5	50 U	7.5 U	52	24	0.37 J	20	--	--	--	--	--	--
	11/21/2016	5.5	50 U	3.0 U	45	24	0.50 J	20	7.68	9.8	7.34	145	4.87	5.13
	11/29/2017	4.8	75 U	5.0 U	45	37	0.50 U	24	2.01	117.2	7.16	589	12.13	1.27
	11/28/2018	3.4	50 U	3.0 U	48	37	1.0 U	22	6.42	45.4	7.17	291	10.20	1.88
	11/07/2019	4.2	50 U	3.0 U	49	38	1.6	26	1.90	95.0	7.20	270	11.00	11.0
	10/26/2020	3.9	50 U	3.0 U	50	39	1.0 U	24	3.91	130.0	7.58	136	16.10	1.12
SHL-3	11/27/2017	3.0 U	75 U	2.6 J	99	1.9	1.7	21	7.01	126.3	5.53	261	12.32	5.07
	11/5/2018	3.0 U	22 J	3.0 U	150	1.8	1.9	22	6.57	37.9	6.06	342	12.70	6.78
	10/29/2019	3.0 U	50 U	1.3 J	99	1.3	1.4	7.3	5.10	160.0	6.00	220	12.00	3.60
	11/09/2020	3.0 U	50 U	10 U	61	0.65	1.6 U	6.3	0.80	-17.2	6.00	147	12.70	65.2
SHL-4	10/14/2010	--	--	--	110	25	--	7.2	0.46	47.0	6.01	334	12.20	0.03
	10/7/2011	--	--	--	32	1.6	--	2.3	1.44	274.0	5.65	82	12.55	0.00
	10/16/2012	--	--	--	55	13	--	0.65 J	0.34	47.0	5.69	162	13.55	0.84
	5/24/2013	2.6	58 J	481	123	13	2.4	15	0.27	107.1	6.10	278	10.39	0.36
	11/19/2013	6.2	637	**1,830**	112	18	3.3	69	0.33	35.2	6.13	427	11.52	0.06
	10/8/2014	**37**	8,030 J	**2,480 J**	114	6.0	2.7	15	0.30	4.2	6.20	239	17.71	11.7
	10/27/2015	**37**	3,470	**2,320**	71	15	3.0	16	0.82	6.2	6.15	189	12.96	3.70
	11/21/2016	**110**	**22,000**	**3,300**	84	1.4	1.4	22	0.81	-20.0	6.43	219	11.68	18.0
	6/7/2017	**74**	**15,000**	**2,000**	65	1.6	1.5	24	0.42	-8.2	5.99	149	10.31	12.1
	11/7/2017	**130**	**15,000**	**2,500**	76	1.5	1.4	18	0.17	-38.2	6.62	163	12.27	4.14
	4/19/2018	**110**	**15,000**	**2,600**	64 J	1.7	1.4	24	1.05	-1.6	6.28	212	8.78	4.31
	11/14/2018	**150**	**17,000**	**3,200**	68	1.2	1.5	22	0.21	-15.2	6.32	313	11.30	22.4
	04/16/2019	**98**	**14,000**	**2,900**	55	0.93	1.6	18	0.59	-28.0	6.30	190	11.00	7.70
	10/29/2019	**69**	**11,000**	**3,900**	90	1.5	1.5	17	0.29	-4.1	6.10	210	12.00	18.0
	05/20/2020	**220**	**24,000**	**2,500**	100	1.5	1.3	27	0.46	18.6	6.58	262	11.00	21.0
	11/12/2020	**110**	**15,000**	**2,500**	76	1.5	1.6	21	0.85	92.8	5.77	81	15.10	33.1
SHL-5	4/22/2010	--	--	--	25	3.6	--	1.0 U	0.09	-254.0	5.86	90	7.21	0.56
	10/11/2010	--	--	--	20	2.9	--	2.1	0.34	108.0	5.39	123	13.90	0.44
	4/5/2011	--	--	--	12	3.7	--	2.2	0.34	85.2	5.78	60	4.28	0.20
	10/11/2011	--	--	--	33	0.60	--	1.1	0.14	130.0	5.28	78	15.15	1.00
	4/10/2012	--	--	--	24	3.3	--	1.7 U	0.54	111.8	5.54	84	7.73	2,100
	10/15/2012	--	--	--	37	2.9	--	4.7	0.49	82.4	5.42	99	13.98	4.10
	5/21/2013	3.7	999	286	23	16	4.1	4.5 U	0.36	82.9	5.59	100	10.81	3.36
	10/22/2013	**15**	2,380	429	44	4.3	--	0.87 J	0.86	-89.4	5.73	88	13.75	0.90
	4/22/2014	2.0 U	282	159	27	63	5.1	4.5 J	0.43	141.4	5.87	235	6.33	1.63
	10/13/2014	**13**	8,390	320	41	35	10	5.6 J	0.18	4.7	5.98	205	13.05	1.27
	10/21/2015	**13**	700	293	38	31	11	2.4	0.93	38.7	6.24	170	12.73	0.44
	11/17/2016	3.0 U	190	130	26	15	6.7	17	0.23	130.1	5.74	132	10.81	0.66
	11/10/2017	3.7	640	190	42	6.2	6.9	4.4	0.19	63.7	6.38	100	12.40	3.34
	11/14/2018	2.8 J	610	140	32	3.8	6.4	0.54 J	0.43	3.4	5.37	132	8.38	2.11
	11/08/2019	5.1	390	170	41	12	8.0	11	0.00	63.0	5.50	140	12.00	3.60
	11/09/2020	4.6	2,100	290	30	13	8.2	1.0 U	0.79	84.3	5.91	175	9.10	8.90
SHL-7	11/15/2017	3.0	180	110	48	13	0.50 U	5.3	0.39	87.9	6.70	162	11.79	6.18

Table F-2: Historical Groundwater Monitoring Well Analytical Results (2006 - 2020)
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

Analytical Method		Dissolved Metals			Anions		General Chemistry		Field Parameters					
Analyte		Arsenic	Iron	Manganese	Alkalinity	Chloride	DOC	Sulfate	DO	ORP	pH	SPC	Temp	Turbidity
Unit		(µg/L)	(µg/L)	(µg/L)	mg/L	mg/L	mg/L	mg/L	mg/L	mV	SU	µS/cm	°C	NTU
Screening Limit*		10	9,100	1,715										
Well ID	Date													
	11/12/2018	3.0 U	22 J	34	59	4.6	1.1 U	3.5	0.27	128.0	6.27	137	14.50	4.95
	11/13/2019	3.0 U	160	13	61	26	1.0	12	3.30	-4.5	7.70	190	9.40	4.20
	11/03/2020	3.0 U	700	63	39	73	1.0 U	3.0	0.66	89.0	5.94	154	13.90	2.00
SHL-8D	4/22/2010	--	--	--	36	12	--	7.5	1.50	-121.0	6.28	167	10.25	0.03
	10/11/2010	--	--	--	23	9.6	--	8.0	3.65	14.3	6.02	102	11.31	0.98
	4/5/2011	--	--	--	20	19	--	7.0	3.47	88.0	6.13	124	10.18	0.00
	10/6/2011	--	--	--	22	7.9	--	7.6	5.39	43.0	6.13	91	10.55	0.00
	4/11/2012	--	--	--	5.0	12	--	5.8 U	0.83	89.6	5.89	164	9.45	130
	10/15/2012	--	--	--	18	24	--	6.4	2.19	60.5	6.17	92	12.99	1.2
	5/21/2013	0.72 J	30 U	2.5 U	28	30	0.64 U	6.2	1.67	48.7	6.12	138	13.65	0.32
	10/22/2013	2.0 U	30 U	2.5 U	13	12	--	7.5 J	3.25	83.9	6.21	90	11.08	0.00
	4/22/2014	2.0 U	30 U	2.5 U	11	28	0.73 J	6.3 J	2.08	146.6	5.92	147	10.88	0.15
	10/9/2014	2.0 U	50 U	7.5 U	16	43	0.41 J	7.2 J	0.77	101.8	5.88	204	10.89	0.60
	10/27/2015	4.0 U	70 J	39	29	6.3	1.0	3.6 J	0.35	49.2	5.42	69	9.94	0.32
	11/17/2016	3.0 U	50 U	9.9 J	27	13	0.73 J	7.1	0.16	36.9	6.34	101	10.59	1.06
	11/8/2017	3.0 U	34 J	8.7	23	21	0.54 J	7.1	0.25	38.3	6.44	137	10.11	4.66
	11/13/2018	3.0 U	50 U	6.6 J	24	25	1.0 U	7.5	0.19	-47.0	5.84	227	10.80	6.59
	10/24/2019	3.0 U	22 J	11	24	38	0.68 J	7.4	0.19	120.0	6.00	190	10.00	0.72
	11/10/2020	3.0 U	100 U	19	21	45	1.0	7.5	4.07	163.0	5.98	66	13.30	2.30
SHL-8S	4/22/2010	--	--	--	20	6.7	--	6.6	2.39	-91.0	6.28	101	9.85	0.01
	10/11/2010	--	--	--	20	7.5	--	5.0	1.72	145.0	6.15	78	10.20	0.47
	4/5/2011	--	--	--	21	6.4	--	6.1	4.37	138.0	6.15	77	10.24	0.00
	10/6/2011	--	--	--	21	7.1	--	5.4	2.24	175.0	6.06	82	10.38	0.00
	4/10/2012	--	--	--	20	5,200	--	4.0 U	6.90	139.8	6.21	97	9.98	580
	10/15/2012	--	--	--	19	7.4	--	4.3	4.56	110.1	6.37	51	12.55	1.1
	5/28/2013	0.93 J	100 U	15 U	22	6.0	16	6.2	5.94	146.2	6.40	74	10.32	1.33
	10/22/2013	2.0 U	30 U	2.5 U	18	6.8	--	6.4 J	2.49	230.0	6.20	75	10.77	0.70
	4/22/2014	2.0 U	79 J	6.1 J	26	6.3	0.55 J	6.0 J	5.53	160.8	6.54	77	10.07	0.62
	10/9/2014	2.0 U	50 U	83	25	5.0	0.59 J	7.8 J	0.53	127.8	6.06	84	10.82	1.50
	10/27/2015	4.0 U	100 U	15 U	22	6.0	0.49 J	7.3	2.36	101.1	5.47	65	9.36	0.29
	11/17/2016	3.0 U	50 U	3.0 U	24	5.0	0.36 J	6.8	4.11	170.2	6.42	76	10.36	1.01
	11/8/2017	3.0 U	75 U	5.0 U	23	5.6	0.43 J	5.7	4.03	68.7	6.28	85	10.01	5.91
	11/13/2018	3.0 U	50 U	1.3 J	23	5.9	1.0 U	6.3	3.48	29.8	5.78	145	10.90	5.66
	10/24/2019	3.0 U	50 U	1.7 J	26	5.9	0.37 J	6.7	4.70	170.0	6.00	82	9.60	1.10
	11/10/2020	3.0 U	70 U	7.3 J	24	7.2	1.0 U	6.1	0.83	3.6	6.52	194	8.70	72.3
SHL-9	4/21/2010	--	--	--	580	6.3	--	6.6	0.12	-74.0	6.58	204	8.38	4.10
	10/12/2010	--	--	--	770	7.3	--	4.3	0.21	-70.0	6.35	204	10.20	0.89
	4/6/2011	--	--	--	580	3.4	--	6.8 U	0.27	-38.7	6.48	160	7.65	24.0
	10/7/2011	--	--	--	670	14	--	7.8	0.27	-55.1	6.26	223	11.78	0.00
	4/10/2012	--	--	--	860	5.0	--	4.4	0.34	-19.3	6.20	268	8.47	4,600
	10/17/2012	--	--	--	85	4.4	--	6.8	0.36	-80.3	6.94	210	9.12	0.72
	5/28/2013	**30**	**9,590 J**	497	88	5.5	4.6	4.5 U	0.27	-54.1	6.51	199	9.04	1.71
	10/23/2013	**33**	8,890	439	64	23	--	2.1 J	0.22	-76.4	6.52	160	10.87	0.58
	4/23/2014	**22**	**9,530**	533	62	24	4.8	6.7 J	0.71	5.3	6.28	211	7.41	20.0
	10/9/2014	**29**	**9,820**	469	56	37	4.5	8.5 J	0.11	-42.1	6.45	183	9.67	7.51
	10/28/2015	**19**	**15,900**	451	82	14	11	1.6 J	0.28	-7.8	5.96	299	9.41	1.51
	11/17/2016	**38**	6,800	350	52	78	5.8	10	0.81	-13.0	6.34	431	10.53	42.0
	11/15/2017	**25**	6,400	360	55	21	5.3	11	2.06	4.9	7.89	418	10.17	4.77
	11/12/2018	**28**	3,700	220	76	26	8.1	8.9	0.28	-131.0	6.25	339	11.20	4.55

Table F-2: Historical Groundwater Monitoring Well Analytical Results (2006 - 2020)
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

Analytical Method		Dissolved Metals			Anions		General Chemistry		Field Parameters					
Analyte		Arsenic	Iron	Manganese	Alkalinity	Chloride	DOC	Sulfate	DO	ORP	pH	SPC	Temp	Turbidity
Unit		(µg/L)	(µg/L)	(µg/L)	mg/L	mg/L	mg/L	mg/L	mg/L	mV	SU	µS/cm	°C	NTU
Screening Limit*		10	9,100	1,715										
Well ID	Date													
	10/30/2019	**33**	3,800	190	100	20	8.7	3.8	0.36	5.0	6.30	270	11.00	21.0
	11/03/2020	**35**	6,200	390	69	50	5.7	1.6	1.71	196.0	6.28	150	12.10	33.5
SHM-05-39A	8/12/2010	**236**	**24,500**	680	100	7.1	2.9	6.0	0.35	-52.9	6.45	263	11.37	--
	10/13/2012	--	--	--	87	3.6	--	3.8	0.16	-66.0	6.62	213	12.05	2.00
	10/4/2011	--	--	--	110	13	--	4.3	0.20	-92.0	6.63	297	11.29	0.17
	10/16/2012	--	--	--	50	17	--	4.8	0.37	69.6	6.28	149	14.29	40.0
	10/24/2013	**146**	**14,700**	575	52	19	--	4.0 J	0.23	-94.3	6.70	133	11.90	0.35
	10/29/2015	4.0 U	100 U	417	57	18	1.8	5.4 J	3.35	16.5	6.47	175	13.39	5.62
	10/26/2020	7.3	150	96	59	26	1.1	5.2	0.77	-70.5	6.91	523	10.80	11.5
SHM-05-39B	10/13/2010	--	--	--	300	130 J	--	4.0 J	0.19	-68.1	6.75	896	12.93	3.54
	10/5/2011	--	--	--	420	93 J	--	3.2	0.11	-66.0	6.85	919	13.12	3.00
	10/16/2012	--	--	--	420	37	--	2.0 J	1.67	-126.7	6.91	1,365	15.30	55.0
	10/24/2013	**113**	**9,580**	1,230	71	89	--	3.8 J	0.40	-95.3	6.93	278	10.76	0.97
	10/29/2015	**293**	**37,800**	1,500	63	525	3.0	10	2.81	-160.8	6.82	1,712	13.75	5.44
	10/26/2020	**420**	**15,000**	760	58	240	1.3	7.8	0.77	-70.5	6.91	523	10.8	11.5
SHM-05-40X	10/31/2007	**2,620**	**43,500**	1,244	220	13	--	1.7	1.62	-134.1	6.71	565	11.02	7.89
	8/12/2010	**3,180**	**22,500**	544	94	8.9	2.0	8.1	0.40	-21.5	6.45	256	11.43	--
	10/7/2010	--	--	--	160	12	--	5.8	0.22	-106.1	6.47	409	10.68	0.34
	10/5/2011	--	--	--	159	11	--	4.2	0.24	-77.3	6.48	3,950	10.52	4.10
	10/17/2012	--	--	--	150	9.7	--	5.9	0.19	-133.2	6.71	374	10.62	40.0
	10/24/2013	**3,100**	**28,800**	--	165	13	--	4.8 J	0.32	-136.3	6.87	253	10.62	2.21
	10/13/2014	**3,070**	**40,800**	1,080	178	12	5.8	5.4 J	0.39	-130.2	6.85	334	10.50	8.65
	10/29/2015	**2,060**	**39,800**	955	174	13	4.3	4.5 J	4.13	-144.8	6.71	445	11.72	5.92
	11/21/2016	**2,400**	**35,000**	800	160	10	2.0	2.9	1.09	-107.1	6.88	347	10.10	4.79
	6/6/2017	**25 J**	9,000	1,700	8.6	8.6	2.0	8.6	5.09	71.6	7.10	46	11.66	40.2
	11/17/2017	**2,200**	**43,000**	1,100	150	14	2.1	2.7	0.20	-66.1	6.73	331	9.60	3.45
	4/17/2018	**1,900**	**28,000**	740	180	130	2.1	4.6	0.98	-60.9	6.66	1,026	10.54	0.80
	11/26/2018	**2,400**	**41,000**	980	120 J	23 J	2.0	3.7 J	1.20	0.5	6.44	532	8.98	6.49
	04/23/2019	**2,100**	**27,000**	690	74	38	1.9	3.5	0.41	-110.0	6.80	360	10.00	3.00
	11/08/2019	**2,200**	**33,000**	820	140	23	2.8	5.4	0.44	20.0	6.50	390	8.10	13.0
	05/19/2020	**1,900**	**23,000**	700	110	27	1.7	3.1 J	0.36	236.0	5.33	1,560	12.40	22.0
	11/11/2020	**2,100**	**24,000**	670	150	11	1.6	3.8	0.46	7.9	7.67	423	11.40	5.51
SHM-05-41A	4/21/2010	--	--	--	37	1.4	--	7.9	0.09	-34.0	6.60	121	9.53	0.15
	10/7/2010	--	--	--	31	3.0	--	7.3	0.26	1.3	6.09	95	10.18	0.67
	4/4/2011	--	--	--	37	2.5	--	6.7	0.32	1.8	6.46	100	8.44	2.70
	10/4/2011	--	--	--	41	2.2	--	5.2	0.48	44.9	5.76	107	10.99	3.90
	4/11/2012	--	--	--	30	3.0	--	6.2 U	0.52	18.4	6.20	111	9.56	1,200
	10/17/2012	--	--	--	34	2.0	--	6.1	0.35	-33.5	6.25	90	12.98	1.40
	5/22/2013	**12**	5,530	569	33	3.3	1.2	7.9	0.76	17.6	6.27	101	10.43	3.79
	10/23/2013	**13**	4,560	534	41	2.8	--	5.8 J	0.35	-18.0	6.42	69	10.17	0.66
	4/23/2014	9.7	6,240	576	35	21	1.9	4.9 J	0.72	45.3	6.22	172	9.27	6.28
	10/9/2014	**14**	8,040	552	38	3.5	1.5	6.8 J	0.08	-20.0	6.39	81	10.94	0.42
	10/26/2015	**15**	6,330	308	32	5.5	1.5	5.4	2.16	54.2	5.79	88	10.13	0.28
	11/18/2016	**19**	4,600	160	33	5.7	1.5	4.1	1.53	81.2	6.45	103	10.71	1.03
	11/20/2017	**18**	5,900	210	25	17	1.1	3.3	0.46	43.5	6.73	142	9.42	3.79
	11/16/2018	**16**	4,400	160	29	11	1.2	5.7	0.21	-0.9	5.52	193	10.40	2.55
	11/08/2019	**31**	6,300	260	36	5.8	1.0 U	8.5	0.10	9.5	6.10	120	8.00	36.0
	11/06/2020	**18**	4,800	170	36	5.9	1.0 U	6.5	0.32	19.8	8.17	104	11.80	6.25
SHM-05-41B	8/9/2010	--	--	--	120	7.0	--	5.0	0.08	-124.0	6.74	392	9.60	9.60

Table F-2: Historical Groundwater Monitoring Well Analytical Results (2006 - 2020)
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

Analytical Method		Dissolved Metals			Anions		General Chemistry		Field Parameters					
Analyte		Arsenic	Iron	Manganese	Alkalinity	Chloride	DOC	Sulfate	DO	ORP	pH	SPC	Temp	Turbidity
Unit		(µg/L)	(µg/L)	(µg/L)	mg/L	mg/L	mg/L	mg/L	mg/L	mV	SU	µS/cm	°C	NTU
Screening Limit*		10	9,100	1,715										
Well ID	Date													
	4/21/2010	**1,130**	**28,000**	656 J	--	--	2.6	--	0.32	42.6	6.43	310	11.75	--
	10/7/2010	--	--	--	100	2.9	--	5.3	0.35	-86.8	6.65	259	10.29	1.64
	4/4/2011	--	--	--	120	1.5	--	5.7	0.16	-80.4	6.73	266	8.44	0.50
	10/4/2011	--	--	--	83	1.5	--	3.5	0.35	-61.2	6.29	209	10.92	5.80
	4/11/2012	--	--	--	66	3.0	--	3.3 U	0.14	-57.2	6.44	199	10.02	8,400
	10/17/2012	--	--	--	100	3.1	--	4.1	0.22	-150.1	6.58	259	12.23	41.0
	5/22/2013	**812**	**32,300**	780	97	5.8	2.8	8.7	0.26	-94.0	6.55	302	9.98	3.03
	10/23/2013	**716**	**21,400**	583	81	4.3	--	4.7 J	0.46	-120.4	6.88	155	10.05	4.49
	4/23/2014	**678**	**25,900**	766	88	3.8	2.3	5.2 J	0.47	-37.7	6.60	245	9.33	15.0
	10/9/2014	**638**	**24,300**	752	97	2.5	1.7	5.3 J	0.41	-93.0	6.76	195	10.49	10.7
	6/8/2015	**626**	**28,500**	947	93	19	1.6	3.8 J	0.09	-64.0	6.67	315	13.29	6.90
	10/26/2015	**614**	**27,300**	890	34	18	1.7	5.8	0.27	-23.3	5.32	269	11.26	30.9
	6/27/2016	**670**	**32,000**	1,100	130	7.9	1.9	1.7	13.23	-59.7	6.43	327	0.26	11.7
	11/18/2016	**730**	**41,000**	1,400	120	10	1.8	1.8	0.29	-103.7	6.67	373	12.14	9.82
	6/6/2017	**630**	**53,000**	**1,800**	130	15	1.8	2.3	1.73	-50.9	7.12	479	6.58	9.06
	11/20/2017	**620**	**50,000**	**1,800**	110	16	1.6	1.8	0.31	-69.1	6.86	300	10.14	6.48
	4/20/2018	**330**	**33,000**	1,300	110	810	1.7	5.4	1.85	-33.9	6.47	3,310	8.53	4.91
	11/16/2018	**510**	**42,000**	1,400	81	17	1.4	4.0	0.19	-70.0	6.13	437	9.91	5.01
	04/18/2019	**360**	**23,000**	840	65	430	2.2	11	0.41	-44.0	6.40	1,400	6.60	14.0
	11/08/2019	**530**	**24,000**	720	62	2.3	1.0 U	6.4	0.13	-60.0	6.60	190	9.30	25.0
	05/21/2020	**420**	**22,000**	740	84	430	1.7	5.7	0.26	44.4	6.43	333	13.50	12.0
	11/06/2020	**570**	**35,000**	1,100	86	48	1.7 U	2.5 J	0.54	-19.9	7.58	1,940	13.60	3.34
SHM-05-41C	4/21/2010	--	--	--	350	30	--	1.0 U	0.11	-167.0	7.17	963	10.06	0.80
	10/7/2010	--	--	--	350	29	--	1.0 U	0.29	-132.0	7.01	753	10.71	0.43
	4/4/2011	--	--	--	250	130	--	2.9	0.28	-99.0	7.03	1,132	8.67	19.0
	10/4/2011	--	--	--	340	28	--	0.30 J	0.36	-88.7	6.28	775	11.14	4.80
	4/11/2012	--	--	--	330	30	--	2.1 U	0.19	-116.8	7.00	929	9.20	150,000
	10/18/2012	--	--	--	350	28	--	0.81 J	0.70	-164.5	6.93	714	9.02	170
	5/21/2013	**709**	**14,700**	**2,530**	375	153	3.9	4.5 U	0.26	-98.5	6.98	1,081	11.50	2.70
	10/23/2013	**890**	**16,200**	**2,940**	364	29	--	1.4 J	0.93	-165.9	7.16	511	10.08	0.44
	4/23/2014	**1,490**	**17,600**	1,660	378	437	4.5	4.2 J	0.57	-121.7	7.14	1,905	9.46	4.91
	10/9/2014	**946**	**16,000**	**2,540**	368	90	4.1	2.6 J	0.14	-152.2	7.13	699	10.97	0.42
	6/8/2015	**883**	**16,700**	**2,880**	368	41	3.8	1.4 J	0.49	-131.7	7.02	825	12.08	4.59
	10/26/2015	**851**	**15,700**	**2,740**	370	34	6.4	2.1 J	0.54	-98.1	6.29	654	10.32	0.12
	6/27/2016	**810**	**17,000**	**3,100**	370	30	3.8	1.9	12.83	-93.6	6.83	798	0.47	5.66
	11/18/2016	**820**	**17,000**	**3,100**	360	27	3.7	2.6	0.70	-113.3	7.21	732	10.07	0.34
	6/6/2017	**390**	8,000	**2,400**	270	180	2.8	4.3	0.90	-76.7	7.43	1,130	6.73	8.42
	11/20/2017	**740**	**16,000**	**2,900**	360	25	3.1	2.9	0.39	-97.1	7.05	559	9.66	6.62
	4/20/2018	**800**	**18,000**	**3,000**	370	23	3.6	3.1	1.87	-118.9	7.06	808	8.02	0.15
	4/15/2019	**91**	**10,000**	**3,700**	280	550	6.0	10 U	1.20	-90.0	6.80	2,600	9.80	4.50
	11/08/2019	**29**	3,400	820 J	86	1,900	1.0 U	14 J	0.05	-53.0	6.80	5,900	8.30	6.90
	05/21/2020	**660**	**14,000**	**2,400**	360	1,200	3.1	10	0.37	89.7	6.20	4,550	12.40	7.96
	11/06/2020	**610**	**14,000**	**2,600**	350	380	3.2	2.4	0.68	176.0	5.63	67	12.20	15.6
SHM-05-42A	8/12/2010	--	--	--	160	2.0	--	5.8	5.11	-95.0	6.08	71	9.63	3.50
	4/22/2010	1.3	388	140	18	1.6	1.0 U	5.6	1.20	89.5	6.50	61	10.39	--
	10/13/2010	--	--	--	230	2.2	--	5.9	0.31	102.7	5.75	70	9.82	1.00
	4/5/2011	--	--	--	210	2.3	--	6.4	0.16	95.2	6.05	70	8.76	0.00
	10/7/2011	--	--	--	190	1.8	--	4.5	1.95	156.3	5.23	61	10.27	0.08
	4/11/2012	--	--	--	170	2.7	--	3.8 U	6.09	186.2	5.60	63	9.00	2,700

Table F-2: Historical Groundwater Monitoring Well Analytical Results (2006 - 2020)
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

Analytical Method		Dissolved Metals			Anions		General Chemistry		Field Parameters					
Analyte		Arsenic	Iron	Manganese	Alkalinity	Chloride	DOC	Sulfate	DO	ORP	pH	SPC	Temp	Turbidity
Unit		(µg/L)	(µg/L)	(µg/L)	mg/L	mg/L	mg/L	mg/L	mg/L	mV	SU	µS/cm	°C	NTU
Screening Limit*		10	9,100	1,715										
Well ID	Date													
	10/18/2012	--	--	--	23	3.3	--	4.3	0.54	125.5	6.04	66	9.87	0.73
	5/22/2013	0.89 J	224	103	23	2.8	0.65 J	5.6	0.38	86.2	6.06	62	9.61	0.00
	10/23/2013	2.0 U	111	66	23	2.8	--	6.3 J	2.53	73.2	6.09	61	7.97	0.28
	4/23/2014	2.0 U	961	193	23	4.3	3.1	7.5 J	0.23	101.2	5.86	62	9.16	0.88
	10/9/2014	2.0 U	130	130	35	5.5	0.87 J	7.6 J	0.09	123.7	5.81	73	10.57	2.20
	10/28/2015	4.0 U	122	199	32	4.5	0.98 J	8.3	0.91	103.7	5.33	76	9.41	0.20
	11/18/2016	3.0 U	110	510	33	4.8	0.96 J	11	0.25	144.6	6.21	89	9.02	0.86
	11/28/2017	3.0 U	170	680	27	5.5	0.50 U	7.5	0.27	127.3	6.42	105	8.73	4.11
	11/15/2018	3.0 U	950	680	31	5.7	0.96 J	7.4	0.24	46.7	5.92	164	7.47	2.01
	11/5/2019	3.0 U	50 U	50	26	8.3	0.78 J	5.8	0.23	100.0	5.80	84	9.80	2.30
	11/09/2020	3.0 U	50 U	100	26	7.4	1.1 U	7.6	0.72	-24.5	6.22	296	12.10	6.30
SHM-05-42B	4/22/2010	--	--	--	290	23	--	5.2	0.19	-272.0	6.52	863	9.77	6.00
	10/13/2010	--	--	--	300	25	--	3.9	0.53	-64.6	6.52	691	9.89	1.00
	4/1/2011	--	--	--	340	32	--	3.3	0.25	-63.0	6.44	759	8.79	0.00
	10/7/2011	--	--	--	330	31	--	3.4	0.26	-44.1	6.36	755	10.42	0.30
	4/11/2012	--	--	--	320	26	--	2.4 U	0.54	-59.0	6.45	895	9.55	37,000
	10/18/2012	--	--	--	300	25	--	3.2	0.69	-116.8	6.53	643	10.17	48.0
	5/22/2013	**238**	**51,100**	**2,900**	318	28	3.4	4.5 U	0.37	-49.9	6.58	655	9.92	1.20
	10/23/2013	**232**	**43,200**	**3,280**	313	21	--	3.3 J	0.16	-105.7	6.48	654	10.79	0.96
	4/23/2014	**229**	**38,000**	**6,110**	308	18	3.9	2.0 J	0.14	-36.9	6.43	643	9.36	3.08
	10/9/2014	**215**	**34,300**	**6,450**	293	17	2.9	1.5 J	0.10	-78.6	6.60	498	10.69	3.40
	10/28/2015	**206**	**27,500**	**6,950**	221	15	2.5	2.4 J	0.41	-11.2	6.33	389	9.73	0.21
	11/18/2016	**180**	**27,000**	**6,500**	200	22	2.3	3.7	0.40	-8.3	6.56	441	9.07	97.0
	11/28/2017	**160**	**20,000**	**4,200**	110	38	1.5	3.6	0.48	-34.2	7.17	364	8.52	2.87
	11/15/2018	**160**	**21,000**	**4,800**	150	26	1.8	3.3	0.47	-38.1	6.54	517	7.52	3.52
	11/05/2019	**170**	**29,000**	**6,300**	170	34	1.6	9.7	0.19	-54.0	6.40	450	9.60	4.70
	11/09/2020	**160**	**28,000**	**6,200**	170	38	1.8 U	9.4	7.85	139.0	5.84	1,270	14.20	12.9
SHM-07-03	10/31/2007	0.50 U	73 J	211	21	6.4	--	24	--	--	--	--	--	--
	8/12/2010	0.29 J	54	9.7	18	8.2	1.0 U	10	6.61	133.9	5.81	81	12.25	--
	5/28/2013	1.0	100 U	15 U	17	29	1.3	6.4	4.82	139.2	5.81	147	12.84	12.0
	6/9/2015	2.0 U	98 K	18	17	180	0.77 J	8.8 J	7.55	136.7	5.75	601	12.59	7.34
	6/30/2016	3.2	660	82	13	200	1.3	7.6	4.42	140.8	5.78	686	17.42	36.7
	06/01/2017	3.0 U	83	23	13	210	1.0 U	5.6	7.40	76.5	5.70	786	12.63	9.81
	11/17/2017	3.0 U	470	41	12	150	0.50 U	6.2	0.60	59.4	6.09	435	10.11	11.2
	4/17/2018	3.1	620	60	16	840	1.0 U	9.0	4.32	85.1	5.96	3,125	11.31	51.3
	11/19/2018	3.0 U	540	27	180	170	2.5	6.8	4.22	232.0	5.33	638	8.46	12.5
	4/18/2019	3.0 U	260	3.0 U	28	170	1.6	10	5.40	1700	5.60	650	8.30	22.0
	11/07/2019	3.0 U	200	7.3 J	16	130	1.9	8.8	7.80	117.6	5.60	444	9.20	602
	05/15/2020	3.0 U	110	26	25	130	0.84 J	6.1	5.58	290.0	5.62	443	13.80	19.1
	11/11/2020	3.0 U	320	8.9 J	15 U	320	0.87 J	11	0.81	56.2	6.75	253	18.20	27.4
SHM-07-05X	10/31/2007	--	--	--	46	60	--	12	1.85	19.0	7.61	429	11.10	5.01
	6/8/2015	4.8	50 U	7.5 U	157	77	4.2	28	6.47	37.9	7.41	460	13.70	3.05
	6/30/2016	**11**	50 U	10	160	200	2.0	25	0.03	56.2	6.06	1,000	17.63	13.5
	6/1/2017	**54**	870	550	120	1,100	3.3	19	1.46	-45.9	7.19	3,798	14.70	20.0
	11/17/2017	**890**	**19,000**	**2,200**	220	24	2.2	6.4	0.18	-106.3	7.17	472	9.48	2.85
	4/18/2018	**430**	**11,000**	1,500	170	1,300	3.1	13	1.20	-57.1	6.83	4,659	13.48	11.0
	11/26/2018	**100**	**9,800**	1,700	210	96	2.9	6.8	0.85	6.0	6.63	785	9.59	32.1
	4/18/2019	**950**	**23,000**	**1,900**	220	130	2.8	8.0	2.00	-66.0	6.70	1,500	7.60	35.0
	11/08/2019	**500**	**18,000**	**1,900**	240	68	3.1	8.7	0.46	11.0	6.80	660	7.40	14.0

Table F-2: Historical Groundwater Monitoring Well Analytical Results (2006 - 2020)
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

Analytical Method		Dissolved Metals			Anions		General Chemistry		Field Parameters					
Analyte		Arsenic	Iron	Manganese	Alkalinity	Chloride	DOC	Sulfate	DO	ORP	pH	SPC	Temp	Turbidity
Unit		(µg/L)	(µg/L)	(µg/L)	mg/L	mg/L	mg/L	mg/L	mg/L	mV	SU	µS/cm	°C	NTU
Screening Limit*		10	9,100	1,715										
Well ID	Date													
	05/18/2020	**15**	3,400	74	30	46	3.0	2.3	0.92	216.0	6.27	188	12.80	119
	11/11/2020	**83**	1,900	140	38	48	2.0	2.7	0.28	101.0	6.40	608	14.80	4.02
SHM-10-01	7/13/2010	0.68 J	373	**10,600**	130	12	--	6.8	0.18	63.5	6.19	297	12.38	3.34
	8/12/2010	3.5 J	886	**10,700**	130	14	1.5	7.0	0.49	42.2	6.61	291	11.86	--
	9/8/2010	7.9	1,680	**10,300**	140	11	1.6	8.7	0.12	11.3	6.31	299	12.68	0.15
	10/24/2012	1.4	210	--	89	8.5	--	6.2 U	0.40	48.3	6.39	143	11.51	0.95
	5/29/2013	1.3	124	**5,970 J**	73	4.0	5.3	6.5	0.16	51.2	6.53	160	10.58	0.00
	6/9/2015	2.0 U	93 J	**14,800**	137	18	1.1	8.6 J	1.03	98.0	6.08	310	10.96	0.50
SHM-10-02	7/15/2010	0.43 J	881	**2,180**	250	160	--	20	0.45	80.8	6.42	836	12.24	3.47
	9/7/2010	1.1	843	**2,190**	260	120	2.5	19	0.87	-258.3	5.94	881	12.45	0.64
	10/22/2012	1.1	100 UJ	--	448	62	--	7.4 U	0.48	40.2	6.52	726	12.18	1.78
	5/29/2013	1.5	34 J	**2,450**	444	62	3.8	8.8	0.20	73.2	6.53	537	11.37	1.04
	6/8/2015	3.2 J	50 U	**4,700**	291	215	2.0	12	0.69	59.8	6.47	1,173	11.28	0.31
	11/21/2017	3.0 U	75 U	**1,800**	140	88	1.5	5.8	0.80	202.9	7.38	530	11.47	1.92
	11/28/2018	3.0 U	50 U	1,600	130	93	1.2	7.1	1.70	139.0	6.38	580	10.60	1.51
	11/14/2019	3.0 U	50 U	1,400	90	120	1.3	7.8	9.60	150.0	6.70	500	11.00	1.10
	11/10/2020	3.0 U	62 U	**2,000**	110	150	1.2	6.3	0.52	93.5	6.80	598	16.50	9.84
SHM-10-03	7/14/2010	0.78 J	866	153	96	1,000	--	38	1.47	75.7	6.60	3,331	16.09	31.7
	9/7/2010	0.51 J	1,030	44	78	1,100	1.0 U	39	1.72	148.1	6.31	3,341	11.93	13.4
	10/23/2012	1.0 U	79 J	--	57	900	--	38	1.45	-3.6	6.51	2,230	13.75	21.9
	5/24/2013	1.5	51 J	37	72	870	0.72 J	35	0.61	61.5	6.54	1,981	11.49	3.68
	6/9/2015	4.2	50 U	38	74	1,000	0.61 J	67	0.31	140.0	6.41	3,485	12.61	2.54
	11/21/2017	3.0 U	75 U	15	170	320	1.0	19	0.52	103.1	6.96	1,162	11.60	4.89
	11/28/2018	3.0 U	50 U	7.5 J	170	260	1.0 U	13	2.21	152.0	6.83	1,170	9.80	2.37
	11/14/2019	8.5	50 U	4.0 J	150	120	1.4	11	4.20	120.0	7.10	580	9.60	2.60
	11/10/2020	1.9 J	75 U	8.0 J	160	110	1.7	7.5	0.73	96.0	6.03	459	11.60	6.01
SHM-10-04	7/14/2010	0.64	5,190	**2,500**	99	74	--	84	0.23	9.9	6.37	630	10.82	17.7
	9/7/2010	0.79 J	1,650	**3,100**	100	92	2.7	87	0.23	43.7	5.99	656	12.10	4.28
	10/22/2012	1.0 U	100 U	--	81	83	--	71	0.27	65.0	5.89	460	11.64	4.15
	5/29/2013	1.0	100 U	622	100	83	1.9	82	0.16	180.1	6.01	382	10.18	1.67
	6/8/2015	2.0 U	50 U	597	58	140	1.3	65	0.24	96.9	6.14	710	10.89	0.17
	11/21/2017	3.0 U	180	330	100	92	1.5	17	0.26	151.2	6.33	473	11.23	1.28
	11/26/2018	3.0 U	50 U	320	80	97	1.1	23	0.39	71.0	6.16	522	10.70	2.97
	11/14/2019	3.0 U	50 U	330	71	89	1.1	20	0.43	100.0	6.80	420	11.00	3.10
	11/12/2020	3.0 U	50 U	280 J	63	90	1.2	17	1.21	158.0	5.64	165	13.50	6.20
SHM-10-05A	7/15/2010	4.6	1,880	620	43	34	--	10	1.42	31.7	6.29	186	19.06	5.12
	9/8/2010	5.2	677	122	36	29	1.0 U	11	3.20	-29.0	5.27	200	20.20	8.92
	10/23/2012	3.0	68 J	--	42	31	--	8.0	4.84	164.8	6.04	208	14.43	4.30
	5/22/2013	3.1	30 U	16	39	31	0.79 J	7.2	1.31	158.1	6.26	145	13.51	2.47
	6/9/2015	3.0 U	50 U	10 J	29	36	0.70 J	9.5 J	1.86	208.2	6.10	207	13.99	1.26
	11/16/2017	2.1 J	75 U	5.4	25	48	0.50 U	11	1.60	161.9	6.68	242	11.92	4.17
	11/13/2018	3.0 U	50 U	3.7 J	24	62	1.0 U	6.7	1.38	65.7	6.18	276	11.40	24.7
	11/12/2019	2.0 J	50 U	2.4 J	32	32	0.62 J	9.5	2.60	180.0	5.70	210	11.00	4.20
	11/12/2020	2.0 J	96 U	10 U	36	43	0.89 J	8.8	0.77	-10.6	6.50	479	8.30	28.3
SHM-10-06	7/8/2010	**1,680 J**	**117,000**	699	360	17	--	0.89	0.55	-93.8	6.62	754	21.74	21.4
	9/8/2010	**2,710**	**145,000**	9.6	300	15	5.0	0.49 J	2.83	-64.3	6.16	783	11.59	3.72
	10/23/2012	**2,300**	**111,000**	--	184	17	--	5.0 U	1.18	-122.1	6.57	587	15.78	3.38
	10/23/2012	--	--	--	117	14	--	0.99	--	--	--	--	--	--
	5/23/2013	**1,980**	**107,000**	**1,890**	227	16	3.7	4.5 U	0.86	-120.7	6.60	473	13.22	4.66

Table F-2: Historical Groundwater Monitoring Well Analytical Results (2006 - 2020)
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

Analytical Method		Dissolved Metals			Anions		General Chemistry		Field Parameters					
Analyte		Arsenic	Iron	Manganese	Alkalinity	Chloride	DOC	Sulfate	DO	ORP	pH	SPC	Temp	Turbidity
Unit		(µg/L)	(µg/L)	(µg/L)	mg/L	mg/L	mg/L	mg/L	mg/L	mV	SU	µS/cm	°C	NTU
Screening Limit*		10	9,100	1,715										
Well ID	Date													
	10/8/2014	**1,900**	**92,000**	**2,080**	238	18	2.9	4.8 J	0.41	-119.3	6.73	515	11.45	3.49
	10/22/2015	**2,150**	**88,800**	**2,090**	183	18	5.4	3.7 J	0.41	-123.5	6.65	535	10.98	3.00
	11/21/2016	**1,700**	**77,000**	**3,100**	210	27	2.3	5.1	1.55	-89.3	6.83	613	8.43	0.18
	11/16/2017	**1,600**	**88,000**	**5,000**	180	26	2.5	5.4	0.31	-79.1	6.90	483	9.72	3.57
	11/12/2018	**1,200**	**81,000**	**3,300**	160	27	2.5	5.7	0.20	-82.1	6.64	592	12.20	2.90
	11/1/2019	**1,300**	**81,000**	**2,400**	150	29	2.2	11	0.08	-75.0	6.60	580	11.00	3.40
	10/30/2020	**1,000**	**63,000**	1,400	140	33	1.9 U	7.8	0.82	50.0	5.59	150	9.30	6.30
SHM-10-06A	7/7/2010	**61**	**19,900 J**	1,620	100	3.4	--	2.5 B	1.49	-22.6	6.51	209	19.74	5.38
	9/9/2010	**94**	**42,900**	**4,080**	190	11	3.3	3.2	0.39	-157.3	5.94	431	10.65	40.6
	10/24/2012	**72**	**19,900**	--	67	4.5	--	5.9 U	0.63	-203.0	5.90	190	10.98	13.9
	5/22/2013	**73**	**11,400**	1,430	49	1.8	1.9	4.5 U	0.55	-12.3	6.57	90	12.60	3.67
	11/20/2013	**23**	3,410	**1,960**	54	1.5	1.8	2.1 J	0.22	-61.6	6.49	107	9.34	0.44
	10/7/2014	**96**	**27,800**	**3,480**	119	10	5.4	2.7 J	0.41	-25.1	6.19	199	11.77	4.63
	10/21/2015	4.0 U	100 U	1,170	27	1.5	2.2	5.1	0.59	53.1	6.78	65	11.47	6.39
	12/2/2016	**76**	**11,000**	1,200	59	11	1.7	9.6	2.43	36.2	6.08	147	9.04	9.41
	11/30/2017	**74**	**28,000**	190	61	15	1.6	7.7	2.99	55.9	7.00	170	8.24	23.0
	11/7/2018	**64**	6,100	550	57 J	8.7	1.4 U	6.4	0.58	13.8	5.87	164	10.50	4.91
	11/7/2019	**63**	8,900	710	93	13	1.0 U	6.1	0.99	40.0	6.00	220	11.00	9.90
	11/13/2020	**71**	**9,800**	1,500	85	20	1.4	4.5	0.41	-45.4	7.74	644	12.70	5.27
SHM-10-07	5/27/2010	**818 J**	**70,600 J**	**3,110 J**	300	48	--	8.6	0.15	-195.0	6.97	751	13.43	237
	9/9/2010	**918**	**56,800**	**1,940**	240	41	3.5	2.3	0.43	-105.6	6.54	635	12.39	15.4
	10/22/2012	**1,100**	**69,000**	--	191	47	--	5.0 U	0.13	-86.0	6.45	516	12.10	21.3
	5/23/2013	**1,210**	**94,900**	**2,670**	243	62	3.5	5.6	1.23	-109.6	6.50	561	12.03	4.60
	10/7/2014	**861**	**53,330**	**2,150**	162	55	2.8	1.9 J	0.27	-92.8	6.80	634	12.23	44.0
	10/22/2015	**926**	**43,900**	**2,410**	127	56	2.8	4.0 J	0.48	-117.1	6.61	453	12.29	7.21
	12/1/2016	**750**	**26,000**	**3,400**	130	54	2.3	10	0.78	-87.4	6.83	413	12.11	--
	11/7/2017	**970**	**44,000**	**1,800**	110	52	1.9	6.9	0.47	-72.9	6.66	360	11.18	7.93
	11/9/2018	**900**	**39,000**	**1,800**	100	54	1.9	8.8	0.29	-82.7	6.68	498	10.70	283
	11/6/2019	**1,000**	**52,000**	**2,000**	150	64	1.9	7.7	3.10	-97.0	6.60	580	11.00	15.0
	11/10/2020	**1,000**	**46,000**	**2,100**	130	70	2.1	7.0	0.36	113.0	6.46	656	14.70	4.65
SHM-10-08	7/15/2010	0.73 J	1,310 J	885 J	480	71	--	15	0.21	33.7	6.73	917	10.95	7.15
	9/7/2010	1.6	1,260	376	500	79	3.8	15	3.61	-233.0	6.19	1,079	12.10	1.37
	10/22/2012	1.9	37 J	--	459	54	--	7.8 U	0.40	45.1	6.63	713	11.59	0.00
	5/21/2013	1.9	43 J	242	499	56	3.2	10	0.49	7.8	6.73	721	11.86	1.70
	6/8/2015	3.6 J	50 U	328	426	120	2.6	6.9 J	0.39	102.8	6.36	937	10.69	1.29
	11/21/2017	3.0 U	75 U	470	430	51	3.0	7.1	1.26	219.8	7.22	878	10.80	1.70
	11/26/2018	2.0 J	50 U	540	430	58	3.0	11	2.05	82.4	6.57	759	9.96	4.65
	11/14/2019	3.0 U	50 U	550	350	69	2.1	7.9	4.20	170.0	6.30	710	9.80	3.60
	11/10/2020	3.0 U	53 U	340	220	89	1.7	5.2	0.32	216.0	6.33	5,090	16.90	2.55
SHM-10-10	7/13/2010	1.3 J	799	**24,200**	350	19	--	0.56 J	0.85	28.7	6.61	658	12.10	4.52
	8/12/2010	3.6 J	1,180	**22,000**	320	23	3.9	0.79 J	0.76	-9.1	6.57	622	11.27	--
	9/8/2010	2.4 J	700	**25,200**	320	17	3.8	0.34 J	0.16	63.3	6.55	617	13.13	0.71
	10/24/2012	1.0	180	--	295	21	--	5.0 U	0.28	37.6	6.55	464	12.06	3.25
	5/29/2013	1.7	83 J	**26,400**	343	19	2.9	4.5 U	3.07	48.8	6.62	579	11.22	0.46
	11/20/2013	2.0 J	49 J	**23,300**	256	61	16	2.9 J	0.36	75.2	6.53	557	11.98	0.39
	10/10/2014	2.6 J	50 U	**25,800**	327	44	3.5	4.0 J	0.26	78.8	6.57	484	12.08	0.98
	10/23/2015	2.9 J	100 U	**16,000**	271	51	3.9	6.6 J	4.59	17.2	6.53	561	11.73	0.89
	11/29/2016	3.5	21 J	**10,000**	240	49	2.9	3.6	2.06	105.7	6.65	488	11.97	6.01
	11/27/2017	3.0 U	75 U	**8,600**	150	280	2.0	46	0.31	117.6	7.35	1,040	11.51	1.39

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Analytical Method		Dissolved Metals			Anions		General Chemistry		Field Parameters					
Analyte		Arsenic	Iron	Manganese	Alkalinity	Chloride	DOC	Sulfate	DO	ORP	pH	SPC	Temp	Turbidity
Unit		(µg/L)	(µg/L)	(µg/L)	mg/L	mg/L	mg/L	mg/L	mg/L	mV	SU	µS/cm	°C	NTU
Screening Limit*		10	9,100	1,715										
Well ID	Date													
	11/20/2018	3.0 U	50 U	**5,900**	14	260	0.66 J	7.3	0.21	186.0	6.37	1,150	9.31	6.19
	11/11/2019	3.0 U	50 U	**8,400**	260	93	2.6	4.9	0.58	43.0	6.50	790	11.00	1.20
	11/09/2020	3.0 U	50 U	3.0 U	200	64	2.8 U	3.9	0.19	15.9	5.97	541	12.00	19.0
SHM-10-11	8/30/2010	**342 J**	**55,700**	**2,320**	160	24	3.3	19	1.68	-32.0	6.12	419	13.19	4.05
	10/19/2010	**463**	**61,000**	**2,260**	140	23	3.4	19 J	0.41	-42.1	6.28	4,140	11.57	4.28
	10/23/2012	**440**	**56,100**	--	77	26	--	29	1.78	-34.0	6.27	304	11.18	1.10
	5/23/2013	**460**	**65,100**	**2,510**	102	21	2.9	30	0.80	-46.1	6.15	287	11.25	2.01
	11/19/2013	**432**	**60,400**	**2,400**	121	30	2.7	35	0.33	-43.5	6.41	421	10.63	0.45
	10/21/2015	**503**	**59,700**	**2,430**	52	32	2.6	45	0.40	-19.9	6.01	348	11.23	1.54
	12/1/2016	**520**	**52,000**	**2,600**	120	29	2.5	48	0.80	-49.7	6.32	345	11.13	16.9
	11/30/2017	**540**	**59,000**	**2,900**	89	32	2.4	52	0.25	-38.1	7.05	363	10.95	9.19
	11/9/2018	**620**	**61,000**	**3,600**	73	33	2.7	74	0.21	-49.9	6.34	504	11.30	5.81
	11/7/2019	**560**	**63,000**	**2,800**	150	32	1.0 U	51	0.20	-21.0	6.20	500	11.00	15.0
	11/12/2020	**430**	**47,000**	**1,900**	130	34	2.5	56	0.50	53.6	5.78	394	12.30	13.1
SHM-10-12	8/30/2010	**3,560**	**104,000**	**7,000**	240	3.7	4.1	1.7	3.55	-34.9	6.04	460	14.41	8.43
	10/20/2010	**3,120**	**90,000**	**6,200**	240	4.4	4.3	1.4	0.32	-14.5	5.93	432	10.92	1.60
	10/23/2012	**4,100**	**78,600**	--	131	2.5	--	5.0 U	0.29	8.4	5.74	322	11.49	0.20
	5/23/2013	**3,580**	**56,300**	**6,450**	171	7.3	24	7.9	0.26	-44.9	6.09	302	11.84	4.36
	11/19/2013	**3,570**	**89,600**	**6,270**	210	4.0	3.5	3.8 J	0.72	-19.3	6.35	428	10.49	0.16
	10/7/2014	**3,510**	**84,100**	**6,970**	191	3.5	3.9	4.0 J	0.31	-29.1	6.02	368	13.99	0.43
	10/22/2015	**3,850**	**85,600**	**7,760**	136	4.5	4.1	6.1	0.33	-27.1	6.09	452	10.70	0.38
	12/1/2016	**2,900**	**65,000**	**7,000**	200	8.1	4.0	9.7	1.99	-22.6	6.12	367	12.79	--
	11/30/2017	**3,300**	**79,000**	**7,700**	210	4.9	3.5	3.5	0.35	-19.0	6.89	392	10.83	6.62
	11/8/2018	**3,300**	**79,000**	**6,500**	170	4.9	3.1	3.7	0.25	-12.7	5.58	443	11.10	23.8
	11/14/2019	**3,400**	**65,000**	**5,400**	170	4.1	2.9	2.6	0.26	20.0	5.40	400	9.50	25.0
	11/11/2020	**3,400**	**69,000**	**5,000**	170	2.9	4.1	1.7	0.68	-64.6	6.35	332	8.20	12.4
SHM-10-13	9/1/2010	**575**	**84,100**	**1,850 J**	380	18	5.6	0.12 U	2.76	-68.6	6.32	782	13.57	18.8
	10/19/2010	**672**	**94,600**	**2,060**	360	21	8.7	0.12 U	0.12	-52.5	6.27	743	12.48	12.0
	10/23/2012	**670**	**68,800**	--	296	17	--	5.3 U	0.11	-44.5	6.42	597	12.49	14.2
	5/23/2013	**565**	**83,400 J**	1,130	292	20	5.1	4.5 U	0.22	-91.7	6.35	571	12.59	14.4
	10/7/2014	**532**	**55,700**	1,670	266	25	4.7	22	0.20	-112.2	6.56	527	11.83	3.05
	10/22/2015	4.5	354	327	162	36	2.8	102	0.29	62.7	6.47	629	13.09	3.50
	11/28/2016	**530**	**67,000**	1,000	280	16	3.9	1.0 U	1.80	-46.8	6.50	432	8.98	3.11
	11/9/2017	**450**	**82,000**	1,300	260	21	3.5	1.0 U	0.36	-61.2	6.76	374	11.73	7.84
	11/14/2018	**570**	**72,000**	1,200	230	22	3.2	4.9	1.08	-64.5	6.98	614	9.13	65.2
	11/06/2019	**460**	**69,000**	960	260	30	4.1	2.5	0.55	-39.0	6.50	710	10.00	12.0
	10/30/2020	**430**	**58,000**	1,200	250	31	4.3	1.0 U	0.93	-67.4	6.28	244	6.30	10.7
SHM-10-14	9/2/2010	**4,100**	**73,000**	**4,720**	360	6.3	8.7	3.7	0.18	-87.4	6.35	645	14.48	34.7
	10/19/2010	**5,860**	**92,700**	**4,180**	320	4.8	62	0.67 J	0.36	-38.6	6.35	693	11.99	34.5
	10/23/2012	**6,200 J**	**94,400**	--	194	5.0	--	5.0 U	0.13	-41.0	6.26	445	12.40	4.88
	5/23/2013	**5,540**	**83,100**	**2,800**	241	5.8	21	6.4	0.20	-67.0	6.24	467	11.43	10.1
	10/8/2014	**5,380**	**92,100**	**2,810**	283	5.5	23	1.8 J	0.19	-76.1	6.30	482	13.73	4.56
	10/22/2015	**2,320**	**63,500**	**3,650**	169	4.0	4.7	2.7 J	0.37	-30.2	6.22	418	12.25	3.68
	11/28/2016	**4,900**	**85,000**	**2,300**	280	4.5	3.8	1.0 U	0.14	-46.3	6.40	433	11.18	12.4
	11/9/2017	**5,400**	**95,000**	**2,300**	240	5.2	3.9	1.0 U	0.66	-42.1	6.49	430	11.10	4.70
	11/8/2018	**3,900**	**75,000**	**2,600**	200	4.2	3.5	1.0 U	0.50	-79.8	7.65	512	13.00	55.1
	11/06/2019	**4,500**	**78,000**	**2,400**	200	4.0	3.4	2.4	11.00	31.0	6.50	470	11.00	13.0
	11/10/2020	**5,000**	**86,000**	**1,900**	250	5.1	4.1	1.0 U	0.93	-67.4	6.28	244	6.30	10.7
SHM-10-15	9/1/2010	**8,110**	**63,300**	**10,700**	210	5.7	4.2	3.8	0.25	-52.7	6.21	503	16.02	16.3

Table F-2: Historical Groundwater Monitoring Well Analytical Results (2006 - 2020)
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

Analytical Method		Dissolved Metals			Anions		General Chemistry		Field Parameters					
Analyte		Arsenic	Iron	Manganese	Alkalinity	Chloride	DOC	Sulfate	DO	ORP	pH	SPC	Temp	Turbidity
Unit		(µg/L)	(µg/L)	(µg/L)	mg/L	mg/L	mg/L	mg/L	mg/L	mV	SU	µS/cm	°C	NTU
Screening Limit*		10	9,100	1,715										
Well ID	Date													
	9/1/2010	**8,110**	**63,300**	**10,700**	240	11	3.2	8.4	0.25	-52.7	6.21	503	16.02	16.3
	10/20/2010	**6,230**	**52,000**	**8,680**	230	12	4.0	10	0.36	-10.9	5.94	510	11.95	59.5
	10/23/2012	**7,000**	**46,600**	--	172	10	--	9.5 U	0.20	-49.0	6.43	376	11.98	5.10
	5/24/2013	**1,090**	8,290	**1,960**	196	7.5	3.4	7.4	0.49	-73.9	6.37	440	15.10	12.0
	11/20/2013	**5,740**	**47,400**	**8,210**	210	9.5	2.8	11	0.38	-65.9	6.51	48	10.41	10.3
	10/7/2014	**5,870 J**	**46,500 J**	**8,530 J**	207	9.0	2.6	12	0.08	-90.8	6.45	351	12.26	29.7
	10/23/2015	**5,450**	**41,500**	**7,600**	197	9.0	2.9	11	0.76	-60.1	6.25	492	11.06	1.05
	11/22/2016	**5,100**	**44,000**	**7,700**	210	12	2.8	11	0.99	-56.3	6.44	382	10.75	8.19
	11/9/2017	**6,400**	**52,000**	**8,600**	200	12	2.5	9.3	0.47	-30.2	6.70	327	10.40	5.52
	11/14/2018	**5,800**	**48,000**	**8,200**	200	12	2.7	10	0.50	-60.1	6.96	497	9.69	50.3
	11/14/2019	**5,600**	**44,000**	**7,300**	200	12	2.4	14	0.16	79.0	6.40	430	10.00	6.80
	11/02/2020	**6,800**	**44,000**	**7,300**	220	8.1	2.2	8.1	0.87	-65.4	6.22	387	11.50	25.9
SHM-10-16	9/2/2010	**495**	**53,100**	**1,790**	330	31	5.3	2.9	0.17	-233.8	6.98	784	11.40	78.5
	10/20/2010	**1,090**	**46,900**	1,150	320	28	10	3.2	0.34	-129.2	6.77	793	10.63	34.6
	10/23/2012	**1,600**	**41,700**	--	281	25	--	6.8 U	0.26	-86.2	6.64	533	10.15	0.65
	5/28/2013	**1,350**	**42,700**	1,280	309	21	3.8	4.7 J	0.15	-128.0	6.71	632	9.39	0.08
	11/20/2013	**1,530**	**44,500**	1,480	312	24	3.7	2.9 J	0.19	-115.6	6.75	677	9.39	0.84
	10/28/2015	**1,760**	**44,600**	1,410 J	290	29	4.0	4.6 J	2.63	-13.1	7.02	354	10.11	0.31
	6/27/2016	**1,900**	**43,000**	1,600	300	23	3.3	2.2	11.27	-93.8	6.77	690	1.52	1.74
	11/29/2016	**1,600**	**43,000**	1,700	320	21	2.8	2.8	1.12	-101.9	6.76	523	9.10	5.87
	6/2/2017	**1,800**	**79,000**	**4,000**	190	25	2.7	8.5	6.65	-68.0	6.77	704	10.87	6.36
	11/17/2017	**1,200**	**40,000**	**1,800**	290	20	2.2	3.2	0.30	-75.5	6.93	429	9.30	4.74
	11/15/2018	**1,100**	**37,000**	1,700	260	21	2.1	3.9	0.33	-50.1	6.64	756	9.02	0.50
	11/13/2019	**1,200**	**37,000**	1,700	280	24	1.9	3.7	0.69	42.0	6.50	560	7.60	11.0
	11/12/2020	**1,100**	**29,000**	**2,100**	290	26	1.8	3.9	0.49	-29.7	6.76	533	9.30	14.9
SHM-11-02	10/22/2012	7.1	2,000	--	228	42	--	16	0.21	-135.0	7.32	468	14.43	19.6
	11/20/2013	3.2 J	2,470	146	92	35	38	9.9 J	0.30	-279.2	8.38	241	10.82	21.3
	4/24/2014	2.0 U	1,270	268	52	35	42	5.3 J	0.79	-118.3	7.23	196	10.77	22.7
	10/8/2014	2.0 U	5,030	224	109	41	21	1.2 J	0.06	-289.0	7.91	351	15.44	19.0
	6/5/2015	2.0 U	1,720	479	44	37	39	0.50 U	0.13	-195.4	7.35	232	17.08	8.50
	10/27/2015	4.0 U	3,340	278	51	36	28	5.0 U	0.40	-232.6	7.21	247	12.30	13.0
	6/27/2016	3.0	**12,000**	310	130	49	2.9	0.80 U	19.40	-188.0	7.33	400	0.44	22.7
	11/16/2016	3.0 U	**15,000**	330	140	45	3.1	1.0 U	0.79	-139.9	7.32	343	11.82	11.7
	5/31/2017	3.0 U	**13,000**	280	140	45	3.4	1.0 U	0.19	-209.6	7.39	312	12.27	8.14
	11/6/2017	2.5 J	**14,000**	330	160	47	1.9	1.7	0.31	-177.6	7.26	500	13.06	5.25
	4/19/2018	2.0 J	**17,000**	310	160 J	46	1.8	1.0 U	1.05	-198.5	7.57	505	8.84	9.99
	11/7/2018	8.7	**31,000**	**1,900**	280	45	70	1.0 U	0.52	-144.0	6.94	841	15.10	34.1
	4/26/2019	**37**	**34,000**	**2,300**	280	44	2.6	1.0 U	0.40	-240.0	7.60	750	12.00	8.60
	11/13/2019	**33**	**22,000**	1,600	250	47	1.0 U	1.1	0.24	-190.0	7.40	630	9.50	9.90
	05/19/2020	**13**	**12,000**	880	220	44	1.6	1.4	0.39	-131.0	6.96	526	14.10	8.29
	11/03/2020	**12**	**11,000**	830	250	42	1.3 U	0.85 J	0.46	41.3	7.16	533	9.20	10.4
SHM-11-06	10/22/2012	**920**	**84,100**	--	287	21	--	5.0 U	1.80	-83.0	6.41	561	13.11	4.24
	5/28/2013	**1,020**	**73,200**	990	262	20	3.1	6.8	0.34	-105.7	6.54	495	12.08	3.19
	11/20/2013	**1,000**	**74,600**	938	220	23	3.2	6.8 J	0.36	-104.4	6.45	578	9.29	2.23
	10/8/2014	**825**	**63,600**	818	173	36	2.7	5.2 J	0.20	-88.3	6.53	633	12.69	2.18
	10/27/2015	**821**	4,680	687	118	41	2.2	14	0.65	-131.2	6.62	492	11.35	0.74
	11/16/2016	**900**	**56,000**	1,400	170	50	--	0.77 J	1.40	-67.1	6.30	433	11.78	5.17
	06/06/2017	**730**	**67,000**	1,700	160	54	1.9	2.2	0.31	-59.9	6.12	415	8.86	6.12
	11/7/2017	**780**	**62,000**	1,400	150	50	1.8	5.9	0.31	-54.9	6.52	413	11.46	7.21

Table F-2: Historical Groundwater Monitoring Well Analytical Results (2006 - 2020)
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

Analytical Method		Dissolved Metals			Anions		General Chemistry		Field Parameters					
Analyte		Arsenic	Iron	Manganese	Alkalinity	Chloride	DOC	Sulfate	DO	ORP	pH	SPC	Temp	Turbidity
Unit		(µg/L)	(µg/L)	(µg/L)	mg/L	mg/L	mg/L	mg/L	mg/L	mV	SU	µS/cm	°C	NTU
Screening Limit*		10	9,100	1,715										
Well ID	Date													
	4/13/2018	**600**	**56,000**	1,400	160	49	1.9	7.4	0.70	12.7	7.18	524	11.61	1.70
	11/12/2018	**750**	**64,000**	1,400	140	48	1.9	6.2	0.22	-69.9	6.53	560	12.50	14.0
	4/18/2019	**680**	**59,000**	1,300	140	48	1.9	8.4	0.90	-72.0	6.60	590	9.30	17.0
	11/1/2019	**780**	**69,000**	1,700	190	46	2.1	8.6	0.18	-61.0	6.30	640	10.00	3.40
	05/20/2020	**750**	**77,000**	**2,000**	220	50	2.1	4.7	3.21	-38.3	5.77	1,060	15.40	0.02
	11/02/2020	**620**	**62,000 J**	1,600 J	150	55	1.8	9.6	2.04	165.0	6.13	245	13.50	9.40
SHM-13-01	11/21/2013	2.2 J	30 U	7.4 J	25	32	0.82 J	12	6.48	165.1	6.46	163	10.15	0.31
	10/27/2015	2.1 J	100 U	15 U	14	48	0.47 J	7.6	7.92	99.9	6.13	198	10.93	0.61
	11/28/2017	1.5 J	75 U	5.9	16	95	0.50 U	6.7	6.41	58.6	6.20	306	10.25	0.40
	11/26/2018	1.5 J	50 U	5.7 J	17	130	1.0 U	7.6	8.45	114.0	5.99	476	11.10	3.97
	11/14/2019	1.9 J	50 U	3.3 J	17	340	0.93 J	9.5	4.50	110.0	5.80	1,100	11.00	9.00
	11/09/2020	3.0 U	50 U	10 U	20	150	1.2 U	8.7	4.26	230.0	5.69	4,690	11.80	2.95
SHM-13-02	5/29/2013	2.5	30 U	**7,960**	160	9.5	34	6.5	0.16	-107.7	7.23	311	11.50	0.22
	11/21/2013	2.7 J	250	**9,490**	161	8.0	1.9	5.7 J	0.10	-17.0	6.99	24	10.89	1.84
	10/10/2014	2.6 J	261	**15,800**	220	31	1.6	5.0 J	0.22	-8.6	6.72	430	12.04	0.26
	10/23/2015	2.6	100 U	**13,200**	155	15	1.7	10	0.26	4.9	6.83	302	11.04	0.96
	11/29/2016	1.8 J	35 J	**12,000**	170	21	1.6	6.8	1.31	41.3	6.84	382	10.30	2.65
	11/27/2017	3.0 U	59 J	**20,000**	180	120	2.1	8.1	3.04	86.0	6.66	510	10.80	0.25
	11/15/2018	3.0 U	50 U	**17,000**	98	160	1.7	8.9	0.59	75.0	6.12	509	8.65	0.63
	11/11/2019	3.0 U	50 U	**9,400**	160	51	1.7	7.1	4.30	46.0	6.50	430	11.00	4.60
	11/05/2020	3.0 U	50 U	74	110	41	1.5 U	4.4	1.15	14.4	4.93	315	10.80	5.60
SHM-13-03	5/29/2013	**318**	**13,600**	**6,740**	372	39	4.4	5.6	0.14	-99.2	6.56	730	11.72	1.20
	11/20/2013	**137**	**11,200**	**9,640**	391	38	4.3	5.0 J	0.40	-41.8	6.50	563	10.26	0.54
	4/23/2014	**120**	6,770	**7,990**	287	24	7.3	4.7 J	0.16	-12.5	6.10	433	9.27	0.22
	10/10/2014	**81**	7,590	**12,100**	390	38	3.7	4.7 J	0.13	-57.7	6.53	557	12.63	0.69
	6/8/2015	**76**	7,190	**12,600**	380	37	6.6	6.6 J	0.25	-71.3	6.48	677	13.15	3.98
	10/23/2015	**69**	6,610	**10,800**	273	37	3.9	5.4 J	0.29	-91.4	6.43	473	12.60	0.81
	6/28/2016	**53**	5,500	**9,300**	300	37	4.1	2.8	16.38	-46.4	6.33	590	1.22	5.41
	11/28/2016	**55**	5,800	**8,400**	120	93	1.9	7.3	1.40	-40.7	6.63	544	9.87	2.40
	06/07/2017	**46**	3,900	**8,900**	290	32	3.8	7.4	0.66	-65.6	7.00	661	8.10	4.74
	11/27/2017	**46**	4,000	**12,000**	180	130	2.5	4.2	3.02	119.3	6.61	452	11.37	0.97
	4/25/2018	**26**	830	**9,900**	320	44	3.0	5.8	0.89	-18.5	6.66	702	10.01	7.66
	11/19/2018	**44**	2,000	**13,000**	120	160	2.5	3.8	0.23	59.9	6.52	993	9.84	3.77
	04/16/2019	**110**	7,000	**8,400**	200	200	2.5	4.6	0.37	4.0	6.40	1,100	8.10	3.60
	11/11/2019	**140**	8,600	**10,000**	280	32	2.5	6.0	0.40	-1.0	6.40	620	11.00	0.98
	05/21/2020	**150**	**10,000**	**11,000**	220	180	2.3	2.9	0.42	44.7	5.08	658	11.30	3.60
	10/29/2020	**83**	6,200	**7,500**	140	64	2.6	3.5	2.89	239.0	6.17	290	14.70	128
SHM-13-04	5/28/2013	**2,060**	**40,900**	**2,130**	40	200	1.8	10	0.71	-73.6	6.46	717	11.70	3.63
	4/24/2014	**61**	334	238	30	167	0.92 J	10	3.21	92.4	6.35	866	10.57	2.18
	10/13/2014	**693**	6,410	392	41	110	1.6	13	2.04	-13.2	6.48	464	11.94	2.31
	6/9/2015	**620**	**12,500**	843	33	175	1.1 J	14	2.01	41.1	5.89	680	11.55	2.68
	10/28/2015	**212**	4,620	429	38	175	0.94	12	1.81	-19.3	6.43	595	11.93	3.49
	6/28/2016	**20**	110	72	39	310	1.2	15	14.58	153.6	6.29	1,251	3.22	10.8
	11/28/2016	**140 J**	2,500	260 J	48	180	0.93 J	11	3.86	44.0	6.31	750	12.16	11.4
	6/6/2017	**350**	4,700	**3,700**	57	57	1.3	57	3.97	69.9	6.32	617	9.53	12.9
	11/14/2017	**160**	3,200	520	42	250	0.50 U	13	2.19	65.1	6.65	813	11.90	4.93
	4/17/2018	**340**	5,900	620	61	200	1.2	7.9	3.20	14.2	6.59	850	10.96	11.2
	11/13/2018	**190 J**	2,400	180	45	120	1.0 U	9.7	5.82	7.3	6.63	565	12.30	49.5
	4/15/2019	**430**	2,400	100	41	75	0.50 U	9.8	4.70	40.0	6.50	380	11.00	26.0

Table F-2: Historical Groundwater Monitoring Well Analytical Results (2006 - 2020)
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

Analytical Method		Dissolved Metals			Anions		General Chemistry		Field Parameters					
Analyte		Arsenic	Iron	Manganese	Alkalinity	Chloride	DOC	Sulfate	DO	ORP	pH	SPC	Temp	Turbidity
Unit		(µg/L)	(µg/L)	(µg/L)	mg/L	mg/L	mg/L	mg/L	mg/L	mV	SU	µS/cm	°C	NTU
Screening Limit*		10	9,100	1,715										
Well ID	Date													
	11/12/2019	**600**	3,400	84	46	250	1.1	11	4.00	58.0	6.30	1,000	10.00	2.50
	05/20/2020	**200**	1,300	100	44	160	0.89 J	8.0	6.05	49.1	6.42	640	13.40	10.4
	11/06/2020	**260 J**	2,400	160	36	100	1.0 U	10	1.15	217.0	6.13	134	12.40	3.70
SHM-13-05	5/28/2013	8.9	597	**4,680**	423	37	4.7	12	0.27	-136.0	6.88	629	11.14	2.05
	11/21/2013	6.8	1,860	**5,720**	425	42	4.5	11	0.44	-154.6	7.94	44	10.27	2.11
	10/13/2014	**11**	4,580	**5,940**	455	36	3.6	8.4 J	0.44	-159.0	6.88	686	11.04	1.11
	10/28/2015	**12**	3,470	**3,660**	359	43	3.9	13	0.39	-94.1	6.94	688	11.19	0.74
	11/28/2016	**11**	3,700	**3,500**	360	41	3.0	12	1.76	-52.9	6.88	808	10.70	0.84
	11/16/2017	8.4	3,000	**3,600**	410	38	2.8	9.9	0.37	-46.9	6.98	656	10.71	3.20
	11/13/2018	**12**	3,300	**3,600**	390	37	2.6	12	0.51	-58.4	7.23	831	10.50	25.6
	11/12/2019	**16**	3,100	**3,400**	410	39	2.5	12	0.36	48.0	6.80	740	9.30	15.0
	11/06/2020	6.4	1,000	1,100	140	38	2.0 U	7.9	0.06	-131.0	6.86	5,000	16.10	14.2
SHM-13-06	6/13/2013	**3,180 J**	**19,700 J**	**1,830**	84	19	1.0	6.4	0.14	-154.4	7.16	287	12.43	4.07
	11/21/2013	**2,540**	**39,900 J**	**2,490**	33	145	1.5	11	0.25	-119.4	6.84	587	11.33	1.24
	4/24/2014	**2,850**	**25,000**	**1,820**	61	70	1.5	8.9 J	0.28	-104.3	6.94	446	11.71	2.51
	10/13/2014	**2,360**	**25,400**	1,570	46	130	1.1	9.9 J	0.10	-145.6	7.04	569	11.99	1.23
	6/8/2015	**2,460**	**35,200**	**1,840**	40	240	0.91 J	10	0.18	-128.2	7.00	924	11.75	1.53
	12/22/2015	**2,160**	**32,600**	1,640	57	192	1.0	9.1	--	--	--	--	--	--
	6/28/2016	**2,500**	**30,000**	1,400	70	130	1.4	7.1	14.44	-98.2	6.55	666	0.43	8.36
	11/28/2016	**2,700**	**27,000**	1,200	80	110	1.4	6.5	0.46	-123.4	7.10	429	11.96	11.7
	6/6/2017	**2,800**	**36,000**	**3,100**	110	110	1.9	110	0.64	-100.1	6.84	638	12.93	6.03
	11/14/2017	**2,700**	**43,000**	**2,100**	86	130	1.3	5.1	0.32	-103.1	7.07	518	11.60	17.2
	4/17/2018	**2,700**	**29,000**	**2,200**	85	80	1.2	5.1	0.57	-106.1	7.10	441	10.58	3.01
	11/13/2018	**2,400**	**25,000**	1,400	89	140	1.4	6.7	0.45	-133.0	7.67	720	11.40	54.6
	04/16/2019	**3,100**	**18,000**	1,100	73	70	1.4	6.3	0.79	-51.0	6.40	450	7.80	6.60
	11/12/2019	**1,900**	**18,000**	880	44	100	1.0	5.7	0.45	41.0	6.40	440	10.00	11.0
	05/19/2020	**2,900**	**22,000**	1,200	57	95	1.1	2.7 J	0.53	22.3	6.70	402	11.50	29.2
	11/09/2020	**2,200**	**20,000**	980	51	120	1.7 U	6.7	0.85	-26.3	6.35	498	14.60	77.3
SHM-13-07	11/21/2013	**1,340**	**30,000**	**2,710**	45	225	1.6	12	0.14	-97.4	6.80	773	12.50	4.70
	4/24/2014	**1,280**	**39,200**	**3,660**	31	212	1.2	7.7 J	0.29	-106.1	6.84	734	10.97	26.8
	10/10/2014	**962**	**25,200**	**2,160**	62	165	8.8	16	0.15	-126.3	6.90	787	12.82	4.90
	6/8/2015	**946**	**18,800**	**3,460**	57	120	3.2	10	0.19	-60.7	6.82	565	12.73	24.8
	10/23/2015	**531**	**11,500**	1,390	91	68	1.7	12	0.17	-140.2	6.88	366	12.36	4.83
	6/28/2016	**320**	**29,000**	**4,900**	80	260	1.5	6.7	15.01	-47.1	6.28	990	0.76	9.72
	11/28/2016	**140**	9,100	**1,800**	85	200	1.4	9.8	2.10	-9.1	6.57	918	12.00	13.0
	06/07/2017	**230**	6,900	790	87	49	2.0	8.9	0.22	-15.3	6.30	267	11.48	19.2
	11/28/2017	**620**	**16,000**	**2,700**	97	230	1.4	8.2	0.26	-67.3	7.52	874	12.07	5.24
	4/17/2018	**470**	**18,000**	**2,300**	86	120	1.4	7.9	0.82	-53.9	6.83	610	10.81	6.17
	11/20/2018	**490**	**20,000**	**2,200**	260	95	6.4	5.2	0.21	-27.0	6.60	630	9.83	25.2
	04/16/2019	**470**	**23,000**	**3,100**	60	100	1.4	5.8	0.49	-18.0	6.20	560	8.60	12.0
	11/11/2019	**750**	**27,000**	**4,700**	65	180	1.2	4.9	0.15	-39.0	6.40	770	12.00	16.0
	05/22/2020	**400**	**12,000**	**2,500**	72	96	1.2	7.5	0.92	199.0	5.64	471	17.40	8.63
	11/05/2020	**420**	**15,000**	**2,000**	44	170	1.0 U	8.4	0.27	-120.0	6.55	612	18.00	15.9
SHM-13-08	6/13/2013	**928**	**35,900**	941	141	8.5	2.8	7.3	0.74	-122.4	6.84	378	12.75	2.92
	11/21/2013	**994**	**35,400**	826	116	8.0	3.2	3.7 J	0.24	-131.1	6.84	323	11.32	0.98
	4/24/2014	**1,040**	**50,600**	1,170	173	15	3.8	4.9 J	0.38	-123.8	6.89	439	11.26	1.14
	10/13/2014	**978**	**52,200 J**	1,160	140	130	3.6	6.5 J	0.16	-146.1	6.90	733	11.81	0.39
	6/8/2015	**975**	**113,000**	**2,180**	112 J	140 J	2.4 J	0.50 U	0.83	-88.1	6.76	376	14.12	6.10
	10/28/2015	**954**	**78,000**	1,620	126	145	2.8	10	0.47	-148.0	6.46	728	11.30	3.21

Table F-2: Historical Groundwater Monitoring Well Analytical Results (2006 - 2020)
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

Analytical Method		Dissolved Metals			Anions		General Chemistry		Field Parameters					
Analyte		Arsenic	Iron	Manganese	Alkalinity	Chloride	DOC	Sulfate	DO	ORP	pH	SPC	Temp	Turbidity
Unit		(µg/L)	(µg/L)	(µg/L)	mg/L	mg/L	mg/L	mg/L	mg/L	mV	SU	µS/cm	°C	NTU
Screening Limit*		10	9,100	1,715										
Well ID	Date													
	6/29/2016	**770**	**68,000**	1,600	90	140	2.6	2.7	15.68	-106.1	6.54	782	0.30	3.58
	11/28/2016	**870**	**62,000**	1,500	200	74	2.9	4.0	1.74	-132.2	6.93	714	11.85	3.01
	06/06/2017	**900**	**74,000**	**2,100**	67	240	2.4	4.4	0.37	-45.9	6.73	1,084	10.75	9.89
	11/14/2017	**810**	**54,000**	1,400	90	130	2.1	3.5	0.55	-117.3	7.05	464	11.07	6.94
	4/17/2018	**830**	**48,000**	1,300	95	95	2.6	4.8	0.68	-78.3	6.82	556	10.79	1.83
	11/19/2018	**310**	**32,000**	940	250	50	3.2	4.1	0.39	29.8	6.71	442	9.75	33.2
	04/16/2019	**800**	**30,000**	760	73	31	2.0	3.7	0.36	-66.0	6.50	320	9.40	5.30
	11/11/2019	**930**	**41,000**	970	100	33	1.9	4.4	0.55	70.0	6.40	390	11.00	4.70
	05/22/2020	**630**	**19,000**	410	110	17	2.1	2.8	0.99	252.0	5.05	314	15.40	7.66
	11/10/2020	**1,000**	**59,000**	**2,100**	150	72	2.7	5.2	3.62	94.3	5.57	409	10.90	14.3
SHM-13-14D	2/19/2014	7.9	**11,800**	1,190	81	48	1.9	12	0.09	-82.0	6.85	349	9.18	26.0
	10/10/2014	9.6	**20,900**	**2,910**	44	320	1.3	7.2 J	0.19	-79.6	6.75	1,233	12.40	1.24
	12/2/2016	9.1	4,900	1,400	48	130	0.93 J	7.5	2.37	23.9	6.82	478	13.71	70.0
	11/27/2017	**11**	1,600	190	77	56	1.7	7.7	3.29	159.9	6.87	332	10.76	5.58
	11/15/2018	6.1	2,600	370	83	75	1.8	6.4	0.59	31.4	6.58	474	11.00	2.51
	11/11/2019	**12**	2,600	470	74	120	1.4	7.0	0.24	29.0	6.40	490	11.00	0.78
	10/29/2020	3.0 U	50 U	380	53	120	1.9	15	0.67	158.0	5.83	305	11.40	5.90
SHM-13-14S	2/19/2014	2.0 U	241	56	58	91	1.2	9.6 J	0.59	96.3	5.88	440	6.53	1.97
	10/10/2014	2.0 U	94 J	87	75	100	1.9	8.1 J	0.45	139.4	5.87	320	12.82	0.88
	12/2/2016	3.0 U	75 U	1,300	29	150	1.3	2.9	0.28	155.4	6.74	569	10.55	4.75
	11/27/2017	4.0	280	160	51	200	2.7	0.45 J	0.27	179.1	5.71	693	12.11	32.1
	11/15/2018	3.0 U	50 U	710	35	110	1.3	13	0.83	70.5	6.16	463	10.60	3.65
	11/11/2019	1.9 J	50 U	410	42	140	1.8	19	0.39	57.0	5.90	650	11.00	0.71
	10/29/2020	1.5 J	110	27	87	120	1.8	7.3	0.67	14.5	6.56	394	11.20	12.7
SHM-13-15	2/19/2014	3.8 J	623	**4,860**	273	46	2.9	7.7 J	0.44	-172.7	6.59	642	9.16	42.3
	10/10/2014	8.1	1,050	**4,480**	315	38	2.8	5.5 J	0.15	20.4	6.56	704	13.35	0.23
	12/2/2016	5.5	1,400	**3,600**	200	82	1.8	8.2	0.24	-6.9	6.58	612	12.15	0.94
	11/27/2017	5.7	1,100	**7,200**	380	48	3.4	10	0.74	12.7	7.27	790	10.45	7.52
	11/15/2018	1.6 J	200	1,000	150	84	1.8	7.7	0.33	46.5	7.20	607	8.95	1.00
	11/11/2019	5.1	770	**5,800**	430	43	3.2	9.6	0.41	44.0	6.10	920	11.00	2.90
	10/29/2020	7.1	1,200	**4,300**	320	42	2.5	5.4	1.08	-122.0	11.20	275	19.40	15.7
SHM-93-10C	10/14/2010	--	--	--	170	23	--	1.9	0.30	-30.7	7.31	469	12.10	1.00
	10/16/2012	--	--	--	180	23	--	18	1.23	16.3	7.28	434	9.45	1.0
	10/22/2015	**12**	100 U	15 U	162	23	1.0 U	20	2.38	43.3	7.69	342	12.21	0.48
SHM-93-10D	10/29/2019	3.0 U	73	2.1 J	54	29	0.95 J	17 J	0.51	88.0	12.00	400	11.00	20.0
	11/11/2020	3.0 U	490	9.9 J	53	30	1.2	18	0.69	216.0	5.86	392	12.60	8.50
SHM-93-18B	11/13/2019	3.0 U	50 U	1.4 J	60	51	0.61 J	33	7.60	2.3	7.70	320	9.20	1.90
	11/12/2020	3.0 U	50 U	450	49	140	0.83 J	34	0.90	-24.2	6.45	322	9.10	42.0
SHM-93-22B	4/21/2010	--	--	--	380	22	--	4.4	0.11	-125.0	6.71	953	8.10	5.20
	10/11/2010	--	--	--	350	24	--	3.7	0.29	-83.2	6.52	745	9.52	1.18
	4/6/2011	--	--	--	330	26	--	3.5 U	0.23	-78.8	6.57	749	6.96	8.60
	10/11/2011	--	--	--	330	23	--	3.6	0.16	-63.0	6.36	704	11.13	5.00
	4/10/2012	--	--	--	340 J	19	--	1.9 U	0.37	-59.8	6.25	908	8.73	95,000
	10/17/2012	--	--	--	340	22	--	4.4	0.55	-141.4	6.54	415	10.83	39.0
	5/28/2013	**1,150**	**30,000**	**9,680**	337	22	2.9	4.5 U	0.22	80.4	6.57	471	8.92	71.0
	10/23/2013	**1,150**	**31,300**	**9,450**	334	21	--	4.4 J	0.39	1.8	6.59	485	10.17	1.20
	4/24/2014	**997**	**28,300 J**	**10,600 J**	329	22	2.8	2.9 J	0.14	-66.3	6.48	734	7.63	0.45
	10/8/2014	**690**	**19,300**	**11,700**	338	21	2.7	4.9 J	0.29	-43.8	6.51	503	10.27	3.44
	6/8/2015	**1,050**	**19,500**	**12,100**	309	19	2.2	3.3 J	0.65	-49.3	6.39	628	9.54	9.60

Table F-2: Historical Groundwater Monitoring Well Analytical Results (2006 - 2020)
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

Analytical Method		Dissolved Metals			Anions		General Chemistry		Field Parameters					
Analyte		Arsenic	Iron	Manganese	Alkalinity	Chloride	DOC	Sulfate	DO	ORP	pH	SPC	Temp	Turbidity
Unit		(µg/L)	(µg/L)	(µg/L)	mg/L	mg/L	mg/L	mg/L	mg/L	mV	SU	µS/cm	°C	NTU
Screening Limit*		10	9,100	1,715										
Well ID	Date													
	10/23/2015	**670**	**12,500**	**11,500**	283	18	4.0	5.2 J	0.41	2.7	5.27	475	9.13	10.6
	6/27/2016	**630**	**17,000**	**9,800**	290	18	2.2	1.5	11.31	-64.8	6.37	570	1.66	10.9
	11/17/2016	**480**	**12,000**	**9,100**	260	19	1.8	2.1	1.40	-45.9	6.47	590	10.42	23.2
	5/23/2017	**310**	**18,000**	**9,700**	230	21	2.1	1.9	0.48	1.0	6.30	626	8.73	34.7
	11/13/2017	**360**	**16,000**	**10,000**	240	25	1.8	1.9 J	0.41	-41.7	6.48	418	9.77	7.68
	4/24/2018	**270**	**17,000**	**9,500**	240	33	1.4	4.2	0.70	-34.5	6.75	601	11.13	4.84
	11/14/2018	**170**	8,600	**8,400**	230	33	1.7 U	4.4	0.48	-65.8	6.62	658	11.50	3.99
	4/12/2019	**83**	3,000	**9,500**	260	31	1.8	5.6	0.45	13.0	6.70	600	6.80	6.10
	11/04/2019	**370**	**11,000**	**10,000**	250	35	1.6	10	0.62	1.5	6.30	620	9.10	12.0
	05/21/2020	**170**	**10,000**	**9,300**	240	34	1.6	7.9	0.32	87.1	6.13	481	10.96	17.3
	11/03/2020	**300**	**12,000**	**9,000**	220	34	1.4 U	7.8	2.46	-13.9	7.52	192	9.20	4.20
SHM-93-22C	4/21/2010	--	--	--	110	10	--	6.1	1.10	-38.0	8.23	321	11.33	2.20
	10/12/2010	--	--	--	110	12	--	5.8	0.58	-103.1	7.82	286	10.86	1.05
	4/6/2011	--	--	--	120	10	--	6.0 U	0.78	-1.0	8.84	284	9.93	0.00
	10/5/2011	--	--	--	120	8.4	--	6.1	0.14	-42.0	7.50	282	12.07	1.00
	4/11/2012	--	--	--	120	9.9	--	6.6 U	1.26	-105.3	7.46	361	8.17	1,600
	10/17/2012	--	--	--	120	10	--	6.9	0.41	-163.1	8.04	140	8.40	0.30
	5/28/2013	**20**	568	140	133	10	3.6	7.5	0.45	-145.7	7.83	196	10.73	3.37
	10/23/2013	**25**	555	154	137	11	--	7.0 J	0.40	-164.8	7.79	198	10.87	0.31
	4/24/2014	**32**	397	145	140	11	3.5	6.3 J	0.17	-89.5	7.77	294	8.94	0.82
	10/8/2014	**46**	519	**8,800**	375	20	2.4	7.9 J	0.25	18.2	6.65	743	10.92	0.73
	10/23/2015	**137**	1,410	271	201	25	3.5	3.9 J	0.30	-127.1	6.78	384	10.57	0.30
	11/29/2016	**120**	850	260	200	23	2.7	1.3	0.82	-122.6	7.74	451	9.02	3.27
	11/13/2017	3.8	63 J	7.6	110	26	2.9	6.5	3.01	32.9	7.29	286	10.09	5.12
	11/14/2018	3.8	50 U	3.0 U	120	25	3.3	6.5	2.29	-62.7	7.26	404	9.15	1.18
	11/4/2019	4.3	50 U	3.0 U	120	22	3.2	7.6	2.30	31.0	7.60	320	9.00	4.30
	11/03/2020	4.4	50 U	10 U	120	20	2.8 U	5.1	8.09	257.0	5.86	46	12.00	2.99
SHM-93-24A	11/08/2019	3.0 U	50 U	7.7 J	22	180	2.1	54	9.40	124.0	5.80	713	11.50	12.4
	10/26/2020	3.0 U	50 U	6.4 J	25	190	0.68 J	55	1.07	2.6	6.17	324	12.00	124
SHM-96-5B	4/22/2010	--	--	--	330 J	19	--	4.4	0.16	-278.0	6.51	883	10.22	0.18
	10/11/2010	--	--	--	320	21	--	4.5	0.13	-35.0	6.34	685	11.16	0.24
	4/5/2011	--	--	--	340	17	--	3.8	0.19	-60.0	6.54	681	10.15	1.00
	10/6/2011	--	--	--	310	20	--	4.1	0.38	-19.8	6.15	702	12.86	4.40
	4/10/2012	--	--	--	330	18	--	1.6 U	0.25	-43.0	6.35	869	9.83	42,000
	10/15/2012	--	--	--	320	18	--	5.4	0.69	-71.6	6.56	475	14.74	52.0
	5/21/2013	**1,400**	**20,000**	**9,670**	315	19	2.7	5.4	0.36	-43.7	6.42	652	10.75	9.01
	10/22/2013	**1,660**	**24,700**	**9,980**	315	18	--	5.0 J	1.31	-69.0	6.55	560	11.55	0.58
	4/22/2014	**1,340**	**17,100**	**9,810**	345	18	2.4	4.5 J	0.73	-29.4	6.21	642	10.14	4.61
	10/9/2014	**991**	**13,100**	**10,500**	318	17	2.7	5.7 J	0.12	-54.8	6.53	484	12.11	0.41
	6/5/2015	**1,210**	**16,200**	**9,810**	296	28	2.0	6.9 J	1.36	-56.8	6.54	618	14.27	4.03
	10/21/2015	**799**	**11,000**	**11,600**	256	19	2.2	7.2	0.60	-18.3	7.42	541	13.18	0.17
	6/27/2016	**1,100**	**15,000**	**10,000**	280	20	1.8	5.1	13.74	-19.1	6.30	593	0.24	11.2
	11/17/2016	**990**	**13,000**	**11,000**	250	23	1.7	6.2	0.67	-6.9	6.59	573	13.01	0.97
	5/31/2017	**1,200**	**16,000**	**9,400**	230	27	1.7	8.0	0.98	-12.6	7.21	588	7.67	3.05
	11/10/2017	**990**	**15,000**	**9,200**	230	29	1.7	8.9	0.66	-26.1	6.79	403	10.20	25.3
	4/23/2018	**980**	**15,000**	**8,500**	220	32	1.7	13	0.78	-60.3	6.60	594	11.58	37.0
	11/26/2018	**100**	50 U	28	240	19	1.7	4.4	4.02	36.4	6.67	500	9.82	2.41
	04/23/2019	**1,100**	**14,000**	**8,300**	220	33	1.8	14	0.87	-41.0	6.50	550	8.60	19.0
	11/07/2019	**41**	50 U	23	230	23	2.5	9.6	3.40	150.0	6.80	490	10.00	4.40

Table F-2: Historical Groundwater Monitoring Well Analytical Results (2006 - 2020)
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

Analytical Method		Dissolved Metals			Anions		General Chemistry		Field Parameters					
Analyte		Arsenic	Iron	Manganese	Alkalinity	Chloride	DOC	Sulfate	DO	ORP	pH	SPC	Temp	Turbidity
Unit		(µg/L)	(µg/L)	(µg/L)	mg/L	mg/L	mg/L	mg/L	mg/L	mV	SU	µS/cm	°C	NTU
Screening Limit*		10	9,100	1,715										
Well ID	Date													
	05/19/2020	**1,100**	**15,000**	**8,000**	210	30	1.6	17	0.50	82.6	6.47	491	11.30	21.4
	11/10/2020	**720**	8,600	**7,900**	210	35	1.6	16	0.99	266.0	5.58	86	8.20	14.6
SHM-96-5C	4/22/2010	--	--	--	30	34	--	1.0 U	0.14	-267.0	6.31	1,008	9.84	0.19
	10/11/2010	--	--	--	310	31	--	2.0	0.12	-51.0	6.19	712	10.55	0.49
	4/5/2011	--	--	--	340	28	--	1.6	0.20	-32.2	6.33	744	9.38	15.0
	10/6/2011	--	--	--	310	28	--	1.7	0.22	-3.1	6.16	721	12.15	4.60
	4/10/2012	--	--	--	310	27	--	2.0 U	0.11	32.7	6.00	885	9.48	6,600
	10/17/2012	--	--	--	300	27	--	2.6	0.84	-71.0	6.30	396	11.96	0.62
	5/28/2013	**10**	2,200	**12,600**	318	24	3.8	4.5 U	0.18	-64.9	6.29	482	9.98	4.82
	10/22/2013	5.5	609	**12,900**	315	19	--	3.4 J	1.41	-20.1	6.21	529	11.63	0.10
	4/22/2014	**11**	3,980	**10,400**	326	20	3.8	2.6 J	0.16	7.8	6.18	618	9.79	3.66
	10/9/2014	**18**	7,300	**8,310**	302	18	2.8	3.5 J	0.07	-28.1	6.39	466	11.75	0.35
	10/21/2015	**40**	**22,000**	**7,820**	265	21	5.2	5.0	0.91	-33.7	7.02	637	12.13	18.0
	11/17/2016	**42**	**16,000**	**6,200**	250	19	4.4	2.1	0.18	-48.7	6.57	588	11.40	2.57
	11/10/2017	**34**	**13,000**	**6,900**	240	21	3.1	1.8	0.47	-12.9	6.66	365	9.60	4.92
	11/20/2018	**31**	**22,000**	**2,100**	130	28	1.5	1.2	0.25	15.5	6.07	360	8.93	24.2
	11/07/2019	**13**	1,900	**14,000**	240	28	3.3	8.1	0.31	-37.0	6.40	540	9.80	3.80
	11/10/2020	**29**	7,500	**9,700**	200	31	2.4	6.4	0.69	8.4	6.27	335	13.10	12.6
SHM-99-32X	10/13/2010	--	--	--	390	39	--	3.9	0.16	-77.0	6.51	879	10.49	0.42
	10/4/2011	--	--	--	380	32	--	2.4	0.33	-36.0	6.42	825	11.54	5.00
	10/17/2012	--	--	--	370	36	--	2.8	0.63	-136.4	6.54	469	10.52	28.0
	10/23/2013	**107**	**18,400**	**10,900**	342	32	--	2.9 J	0.17	-77.9	6.45	704	11.17	0.37
	10/13/2014	**94**	**16,800**	**9,670**	280	33	2.1	4.9 J	1.89	-83.0	6.64	462	11.19	17.4
	11/21/2016	**59**	4,800	**3,900**	76	55	1.2	4.9	0.35	-31.2	7.06	354	10.37	12.3
	11/28/2017	**60**	4,900	**4,000**	81	64 J	1.2	5.6	1.85	-59.1	6.91	362	10.15	4.28
	11/15/2018	6.3	1,200	1,700	50	56	1.5	5.8	2.10	170.0	6.52	289	4.09	42.1
	11/12/2019	**47**	6,700	**4,100**	78	64	1.4	17	0.16	12.0	6.40	370	9.20	7.80
	10/30/2020	**26**	4,200	**2,800**	58	72	1.2 U	11	0.97	46.3	6.42	232	13.60	2.70
SHP-01-36X	10/14/2010	--	--	--	24	40	--	9.2	0.12	-78.0	6.50	218	15.80	1.00
	10/10/2011	--	--	--	28	46	--	4.3	0.18	-43.0	5.82	208	19.76	1.00
	10/16/2012	--	--	--	40	63	--	5.1	0.36	-73.4	6.52	379	15.00	23.0
	11/19/2013	4.8	75 J	23	24	76	--	24	7.07	118.8	6.42	351	6.79	0.63
	10/9/2014	**11**	535	68	26	110	3.1	8.1 J	0.32	39.2	6.27	329	17.35	2.99
	10/27/2015	9.0	686	111	24	105	2.7	7.7	1.40	27.2	6.12	329	11.81	0.91
	11/22/2016	4.5	350	28	24	84	3.1	8.4	2.50	36.5	6.82	370	8.20	0.47
	6/2/2017	4.3	490	39	27	84	3.6	3.9	0.59	32.9	6.55	382	14.45	6.69
	11/13/2017	**17**	6,800	220	26	66	5.0	2.9	1.08	7.5	6.31	293	12.11	1.20
	4/13/2018	**11**	3,400	77	18	110	3.2	7.7	0.94	69.4	7.00	403	8.29	1.51
	11/8/2018	7.8	550	39	25	53	3.6	5.4	0.34	36.4	6.42	239	11.80	28.2
	04/12/2019	6.3	870	33	22	81	2.1	7.3	1.30	170.0	7.30	330	7.50	1.30
	11/04/2019	**11**	1,500	78	27	67	3.5	6.0	0.30	37.0	6.40	300	12.00	--
	05/20/2020	5.9	760	32	33	62	2.8	5.6	3.18	23.4	6.41	272	11.80	0.02
	11/11/2020	6.6	530	49	33	74	2.9	8.6	3.38	44.9	6.66	247	15.40	3.20
SHP-01-37X	10/14/2010	--	--	--	44	60	--	1.0 U	0.42	-43.0	6.21	300	16.68	0.29
	10/16/2012	--	--	--	37	62	--	3.0	0.38	-105.8	6.40	287	14.67	1.60
	11/19/2013	4.7	1,430	569	4.4 J	76	2.0 U	78	3.12	123.3	5.64	433	6.85	0.43
	10/9/2014	8.5	3,410	158	12	80	3.1	8.0 J	1.80	28.0	6.22	350	17.13	0.10
	10/27/2015	**14**	1,090	136	26	95	3.8	6.3	3.02	0.7	6.30	325	11.71	0.88
	11/22/2016	**11**	1,000	46	22	86	4.3	11	3.60	-28.5	7.85	367	8.70	0.71

Table F-2: Historical Groundwater Monitoring Well Analytical Results (2006 - 2020)
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

Analytical Method		Dissolved Metals			Anions		General Chemistry		Field Parameters					
Analyte		Arsenic	Iron	Manganese	Alkalinity	Chloride	DOC	Sulfate	DO	ORP	pH	SPC	Temp	Turbidity
Unit		(µg/L)	(µg/L)	(µg/L)	mg/L	mg/L	mg/L	mg/L	mg/L	mV	SU	µS/cm	°C	NTU
Screening Limit*		10	9,100	1,715										
Well ID	Date													
	6/2/2017	6.5	1,400	72	24	100	3.5	8.0	1.15	13.6	6.64	470	12.56	8.32
	11/13/2017	**13**	1,500	110	26	71	4.9	3.8	1.91	25.4	6.42	301	11.22	2.88
	4/13/2018	9.9	1,200	160	28	89	3.5	7.0	0.90	88.0	6.87	350	8.09	1.77
	11/8/2018	**17**	2,200	120	36	110	3.6	4.0	0.15	11.6	6.30	447	13.70	22.7
	04/12/2019	**15**	5,400	440	65	28	2.1	21	0.62	140.0	7.00	290	8.50	7.40
	11/04/2019	**13**	4,500	210	28	69	3.9	7.8	0.39	-4.3	6.60	310	13.00	2.60
	05/20/2020	**13**	1,500	150	37	68	2.4	6.6	3.77	-17.0	6.58	315	12.20	0.73
	11/11/2020	6.1	430	53	25	75	3.7	8.3	0.88	29.6	5.82	191	15.00	7.10
SHP-01-38A	10/14/2010	--	--	--	140	28	--	18	0.91	-70.0	6.37	433	12.81	1.00
	10/12/2011	--	--	--	200	24	--	11	0.21	-39.0	5.95	500	13.44	3.00
	10/15/2012	--	--	--	180	44	--	18	0.36	-73.1	6.19	499	12.84	30.0
	5/23/2013	**412**	**10,200**	254	64	5.3	2.1	6.3	0.12	-70.1	6.66	156	10.79	4.30
	11/19/2013	**247**	**17,900**	**2,200**	79	7.0	2.2	115	1.25	-20.7	6.14	435	12.33	0.31
	10/9/2014	**263**	**23,500**	**2,490**	94	11	20	49	0.16	-47.0	6.23	256	14.12	0.37
	10/28/2015	**314**	**38,400**	**2,950**	112	11	1.8	21	0.36	-52.8	6.28	388	12.66	1.39
	11/16/2016	**320**	**20,000**	**1,900**	78	4.3	1.4	13	0.78	-34.6	6.18	163	12.20	5.96
	6/12/2017	**190**	**15,000**	1,300	55	1.0	1.4	16	0.70	-4.2	5.34	205	13.65	9.84
	11/7/2017	**190**	**20,000**	1,500	70	2.2	1.5	8.6	0.30	-24.0	6.30	183	13.96	3.16
	4/19/2018	**140**	**12,000**	1,000	39 J	1.2	1.7	11	1.51	-33.4	6.46	142	7.21	1.45
	11/8/2018	**130**	**19,000**	1,600	61	1.8	1.5 U	10	0.34	9.9	5.94	181	12.00	21.1
	04/12/2019	**79**	**15,000**	1,300	41	1.3	1.3	8.6	0.59	130.0	6.80	140	7.30	2.40
	11/04/2019	**130**	**25,000**	**2,000**	94	8.5	1.3	13	0.37	0.8	6.00	250	12.00	2.20
	05/21/2020	**87**	**13,000**	1,200	60	0.49 J	1.1	16	0.88	23.1	7.63	330	11.70	5.23
	11/11/2020	**150**	**24,000**	**2,200**	90	14	1.4	8.0	0.45	-7.5	8.70	501	10.20	7.22
SHP-01-38B	5/23/2013	**900**	**47,100**	**2,240**	190	52	3.6	4.5 U	0.30	-109.1	6.62	583	10.78	0.00
	10/28/2015	**903**	**43,600**	**2,320**	145	43	4.4	7.0	0.15	-100.0	6.34	610	11.13	0.34
SHP-05-45A	8/9/2010	**34**	**22,100**	--	--	--	3.6	--	0.30	-32.2	6.20	294	13.97	--
	10/28/2015	**28**	**17,500**	325	109	7.5	6.3	5.0 U	--	--	--	--	--	--
SHP-05-46B	8/9/2010	**81**	**34,800**	--	--	--	14	--	0.81	3.0	5.71	662	12.93	--
	10/28/2015	7.7	802	361	94	27	12	5.0 U	--	--	--	--	--	--
SHP-2016-06A	6/15/2017	**520**	64	**3,300**	120	120	3.4	120	5.47	62.3	7.49	204	13.47	9.63
	11/28/2017	**600**	320	**2,000**	130	13	9.0	74	0.60	-105.2	6.78	413	8.25	3.32
	4/18/2018	**280**	120	**1,800**	140	10	6.0	57	1.40	-113.8	7.71	424	8.60	6.86
	11/9/2018	**480**	94	**2,600**	170	16	13	1.0 U	0.60	-183.0	7.57	427	9.21	4.55
	4/17/2019	**2,800**	1,400	**1,900**	190	16	22	150	1.50	-97.0	7.30	720	8.10	2.30
	11/5/2019	**860**	400	**2,300**	230	15	18	180	0.68	-67.0	7.20	690	10.00	1.70
	05/21/2020	**760**	160	920	140	8.7	3.2	36	3.33	1.3	6.13	143	10.80	0.02
	11/12/2020	**640**	340	1,000	150	4.9	3.3	41	0.44	2.8	8.27	399	11.90	3.15
SHP-2016-06B	6/15/2017	**830**	120	**2,500**	130	130	1.8	130	1.09	48.6	7.14	246	13.73	6.91
	11/28/2017	**1,300**	240	1,600	130	10	5.8	110	0.79	-69.5	6.81	469	7.20	8.45
	4/18/2018	**1,300**	1,800	**4,700**	240	51	36	730	0.81	-113.9	7.73	1,463	10.14	7.25
	11/7/2018	**1,300**	1,000	1,600	280	40	25	530	0.65	-75.2	7.63	1,900	10.40	41.8
	4/17/2019	**1,300**	990	1,200	260	27	21	440	0.42	-110.0	7.50	1,600	9.60	20.0
	11/5/2019	**1,200**	1,100	1,200	310	17	36	380	0.56	-96.0	7.60	1,100	11.00	6.20
	05/21/2020	**1,100**	310	430	260	7.4	14	210	0.38	-13.9	7.23	971	13.90	3.83
	11/12/2020	**1,100**	240	550	160	3.6	4.8	76	0.36	-7.8	8.98	256	9.60	7.13
SHP-2016-06C	6/14/2017	**320**	360	**1,900**	140	140	2.9	140	1.07	38.7	7.51	276	18.59	8.70
	11/28/2017	**280**	140	330	120	1.5	0.50 U	8.4	2.79	-87.1	7.08	253	7.72	9.57
	4/18/2018	**210**	97 J	220	120	1.6	1.0 U	10	0.50	-64.5	7.77	236	10.35	1.38

Table F-2: Historical Groundwater Monitoring Well Analytical Results (2006 - 2020)
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

Analytical Method		Dissolved Metals			Anions		General Chemistry		Field Parameters					
Analyte		Arsenic	Iron	Manganese	Alkalinity	Chloride	DOC	Sulfate	DO	ORP	pH	SPC	Temp	Turbidity
Unit		(µg/L)	(µg/L)	(µg/L)	mg/L	mg/L	mg/L	mg/L	mg/L	mV	SU	µS/cm	°C	NTU
Screening Limit*		10	9,100	1,715										
Well ID	Date													
	11/7/2018	**300**	340	230	120	1.8	1.0 U	22	0.38	-37.5	7.64	255	11.20	9.74
	4/17/2019	**250**	130	220	120	1.5	0.50 U	9.2	1.40	-42.0	7.30	260	9.30	4.10
	11/5/2019	**270**	110	170	120	1.8	0.40 J	12	2.20	-64.0	7.90	240	11.00	8.00
	05/21/2020	**310**	100	200	130	1.5	0.47 J	10	0.43	272.0	6.03	244	17.30	2.74
	11/12/2020	**350**	150	180	130	1.5	1.0 U	9.4	1.38	-13.5	7.05	174	8.40	42.1
SHP-2016-07A	6/13/2017	**81**	5,900	560	28	28	0.81 J	28	0.43	103.6	4.49	62	13.37	8.59
	11/30/2017	**12**	39 J	**7,300**	64	2.5	1.9	8.8	5.30	154.1	6.60	149	8.62	5.88
	4/19/2018	**84**	5,800	**5,400**	32	2.0	1.4	4.0	0.87	40.3	6.05	60	8.13	3.15
	11/9/2018	**200**	410	600	43	6.5	1.3 U	100	0.12	32.7	5.76	102	12.20	22.8
	4/22/2019	**19**	3,400	**3,600**	20	1.5	0.50 U	3.4	0.90	89.0	5.10	58	8.30	1.70
	05/20/2020	**74**	5,600	**4,100**	34	1.4	1.8	2.9	0.39	10.1	6.12	68	13.70	2.22
SHP-2016-07B	6/13/2017	7.9	270	760	99	99	3.3	99	1.34	32.3	6.67	301	19.24	7.32
	11/30/2017	**11**	230	1,700	100	4.3	1.9	42	1.47	-44.4	7.32	290	10.53	18.9
	4/19/2018	**200**	870	**2,000**	160	16	9.3	200	1.18	-45.9	7.22	630	6.94	23.2
	11/8/2018	**150**	**10,000**	**7,000**	120	2.1	4.5	4.7	0.34	-43.9	6.68	491	12.00	8.43
	4/19/2019	**80**	210	700	120	4.1	3.0	71	0.87	-8.8	7.00	380	14.00	12.0
	11/6/2019	**35**	84	350	110	2.9	1.5	36	0.98	18.0	7.10	300	13.00	28.0
	05/15/2020	**57**	110	470	130	2.6	1.6	34	4.47	16.7	7.09	211	13.30	0.02
	11/13/2020	**65**	460	580	110	2.6	1.6	30	0.30	45.5	7.46	207	12.50	6.62
SHP-2016-1A	05/23/2017	3.0 U	220	82	15	1.2	1.0 U	4.9	7.46	140.6	4.77	42	10.32	9.35
	11/14/2017	3.0 U	75 U	33	22	1.0	0.50 U	4.5	6.07	122.8	6.93	70	10.84	1.27
	11/13/2018	3.0 U	50 U	4.0 J	21	0.69	1.0 U	3.7 J	2.79	79.6	5.38	63	12.50	6.98
	04/22/2019	3.0 U	50 U	2.3 J	20	1.2	0.50 U	3.0	8.10	170.0	5.10	56	8.50	4.80
	11/08/2019	3.0 U	20 J	4.7 J	24	0.48 J	1.7	4.8	0.00	36.0	5.70	68	11.00	6.80
	05/15/2020	3.0 U	50 U	10 U	17	0.55	0.65 J	3.2	10.50	190.0	5.59	43	11.50	2.37
	11/05/2020	3.0 U	240	6.6 J	16	0.53	1.0 U	4.5	3.52	101.0	7.64	45	12.90	8.48
SHP-2016-1B	05/23/2017	**120**	**21,000**	1,200	82	2.6	3.2	0.63 J	0.21	-96.4	6.66	147	10.73	12.5
	11/14/2017	**170**	**27,000**	1,700	120	5.8	2.4	0.98 J	1.48	-46.7	7.35	281	9.81	3.07
	11/13/2018	**130**	**16,000**	970	69	3.0	2.0	2.3	0.90	-9.9	6.10	189	9.24	7.50
	04/22/2019	**120**	**18,000**	1,200	68	12	2.2	2.6	0.48	-22.0	5.70	230	11.00	1.40
	11/08/2019	**180**	**34,000**	1,700	140	11	4.0	7.3	0.89	36.0	5.70	330	10.00	6.80
	05/19/2020	**110**	**15,000**	840	66	6.7	1.9	2.2	4.54	-91.8	6.76	175	11.70	17.3
	11/05/2020	**140**	**24,000**	1,100	91	5.0	1.8 U	2.6	2.87	7.2	8.74	81	11.60	5.00
SHP-2016-2A	05/24/2017	**58**	4,300	420	110	8.3	2.5	4.6	1.15	-177.6	10.07	186	9.50	95.9
	11/20/2017	**51**	420	30	81	7.2	1.7	3.3	--	-196.3	11.91	197	9.03	13.2
	04/23/2018	**32**	430	32	92	6.4	1.6	3.9	1.76	-43.1	9.65	234	10.01	30.8
	11/15/2018	**17**	19 J	190	58	5.1	1.1	3.1	3.07	-51.4	9.44	184	9.14	22.4
	04/19/2019	**16**	22 J	450	64	3.3	0.50 U	4.8	1.10	-31.0	8.70	150	9.80	8.50
	10/24/2019	**11**	25 J	400	51	2.5	1.2	5.0	2.50	160.0	8.10	120	11.00	4.60
	05/20/2020	9.5	32 J	290	58	2.1	0.66 J	3.8	2.28	-46.9	8.47	96	11.20	2.60
	11/06/2020	8.5	120 U	290	57	2.2	1.0 U	3.6	0.78	-78.2	6.51	269	10.40	4.60
SHP-2016-2B	05/24/2017	**350**	**64,000**	**2,700**	220	16	2.7	0.47 J	0.51	-91.3	6.48	421	9.53	9.67
	11/20/2017	**550**	**65,000**	**2,900**	200	20	2.7	0.88 J	--	-69.9	8.76	528	8.30	2.27
	04/23/2018	**420**	**59,000**	**2,600**	200	18	2.6	2.2	0.81	-69.5	6.83	578	9.96	4.79
	11/15/2018	**430**	**52,000**	**2,700**	170	18	2.3	2.4	0.27	-79.6	6.79	634	8.14	1.44
	04/19/2019	**450**	**43,000**	**2,200**	150	9.6	2.2	4.3	0.48	-49.0	6.30	440	8.50	2.50
	10/24/2019	**560**	**46,000**	**2,400**	170	15	2.2	5.1	0.19	-33.0	6.50	490	9.90	3.00
	05/20/2020	**260**	**31,000**	**1,900**	120	7.7	1.8	2.3	0.46	19.5	6.38	248	8.62	1.15
	11/06/2020	**520**	**43,000**	**2,400**	10 U	14	1.8 U	3.2	1.17	151.0	6.53	97	6.60	3.40

Table F-2: Historical Groundwater Monitoring Well Analytical Results (2006 - 2020)
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

Analytical Method		Dissolved Metals			Anions		General Chemistry		Field Parameters					
Analyte		Arsenic	Iron	Manganese	Alkalinity	Chloride	DOC	Sulfate	DO	ORP	pH	SPC	Temp	Turbidity
Unit		(µg/L)	(µg/L)	(µg/L)	mg/L	mg/L	mg/L	mg/L	mg/L	mV	SU	µS/cm	°C	NTU
Screening Limit*		10	9,100	1,715										
Well ID	Date													
SHP-2016-3A	05/23/2017	4.8	1,700	190	61	2.7	3.0	3.7	1.59	-61.9	7.06	97	7.26	35.1
	11/15/2017	7.0	3,200	590	77	8.2	3.8	0.92 J	1.87	-31.4	7.96	171	8.49	1.89
	04/24/2018	3.2	5,000	600	55	4.0	1.5	3.2	1.40	-87.5	7.52	150	9.76	1.09
	11/12/2018	4.5	**9,400**	830	69	6.5	1.9	1.5	0.32	-81.4	6.53	255	11.00	0.90
	04/18/2019	4.0	8,100	530	43	2.5	0.50 U	1.4	1.10	-34.0	6.30	120	4.30	2.00
	10/28/2019	**260 R**	**36,000 R**	**2,800 R**	130 R	11 R	1.8 R	4.5 R	0.37	-52.0	6.50	160	8.70	3.00
	05/20/2020	3.1	7,400	380	37	1.9	0.90 J	2.2	1.13	94.4	6.16	85	10.10	1.09
	11/02/2020	5.3	**14,000**	670	55	14	1.3	1.7	1.01	-43.9	6.30	151	7.30	11.8
SHP-2016-3B	05/23/2017	**240**	**54,000**	**4,100**	200	18	3.5	0.56 J	0.32	-70.1	6.45	398	8.67	7.19
	11/15/2017	**270**	**53,000**	**4,000**	240	18	2.9	0.47 J	2.51	-45.4	7.87	512	8.91	1.15
	04/24/2018	**240**	**43,000**	**3,400**	170	16	2.2	1.9	0.84	-49.6	6.79	485	9.97	3.85
	11/12/2018	**240**	**43,000**	**3,200**	150	18	2.3	2.0	0.29	-72.5	6.36	570	10.10	3.62
	04/18/2019	**230**	**42,000**	**3,000**	150	12	2.3	3.4	0.52	-44.0	6.20	420	6.00	2.70
	10/28/2019	4.1 R	**11,000 R**	740 R	49 R	14 R	1.1 R	2.5 R	0.21	-86.0	6.50	240	9.10	2.90
	05/20/2020	**160**	**25,000**	**2,000**	100	5.9	1.7	2.4	0.29	55.0	6.36	202	10.00	2.22
	11/03/2020	**180**	**29,000**	**2,200**	110	5.9	1.9 U	1.8	0.87	-69.6	6.43	305	10.10	6.50
SHP-2016-4A	05/24/2017	10	3,400	150	57	4.9	2.5	6.2	0.73	-75.1	7.05	98	9.94	62.0
	11/16/2017	4.6	610	170	43	5.5	1.4	2.6	2.08	-6.5	8.30	91	7.19	20.9
	04/24/2018	3.8	1,600	710	44	7.0	0.89 J	3.7	1.23	-43.0	6.92	121	11.00	5.18
	11/12/2018	1.5 J	960	1,000	24	5.4	1.1 U	5.7	2.59	24.6	5.56	141	8.24	2.15
	04/19/2019	3.0 U	84	640	24	6.2	0.50 U	6.6	4.80	210.0	5.60	82	9.90	7.40
	11/05/2019	3.0 U	24 J	580	16	8.9	0.63 J	7.8	2.70	50.0	6.30	84	8.10	9.10
	05/21/2020	3.0 U	68	70	11	4.2	0.70 J	6.9	6.48	153.0	5.82	46	11.20	1.60
	11/06/2020	3.0 U	50 U	110	17	4.2	1.0 U	4.6	0.72	-5.1	6.40	157	11.20	2.79
SHP-2016-4B	05/24/2017	**1,100**	**75,000**	**1,900**	220	17	5.5	1.0 U	0.27	-95.4	6.50	415	8.90	6.68
	11/16/2017	**1,800**	**62,000**	1,400	230	18	2.6	0.78 J	3.76	-58.9	7.79	524	7.68	2.65
	04/23/2018	**1,300**	**55,000**	1,500	190	17	2.3	2.1	0.75	-64.8	6.71	541	9.37	6.51
	11/12/2018	**1,400**	**53,000**	1,500	160	16	2.3	2.6	0.50	-109.0	6.30	594	8.86	23.1
	04/19/2019	**1,400**	**41,000**	1,300	130	10	1.9	4.7	0.62	-62.0	6.10	370	10.00	4.20
	11/05/2019	**1,500**	**50,000**	**2,000**	170	17	1.8	5.4	--	-60.0	6.50	490	8.30	8.10
	05/21/2020	**650**	**29,000**	**1,900**	91	4.0	1.4	4.0	0.39	4.4	6.52	207	10.00	0.09
	11/06/2020	**1,700**	**48,000**	**2,600**	160	22	1.7 U	5.1	4.27	148.0	6.19	40	10.30	7.20
SHP-2016-5A	05/24/2017	2.3 J	8,000	260	63	27	18	1.0 U	0.26	-78.3	6.76	162	9.18	9.94
	11/16/2017	2.2 J	4,900	140	73	17	8.6	0.76 J	1.60	-59.4	8.19	174	8.19	5.74
	04/24/2018	2.5 J	3,900	110	70	14	7.9	2.8	0.40	-58.5	7.02	191	11.58	7.68
	11/14/2018	2.8 J	4,000	140	66	40	5.6	6.7	0.24	14.6	6.26	375	9.69	1.52
	04/23/2019	3.9	3,200	100	67	25	6.3	6.7	0.59	-9.9	6.50	240	8.80	7.90
	11/05/2019	3.2	4,400	190	65	67	4.1	4.8	0.45	30.0	6.20	380	8.10	8.10
	05/21/2020	3.0	2,000	150	60	31	6.5	2.1	0.23	114.0	5.96	180	9.60	4.63
	11/09/2020	3.9	2,200	200	56	39	5.5	2.7	0.76	-87.7	6.56	339	12.80	2.10
SHP-2016-5B	05/24/2017	**620**	**66,000**	**4,100**	240	19	4.4	1.0 U	0.59	-76.9	6.40	462	9.31	7.86
	11/20/2017	**700**	**64,000**	**4,700**	200	19	3.3	0.63 J	--	-64.1	8.44	518	9.08	1.96
	04/24/2018	**620**	**57,000**	**4,300**	200	19	2.8	2.3	0.75	-71.5	7.19	578	10.81	5.29
	11/14/2018	**520**	**52,000**	**4,000**	190	21	2.6	1.2	0.87	-81.0	6.85	735	8.21	6.82
	04/23/2019	**610**	**64,000**	**5,100**	180	21	2.6	0.81 J	0.69	-81.0	6.70	600	9.20	37.0
	11/05/2019	**720**	**66,000**	**3,500**	210	20	2.5	5.2	0.34	-70.0	6.50	590	8.50	13.0
	05/21/2020	**470**	**47,000**	**2,500**	150	12	2.6	1.6	0.33	61.9	5.99	352	10.30	3.62
	11/09/2020	**730**	**57,000**	**2,600**	160	25	2.7 U	9.6	1.50	0.2	5.92	118	7.90	67.9
SHP-99-29X	10/12/2010	--	--	--	130	2.5	--	4.9	0.13	-8.8	5.67	270	11.90	1.00

Table F-2: Historical Groundwater Monitoring Well Analytical Results (2006 - 2020)
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

Analytical Method		Dissolved Metals			Anions		General Chemistry		Field Parameters					
Analyte		Arsenic	Iron	Manganese	Alkalinity	Chloride	DOC	Sulfate	DO	ORP	pH	SPC	Temp	Turbidity
Unit		(µg/L)	(µg/L)	(µg/L)	mg/L	mg/L	mg/L	mg/L	mg/L	mV	SU	µS/cm	°C	NTU
Screening Limit*		10	9,100	1,715										
Well ID	Date													
	10/11/2012	--	--	--	110	4.1	--	3.0 J	0.27	-1.0	5.54	287	12.07	6.00
	10/17/2012	--	--	--	92	1.6	--	4.8	0.29	-75.7	5.82	191	11.32	3.60
	10/22/2013	**2,760**	**43,300**	**6,430**	101	2.3	--	5.6 J	0.90	-48.3	6.02	230	13.10	4.29
	10/7/2014	**3,000**	**49,100**	**8,510**	120	3.0	1.5	7.8 J	0.13	-17.8	5.92	180	11.60	13.2
	10/22/2015	**3,810**	**48,500**	**8,340**	108	2.8	1.5	6.2	0.35	27.3	5.73	243	12.31	3.35
	11/22/2016	**3,900**	**57,000**	**9,600**	140	2.3	1.5	6.1	1.03	-4.1	5.97	229	11.41	7.89
	11/9/2017	**2,100**	**47,000**	**2,500**	98	3.5	2.4	2.0	0.40	4.0	6.47	207	10.70	8.70
	11/8/2018	**1,200**	**50,000**	**2,700**	81	4.6	3.1	1.9	0.56	22.7	7.24	265	12.10	49.5
	11/06/2019	**1,600**	**42,000**	**3,900**	110	5.5	2.8	5.1	0.51	14.0	5.60	240	11.00	4.10
	11/2/2020	**2,300**	**44,000**	**5,500**	100	2.3	2.4	3.2	0.21	-86.0	6.50	240	9.10	2.90
SHP-99-31A	10/13/2010	--	--	--	32	46	--	5.6	0.11	6.4	5.83	241	13.63	0.24
	10/5/2011	--	--	--	38	3.0	--	6.6	0.28	3.2	5.55	151	15.55	1.80
	10/18/2012	--	--	--	22	46	--	15	0.42	-6.0	5.78	169	13.71	2.20
	10/23/2013	**14**	4,210	311	15	26	--	9.7 J	1.02	41.9	5.83	145	12.48	3.79
	10/29/2015	**19**	7,300	443	17	63	2.4	7.4	0.48	20.5	5.48	271	13.07	4.44
	11/02/2020	**20**	7,600	270	14 U	20	3.9	7.4	1.10	-37.1	6.61	308	6.70	4.60
SHP-99-31B	8/12/2010	**29**	**14,600**	478	86	4.0	6.5	3.0	0.19	33.9	6.03	186	10.74	--
	10/13/2010	--	--	--	86	3.4	--	3.8	0.15	-71.0	6.27	211	10.58	0.19
	10/5/2011	--	--	--	83	3.3	--	4.1	0.22	-46.0	6.22	201	11.80	0.19
	10/18/2012	--	--	--	73	2.3	--	5.3	0.31	-85.0	6.31	175	10.42	1.30
	10/23/2013	**62**	**9,460**	448	64	4.3	--	7.6 J	2.42	-57.7	6.56	176	11.15	1.02
	10/29/2015	**59**	7,430	340	57	5.0	3.5	6.2	0.28	-23.4	5.81	156	11.04	0.84
	10/30/2020	1.9 J	17 J	1.5 J	35	8.8	2.3	4.7	6.46	97.6	6.78	77	6.70	5.30
SHP-99-31C	10/13/2010	--	--	--	350	30	--	3.5	0.16	-80.0	6.46	811	10.61	0.25
	10/5/2011	--	--	--	340	27	--	3.9	0.27	-59.2	6.50	809	11.61	1.90
	10/18/2012	--	--	--	310	28	--	5.2	0.64	-117.1	6.75	641	13.81	19.0
	10/23/2013	**205**	**16,400**	**6,160**	348	32	--	5.7 J	0.23	-95.7	6.70	737	11.13	3.71
	10/13/2014	**180**	**15,800**	**5,060**	315	25	4.2	6.0 J	0.17	-78.4	6.71	634	10.85	4.22
	10/29/2015	**194**	**14,700**	**5,200**	313	23	3.6	5.0	1.31	-73.9	6.62	663	13.39	8.32
	11/29/2016	**200**	**17,000**	**5,900**	330	25	3.0	3.9	0.67	-57.7	6.66	534	9.35	6.59
	11/28/2017	**200**	**17,000**	**5,600**	320	31	2.5	4.4	3.83	-26.6	6.73	675	8.64	1.99
	11/29/2018	**160**	**15,000**	**5,300**	270	33	2.6	4.6	1.34	-46.4	6.87	695	8.88	2.39
	11/14/2019	**140**	**11,000**	**4,700**	250	31	2.0	5.4	0.78	-78.0	6.70	300	9.40	6.40
	10/30/2020	**140**	**12,000**	**4,600**	230	31	1.9 U	4.7	1.06	-36.1	6.63	241	8.80	11.4

Table F-2: Historical Groundwater Monitoring Well Analytical Results (2006 - 2020)
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

Analytical Method		Dissolved Metals			Anions		General Chemistry		Field Parameters					
Analyte		Arsenic	Iron	Manganese	Alkalinity	Chloride	DOC	Sulfate	DO	ORP	pH	SPC	Temp	Turbidity
Unit		(µg/L)	(µg/L)	(µg/L)	mg/L	mg/L	mg/L	mg/L	mg/L	mV	SU	µS/cm	°C	NTU
Screening Limit*		10	9,100	1,715										
Well ID	Date													

Notes:

*Screening Limits: Shepley's Hill Landfill (SHL) Cleanup Goals

Screening Limits Source: USACE. 1995. Record of Decision, Shepley's Hill Landfill Operable Unit, Fort Devens, Massachusetts. September.

Analytical Parameters:

#	= Above Cleanup Goal
	= Spring 2020 sampling result
	= Fall 2020 sampling result

Acronyms and Abbreviations:

--	no data available
°C	degrees Celsius
µg/L	microgram per liter
µS/cm	microsiemen per centimeter
DO	dissolved oxygen
DOC	dissolved organic carbon
mg/L	milligram per liter
mV	millivolt
NTU	Nephelometric Turbidity Unit
ORP	oxidation-reduction potential
SPC	specific conductivity
SU	standard unit
Temp	temperature

Qualifiers

J	The analyte was positively identified, the quantitation is an estimation.
U	The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection limit.

Table F-3: Historical Gas Vent Analytical Results
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

ID	Date	Time	VOC (ppm)	O_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	O_2 (%)	Purge Rate (lpm)	Purge Time (sec)	VOC (ppm)	O_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	CH_4 (%)	Barometric Pressure ("Hg)
GV-1	10/26/2012	12:54	0.2	8.6	0	16	0	9.5	0.8	4	167	0.5	8.0	0	23	0	10.8	1.1	29.87
	11/12/2013	8:46	0.0	20.9	0	0	0	0.1	0.0	4	167	0.0	20.9	0	0	0	0.2	0.0	29.98
	10/17/2014	14:49	0.0	21.0	0.0	0.0	0.0	0.0	0.0	4	167	0.0	18.4	0.0	3.0	4.0	1.9	0.1	29.32
	10/20/2015	9:21	0.0	20.8	0.0	0.0	0.0	0.1	0.0	4	167	0.0	20.9	0.0	0.0	0.0	0.0	0.0	29.90
	10/18/2016	17:48	0.1	8.8	0.0	21	0.0	9.4	1.1	4	167	0.1	6.1	0.0	24	0.0	11.8	1.2	29.55
	10/18/2017	15:05	0.0	19.6	0.0	0.0	0.0	1.0	0.0	4	167	0.0	11.4	0.0	12.0	0.0	6.9	0.3	29.98
	10/18/2018	14:28	0.0	21.3	0.0	0.0	0.0	0.4	0.0	4	167	0.0	21.1	0.0	0.0	0.0	0.5	0.0	30.03
	10/16/2019	14:07	0.0	9.1	0.0	64.0	0.0	8.4	1.3	4	167	0.0	5.6	0.0	66.0	0.0	11.0	3.3	29.71
	10/13/2020	13:15	0.5	8.8	0.0	32.0	0.0	9.2	0.8	4	167	0.5	8.8	0.0	31.0	0.0	9.1	0.8	29.57
GV-2	10/26/2012	13:05	0.4	9.9	0	87	0	9.6	4.3	4	167	0.6	4.0	0	>100	0	15.4	9.3	29.87
	11/12/2013	8:56	0.0	20.9	0	0	0	0.1	0.0	4	167	0.0	20.9	0	0	0	0.1	0.0	29.98
	10/17/2014	14:40	0.0	20.8	1.0	0.0	0.0	0.1	0.0	4	167	0.0	15.2	0.0	68.0	4.0	5.1	3.5	29.32
	10/20/2015	10:50	0.1	19.4	0.0	27.0	0.0	1.2	0.8	4	167	0.1	16.4	0.0	83.0	1.0	4.2	2.5	29.89
	10/18/2016	17:43	0.1	8.7	0.0	99	0.0	10.3	4.9	4	167	0.0	3.9	0.0	100	0.0	14.8	7.2	29.55
	10/18/2017	14:58	0.0	20.5	0.0	5.0	0.0	0.5	0.1	4	167	0.0	11.3	0.0	69.0	0.0	6.7	2.7	29.99
	10/18/2018	14:23	0.0	21.6	0.0	0.0	0.0	0.0	0.0	4	167	0.0	21.6	0.0	0.0	0.0	0.1	0.0	30.03
	10/16/2019	14:15	0.0	11.5	0.0	74.0	0.0	7.5	3.0	4	167	0.0	2.6	0.0	99.0	0.0	13.7	7.7	29.71
	10/13/2020	13:35	0.4	1.2	0.0	45.0	0.0	11.3	9.6	4	167	0.7	1.1	0.0	99.0	0.0	11.3	9.8	29.57
GV-3	10/26/2012	13:22	0.0	20.9	0	0	0	0.0	0.0	4	167	0.0	20.9	0	0	0	0.0	0.0	29.87
	11/12/2013	9:09	0.1	20.9	0	0	0	0.1	0.0	4	167	0.0	20.9	0	0	0	0.1	0.0	29.98
	10/17/2014	14:25	0.0	20.7	0.0	0.0	0.0	0.0	0.0	4	167	0.0	20.9	0.0	0.0	0.0	0.0	0.0	29.32
	10/20/2015	8:50	0.0	20.5	0.0	0.0	0.0	0.0	0.0	4	167	0.0	20.5	0.0	0.0	0.0	0.1	0.1	29.88
	10/18/2016	17:31	0.0	18.3	0.0	13	0.0	1.8	0.6	4	167	0.0	19.9	0.0	0	0.0	0.0	0.0	29.55
	10/18/2017	14:39	0.0	20.9	0.0	0.0	0.0	0.1	0.0	4	167	0.0	20.9	0.0	0.0	0.0	0.1	0.0	29.98
	10/18/2018	14:12	0.0	21.3	0.0	0.0	0.0	0.0	0.0	4	167	0.0	21.4	0.0	0.0	0.0	0.0	0.0	30.03
	10/16/2019	13:40	0.0	21.1	0.0	3.0	0.0	0.0	0.1	4	167	0.0	20.9	0.0	0.0	0.0	0.0	0.1	29.71
	10/13/2020	13:25	0.0	20.9	0.0	0.0	0.0	0.0	0.0	4	167	0.0	20.9	0.0	0.0	0.0	0.0	0.0	29.57
GV-4	10/26/2012	13:15	0.6	7.4	0	72	0	10.4	3.4	4	167	0.5	11.3	0	39	0	6.8	1.9	29.87
	11/12/2013	9:18	0.0	20.9	0	0	0	0.1	0.0	4	167	0.0	20.9	0	0	0	0.1	0.0	29.98
	10/17/2014	14:33	0.0	18.0	0.0	21.0	5.0	2.5	1.0	4	167	0.2	1.8	0.0	100.0	0.0	14.3	8.1	29.32
	10/20/2015	9:00	0.1	10.0	0.0	71.0	0.0	8.7	2.1	4	167	0.2	10.1	0.0	100.0	0.0	10.1	3.1	29.88
	10/18/2016	17:37	0.2	8.7	0.0	80	0.0	11.0	4.0	4	167	0.2	5.2	0.0	100	0.0	14.0	5.3	29.55
	10/18/2017	14:48	0.0	13.3	0.0	61.0	0.0	4.8	2.1	4	167	0.0	15.2	0.0	30.0	0.0	4.1	1.0	29.97
	10/18/2018	14:18	0.0	21.5	0.0	0.0	0.0	0.0	0.0	4	167	0.0	21.5	0.0	0.0	0.0	0.0	0.0	30.03
	10/16/2019	13:58	0.0	5.5	0.0	91.0	0.0	11.7	5.1	4	167	0.0	9.3	0.0	63.0	0.0	8.5	2.7	29.71
	10/13/2020	13:45	0.5	5.4	0.0	99.0	0.0	12.8	6.4	4	167	0.5	5.8	0.0	99.0	0.0	12.3	6.0	29.55
GV-5	10/26/2012	13:55	1.5	13.4	0	1	0	5.2	0.0	4	167	0.2	14.0	0	0	0	4.8	0.0	29.87
	11/12/2013	9:48	0.0	20.9	0	0	0	0.1	0.0	4	167	0.0	20.9	0	0	0	0.1	0.0	29.98
	10/17/2014	14:02	0.0	6.9	0.0	0.0	5.0	6.7	0.0	4	167	0.0	5.9	0.0	0.0	5.0	7.9	0.0	29.32
	10/20/2015	9:12	0.1	19.7	0.0	4.0	0.0	0.6	0.1	4	167	0.0	20.5	0.0	0.0	0.0	0.4	0.0	29.88
	10/18/2016	17:01	0.0	14.2	0.0	0	0.0	5.0	0.0	4	167	0.0	12.4	0.0	0	0.0	6.3	0.0	29.55
	10/18/2017	13:47	0.0	18.0	0.0	0.0	0.0	1.3	0.0	4	167	0.0	18.1	0.0	0.0	0.0	1.9	0.0	29.98
	10/18/2018	12:58	0.0	21.7	0.0	0.0	0.0	0.1	0.0	4	167	0.0	21.8	0.0	1.0	0.0	0.1	0.1	30.02
	10/16/2019	14:43	0.0	12.2	0.0	6.0	0.0	6.4	6.2	4	167	0.0	12.6	0.0	0.0	0.0	6.2	0.2	29.71
	10/13/2020	13:55	0.0	12.8	0.0	4.0	0.0	5.6	0.1	4	167	0.0	13.5	0.0	0.4	0.0	5.9	0.1	29.55
GV-6	10/26/2012	13:31	0.4	5.8	0	>100	0	12.8	7.5	4	167	0.7	5.7	0	85	0	11.4	4.2	29.87
	11/12/2013	9:29	0.0	20.9	0	0	0	0.1	0.0	4	167	0.0	20.9	0	0	0	0.1	0.0	29.98
	10/17/2014	14:14	70.1	2.6	0.0	>100	3.0	14.3	8.0	4	167	0.1	0.5	0.0	>100	0.0	17.5	9.4	29.32
	10/20/2015	13:16	0.0	3.3	0.0	100.0	0.0	13.7	7.6	4	167	0.0	1.7	0.0	100.0	0.0	14.8	7.8	29.88
	10/18/2016	17:29	0.0	6.5	0.0	100	0.0	14.1	6.0	4	167	0.1	6.9	0.0	100	0.0	14.0	5.7	29.55
	10/18/2017	14:31	0.0	14.8	0.0	46.0	0.0	4.0	1.0	4	167	0.0	14.3	0.0	49.0	0.0	43.0	1.8	29.97
	10/18/2018	14:06	0.0	21.1	0.0	0.0	0.0	0.1	0.0	4	167	0.0	21.1	0.0	0.0	0.0	0.1	0.0	30.03
	10/16/2019	13:38	1.0	1.6	0.0	97.0	0.0	14.4	6.5	4	167	0.0	1.6	0.0	51.0	0.0	14.7	5.4	29.71
	10/13/2020	14:10	0.7	4.5	0.0	99.0	0.0	12.9	2.8	4	167	0.7	4.0	0.0	99.0	0.0	12.0	2.9	29.55
GV-7	10/26/2012	14:15	0.5	1.1	0	>100	2	12.1	6.6	4	167	0.4	1.2	0	63	0	11.1	3.2	29.87
	11/12/2013	9:57	0.0	20.7	0	0	0	0.1	0.0	4	167	0.0	20.5	0	0	0	0.1	0.0	29.98
	10/17/2014	13:47	0.0	2.9	0.0	>100	0.0	11.4	7.6	4	167	0.0	0.6	0.0	>100	0.0	13.8	8.2	29.32
	10/20/2015	11:30	0.0	5.4	0.0	100.0	0.0	11.6	8.2	4	167	0.0	1.1	0.0	100.0	1.0	14.1	7.9	29.89
	10/18/2016	17:10	0.0	11.8	0.0	100	0.0	7.7	5.6	4	167	0.0	2.5	0.0	100	0.0	16.8	11.0	29.55
	10/18/2017	13:37	0.0	18.2	0.0	10.0	0.0	0.9	0.3	4	167	0.0	18.6	0.0	5.0	0.0	0.8	0.0	29.98
	10/18/2018	12:47	0.0	21.6	1.0	1.0	0.0	0.0	0.1	4	167	0.0	21.6	1.0	0.0	0.0	0.0	0.0	30.02
	10/16/2019	14:27	0.0	0.3	0.0	99.0	0.0	15.2	13.3	4	167	0.0	0.1	0.0	99.0	0.0	15.1	12.1	29.71
	10/13/2020	14:20	0.5	0.2	0.0	99.0	0.0	15.8	12.4	4	167	0.3	1.5	0.0	99.0	0.0	15.0	12.2	29.55
GV-8	10/26/2012	14:05	0.7	10.1	0	1	0	7.0	0.1	4	167	0.1	9.1	0	0	1	7.4	0.0	29.87
	11/12/2013	10:04	0.0	20.3	0	0	0	0.1	0.0	4	167	0.0	20.2	0	0	0	0.1	0.0	29.98
	10/17/2014	13:54	0.0	6.7	0.0	15.0	6.0	6.6	0.8	4	167	0.0	5.8	0.0	9.0	6.0	7.7	0.4	29.32
	10/20/2015	11:39	0.0	12.7	0.0	45.0	0.0	6.2	1.4	4	167	0.0	10.6	0.0	27.0	0.0	7.3	0.8	29.89
	10/18/2016	16:53	0.0	13.6	0.0	9	0.0	5.2	0.4	4	167	0.0	8.1	0.0	2	0.0	9.6	0.1	29.55
	10/18/2017	13:56	0.0	17.7	0.0	9.0	0.0	1.8	0.1	4	167	0.0	17.8	0.0	0.0	0.0	1.9	0.0	29.95
	10/18/2018	12:52	0.0	21.7	1.0	0.0	0.0	0.1	0.0	4	167	0.0	21.5	0.0	0.0	0.0	0.1	0.0	30.02
	10/16/2019	14:26	0.0	8.2	0.0	49.0	0.0	9.0	2.5	4	167	0.0	5.8	0.0	5.0	0.0	11.1	0.3	29.71
	10/13/2020	14:30	0.0	9.2	0.0	58.0	0.0	8.7	1.5	4	167	0.6	9.0	0.0	59.0	0.0	8.8	1.5	29.55
GV-9	10/26/2012	13:40	0.6	3.0	0	99	0	11.7	4.9	4	167	1.2	3.2	0	>100	0	18.1	22.0	29.87
	11/12/2013	9:39	0.0	20.9	0	0	0	0.1	0.0	4	167	0.0	20.9	0	0	0	0.1	0.0	29.98
	10/17/2014	14:10	0.2	1.0	0.0	>100	0.0	16.8	9.1	4	167	0.2	0.3	0.0	0.0	0.0	18.7	17.0	29.32
	10/20/2015	13:24	0.2	7.1	0.0	100.0	0.0	11.2	5.9	4	167	0.4	0.7	0.0	100.0	0.0	19.1	17.8	29.88
	10/18/2016	17:17	0.0	5.5	0.0	100	0.0	15.7	7.6	4	167	0.0	4.9	0.0	100	0.0	17.1	13.7	29.55
	10/18/2017	14:23	0.0	14.9	0.0	49.0	0.0	3.3	1.5	4	167	0.0	10.1	0.0	100.0	0.0	9.1	10.3	29.98
	10/18/2018	14:00	0.0	20.7	0.0	3.0	0.0	0.3	0.2	4	167	0.0	20.1	0.0	11.0	0.0	0.7	0.5	30.03
	10/16/2019	13:27	0.0	0.0	0.0	40.0	0.0	16.0	8.8	4	167	0.0	0.1	0.0	99.0	0.0	17.0	13.1	29.71
	10/13/2020	13:00	0.5	2.3	0.0	99.0	0.0	16.0	6.6	4	167	0.5	1.1	0.0	99.0	0.0	16.2	6.7	29.57
GV-10	10/26/2012	14:22	0.3	2.8	0	50	2	10.5	2.6	4	167	0.2	4.0	0	30	2	9.5	1.5	29.87
	11/12/2013	10:22	0.0	20.7	0	0	0	0.2	0.0	4	167	0.0	20.6	0	0	0	0.1	0.0	29.98
	10/17/2014	13:30	0.0	1.9	0.0	55.0	0.0	11.6	2.7	4	167	0.0	1.3	0.0	54.0	0.0	12.1	2.7	29.32
	10/20/2015	13:03	0.0	4.2	0.0	100.0	0.0	11.6	4.2	4	167	0.0	2.0	0.0	100.0	0.0	12.4	4.3	29.89
	10/18/2016	16:40	0.0	6.1	0.0	100	0.0	14.4	8.4	4	167	0.0	2.2	0.0	100	0.0	16.3	7.8	29.55
	10/18/2017	14:17	0.0	18.6	0.0	0.0	0.0	0.9	0.0	4	167	0.0	17.6	0.0	0.0	0.0	1.3	0.0	29.98
	10/18/2018	12:41	0.0	21.6	1.0	0.0	0.0	0.0	0.0	4	167	0.0	21.6	1.0	0.0	0.0	0.0	0.0	30.02
	10/16/2019	13:17	0.0	1.1	0.0	51.0	0.0	14.1	3.0	4	167	0.0	2.0	0.0	45.0	0.0	13.6	2.4	29.71
	10/13/2020	12:50	0.5	2.1	0.0	99.0	0.0	12.4	2.2	4	167	0.5	1.9	0.0	99.0	0.0	13.2	3.2	29.55
GV-11	10/26/2012	14:30	0.2	11.8	0	9	0	5.2	0.5	4	167	0.1	11.3	0	16	0	5.1	0.8	29.87

Table F-3: Historical Gas Vent Analytical Results
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

ID	Date	Time	VOC (ppm)	O_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	O_2 (%)	Purge Rate (lpm)	Purge Time (sec)	VOC (ppm)	O_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	CH_4 (%)	Barometric Pressure ("Hg)
	11/12/2013	10:14	0.0	20.6	0	0	0	0.1	0.0	4	167	0.0	20.6	0	0	0	0.2	0.0	29.98
	10/17/2014	13:37	0.0	13.3	0.0	5.0	4.0	4.9	0.2	4	167	0.0	6.9	0.0	2.0	6.0	5.0	1.0	29.32
	10/20/2015	12:54	0.0	14.1	0.0	0.0	0.0	4.5	1.1	4	167	0.0	13.7	0.0	22.0	1.0	4.8	0.6	29.89
	10/18/2016	16:46	0.1	13.8	0.0	23	0.0	4.9	1.1	4	167	0.0	12.2	0.0	15	0.0	5.6	0.7	29.55
	10/18/2017	14:12	0.0	19.5	0.0	3.0	0.0	0.7	0.0	4	167	0.0	18.0	0.0	5.0	0.0	1.5	0.0	29.98
	10/18/2018	12:35	0.0	21.3	0.0	0.0	0.0	0.0	0.0	4	167	0.0	21.4	0.0	0.0	0.0	0.1	0.0	30.02
	10/16/2019	13:09	0.0	10.9	0.0	99.0	0.0	6.8	2.5	4	167	0.0	5.9	0.0	99.0	0.0	6.5	9.0	29.71
	10/13/2020	12:40	0.6	11.9	0.0	78.0	0.0	6.8	2.2	4	167	0.5	11.8	0.0	75.0	0.0	6.0	2.6	29.57
GV-12	10/26/2012	14:40	0.1	0.9	0	>100	0	9.3	6.1	4	167	0.2	1.0	0	>100	1	10.1	6.5	29.87
	11/12/2013	11:00	0.0	20.4	0	0	0	0.2	0.0	4	167	0.0	20.6	0	0	0	0.2	0.0	29.98
	10/17/2014	12:55	0.0	12.6	1.0	14.0	2.0	5.3	0.7	4	167	0.0	4.9	0.0	24.0	5.0	7.4	1.2	29.32
	10/20/2015	13:35	0.1	7.5	0.0	100.0	0.0	10.2	8.3	4	167	0.0	0.8	0.0	100.0	0.0	14.6	11.8	29.88
	10/18/2016	16:16	0.0	3.1	0.0	100	0.0	14.7	9.5	4	167	0.0	1.5	0.0	100	0.0	15.7	9.7	29.55
	10/18/2017	13:11	0.0	20.5	0.0	0.0	0.0	0.2	0.0	4	167	0.0	20.3	0.0	0.0	10.0	0.4	0.0	29.99
	10/18/2018	12:28	0.0	21.2	1.0	0.0	0.0	0.0	0.0	4	167	0.0	21.3	1.0	0.0	0.0	0.0	0.0	30.02
	10/16/2019	13:00	0.0	3.3	0.0	95.0	0.0	10.7	7.0	4	167	0.0	0.0	0.0	99.0	0.0	12.4	8.8	29.71
	10/13/2020	12:25	0.4	2.8	0.0	99.0	0.0	14.6	9.9	4	167	0.3	1.2	0.0	99.0	0.0	14.2	9.6	29.57
GV-13	10/26/2012	15:51	1.5	19.4	0	77	0	2.0	3.8	4	167	0.5	18.1	0	>100	0	3.7	5.2	29.77
	11/12/2013	11:11	0.1	20.6	0	0	0	0.4	0.0	4	167	0.0	20.5	0	6	0	0.4	0.0	29.98
	10/17/2014	10:01	0.0	20.9	0.0	0.0	0.0	0.1	0.0	4	167	0.0	20.7	0.0	0.0	0.0	0.2	0.0	29.40
	10/20/2015	13:45	0.1	20.1	0.0	15.0	0.0	0.7	0.4	4	167	0.1	19.3	0.0	32.0	0.0	1.2	0.8	29.88
	10/18/2016	8:44	0.0	19.6	0.0	0	0.0	0.3	0.0	4	167	0.0	19.7	0.0	0	0.0	0.1	0.0	29.73
	10/18/2017	9:40	0.0	20.9	0.0	0.0	0.0	0.4	0.0	4	167	0.0	20.9	0.0	0.0	0.0	0.4	0.0	30.02
	10/18/2018	9:04	0.0	20.9	0.0	0.0	0.0	0.1	0.0	4	167	0.0	20.9	0.0	0.0	0.0	0.1	0.0	30.06
	10/16/2019	11:44	0.0	12.4	0.0	47.0	0.0	5.0	3.4	4	167	0.0	16.2	0.0	30.0	0.0	2.5	2.1	29.85
	10/13/2020	11:25	0.6	19.2	0.0	40.0	0.0	4.8	2.1	4	167	0.0	11.5	0.0	82.0	0.0	33.0	1.5	29.61
GV-14	10/26/2012	15:37	0.6	20.9	0	>100	0	15.7	29.5	4	167	0.5	3.0	0	>100	0	19.7	34.9	29.87
	11/12/2013	12:30	0.2	11.2	0	>100	0	6.3	7.9	4	167	0.3	8.1	0	>100	0	8.3	10.3	29.91
	10/17/2014	10:12	0.0	20.1	0.0	29.0	30.0	1.6	1.7	4	167	0.2	17.1	0.0	100.0	0.0	4.4	6.1	29.40
	10/20/2015	14:00	0.1	20.4	0.0	15.0	0.0	0.6	0.3	4	167	0.0	13.9	0.0	100.0	0.0	7.0	11.9	29.88
	10/18/2016	10:00	0.0	19.3	0.0	7	0.0	0.7	0.3	4	167	0.0	19.7	0.0	2	0.0	0.3	0.1	29.72
	10/18/2017	10:20	0.0	20.5	0.0	0.0	0.0	0.6	0.0	4	167	0.0	20.9	0.0	0.0	0.0	0.3	0.0	30.02
	10/18/2018	12:21	0.0	21.3	1.0	0.0	0.0	0.0	0.0	4	167	0.0	21.3	1.0	0.0	0.0	0.0	0.0	30.02
	10/16/2019	11:55	0.0	20.6	0.0	99.0	0.0	0.2	0.2	4	167	0.0	3.7	0.0	99.0	0.0	15.1	29.3	29.85
	10/13/2020	11:35	0.6	19.1	0.0	99.0	0.0	21.0	9.9	4	167	0.0	19.7	0.0	99.0	0.0	6.1	10.0	29.61
GV-15	10/26/2012	15:27	1.0	1.5	0	>100	4	22.5	24.3	4	375	0.4	1.5	0	>100	1	22.6	23.9	29.87
	11/12/2013	14:39	0.3	6.4	0	75	0	10.5	7.9	4	375	0.2	4.8	0	>100	0	11.4	8.6	29.91
	10/17/2014	10:56	0.0	15.2	1.0	25.0	5.0	5.0	1.3	4	375	0.0	20.7	0.0	0.0	0.0	0.1	0.0	29.33
	10/20/2015	16:15	0.1	20.6	0.0	23.0	0.0	0.7	0.6	4	375	0.1	3.1	0.0	100.0	0.0	21.2	24.9	29.88
	10/18/2016	16:05	0.0	2.7	0.0	100	0.0	23.3	22.3	4	375	0.0	2.8	0.0	100	0.0	22.9	21.2	29.55
	10/18/2017	13:02	0.0	16.9	0.0	35.0	0.0	2.4	1.1	4	375	0.0	16.0	0.0	42.0	0.0	3.2	1.4	29.98
	10/18/2018	12:11	0.0	21.5	0.0	0.0	0.0	0.0	0.1	4	375	0.0	21.4	0.0	0.0	0.0	0.0	0.0	30.10
	10/16/2019	12:10	0.0	1.8	0.0	99.0	0.0	21.9	23.5	4	375	0.0	0.0	0.0	99.0	0.0	21.0	26.5	29.85
	10/13/2020	11:55	0.4	4.3	0.0	99.0	0.0	22.2	17.5	4	375	0.3	4.3	0.0	99.0	0.0	22.2	24.0	29.59
GV-16	10/26/2012	14:50	0.3	1.2	0	>100	2	20.3	14.1	4	375	0.4	2.2	0	>100	2	20.3	13.7	29.87
	11/12/2013	10:45	0.0	20.8	0	0	0	0.3	0.0	4	375	0.0	20.0	0	0	0	0.3	0.0	29.98
	10/17/2014	13:04	0.0	1.2	0.0	100.0	0.0	19.5	15.8	4	375	0.1	0.7	0.0	100.0	0.0	20.2	17.0	29.32
	10/20/2015	15:55	0.1	20.1	0.0	27.0	0.0	23.7	17.3	4	375	0.2	6.1	0.0	100.0	0.0	16.7	11.0	29.88
	10/18/2016	16:22	0.0	1.7	0.0	100	0.0	25.5	19.9	4	375	0.0	1.9	0.0	100	0.0	25.5	19.9	29.55
	10/18/2017	13:19	0.0	17.2	0.0	14.0	0.0	2.4	0.4	4	375	0.0	16.8	0.0	12.0	0.0	2.7	0.3	29.90
	10/18/2018	12:00	0.0	21.6	0.0	0.0	0.0	0.0	0.0	4	375	0.0	21.7	0.0	0.0	0.0	0.0	0.0	30.10
	10/16/2019	12:48	0.0	0.0	0.0	99.0	22.1	0.0	20.2	4	375	0.0	0.0	0.0	99.0	0.0	22.4	19.2	29.71
	10/13/2020	12:15	0.2	0.9	0.0	99.0	0.0	22.0	17.5	4	375	0.4	0.1	0.0	99.0	0.0	22.2	17.3	29.59
GV-17	10/26/2012	15:02	0.0	3.3	0	>100	2	22.7	20.7	4	375	0.3	2.7	0	>100	2	22.9	20.9	29.87
	11/12/2013	10:30	0.0	20.5	0	0	0	0.3	0.0	4	375	0.0	20.0	0	0	0	0.3	0.0	29.98
	10/17/2014	13:16	0.0	0.2	97.0	100.0	0.0	24.6	27.5	4	375	0.1	0.0	0.0	100.0	0.0	25.0	28.4	29.32
	10/20/2015	16:08	0.2	2.2	0.0	100.0	0.0	23.2	21.5	4	375	0.1	1.1	0.0	100.0	0.0	24.3	22.8	29.88
	10/18/2016	16:30	0.0	1.7	0.0	100	0.0	27.5	26.0	4	375	0.0	3.6	0.0	100	0.0	25.1	24.3	29.55
	10/18/2017	13:27	0.0	16.1	0.0	20.0	0.0	2.4	0.4	4	375	0.0	15.8	0.0	21.0	0.0	3.2	0.6	29.94
	10/18/2018	11:51	0.0	21.2	0.0	0.0	0.0	0.1	0.0	4	375	0.0	21.4	0.0	0.0	0.0	0.1	0.0	30.10
	10/16/2019	12:36	0.0	2.6	0.0	99.0	0.0	23.4	25.6	4	375	0.0	0.0	0.0	99.0	0.0	23.4	26.1	29.71
	10/13/2020	12:05	0.4	4.3	0.0	99.0	0.0	14.6	9.9	4	375	0.3	0.3	0.0	99.0	0.0	39.1	19.0	29.59
GV-18	10/26/2012	15:15	0.5	5.3	0	>100	4	25.8	34.6	4	375	0.4	0.8	0	>100	3	26.3	35.5	29.87
	11/12/2013	14:23	0.2	5.9	0	>100	0	15.5	16.2	4	375	0.2	3.2	0	>100	0	17.9	18.9	29.91
	10/17/2014	11:12	0.0	20.8	0.0	0.0	0.0	0.1	0.0	4	375	0.0	20.7	0.0	0.0	0.0	0.1	0.0	29.33
	10/20/2015	16:25	0.1	5.6	0.0	100.0	0.0	21.2	29.1	4	375	0.2	8.8	0.0	100.0	0.0	17.1	24.1	29.88
	10/18/2016	15:55	0.0	4.8	0.0	100	0.0	22.9	25.2	4	375	0.0	2.6	0.0	100	0.0	26.4	29.3	29.55
	10/18/2017	12:55	0.0	20.2	0.0	7.0	0.0	0.5	0.1	4	375	0.0	20.3	0.0	0.0	0.0	0.5	0.1	29.98
	10/18/2018	11:40	0.0	20.9	0.0	0.0	0.0	0.2	0.0	4	375	0.0	21.2	0.0	0.0	0.0	0.1	0.0	30.10
	10/16/2019	12:21	0.0	0.7	0.0	99.0	0.0	21.3	23.4	4	375	0.0	1.0	0.0	99.0	0.0	21.2	23.4	29.71
	10/13/2020	11:45	0.1	18.8	0.0	14.0	0.0	2.7	3.2	4	375	0.5	19.8	0.0	88.0	0.0	1.5	1.6	29.59
LGP-01-01X	10/26/2012	7:55	0.0	20.9	0	0	0	0.7	0.0	2	83	0.0	20.3	0	0	0	0.7	0.0	29.88
	11/12/2013	7:36	0.0	20.8	0	0	0	0.4	0.0	2	83	0.0	20.9	0	0	0	0.5	0.0	29.98
	10/17/2014	15:00	0.0	20.4	0.0	0.0	0.0	0.6	0.0	2	83	0.0	20.6	0.0	0.0	0.0	0.6	0.0	29.32
	10/20/2015	9:45	0.0	20.6	0.0	0.0	0.0	0.7	0.0	2	83	0.0	20.5	0.0	0.0	0.0	0.7	0.0	29.90
	10/18/2016	17:56	0.0	18.9	0.0	0	0.0	1.4	0.0	2	83	0.0	19.3	0.0	0	0.0	0.9	0.0	29.55
	10/18/2017	8:55	0.0	20.3	0.0	0.0	0.0	0.8	0.0	2	83	0.0	20.4	0.0	0.0	0.0	0.9	0.0	30.00
	10/18/2018	14:48	0.0	20.9	0.0	0.0	0.0	1.0	0.0	2	83	0.0	20.9	0.0	0.0	0.0	1.0	0.0	30.03
	10/16/2019	15:37	0.0	21.0	0.0	0.0	0.0	0.5	0.1	2	83	0.0	21.1	0.0	0.0	0.0	0.5	0.1	29.64
	10/13/2020	15:40	0.0	20.9	0.0	0.0	0.0	0.5	0.0	2	83	0.0	20.9	0.0	0.0	0.0	0.5	0.0	29.52
LGP-09-01XA	10/26/2012	8:00	0.0	20.3	0	0	0	0.8	0.0	2	157	0.0	20.4	0	0	0	0.8	0.0	29.89
	11/12/2013	7:42	0.0	20.9	0	0	0	0.7	0.0	2	157	0.0	20.9	0	0	0	0.7	0.0	29.98
	10/17/2014	15:03	0.4	20.6	0.0	0.0	0.0	0.6	0.0	2	157	0.0	20.7	0.0	0.0	0.0	0.6	0.0	29.32
	10/20/2015	9:33	0.0	20.8	0.0	0.0	0.0	0.8	0.0	2	157	0.0	20.3	0.0	0.0	0.0	0.9	0.0	29.90
	10/18/2016	18:01	0.0	19.7	0.0	0	0.0	0.5	0.0	2	157	0.0	19.6	0.0	0	0.0	0.6	0.0	29.55
	10/18/2017	9:00	0.0	20.2	0.0	0.0	0.0	0.8	0.0	2	157	0.0	20.2	0.0	0.0	0.0	1.0	0.0	30.00
	10/18/2018	14:43	0.0	20.6	0.0	0.0	0.0	1.2	0.0	2	157	0.0	20.6	0.0	0.0	0.0	1.2	0.0	30.03
	10/16/2019	15:48	0.0	21.0	0.0	0.0	0.0	0.5	0.1	2	157	0.0	21.2	0.0	0.0	0.0	0.6	0.1	29.64
	10/13/2020	15:45	0.0	20.9	0.0	0.0	0.0	0.5	0.0	2	157	0.0	20.9	0.0	0.0	0.0	0.6	0.0	29.52
LGP-09-01XB	10/26/2012	8:06	0.1	20.9	0	0	0	0.9	0.0	2	259	0.0	20.9	0	0	0	0.9	0.0	29.89
	11/12/2013	7:50	0.2	20.9	0	0	0	0.2	0.0	2	259	0.0	20.9	0	0	0	1.0	0.0	29.98

Table F-3: Historical Gas Vent Analytical Results
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

ID	Date	Time	VOC (ppm)	O_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	O_2 (%)	Purge Rate (lpm)	Purge Time (sec)	VOC (ppm)	O_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	CH_4 (%)	Barometric Pressure ("Hg)
	10/17/2014	15:02	0.7	20.5	0.0	0.0	0.0	0.6	0.0	2	157	0.0	20.6	0.0	0.0	0.0	0.6	0.0	29.32
	10/20/2015	9:40	0.0	20.2	0.0	0.0	0.0	0.9	0.0	2	157	0.0	20.2	0.0	0.0	0.0	0.9	0.0	29.90
	10/18/2016	18:05	0.0	19.5	0.0	0	0.0	0.7	0.0	2	157	0.0	19.5	0.0	0	0.0	0.7	0.0	29.55
	10/18/2017	9:05	1.0	20.1	0.0	0.0	0.0	1.0	0.0	2	157	0.0	20.1	0.0	0.0	0.0	1.0	0.0	30.00
	10/18/2018	14:38	0.0	20.8	0.0	1.0	0.0	0.9	0.1	2	157	0.0	20.6	0.0	0.0	0.0	1.0	0.0	30.03
	10/16/2019	15:43	0.0	20.8	0.0	0.0	0.0	0.7	0.1	2	157	0.0	20.9	0.0	0.0	0.0	0.8	0.1	29.64
	10/13/2020	15:50	0.3	20.9	0.0	0.0	0.0	0.7	0.0	2	157	0.2	20.4	0.0	0.0	0.0	0.5	0.0	29.52
LGP-01-02X	10/26/2012	8:26	0.0	19.8	0	0	0	1.4	0.0	2	83	0.0	20.2	0	0	0	1.5	0.0	29.89
	11/12/2013	8:02	0.0	20.9	0	0	0	0.9	0.0	2	83	0.0	20.8	0	0	0	0.9	0.0	29.98
	10/17/2014	15:18	0.0	20.2	0.0	0.0	0.0	0.8	0.0	2	83	0.0	20.2	0.0	0.0	0.0	0.9	0.0	29.32
	10/20/2015	9:58	0.0	20.3	0.0	0.0	0.0	1.1	0.0	2	83	0.0	20.2	0.0	0.0	0.0	1.3	0.0	29.90
	10/18/2016	18:09	0.0	19.4	0.0	0	0.0	1.0	0.0	2	83	0.0	19.3	0.0	0	0.0	1.2	0.0	29.55
	10/18/2017	9:18	0.0	19.9	0.0	0.0	0.0	1.3	0.0	2	83	0.0	20.0	0.0	0.0	0.0	1.2	0.0	30.01
	10/18/2018	15:01	0.0	18.7	0.0	0.0	0.0	3.2	0.0	2	83	0.0	18.8	1.0	0.0	0.0	3.2	0.0	30.03
	10/16/2019	15:28	0.0	20.8	0.0	0.0	0.0	0.9	0.1	2	83	0.0	20.8	0.0	0.0	0.0	0.9	0.1	29.64
	10/13/2020	15:25	0.0	20.9	0.0	0.0	0.0	0.2	0.0	2	83	0.0	20.9	0.0	0.0	0.0	0.0	0.0	29.53
LGP-09-02X	10/26/2012	8:20	0.1	19.6	0	0	0	1.7	0.0	2	204	0.0	19.7	0	0	0	1.7	0.0	29.89
	11/12/2013	8:07	0.2	20.9	0	0	0	1.1	0.0	2	204	0.1	20.6	0	0	0	1.3	0.0	29.98
	10/17/2014	15:20	0.0	20.2	0.0	0.0	0.0	1.0	0.0	2	204	0.0	20.3	1.0	0.0	0.0	1.1	0.0	29.32
	10/20/2015	9:52	0.0	20.1	0.0	0.0	0.0	1.4	0.0	2	204	0.0	20.0	0.0	0.0	0.0	0.3	0.0	29.90
	10/18/2016	18:12	0.0	19.4	0.0	0	0.0	1.0	0.0	2	204	0.0	19.5	0.0	0	0.0	0.9	0.0	29.55
	10/18/2017	9:13	0.0	19.8	0.0	0.0	0.0	1.1	0.0	2	204	0.0	19.9	0.0	0.0	0.0	1.2	0.0	30.00
	10/18/2018	14:56	0.0	18.9	1.0	0.0	0.0	3.2	0.0	2	204	0.0	18.5	2.0	0.0	0.0	3.5	0.0	30.03
	10/16/2019	15:26	0.0	20.7	0.0	0.0	0.0	1.1	0.1	2	204	0.0	20.9	0.0	0.0	0.0	1.2	0.2	29.64
	10/13/2020	15:30	0.0	20.9	0.0	0.0	0.0	1.0	0.0	2	204	0.0	20.9	0.0	0.0	0.0	1.1	0.0	29.53
LGP-01-03X	10/26/2012	8:47	0.0	20.2	0	0	0	1.1	0.0	2	83	0.0	20.2	0	0	0	1.1	0.0	29.91
	11/12/2013	8:15	0.0	20.8	0	0	0	0.9	0.0	2	83	0.0	20.7	0	0	0	0.9	0.0	29.98
	10/17/2014	15:29	0.0	20.2	0.0	0.0	0.0	0.8	0.0	2	83	0.0	20.2	0.0	0.0	0.0	0.8	0.0	29.32
	10/20/2015	10:10	0.0	20.3	0.0	0.0	0.0	1.1	0.0	2	83	0.0	20.3	0.0	0.0	0.0	1.1	0.0	29.90
	10/18/2016	18:15	0.0	19.6	0.0	0	0.0	0.7	0.0	2	83	0.0	19.6	0.0	0	0.0	0.7	0.0	29.55
	10/18/2017	8:40	0.0	20.2	0.0	0.0	0.0	1.0	0.0	2	83	0.0	20.1	0.0	0.0	0.0	1.2	0.0	30.00
	10/18/2018	15:07	0.0	19.9	1.0	0.0	0.0	1.8	0.0	2	83	0.0	20.0	0.0	0.0	0.0	1.6	0.0	30.03
	10/16/2019	15:22	0.0	20.8	0.0	0.0	0.0	0.8	0.1	2	83	0.0	20.9	0.0	0.0	0.0	0.8	0.1	29.64
	10/13/2020	15:05	0.0	20.9	0.0	0.0	0.0	0.6	0.0	2	83	0.0	20.9	0.0	0.0	0.0	0.0	0.0	29.53
LGP-09-03X	10/26/2012	8:40	0.4	19.8	0	0	0	1.4	0.0	2	167	0.0	19.9	0	0	0	1.5	0.0	29.91
	11/12/2013	8:20	0.1	20.7	0	0	0	1.2	0.0	2	167	0.0	20.6	0	0	0	1.3	0.0	29.98
	10/17/2014	15:31	0.5	20.1	0.0	0.0	0.0	1.0	0.0	2	167	0.0	20.8	0.0	0.0	0.0	0.3	0.0	29.32
	10/20/2015	10:19	0.0	20.1	0.0	0.0	0.0	1.2	0.0	2	167	0.0	20.2	0.0	0.0	0.0	1.3	0.0	29.90
	10/18/2016	18:19	0.0	19.4	0.0	0	0.0	0.9	0.0	2	167	0.0	19.4	0.0	0	0.0	1.0	0.0	29.55
	10/18/2017	8:46	0.0	19.8	0.0	0.0	0.0	1.5	0.0	2	167	0.0	19.8	0.0	0.0	0.0	1.6	0.0	30.00
	10/18/2018	15:12	0.0	19.8	0.0	0.0	0.0	1.9	0.0	2	167	0.0	19.6	0.0	0.0	0.0	2.0	0.0	30.03
	10/16/2019	15:16	0.0	20.8	0.0	0.0	0.0	1.0	0.1	2	167	0.0	20.7	0.0	0.0	0.0	1.0	0.1	29.64
	10/13/2020	15:15	0.1	20.9	0.0	0.0	0.0	0.0	0.0	2	167	0.0	20.9	0.0	0.0	0.0	0.0	0.0	29.53
LGP-01-04X	10/26/2012	8:54	0.0	20.5	0	0	0	0.8	0.0	2	83	0.0	20.9	0	0	0	0.8	0.0	29.91
	11/12/2013	8:27	0.0	20.9	0	0	0	0.5	0.0	2	83	0.0	20.9	0	0	0	0.5	0.0	29.98
	10/17/2014	15:38	0.0	20.5	0.0	0.0	0.0	0.5	0.0	2	83	0.0	20.5	0.0	0.0	0.0	0.5	0.0	29.32
	10/20/2015	11:11	0.0	20.1	0.0	0.0	0.0	0.7	0.0	2	83	0.0	20.2	0.0	0.0	0.0	0.8	0.0	29.89
	10/18/2016	18:23	0.0	19.7	0.0	0	0.0	0.5	0.0	2	83	0.0	19.6	0.0	0	0.0	0.7	0.0	29.55
	10/18/2017	8:20	0.0	20.4	0.0	0.0	0.0	0.8	0.1	2	83	0.0	20.3	0.0	0.0	0.0	1.0	0.1	30.00
	10/18/2018	15:20	0.0	20.4	0.0	0.0	0.0	1.6	0.0	2	83	0.0	20.4	0.0	0.0	0.0	1.6	0.0	30.03
	10/16/2019	15:05	0.0	20.9	0.0	0.0	0.0	0.5	0.1	2	83	0.0	20.9	0.0	0.0	0.0	0.5	0.2	29.65
	10/13/2020	14:45	0.0	20.9	0.0	0.0	0.0	0.0	0.0	2	83	0.0	20.9	0.0	0.0	0.0	0.5	0.0	29.55
LGP-09-04X	10/26/2012	9:00	0.0	20.4	0	0	0	0.8	0.0	2	120	0.0	20.4	0	0	0	0.9	0.0	29.91
	11/12/2013	8:33	0.1	20.9	0	0	0	0.6	0.0	2	120	0.0	20.8	0	0	0	0.7	0.0	29.98
	10/17/2014	15:40	0.1	20.6	0.0	0.0	0.0	0.5	0.0	2	120	0.0	20.5	0.0	0.0	0.0	0.5	0.0	29.32
	10/20/2015	11:18	0.0	20.8	0.0	0.0	0.0	0.8	0.0	2	120	0.0	20.3	0.0	0.0	0.0	0.9	0.0	29.89
	10/18/2016	18:27	0.0	19.7	0.0	0	0.0	0.6	0.0	2	120	0.0	19.6	0.0	0	0.0	0.7	0.0	29.55
	10/18/2017	8:27	0.0	20.5	0.0	0.0	0.0	0.6	0.0	2	120	0.0	20.3	0.0	0.0	0.0	1.0	0.0	30.00
	10/18/2018	15:24	0.0	19.9	0.0	0.0	0.0	1.8	0.0	2	120	0.0	19.7	0.0	0.0	0.0	1.9	0.0	30.03
	10/16/2019	15:11	0.0	21.0	0.0	0.0	0.0	0.2	0.1	2	120	0.0	21.0	0.0	0.0	0.0	0.6	0.1	29.65
	10/13/2020	14:55	0.0	20.9	0.0	0.0	0.0	0.0	0.0	2	120	0.0	20.9	0.0	0.0	0.0	0.5	0.0	29.53
LGP-05-05X	10/26/2012	9:10	0.3	14.4	0	3	0	7.1	0.2	2	93	0.0	12.4	0	0	0	9.7	0.0	29.91
	11/12/2013	14:10	0.2	17.1	0	13	0	7.6	0.4	2	93	0.1	18.1	0	2	0	5.6	0.0	29.91
	10/17/2014	11:43	0.0	2.5	1.0	100.0	0.0	17.1	12.2	2	93	0.2	0.0	1.0	100.0	0.0	29.7	30.1	29.33
	10/20/2015	15:35	0.2	14.4	0.0	6.0	0.0	6.0	0.0	2	93	0.3	1.1	0.0	44.0	0.0	18.9	1.5	29.88
	10/18/2016	15:41	0.0	8.0	0.0	100	0.0	16.7	9.7	2	93	0.0	2.6	0.0	100	0.0	27.6	16.7	29.65
	10/18/2017	11:55	0.0	15.2	0.0	40.0	0.0	8.1	1.5	2	93	0.0	14.3	0.0	0.0	0.0	6.9	0.0	30.00
	10/18/2018	11:27	0.0	14.9	1.0	66.0	0.0	8.7	3.3	2	93	0.0	19.5	1.0	6.0	0.0	2.6	0.3	30.10
	10/16/2019	8:33	0.0	11.7	0.0	12.0	0.0	11.7	0.8	2	93	0.0	9.9	0.0	0.0	0.0	0.1	0.2	29.95
	10/13/2020	7:50	0.0	14.0	0.0	0.0	0.0	0.5	0.0	2	93	0.0	14.0	0.0	0.0	0.0	9.2	0.0	29.67
LGP-09-05X	10/26/2012	9:18	2.5	10.6	0	30	0	14.4	1.5	2	167	0.2	9.3	0	0	0	13.0	0.0	29.91
	11/12/2013	14:15	0.8	10.4	0	42	0	14.2	2.4	2	167	0.1	11.4	0	0	0	13.0	0.0	29.91
	10/17/2014	11:45	0.3	1.7	1.0	100.0	0.0	20.2	16.0	2	167	0.3	0.0	1.0	100.0	0.0	30.1	33.5	29.33
	10/20/2015	15:40	0.6	9.3	0.0	65.0	0.0	13.1	1.7	2	167	0.3	0.5	0.0	100.0	0.0	24.7	9.1	29.88
	10/18/2016	15:36	0.0	6.1	0.0	100	0.0	20.5	13.2	2	167	0.0	1.6	0.0	100	0.0	30.1	21.9	29.65
	10/18/2017	11:48	0.0	10.6	0.0	100.0	0.0	13.8	4.6	2	167	0.0	12.8	0.0	0.0	0.0	9.4	0.0	30.00
	10/18/2018	11:32	1.0	18.0	1.0	34.0	0.0	5.1	1.7	2	167	0.0	19.3	1.0	3.0	0.0	2.8	0.2	30.10
	10/16/2019	8:43	0.6	22.0	0.0	53.0	0.0	0.2	0.2	2	167	0.0	3.0	0.0	31.0	0.0	0.2	0.2	29.95
	10/13/2020	8:00	30.7	12.0	0.0	30.0	0.0	1.3	1.3	2	167	0.5	0.9	0.0	99.0	0.0	22.0	61.0	29.67
LGP-05-06X	10/26/2012	9:37	0.0	17.5	0	0	0	0.0	0.0	2	93	0.0	15.9	0	0	0	4.9	0.0	29.91
	11/12/2013	14:01	0.1	18.7	0	2	0	2.6	0.0	2	93	0.1	19.7	0	2	0	2.7	0.0	29.91
	10/17/2014	11:34	0.0	17.2	0.0	0.0	0.0	3.0	0.0	2	93	0.0	16.5	0.0	0.0	5.0	3.6	0.0	29.33
	10/20/2015	15:23	0.0	17.0	0.0	0.0	0.0	3.7	0.0	2	93	0.0	17.3	0.0	0.0	0.0	3.5	0.0	29.88
	10/18/2016	15:29	0.0	16.8	0.0	0	0.0	3.0	0.0	2	93	0.0	16.3	0.0	0	0.0	3.5	0.0	29.65
	10/18/2017	11:36	0.0	17.6	0.0	0.0	0.0	2.7	0.0	2	93	0.0	17.6	0.0	0.0	0.0	3.5	0.0	30.00
	10/18/2018	11:20	0.0	14.2	2.0	0.0	0.0	5.3	0.0	2	93	0.0	14.6	2.0	0.0	0.0	5.2	0.0	30.10
	10/16/2019	9:00	0.0	18.3	0.0	0.0	0.0	2.3	0.2	2	93	0.0	18.8	0.0	0.0	0.0	2.5	0.2	29.93
	10/13/2020	8:15	0.0	20.4	0.0	0.0	0.0	1.6	0.0	2	93	0.0	20.4	0.0	0.0	0.0	0.0	0.0	29.67
LGP-09-06X	10/26/2012	9:28	0.2	10.2	0	0	0	8.6	0.0	2	120	0.0	10.9	0	0	0	8.4	0.0	29.91
	11/12/2013	14:06	0.1	15.5	0	1	0	5.8	0.0	2	120	0.1	15.7	0	1	0	5.8	0.0	29.91
	10/17/2014	11:32	0.5	6.9	7.0	0.0	5.0	6.2	0.0	2	120	0.0	6.6	1.0	0.0	5.0	6.5	0.0	29.32

Table F-3: Historical Gas Vent Analytical Results
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

ID	Date	Time	VOC (ppm)	O_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	O_2 (%)	Purge Rate (lpm)	Purge Time (sec)	VOC (ppm)	O_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	CH_4 (%)	Barometric Pressure ("Hg)
	10/20/2015	15:30	0.2	14.1	0.0	0.0	0.0	5.6	0.0	2	120	0.0	14.1	0.0	0.0	0.0	5.8	0.0	29.88
	10/18/2016	15:23	0.0	14.4	0.0	0	0.0	5.0	0.0	2	120	0.0	13.7	0.0	0	0.0	5.5	0.0	29.65
	10/18/2017	11:41	0.0	14.4	0.0	0.0	0.0	6.1	0.0	2	120	0.0	14.5	0.0	0.0	0.0	6.1	0.0	30.01
	10/18/2018	11:15	0.0	9.5	0.0	0.0	0.0	10.1	0.0	2	120	0.0	11.6	1.0	0.0	0.0	8.5	0.0	30.10
	10/16/2019	8:52	0.0	16.2	0.0	0.0	0.0	0.2	0.2	2	120	0.0	16.1	0.0	0.0	0.0	5.0	0.2	29.93
	10/13/2020	8:25	0.0	20.9	0.0	0.0	0.0	3.6	0.0	2	120	0.0	17.2	0.0	0.0	0.0	3.6	0.0	29.67
LGP-05-07X	10/26/2012	9:45	0.1	15.4	0	0	0	7.7	0.0	2	65	0.0	13.2	0	0	0	6.8	0.0	29.91
	11/12/2013	13:55	0.1	19.8	0	1	0	2.0	0.0	2	65	0.0	19.6	0	0	0	2.7	0.0	29.91
	10/17/2014	11:25	0.1	1.1	0.0	100.0	0.0	20.6	10.4	2	65	0.2	0.0	0.0	100.0	0.0	21.9	8.4	29.33
	10/20/2015	15:17	0.1	10.8	0.0	0.0	0.0	7.3	0.0	2	65	0.0	8.1	0.0	0.0	0.0	12.7	0.0	29.88
	10/18/2016	15:15	0.1	10.7	0.0	4	0.0	10.4	0.2	2	65	0.0	9.4	0.0	0	0.0	11.9	0.0	29.65
	10/18/2017	11:27	0.0	17.9	0.0	0.0	0.0	3.9	0.0	2	65	0.0	18.4	0.0	0.0	0.0	3.8	0.0	30.01
	10/18/2018	11:08	0.0	12.5	1.0	7.0	0.0	10.5	0.4	2	65	0.0	16.3	0.0	0.0	0.0	6.7	0.0	30.10
	10/16/2019	9:09	0.0	18.2	0.0	0.0	0.0	3.7	0.2	2	65	0.0	15.4	0.0	0.0	0.0	6.0	0.2	NR
	10/13/2020	8:40	0.0	21.9	0.0	0.0	0.0	0.1	0.0	2	65	0.0	12.2	0.0	0.0	0.0	6.1	0.0	29.65
LGP-05-08X	10/26/2012	9:55	0.8	9.8	0	0	0	4.4	0.0	2	93	0.0	7.7	0	0	0	13.5	0.0	29.91
	11/12/2013	13:42	0.1	17.7	0	0	0	5.2	0.0	2	93	0.0	14.1	0	0	0	8.6	0.0	29.91
	10/17/2014	11:38	0.3	3.8	20.0	17.0	1.0	13.2	0.9	2	93	0.2	0.0	0.0	69.0	4.0	19.8	3.4	29.33
	10/20/2015	15:05	0.0	16.9	0.0	0.0	0.0	7.2	0.0	2	93	0.0	4.7	0.0	0.0	0.0	14.8	0.0	29.88
	10/18/2016	15:10	0.0	9.7	0.0	2	0.0	10.4	0.1	2	93	0.0	1.8	0.0	8	0.0	10.1	0.4	29.65
	10/18/2017	11:18	0.0	12.4	0.0	0.0	0.0	0.4	0.0	2	93	0.0	10.7	0.0	0.0	0.0	10.3	0.0	30.01
	10/18/2018	10:50	0.0	20.9	1.0	0.0	0.0	0.4	0.0	2	93	0.0	17.6	1.0	0.0	0.0	2.5	0.0	30.10
	10/16/2019	9:25	0.0	15.7	0.0	0.0	0.0	6.6	0.2	2	93	0.0	7.0	0.0	0.0	0.0	14.5	0.2	29.93
	10/13/2020	8:55	0.0	17.9	0.0	0.0	0.0	3.9	0.0	2	93	0.0	12.5	0.0	0.0	0.0	0.0	0.0	29.65
LGP-09-08X	10/26/2012	10:05	0.8	5.6	0	0	1	3.8	0.0	2	185	0.1	2.2	0	4	0	18.6	0.2	29.91
	11/12/2013	13:48	0.2	7.7	0	7	0	14.6	0.2	2	185	0.1	1.8	0	3	0	18.7	0.0	29.91
	10/17/2014	10:40	0.4	1.0	0.0	21.0	5.0	17.2	1.1	2	185	0.3	0.0	0.0	90.0	4.0	20.3	4.4	29.40
	10/20/2015	15:10	0.1	10.5	0.0	5.0	0.0	13.9	0.0	2	185	0.1	0.7	0.0	9.0	0.0	20.3	0.3	29.88
	10/18/2016	15:05	0.1	8.4	0.0	13	0.0	12.0	0.6	2	185	0.2	4.4	0.0	27	0.0	19.3	1.3	29.65
	10/18/2017	11:09	0.0	7.3	0.0	11.0	0.0	15.0	0.5	2	185	0.0	7.8	0.0	0.0	0.0	14.4	0.0	30.01
	10/18/2018	10:56	0.0	8.4	2.0	4.0	0.0	15.7	0.2	2	185	0.0	7.8	2.0	0.0	0.0	16.1	0.0	30.10
	10/16/2019	9:18	0.0	5.9	0.0	0.0	0.0	16.5	0.2	2	185	0.0	2.8	0.0	5.0	0.0	19.3	0.3	NR
	10/13/2020	9:05	0.0	11.1	0.0	4.0	0.0	12.9	0.0	2	185	0.0	3.1	0.0	0.0	0.0	16.7	0.0	29.65
LGP-05-09X	10/26/2012	10:15	0.1	13.8	0	0	0	7.2	0.0	2	93	0.0	13.2	0	0	0	7.9	0.0	29.91
	11/12/2013	13:27	0.0	16.9	0	0	0	6.0	0.0	2	93	0.0	18.1	0	0	0	5.4	0.0	29.91
	10/17/2014	8:46	0.0	5.8	0.0	0.0	0.0	9.0	0.0	2	93	0.0	0.5	0.0	0.0	0.0	16.7	0.0	29.40
	10/20/2015	14:55	0.0	16.0	0.0	0.0	0.0	5.1	0.0	2	93	0.0	14.0	0.0	0.0	0.0	6.6	0.0	29.88
	10/18/2016	14:58	0.0	10.6	0.0	0	0.0	9.0	0.0	2	93	0.0	8.3	0.0	0	0.0	11.4	0.0	29.65
	10/18/2017	10:56	0.0	14.3	0.0	0.0	0.0	7.2	0.0	2	93	0.0	14.0	0.0	0.0	0.0	7.5	0.0	30.01
	10/18/2018	10:32	0.0	8.7	1.0	4.0	0.0	13.7	0.2	2	93	0.0	9.9	1.0	0.0	0.0	12.9	0.0	30.10
	10/16/2019	9:53	0.0	14.4	0.0	0.0	0.0	15.2	0.2	2	93	0.0	20.9	0.0	0.0	0.0	7.4	0.2	29.86
	10/13/2020	8:20	0.0	20.4	0.0	0.0	0.0	1.4	0.0	2	93	0.0	16.5	0.0	0.0	0.0	6.6	0.0	29.67
LGP-09-09X	10/26/2012	10:25	0.4	17.5	0	0	0	1.0	0.0	2	185	0.1	7.3	0	4	0	13.1	0.0	29.91
	11/12/2013	13:32	0.2	11.9	0	0	0	10.2	0.0	2	185	0.0	5.2	0	0	0	15.0	0.0	29.91
	10/17/2014	8:49	0.0	20.7	0.0	0.0	0.0	0.1	0.0	2	185	0.0	0.2	0.0	28.0	6.0	18.5	1.4	29.40
	10/20/2015	15:00	0.1	11.3	0.0	0.0	0.0	9.7	0.0	2	185	0.0	3.7	0.0	0.0	6.0	16.7	0.0	29.88
	10/18/2016	14:48	0.1	5.9	0.0	5	0.0	13.5	0.2	2	185	0.0	1.8	0.0	2	0.0	18.2	0.1	29.65
	10/18/2017	11:00	0.0	10.5	0.0	5.0	0.0	0.1	0.0	2	185	0.0	10.5	0.0	0.0	0.0	11.1	0.0	30.01
	10/18/2018	10:26	1.0	6.7	1.0	32.0	0.0	15.1	1.6	2	185	0.0	7.1	1.0	2.0	0.0	15.2	0.1	30.10
	10/16/2019	9:37	0.0	10.1	0.0	0.0	0.0	10.9	0.2	2	185	0.0	5.4	0.0	0.0	0.0	15.3	0.2	29.93
	10/13/2020	9:30	0.0	13.6	0.0	0.0	0.0	10.7	0.0	2	185	0.0	9.0	0.0	0.0	0.0	13.3	0.0	29.65
LGP-05-10X	10/26/2012	10:51	0.1	14.6	0	0	0	4.6	0	2	93	0.1	10.1	0	0	0	10.5	0.0	29.89
	11/12/2013	13:15	0.0	20.2	0.0	0.0	0.0	1.9	0.0	2	93	0.0	19.0	0.0	0.0	0.0	4.1	0.0	29.91
	10/17/2014	9:07	0.0	2.3	0.0	10.0	0.0	16.4	8.0	2	93	0.0	0.0	0.0	100.0	0.0	21.4	14.0	29.40
	10/20/2015	14:40	0.0	14.8	0.0	0.0	0.0	5.3	0.0	2	93	0.0	6.7	0.0	0.0	0.0	10.2	0.0	29.88
	10/18/2016	14:38	0.3	8.3	0.0	46	0.0	11.7	2.3	2	93	0.0	1.6	0.0	100	0.0	20.1	5.2	29.65
	10/18/2017	10:47	0.0	16.9	0.0	0.0	0.0	3.2	0.0	2	93	0.0	15.4	0.0	0.0	0.0	6.1	0.0	30.02
	10/18/2018	10:05	0.0	19.3	1.0	7.0	0.0	2.8	0.4	2	93	0.0	20.0	1.0	0.0	0.0	2.3	0.0	30.10
	10/16/2019	10:06	0.0	15.4	0.0	0.0	0.0	5.2	0.2	2	93	0.0	8.3	0.0	0.0	0.0	11.9	0.2	29.86
	10/13/2020	9:45	0.0	19.6	0.0	0.0	0.0	2.6	0.0	2	93	0.0	13.1	0.0	0.0	0.0	0.4	0.0	29.63
LGP-09-10X	10/26/2012	11:00	0.1	17.2	0	0	0	9.5	0	2	148	0.1	7.0	0	0	0	14.4	0.0	29.89
	11/12/2013	13:20	0.1	15.0	0	0	0	8.3	0.0	2	148	0.0	14.3	0	0	0	8.9	0.0	29.91
	10/17/2014	9:09	0.0	1.2	0.0	100.0	0.0	19.8	14.0	2	148	0.1	0.0	0.0	100.0	0.0	23.1	20.5	29.40
	10/20/2015	14:45	0.1	10.4	0.0	0.0	0.0	9.7	0.0	2	148	0.0	2.9	0.0	5.0	0.0	16.5	0.0	29.88
	10/18/2016	14:32	0.0	6.1	0.0	100	0.0	15.9	6.2	2	148	0.0	1.4	0.0	100	0.0	22.0	10.1	29.65
	10/18/2017	10:42	0.0	18.6	0.0	0.0	0.0	2.2	0.0	2	148	0.0	12.0	0.0	0.0	0.0	9.8	0.0	30.02
	10/18/2018	10:11	0.0	20.8	1.0	0.0	0.0	1.6	0.0	2	148	1.0	12.1	1.0	0.0	0.0	11.8	0.0	30.10
	10/16/2019	10:15	0.0	2.5	0.0	5.0	0.0	14.1	0.3	2	148	0.0	2.7	0.0	7.0	0.0	17.7	0.5	29.86
	10/13/2020	9:55	0.0	15.4	0.0	0.0	0.0	6.8	0.0	2	148	0.0	6.2	0.0	0.0	0.0	13.4	0.0	29.63
LGP-05-11X	10/26/2012	10:35	0.2	15.9	0	0	0	12.6	0	2	83	0.0	9.8	0	0	0	10.8	0.0	29.91
	11/12/2013	13:02	0.1	19.2	0	0	0	2.8	0.0	2	83	0.1	16.1	0	0	0	6.5	0.0	29.91
	10/17/2014	9:20	0.1	3.1	0.0	44.0	5.0	13.2	2.2	2	83	0.0	0.0	0.0	100.0	0.0	19.8	8.7	29.40
	10/20/2015	14:25	0.1	15.5	0.0	0.0	0.0	5.5	0.0	2	83	0.0	8.5	0.0	0.0	0.0	11.6	0.0	29.88
	10/18/2016	14:22	0.2	7.8	0.0	24	0.0	11.7	1.2	2	83	0.1	2.7	0.0	54	0.0	17.8	2.7	29.65
	10/18/2017	10:09	0.0	12.9	0.0	4.0	0.0	9.1	0.1	2	83	0.0	10.4	0.0	0.0	0.0	12.0	0.0	30.02
	10/18/2018	9:58	1.0	11.1	1.0	5.0	0.0	13.0	0.3	2	83	1.0	14.2	1.0	25.0	0.0	11.1	1.3	30.06
	10/16/2019	10:36	0.0	14.8	0.0	0.0	0.0	5.6	0.2	2	83	0.0	8.5	0.0	0.0	0.0	10.9	0.2	29.86
	10/13/2020	10:10	0.0	20.1	0.0	0.0	0.0	1.9	0.0	2	83	0.0	14.3	0.0	0.0	0.0	7.3	0.0	29.63
LGP-09-11X	10/26/2012	10:41	1.0	1.5	0	54	0	10.5	0.8	2	139	0.2	0.8	0	3	0	18.8	0.1	29.91
	11/12/2013	13:10	0.4	12.2	0	0	0	9.1	0.0	2	139	0.1	14.0	0	0	0	8.7	0.0	29.91
	10/17/2014	9:22	0.0	16.1	0.0	26.0	5.0	12.6	1.9	2	139	0.2	20.5	0.0	1.0	3.0	0.9	0.2	29.40
	10/20/2015	14:30	0.3	7.7	0.0	20.0	0.0	14.1	0.5	2	139	0.1	2.9	0.0	2.0	3.0	17.2	0.0	29.88
	10/18/2016	14:10	0.1	3.8	0.0	61	0.0	16.3	3.0	2	139	0.1	2.7	0.0	100	0.0	18.4	5.8	29.65
	10/18/2017	10:17	0.0	8.9	0.0	18.0	0.0	15.2	1.0	2	139	0.0	6.5	0.0	0.0	0.0	15.8	0.0	30.02
	10/18/2018	9:51	0.0	8.1	0.0	85.0	0.0	14.1	4.3	2	139	0.0	2.9	1.0	24.0	0.0	18.7	1.2	30.06
	10/16/2019	10:30	0.0	6.8	0.0	0.0	0.0	11.9	0.2	2	139	0.0	4.6	0.0	0.0	0.0	15.0	0.2	29.86
	10/13/2020	10:20	0.4	14.6	0.0	0.0	0.0	9.6	0.2	2	139	0.0	9.9	0.0	0.0	0.0	12.2	0.0	29.63
LGP-05-13X	10/26/2012	11:21	0.0	18.0	0	0	0	5.4	0	2	56	0.0	13.3	0	0	0	6.8	0.0	29.88
	11/12/2013	12:43	0.1	19.5	0	0	0	1.6	0.0	2	56	0.0	19.8	0	0	0	2.4	0.0	29.91
	10/17/2014	9:35	0.0	1.3	0.0	56.0	4.0	14.3	2.0	2	56	0.1	0.0	0.0	100.0	0.0	15.3	6.7	29.40
	10/20/2015	14:20	0.1	14.8	0.0	0.0	0.0	4.4	0.0	2	56	0.1	9.5	0.0	0.0	0.0	8.2	0.0	29.88

Table F-3: Historical Gas Vent Analytical Results
Shepley's Hill Landfill, Former Fort Devens Army Installation
Devens, Massachusetts

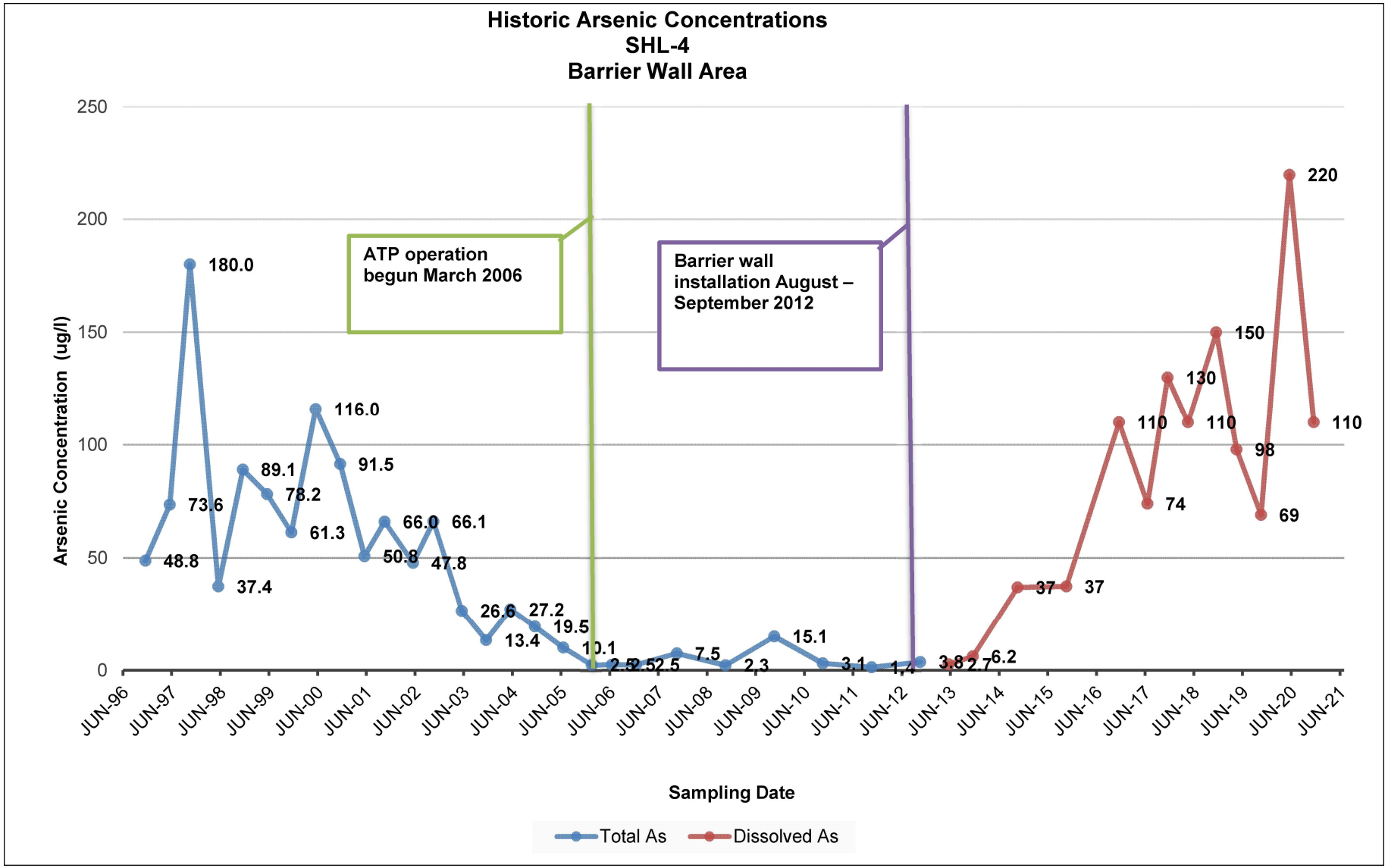
ID	Date	Time	VOC (ppm)	O_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	O_2 (%)	Purge Rate (lpm)	Purge Time (sec)	VOC (ppm)	O_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	CH_4 (%)	Barometric Pressure ("Hg)
	10/18/2016	9:40	0.0	14.8	0.0	0	0.0	5.0	0.0	2	56	0.0	13.3	0.0	0	0.0	6.6	0.0	29.72
	10/18/2017	10:00	0.0	18.0	0.0	0.0	0.0	3.2	0.0	2	56	0.0	16.9	0.0	0.0	0.0	4.3	0.0	30.03
	10/18/2018	9:39	0.0	18.6	0.0	2.0	0.0	3.1	0.1	2	56	0.0	18.5	1.0	0.0	0.0	3.8	0.0	30.06
	10/16/2019	11:16	0.0	17.0	0.0	0.0	0.0	3.8	0.2	2	56	0.0	12.5	0.0	0.0	0.0	6.6	0.2	29.85
	10/13/2020	10:35	0.2	19.4	0.0	0.0	0.0	2.3	0.0	2	56	0.0	16.1	0.0	0.0	0.0	6.5	0.0	29.61
LGP-05-14X	10/26/2012	11:30	0.0	6.1	0	0	0	13.3	0	2	93	0.0	8.5	0	0	0	13.4	0.0	29.88
	11/12/2013	12:53	0.1	15.2	0	0	0	7.2	0.0	2	93	0.0	14.2	0	0	0	8.7	0.0	29.91
	10/17/2014	9:44	0.0	5.6	0.0	100.0	5.0	8.8	0.6	2	93	0.0	0.0	0.0	37.0	5.0	15.5	1.9	29.40
	10/20/2015	14:10	0.2	15.7	0.0	13.0	0.0	4.7	0.4	2	93	0.1	9.9	0.0	6.0	5.0	9.6	0.1	29.88
	10/18/2016	9:05	0.0	9.4	0.0	0	0.0	10.2	0.0	2	93	0.0	8.9	0.0	0	0.0	10.8	0.0	29.73
	10/18/2017	9:52	0.0	11.8	0.0	0.0	0.0	9.7	0.0	2	93	0.0	11.5	0.0	0.0	0.0	11.1	0.0	29.95
	10/18/2018	9:31	0.0	1.0	1.0	31.0	0.0	11.0	1.6	2	93	0.0	0.2	0.0	39.0	0.0	11.9	1.9	30.06
	10/16/2019	11:22	0.0	12.4	0.0	0.0	0.0	7.7	0.2	2	93	0.0	12.5	0.0	0.0	0.0	7.5	0.2	29.85
	10/13/2020	10:50	0.0	17.9	0.0	0.0	0.0	3.0	0.0	2	93	0.0	14.5	0.0	0.0	0.0	7.5	0.0	29.61
LGP-09-15X	10/26/2012	11:39	0.1	15.9	0	0	0	6.6	0	2	111	0.0	13.7	0	0	0	7.0	0.0	29.88
	11/12/2013	11:25	0.0	16.4	0	0	0	5.8	0.0	2	111	0.0	16.4	0	0	0	5.9	0.0	29.98
	10/17/2014	9:53	0.0	16.7	1.0	0.0	60.0	5.1	0.0	2	111	0.0	16.4	0.0	0.0	0.0	5.6	0.0	29.40
	10/20/2015	13:50	0.1	16.3	0.0	0.0	0.0	4.6	0.0	2	111	0.0	15.3	0.0	0.0	0.0	6.1	0.0	29.88
	10/18/2016	8:29	0.0	15.6	0.0	0	0.0	4.8	0.0	2	111	0.0	14.8	0.0	0	0.0	5.8	0.0	29.73
	10/18/2017	9:34	0.0	18.0	0.0	0.0	0.0	4.1	0.0	2	111	0.0	16.6	0.0	0.0	0.0	6.0	0.0	30.01
	10/18/2018	9:15	0.0	11.7	1.0	0.0	0.0	9.3	0.0	2	111	0.0	10.6	1.0	0.0	0.0	10.5	0.0	30.06
	10/16/2019	11:33	0.0	17.0	0.0	0.0	0.0	4.2	0.2	2	111	0.0	16.0	0.0	0.0	0.0	5.7	0.2	29.85
	10/13/2020	11:15	0.0	18.5	0.0	0.0	0.0	13.4	0.0	2	111	0.0	17.4	0.0	0.0	0.0	4.5	0.0	29.61

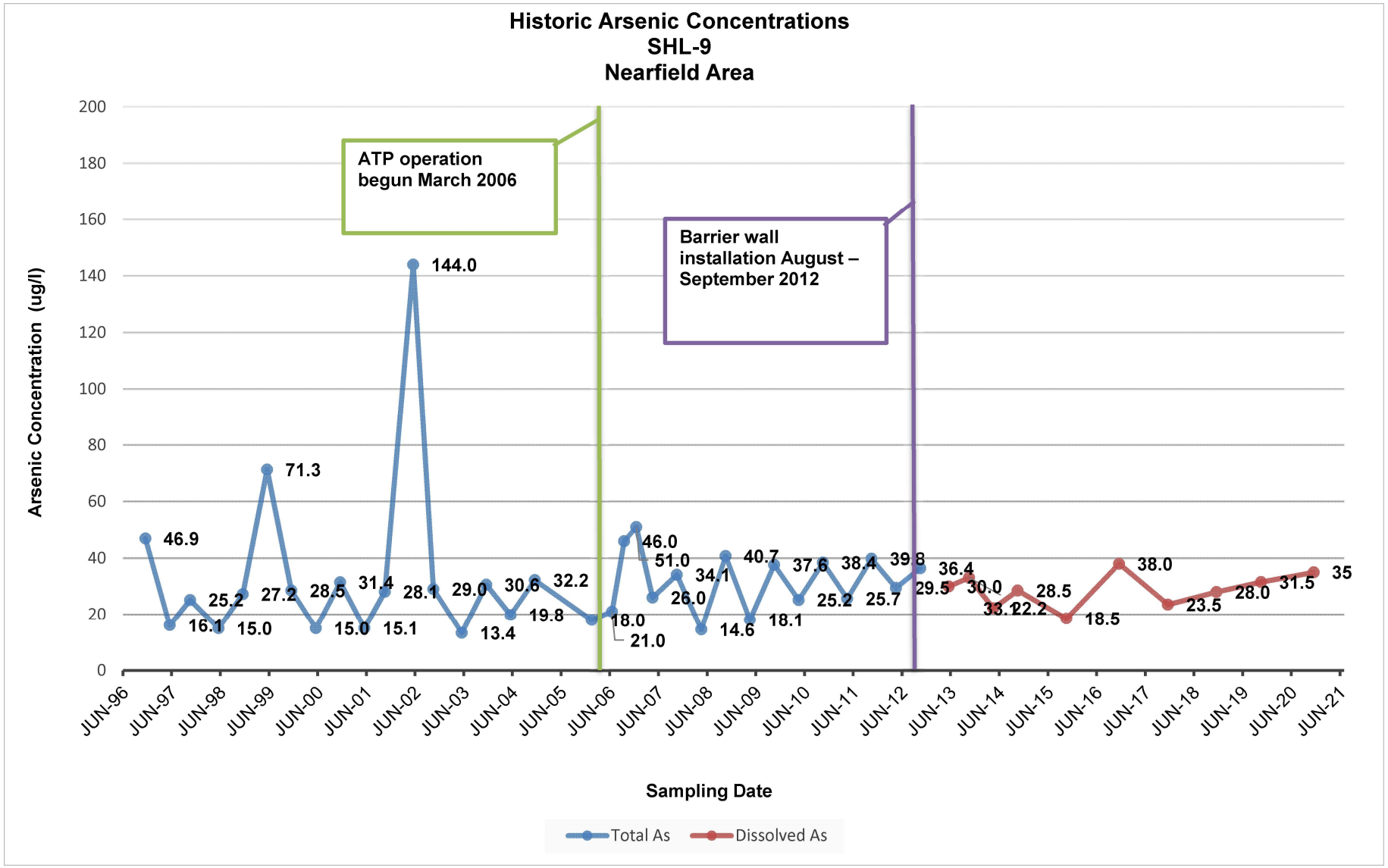
Notes:
"Hg = inches of Mercury
CH_4 = Methane
CO = Carbon Monoxide
CO_2 = Carbon Dioxide
H_2S = Hydrogen Sulfide
LEL = Lower Explosive Limit
lpm = Liters per minute
O_2 = Oxygen
ppm = Parts per million
VOC = Volatile Organic Compound

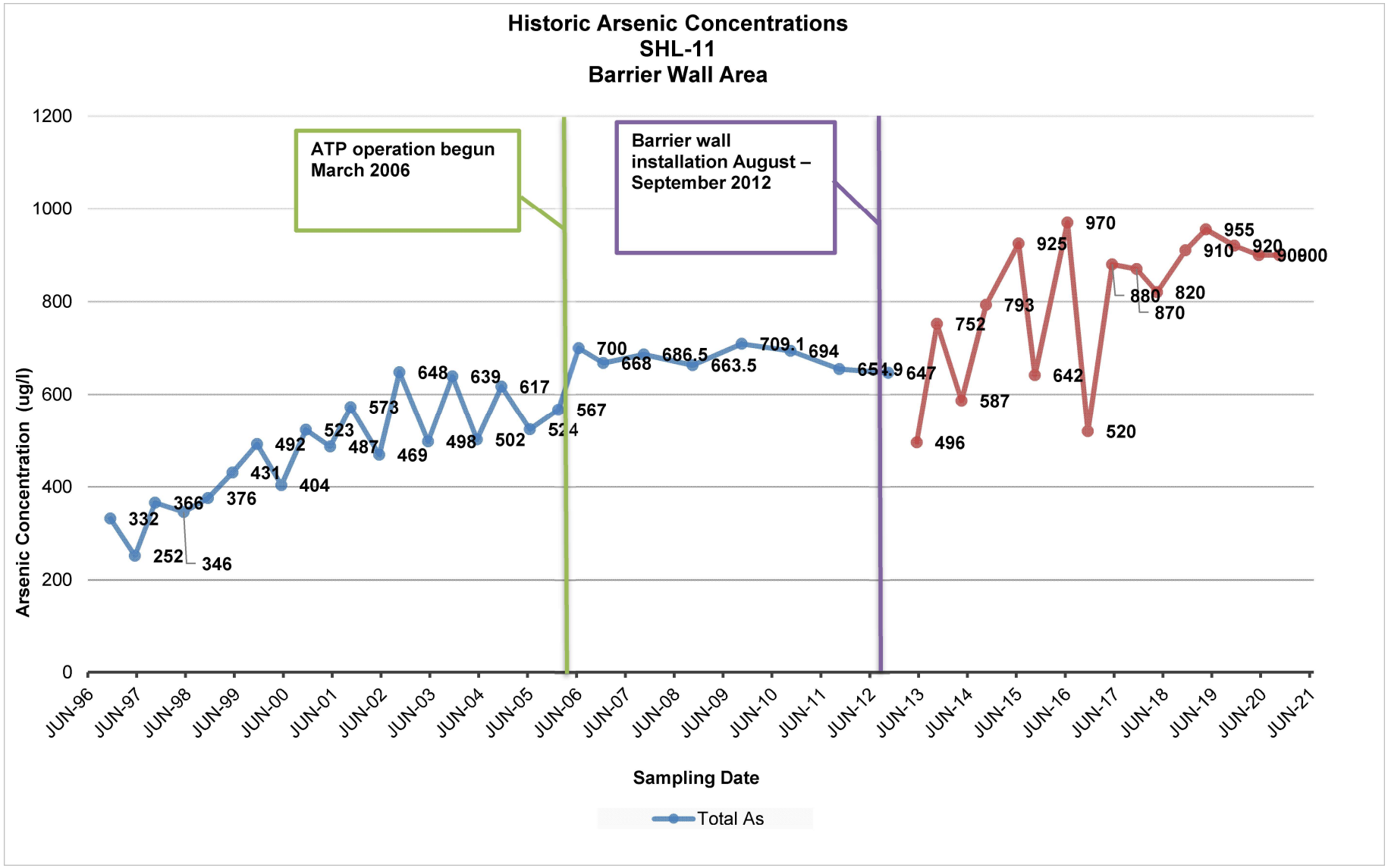
= 2020 sampling result

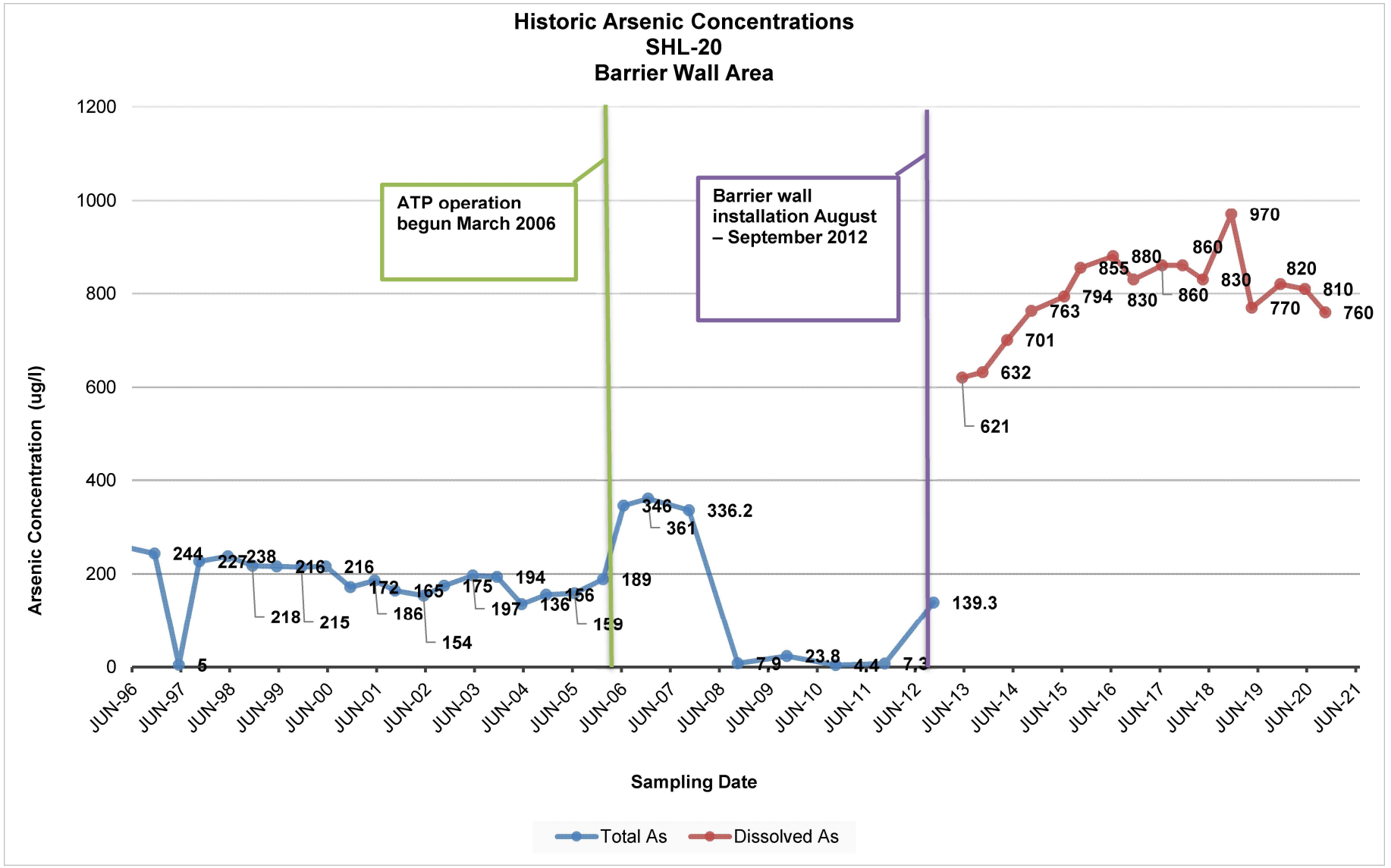
Appendix G

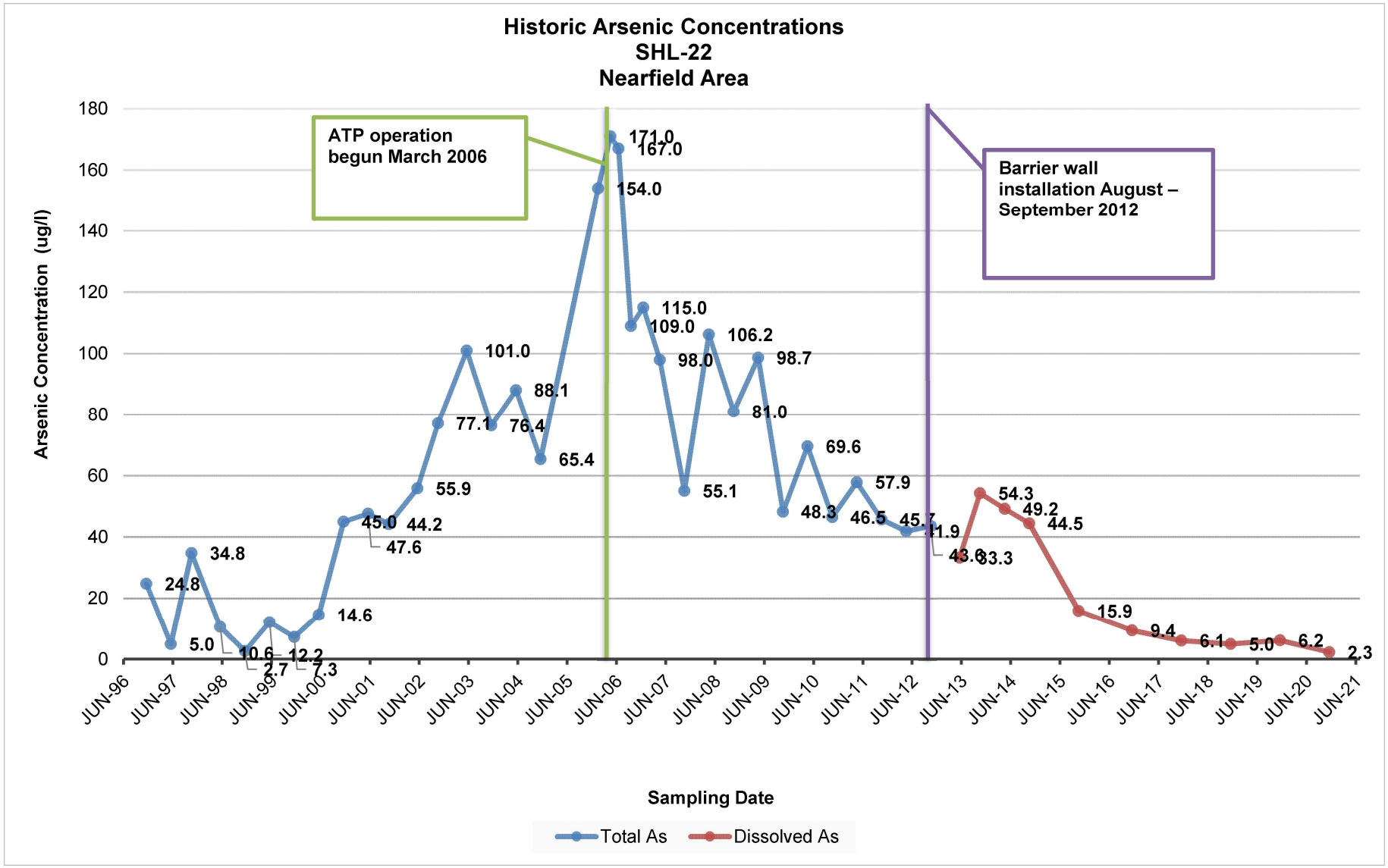
Arsenic Concentration Trend Graphs

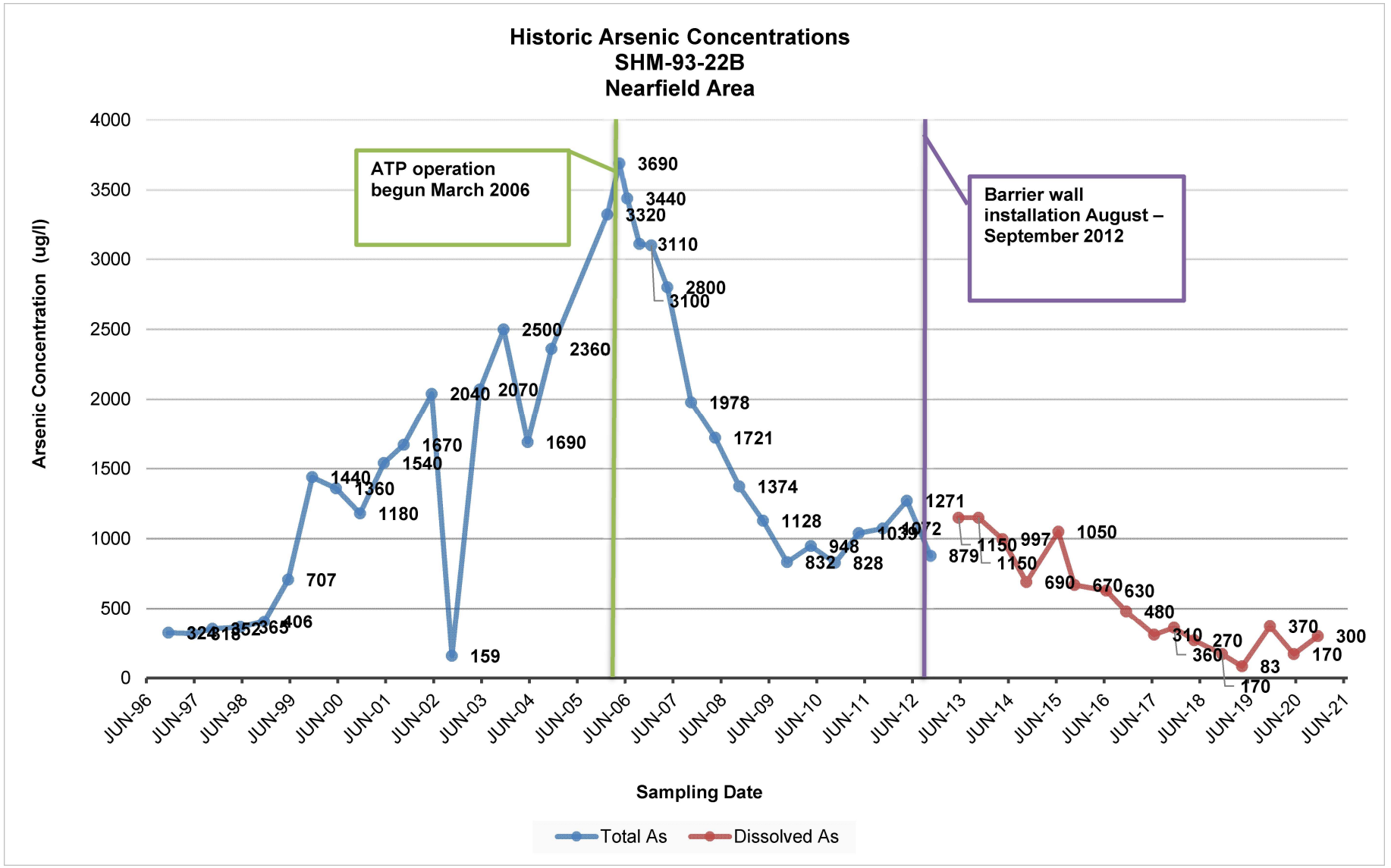

Historic Arsenic Concentrations
SHL-4
Barrier Wall Area
Arsenic Concentration (ug/l)
250
200
150
100
50
0
ATP operation begun March 2006
Barrier wall installation August – September 2012
180.0
73.6
48.8
37.4
89.1
78.2
61.3
116.0
91.5
66.0
50.8
66.1
47.8
26.6
13.4
27.2
19.5
10.1
7.5
2.3
15.1
3.1
1.4
3.8
2.7
6.2
37
37
110
74
130
110
150
98
69
220
110
JUN-96
JUN-97
JUN-98
JUN-99
JUN-00
JUN-01
JUN-02
JUN-03
JUN-04
JUN-05
JUN-06
JUN-07
JUN-08
JUN-09
JUN-10
JUN-11
JUN-12
JUN-13
JUN-14
JUN-15
JUN-16
JUN-17
JUN-18
JUN-19
JUN-20
JUN-21
Sampling Date
Total As
Dissolved As

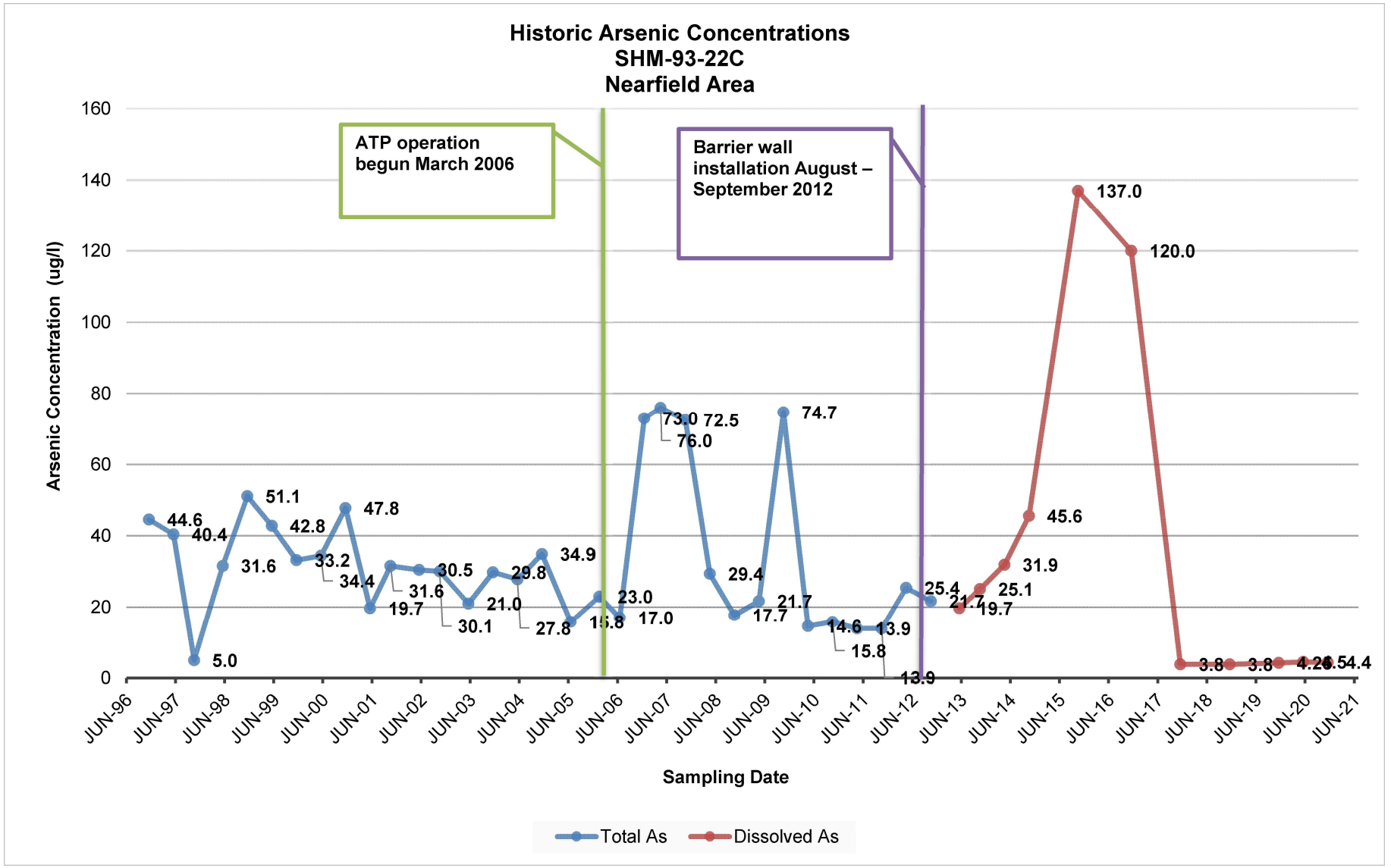

Historic Arsenic Concentrations
SHL-9
Nearfield Area
ATP operation begun March 2006
Barrier wall installation August – September 2012
Arsenic Concentration (ug/l)
Sampling Date
Total As
Dissolved As
0
20
40
60
80
100
120
140
160
180
200
JUN-96
JUN-97
JUN-98
JUN-99
JUN-00
JUN-01
JUN-02
JUN-03
JUN-04
JUN-05
JUN-06
JUN-07
JUN-08
JUN-09
JUN-10
JUN-11
JUN-12
JUN-13
JUN-14
JUN-15
JUN-16
JUN-17
JUN-18
JUN-19
JUN-20
JUN-21
46.9
16.1
25.2
15.0
27.2
71.3
15.0
28.5
15.0
31.4
15.1
144.0
28.1
13.4
29.0
30.6
19.8
32.2
18.0
21.0
46.0
51.0
26.0
34.1
14.6
40.7
18.1
37.6
25.2
38.4
25.7
39.8
29.5
36.4
30.0
33.1
22.2
28.5
18.5
38.0
23.5
28.0
31.5
35

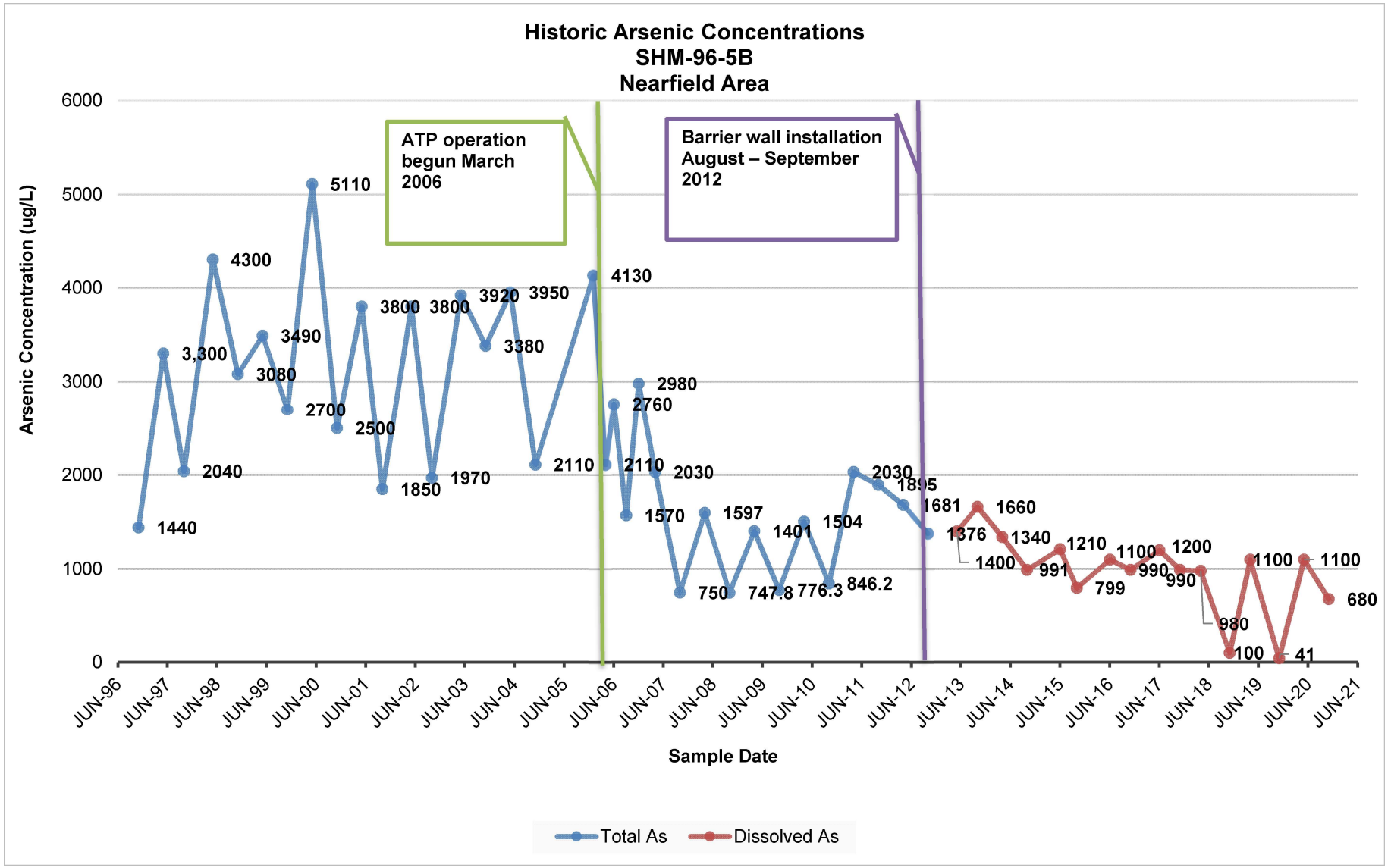

Historic Arsenic Concentrations
SHL-11
Barrier Wall Area
ATP operation begun March 2006
Barrier wall installation August – September 2012
Arsenic Concentration (ug/l)
Sampling Date
Total As
0
200
400
600
800
1000
1200
JUN-96
JUN-97
JUN-98
JUN-99
JUN-00
JUN-01
JUN-02
JUN-03
JUN-04
JUN-05
JUN-06
JUN-07
JUN-08
JUN-09
JUN-10
JUN-11
JUN-12
JUN-13
JUN-14
JUN-15
JUN-16
JUN-17
JUN-18
JUN-19
JUN-20
JUN-21
332
252
366
346
376
431
404
492
523
487
573
469
648
498
639
502
617
524
567
700
668
686.5
663.5
709.1
694
654.9
647
496
752
587
793
925
642
970
520
880
870
820
910
955
920
900

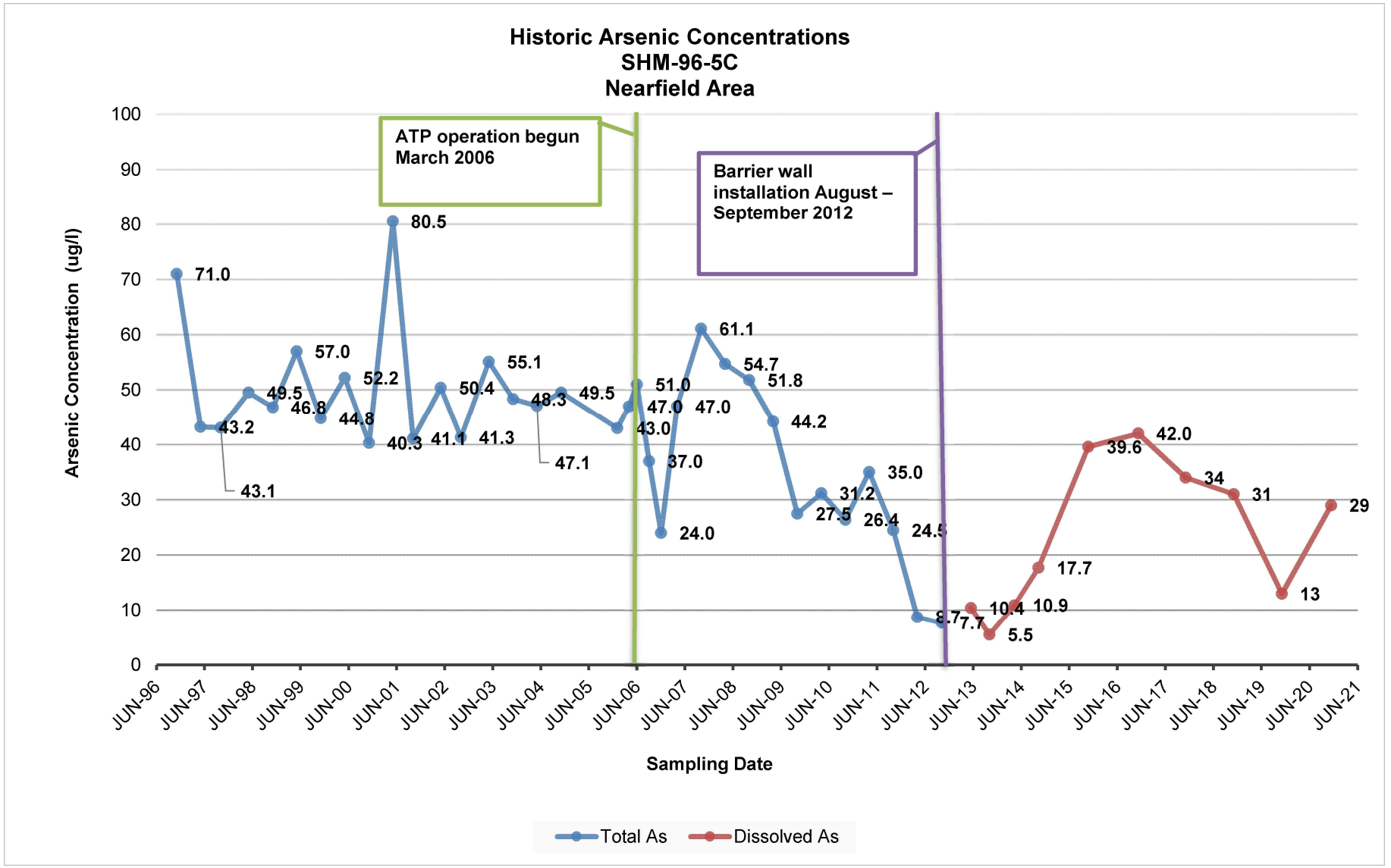

Historic Arsenic Concentrations
SHL-20
Barrier Wall Area
ATP operation begun March 2006
Barrier wall installation August – September 2012
Arsenic Concentration (ug/l)
Sampling Date
Total As
Dissolved As
0
200
400
600
800
1000
1200
JUN-96
JUN-97
JUN-98
JUN-99
JUN-00
JUN-01
JUN-02
JUN-03
JUN-04
JUN-05
JUN-06
JUN-07
JUN-08
JUN-09
JUN-10
JUN-11
JUN-12
JUN-13
JUN-14
JUN-15
JUN-16
JUN-17
JUN-18
JUN-19
JUN-20
JUN-21
244
227
238
216
216
172
165
175
194
136
156
159
189
346
361
336.2
7.9
23.8
4.4
7.3
139.3
5
218
215
186
154
197
621
632
701
763
794
855
880
830
860
860
830
970
770
820
810
760

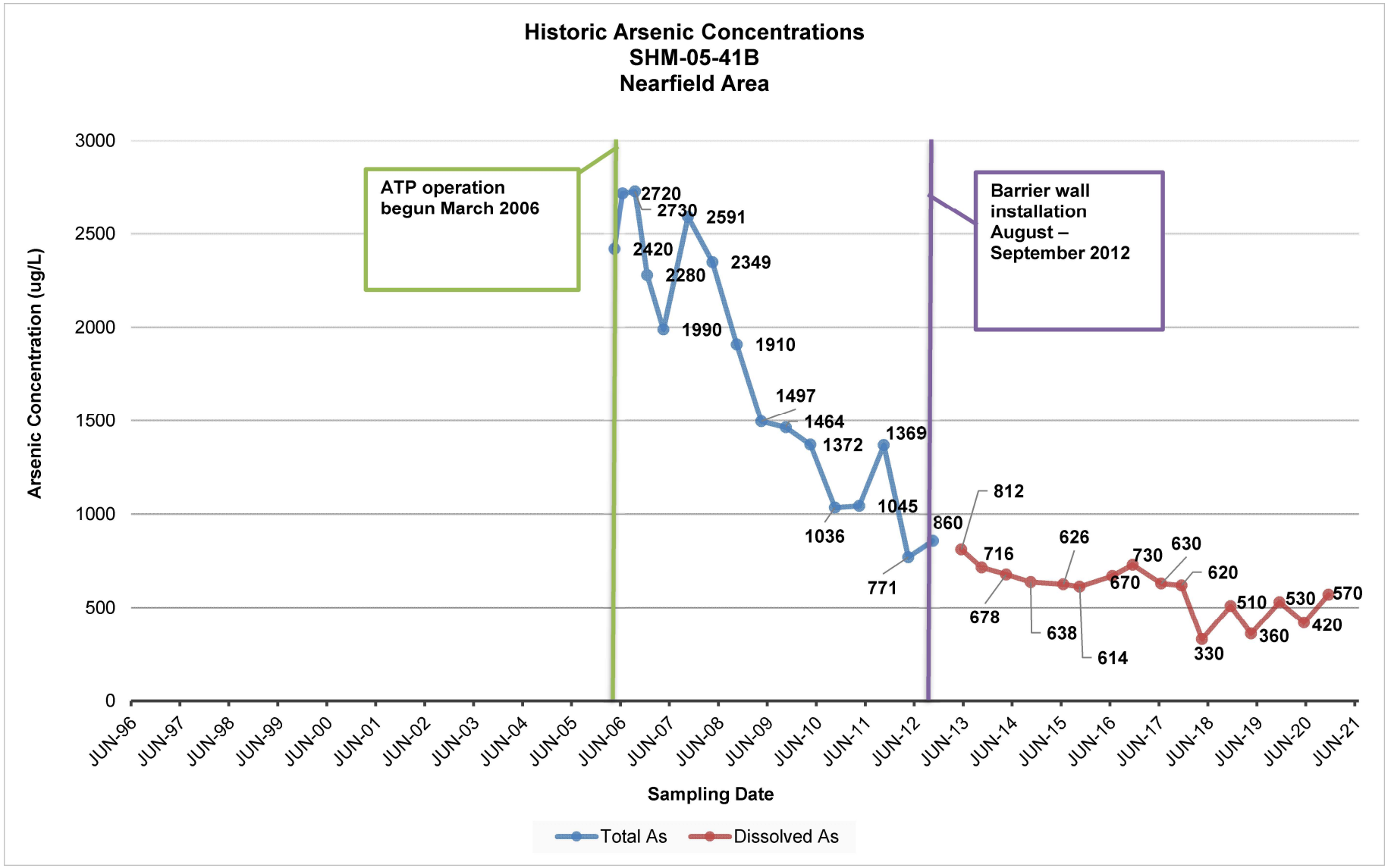

Historic Arsenic Concentrations
SHL-22
Nearfield Area
ATP operation begun March 2006
Barrier wall installation August – September 2012
Arsenic Concentration (ug/l)
Sampling Date
Total As
Dissolved As
180
160
140
120
100
80
60
40
20
0
JUN-96
JUN-97
JUN-98
JUN-99
JUN-00
JUN-01
JUN-02
JUN-03
JUN-04
JUN-05
JUN-06
JUN-07
JUN-08
JUN-09
JUN-10
JUN-11
JUN-12
JUN-13
JUN-14
JUN-15
JUN-16
JUN-17
JUN-18
JUN-19
JUN-20
JUN-21
24.8
34.8
5.0
10.6
2.7
12.2
7.3
14.6
45.0
47.6
44.2
55.9
77.1
101.0
76.4
88.1
65.4
154.0
171.0
167.0
109.0
115.0
98.0
55.1
106.2
81.0
98.7
48.3
69.6
46.5
57.9
45.7
41.9
43.6
54.3
49.2
33.3
44.5
15.9
9.4
6.1
5.0
6.2
2.3

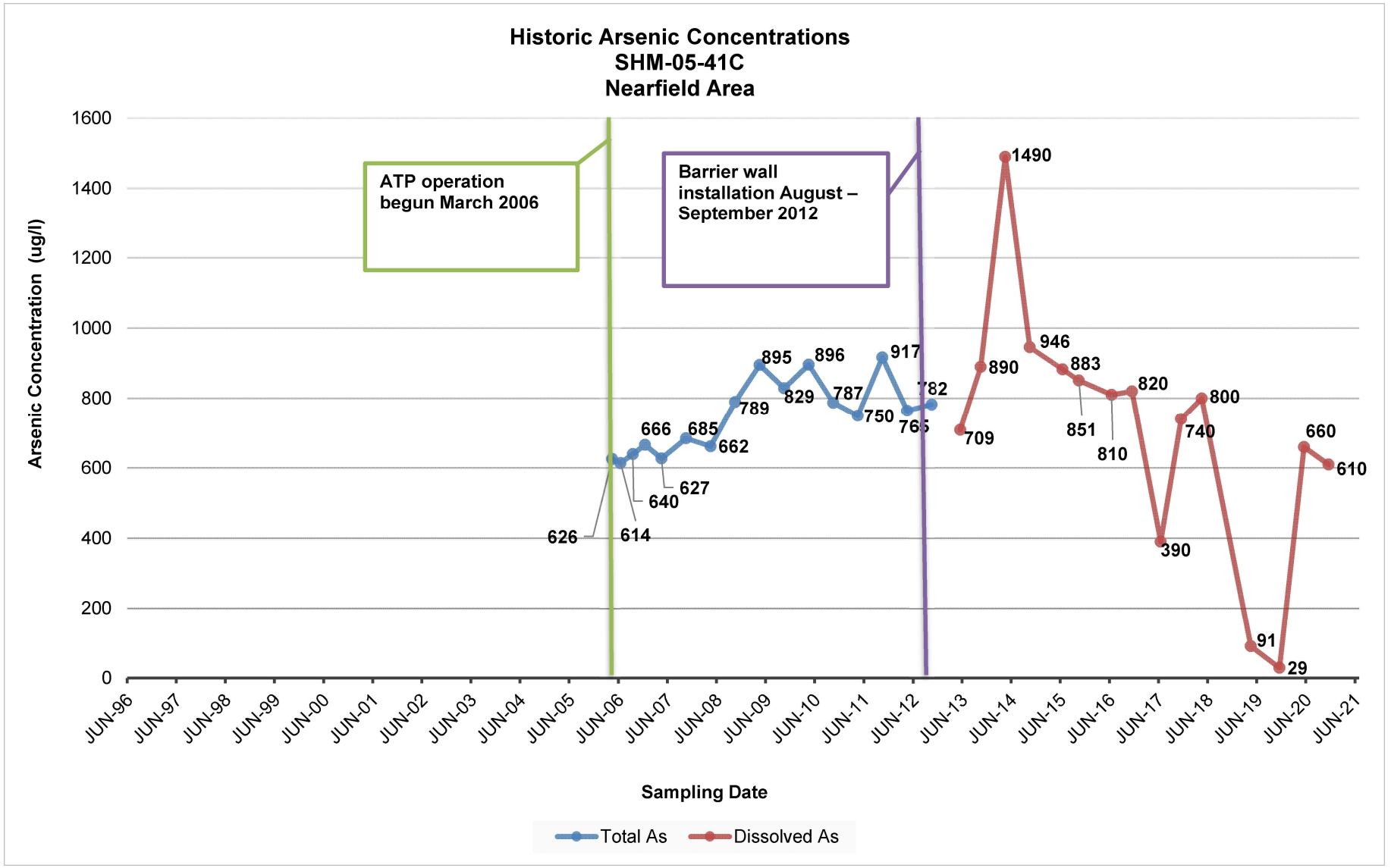

Historic Arsenic Concentrations
SHM-93-22B
Nearfield Area
ATP operation begun March 2006
Barrier wall installation August – September 2012
Arsenic Concentration (ug/l)
Sampling Date
Total As
Dissolved As
4000
3500
3000
2500
2000
1500
1000
500
0
JUN-96
JUN-97
JUN-98
JUN-99
JUN-00
JUN-01
JUN-02
JUN-03
JUN-04
JUN-05
JUN-06
JUN-07
JUN-08
JUN-09
JUN-10
JUN-11
JUN-12
JUN-13
JUN-14
JUN-15
JUN-16
JUN-17
JUN-18
JUN-19
JUN-20
JUN-21
324
318
352
365
406
707
1440
1360
1180
1540
1670
159
2040
2070
2500
1690
2360
3690
3440
3320
3110
3100
2800
1978
1721
1374
1128
832
948
828
1039
1271
1072
879
1150
997
1150
1050
690
670
630
480
310
360
270
170
83
370
170
300

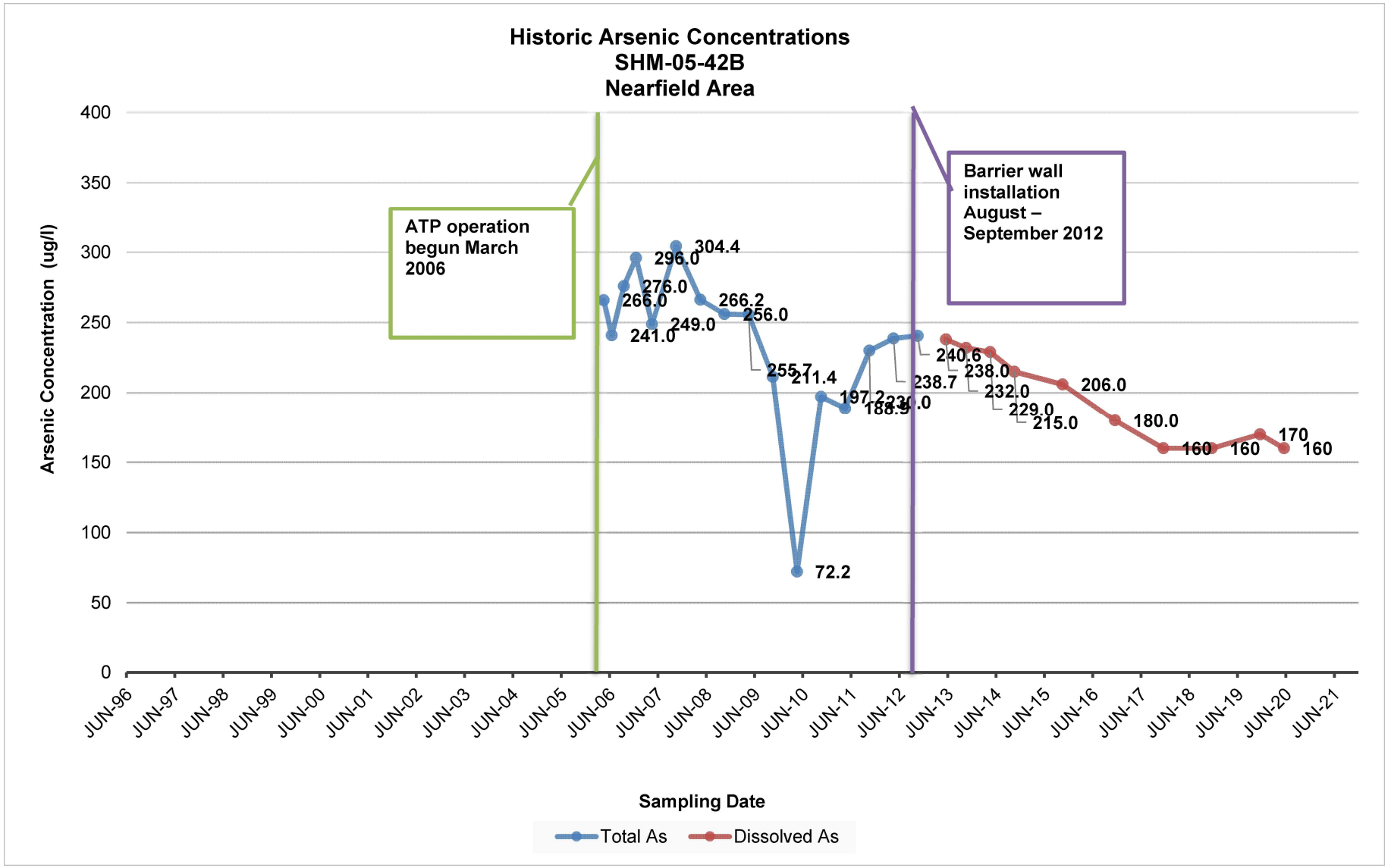

Historic Arsenic Concentrations
SHM-93-22C
Nearfield Area
ATP operation begun March 2006
Barrier wall installation August – September 2012
Arsenic Concentration (ug/l)
Sampling Date
Total As
Dissolved As
0
20
40
60
80
100
120
140
160
JUN-96
JUN-97
JUN-98
JUN-99
JUN-00
JUN-01
JUN-02
JUN-03
JUN-04
JUN-05
JUN-06
JUN-07
JUN-08
JUN-09
JUN-10
JUN-11
JUN-12
JUN-13
JUN-14
JUN-15
JUN-16
JUN-17
JUN-18
JUN-19
JUN-20
JUN-21
44.6
40.4
5.0
31.6
51.1
42.8
33.2
34.4
47.8
19.7
31.6
30.5
30.1
21.0
29.8
27.8
34.9
23.0
17.0
73.0
72.5
76.0
29.4
17.7
74.7
21.7
14.6
15.8
13.9
25.4
21.7
19.7
25.1
31.9
45.6
137.0
120.0
3.8
3.8
4.2
54.4

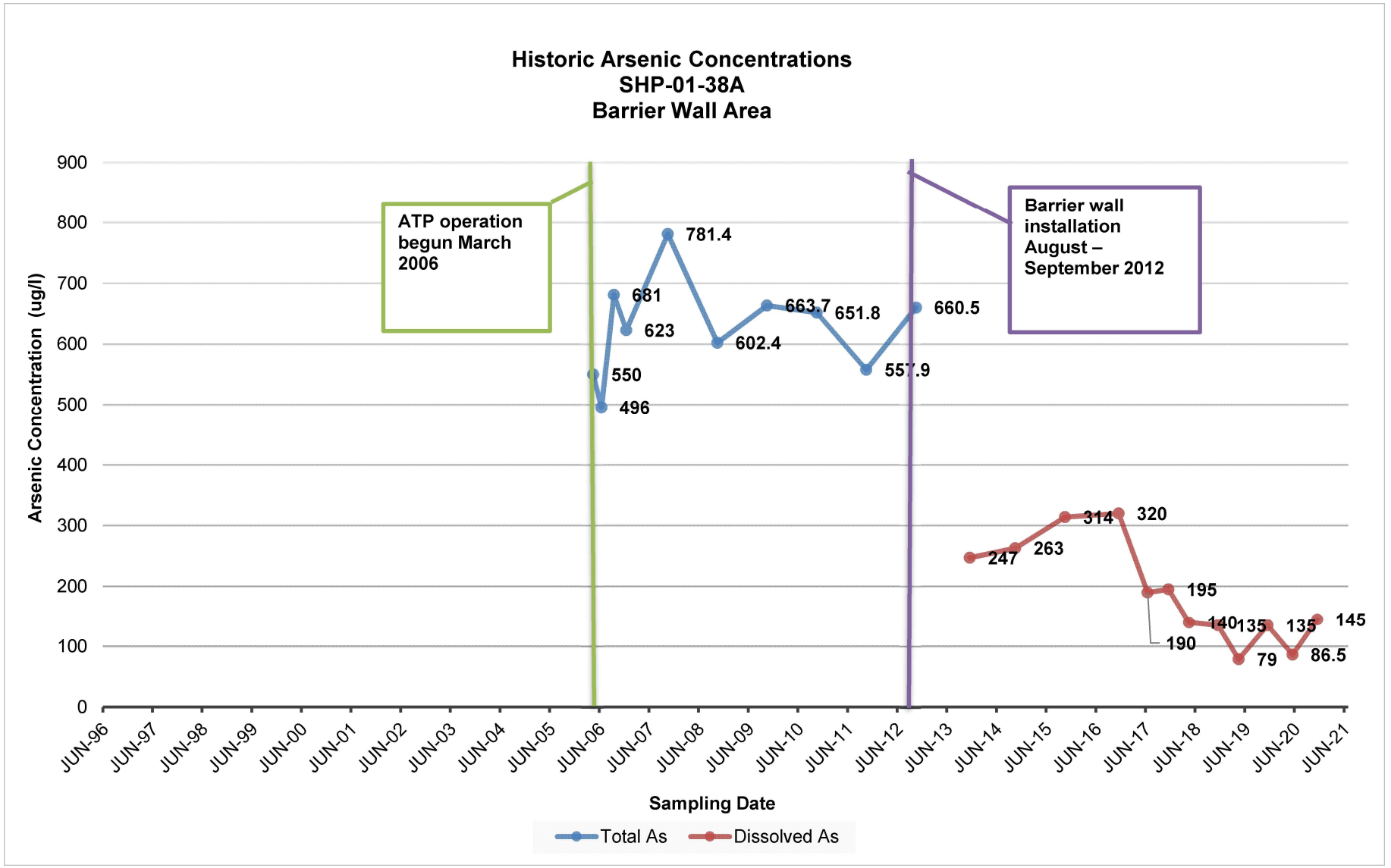

Historic Arsenic Concentrations
SHM-96-5B
Nearfield Area
ATP operation begun March 2006
Barrier wall installation August – September 2012
Arsenic Concentration (ug/L)
Sample Date
Total As
Dissolved As
6000
5000
4000
3000
2000
1000
0
JUN-96
JUN-97
JUN-98
JUN-99
JUN-00
JUN-01
JUN-02
JUN-03
JUN-04
JUN-05
JUN-06
JUN-07
JUN-08
JUN-09
JUN-10
JUN-11
JUN-12
JUN-13
JUN-14
JUN-15
JUN-16
JUN-17
JUN-18
JUN-19
JUN-20
JUN-21
1440
3,300
2040
4300
3080
3490
2700
5110
2500
3800
1850
3800
1970
3920
3950
3380
2110
4130
2110
2760
2980
2030
1570
750
1597
747.8
1401
776.3
1504
846.2
2030
1895
1681
1376
1660
1340
1400
1210
991
1100
799
990
1200
990
980
100
1100
41
1100
680

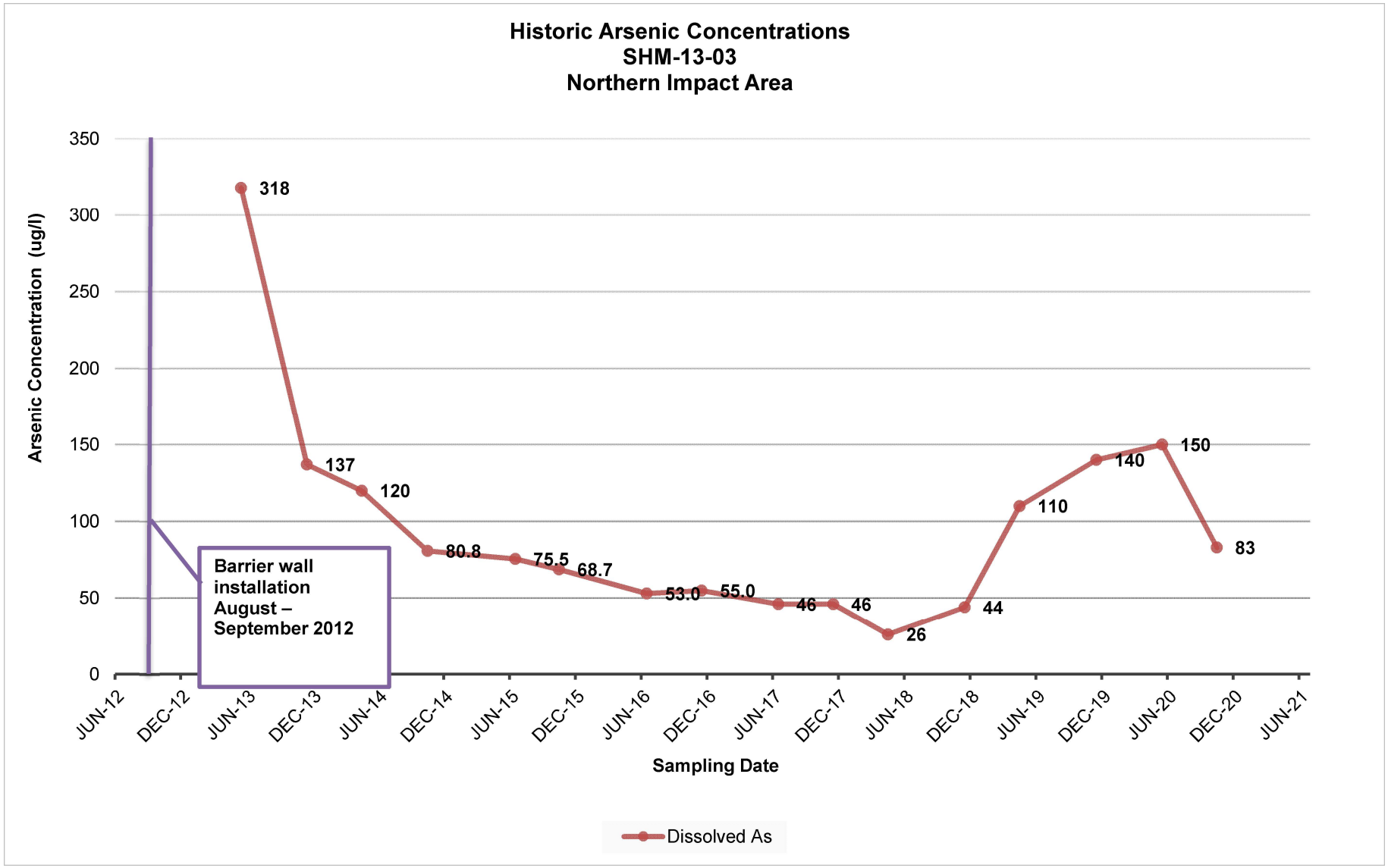

Historic Arsenic Concentrations
SHM-96-5C
Nearfield Area
ATP operation begun March 2006
Barrier wall installation August – September 2012
Arsenic Concentration (ug/l)
Sampling Date
Total As
Dissolved As
71.0
43.2
43.1
49.5
46.8
57.0
44.8
52.2
80.5
40.3
41.1
50.4
41.3
55.1
48.3
47.1
49.5
51.0
47.0
43.0
37.0
24.0
47.0
61.1
54.7
51.8
44.2
27.5
31.2
26.4
35.0
24.5
8.7
7.7
10.4
5.5
10.9
17.7
39.6
42.0
34
31
13
29

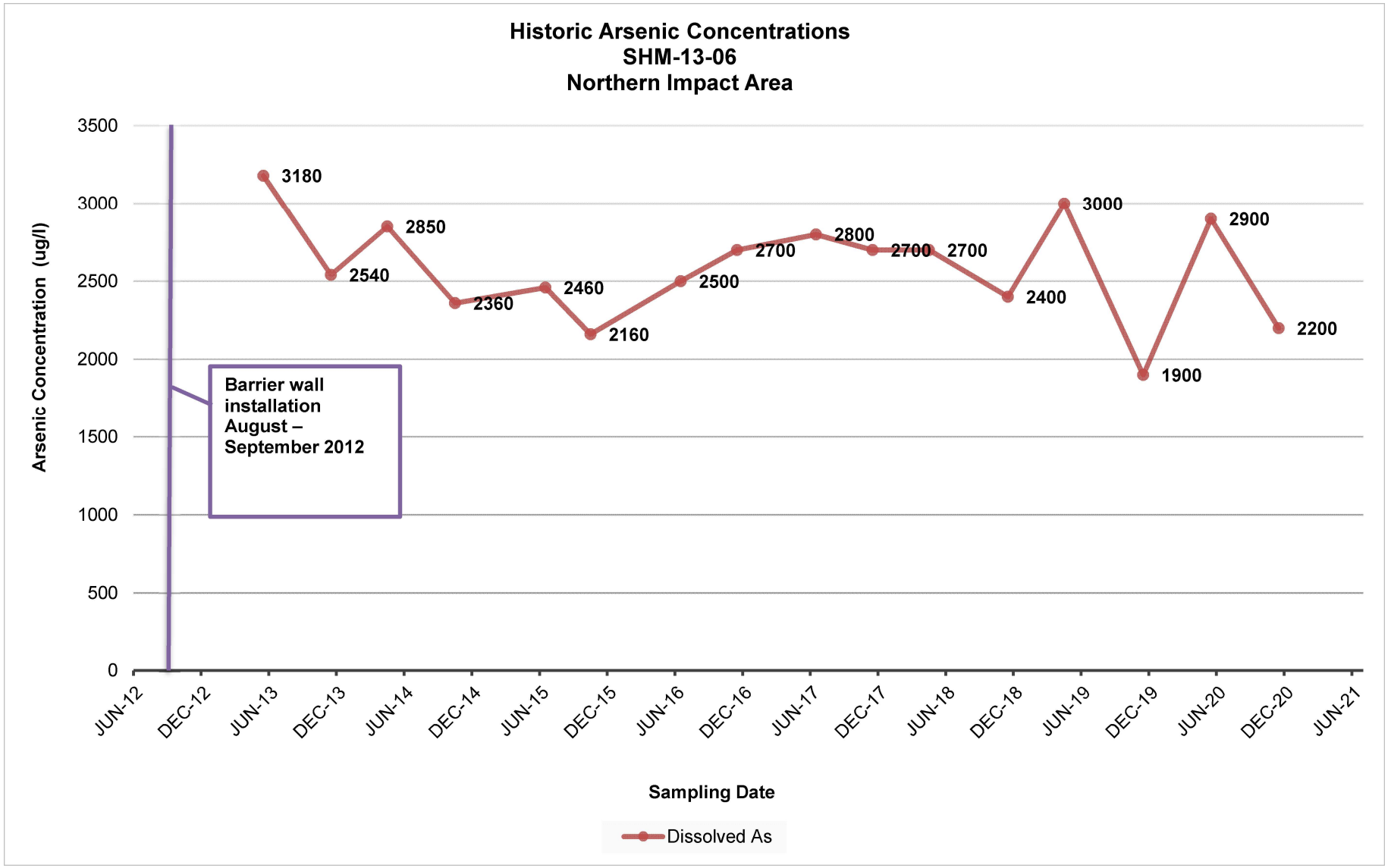

Historic Arsenic Concentrations
SHM-05-41B
Nearfield Area
ATP operation begun March 2006
Barrier wall installation August – September 2012
Arsenic Concentration (ug/L)
Sampling Date
Total As
Dissolved As
2720
2730
2591
2420
2349
2280
1990
1910
1497
1464
1372
1369
1045
1036
860
771
812
716
678
638
626
614
670
730
630
620
510
530
570
420
360
330

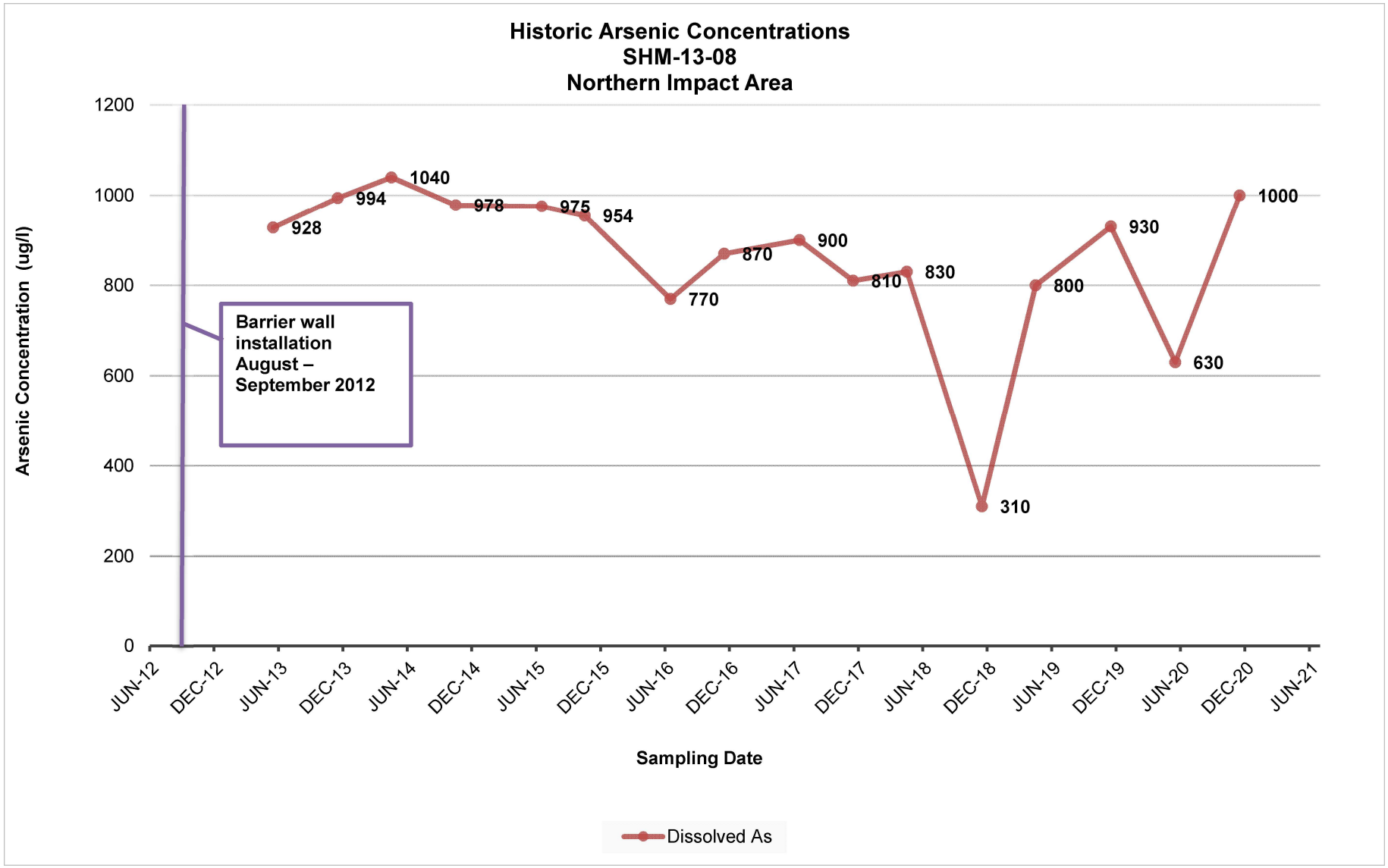

Historic Arsenic Concentrations
SHM-05-41C
Nearfield Area
ATP operation begun March 2006
Barrier wall installation August – September 2012
Arsenic Concentration (ug/l)
Sampling Date
Total As
Dissolved As
1600
1400
1200
1000
800
600
400
200
0
JUN-96
JUN-97
JUN-98
JUN-99
JUN-00
JUN-01
JUN-02
JUN-03
JUN-04
JUN-05
JUN-06
JUN-07
JUN-08
JUN-09
JUN-10
JUN-11
JUN-12
JUN-13
JUN-14
JUN-15
JUN-16
JUN-17
JUN-18
JUN-19
JUN-20
JUN-21
626
614
640
666
627
685
662
789
895
829
896
787
750
917
765
782
709
890
1490
946
883
851
810
820
390
740
800
91
29
660
610

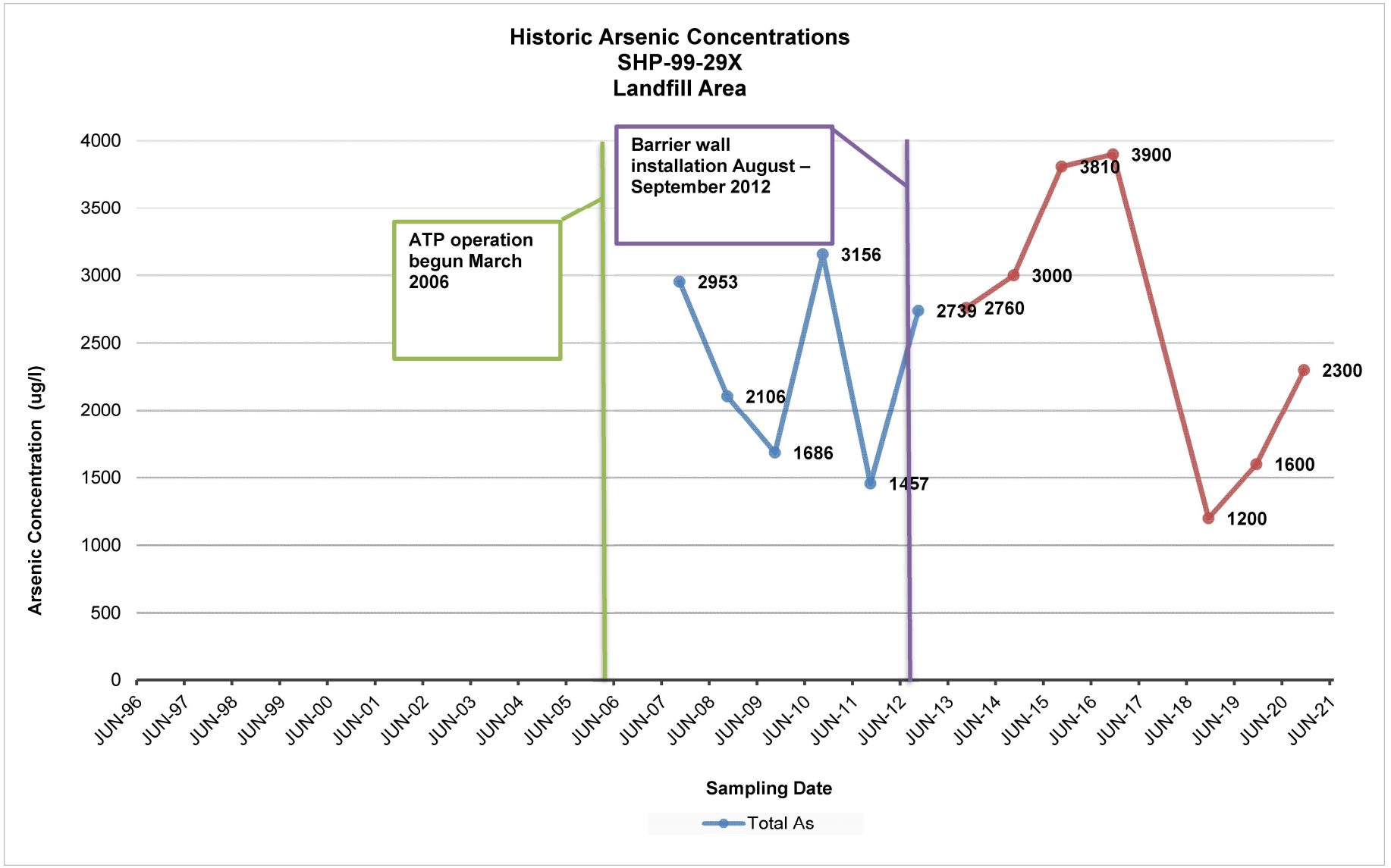

Historic Arsenic Concentrations
SHM-05-42B
Nearfield Area
ATP operation begun March 2006
Barrier wall installation August – September 2012
Arsenic Concentration (ug/l)
Sampling Date
Total As
Dissolved As
0
50
100
150
200
250
300
350
400
JUN-96
JUN-97
JUN-98
JUN-99
JUN-00
JUN-01
JUN-02
JUN-03
JUN-04
JUN-05
JUN-06
JUN-07
JUN-08
JUN-09
JUN-10
JUN-11
JUN-12
JUN-13
JUN-14
JUN-15
JUN-16
JUN-17
JUN-18
JUN-19
JUN-20
JUN-21
266.0
276.0
296.0
304.4
241.0
249.0
266.2
256.0
255.7
211.4
72.2
197.2
188.9
238.7
240.6
238.0
232.0
229.0
215.0
206.0
180.0
160
160
170
160

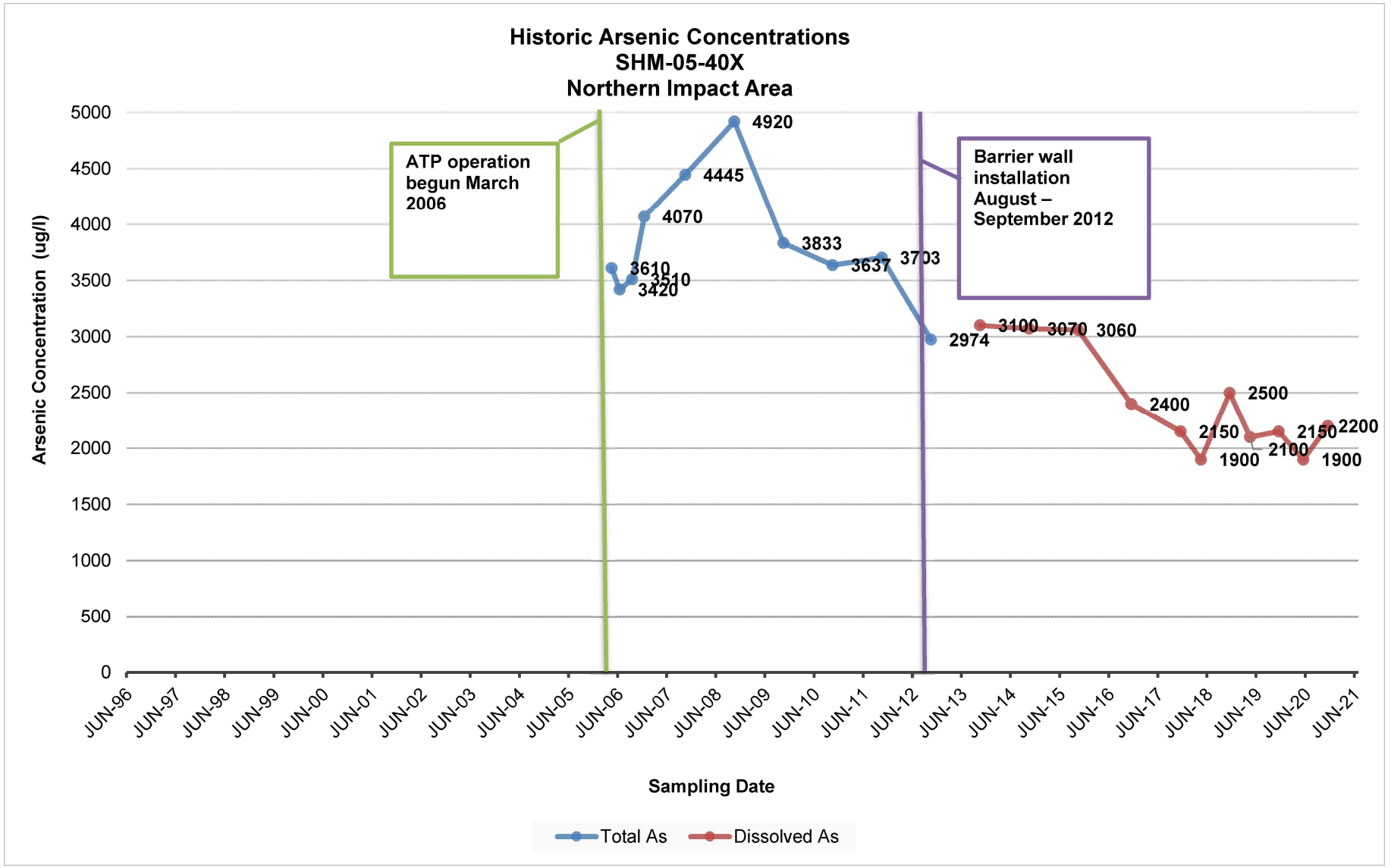

Historic Arsenic Concentrations
SHP-01-38A
Barrier Wall Area
ATP operation begun March 2006
Barrier wall installation August – September 2012
Arsenic Concentration (ug/l)
Sampling Date
Total As
Dissolved As
781.4
681
623
550
496
602.4
663.7
651.8
557.9
660.5
247
263
314
320
195
190
140
135
79
135
86.5
145

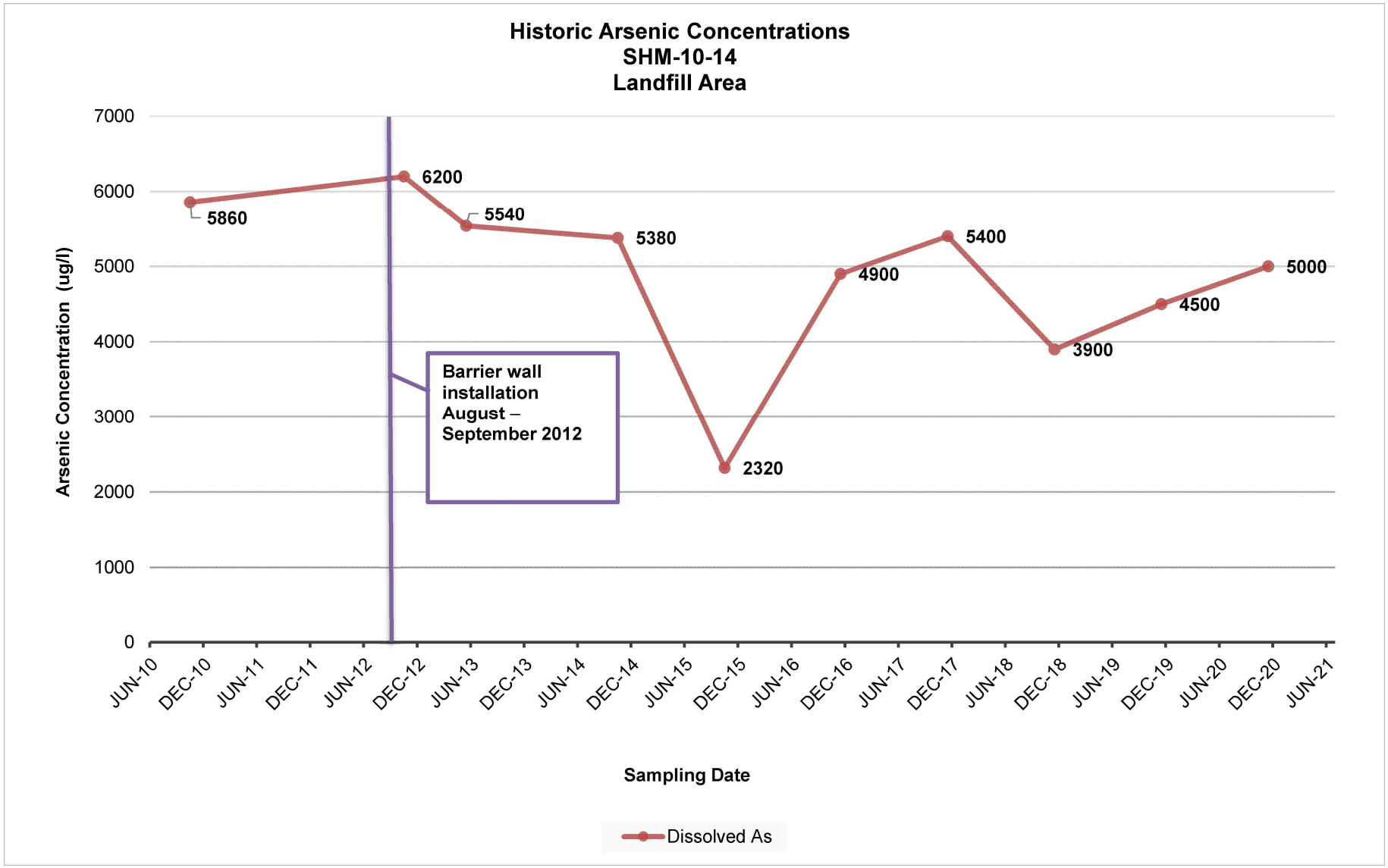

Historic Arsenic Concentrations
SHM-13-03
Northern Impact Area
Arsenic Concentration (ug/l)
350
300
250
200
150
100
50
0
318
137
120
80.8
75.5
68.7
53.0
55.0
46
46
26
44
110
140
150
83
Barrier wall installation August – September 2012
JUN-12
DEC-12
JUN-13
DEC-13
JUN-14
DEC-14
JUN-15
DEC-15
JUN-16
DEC-16
JUN-17
DEC-17
JUN-18
DEC-18
JUN-19
DEC-19
JUN-20
DEC-20
JUN-21
Sampling Date
Dissolved As


Historic Arsenic Concentrations
SHM-13-06
Northern Impact Area
Arsenic Concentration (ug/l)
3500
3000
2500
2000
1500
1000
500
0
3180
2540
2850
2360
2460
2160
2500
2700
2800
2700
2700
2400
3000
1900
2900
2200
Barrier wall installation August – September 2012
JUN-12
DEC-12
JUN-13
DEC-13
JUN-14
DEC-14
JUN-15
DEC-15
JUN-16
DEC-16
JUN-17
DEC-17
JUN-18
DEC-18
JUN-19
DEC-19
JUN-20
DEC-20
JUN-21
Sampling Date
Dissolved As


Historic Arsenic Concentrations
SHM-13-08
Northern Impact Area
Arsenic Concentration (ug/l)
1200
1000
800
600
400
200
0
928
994
1040
978
975
954
770
870
900
810
830
310
800
930
630
1000
Barrier wall installation August – September 2012
JUN-12
DEC-12
JUN-13
DEC-13
JUN-14
DEC-14
JUN-15
DEC-15
JUN-16
DEC-16
JUN-17
DEC-17
JUN-18
DEC-18
JUN-19
DEC-19
JUN-20
DEC-20
JUN-21
Sampling Date
Dissolved As

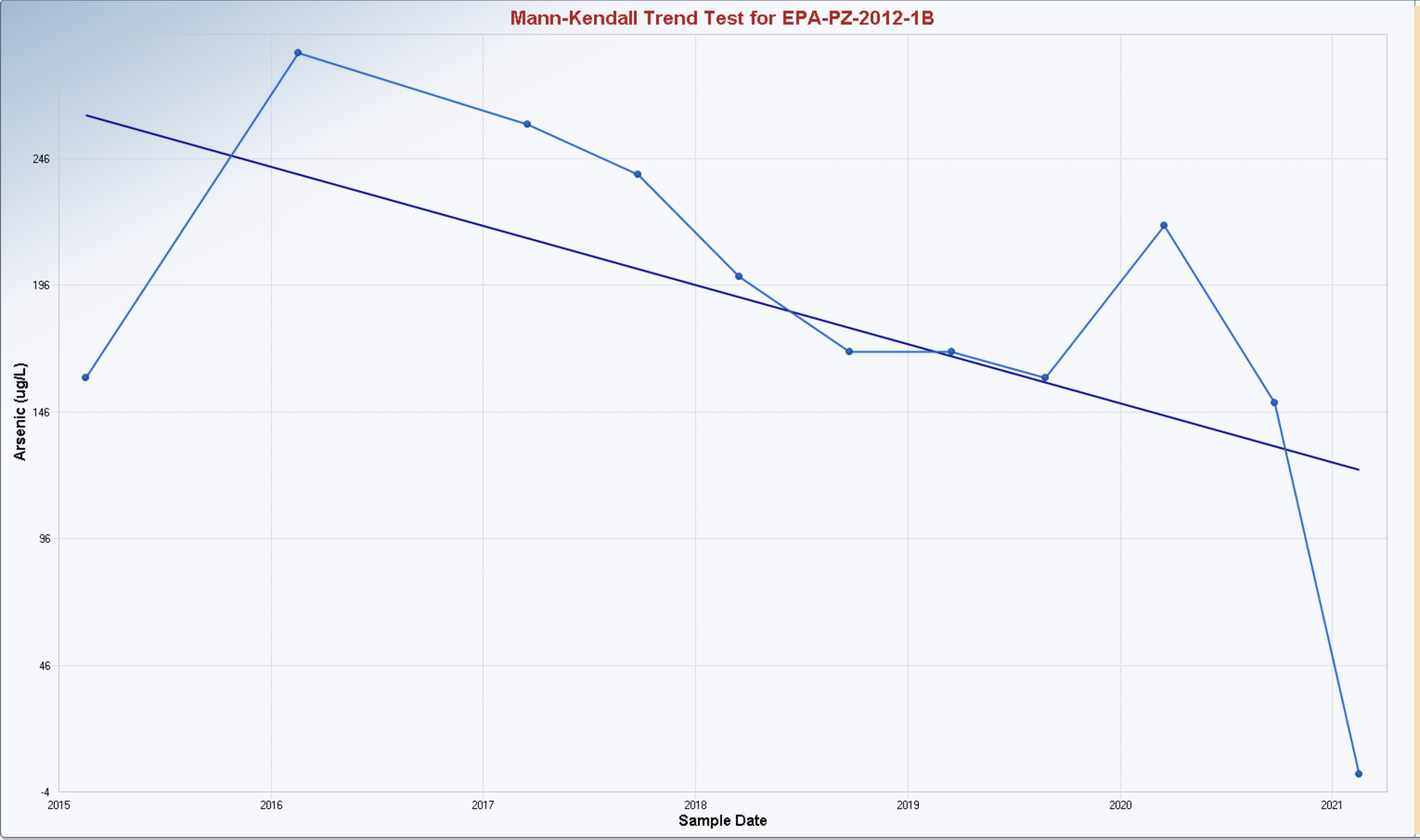

Historic Arsenic Concentrations
SHP-99-29X
Landfill Area
Barrier wall installation August – September 2012
ATP operation begun March 2006
2953
2106
1686
3156
1457
2739
2760
3000
3810
3900
1200
1600
2300
Arsenic Concentration (ug/l)
4000
3500
3000
2500
2000
1500
1000
500
0
JUN-96
JUN-97
JUN-98
JUN-99
JUN-00
JUN-01
JUN-02
JUN-03
JUN-04
JUN-05
JUN-06
JUN-07
JUN-08
JUN-09
JUN-10
JUN-11
JUN-12
JUN-13
JUN-14
JUN-15
JUN-16
JUN-17
JUN-18
JUN-19
JUN-20
JUN-21
Sampling Date
Total As


Historic Arsenic Concentrations
SHM-05-40X
Northern Impact Area
ATP operation begun March 2006
Barrier wall installation August – September 2012
Arsenic Concentration (ug/l)
Sampling Date
Total As
Dissolved As
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
JUN-96
JUN-97
JUN-98
JUN-99
JUN-00
JUN-01
JUN-02
JUN-03
JUN-04
JUN-05
JUN-06
JUN-07
JUN-08
JUN-09
JUN-10
JUN-11
JUN-12
JUN-13
JUN-14
JUN-15
JUN-16
JUN-17
JUN-18
JUN-19
JUN-20
JUN-21
3610
3510
3420
4070
4445
4920
3833
3637
3703
2974
3100
3070
3060
2400
2150
1900
2500
2100
2150
1900
2200


Historic Arsenic Concentrations
SHM-10-14
Landfill Area
Arsenic Concentration (ug/l)
7000
6000
5000
4000
3000
2000
1000
0
5860
6200
5540
5380
2320
4900
5400
3900
4500
5000
Barrier wall installation August – September 2012
JUN-10
DEC-10
JUN-11
DEC-11
JUN-12
DEC-12
JUN-13
DEC-13
JUN-14
DEC-14
JUN-15
DEC-15
JUN-16
DEC-16
JUN-17
DEC-17
JUN-18
DEC-18
JUN-19
DEC-19
JUN-20
DEC-20
JUN-21
Sampling Date
Dissolved As

Appendix H

ProUCL Outputs



Mann-Kendall Trend Analysis

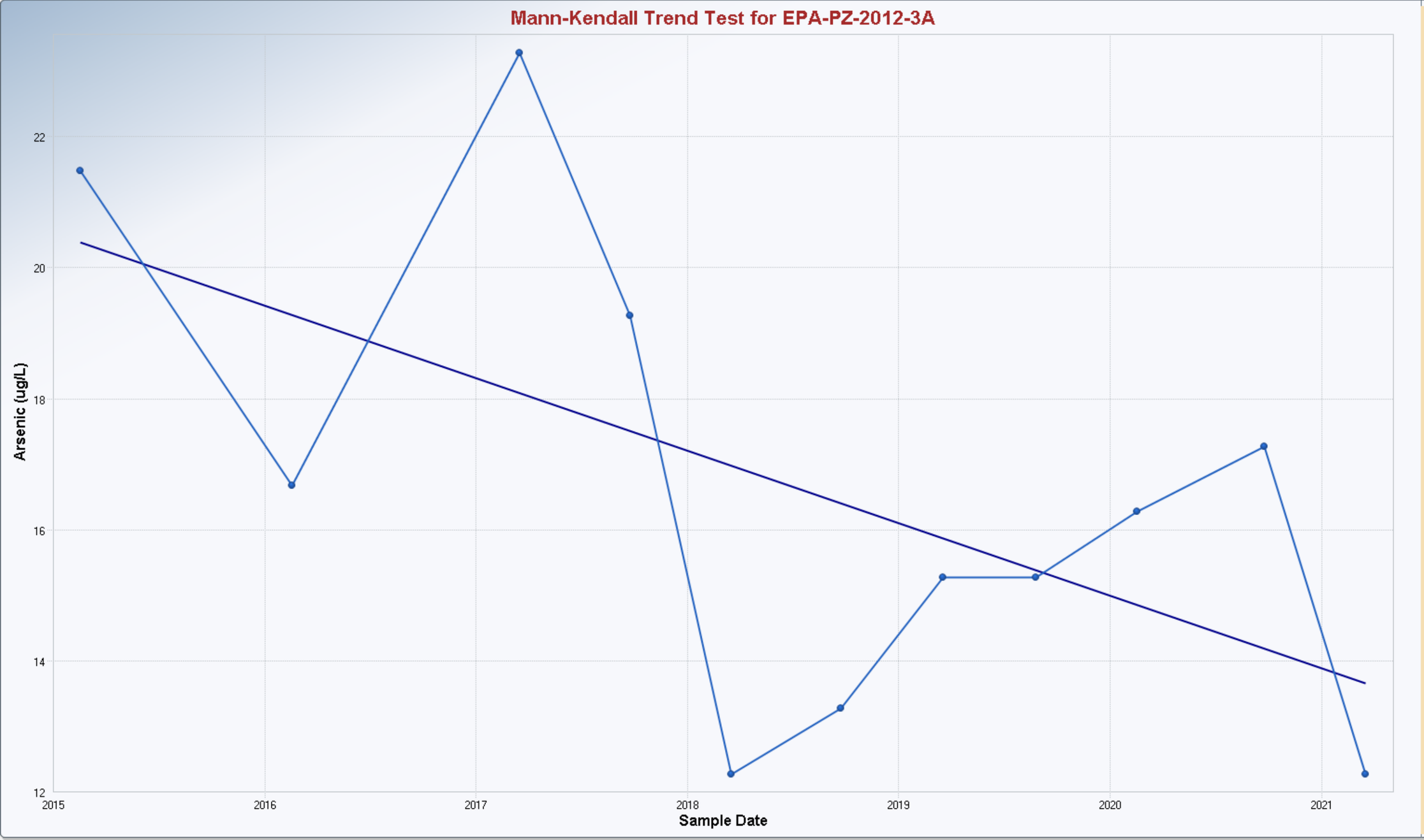
n	11
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	12.7671
Standardized Value of S	-2.3498
M-K Test Value (S)	-31
Tabulated p-value	0.0080
Approximate p-value	0.0094

OLS Regression Line (Blue)

OLS Regression Slope	-23.3679
OLS Regression Intercept	47,345.3586

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test for EPA-PZ-2012-3A



Mann-Kendall Trend Analysis

n	11
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	12.7671
Standardized Value of S	-1.2532
M-K Test Value (S)	-17
Tabulated p-value	0.1090
Approximate p-value	0.1051

OLS Regression Line (Blue)

OLS Regression Slope	-1.1068
OLS Regression Intercept	2,250.1042

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test for EPA-PZ-2012-3B

Mann-Kendall Trend Analysis

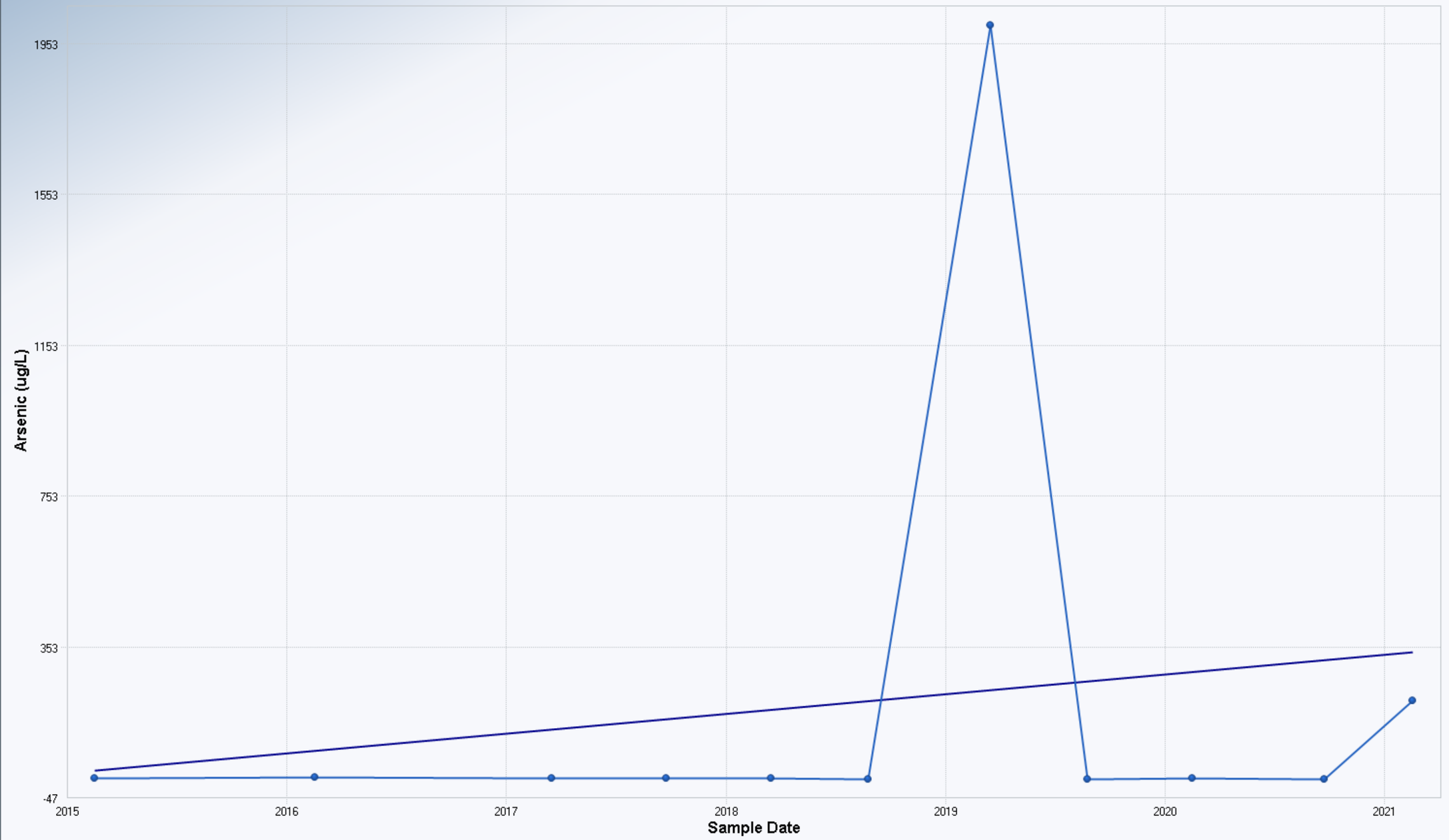
n	11
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	12.8062
Standardized Value of S	-2.5769
M-K Test Value (S)	-34
Tabulated p-value	0.0030
Approximate p-value	0.0050

OLS Regression Line (Blue)

OLS Regression Slope	-204.5778
OLS Regression Intercept	416,222.7311

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test for EPA-PZ-2012-4A



Mann-Kendall Trend Analysis

n	11
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	12.8062
Standardized Value of S	-0.3904
M-K Test Value (S)	-6
Tabulated p-value	0.3240
Approximate p-value	0.3481

OLS Regression Line (Blue)

OLS Regression Slope	52.2762
OLS Regression Intercept	-105,300.1607

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test for EPA-PZ-2012-4B

Mann-Kendall Trend Analysis

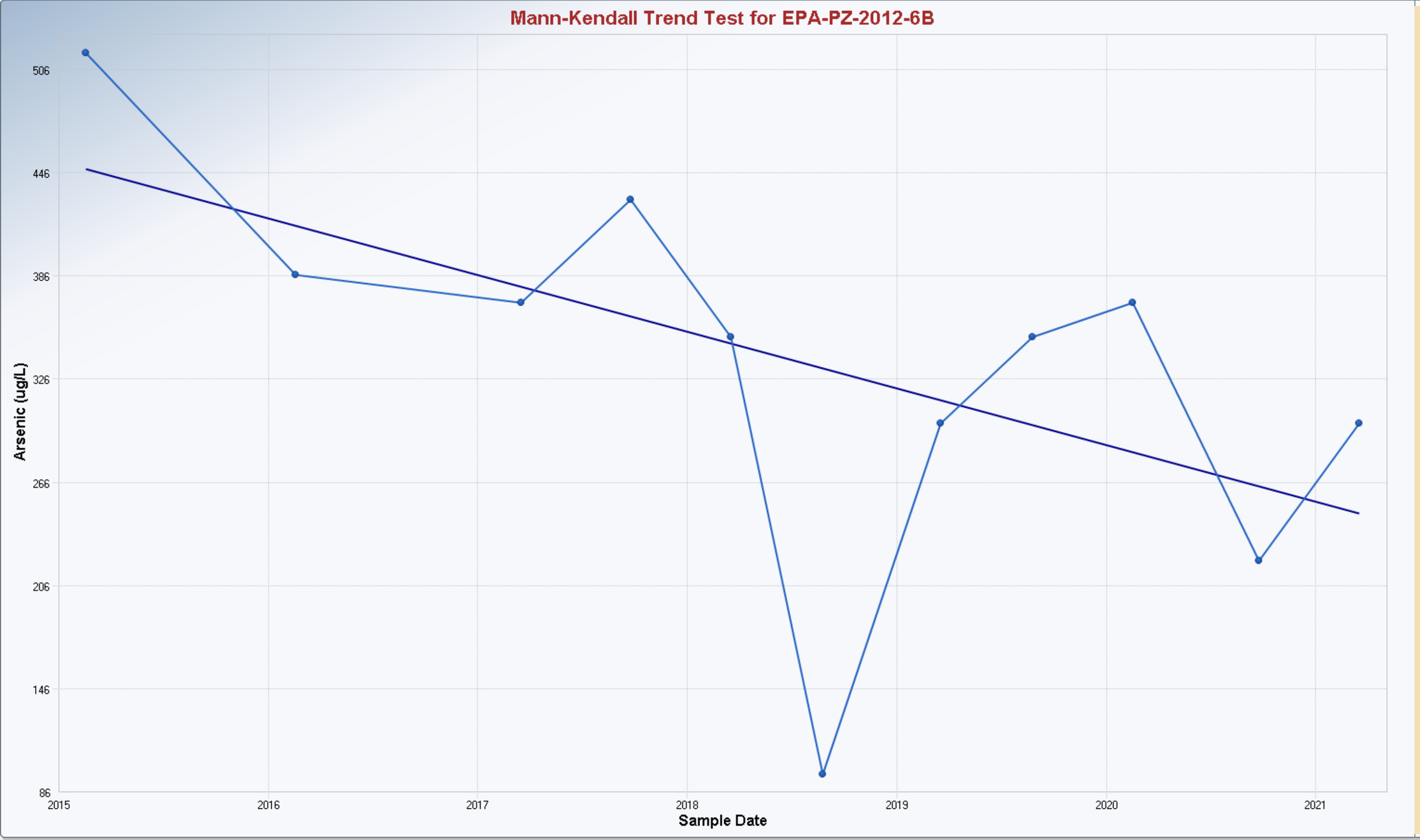
n	11
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	12.7671
Standardized Value of S	-2.5064
M-K Test Value (S)	-33
Tabulated p-value	0.0050
Approximate p-value	0.0061

OLS Regression Line (Blue)

OLS Regression Slope	-192.2223
OLS Regression Intercept	390,212.5784

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test for EPA-PZ-2012-6B



Mann-Kendall Trend Analysis

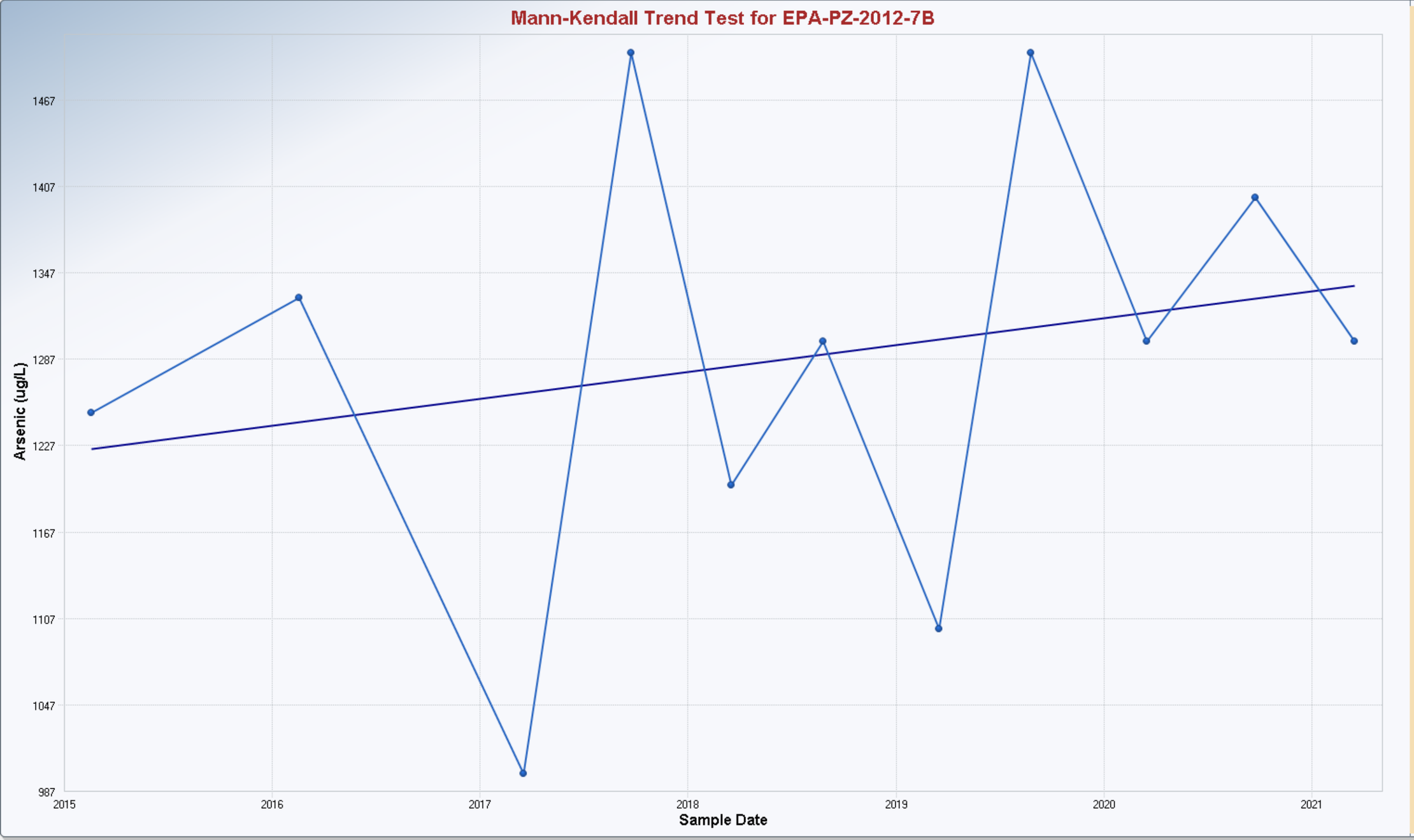
n	11
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	12.7279
Standardized Value of S	-2.1213
M-K Test Value (S)	-28
Tabulated p-value	0.0130
Approximate p-value	0.0169

OLS Regression Line (Blue)

OLS Regression Slope	-32.8914
OLS Regression Intercept	66,717.1338

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test for EPA-PZ-2012-7B



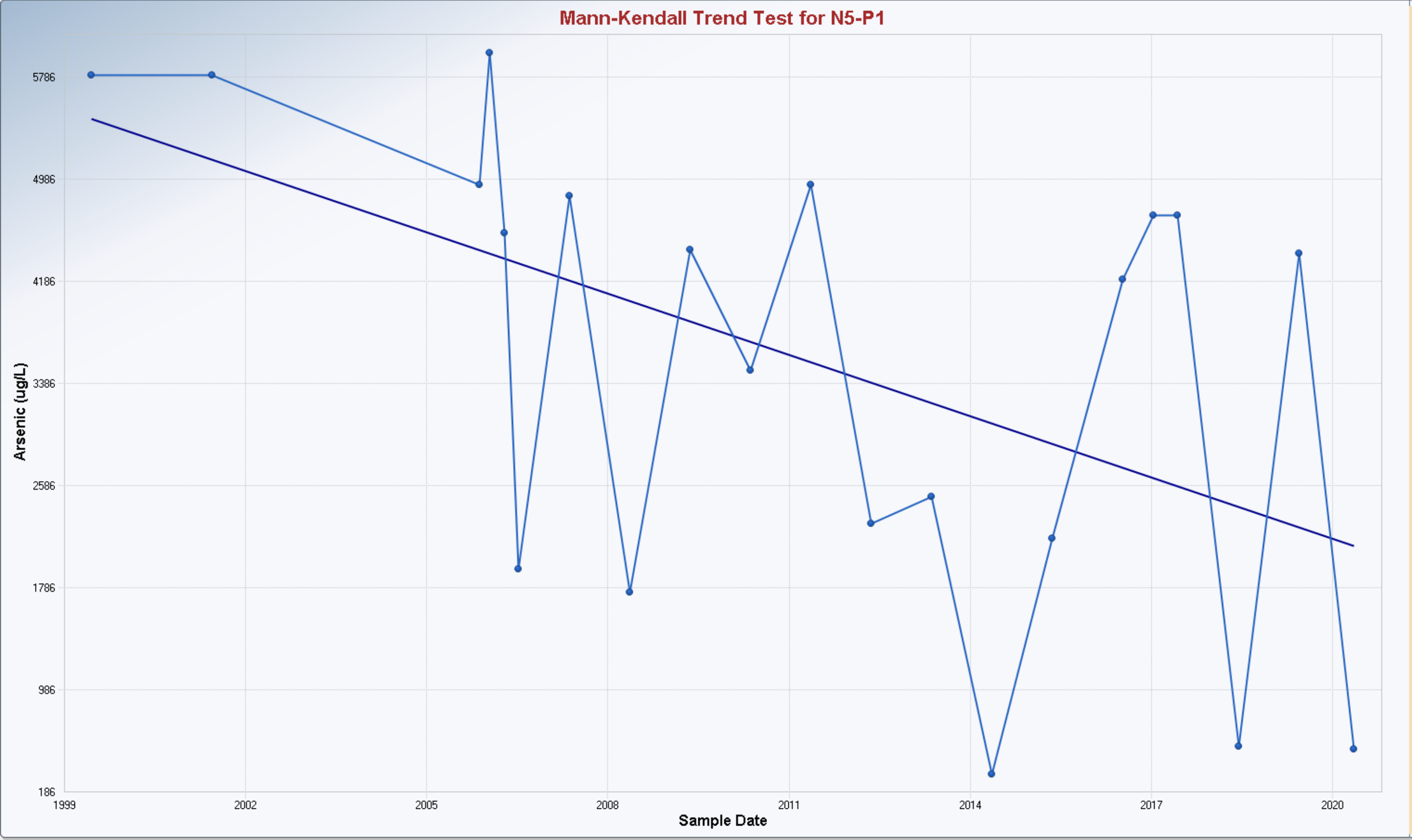
Mann-Kendall Trend Analysis

n	11
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	12.6623
Standardized Value of S	0.6318
M-K Test Value (S)	9
Tabulated p-value	0.2710
Approximate p-value	0.2638

OLS Regression Line (Blue)

OLS Regression Slope	18.6009
OLS Regression Intercept	-36,251.6491

Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis

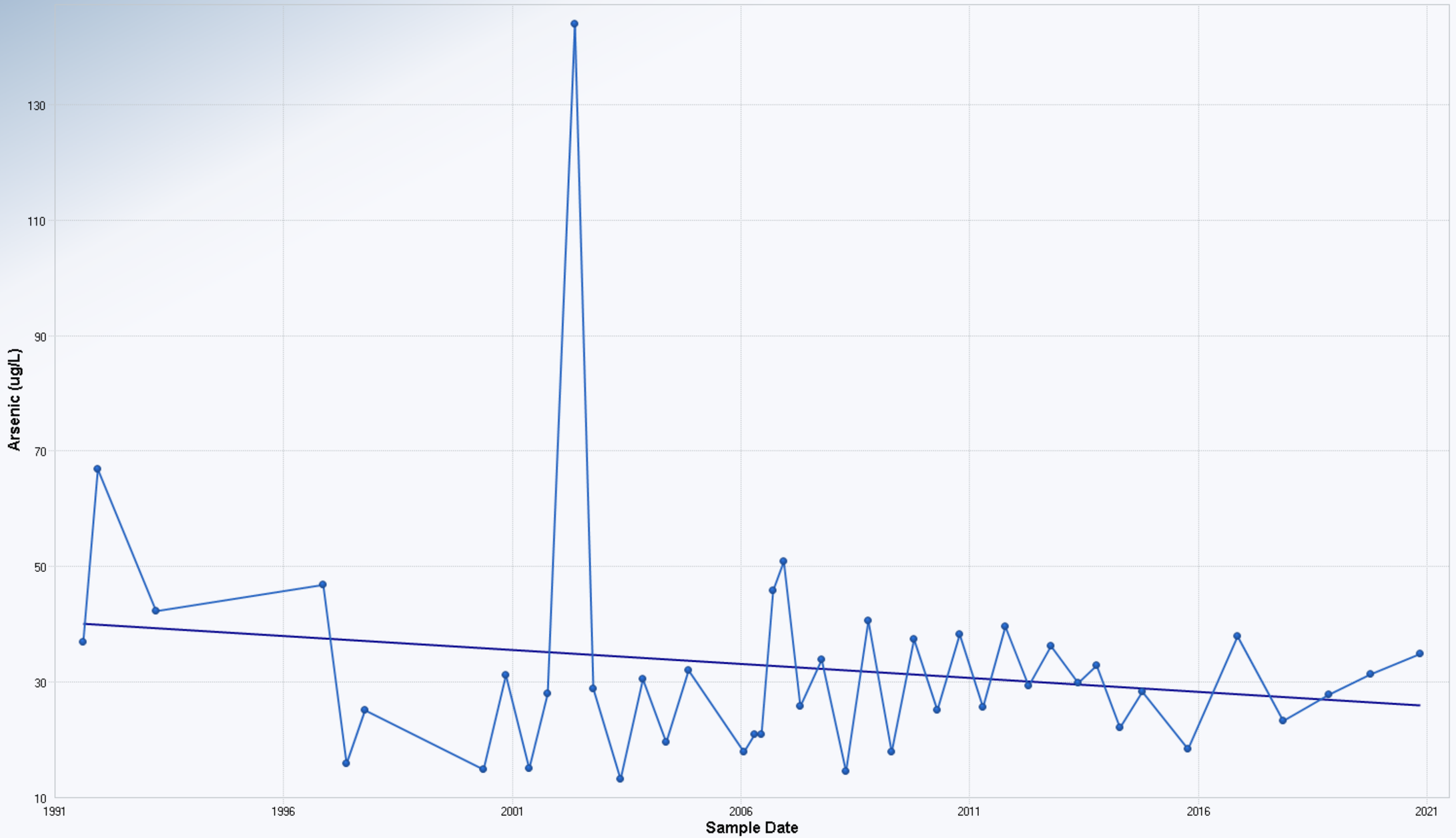
n	21
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	33.0857
Standardized Value of S	-2.5086
M-K Test Value (S)	-84
Tabulated p-value	0.0050
Approximate p-value	0.0061

OLS Regression Line (Blue)

OLS Regression Slope	-159.6716
OLS Regression Intercept	324,778.3521

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test for SHL-9



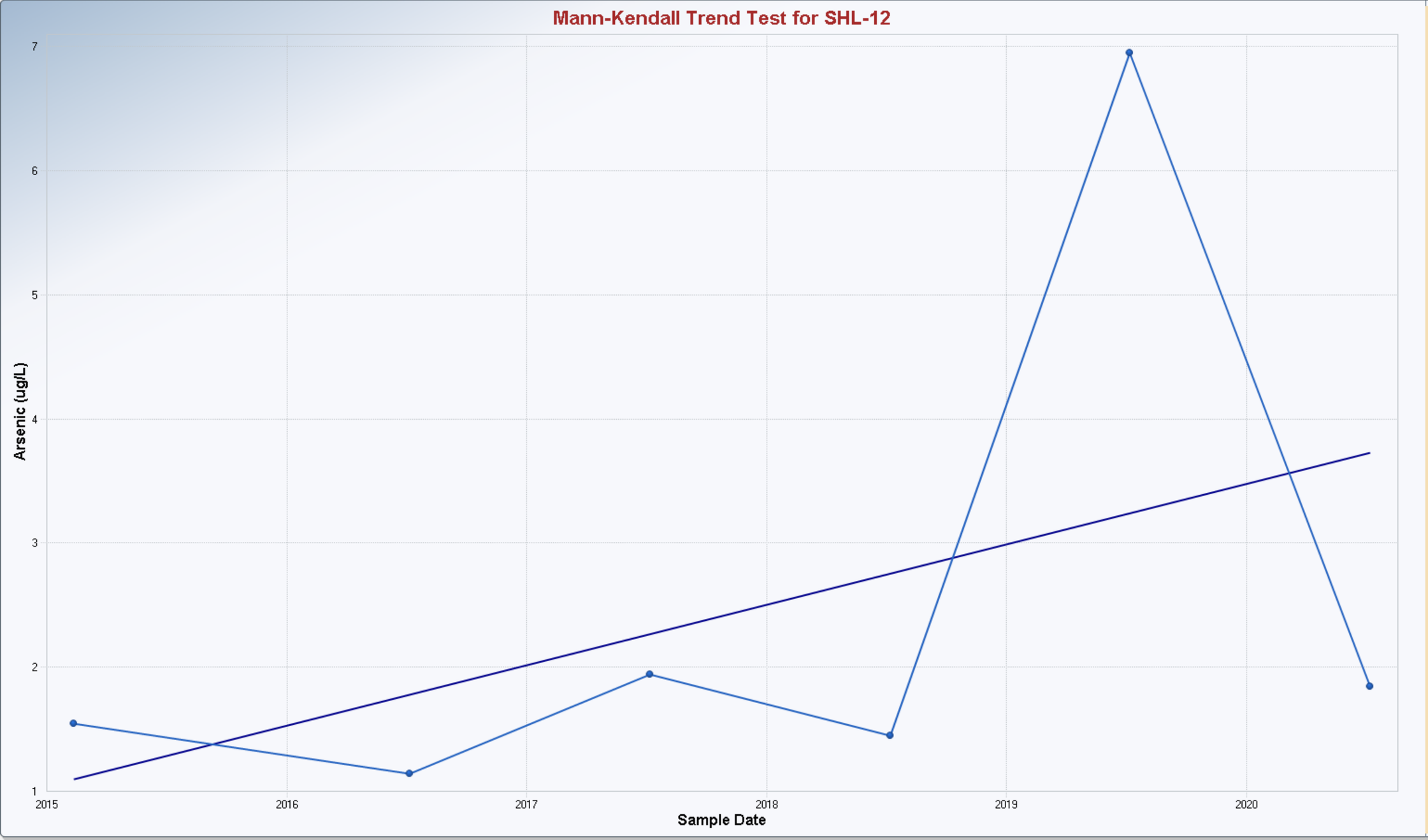
Mann-Kendall Trend Analysis

n	43
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	95.5423
Standardized Value of S	0.0419
M-K Test Value (S)	5
Appx. Critical Value (0.05)	1.6449
Approximate p-value	0.4833

OLS Regression Line (Blue)

OLS Regression Slope	-0.4856
OLS Regression Intercept	1,007.3638

Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis

n	6
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	5.3229
Standardized Value of S	0.7515
M-K Test Value (S)	5
Tabulated p-value	0.2350
Approximate p-value	0.2262

OLS Regression Line (Blue)

OLS Regression Slope	0.4876
OLS Regression Intercept	-981.2086

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Analysis

n	18
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	26.4008
Standardized Value of S	0.0000
M-K Test Value (S)	1
Tabulated p-value	0.5000
Approximate p-value	0.5000

OLS Regression Line (Blue)

OLS Regression Slope	-1.5136
OLS Regression Intercept	3,107.4214

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test for SHL-24

Mann-Kendall Trend Analysis

n	7
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	6.6583
Standardized Value of S	-1.8023
M-K Test Value (S)	-13
Tabulated p-value	0.0350
Approximate p-value	0.0358

OLS Regression Line (Blue)

OLS Regression Slope	-0.3821
OLS Regression Intercept	775.7441

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test for SHM-05-40X

Mann-Kendall Trend Analysis

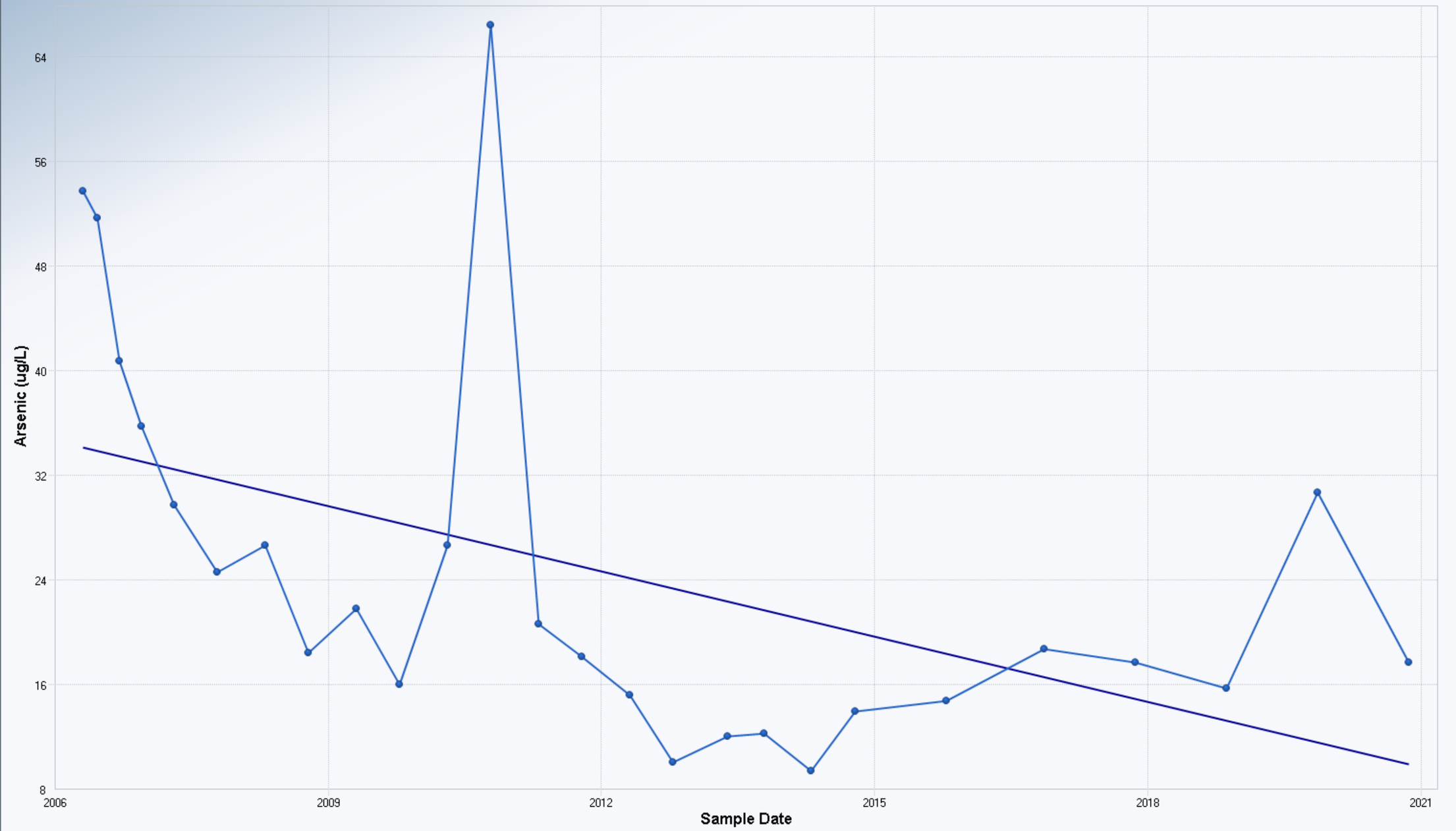
n	22
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	35.4354
Standardized Value of S	-4.2895
M-K Test Value (S)	-153
Tabulated p-value	0.0000
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	-146.1817
OLS Regression Intercept	297,409.5924

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test for SHM-05-41A



Mann-Kendall Trend Analysis

n	26
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	45.3468
Standardized Value of S	-3.3519
M-K Test Value (S)	-153
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0004

OLS Regression Line (Blue)

OLS Regression Slope	-1.6618
OLS Regression Intercept	3,368.5943

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test for SHM-05-41B

Mann-Kendall Trend Analysis

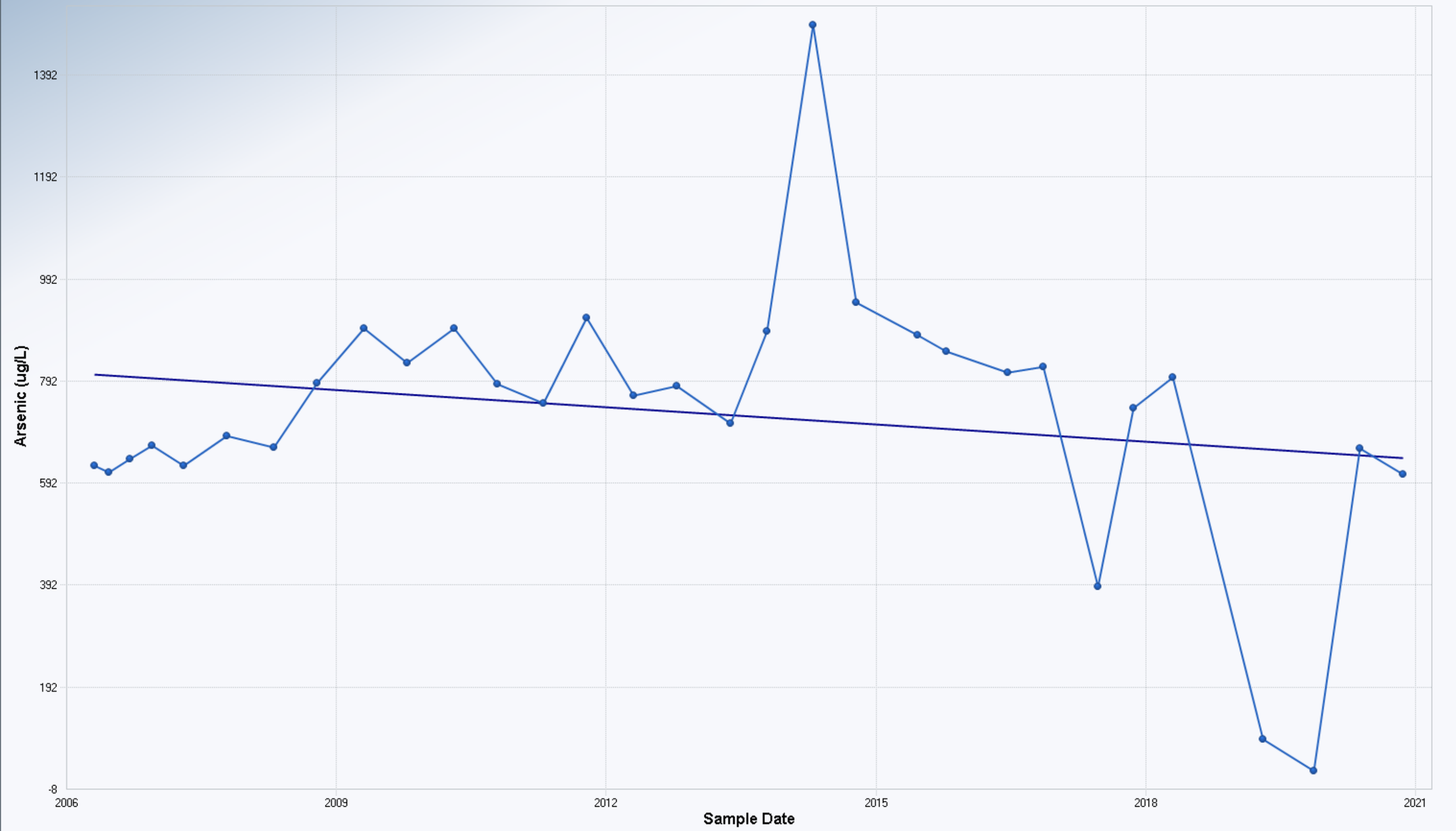
n	32
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	61.6658
Standardized Value of S	-6.8271
M-K Test Value (S)	-422
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	-150.8877
OLS Regression Intercept	304,944.4059

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test for SHM-05-41C



Mann-Kendall Trend Analysis

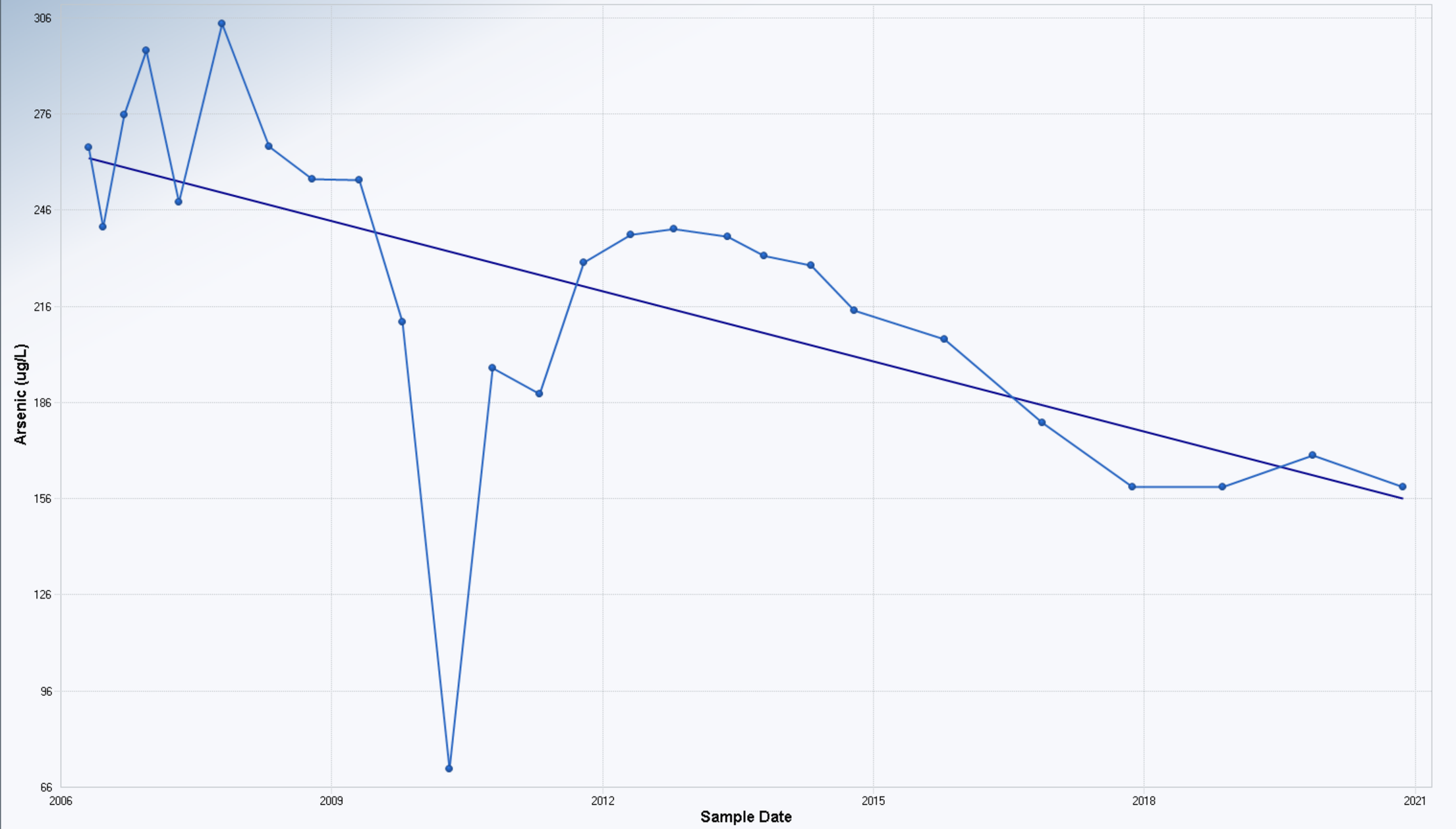
n	31
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	58.8359
Standardized Value of S	0.2040
M-K Test Value (S)	13
Appx. Critical Value (0.05)	1.6449
Approximate p-value	0.4192

OLS Regression Line (Blue)

OLS Regression Slope	-11.2874
OLS Regression Intercept	23,451.8820

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test for SHM-05-42B



Mann-Kendall Trend Analysis

n	26
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	45.3284
Standardized Value of S	-4.3019
M-K Test Value (S)	-196
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	-7.3049
OLS Regression Intercept	14,918.5910

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test for SHM-10-06

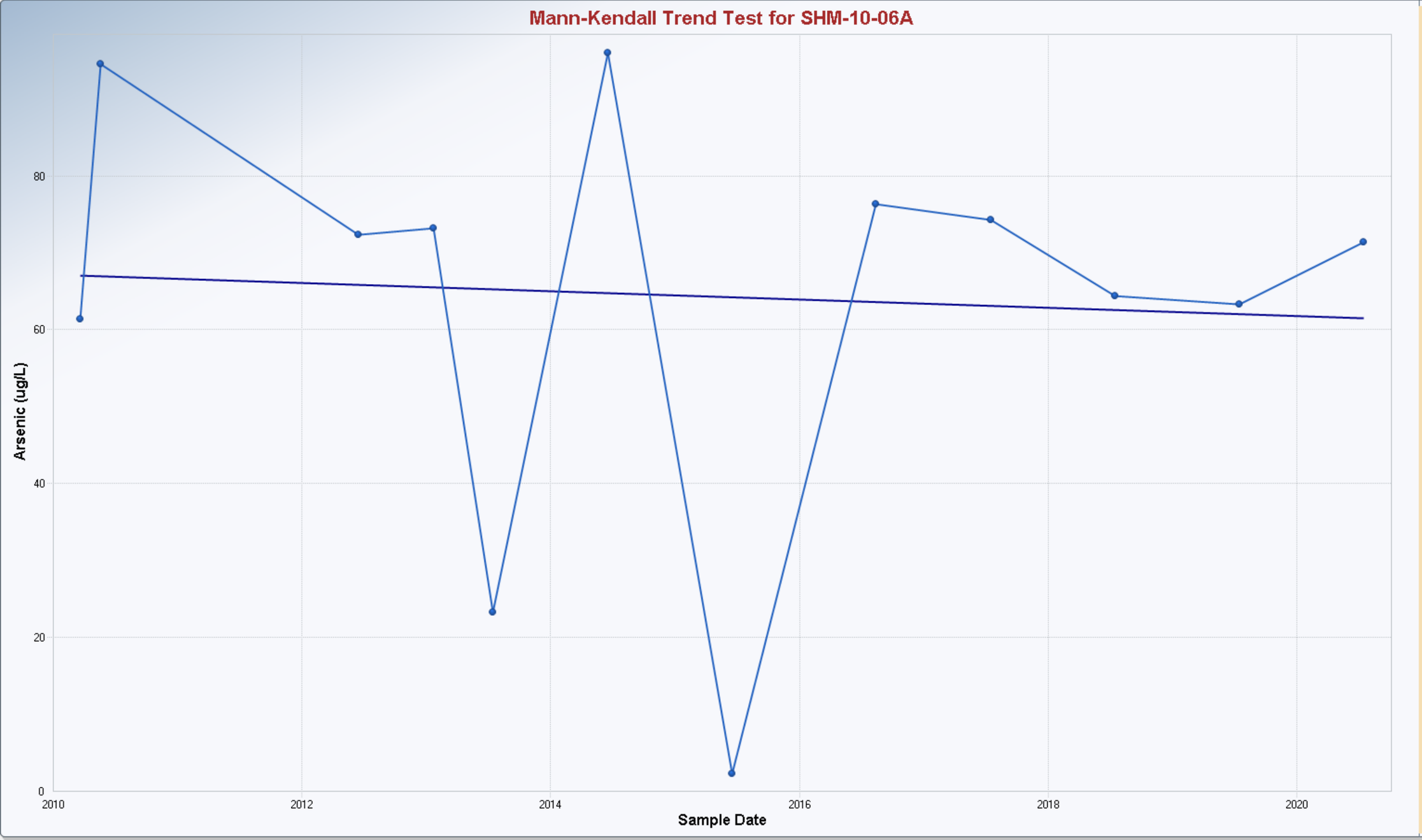
Mann-Kendall Trend Analysis

n	11
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	12.8452
Standardized Value of S	-2.8026
M-K Test Value (S)	-37
Tabulated p-value	0.0020
Approximate p-value	0.0025

OLS Regression Line (Blue)

OLS Regression Slope	-115.3541
OLS Regression Intercept	234,290.5599

Statistically significant evidence of a decreasing trend at the specified level of significance.



Mann-Kendall Trend Analysis

n	12
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	14.5831
Standardized Value of S	-0.3429
M-K Test Value (S)	-6
Tabulated p-value	0.3690
Approximate p-value	0.3659

OLS Regression Line (Blue)

OLS Regression Slope	-0.5342
OLS Regression Intercept	1,140.7267

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test for SHM-10-07

Mann-Kendall Trend Analysis

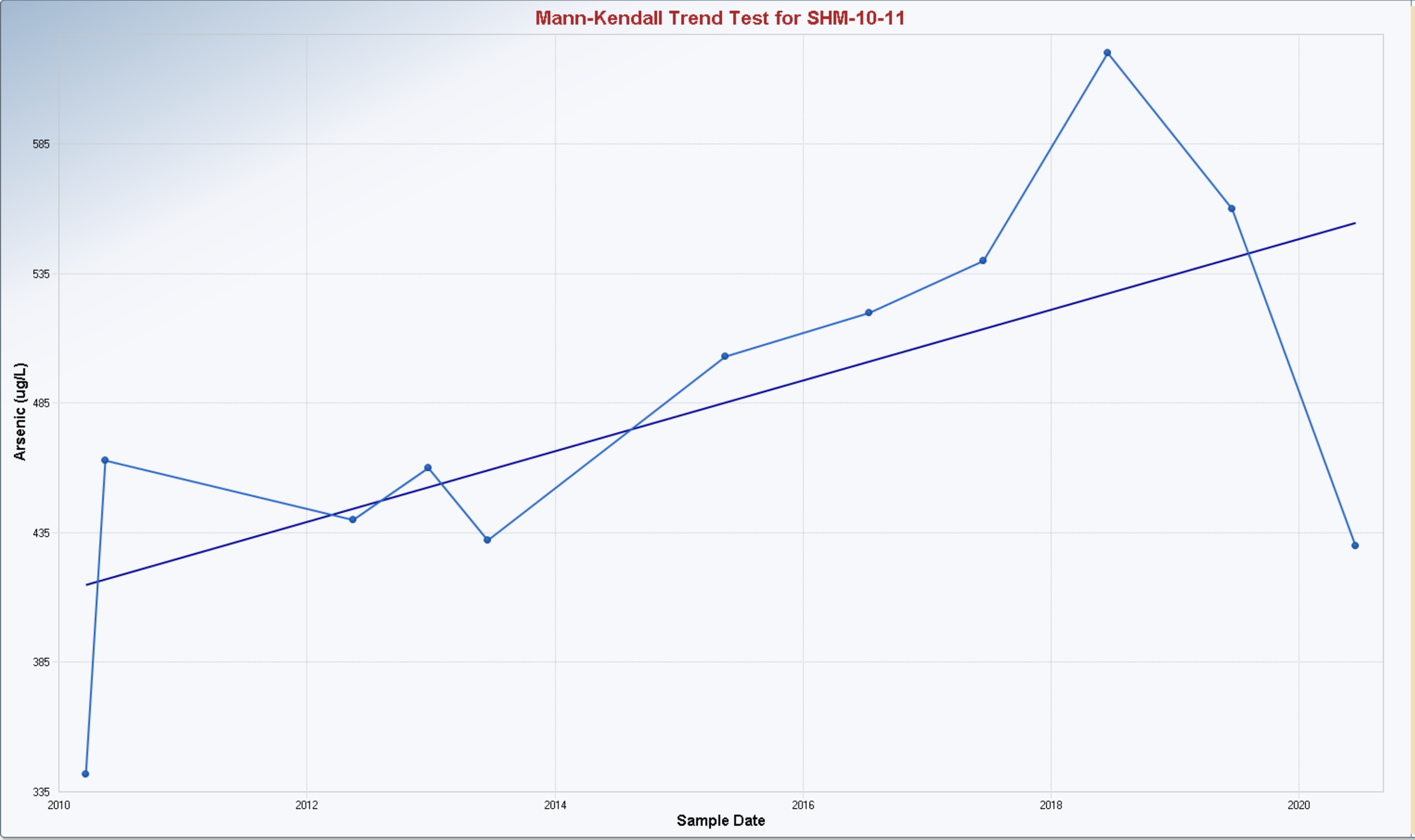
n	11
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	12.8062
Standardized Value of S	0.7028
M-K Test Value (S)	10
Tabulated p-value	0.2230
Approximate p-value	0.2411

OLS Regression Line (Blue)

OLS Regression Slope	0.0339
OLS Regression Intercept	881.9852

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test for SHM-10-11



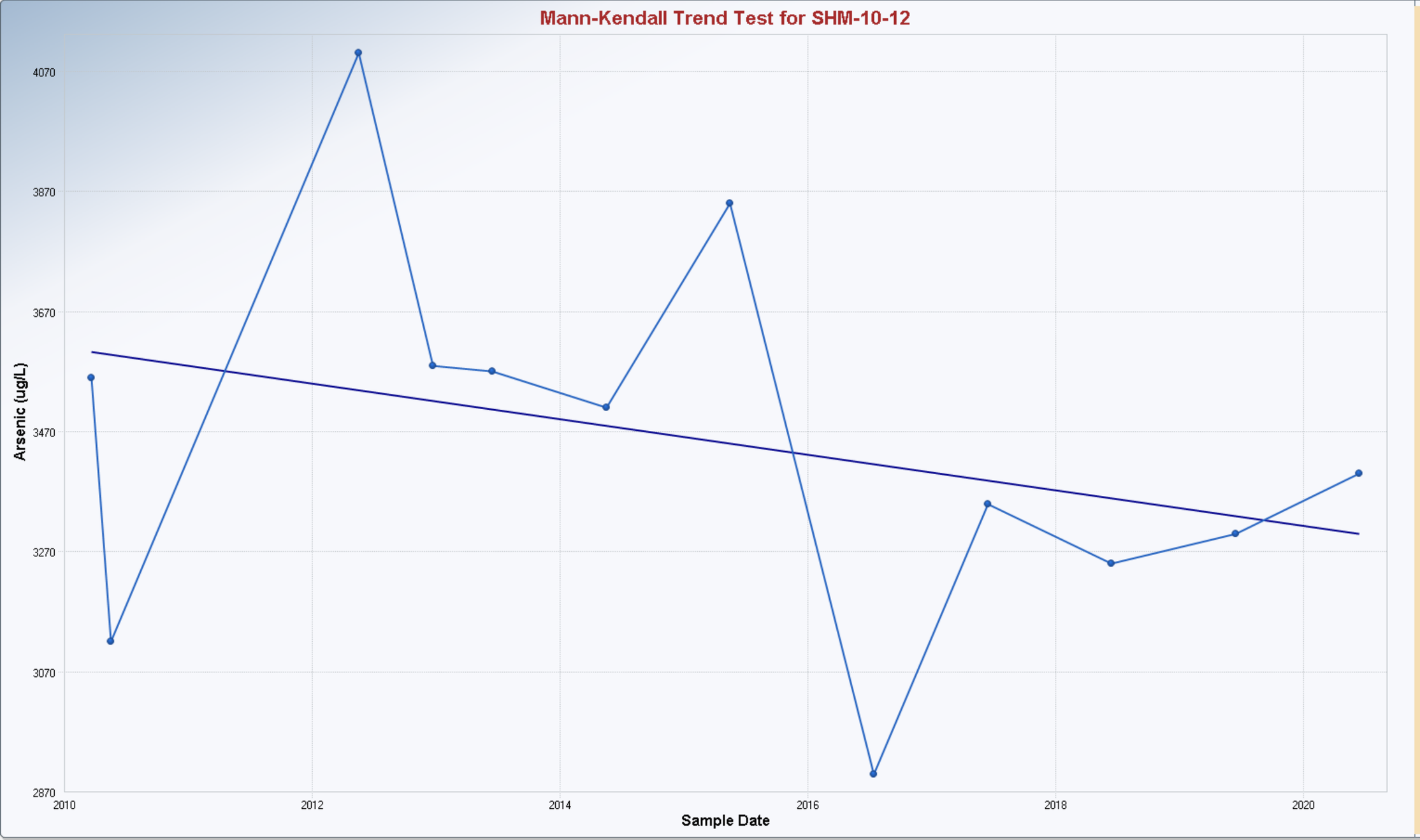
Mann-Kendall Trend Analysis

n	11
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	12.8452
Standardized Value of S	1.8684
M-K Test Value (S)	25
Tabulated p-value	0.0300
Approximate p-value	0.0309

OLS Regression Line (Blue)

OLS Regression Slope	13.6467
OLS Regression Intercept	-27,023.8514

Statistically significant evidence of an increasing trend at the specified level of significance.



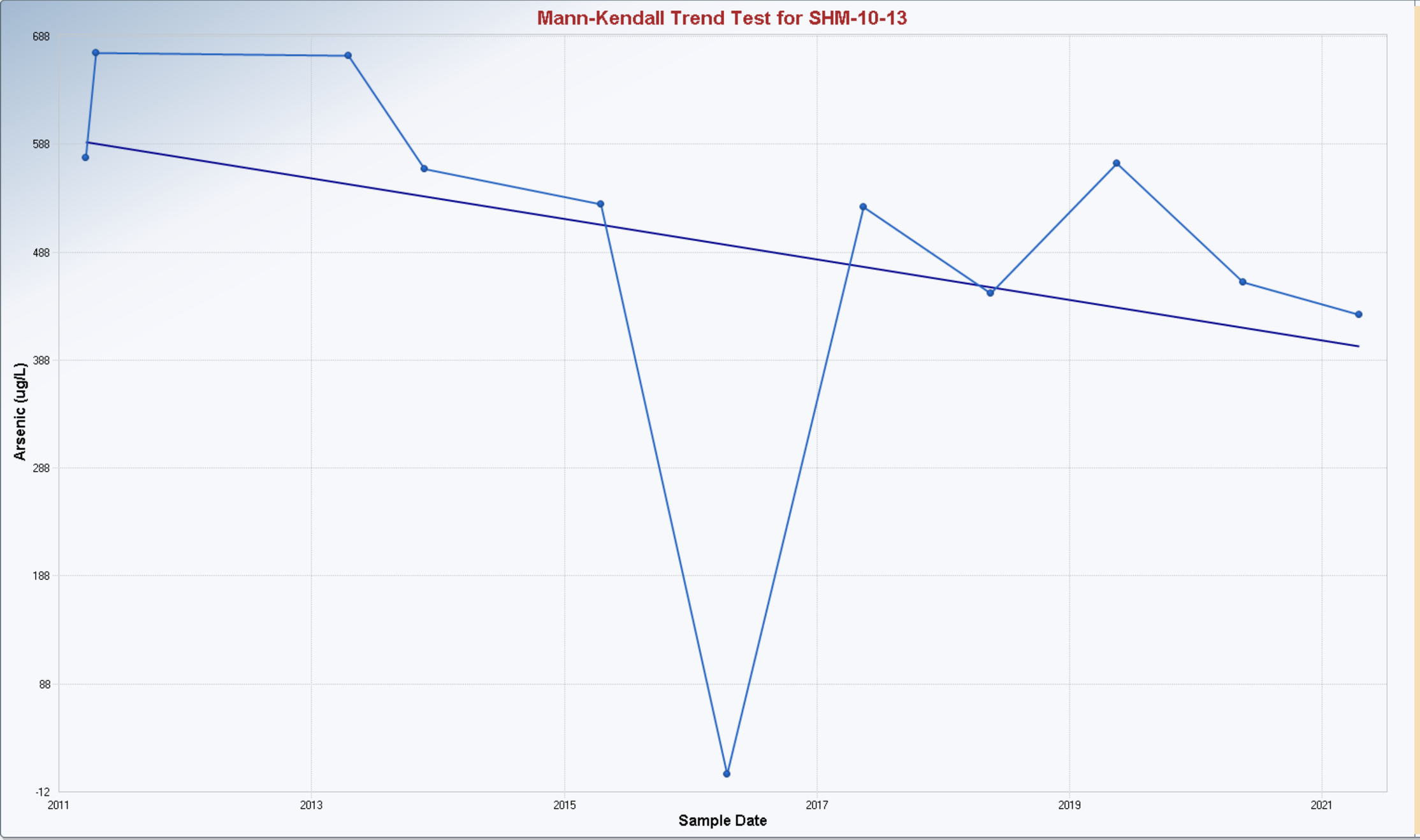
Mann-Kendall Trend Analysis

n	12
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	14.5831
Standardized Value of S	-1.1657
M-K Test Value (S)	-18
Tabulated p-value	0.1250
Approximate p-value	0.1219

OLS Regression Line (Blue)

OLS Regression Slope	-29.5115
OLS Regression Intercept	62,939.3939

Insufficient statistical evidence of a significant trend at the specified level of significance.



Mann-Kendall Trend Analysis

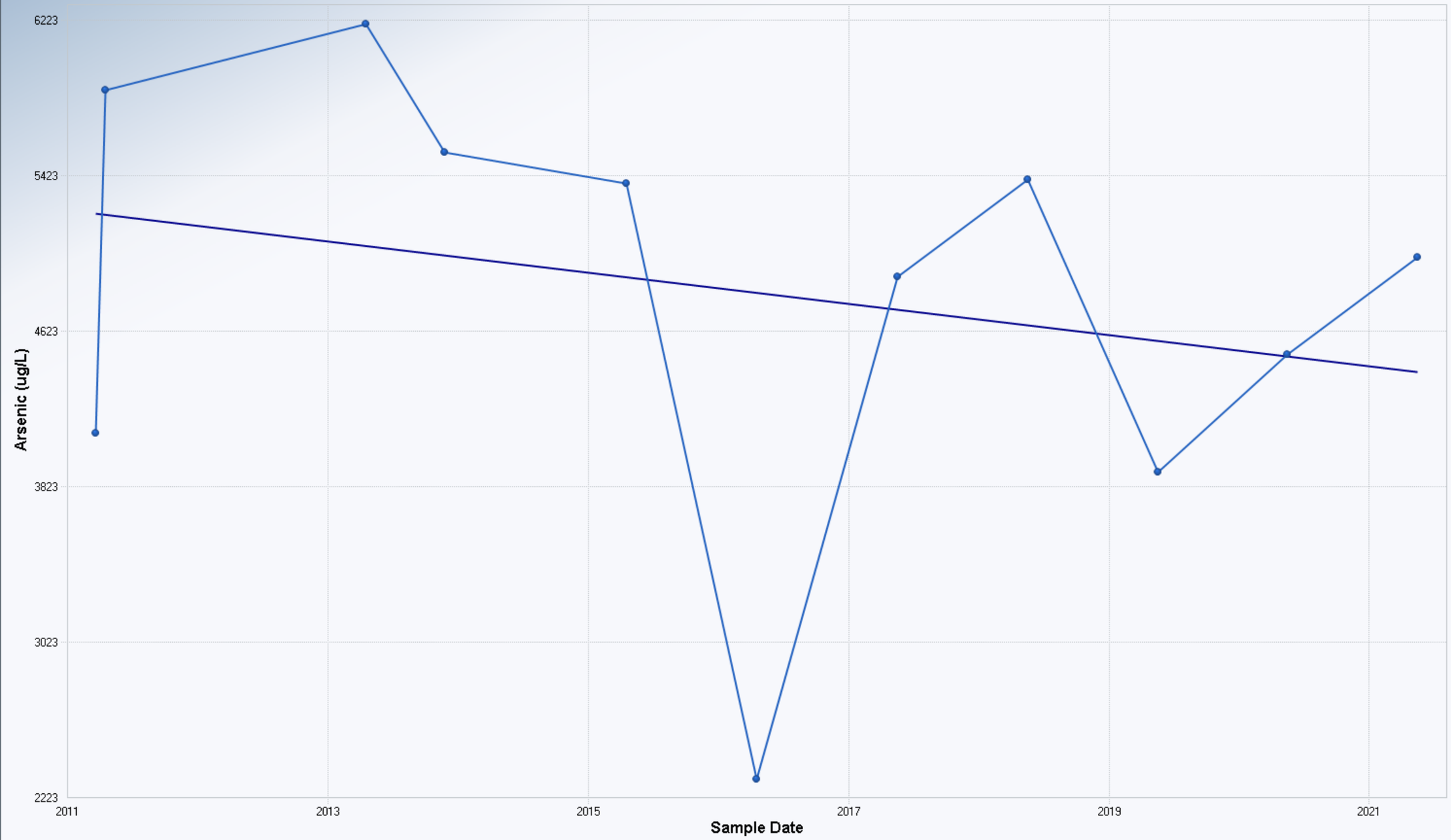
n	11
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	12.8452
Standardized Value of S	-2.3355
M-K Test Value (S)	-31
Tabulated p-value	0.0080
Approximate p-value	0.0098

OLS Regression Line (Blue)

OLS Regression Slope	-18.7908
OLS Regression Intercept	38,372.7200

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test for SHM-10-14



Mann-Kendall Trend Analysis

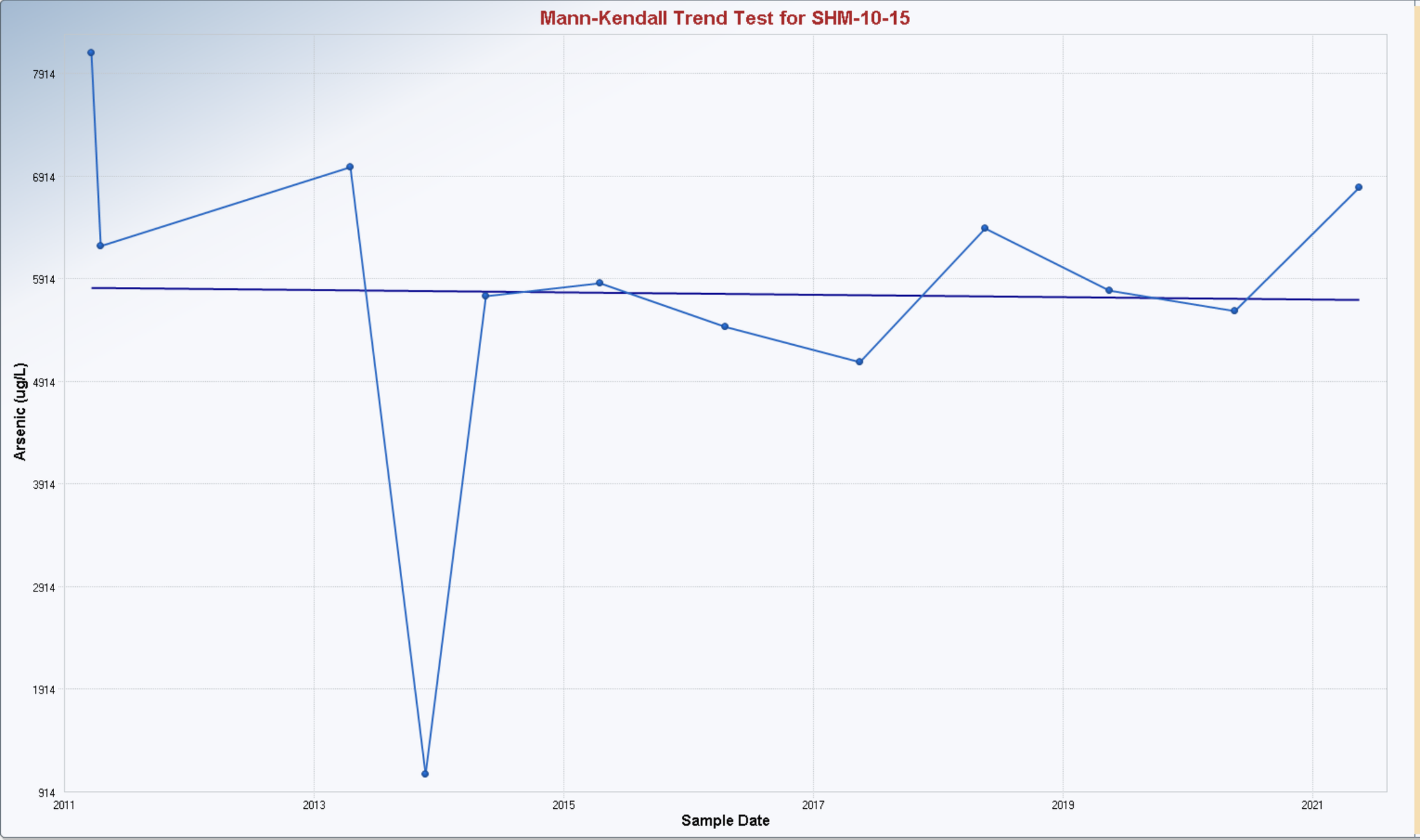
n	11
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	12.8452
Standardized Value of S	-1.0899
M-K Test Value (S)	-15
Tabulated p-value	0.1410
Approximate p-value	0.1379

OLS Regression Line (Blue)

OLS Regression Slope	-79.8640
OLS Regression Intercept	165,809.3759

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test for SHM-10-15



Mann-Kendall Trend Analysis

n	12
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	14.5831
Standardized Value of S	-0.6172
M-K Test Value (S)	-10
Tabulated p-value	0.2730
Approximate p-value	0.2686

OLS Regression Line (Blue)

OLS Regression Slope	-11.6761
OLS Regression Intercept	29,299.5424

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test for SHM-10-16

Mann-Kendall Trend Analysis

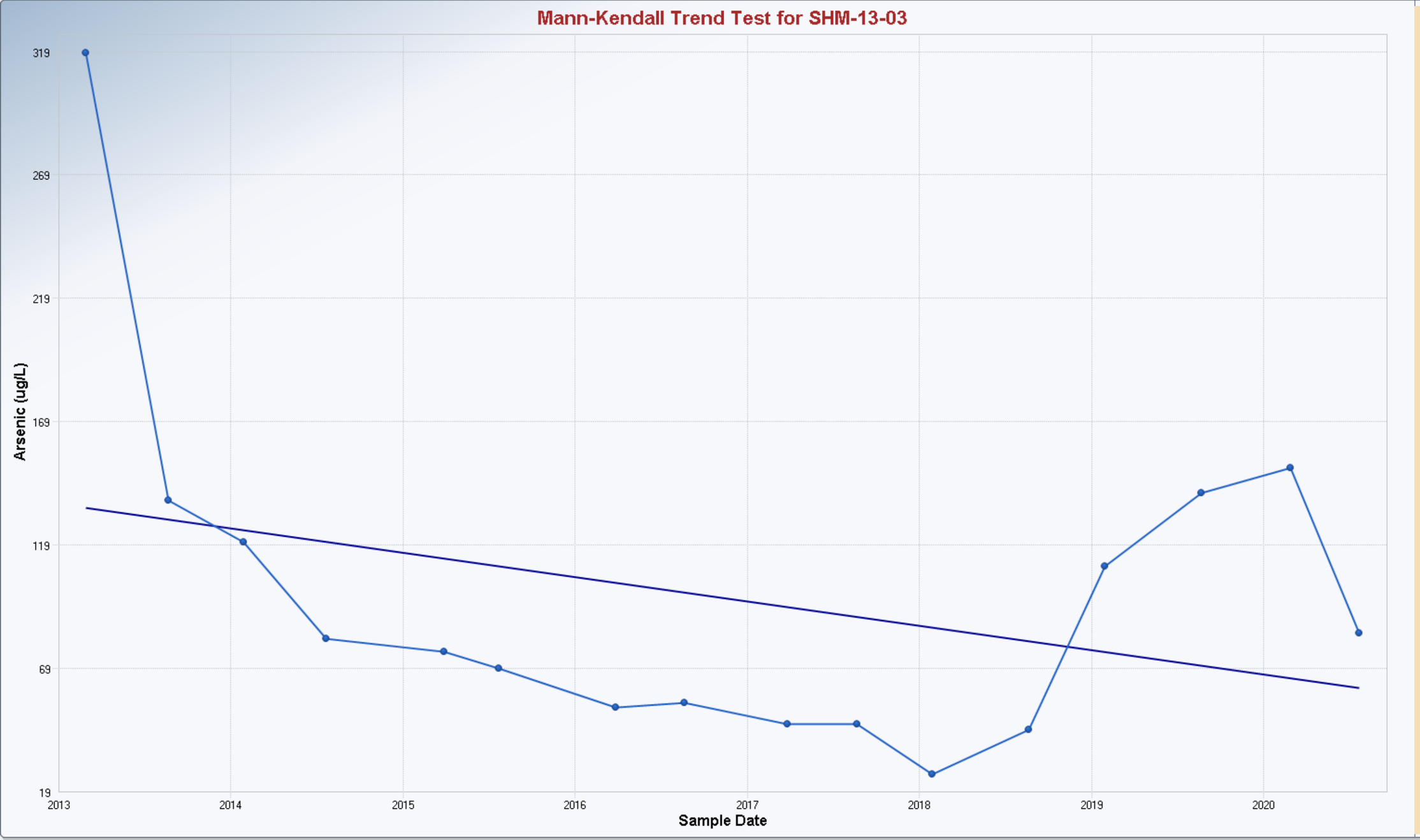
n	14
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	18.1384
Standardized Value of S	-0.2205
M-K Test Value (S)	-5
Tabulated p-value	0.4150
Approximate p-value	0.4127

OLS Regression Line (Blue)

OLS Regression Slope	11.2075
OLS Regression Intercept	-21,254.9127

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test for SHM-13-03



Mann-Kendall Trend Analysis

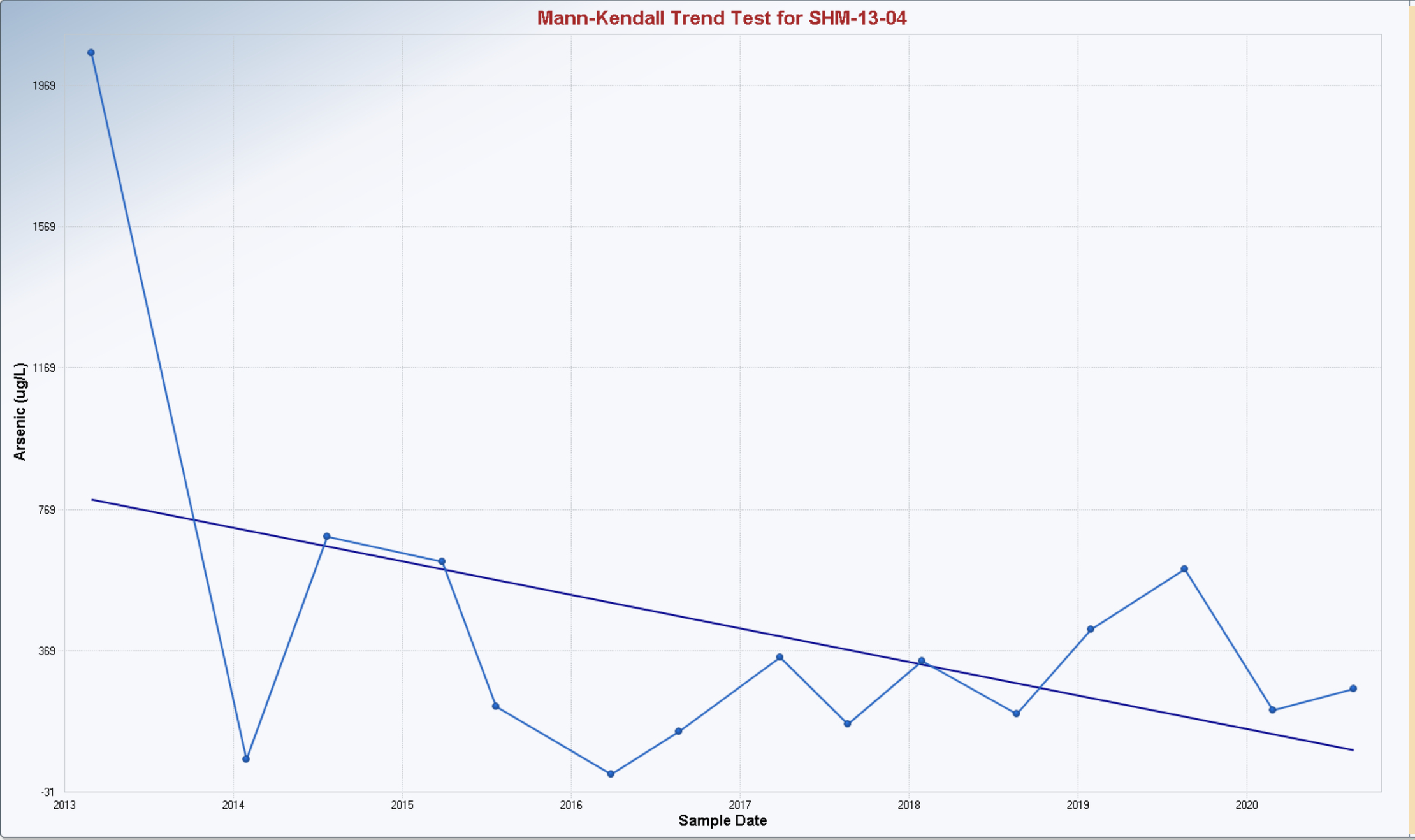
n	16
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	22.1886
Standardized Value of S	-1.2619
M-K Test Value (S)	-29
Tabulated p-value	0.1140
Approximate p-value	0.1035

OLS Regression Line (Blue)

OLS Regression Slope	-9.8707
OLS Regression Intercept	20,007.5396

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test for SHM-13-04



Mann-Kendall Trend Analysis

n	15
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	20.2073
Standardized Value of S	-0.1979
M-K Test Value (S)	-5
Tabulated p-value	0.4230
Approximate p-value	0.4215

OLS Regression Line (Blue)

OLS Regression Slope	-94.8079
OLS Regression Intercept	191,682.8795

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test for SHM-13-06

Mann-Kendall Trend Analysis

n	16
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	22.1284
Standardized Value of S	-0.4519
M-K Test Value (S)	-11
Tabulated p-value	0.3450
Approximate p-value	0.3257

OLS Regression Line (Blue)

OLS Regression Slope	-34.8529
OLS Regression Intercept	72,887.7588

Insufficient statistical evidence of a significant trend at the specified level of significance.

Mann-Kendall Trend Test for SHM-13-07

Mann-Kendall Trend Analysis

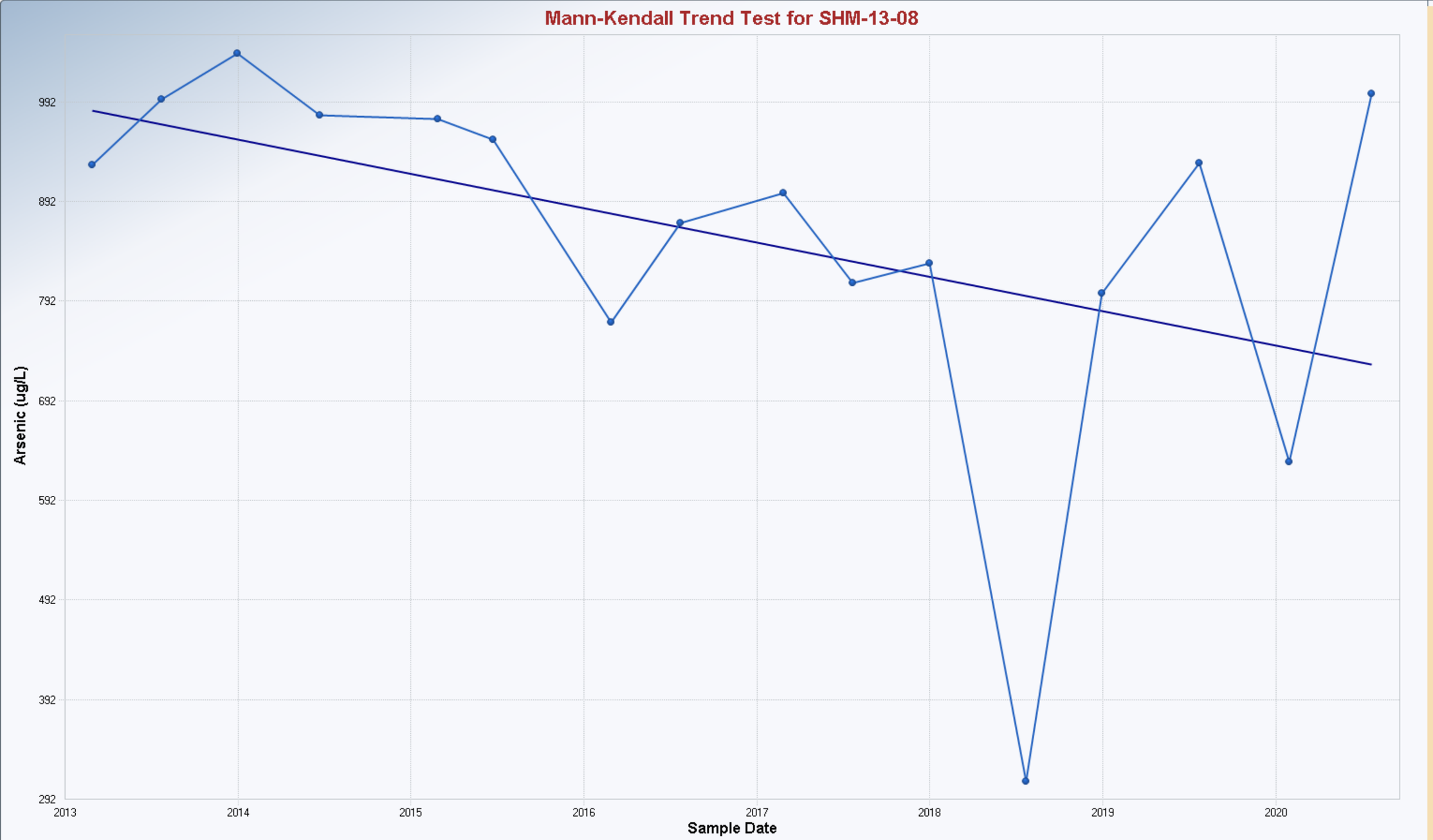
n	15
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	20.1825
Standardized Value of S	-2.1306
M-K Test Value (S)	-44
Tabulated p-value	0.0140
Approximate p-value	0.0166

OLS Regression Line (Blue)

OLS Regression Slope	-101.0632
OLS Regression Intercept	204,507.3199

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test for SHM-13-08



Mann-Kendall Trend Analysis

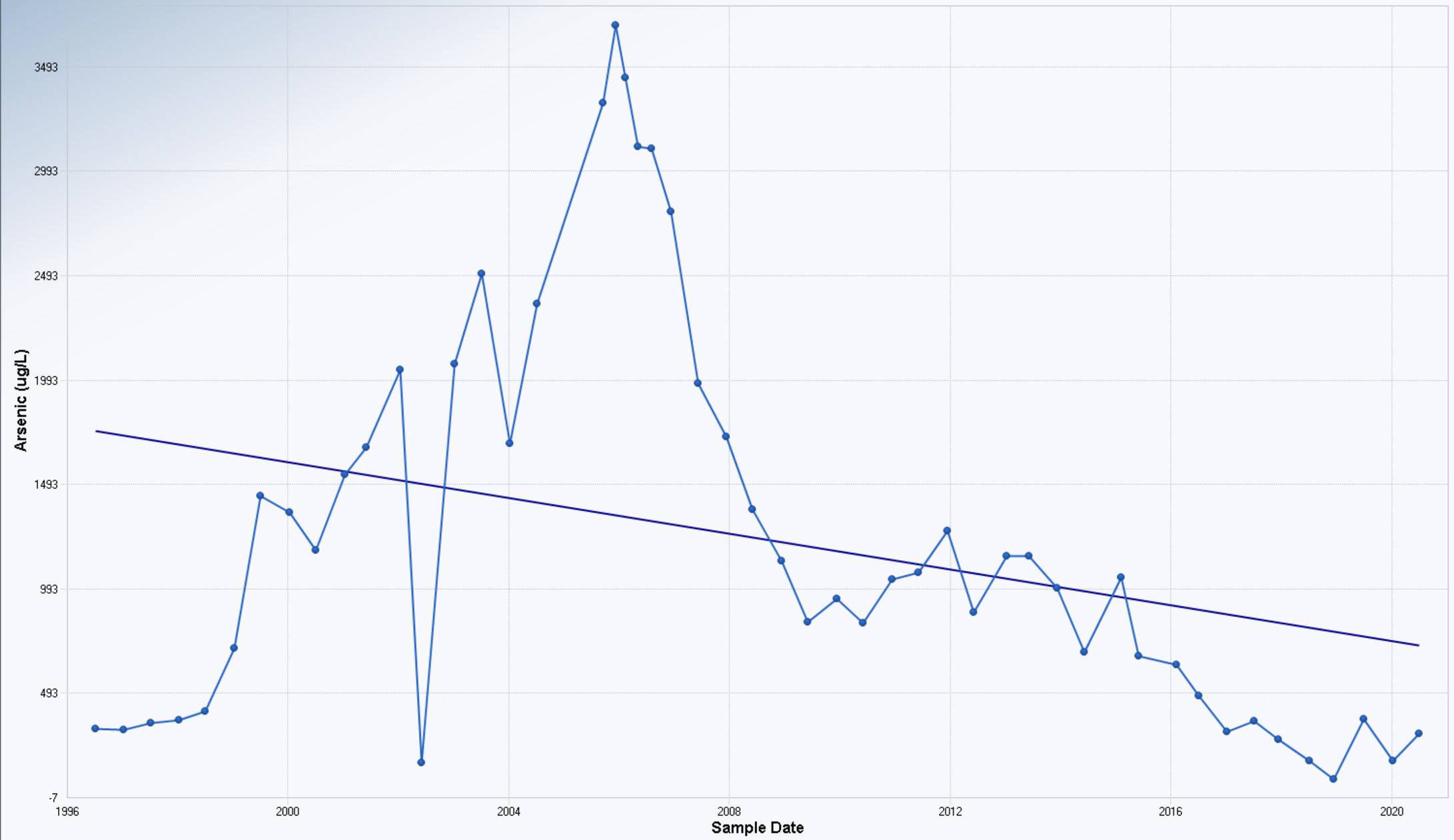
n	16
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	22.2111
Standardized Value of S	-2.0260
M-K Test Value (S)	-46
Tabulated p-value	0.0210
Approximate p-value	0.0214

OLS Regression Line (Blue)

OLS Regression Slope	-34.4611
OLS Regression Intercept	70,370.0433

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test for SHM-93-22B



Mann-Kendall Trend Analysis

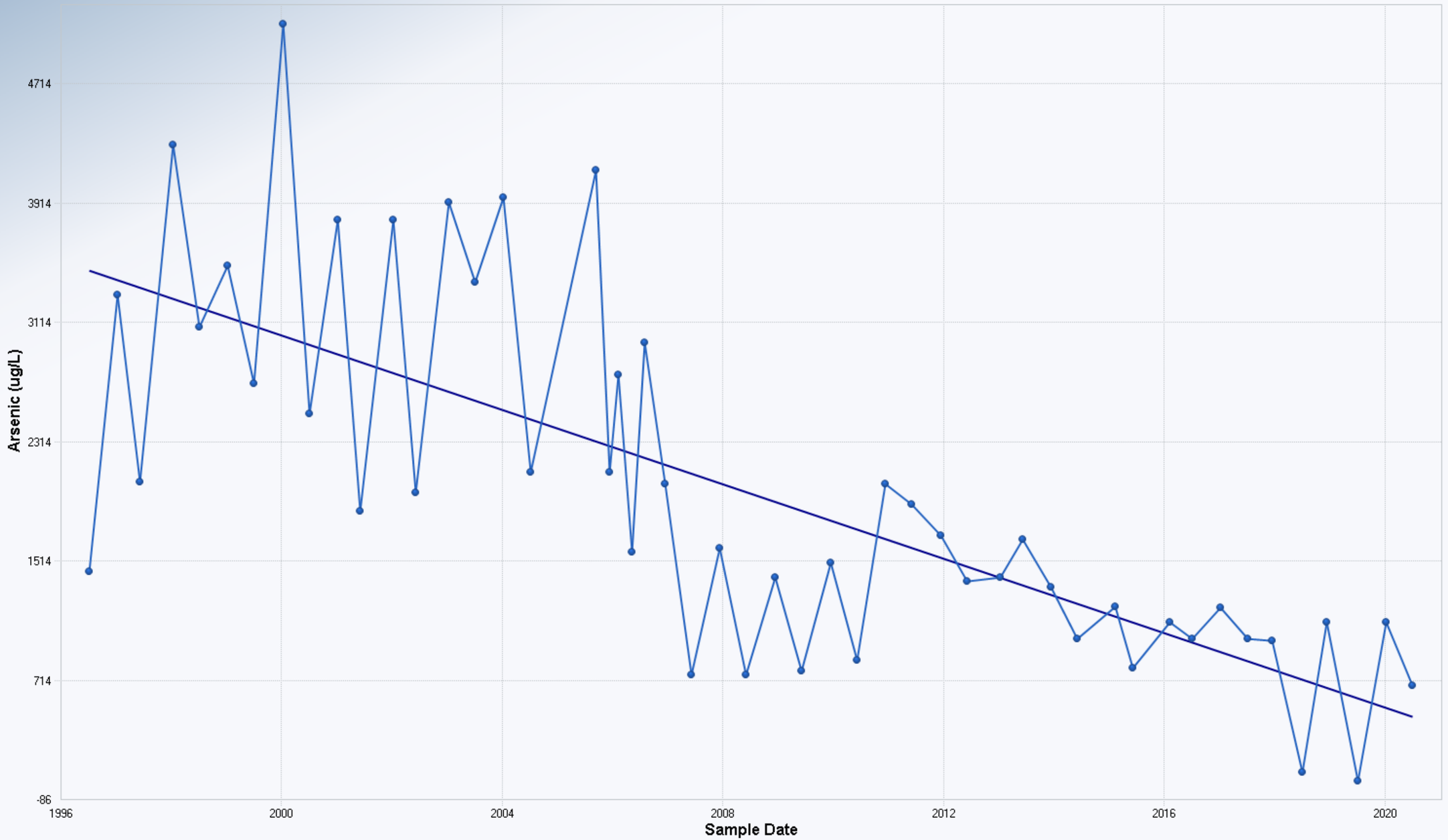
n	50
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	119.5394
Standardized Value of S	-3.0283
M-K Test Value (S)	-363
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0012

OLS Regression Line (Blue)

OLS Regression Slope	-42.7478
OLS Regression Intercept	87,110.8105

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test for SHM-96-5B



Mann-Kendall Trend Analysis

n	50
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	119.5157
Standardized Value of S	-5.9825
M-K Test Value (S)	-716
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	-124.5708
OLS Regression Intercept	252,215.1377

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test for SHM-96-5C

Mann-Kendall Trend Analysis

n	44
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	98.8602
Standardized Value of S	-4.3799
M-K Test Value (S)	-434
Appx. Critical Value (0.05)	-1.6449
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	-1.6644
OLS Regression Intercept	3,380.4269

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test for SHM-99-31C

Mann-Kendall Trend Analysis

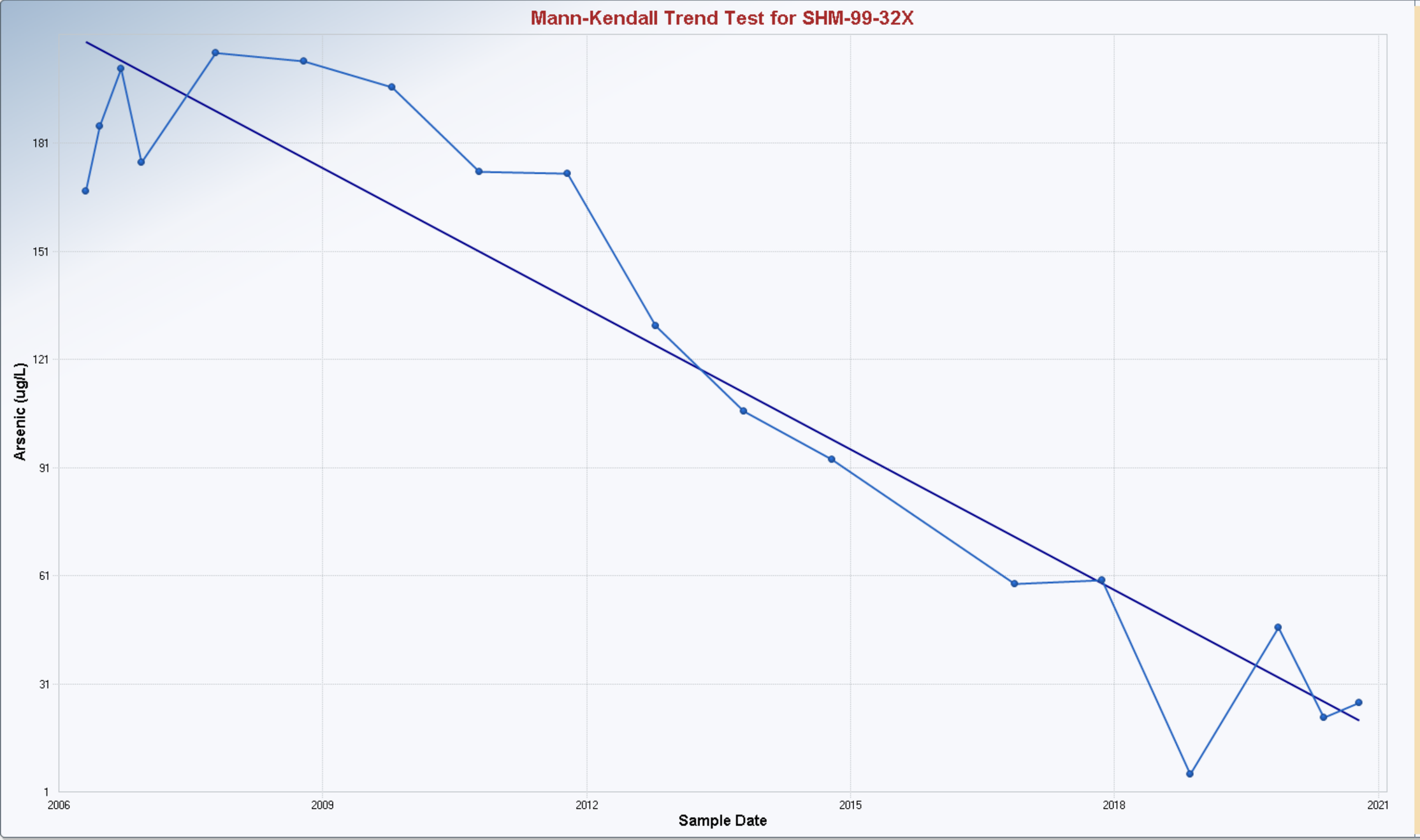
n	19
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	28.5307
Standardized Value of S	-4.6616
M-K Test Value (S)	-134
Tabulated p-value	0.0000
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	-9.4895
OLS Regression Intercept	19,324.2547

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test for SHM-99-32X



Mann-Kendall Trend Analysis

n	18
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	26.4008
Standardized Value of S	-4.0908
M-K Test Value (S)	-109
Tabulated p-value	0.0000
Approximate p-value	0.0000

OLS Regression Line (Blue)

OLS Regression Slope	-13.0109
OLS Regression Intercept	26,313.5466

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test for SHP-99-29X

Mann-Kendall Trend Analysis

n	16
Confidence Coefficient	0.9500
Level of Significance	0.0500
Standard Deviation of S	22.2111
Standardized Value of S	-1.3057
M-K Test Value (S)	-30
Tabulated p-value	0.0970
Approximate p-value	0.0958

OLS Regression Line (Blue)

OLS Regression Slope	-79.2787
OLS Regression Intercept	162,244.3255

Insufficient statistical evidence of a significant trend at the specified level of significance.

Appendix I

Summary of Landfill and ATP Operations, Maintenance, and Monitoring

Sovereign Consulting Inc.
9 Payson Road, Suite 150
Foxborough, MA 02035

ANNUAL LANDFILL INSPECTION
Shepley's Hill Landfill
Devens, Massachusetts

Date of Inspection: 8 October 2020
Inspector/Company: Steven Passafaro, PE of Sovereign Consulting Inc.
Site Location: Shepley's Hill Landfill, Devens, Massachusetts

Weather Conditions:
Temperature: 55° F
Weather: Clear

Type of Inspection:
☒ Annual
☐ Post-Major Weather Event
☐ Re-Inspection of Deficiencies
☐ Other

Landfill Attribute & Observations	Comments and Recommendations	SAT	UNSAT
Cover Surface			
1. There are no new depressions on the cover surface	Continue monitoring for settlement that creates depressions.	☒	☐
2. No tree or shrub growth was observed on the landfill surface during the inspection. Small tree and shrub growth on the margins of the landfill were removed during annual mowing event.	Continue monitoring for tree and shrub growth on cover surface. Remove tree/shrub growth as necessary.	☒	☐

Landfill Attribute & Observations	Comments and Recommendations	SAT	UNSAT
3. The utility berm that was constructed through the middle of the landfill in 2004 provides utility service to the pumping station at the northeastern corner of the landfill. The vegetation atop the utility berm was mowed during the September 2020 mowing event. The berm is intact and no adverse effects to the berm were observed.	Continue monitoring the utility berm for negative impacts on the drainage patterns.	☒	☐
Vegetative Growth			
1. The vegetation growth was normal and appeared to have no major stressed areas. The annual landfill mowing event was conducted from 29 September to 30 September 2020.	Continue mowing on an annual basis.	☒	☐
Landfill Gas Vents & Monitoring Wells			
1. The landfill gas vents are in good condition. All pipes are in functional condition with screens installed on all vents.	Continue to monitor the condition of the landfill gas vents.	☒	☐
2. The landfill gas points are in good condition.	Continue to monitor the condition of the landfill gas points.	☒	☐
3. All monitoring wells located on the landfill appeared to be in good condition.	Continue to monitor the condition of the landfill monitoring wells.	☒	☐

Sovereign Consulting Inc.
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Foxborough, MA 02035

ANNUAL LANDFILL INSPECTION
Shepley's Hill Landfill
Devens, Massachusetts

Landfill Attribute & Observations	Comments and Recommendations	SAT	UNSAT
Drainage Swales			
1. Most of the southern drainage swale exhibited vegetative growth. Large growth was removed during the September 2020 mowing activities. Small growth and wetland plant life were not disturbed, as they have become a natural retardant to erosive forces.	Continue to monitor and clear drainage swales of invasive vegetative growth.	☒	☐
2. Vegetative growth was removed from all northern drainage swales during the September 2020 mowing activities.	Continue to monitor and clear drainage swales of invasive vegetative growth.	☒	☐
3. Mowing is conducted to the edge of the swales.	Continue mowing annually.	☒	☐
Settlement			
1. No new depressions were observed within the landfill.	Continue to monitor for new depressions or settlement and repair as necessary.	☒	☐
Erosion			
1. There was no erosion observed.	Continue to monitor for erosion annually.	☒	☐
Access Roads			
1. The landfill access road is in good condition, and no erosion of the road was observed.	Continue to monitor condition of road.	☒	☐

Sovereign Consulting Inc.
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Foxborough, MA 02035

ANNUAL LANDFILL INSPECTION
Shepley's Hill Landfill
Devens, Massachusetts

Landfill Attribute & Observations	Comments and Recommendations	SAT	UNSAT
Culverts and Catch Basins			
1. The culverts along the northern portion of the landfill were observed to be in good condition; some growth was removed from the culverts along the entrance road to the ATP during the September 2020 mowing event to ensure proper use.	Continue to monitor and remove growth as necessary.	☒	☐
Security/Fencing			
1. Perimeter fencing is non-existent along much of the western boundary of the landfill (wooded area along Shepley's Hill), and along the southeastern boundary near the railroad tracks. However, no roads have open access to the landfill, and existing fence gates across roads that access the landfill are secured with chains and padlocks.	Continue to maintain proper security measures including ensure lockage of all landfill fence gates.	☒	☐
Wetland Encroachment			
1. Wetland encroachment was observed in the swales located in the southern portion of the landfill. Overall, the areas of encroachment are small and confined to the swales.	Continue to monitor wetland encroachment and continued mowing of the areas close to the existing growth will prevent the development of wide-spread wetland encroachment issues.	☒	☐

Sovereign Consulting Inc.
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Foxborough, MA 02035

ANNUAL LANDFILL INSPECTION
Shepley's Hill Landfill
Devens, Massachusetts

Landfill Attribute & Observations	Comments and Recommendations	SAT	UNSAT
Other Observations			
1. The recreation field located south of the landfill access road in the middle of the southern area of the landfill appears to be in good condition, and although tire rutting was not observed between the field and the landfill access road, grass has been worn away between the landfill access road and the recreation field by frequent vehicle use. 2. No other outstanding issues were observed.	1. Gravel has been added to part of the recreation access road. It is recommended that gravel be installed across the remaining distance between the landfill access road and the recreation field to ensure that tire rutting does not develop and that there is minimal impact to the landfill cover by vehicle usage. 2. Ensure all post closure uses of the landfill do not compromise the integrity of the landfill cover or the network of landfill gas vents and groundwater monitoring wells.	☒	☐

Shepley's Hill Landfill
Annual Inspection
October 2020

Description - Current Conditions of Northern Portion of Landfill

Description - Current Conditions of Western Portion of Landfill and Western Drainage Swale

Shepley's Hill Landfill
Annual Inspection
October 2020

Description - Current Conditions of Southern Portion of Landfill

Description - Current Conditions of Eastern Portion of Landfill

Shepley's Hill Landfill
Annual Inspection
October 2020

Description - Current Condition of the Northern Barrier Wall Area

Description - Current Condition of the Southern Barrier Wall Area

Shepley's Hill Landfill
Annual Inspection
October 2020

Description - Current Conditions of Red Cove Area

Description - Current Condition of Southern Drainage Swale

Shepley's Hill Landfill
Annual Inspection
October 2020

Description - Current Condition of Eastern Drainage Swale

Description - Current Condition of the Northern Landfill Access Road

Shepley's Hill Landfill
Annual Inspection
October 2020

Description - Current Condition of the Southern Landfill Access Road

Description - Current condition of Recreation Field Access Point

Shepley's Hill Landfill
Annual Inspection
October 2020

Description - Current Conditions of Southern Portion of Recreation Field

Description - Current Conditions of Northern Portion of Recreation Field

Date: 10/13/20 Weather: Rainy 50s Field Team: CJH + JMR

Ambient / Barometric pressure end 29.52 ↳ 16:00 ↳ 11:00 start 29.61

		Initial Readings									Post Purge Readings							
ID	Time	VOC (ppm)	O_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	CH_4 (%)	Purge Rate (lpm)	Purge Time (sec)	VOC (ppm)	O_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	CH_4 (%)	Bar. Pres.("Hg)
GV-1	1315	0.5	8.6	0	32	0	9.2	0.8	4	167	0.5	8.8	0	31	0	9.1	0.8	29.67
GV-2	1335	0.4	1.2	0	45	0	11.3	9.6	4	167	0.7	1.1	0	99	0	11.3	9.8	29.57
GV-3	1325	0	20.9	0	0	0	0	0	4	167	0	20.9	0	0	0	0	0	29.57
GV-4	1345	0.5	5.4	0	99	0	12.3	6.4	4	167	0.5	5.8	0	99	0	12.3	6	29.57
GV-5	1355	0	12.5	0	4	0	5.8	0.1	4	167	0	13.5	0	0.4	0	5.8	0.1	29.55
GV-6	1410	0.9	4.5	0	99	0	12.9	2.8	4	167	0.7	4.0	0	99	0	12	2.9	29.55
GV-7	1420	0.5	0.8	0	99	0	15.8	12.4	4	167	0.6	1.5	0	99	0	15.0	12.2	29.55
GV-8	1430	0.9	9.2	0	58	0	8.7	1.5	4	167	0.6	9	0	58	0	8.8	1.5	29.55
GV-9	1300	0.5	2.5	0	99	0	10.0	6.6	4	167	0.5	11	0	99	0	16.2	6.7	29.55
GV-10	1250	0.6	2.1	0	99	0	12.4	2.2	4	167	0.6	1.9	0	99	0	13.2	3.2	29.57
GV-11	1240	0.6	11.0	0	78	0	6.6	2.2	4	167	0.5	11.8	0	75	0	6	2.6	29.57
GV-12	1225	0.4	2.8	0	99	0	4.6	9.9	4	167	0.3	1.2	0	99	0	14.0	9.6	29.61
GV-13	1125	0.6	19.2	0	40	0	4.8	2.1	4	167	0	11.5	0	52	0	33	1.5	29.61
GV-14	1135	0.6	19.1	0	99	0	21	99	4	167	0	19.7	0	79	0	6.1	10.0	29.59
GV-15	1155	0.4	4.3	0	99	0	22.2	17.5	4	375	8.3	4.3	0	99	0	22.2	24.0	29.59
GV-16	1315	0.2	0.9	0	99	0	22.0	17.5	4	375	6.4	0.1	0	99	0	22.2	17.3	29.59
GV-17	1205	0.4	4.3	0	99	0	14.6	99	4	375	0.3	0.3	0	99	0	19.1	19.0	29.59
GV-18	1145	0.1	18.8	0	11	0	2.7	3.2	4	375	0.5	19.8	0	88	0	6.5	1.6	29.52
LGP-01-01X	1510	0	20.9	0	0	0	0.5	0	2	83	0	20.9	0	0	0	0.5	0	29.52
LGP-09-01XA	1545	0	20.9	0	0	0	0.5	0	2	157	0	20.9	0	0	0	0.6	0	29.52
LGP-09-01XB	1530	0.3	20.9	0	0	0	0.7	0	2	157	0.2	20.4	0	0	0	0.5	0	29.53
LGP-09-02X	1525	0	20.9	0	0	0	0.2	0	2	83	0	20.9	0	0	0	0	0	29.53
LGP-09-02X	1530	0	20.9	0	0	0	1	0	2	204	0	20.9	0	0	0	1.1	0	29.53
LGP-01-03X	1505	0	20.9	0	0	0	0.6	0	2	83	0	20.9	0	0	0	0	0	29.53
LGP-09-03X	1515	0.1	20.9	0	0	0	0	0	2	167	0	20.9	0	0	0	0	0	29.55
LGP-09-04X	1445	0	20.9	0	0	0	0	0	2	83	0	20.9	0	0	0	0.5	0	29.53
LGP-09-04X	1455	0	20.9	0	0	0	0	0	2	120	0	20.9	0	0	0	0.6	0	29.67
LGP-05-05X	0750	0	14.0	0	0	0	0.5	0	2	93	0	11	0	0	0	9.2	0	29.67
LGP-09-05X	0900	36.7	12.0	0	60	0	6.3	1.3	2	167	0.5	0.9	0	99	0	22	6.7	29.67
LGP-05-06X	0815	0	20.4	0	0	0	1.6	0	2	93	0	20.4	0	0	0	0	0	29.67
LGP-09-06X	0835	0	20.9	0	0	0	3.6	0	2	120	0	17.2	0	0	0	3.4	0	29.65
LGP-05-07X	0840	0	21.9	0	0	0	0.1	0	2	65	0	12.2	0	0	0	0.1	0	29.65
LGP-05-08X	0855	0	17.9	0	0	0	3.9	0	2	93	0	12.9	0	0	0	0	0	29.65
LGP-09-08X	0905	0	11.1	0	4	0	12.9	0	2	185	0	3.1	0	0	0	16.7	0	29.65
0920 LGP-05-09X	9/	30	20.4	0.1	30	0	1.5	1.2	2	93	0.5	0.9	0	99	0	2.2	6.1	9/
0930 LGP-09-09X		0	13.6	0	0	0	10.7	0	2	185	0	9.0	0	0	0	13.3	0	29.65
LGP-05-10X	0945	0	19.6	0	0	0	2.6	0	2	93	0	13.1	0	0	0	0.4	0	29.63
LGP-09-10X	0955	0	15.4	0	0	0	6.8	0	2	148	0	6.2	0	0	0	13.4	0	29.63
LGP-05-11X	1010	0	10.1	0	0	0	1.9	0	2	83	0	14.3	0	0	0	7.3	0	29.63
LGP-09-11X	1000	0.4	14.6	0	0	0	9.6	0.2	2	139	0	9.9	0	0	0	12.2	0	29.63
LGP-05-13X	1035	0.2	19.4	0	0	0	2.3	0	2	56	0	16.1	0	5	0	6.5	0	29.61
LGP-05-14X	1050	0	17.9	0	0	0	5.6	0	2	93	0	14.5	0	0	0	9.5	0	29.61
LGP-09-15X	1115	0	18.5	0	0	0	13.4	0	2	111	0	13.4	0	0	0	4.5	0	29.61
LGW-09-14X	1100	0	12.9	0	0	0	3.6	0			0	22.0	0	0	0	0	0	29.52
Research resample @ end of day LGP-09-05X	1600	0.7	3.1	0	99	0	21.2	6			1.6	1.2	0	99	0	24.9	15	29.52
LGP-05-09X		0	20.4	0	0	0	1.4	0	2	93	0	16.5	0	0	0	6.6	0	29.67

US Environmental Rental Corporation

(888) 550-8100 www.usenvironmental.com

166 Riverview Ave, Waltham, MA 02453 (781) 899-1560

91 Prestige Park Circle, Suite 5, East Hartford, CT 06108 (860) 289-8700

5C South Gold Dr, Hamilton, NJ 08691 (609) 570-8555

1202 Tech Blvd., Suite 108, Tampa, FL 33619 (813) 628-4200

Order No.: R-51578

Date: 10/12/2020

Technician: BP

Company: SOVEREIGN

Contact: STEVE

Phone #: #N/A

Packing List

Item	Serial Number	Included	QC
MultiRAE Lite	**1090-1017**	✓	
Manual		✓	
Charger		✓	
Sample Tubing		✓	
Alkaline Battery Pack		✓	
External Filters		✓	
Software			
Comm. Cable			
Regulator		✓	
Tedlar Bag		✓	
Calibration Gas		✓	

Calibration Report

MultiRAE Lite **1090-1017**

Calibrated with the following calibration gas:

10 H2S /50 CO/ 50 LEL/ 18 O2/	*Lot #:*	40003187
ISO 100PPM	*Lot #:*	4931808
	Lot #:	

	Span Setting	Calibrated Reading	Post-Calibration Bump Test
H_2S	10 *ppm*	10 *ppm*	0 *ppm*
CO	50 *ppm*	49 *ppm*	0 *ppm*
LEL	50 %	50 %	0 %
O_2	18 %	18 %	0 %
PID	100 *ppm*	100.2 *ppm*	0 *ppm*
CO2	0 *ppm*	0 *ppm*	0 *ppm*

This document certifies that US Environmental Rental Corporation has provided this rental equipment and all accessories in good working order. It is the renter's responsibility to: a) review all included items upon receipt, b) verify that all items are in acceptable condition and function properly, and c) contact a US Environmental associate immediately if any item is missing, damaged, and/or not functioning properly. Any delay in notifying US Environmental will be considered as the Renter taking responsibility for such missing, damaged, and/or malfunctioning item.

Missing, damaged, and/or malfunctioning equipment and accessories will result in additional fees.

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1202 Tech Blvd., Suite 108, Tampa, FL 33619 (813) 628-4200

LANDTEC

Company: SOVEREIGN
Contact: STEVE
Phone #: 631 454 3182

Order No.: R-51578
Date: 10/12/2020
Technician: BP

Packing List

Item	Serial Number	Included	QC
GEM 5000	G503663	✓	
H2S Sensor	NA	✓	
Manual		✓	
Charger		✓	
External Filters		✓	
Sample Line		✓	
Pressure Line		✓	
Temperature Probe		✓	
Quick Connects		✓	
Regulator		✓	
Tedlar Bag		✓	
Calibration Gas		✓	
Software			
Comm. Cable			

Calibration Report

Item		Information	
GEM 5000	G503663		
Calibration Gas:		15% CO2 / 15% CH4	
Lot Number:		*4908907*	
H2S Concentration		*25.0*	*ppm*
Lot Number:		*4020301*	
CO_2 Calibrated Reading		*15.0*	*%*
CO_2 Post-Cal Bump		*15.0*	*%*
CH_4 Calibrated Reading		*15.0*	*%*
CH_4 Post-Cal Bump		*15.0*	*%*
O_2 Calibrated Reading		*20.9*	*%*
O_2 Post-Cal Bump		*20.9*	*%*
H_2S Calibrated Reading		*25.0*	*ppm*
H_2S Post-Cal Bump		*25.0*	*ppm*

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Missing, damaged, and/or malfunctioning equipment and accessories will result in additional fees.

Appendix B
Landfill Gas Monitoring 2020
Devens, Massachusetts

Date: October 13, 2020 **Weather: Rainy, 50's F** **Field Team: Joe Rogers, Liam Henry**

		Initial Readings									Post Purge Readings							
ID	Time	VOC (ppm)	0_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	$C0_2$ (%)	CH_4 (%)	rge Rate (lp	rge Time (se	VOC (ppm)	0_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	$C0_2$ (%)	CH_4 (%)	Bar. Pres.("Hg)
Background	7:45	0.0	20.9	0.0	0.0	0.0	0.0	0.0										29.67
GV-1	13:15	0.5	8.8	0.0	32.0	0.0	9.2	0.8	4	167	0.5	8.8	0.0	31.0	0.0	9.1	0.8	29.57
GV-2	13:35	0.4	1.2	0.0	45.0	0.0	11.3	9.6	4	167	0.7	1.1	0.0	99.0	0.0	11.3	9.8	29.57
GV-3	13:25	0.0	20.9	0.0	0.0	0.0	0.0	0.0	4	167	0.0	20.9	0.0	0.0	0.0	0.0	0.0	29.57
GV-4	13:45	0.5	5.4	0.0	99.0	0.0	12.8	6.4	4	167	0.5	5.8	0.0	99.0	0.0	12.3	6.0	29.55
GV-5	13:55	0.0	12.8	0.0	4.0	0.0	5.6	0.1	4	167	0.0	13.5	0.0	0.4	0.0	5.9	0.1	29.55
GV-6	14:10	0.7	4.5	0.0	99.0	0.0	12.9	2.8	4	167	0.7	4.0	0.0	99.0	0.0	12.0	2.9	29.55
GV-7	14:20	0.5	0.2	0.0	99.0	0.0	15.8	12.4	4	167	0.3	1.5	0.0	99.0	0.0	15.0	12.2	29.55
GV-8	14:30	0.0	9.2	0.0	58.0	0.0	8.7	1.5	4	167	0.6	9.0	0.0	59.0	0.0	8.8	1.5	29.55
GV-9	13:00	0.5	2.3	0.0	99.0	0.0	16.0	6.6	4	167	0.5	1.1	0.0	99.0	0.0	16.2	6.7	29.57
GV-10	12:50	0.5	2.1	0.0	99.0	0.0	12.4	2.2	4	167	0.5	1.9	0.0	99.0	0.0	13.2	3.2	29.55
GV-11	12:40	0.6	11.9	0.0	78.0	0.0	6.8	2.2	4	167	0.5	11.8	0.0	75.0	0.0	6.0	2.6	29.57
GV-12	12:25	0.4	2.8	0.0	99.0	0.0	14.6	9.9	4	167	0.3	1.2	0.0	99.0	0.0	14.2	9.6	29.57
GV-13	11:25	0.6	19.2	0.0	40.0	0.0	4.8	2.1	4	167	0.0	11.5	0.0	82.0	0.0	33.0	1.5	29.61
GV-14	11:35	0.6	19.1	0.0	99.0	0.0	21.0	9.9	4	167	0.0	19.7	0.0	99.0	0.0	6.1	10.0	29.61
GV-15	11:55	0.4	4.3	0.0	99.0	0.0	22.2	17.5	4	375	0.3	4.3	0.0	99.0	0.0	22.2	24.0	29.59
GV-16	12:15	0.2	0.9	0.0	99.0	0.0	22.0	17.5	4	375	0.4	0.1	0.0	99.0	0.0	22.2	17.3	29.59
GV-17	12:05	0.4	4.3	0.0	99.0	0.0	14.6	9.9	4	375	0.3	0.3	0.0	99.0	0.0	39.1	19.0	29.59
GV-18	11:45	0.1	18.8	0.0	14.0	0.0	2.7	3.2	4	375	0.5	19.8	0.0	88.0	0.0	1.5	1.6	29.59
LGP-01-01X	15:40	0.0	20.9	0.0	0.0	0.0	0.5	0.0	2	83	0.0	20.9	0.0	0.0	0.0	0.5	0.0	29.52
LGP-09-01XA	15:45	0.0	20.9	0.0	0.0	0.0	0.5	0.0	2	157	0.0	20.9	0.0	0.0	0.0	0.6	0.0	29.52
LGP-09-01XB	15:50	0.3	20.9	0.0	0.0	0.0	0.7	0.0	2	157	0.2	20.4	0.0	0.0	0.0	0.5	0.0	29.52
LGP-01-02X	15:25	0.0	20.9	0.0	0.0	0.0	0.2	0.0	2	83	0.0	20.9	0.0	0.0	0.0	0.0	0.0	29.53
LGP-09-02X	15:30	0.0	20.9	0.0	0.0	0.0	1.0	0.0	2	204	0.0	20.9	0.0	0.0	0.0	1.1	0.0	29.53
LGP-01-03X	15:05	0.0	20.9	0.0	0.0	0.0	0.6	0.0	2	83	0.0	20.9	0.0	0.0	0.0	0.0	0.0	29.53
LGP-09-03X	15:15	0.1	20.9	0.0	0.0	0.0	0.0	0.0	2	167	0.0	20.9	0.0	0.0	0.0	0.0	0.0	29.53
LGP-01-04X	14:45	0.0	20.9	0.0	0.0	0.0	0.0	0.0	2	83	0.0	20.9	0.0	0.0	0.0	0.5	0.0	29.55
LGP-09-04X	14:55	0.0	20.9	0.0	0.0	0.0	0.0	0.0	2	120	0.0	20.9	0.0	0.0	0.0	0.5	0.0	29.53
LGP-05-05X	7:50	0.0	14.0	0.0	0.0	0.0	0.5	0.0	2	93	0.0	14.0	0.0	0.0	0.0	9.2	0.0	29.67
LGP-09-05X	8:00	30.7	12.0	0.0	30.0	0.0	1.3	1.3	2	167	0.5	0.9	0.0	99.0	0.0	22.0	61.0	29.67
LGP-05-06X	8:15	0.0	20.4	0.0	0.0	0.0	1.6	0.0	2	93	0.0	20.4	0.0	0.0	0.0	0.0	0.0	29.67
LGP-09-06X	8:25	0.0	20.9	0.0	0.0	0.0	3.6	0.0	2	120	0.0	17.2	0.0	0.0	0.0	3.6	0.0	29.67
LGP-05-07X	8:40	0.0	21.9	0.0	0.0	0.0	0.1	0.0	2	65	0.0	12.2	0.0	0.0	0.0	6.1	0.0	29.65
LGP-05-08X	8:55	0.0	17.9	0.0	0.0	0.0	3.9	0.0	2	93	0.0	12.5	0.0	0.0	0.0	0.0	0.0	29.65
LGP-09-08X	9:05	0.0	11.1	0.0	4.0	0.0	12.9	0.0	2	185	0.0	3.1	0.0	0.0	0.0	16.7	0.0	29.65
LGP-05-09X	8:20	0.0	20.4	0.0	0.0	0.0	1.4	0.0	2	93	0.0	16.5	0.0	0.0	0.0	6.6	0.0	29.67
LGP-09-09X	9:30	0.0	13.6	0.0	0.0	0.0	10.7	0.0	2	185	0.0	9.0	0.0	0.0	0.0	13.3	0.0	29.65
LGP-05-10X	9:45	0.0	19.6	0.0	0.0	0.0	2.6	0.0	2	93	0.0	13.1	0.0	0.0	0.0	0.4	0.0	29.63
LGP-09-10X	9:55	0.0	15.4	0.0	0.0	0.0	6.8	0.0	2	148	0.0	6.2	0.0	0.0	0.0	13.4	0.0	29.63
LGP-05-11X	10:10	0.0	20.1	0.0	0.0	0.0	1.9	0.0	2	83	0.0	14.3	0.0	0.0	0.0	7.3	0.0	29.63
LGP-09-11X	10:20	0.4	14.6	0.0	0.0	0.0	9.6	0.2	2	139	0.0	9.9	0.0	0.0	0.0	12.2	0.0	29.63
LGP-05-13X	10:35	0.2	19.4	0.0	0.0	0.0	2.3	0.0	2	56	0.0	16.1	0.0	0.0	0.0	6.5	0.0	29.61
LGP-05-14X	10:50	0.0	17.9	0.0	0.0	0.0	3.0	0.0	2	93	0.0	14.5	0.0	0.0	0.0	7.5	0.0	29.61
LGP-09-15X	11:15	0.0	18.5	0.0	0.0	0.0	13.4	0.0	2	111	0.0	17.4	0.0	0.0	0.0	4.5	0.0	29.61

Appendix B
Historical Results: 2012-Present
Shepley Hill Landfill Gas Monitoring
Former Fort Devens, Devens, MA

			Initial Readings									Post Purge Readings							
ID	Date	Time	VOC (ppm)	0_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	CH_4 (%)	Purge Rate (lpm)	Purge Time (sec)	VOC (ppm)	0_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	CH_4 (%)	Bar. Pres.("Hg)
GV-1	10/26/2012	12:54	0.2	8.6	0	16	0	9.5	0.8	4	167	0.5	8.0	0	23	0	10.8	1.1	29.87
	11/12/2013	8:46	0.0	20.9	0	0	0	0.1	0.0	4	167	0.0	20.9	0	0	0	0.2	0.0	29.98
	10/17/2014	14:49	0.0	21.0	0.0	0.0	0.0	0.0	0.0	4	167	0.0	18.4	0.0	3.0	4.0	1.9	0.1	29.32
	10/20/2015	9:21	0.0	20.8	0.0	0.0	0.0	0.1	0.0	4	167	0.0	20.9	0.0	0.0	0.0	0.0	0.0	29.90
	10/18/2016	17:48	0.1	8.8	0.0	21	0.0	9.4	1.1	4	167	0.1	6.1	0.0	24	0.0	11.8	1.2	29.55
	10/18/2017	15:05	0.0	19.6	0.0	0.0	0.0	1.0	0.0	4	167	0.0	11.4	0.0	12.0	0.0	6.9	0.3	29.98
	10/18/2018	14:28	0.0	21.3	0.0	0.0	0.0	0.4	0.0	4	167	0.0	21.1	0.0	0.0	0.0	0.5	0.0	30.03
	10/16/2019	14:07	0.0	9.1	0.0	64.0	0.0	8.4	1.3	4	167	0.0	5.6	0.0	66.0	0.0	11.0	3.3	29.71
	10/13/2020	13:15	0.5	8.8	0.0	32.0	0.0	9.2	0.8	4	167	0.5	8.8	0.0	31.0	0.0	9.1	0.8	29.57
GV-2	10/26/2012	13:05	0.4	9.9	0	87	0	9.6	4.3	4	167	0.6	4.0	0	>100	0	15.4	9.3	29.87
	11/12/2013	8:56	0.0	20.9	0	0	0	0.1	0.0	4	167	0.0	20.9	0	0	0	0.1	0.0	29.98
	10/17/2014	14:40	0.0	20.8	1.0	0.0	0.0	0.1	0.0	4	167	0.0	15.2	0.0	68.0	4.0	5.1	3.5	29.32
	10/20/2015	10:50	0.1	19.4	0.0	27.0	0.0	1.2	0.8	4	167	0.1	16.4	0.0	83.0	1.0	4.2	2.5	29.89
	10/18/2016	17:43	0.1	8.7	0.0	99	0.0	10.3	4.9	4	167	0.0	3.9	0.0	100	0.0	14.8	7.2	29.55
	10/18/2017	14:58	0.0	20.5	0.0	5.0	0.0	0.5	0.1	4	167	0.0	11.3	0.0	69.0	0.0	6.7	2.7	29.99
	10/18/2018	14:23	0.0	21.6	0.0	0.0	0.0	0.0	0.0	4	167	0.0	21.6	0.0	0.0	0.0	0.1	0.0	30.03
	10/16/2019	14:15	0.0	11.5	0.0	74.0	0.0	7.5	3.0	4	167	0.0	2.6	0.0	99.0	0.0	13.7	7.7	29.71
	10/13/2020	13:35	0.4	1.2	0.0	45.0	0.0	11.3	9.6	4	167	0.7	1.1	0.0	99.0	0.0	11.3	9.8	29.57
GV-3	10/26/2012	13:22	0.0	20.9	0	0	0	0.0	0.0	4	167	0.0	20.9	0	0	0	0.0	0.0	29.87
	11/12/2013	9:09	0.1	20.9	0	0	0	0.1	0.0	4	167	0.0	20.9	0	0	0	0.1	0.0	29.98
	10/17/2014	14:25	0.0	20.7	0.0	0.0	0.0	0.0	0.0	4	167	0.0	20.9	0.0	0.0	0.0	0.0	0.0	29.32
	10/20/2015	8:50	0.0	20.5	0.0	0.0	0.0	0.0	0.0	4	167	0.0	20.5	0.0	0.0	0.0	0.1	0.1	29.88
	10/18/2016	17:31	0.0	18.3	0.0	13	0.0	1.8	0.6	4	167	0.0	19.9	0.0	0	0.0	0.0	0.0	29.55
	10/18/2017	14:39	0.0	20.9	0.0	0.0	0.0	0.1	0.0	4	167	0.0	20.9	0.0	0.0	0.0	0.1	0.0	29.98
	10/18/2018	14:12	0.0	21.3	0.0	0.0	0.0	0.0	0.0	4	167	0.0	21.4	0.0	0.0	0.0	0.0	0.0	30.03
	10/16/2019	13:40	0.0	21.1	0.0	3.0	0.0	0.0	0.1	4	167	0.0	20.9	0.0	0.0	0.0	0.0	0.1	29.71
	10/13/2020	13:25	0.0	20.9	0.0	0.0	0.0	0.0	0.0	4	167	0.0	20.9	0.0	0.0	0.0	0.0	0.0	29.57
GV-4	10/26/2012	13:15	0.6	7.4	0	72	0	10.4	3.4	4	167	0.5	11.3	0	39	0	6.8	1.9	29.87
	11/12/2013	9:18	0.0	20.9	0	0	0	0.1	0.0	4	167	0.0	20.9	0	0	0	0.1	0.0	29.98
	10/17/2014	14:33	0.0	18.0	0.0	21.0	5.0	2.5	1.0	4	167	0.2	1.8	0.0	100.0	0.0	14.3	8.1	29.32
	10/20/2015	9:00	0.1	10.0	0.0	71.0	0.0	8.7	2.1	4	167	0.2	10.1	0.0	100.0	0.0	10.1	3.1	29.88
	10/18/2016	17:37	0.2	8.7	0.0	80	0.0	11.0	4.0	4	167	0.2	5.2	0.0	100	0.0	14.0	5.3	29.55
	10/18/2017	14:48	0.0	13.3	0.0	61.0	0.0	4.8	2.1	4	167	0.0	15.2	0.0	30.0	0.0	4.1	1.0	29.97
	10/18/2018	14:18	0.0	21.5	0.0	0.0	0.0	0.0	0.0	4	167	0.0	21.5	0.0	0.0	0.0	0.0	0.0	30.03
	10/16/2019	13:58	0.0	5.5	0.0	91.0	0.0	11.7	5.1	4	167	0.0	9.3	0.0	63.0	0.0	8.5	2.7	29.71
	10/13/2020	13:45	0.5	5.4	0.0	99.0	0.0	12.8	6.4	4	167	0.5	5.8	0.0	99.0	0.0	12.3	6.0	29.55
GV-5	10/26/2012	13:55	1.5	13.4	0	1	0	5.2	0.0	4	167	0.2	14.0	0	0	0	4.8	0.0	29.87
	11/12/2013	9:48	0.0	20.9	0	0	0	0.1	0.0	4	167	0.0	20.9	0	0	0	0.1	0.0	29.98
	10/17/2014	14:02	0.0	6.9	0.0	0.0	5.0	6.7	0.0	4	167	0.0	5.9	0.0	0.0	5.0	7.9	0.0	29.32
	10/20/2015	9:12	0.1	19.7	0.0	4.0	0.0	0.6	0.1	4	167	0.0	20.5	0.0	0.0	0.0	0.4	0.0	29.88
	10/18/2016	17:01	0.0	14.2	0.0	0	0.0	5.0	0.0	4	167	0.0	12.4	0.0	0	0.0	6.3	0.0	29.55
	10/18/2017	13:47	0.0	18.0	0.0	0.0	0.0	1.3	0.0	4	167	0.0	18.1	0.0	0.0	0.0	1.9	0.0	29.98
	10/18/2018	12:58	0.0	21.7	0.0	0.0	0.0	0.1	0.0	4	167	0.0	21.8	0.0	1.0	0.0	0.1	0.1	30.02
	10/16/2019	14:43	0.0	12.2	0.0	6.0	0.0	6.4	6.2	4	167	0.0	12.6	0.0	0.0	0.0	6.2	0.2	29.71
	10/13/2020	13:55	0.0	12.8	0.0	4.0	0.0	5.6	0.1	4	167	0.0	13.5	0.0	0.4	0.0	5.9	0.1	29.55
GV-6	10/26/2012	13:31	0.4	5.8	0	>100	0	12.8	7.5	4	167	0.7	5.7	0	85	0	11.4	4.2	29.87
	11/12/2013	9:29	0.0	20.9	0	0	0	0.1	0.0	4	167	0.0	20.9	0	0	0	0.1	0.0	29.98
	10/17/2014	14:14	70.1	2.6	0.0	>100	3.0	14.3	8.0	4	167	0.1	0.5	0.0	>100	0.0	17.5	9.4	29.32
	10/20/2015	13:16	0.0	3.3	0.0	100.0	0.0	13.7	7.6	4	167	0.0	1.7	0.0	100.0	0.0	14.8	7.8	29.88
	10/18/2016	17:29	0.0	6.5	0.0	100	0.0	14.1	6.0	4	167	0.1	6.9	0.0	100	0.0	14.0	5.7	29.55
	10/18/2017	14:31	0.0	14.8	0.0	46.0	0.0	4.0	1.0	4	167	0.0	14.3	0.0	49.0	0.0	43.0	1.8	29.97
	10/18/2018	14:06	0.0	21.1	0.0	0.0	0.0	0.1	0.0	4	167	0.0	21.1	0.0	0.0	0.0	0.1	0.0	30.03
	10/16/2019	13:38	1.0	1.6	0.0	97.0	0.0	14.4	6.5	4	167	0.0	1.6	0.0	51.0	0.0	14.7	5.4	29.71
	10/13/2020	14:10	0.7	4.5	0.0	99.0	0.0	12.9	2.8	4	167	0.7	4.0	0.0	99.0	0.0	12.0	2.9	29.55

Appendix B
Historical Results: 2012-Present
Shepley Hill Landfill Gas Monitoring
Former Fort Devens, Devens, MA

			Initial Readings									Post Purge Readings							
ID	Date	Time	VOC (ppm)	0_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	CH_4 (%)	Purge Rate (lpm)	Purge Time (sec)	VOC (ppm)	0_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	CH_4 (%)	Bar. Pres.("Hg)
GV-7	10/26/2012	14:15	0.5	1.1	0	>100	2	12.1	6.6	4	167	0.4	1.2	0	63	0	11.1	3.2	29.87
	11/12/2013	9:57	0.0	20.7	0	0	0	0.1	0.0	4	167	0.0	20.5	0	0	0	0.1	0.0	29.98
	10/17/2014	13:47	0.0	2.9	0.0	>100	0.0	11.4	7.6	4	167	0.0	0.6	0.0	>100	0.0	13.8	8.2	29.32
	10/20/2015	11:30	0.0	5.4	0.0	100.0	0.0	11.6	8.2	4	167	0.0	1.1	0.0	100.0	1.0	14.1	7.9	29.89
	10/18/2016	17:10	0.0	11.8	0.0	100	0.0	7.7	5.6	4	167	0.0	2.5	0.0	100	0.0	16.8	11.0	29.55
	10/18/2017	13:37	0.0	18.2	0.0	10.0	0.0	0.9	0.3	4	167	0.0	18.6	0.0	5.0	0.0	0.8	0.0	29.98
	10/18/2018	12:47	0.0	21.6	1.0	1.0	0.0	0.0	0.1	4	167	0.0	21.6	1.0	0.0	0.0	0.0	0.0	30.02
	10/16/2019	14:27	0.0	0.3	0.0	99.0	0.0	15.2	13.3	4	167	0.0	0.1	0.0	99.0	0.0	15.1	12.1	29.71
	10/13/2020	14:20	0.5	0.2	0.0	99.0	0.0	15.8	12.4	4	167	0.3	1.5	0.0	99.0	0.0	15.0	12.2	29.55
GV-8	10/26/2012	14:05	0.7	10.1	0	1	0	7.0	0.1	4	167	0.1	9.1	0	0	1	7.4	0.0	29.87
	11/12/2013	10:04	0.0	20.3	0	0	0	0.1	0.0	4	167	0.0	20.2	0	0	0	0.1	0.0	29.98
	10/17/2014	13:54	0.0	6.7	0.0	15.0	6.0	6.6	0.8	4	167	0.0	5.8	0.0	9.0	6.0	7.7	0.4	29.32
	10/20/2015	11:39	0.0	12.7	0.0	45.0	0.0	6.2	1.4	4	167	0.0	10.6	0.0	27.0	0.0	7.3	0.8	29.89
	10/18/2016	16:53	0.0	13.6	0.0	9	0.0	5.2	0.4	4	167	0.0	8.1	0.0	2	0.0	9.6	0.1	29.55
	10/18/2017	13:56	0.0	17.7	0.0	9.0	0.0	1.8	0.1	4	167	0.0	17.8	0.0	0.0	0.0	1.9	0.0	29.95
	10/18/2018	12:52	0.0	21.7	1.0	0.0	0.0	0.1	0.0	4	167	0.0	21.5	0.0	0.0	0.0	0.1	0.0	30.02
	10/16/2019	14:26	0.0	8.2	0.0	49.0	0.0	9.0	2.5	4	167	0.0	5.8	0.0	5.0	0.0	11.1	0.3	29.71
	10/13/2020	14:30	0.0	9.2	0.0	58.0	0.0	8.7	1.5	4	167	0.6	9.0	0.0	59.0	0.0	8.8	1.5	29.55
GV-9	10/26/2012	13:40	0.6	3.0	0	99	0	11.7	4.9	4	167	1.2	3.2	0	>100	0	18.1	22.0	29.87
	11/12/2013	9:39	0.0	20.9	0	0	0	0.1	0.0	4	167	0.0	20.9	0	0	0	0.1	0.0	29.98
	10/17/2014	14:10	0.2	1.0	0.0	>100	0.0	16.8	9.1	4	167	0.2	0.3	0.0	0.0	0.0	18.7	17.0	29.32
	10/20/2015	13:24	0.2	7.1	0.0	100.0	0.0	11.2	5.9	4	167	0.4	0.7	0.0	100.0	0.0	19.1	17.8	29.88
	10/18/2016	17:17	0.0	5.5	0.0	100	0.0	15.7	7.6	4	167	0.0	4.9	0.0	100	0.0	17.1	13.7	29.55
	10/18/2017	14:23	0.0	14.9	0.0	49.0	0.0	3.3	1.5	4	167	0.0	10.1	0.0	100.0	0.0	9.1	10.3	29.98
	10/18/2018	14:00	0.0	20.7	0.0	3.0	0.0	0.3	0.2	4	167	0.0	20.1	0.0	11.0	0.0	0.7	0.5	30.03
	10/16/2019	13:27	0.0	0.0	0.0	40.0	0.0	16.0	8.8	4	167	0.0	0.1	0.0	99.0	0.0	17.0	13.1	29.71
	10/13/2020	13:00	0.5	2.3	0.0	99.0	0.0	16.0	6.6	4	167	0.5	1.1	0.0	99.0	0.0	16.2	6.7	29.57
GV-10	10/26/2012	14:22	0.3	2.8	0	50	2	10.5	2.6	4	167	0.2	4.0	0	30	2	9.5	1.5	29.87
	11/12/2013	10:22	0.0	20.7	0	0	0	0.2	0.0	4	167	0.0	20.6	0	0	0	0.1	0.0	29.98
	10/17/2014	13:30	0.0	1.9	0.0	55.0	0.0	11.6	2.7	4	167	0.0	1.3	0.0	54.0	0.0	12.1	2.7	29.32
	10/20/2015	13:03	0.0	4.2	0.0	100.0	0.0	11.6	4.2	4	167	0.0	2.0	0.0	100.0	0.0	12.4	4.3	29.89
	10/18/2016	16:40	0.0	6.1	0.0	100	0.0	14.4	8.4	4	167	0.0	2.2	0.0	100	0.0	16.3	7.8	29.55
	10/18/2017	14:17	0.0	18.6	0.0	0.0	0.0	0.9	0.0	4	167	0.0	17.6	0.0	0.0	0.0	1.3	0.0	29.98
	10/18/2018	12:41	0.0	21.6	1.0	0.0	0.0	0.0	0.0	4	167	0.0	21.6	1.0	0.0	0.0	0.0	0.0	30.02
	10/16/2019	13:17	0.0	1.1	0.0	51.0	0.0	14.1	3.0	4	167	0.0	2.0	0.0	45.0	0.0	13.6	2.4	29.71
	10/13/2020	12:50	0.5	2.1	0.0	99.0	0.0	12.4	2.2	4	167	0.5	1.9	0.0	99.0	0.0	13.2	3.2	29.55
GV-11	10/26/2012	14:30	0.2	11.8	0	9	0	5.2	0.5	4	167	0.1	11.3	0	16	0	5.1	0.8	29.87
	11/12/2013	10:14	0.0	20.6	0	0	0	0.1	0.0	4	167	0.0	20.6	0	0	0	0.2	0.0	29.98
	10/17/2014	13:37	0.0	13.3	0.0	5.0	4.0	4.9	0.2	4	167	0.0	6.9	0.0	2.0	6.0	5.0	1.0	29.32
	10/20/2015	12:54	0.0	14.1	0.0	0.0	0.0	4.5	1.1	4	167	0.0	13.7	0.0	22.0	1.0	4.8	0.6	29.89
	10/18/2016	16:46	0.1	13.8	0.0	23	0.0	4.9	1.1	4	167	0.0	12.2	0.0	15	0.0	5.6	0.7	29.55
	10/18/2017	14:12	0.0	19.5	0.0	3.0	0.0	0.7	0.0	4	167	0.0	18.0	0.0	5.0	0.0	1.5	0.0	29.98
	10/18/2018	12:35	0.0	21.3	0.0	0.0	0.0	0.0	0.0	4	167	0.0	21.4	0.0	0.0	0.0	0.1	0.0	30.02
	10/16/2019	13:09	0.0	10.9	0.0	99.0	0.0	6.8	2.5	4	167	0.0	5.9	0.0	99.0	0.0	6.5	9.0	29.71
	10/13/2020	12:40	0.6	11.9	0.0	78.0	0.0	6.8	2.2	4	167	0.5	11.8	0.0	75.0	0.0	6.0	2.6	29.57
GV-12	10/26/2012	14:40	0.1	0.9	0	>100	0	9.3	6.1	4	167	0.2	1.0	0	>100	1	10.1	6.5	29.87
	11/12/2013	11:00	0.0	20.4	0	0	0	0.2	0.0	4	167	0.0	20.6	0	0	0	0.2	0.0	29.98
	10/17/2014	12:55	0.0	12.6	1.0	14.0	2.0	5.3	0.7	4	167	0.0	4.9	0.0	24.0	5.0	7.4	1.2	29.32
	10/20/2015	13:35	0.1	7.5	0.0	100.0	0.0	10.2	8.3	4	167	0.0	0.8	0.0	100.0	0.0	14.6	11.8	29.88
	10/18/2016	16:16	0.0	3.1	0.0	100	0.0	14.7	9.5	4	167	0.0	1.5	0.0	100	0.0	15.7	9.7	29.55
	10/18/2017	13:11	0.0	20.5	0.0	0.0	0.0	0.2	0.0	4	167	0.0	20.3	0.0	0.0	10.0	0.4	0.0	29.99
	10/18/2018	12:28	0.0	21.2	1.0	0.0	0.0	0.0	0.0	4	167	0.0	21.3	1.0	0.0	0.0	0.0	0.0	30.02
	10/16/2019	13:00	0.0	3.3	0.0	95.0	0.0	10.7	7.0	4	167	0.0	0.0	0.0	99.0	0.0	12.4	8.8	29.71
	10/13/2020	12:25	0.4	2.8	0.0	99.0	0.0	14.6	9.9	4	167	0.3	1.2	0.0	99.0	0.0	14.2	9.6	29.57

Appendix B
Historical Results: 2012-Present
Shepley Hill Landfill Gas Monitoring
Former Fort Devens, Devens, MA

			Initial Readings									Post Purge Readings							
ID	Date	Time	VOC (ppm)	0_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	CH_4 (%)	Purge Rate (lpm)	Purge Time (sec)	VOC (ppm)	0_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	CH_4 (%)	Bar. Pres.("Hg)
GV-13	10/26/2012	15:51	1.5	19.4	0	77	0	2.0	3.8	4	167	0.5	18.1	0	>100	0	3.7	5.2	29.77
	11/12/2013	11:11	0.1	20.6	0	0	0	0.4	0.0	4	167	0.0	20.5	0	6	0	0.4	0.0	29.98
	10/17/2014	10:01	0.0	20.9	0.0	0.0	0.0	0.1	0.0	4	167	0.0	20.7	0.0	0.0	0.0	0.2	0.0	29.40
	10/20/2015	13:45	0.1	20.1	0.0	15.0	0.0	0.7	0.4	4	167	0.1	19.3	0.0	32.0	0.0	1.2	0.8	29.88
	10/18/2016	8:44	0.0	19.6	0.0	0	0.0	0.3	0.0	4	167	0.0	19.7	0.0	0	0.0	0.1	0.0	29.73
	10/18/2017	9:40	0.0	20.9	0.0	0.0	0.0	0.4	0.0	4	167	0.0	20.9	0.0	0.0	0.0	0.4	0.0	30.02
	10/18/2018	9:04	0.0	20.9	0.0	0.0	0.0	0.1	0.0	4	167	0.0	20.9	0.0	0.0	0.0	0.1	0.0	30.06
	10/16/2019	11:44	0.0	12.4	0.0	47.0	0.0	5.0	3.4	4	167	0.0	16.2	0.0	30.0	0.0	2.5	2.1	29.85
	10/13/2020	11:25	0.6	19.2	0.0	40.0	0.0	4.8	2.1	4	167	0.0	11.5	0.0	82.0	0.0	33.0	1.5	29.61
GV-14	10/26/2012	15:37	0.6	20.9	0	>100	0	15.7	29.5	4	167	0.5	3.0	0	>100	0	19.7	34.9	29.87
	11/12/2013	12:30	0.2	11.2	0	>100	0	6.3	7.9	4	167	0.3	8.1	0	>100	0	8.3	10.3	29.91
	10/17/2014	10:12	0.0	20.1	0.0	29.0	30.0	1.6	1.7	4	167	0.2	17.1	0.0	100.0	0.0	4.4	6.1	29.40
	10/20/2015	14:00	0.1	20.4	0.0	15.0	0.0	0.6	0.3	4	167	0.0	13.9	0.0	100.0	0.0	7.0	11.9	29.88
	10/18/2016	10:00	0.0	19.3	0.0	7	0.0	0.7	0.3	4	167	0.0	19.7	0.0	2	0.0	0.3	0.1	29.72
	10/18/2017	10:20	0.0	20.5	0.0	0.0	0.0	0.6	0.0	4	167	0.0	20.9	0.0	0.0	0.0	0.3	0.0	30.02
	10/18/2018	12:21	0.0	21.3	1.0	0.0	0.0	0.0	0.0	4	167	0.0	21.3	1.0	0.0	0.0	0.0	0.0	30.02
	10/16/2019	11:55	0.0	20.6	0.0	99.0	0.0	0.2	0.2	4	167	0.0	3.7	0.0	99.0	0.0	15.1	29.3	29.85
	10/13/2020	11:35	0.6	19.1	0.0	99.0	0.0	21.0	9.9	4	167	0.0	19.7	0.0	99.0	0.0	6.1	10.0	29.61
GV-15	10/26/2012	15:27	1.0	1.5	0	>100	4	22.5	24.3	4	375	0.4	1.5	0	>100	1	22.6	23.9	29.87
	11/12/2013	14:39	0.3	6.4	0	75	0	10.5	7.9	4	375	0.2	4.8	0	>100	0	11.4	8.6	29.91
	10/17/2014	10:56	0.0	15.2	1.0	25.0	5.0	5.0	1.3	4	375	0.0	20.7	0.0	0.0	0.0	0.1	0.0	29.33
	10/20/2015	16:15	0.1	20.6	0.0	23.0	0.0	0.7	0.6	4	375	0.1	3.1	0.0	100.0	0.0	21.2	24.9	29.88
	10/18/2016	16:05	0.0	2.7	0.0	100	0.0	23.3	22.3	4	375	0.0	2.8	0.0	100	0.0	22.9	21.2	29.55
	10/18/2017	13:02	0.0	16.9	0.0	35.0	0.0	2.4	1.1	4	375	0.0	16.0	0.0	42.0	0.0	3.2	1.4	29.98
	10/18/2018	12:11	0.0	21.5	0.0	0.0	0.0	0.0	0.1	4	375	0.0	21.4	0.0	0.0	0.0	0.0	0.0	30.10
	10/16/2019	12:10	0.0	1.8	0.0	99.0	0.0	21.9	23.5	4	375	0.0	0.0	0.0	99.0	0.0	21.0	26.5	29.85
	10/13/2020	11:55	0.4	4.3	0.0	99.0	0.0	22.2	17.5	4	375	0.3	4.3	0.0	99.0	0.0	22.2	24.0	29.59
GV-16	10/26/2012	14:50	0.3	1.2	0	>100	2	20.3	14.1	4	375	0.4	2.2	0	>100	2	20.3	13.7	29.87
	11/12/2013	10:45	0.0	20.8	0	0	0	0.3	0.0	4	375	0.0	20.0	0	0	0	0.3	0.0	29.98
	10/17/2014	13:04	0.0	1.2	0.0	100.0	0.0	19.5	15.8	4	375	0.1	0.7	0.0	100.0	0.0	20.2	17.0	29.32
	10/20/2015	15:55	0.1	20.1	0.0	27.0	0.0	23.7	17.3	4	375	0.2	6.1	0.0	100.0	0.0	16.7	11.0	29.88
	10/18/2016	16:22	0.0	1.7	0.0	100	0.0	25.5	19.9	4	375	0.0	1.9	0.0	100	0.0	25.5	19.9	29.55
	10/18/2017	13:19	0.0	17.2	0.0	14.0	0.0	2.4	0.4	4	375	0.0	16.8	0.0	12.0	0.0	2.7	0.3	29.90
	10/18/2018	12:00	0.0	21.6	0.0	0.0	0.0	0.0	0.0	4	375	0.0	21.7	0.0	0.0	0.0	0.0	0.0	30.10
	10/16/2019	12:48	0.0	0.0	0.0	99.0	22.1	0.0	20.2	4	375	0.0	0.0	0.0	99.0	0.0	22.4	19.2	29.71
	10/13/2020	12:15	0.2	0.9	0.0	99.0	0.0	22.0	17.5	4	375	0.4	0.1	0.0	99.0	0.0	22.2	17.3	29.59
GV-17	10/26/2012	15:02	0.0	3.3	0	>100	2	22.7	20.7	4	375	0.3	2.7	0	>100	2	22.9	20.9	29.87
	11/12/2013	10:30	0.0	20.5	0	0	0	0.3	0.0	4	375	0.0	20.0	0	0	0	0.3	0.0	29.98
	10/17/2014	13:16	0.0	0.2	97.0	100.0	0.0	24.6	27.5	4	375	0.1	0.0	0.0	100.0	0.0	25.0	28.4	29.32
	10/20/2015	16:08	0.2	2.2	0.0	100.0	0.0	23.2	21.5	4	375	0.1	1.1	0.0	100.0	0.0	24.3	22.8	29.88
	10/18/2016	16:30	0.0	1.7	0.0	100	0.0	27.5	26.0	4	375	0.0	3.6	0.0	100	0.0	25.1	24.3	29.55
	10/18/2017	13:27	0.0	16.1	0.0	20.0	0.0	2.4	0.4	4	375	0.0	15.8	0.0	21.0	0.0	3.2	0.6	29.94
	10/18/2018	11:51	0.0	21.2	0.0	0.0	0.0	0.1	0.0	4	375	0.0	21.4	0.0	0.0	0.0	0.1	0.0	30.10
	10/16/2019	12:36	0.0	2.6	0.0	99.0	0.0	23.4	25.6	4	375	0.0	0.0	0.0	99.0	0.0	23.4	26.1	29.71
	10/13/2020	12:05	0.4	4.3	0.0	99.0	0.0	14.6	9.9	4	375	0.3	0.3	0.0	99.0	0.0	39.1	19.0	29.59
GV-18	10/26/2012	15:15	0.5	5.3	0	>100	4	25.8	34.6	4	375	0.4	0.8	0	>100	3	26.3	35.5	29.87
	11/12/2013	14:23	0.2	5.9	0	>100	0	15.5	16.2	4	375	0.2	3.2	0	>100	0	17.9	18.9	29.91
	10/17/2014	11:12	0.0	20.8	0.0	0.0	0.0	0.1	0.0	4	375	0.0	20.7	0.0	0.0	0.0	0.1	0.0	29.33
	10/20/2015	16:25	0.1	5.6	0.0	100.0	0.0	21.2	29.1	4	375	0.2	8.8	0.0	100.0	0.0	17.1	24.1	29.88
	10/18/2016	15:55	0.0	4.8	0.0	100	0.0	22.9	25.2	4	375	0.0	2.6	0.0	100	0.0	26.4	29.3	29.55
	10/18/2017	12:55	0.0	20.2	0.0	7.0	0.0	0.5	0.1	4	375	0.0	20.3	0.0	0.0	0.0	0.5	0.1	29.98
	10/18/2018	11:40	0.0	20.9	0.0	0.0	0.0	0.2	0.0	4	375	0.0	21.2	0.0	0.0	0.0	0.1	0.0	30.10
	10/16/2019	12:21	0.0	0.7	0.0	99.0	0.0	21.3	23.4	4	375	0.0	1.0	0.0	99.0	0.0	21.2	23.4	29.71
	10/13/2020	11:45	0.1	18.8	0.0	14.0	0.0	2.7	3.2	4	375	0.5	19.8	0.0	88.0	0.0	1.5	1.6	29.59

Appendix B
Historical Results: 2012-Present
Shepley Hill Landfill Gas Monitoring
Former Fort Devens, Devens, MA

			Initial Readings									Post Purge Readings							
ID	Date	Time	VOC (ppm)	0_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	CH_4 (%)	Purge Rate (lpm)	Purge Time (sec)	VOC (ppm)	0_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	CH_4 (%)	Bar. Pres.("Hg)
LGP-01-01X	10/26/2012	7:55	0.0	20.9	0	0	0	0.7	0.0	2	83	0.0	20.3	0	0	0	0.7	0.0	29.88
	11/12/2013	7:36	0.0	20.8	0	0	0	0.4	0.0	2	83	0.0	20.9	0	0	0	0.5	0.0	29.98
	10/17/2014	15:00	0.0	20.4	0.0	0.0	0.0	0.6	0.0	2	83	0.0	20.6	0.0	0.0	0.0	0.6	0.0	29.32
	10/20/2015	9:45	0.0	20.6	0.0	0.0	0.0	0.7	0.0	2	83	0.0	20.5	0.0	0.0	0.0	0.7	0.0	29.90
	10/18/2016	17:56	0.0	18.9	0.0	0	0.0	1.4	0.0	2	83	0.0	19.3	0.0	0	0.0	0.9	0.0	29.55
	10/18/2017	8:55	0.0	20.3	0.0	0.0	0.0	0.8	0.0	2	83	0.0	20.4	0.0	0.0	0.0	0.9	0.0	30.00
	10/18/2018	14:48	0.0	20.9	0.0	0.0	0.0	1.0	0.0	2	83	0.0	20.9	0.0	0.0	0.0	1.0	0.0	30.03
	10/16/2019	15:37	0.0	21.0	0.0	0.0	0.0	0.5	0.1	2	83	0.0	21.1	0.0	0.0	0.0	0.5	0.1	29.64
	10/13/2020	15:40	0.0	20.9	0.0	0.0	0.0	0.5	0.0	2	83	0.0	20.9	0.0	0.0	0.0	0.5	0.0	29.52
LGP-09-01XA	10/26/2012	8:00	0.0	20.3	0	0	0	0.8	0.0	2	157	0.0	20.4	0	0	0	0.8	0.0	29.89
	11/12/2013	7:42	0.0	20.9	0	0	0	0.7	0.0	2	157	0.0	20.9	0	0	0	0.7	0.0	29.98
	10/17/2014	15:03	0.4	20.6	0.0	0.0	0.0	0.6	0.0	2	157	0.0	20.7	0.0	0.0	0.0	0.6	0.0	29.32
	10/20/2015	9:33	0.0	20.8	0.0	0.0	0.0	0.8	0.0	2	157	0.0	20.3	0.0	0.0	0.0	0.9	0.0	29.90
	10/18/2016	18:01	0.0	19.7	0.0	0	0.0	0.5	0.0	2	157	0.0	19.6	0.0	0	0.0	0.6	0.0	29.55
	10/18/2017	9:00	0.0	20.2	0.0	0.0	0.0	0.8	0.0	2	157	0.0	20.2	0.0	0.0	0.0	1.0	0.0	30.00
	10/18/2018	14:43	0.0	20.6	0.0	0.0	0.0	1.2	0.0	2	157	0.0	20.6	0.0	0.0	0.0	1.2	0.0	30.03
	10/16/2019	15:48	0.0	21.0	0.0	0.0	0.0	0.5	0.1	2	157	0.0	21.2	0.0	0.0	0.0	0.6	0.1	29.64
	10/13/2020	15:45	0.0	20.9	0.0	0.0	0.0	0.5	0.0	2	157	0.0	20.9	0.0	0.0	0.0	0.6	0.0	29.52
LGP-09-01XB	10/26/2012	8:06	0.1	20.9	0	0	0	0.9	0.0	2	259	0.0	20.9	0	0	0	0.9	0.0	29.89
	11/12/2013	7:50	0.2	20.9	0	0	0	0.2	0.0	2	259	0.0	20.9	0	0	0	1.0	0.0	29.98
	10/17/2014	15:02	0.7	20.5	0.0	0.0	0.0	0.6	0.0	2	157	0.0	20.6	0.0	0.0	0.0	0.6	0.0	29.32
	10/20/2015	9:40	0.0	20.2	0.0	0.0	0.0	0.9	0.0	2	157	0.0	20.2	0.0	0.0	0.0	0.9	0.0	29.90
	10/18/2016	18:05	0.0	19.5	0.0	0	0.0	0.7	0.0	2	157	0.0	19.5	0.0	0	0.0	0.7	0.0	29.55
	10/18/2017	9:05	1.0	20.1	0.0	0.0	0.0	1.0	0.0	2	157	0.0	20.1	0.0	0.0	0.0	1.0	0.0	30.00
	10/18/2018	14:38	0.0	20.8	0.0	1.0	0.0	0.9	0.1	2	157	0.0	20.6	0.0	0.0	0.0	1.0	0.0	30.03
	10/16/2019	15:43	0.0	20.8	0.0	0.0	0.0	0.7	0.1	2	157	0.0	20.9	0.0	0.0	0.0	0.8	0.1	29.64
	10/13/2020	15:50	0.3	20.9	0.0	0.0	0.0	0.7	0.0	2	157	0.2	20.4	0.0	0.0	0.0	0.5	0.0	29.52
LGP-01-02X	10/26/2012	8:26	0.0	19.8	0	0	0	1.4	0.0	2	83	0.0	20.2	0	0	0	1.5	0.0	29.89
	11/12/2013	8:02	0.0	20.9	0	0	0	0.9	0.0	2	83	0.0	20.8	0	0	0	0.9	0.0	29.98
	10/17/2014	15:18	0.0	20.2	0.0	0.0	0.0	0.8	0.0	2	83	0.0	20.2	0.0	0.0	0.0	0.9	0.0	29.32
	10/20/2015	9:58	0.0	20.3	0.0	0.0	0.0	1.1	0.0	2	83	0.0	20.2	0.0	0.0	0.0	1.3	0.0	29.90
	10/18/2016	18:09	0.0	19.4	0.0	0	0.0	1.0	0.0	2	83	0.0	19.3	0.0	0	0.0	1.2	0.0	29.55
	10/18/2017	9:18	0.0	19.9	0.0	0.0	0.0	1.3	0.0	2	83	0.0	20.0	0.0	0.0	0.0	1.2	0.0	30.01
	10/18/2018	15:01	0.0	18.7	0.0	0.0	0.0	3.2	0.0	2	83	0.0	18.8	1.0	0.0	0.0	3.2	0.0	30.03
	10/16/2019	15:28	0.0	20.8	0.0	0.0	0.0	0.9	0.1	2	83	0.0	20.8	0.0	0.0	0.0	0.9	0.1	29.64
	10/13/2020	15:25	0.0	20.9	0.0	0.0	0.0	0.2	0.0	2	83	0.0	20.9	0.0	0.0	0.0	0.0	0.0	29.53
LGP-09-02X	10/26/2012	8:20	0.1	19.6	0	0	0	1.7	0.0	2	204	0.0	19.7	0	0	0	1.7	0.0	29.89
	11/12/2013	8:07	0.2	20.9	0	0	0	1.1	0.0	2	204	0.1	20.6	0	0	0	1.3	0.0	29.98
	10/17/2014	15:20	0.0	20.2	0.0	0.0	0.0	1.0	0.0	2	204	0.0	20.3	1.0	0.0	0.0	1.1	0.0	29.32
	10/20/2015	9:52	0.0	20.1	0.0	0.0	0.0	1.4	0.0	2	204	0.0	20.0	0.0	0.0	0.0	0.3	0.0	29.90
	10/18/2016	18:12	0.0	19.4	0.0	0	0.0	1.0	0.0	2	204	0.0	19.5	0.0	0	0.0	0.9	0.0	29.55
	10/18/2017	9:13	0.0	19.8	0.0	0.0	0.0	1.1	0.0	2	204	0.0	19.9	0.0	0.0	0.0	1.2	0.0	30.00
	10/18/2018	14:56	0.0	18.9	1.0	0.0	0.0	3.2	0.0	2	204	0.0	18.5	2.0	0.0	0.0	3.5	0.0	30.03
	10/16/2019	15:26	0.0	20.7	0.0	0.0	0.0	1.1	0.1	2	204	0.0	20.9	0.0	0.0	0.0	1.2	0.2	29.64
	10/13/2020	15:30	0.0	20.9	0.0	0.0	0.0	1.0	0.0	2	204	0.0	20.9	0.0	0.0	0.0	1.1	0.0	29.53
LGP-01-03X	10/26/2012	8:47	0.0	20.2	0	0	0	1.1	0.0	2	83	0.0	20.2	0	0	0	1.1	0.0	29.91
	11/12/2013	8:15	0.0	20.8	0	0	0	0.9	0.0	2	83	0.0	20.7	0	0	0	0.9	0.0	29.98
	10/17/2014	15:29	0.0	20.2	0.0	0.0	0.0	0.8	0.0	2	83	0.0	20.2	0.0	0.0	0.0	0.8	0.0	29.32
	10/20/2015	10:10	0.0	20.3	0.0	0.0	0.0	1.1	0.0	2	83	0.0	20.3	0.0	0.0	0.0	1.1	0.0	29.90
	10/18/2016	18:15	0.0	19.6	0.0	0	0.0	0.7	0.0	2	83	0.0	19.6	0.0	0	0.0	0.7	0.0	29.55
	10/18/2017	8:40	0.0	20.2	0.0	0.0	0.0	1.0	0.0	2	83	0.0	20.1	0.0	0.0	0.0	1.2	0.0	30.00
	10/18/2018	15:07	0.0	19.9	1.0	0.0	0.0	1.8	0.0	2	83	0.0	20.0	0.0	0.0	0.0	1.6	0.0	30.03
	10/16/2019	15:22	0.0	20.8	0.0	0.0	0.0	0.8	0.1	2	83	0.0	20.9	0.0	0.0	0.0	0.8	0.1	29.64
	10/13/2020	15:05	0.0	20.9	0.0	0.0	0.0	0.6	0.0	2	83	0.0	20.9	0.0	0.0	0.0	0.0	0.0	29.53

Appendix B
Historical Results: 2012-Present
Shepley Hill Landfill Gas Monitoring
Former Fort Devens, Devens, MA

			Initial Readings									Post Purge Readings							
ID	Date	Time	VOC (ppm)	0_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	CH_4 (%)	Purge Rate (lpm)	Purge Time (sec)	VOC (ppm)	0_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	CH_4 (%)	Bar. Pres.("Hg)
LGP-09-03X	10/26/2012	8:40	0.4	19.8	0	0	0	1.4	0.0	2	167	0.0	19.9	0	0	0	1.5	0.0	29.91
	11/12/2013	8:20	0.1	20.7	0	0	0	1.2	0.0	2	167	0.0	20.6	0	0	0	1.3	0.0	29.98
	10/17/2014	15:31	0.5	20.1	0.0	0.0	0.0	1.0	0.0	2	167	0.0	20.8	0.0	0.0	0.0	0.3	0.0	29.32
	10/20/2015	10:19	0.0	20.1	0.0	0.0	0.0	1.2	0.0	2	167	0.0	20.2	0.0	0.0	0.0	1.3	0.0	29.90
	10/18/2016	18:19	0.0	19.4	0.0	0	0.0	0.9	0.0	2	167	0.0	19.4	0.0	0	0.0	1.0	0.0	29.55
	10/18/2017	8:46	0.0	19.8	0.0	0.0	0.0	1.5	0.0	2	167	0.0	19.8	0.0	0.0	0.0	1.6	0.0	30.00
	10/18/2018	15:12	0.0	19.8	0.0	0.0	0.0	1.9	0.0	2	167	0.0	19.6	0.0	0.0	0.0	2.0	0.0	30.03
	10/16/2019	15:16	0.0	20.8	0.0	0.0	0.0	1.0	0.1	2	167	0.0	20.7	0.0	0.0	0.0	1.0	0.1	29.64
	10/13/2020	15:15	0.1	20.9	0.0	0.0	0.0	0.0	0.0	2	167	0.0	20.9	0.0	0.0	0.0	0.0	0.0	29.53
LGP-01-04X	10/26/2012	8:54	0.0	20.5	0	0	0	0.8	0.0	2	83	0.0	20.9	0	0	0	0.8	0.0	29.91
	11/12/2013	8:27	0.0	20.9	0	0	0	0.5	0.0	2	83	0.0	20.9	0	0	0	0.5	0.0	29.98
	10/17/2014	15:38	0.0	20.5	0.0	0.0	0.0	0.5	0.0	2	83	0.0	20.5	0.0	0.0	0.0	0.5	0.0	29.32
	10/20/2015	11:11	0.0	20.1	0.0	0.0	0.0	0.7	0.0	2	83	0.0	20.2	0.0	0.0	0.0	0.8	0.0	29.89
	10/18/2016	18:23	0.0	19.7	0.0	0	0.0	0.5	0.0	2	83	0.0	19.6	0.0	0	0.0	0.7	0.0	29.55
	10/18/2017	8:20	0.0	20.4	0.0	0.0	0.0	0.8	0.1	2	83	0.0	20.3	0.0	0.0	0.0	1.0	0.1	30.00
	10/18/2018	15:20	0.0	20.4	0.0	0.0	0.0	1.6	0.0	2	83	0.0	20.4	0.0	0.0	0.0	1.6	0.0	30.03
	10/16/2019	15:05	0.0	20.9	0.0	0.0	0.0	0.5	0.1	2	83	0.0	20.9	0.0	0.0	0.0	0.5	0.2	29.65
	10/13/2020	14:45	0.0	20.9	0.0	0.0	0.0	0.0	0.0	2	83	0.0	20.9	0.0	0.0	0.0	0.5	0.0	29.55
LGP-09-04X	10/26/2012	9:00	0.0	20.4	0	0	0	0.8	0.0	2	120	0.0	20.4	0	0	0	0.9	0.0	29.91
	11/12/2013	8:33	0.1	20.9	0	0	0	0.6	0.0	2	120	0.0	20.8	0	0	0	0.7	0.0	29.98
	10/17/2014	15:40	0.1	20.6	0.0	0.0	0.0	0.5	0.0	2	120	0.0	20.5	0.0	0.0	0.0	0.5	0.0	29.32
	10/20/2015	11:18	0.0	20.8	0.0	0.0	0.0	0.8	0.0	2	120	0.0	20.3	0.0	0.0	0.0	0.9	0.0	29.89
	10/18/2016	18:27	0.0	19.7	0.0	0	0.0	0.6	0.0	2	120	0.0	19.6	0.0	0	0.0	0.7	0.0	29.55
	10/18/2017	8:27	0.0	20.5	0.0	0.0	0.0	0.6	0.0	2	120	0.0	20.3	0.0	0.0	0.0	1.0	0.0	30.00
	10/18/2018	15:24	0.0	19.9	0.0	0.0	0.0	1.8	0.0	2	120	0.0	19.7	0.0	0.0	0.0	1.9	0.0	30.03
	10/16/2019	15:11	0.0	21.0	0.0	0.0	0.0	0.2	0.1	2	120	0.0	21.0	0.0	0.0	0.0	0.6	0.1	29.65
	10/13/2020	14:55	0.0	20.9	0.0	0.0	0.0	0.0	0.0	2	120	0.0	20.9	0.0	0.0	0.0	0.5	0.0	29.53
LGP-05-05X	10/26/2012	9:10	0.3	14.4	0	3	0	7.1	0.2	2	93	0.0	12.4	0	0	0	9.7	0.0	29.91
	11/12/2013	14:10	0.2	17.1	0	13	0	7.6	0.4	2	93	0.1	18.1	0	2	0	5.6	0.0	29.91
	10/17/2014	11:43	0.0	2.5	1.0	100.0	0.0	17.1	12.2	2	93	0.2	0.0	1.0	100.0	0.0	29.7	30.1	29.33
	10/20/2015	15:35	0.2	14.4	0.0	6.0	0.0	6.0	0.0	2	93	0.3	1.1	0.0	44.0	0.0	18.9	1.5	29.88
	10/18/2016	15:41	0.0	8.0	0.0	100	0.0	16.7	9.7	2	93	0.0	2.6	0.0	100	0.0	27.6	16.7	29.65
	10/18/2017	11:55	0.0	15.2	0.0	40.0	0.0	8.1	1.5	2	93	0.0	14.3	0.0	0.0	0.0	6.9	0.0	30.00
	10/18/2018	11:27	0.0	14.9	1.0	66.0	0.0	8.7	3.3	2	93	0.0	19.5	1.0	6.0	0.0	2.6	0.3	30.10
	10/16/2019	8:33	0.0	11.7	0.0	12.0	0.0	11.7	0.8	2	93	0.0	9.9	0.0	0.0	0.0	0.1	0.2	29.95
	10/13/2020	7:50	0.0	14.0	0.0	0.0	0.0	0.5	0.0	2	93	0.0	14.0	0.0	0.0	0.0	9.2	0.0	29.67
LGP-09-05X	10/26/2012	9:18	2.5	10.6	0	30	0	14.4	1.5	2	167	0.2	9.3	0	0	0	13.0	0.0	29.91
	11/12/2013	14:15	0.8	10.4	0	42	0	14.2	2.4	2	167	0.1	11.4	0	0	0	13.0	0.0	29.91
	10/17/2014	11:45	0.3	1.7	1.0	100.0	0.0	20.2	16.0	2	167	0.3	0.0	1.0	100.0	0.0	30.1	33.5	29.33
	10/20/2015	15:40	0.6	9.3	0.0	65.0	0.0	13.1	1.7	2	167	0.3	0.5	0.0	100.0	0.0	24.7	9.1	29.88
	10/18/2016	15:36	0.0	6.1	0.0	100	0.0	20.5	13.2	2	167	0.0	1.6	0.0	100	0.0	30.1	21.9	29.65
	10/18/2017	11:48	0.0	10.6	0.0	100.0	0.0	13.8	4.6	2	167	0.0	12.8	0.0	0.0	0.0	9.4	0.0	30.00
	10/18/2018	11:32	1.0	18.0	1.0	34.0	0.0	5.1	1.7	2	167	0.0	19.3	1.0	3.0	0.0	2.8	0.2	30.10
	10/16/2019	8:43	0.55	22.0	0.0	53.0	0.0	0.2	0.2	2	167	0.0	3.0	0.0	31.0	0.0	0.2	0.2	29.95
	10/13/2020	8:00	30.7	12.0	0.0	30.0	0.0	1.3	1.3	2	167	0.5	0.9	0.0	99.0	0.0	22.0	61.0	29.67
LGP-05-06X	10/26/2012	9:37	0.0	17.5	0	0	0	0.0	0.0	2	93	0.0	15.9	0	0	0	4.9	0.0	29.91
	11/12/2013	14:01	0.1	18.7	0	2	0	2.6	0.0	2	93	0.1	19.7	0	2	0	2.7	0.0	29.91
	10/17/2014	11:34	0.0	17.2	0.0	0.0	0.0	3.0	0.0	2	93	0.0	16.5	0.0	0.0	5.0	3.6	0.0	29.33
	10/20/2015	15:23	0.0	17.0	0.0	0.0	0.0	3.7	0.0	2	93	0.0	17.3	0.0	0.0	0.0	3.5	0.0	29.88
	10/18/2016	15:29	0.0	16.8	0.0	0	0.0	3.0	0.0	2	93	0.0	16.3	0.0	0	0.0	3.5	0.0	29.65
	10/18/2017	11:36	0.0	17.6	0.0	0.0	0.0	2.7	0.0	2	93	0.0	17.6	0.0	0.0	0.0	3.5	0.0	30.00
	10/18/2018	11:20	0.0	14.2	2.0	0.0	0.0	5.3	0.0	2	93	0.0	14.6	2.0	0.0	0.0	5.2	0.0	30.10
	10/16/2019	9:00	0.0	18.3	0.0	0.0	0.0	2.3	0.2	2	93	0.0	18.8	0.0	0.0	0.0	2.5	0.2	29.93
	10/13/2020	8:15	0.0	20.4	0.0	0.0	0.0	1.6	0.0	2	93	0.0	20.4	0.0	0.0	0.0	0.0	0.0	29.67

Appendix B
Historical Results: 2012-Present
Shepley Hill Landfill Gas Monitoring
Former Fort Devens, Devens, MA

			Initial Readings									Post Purge Readings							
ID	Date	Time	VOC (ppm)	0_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	CH_4 (%)	Purge Rate (lpm)	Purge Time (sec)	VOC (ppm)	0_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	CH_4 (%)	Bar. Pres.("Hg)
LGP-09-06X	10/26/2012	9:28	0.2	10.2	0	0	0	8.6	0.0	2	120	0.0	10.9	0	0	0	8.4	0.0	29.91
	11/12/2013	14:06	0.1	15.5	0	1	0	5.8	0.0	2	120	0.1	15.7	0	1	0	5.8	0.0	29.91
	10/17/2014	11:32	0.5	6.9	7.0	0.0	5.0	6.2	0.0	2	120	0.0	6.6	1.0	0.0	5.0	6.5	0.0	29.32
	10/20/2015	15:30	0.2	14.1	0.0	0.0	0.0	5.6	0.0	2	120	0.0	14.1	0.0	0.0	0.0	5.8	0.0	29.88
	10/18/2016	15:23	0.0	14.4	0.0	0	0.0	5.0	0.0	2	120	0.0	13.7	0.0	0	0.0	5.5	0.0	29.65
	10/18/2017	11:41	0.0	14.4	0.0	0.0	0.0	6.1	0.0	2	120	0.0	14.5	0.0	0.0	0.0	6.1	0.0	30.01
	10/18/2018	11:15	0.0	9.5	0.0	0.0	0.0	10.1	0.0	2	120	0.0	11.6	1.0	0.0	0.0	8.5	0.0	30.10
	10/16/2019	8:52	0.0	16.2	0.0	0.0	0.0	0.2	0.2	2	120	0.0	16.1	0.0	0.0	0.0	5.0	0.2	29.93
	10/13/2020	8:25	0.0	20.9	0.0	0.0	0.0	3.6	0.0	2	120	0.0	17.2	0.0	0.0	0.0	3.6	0.0	29.67
LGP-05-07X	10/26/2012	9:45	0.1	15.4	0	0	0	7.7	0.0	2	65	0.0	13.2	0	0	0	6.8	0.0	29.91
	11/12/2013	13:55	0.1	19.8	0	1	0	2.0	0.0	2	65	0.0	19.6	0	0	0	2.7	0.0	29.91
	10/17/2014	11:25	0.1	1.1	0.0	100.0	0.0	20.6	10.4	2	65	0.2	0.0	0.0	100.0	0.0	21.9	8.4	29.33
	10/20/2015	15:17	0.1	10.8	0.0	0.0	0.0	7.3	0.0	2	65	0.0	8.1	0.0	0.0	0.0	12.7	0.0	29.88
	10/18/2016	15:15	0.1	10.7	0.0	4	0.0	10.4	0.2	2	65	0.0	9.4	0.0	0	0.0	11.9	0.0	29.65
	10/18/2017	11:27	0.0	17.9	0.0	0.0	0.0	3.9	0.0	2	65	0.0	18.4	0.0	0.0	0.0	3.8	0.0	30.01
	10/18/2018	11:08	0.0	12.5	1.0	7.0	0.0	10.5	0.4	2	65	0.0	16.3	0.0	0.0	0.0	6.7	0.0	30.10
	10/16/2019	9:09	0.0	18.2	0.0	0.0	0.0	3.7	0.2	2	65	0.0	15.4	0.0	0.0	0.0	6.0	0.2	NR
	10/13/2020	8:40	0.0	21.9	0.0	0.0	0.0	0.1	0.0	2	65	0.0	12.2	0.0	0.0	0.0	6.1	0.0	29.65
LGP-05-08X	10/26/2012	9:55	0.8	9.8	0	0	0	4.4	0.0	2	93	0.0	7.7	0	0	0	13.5	0.0	29.91
	11/12/2013	13:42	0.1	17.7	0	0	0	5.2	0.0	2	93	0.0	14.1	0	0	0	8.6	0.0	29.91
	10/17/2014	11:38	0.3	3.8	20.0	17.0	1.0	13.2	0.9	2	93	0.2	0.0	0.0	69.0	4.0	19.8	3.4	29.33
	10/20/2015	15:05	0.0	16.9	0.0	0.0	0.0	7.2	0.0	2	93	0.0	4.7	0.0	0.0	0.0	14.8	0.0	29.88
	10/18/2016	15:10	0.0	9.7	0.0	2	0.0	10.4	0.1	2	93	0.0	1.8	0.0	8	0.0	10.1	0.4	29.65
	10/18/2017	11:18	0.0	12.4	0.0	0.0	0.0	0.4	0.0	2	93	0.0	10.7	0.0	0.0	0.0	10.3	0.0	30.01
	10/18/2018	10:50	0.0	20.9	1.0	0.0	0.0	0.4	0.0	2	93	0.0	17.6	1.0	0.0	0.0	2.5	0.0	30.10
	10/16/2019	9:25	0.0	15.7	0.0	0.0	0.0	6.6	0.2	2	93	0.0	7.0	0.0	0.0	0.0	14.5	0.2	29.93
	10/13/2020	8:55	0.0	17.9	0.0	0.0	0.0	3.9	0.0	2	93	0.0	12.5	0.0	0.0	0.0	0.0	0.0	29.65
LGP-09-08X	10/26/2012	10:05	0.8	5.6	0	0	1	3.8	0.0	2	185	0.1	2.2	0	4	0	18.6	0.2	29.91
	11/12/2013	13:48	0.2	7.7	0	7	0	14.6	0.2	2	185	0.1	1.8	0	3	0	18.7	0.0	29.91
	10/17/2014	10:40	0.4	1.0	0.0	21.0	5.0	17.2	1.1	2	185	0.3	0.0	0.0	90.0	4.0	20.3	4.4	29.40
	10/20/2015	15:10	0.1	10.5	0.0	5.0	0.0	13.9	0.0	2	185	0.1	0.7	0.0	9.0	0.0	20.3	0.3	29.88
	10/18/2016	15:05	0.1	8.4	0.0	13	0.0	12.0	0.6	2	185	0.2	4.4	0.0	27	0.0	19.3	1.3	29.65
	10/18/2017	11:09	0.0	7.3	0.0	11.0	0.0	15.0	0.5	2	185	0.0	7.8	0.0	0.0	0.0	14.4	0.0	30.01
	10/18/2018	10:56	0.0	8.4	2.0	4.0	0.0	15.7	0.2	2	185	0.0	7.8	2.0	0.0	0.0	16.1	0.0	30.10
	10/16/2019	9:18	0.0	5.9	0.0	0.0	0.0	16.5	0.2	2	185	0.0	2.8	0.0	5.0	0.0	19.3	0.3	NR
	10/13/2020	9:05	0.0	11.1	0.0	4.0	0.0	12.9	0.0	2	185	0.0	3.1	0.0	0.0	0.0	16.7	0.0	29.65
LGP-05-09X	10/26/2012	10:15	0.1	13.8	0	0	0	7.2	0.0	2	93	0.0	13.2	0	0	0	7.9	0.0	29.91
	11/12/2013	13:27	0.0	16.9	0	0	0	6.0	0.0	2	93	0.0	18.1	0	0	0	5.4	0.0	29.91
	10/17/2014	8:46	0.0	5.8	0.0	0.0	0.0	9.0	0.0	2	93	0.0	0.5	0.0	0.0	0.0	16.7	0.0	29.40
	10/20/2015	14:55	0.0	16.0	0.0	0.0	0.0	5.1	0.0	2	93	0.0	14.0	0.0	0.0	0.0	6.6	0.0	29.88
	10/18/2016	14:58	0.0	10.6	0.0	0	0.0	9.0	0.0	2	93	0.0	8.3	0.0	0	0.0	11.4	0.0	29.65
	10/18/2017	10:56	0.0	14.3	0.0	0.0	0.0	7.2	0.0	2	93	0.0	14.0	0.0	0.0	0.0	7.5	0.0	30.01
	10/18/2018	10:32	0.0	8.7	1.0	4.0	0.0	13.7	0.2	2	93	0.0	9.9	1.0	0.0	0.0	12.9	0.0	30.10
	10/16/2019	9:53	0.0	14.4	0.0	0.0	0.0	15.2	0.2	2	93	0.0	20.9	0.0	0.0	0.0	7.4	0.2	29.86
	10/13/2020	8:20	0.0	20.4	0.0	0.0	0.0	1.4	0.0	2	93	0.0	16.5	0.0	0.0	0.0	6.6	0.0	29.67
LGP-09-09X	10/26/2012	10:25	0.4	17.5	0	0	0	1.0	0.0	2	185	0.1	7.3	0	4	0	13.1	0.0	29.91
	11/12/2013	13:32	0.2	11.9	0	0	0	10.2	0.0	2	185	0.0	5.2	0	0	0	15.0	0.0	29.91
	10/17/2014	8:49	0.0	20.7	0.0	0.0	0.0	0.1	0.0	2	185	0.0	0.2	0.0	28.0	6.0	18.5	1.4	29.40
	10/20/2015	15:00	0.1	11.3	0.0	0.0	0.0	9.7	0.0	2	185	0.0	3.7	0.0	0.0	6.0	16.7	0.0	29.88
	10/18/2016	14:48	0.1	5.9	0.0	5	0.0	13.5	0.2	2	185	0.0	1.8	0.0	2	0.0	18.2	0.1	29.65
	10/18/2017	11:00	0.0	10.5	0.0	5.0	0.0	0.1	0.0	2	185	0.0	10.5	0.0	0.0	0.0	11.1	0.0	30.01
	10/18/2018	10:26	1.0	6.7	1.0	32.0	0.0	15.1	1.6	2	185	0.0	7.1	1.0	2.0	0.0	15.2	0.1	30.10
	10/16/2019	9:37	0.0	10.1	0.0	0.0	0.0	10.9	0.2	2	185	0.0	5.4	0.0	0.0	0.0	15.3	0.2	29.93
	10/13/2020	9:30	0.0	13.6	0.0	0.0	0.0	10.7	0.0	2	185	0.0	9.0	0.0	0.0	0.0	13.3	0.0	29.65

Appendix B
Historical Results: 2012-Present
Shepley Hill Landfill Gas Monitoring
Former Fort Devens, Devens, MA

			Initial Readings									Post Purge Readings							
ID	Date	Time	VOC (ppm)	0_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	CH_4 (%)	Purge Rate (lpm)	Purge Time (sec)	VOC (ppm)	0_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	CO_2 (%)	CH_4 (%)	Bar. Pres.("Hg)
LGP-05-10X	10/26/2012	10:51	0.1	14.6	0	0	0	4.6	0.0	2	93	0.1	10.1	0	0	0	10.5	0.0	29.89
	11/12/2013	13:15	0.0	20.2	0	0	0	1.9	0.0	2	93	0.0	19.0	0	0	0	4.1	0.0	29.91
	10/17/2014	9:07	0.0	2.3	0.0	10.0	0.0	16.4	8.0	2	93	0.0	0.0	0.0	100.0	0.0	21.4	14.0	29.40
	10/20/2015	14:40	0.0	14.8	0.0	0.0	0.0	5.3	0.0	2	93	0.0	6.7	0.0	0.0	0.0	10.2	0.0	29.88
	10/18/2016	14:38	0.3	8.3	0.0	46	0.0	11.7	2.3	2	93	0.0	1.6	0.0	100	0.0	20.1	5.2	29.65
	10/18/2017	10:47	0.0	16.9	0.0	0.0	0.0	3.2	0.0	2	93	0.0	15.4	0.0	0.0	0.0	6.1	0.0	30.02
	10/18/2018	10:05	0.0	19.3	1.0	7.0	0.0	2.8	0.4	2	93	0.0	20.0	1.0	0.0	0.0	2.3	0.0	30.10
	10/16/2019	10:06	0.0	15.4	0.0	0.0	0.0	5.2	0.2	2	93	0.0	8.3	0.0	0.0	0.0	11.9	0.2	29.86
	10/13/2020	9:45	0.0	19.6	0.0	0.0	0.0	2.6	0.0	2	93	0.0	13.1	0.0	0.0	0.0	0.4	0.0	29.63
LGP-09-10X	10/26/2012	11:00	0.1	17.2	0	0	0	9.5	0.0	2	148	0.1	7.0	0	0	0	14.4	0.0	29.89
	11/12/2013	13:20	0.1	15.0	0	0	0	8.3	0.0	2	148	0.0	14.3	0	0	0	8.9	0.0	29.91
	10/17/2014	9:09	0.0	1.2	0.0	100.0	0.0	19.8	14.0	2	148	0.1	0.0	0.0	100.0	0.0	23.1	20.5	29.40
	10/20/2015	14:45	0.1	10.4	0.0	0.0	0.0	9.7	0.0	2	148	0.0	2.9	0.0	5.0	0.0	16.5	0.0	29.88
	10/18/2016	14:32	0.0	6.1	0.0	100	0.0	15.9	6.2	2	148	0.0	1.4	0.0	100	0.0	22.0	10.1	29.65
	10/18/2017	10:42	0.0	18.6	0.0	0.0	0.0	2.2	0.0	2	148	0.0	12.0	0.0	0.0	0.0	9.8	0.0	30.02
	10/18/2018	10:11	0.0	20.8	1.0	0.0	0.0	1.6	0.0	2	148	1.0	12.1	1.0	0.0	0.0	11.8	0.0	30.10
	10/16/2019	10:15	0.0	2.5	0.0	5.0	0.0	14.1	0.3	2	148	0.0	2.7	0.0	7.0	0.0	17.7	0.5	29.86
	10/13/2020	9:55	0.0	15.4	0.0	0.0	0.0	6.8	0.0	2	148	0.0	6.2	0.0	0.0	0.0	13.4	0.0	29.63
LGP-05-11X	10/26/2012	10:35	0.2	15.9	0	0	0	12.6	0.0	2	83	0.0	9.8	0	0	0	10.8	0.0	29.91
	11/12/2013	13:02	0.1	19.2	0	0	0	2.8	0.0	2	83	0.1	16.1	0	0	0	6.5	0.0	29.91
	10/17/2014	9:20	0.1	3.1	0.0	44.0	5.0	13.2	2.2	2	83	0.0	0.0	0.0	100.0	0.0	19.8	8.7	29.40
	10/20/2015	14:25	0.1	15.5	0.0	0.0	0.0	5.5	0.0	2	83	0.0	8.5	0.0	0.0	0.0	11.6	0.0	29.88
	10/18/2016	14:22	0.2	7.8	0.0	24	0.0	11.7	1.2	2	83	0.1	2.7	0.0	54	0.0	17.8	2.7	29.65
	10/18/2017	10:09	0.0	12.9	0.0	4.0	0.0	9.1	0.1	2	83	0.0	10.4	0.0	0.0	0.0	12.0	0.0	30.02
	10/18/2018	9:58	1.0	11.1	1.0	5.0	0.0	13.0	0.3	2	83	1.0	14.2	1.0	25.0	0.0	11.1	1.3	30.06
	10/16/2019	10:36	0.0	14.8	0.0	0.0	0.0	5.6	0.2	2	83	0.0	8.5	0.0	0.0	0.0	10.9	0.2	29.86
	10/13/2020	10:10	0.0	20.1	0.0	0.0	0.0	1.9	0.0	2	83	0.0	14.3	0.0	0.0	0.0	7.3	0.0	29.63
LGP-09-11X	10/26/2012	10:41	1.0	1.5	0	54	0	10.5	0.8	2	139	0.2	0.8	0	3	0	18.8	0.1	29.91
	11/12/2013	13:10	0.4	12.2	0	0	0	9.1	0.0	2	139	0.1	14.0	0	0	0	8.7	0.0	29.91
	10/17/2014	9:22	0.0	16.1	0.0	26.0	5.0	12.6	1.9	2	139	0.2	20.5	0.0	1.0	3.0	0.9	0.2	29.40
	10/20/2015	14:30	0.3	7.7	0.0	20.0	0.0	14.1	0.5	2	139	0.1	2.9	0.0	2.0	3.0	17.2	0.0	29.88
	10/18/2016	14:10	0.1	3.8	0.0	61	0.0	16.3	3.0	2	139	0.1	2.7	0.0	100	0.0	18.4	5.8	29.65
	10/18/2017	10:17	0.0	8.9	0.0	18.0	0.0	15.2	1.0	2	139	0.0	6.5	0.0	0.0	0.0	15.8	0.0	30.02
	10/18/2018	9:51	0.0	8.1	0.0	85.0	0.0	14.1	4.3	2	139	0.0	2.9	1.0	24.0	0.0	18.7	1.2	30.06
	10/16/2019	10:30	0.0	6.8	0.0	0.0	0.0	11.9	0.2	2	139	0.0	4.6	0.0	0.0	0.0	15.0	0.2	29.86
	10/13/2020	10:20	0.4	14.6	0.0	0.0	0.0	9.6	0.2	2	139	0.0	9.9	0.0	0.0	0.0	12.2	0.0	29.63
LGP-05-13X	10/26/2012	11:21	0.0	18.0	0	0	0	5.4	0.0	2	56	0.0	13.3	0	0	0	6.8	0.0	29.88
	11/12/2013	12:43	0.1	19.5	0	0	0	1.6	0.0	2	56	0.0	19.8	0	0	0	2.4	0.0	29.91
	10/17/2014	9:35	0.0	1.3	0.0	56.0	4.0	14.3	2.0	2	56	0.1	0.0	0.0	100.0	0.0	15.3	6.7	29.40
	10/20/2015	14:20	0.1	14.8	0.0	0.0	0.0	4.4	0.0	2	56	0.1	9.5	0.0	0.0	0.0	8.2	0.0	29.88
	10/18/2016	9:40	0.0	14.8	0.0	0	0.0	5.0	0.0	2	56	0.0	13.3	0.0	0	0.0	6.6	0.0	29.72
	10/18/2017	10:00	0.0	18.0	0.0	0.0	0.0	3.2	0.0	2	56	0.0	16.9	0.0	0.0	0.0	4.3	0.0	30.03
	10/18/2018	9:39	0.0	18.6	0.0	2.0	0.0	3.1	0.1	2	56	0.0	18.5	1.0	0.0	0.0	3.8	0.0	30.06
	10/16/2019	11:16	0.0	17.0	0.0	0.0	0.0	3.8	0.2	2	56	0.0	12.5	0.0	0.0	0.0	6.6	0.2	29.85
	10/13/2020	10:35	0.2	19.4	0.0	0.0	0.0	2.3	0.0	2	56	0.0	16.1	0.0	0.0	0.0	6.5	0.0	29.61
LGP-05-14X	10/26/2012	11:30	0.0	6.1	0	0	0	13.3	0.0	2	93	0.0	8.5	0	0	0	13.4	0.0	29.88
	11/12/2013	12:53	0.1	15.2	0	0	0	7.2	0.0	2	93	0.0	14.2	0	0	0	8.7	0.0	29.91
	10/17/2014	9:44	0.0	5.6	0.0	100.0	5.0	8.8	0.6	2	93	0.0	0.0	0.0	37.0	5.0	15.5	1.9	29.40
	10/20/2015	14:10	0.2	15.7	0.0	13.0	0.0	4.7	0.4	2	93	0.1	9.9	0.0	6.0	5.0	9.6	0.1	29.88
	10/18/2016	9:05	0.0	9.4	0.0	0	0.0	10.2	0.0	2	93	0.0	8.9	0.0	0	0.0	10.8	0.0	29.73
	10/18/2017	9:52	0.0	11.8	0.0	0.0	0.0	9.7	0.0	2	93	0.0	11.5	0.0	0.0	0.0	11.1	0.0	29.95
	10/18/2018	9:31	0.0	1.0	1.0	31.0	0.0	11.0	1.6	2	93	0.0	0.2	0.0	39.0	0.0	11.9	1.9	30.06
	10/16/2019	11:22	0.0	12.4	0.0	0.0	0.0	7.7	0.2	2	93	0.0	12.5	0.0	0.0	0.0	7.5	0.2	29.85
	10/13/2020	10:50	0.0	17.9	0.0	0.0	0.0	3.0	0.0	2	93	0.0	14.5	0.0	0.0	0.0	7.5	0.0	29.61

Appendix B
Historical Results: 2012-Present
Shepley Hill Landfill Gas Monitoring
Former Fort Devens, Devens, MA

			Initial Readings									Post Purge Readings							
ID	**Date**	**Time**	**VOC (ppm)**	**0_2 (%)**	**H_2S (ppm)**	**LEL (%)**	**CO (ppm)**	**CO_2 (%)**	**CH_4 (%)**	**Purge Rate (lpm)**	**Purge Time (sec)**	**VOC (ppm)**	**0_2 (%)**	**H_2S (ppm)**	**LEL (%)**	**CO (ppm)**	**$C0_2$ (%)**	**CH_4 (%)**	**Bar. Pres.("Hg)**
LGP-09-15X	10/26/2012	11:39	0.1	15.9	0	0	0	6.6	0.0	2	111	0.0	13.7	0	0	0	7.0	0.0	29.88
	11/12/2013	11:25	0.0	16.4	0	0	0	5.8	0.0	2	111	0.0	16.4	0	0	0	5.9	0.0	29.98
	10/17/2014	9:53	0.0	16.7	1.0	0.0	60.0	5.1	0.0	2	111	0.0	16.4	0.0	0.0	0.0	5.6	0.0	29.40
	10/20/2015	13:50	0.1	16.3	0.0	0.0	0.0	4.6	0.0	2	111	0.0	15.3	0.0	0.0	0.0	6.1	0.0	29.88
	10/18/2016	8:29	0.0	15.6	0.0	0	0.0	4.8	0.0	2	111	0.0	14.8	0.0	0	0.0	5.8	0.0	29.73
	10/18/2017	9:34	0.0	18.0	0.0	0.0	0.0	4.1	0.0	2	111	0.0	16.6	0.0	0.0	0.0	6.0	0.0	30.01
	10/18/2018	9:15	0.0	11.7	1.0	0.0	0.0	9.3	0.0	2	111	0.0	10.6	1.0	0.0	0.0	10.5	0.0	30.06
	10/16/2019	11:33	0.0	17.0	0.0	0.0	0.0	4.2	0.2	2	111	0.0	16.0	0.0	0.0	0.0	5.7	0.2	29.85
	10/13/2020	11:15	0.0	18.5	0.0	0.0	0.0	13.4	0.0	2	111	0.0	17.4	0.0	0.0	0.0	4.5	0.0	29.61

Notes:

VOC = Volatile Organic Compounds
O_2 = Oxygen
LEL = Lower Explosive Limit
CO = Carbon Monoxide
CO_2 = Carbon Dioxide
CH_4 = Methane
H_2S = Hydrogen Sulfide
"Hg = inches of Mercury
lpm = Liters per minute
sec = Seconds
ppm = Parts per million
% = Percentage

Appendix I
Annual Gas Monitoring Results - 2020
Shepley's Hill Landfill
Devens, Massachusetts

Date: October 13, 2020 **Weather: Rainy, 50's F** **Field Team: Joe Rogers, Liam Henry**

		Initial Readings									Post Purge Readings							
ID	Time	VOC (ppm)	0_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	$C0_2$ (%)	CH_4 (%)	Purge Rate (lpm)	Purge Time (sec)	VOC (ppm)	0_2 (%)	H_2S (ppm)	LEL (%)	CO (ppm)	$C0_2$ (%)	CH_4 (%)	Bar. Pres.("Hg)
Background	7:45	0.0	20.9	0.0	0.0	0.0	0.0	0.0										29.67
GV-1	13:15	0.5	8.8	0.0	32.0	0.0	9.2	0.8	4	167	0.5	8.8	0.0	31.0	0.0	9.1	0.8	29.57
GV-10	12:50	0.5	2.1	0.0	99.0	0.0	12.4	2.2	4	167	0.5	1.9	0.0	99.0	0.0	13.2	3.2	29.55
GV-11	12:40	0.6	11.9	0.0	78.0	0.0	6.8	2.2	4	167	0.5	11.8	0.0	75.0	0.0	6.0	2.6	29.57
GV-12	12:25	0.4	2.8	0.0	99.0	0.0	14.6	9.9	4	167	0.3	1.2	0.0	99.0	0.0	14.2	9.6	29.57
GV-13	11:25	0.6	19.2	0.0	40.0	0.0	4.8	2.1	4	167	0.0	11.5	0.0	82.0	0.0	33.0	1.5	29.61
GV-14	11:35	0.6	19.1	0.0	99.0	0.0	21.0	9.9	4	167	0.0	19.7	0.0	99.0	0.0	6.1	10.0	29.61
GV-15	11:55	0.4	4.3	0.0	99.0	0.0	22.2	17.5	4	375	0.3	4.3	0.0	99.0	0.0	22.2	24.0	29.59
GV-16	12:15	0.2	0.9	0.0	99.0	0.0	22.0	17.5	4	375	0.4	0.1	0.0	99.0	0.0	22.2	17.3	29.59
GV-17	12:05	0.4	4.3	0.0	99.0	0.0	14.6	9.9	4	375	0.3	0.3	0.0	99.0	0.0	39.1	19.0	29.59
GV-18	11:45	0.1	18.8	0.0	14.0	0.0	2.7	3.2	4	375	0.5	19.8	0.0	88.0	0.0	1.5	1.6	29.59
GV-2	13:35	0.4	1.2	0.0	45.0	0.0	11.3	9.6	4	167	0.7	1.1	0.0	99.0	0.0	11.3	9.8	29.57
GV-3	13:25	0.0	20.9	0.0	0.0	0.0	0.0	0.0	4	167	0.0	20.9	0.0	0.0	0.0	0.0	0.0	29.57
GV-4	13:45	0.5	5.4	0.0	99.0	0.0	12.8	6.4	4	167	0.5	5.8	0.0	99.0	0.0	12.3	6.0	29.55
GV-5	13:55	0.0	12.8	0.0	4.0	0.0	5.6	0.1	4	167	0.0	13.5	0.0	0.4	0.0	5.9	0.1	29.55
GV-6	14:10	0.7	4.5	0.0	99.0	0.0	12.9	2.8	4	167	0.7	4.0	0.0	99.0	0.0	12.0	2.9	29.55
GV-7	14:20	0.5	0.2	0.0	99.0	0.0	15.8	12.4	4	167	0.3	1.5	0.0	99.0	0.0	15.0	12.2	29.55
GV-8	14:30	0.0	9.2	0.0	58.0	0.0	8.7	1.5	4	167	0.6	9.0	0.0	59.0	0.0	8.8	1.5	29.55
GV-9	13:00	0.5	2.3	0.0	99.0	0.0	16.0	6.6	4	167	0.5	1.1	0.0	99.0	0.0	16.2	6.7	29.57
LGP-01-01X	15:40	0.0	20.9	0.0	0.0	0.0	0.5	0.0	2	83	0.0	20.9	0.0	0.0	0.0	0.5	0.0	29.52
LGP-01-02X	15:25	0.0	20.9	0.0	0.0	0.0	0.2	0.0	2	83	0.0	20.9	0.0	0.0	0.0	0.0	0.0	29.53
LGP-01-03X	15:05	0.0	20.9	0.0	0.0	0.0	0.6	0.0	2	83	0.0	20.9	0.0	0.0	0.0	0.0	0.0	29.53
LGP-01-04X	14:45	0.0	20.9	0.0	0.0	0.0	0.0	0.0	2	83	0.0	20.9	0.0	0.0	0.0	0.5	0.0	29.55
LGP-05-05X	7:50	0.0	14.0	0.0	0.0	0.0	0.5	0.0	2	93	0.0	14.0	0.0	0.0	0.0	9.2	0.0	29.67
LGP-05-06X	8:15	0.0	20.4	0.0	0.0	0.0	1.6	0.0	2	93	0.0	20.4	0.0	0.0	0.0	0.0	0.0	29.67
LGP-05-07X	8:40	0.0	21.9	0.0	0.0	0.0	0.1	0.0	2	65	0.0	12.2	0.0	0.0	0.0	6.1	0.0	29.65
LGP-05-08X	8:55	0.0	17.9	0.0	0.0	0.0	3.9	0.0	2	93	0.0	12.5	0.0	0.0	0.0	0.0	0.0	29.65
LGP-05-09X	8:20	0.0	20.4	0.0	0.0	0.0	1.4	0.0	2	93	0.0	16.5	0.0	0.0	0.0	6.6	0.0	29.67
LGP-05-10X	9:45	0.0	19.6	0.0	0.0	0.0	2.6	0.0	2	93	0.0	13.1	0.0	0.0	0.0	0.4	0.0	29.63
LGP-05-11X	10:10	0.0	20.1	0.0	0.0	0.0	1.9	0.0	2	83	0.0	14.3	0.0	0.0	0.0	7.3	0.0	29.63
LGP-05-13X	10:35	0.2	19.4	0.0	0.0	0.0	2.3	0.0	2	56	0.0	16.1	0.0	0.0	0.0	6.5	0.0	29.61
LGP-05-14X	10:50	0.0	17.9	0.0	0.0	0.0	3.0	0.0	2	93	0.0	14.5	0.0	0.0	0.0	7.5	0.0	29.61
LGP-09-01XA	15:45	0.0	20.9	0.0	0.0	0.0	0.5	0.0	2	157	0.0	20.9	0.0	0.0	0.0	0.6	0.0	29.52
LGP-09-01XB	15:50	0.3	20.9	0.0	0.0	0.0	0.7	0.0	2	157	0.2	20.4	0.0	0.0	0.0	0.5	0.0	29.52
LGP-09-02X	15:30	0.0	20.9	0.0	0.0	0.0	1.0	0.0	2	204	0.0	20.9	0.0	0.0	0.0	1.1	0.0	29.53
LGP-09-03X	15:15	0.1	20.9	0.0	0.0	0.0	0.0	0.0	2	167	0.0	20.9	0.0	0.0	0.0	0.0	0.0	29.53
LGP-09-04X	14:55	0.0	20.9	0.0	0.0	0.0	0.0	0.0	2	120	0.0	20.9	0.0	0.0	0.0	0.5	0.0	29.53
LGP-09-05X	8:00	30.7	12.0	0.0	30.0	0.0	1.3	1.3	2	167	0.5	0.9	0.0	99.0	0.0	22.0	61.0	29.67
LGP-09-06X	8:25	0.0	20.9	0.0	0.0	0.0	3.6	0.0	2	120	0.0	17.2	0.0	0.0	0.0	3.6	0.0	29.67
LGP-09-08X	9:05	0.0	11.1	0.0	4.0	0.0	12.9	0.0	2	185	0.0	3.1	0.0	0.0	0.0	16.7	0.0	29.65
LGP-09-09X	9:30	0.0	13.6	0.0	0.0	0.0	10.7	0.0	2	185	0.0	9.0	0.0	0.0	0.0	13.3	0.0	29.65
LGP-09-10X	9:55	0.0	15.4	0.0	0.0	0.0	6.8	0.0	2	148	0.0	6.2	0.0	0.0	0.0	13.4	0.0	29.63
LGP-09-11X	10:20	0.4	14.6	0.0	0.0	0.0	9.6	0.2	2	139	0.0	9.9	0.0	0.0	0.0	12.2	0.0	29.63
LGP-09-15X	11:15	0.0	18.5	0.0	0.0	0.0	13.4	0.0	2	111	0.0	17.4	0.0	0.0	0.0	4.5	0.0	29.61

Appendix I
Landfill Gas Probe Construction Details
Shepley's Hill Landfill
Devens, Massachusetts

Gas Probe ID	Gas Probe Screen Interval (ft bgs)	Screen Length (ft)
LGP-01-01X	6.4 to 7.4	1
LGP-09-01XA	7.0 to 17.0	10
LGP-09-01XB	19.0 to 28.0	9
LGP-01-02X	5.0 to 6.0	1
LGP-09-02X	6.0 to 21.0	15
LGP-01-03X	5.0 to 6.0	1
LGP-09-03X	6.0 to 18.0	12
LGP-01-04X	3.0 to 4.0	1
LGP-09-04X	4.0 to 9.0	5
LGP-05-05X	6.0 to 7.0	1
LGP-09-05X (1)	7.0 to 14.5	7.5
LGP-05-06X	6.0 to 7.0	1
LGP-09-06X	7.0 to 12.0	5
LGP-05-07X (2)	3.0 to 4.0	1
LGP-05-08X	6.0 to 7.0	1
LGP-09-08X	7.0 to 19.0	12
LGP-05-09X	6.0 to 7.0	1
LGP-09-09X	7.0 to 19.0	12
LGP-05-10X	6.0 to 7.0	1
LGP-09-10X	7.0 to 14.0	7
LGP-05-11X	5.0 to 6.0	1
LGP-09-11X	7.0 to 14.0	7
LGP-05-13X	2.0 to 3.0	1
LGP-05-14X	6.0 to 7.0	1
LGP-09-15X	4.0 to 10.0	6

Notes:

(1) Bedrock was encountered at a depth of 15 ft bgs. Proposed total depth (19.60 ft) was unattainable due to refusal.

(2) Bedrock was encountered at a depth of 4 ft bgs. Installation of additonal gas probe was unattainable due to refusal.

Appendix I
ATP Operations Summary - January 2020
Shepley's Hill Landfill
Devens, Massachusetts

Date	Hours Online	Gallons Discharged	Average Effluent Flowrate	Status
1/1/2020	24	78,400	54.4	System online and operating.
1/2/2020	24	77,900	54.1	System online and operating.
1/3/2020	24	78,000	54.2	System online and operating. Air sparged IPC. Manually pumped excess sludge.
1/4/2020	24	78,100	54.2	System online and operating.
1/5/2020	24	76,800	53.3	System online and operating.
1/6/2020	24	78,300	54.4	System online and operating. Air sparged IPC. Manually pumped excess sludge.
1/7/2020	24	78,200	54.3	System online and operating.
1/8/2020	24	78,000	54.2	System online and operating. Air sparged IPC. Manually pumped excess sludge.
1/9/2020	24	77,800	54.0	System online and operating.
1/10/2020	24	78,300	54.4	System online and operating. Air sparged IPC. Manually pumped excess sludge.
1/11/2020	24	78,000	54.2	System online and operating.
1/12/2020	24	77,800	54.0	System online and operating.
1/13/2020	8	28,600	59.6	System offline at 0800 for CIP activities.
1/14/2020	10	33,400	55.7	System online at 1400 following CIP activities.FBRO pumped out.
1/15/2020	24	78,000	54.2	System online and operating. Air sparged IPC. Manually pumped excess sludge.
1/16/2020	24	77,200	53.6	System online and operating.
1/17/2020	24	78,100	54.2	System online and operating. Air sparged IPC. Manually pumped excess sludge.
1/18/2020	24	78,100	54.2	System online and operating.
1/19/2020	24	78,600	54.6	System online and operating.
1/20/2020	24	78,200	54.3	System online and operating. Air sparged IPC. Manually pumped excess sludge.
1/21/2020	24	78,200	54.3	System online and operating.
1/22/2020	24	77,400	53.8	System online and operating. Air sparged IPC. Manually pumped excess sludge.
1/23/2020	24	78,500	54.5	System online and operating.
1/24/2020	24	78,100	54.2	System online and operating. Air sparged IPC. Manually pumped excess sludge.
1/25/2020	24	77,700	54.0	System online and operating.
1/26/2020	24	78,500	54.5	System online and operating.
1/27/2020	24	77,900	54.1	System online and operating. Air sparged IPC. Manually pumped excess sludge.
1/28/2020	24	76,300	53.0	System online and operating. Air sparged IPC. Manually pumped excess sludge. FBRO pumped out
1/29/2020	24	78,200	54.3	System online and operating.
1/30/2020	24	78,300	54.4	System online and operating.
1/31/2020	24	77,400	53.8	System online and operating. Air sparged IPC. Manually pumped excess sludge.

Total	**714.0**	**2,322,300**	
Total Available Hours	**744**	**Average On-line Flow**	**54.2**

Percent Online	**96**

Note:

Flowrate in Gallons per Minute (GPM)

Clean in Place (CIP)

Appendix I
ATP Operations Summary - February 2020
Shepley's Hill Landfill
Devens, Massachusetts

Date	Hours Online	Gallons Discharged	Average Effluent Flowrate	Status
2/1/2020	24	77,900	54.1	System online and operating.
2/2/2020	24	78,500	54.5	System online and operating.
2/3/2020	8	28,900	60.2	System offline at 0800 for CIP activities.
2/4/2020	10.75	35,400	54.9	System online at 1315 following CIP activities.
2/5/2020	24	79,000	54.9	System online and operating. Air sparged IPC. Manually pumped excess sludge.
2/6/2020	24	77,500	53.8	System online and operating.
2/7/2020	24	78,400	54.4	System online and operating. Air sparged IPC. Manually pumped excess sludge.
2/8/2020	24	77,300	53.7	System online and operating.
2/9/2020	24	78,700	54.7	System online and operating.
2/10/2020	24	77,900	54.1	System online and operating. Air sparged IPC. Manually pumped excess sludge.
2/11/2020	24	77,000	53.5	System online and operating. Air sparged IPC. Manually pumped excess sludge. FBRO pumped out.
2/12/2020	24	77,800	54.0	System online and operating.
2/13/2020	24	78,300	54.4	System online and operating.
2/14/2020	24	77,500	53.8	System online and operating. Air sparged IPC. Manually pumped excess sludge.
2/15/2020	24	77,400	53.8	System online and operating.
2/16/2020	24	78,400	54.4	System online and operating.
2/17/2020	24	78,300	54.4	System online and operating.
2/18/2020	24	77,700	54.0	System online and operating. Air sparged IPC. Manually pumped excess sludge.
2/19/2020	24	78,700	54.7	System online and operating.
2/20/2020	24	77,400	53.8	System online and operating.
2/21/2020	24	78,400	54.4	System online and operating. Air sparged IPC. Manually pumped excess sludge.
2/22/2020	24	77,800	54.0	System online and operating.
2/23/2020	24	77,700	54.0	System online and operating.
2/24/2020	24	77,400	53.8	System online and operating. Air sparged IPC. Manually pumped excess sludge.
2/25/2020	24	77,200	53.6	System online and operating. Air sparged IPC. Manually pumped excess sludge. FBRO pumped out.
2/26/2020	24	78,200	54.3	System online and operating.
2/27/2020	24	77,900	54.1	System online and operating.
2/28/2020	24	77,400	53.8	System online and operating. Air sparged IPC. Manually pumped excess sludge.
2/29/2020	24	78,200	54.3	System online and operating.

Total	**666.8**	**2,168,200**	
Total Available Hours	**696**	**Average On-line Flow**	**54.2**

Percent Online	**96**

Note:

Flowrate in Gallons per Minute (GPM)

Clean in Place (CIP)

Appendix I
ATP Operations Summary - March 2020
Shepley's Hill Landfill
Devens, Massachusetts

Date	Hours Online	Gallons Discharged	Average Effluent Flowrate	Status
3/1/2020	24	77,400	53.8	System online and operating.
3/2/2020	10	34,800	58.0	System offline at 1000 for CIP activities.
3/3/2020	10	33,400	55.7	System online at 1400 following CIP activities.
3/4/2020	24	77,900	54.1	System online and operating. Air sparged IPC. Manually pumped excess sludge.
3/5/2020	24	78,200	54.3	System online and operating.
3/6/2020	24	78,800	54.7	System online and operating. Air sparged IPC. Manually pumped excess sludge.
3/7/2020	24	77,900	54.1	System online and operating.
3/8/2020	24	74,800	51.9	System online and operating.
3/9/2020	24	77,900	54.1	System online and operating. Air sparged IPC. Manually pumped excess sludge.
3/10/2020	23.25	75,600	54.2	System online and operating. Air sparged IPC. Manually pumped excess sludge. FBRO pumped out. System was offline from 1030 to 1000 for chlorine gas cylinder replacement.
3/11/2020	24	78,300	54.4	System online and operating.
3/12/2020	24	78,200	54.3	System online and operating.
3/13/2020	24	77,700	54.0	System online and operating. Air sparged IPC. Manually pumped excess sludge.
3/14/2020	24	78,200	54.3	System online and operating.
3/15/2020	24	78,200	54.3	System online and operating.
3/16/2020	24	77,700	54.0	System online and operating. Air sparged IPC. Manually pumped excess sludge.
3/17/2020	24	78,200	54.3	System online and operating.
3/18/2020	22	72,600	55.0	System online and operating. System offline from 0745 to 0945 for downstream sewer line repairs by Devens DPW.
3/19/2020	24	77,800	54.0	System online and operating. Air sparged IPC. Manually pumped excess sludge.
3/20/2020	24	77,900	54.1	System online and operating.
3/21/2020	24	77,600	53.9	System online and operating.
3/22/2020	24	78,700	54.7	System online and operating.
3/23/2020	23.25	75,600	54.2	System online and operating. Air sparged IPC. Manually pumped excess sludge. System offline between 1015 to 1100 for chlorite fitting repair.
3/24/2020	24	75,100	52.2	System online and operating. Air sparged IPC. Manually pumped excess sludge. FBRO pumped out.
3/25/2020	24	77,700	54.0	System online and operating.
3/26/2020	24	77,900	54.1	System online and operating.
3/27/2020	24	78,100	54.2	System online and operating. Air sparged IPC. Manually pumped excess sludge.
3/28/2020	24	78,000	54.2	System online and operating.
3/29/2020	24	78,100	54.2	System online and operating.
3/30/2020	24	77,700	54.0	System online and operating. Air sparged IPC. Manually pumped excess sludge.
3/31/2020	24	77,900	54.1	System online and operating.

Total	**712.5**	**2,313,900**	
Total Available Hours	**744**	**Average On-line Flow**	**54.1**
Percent Online	**96**		

Note:

Flowrate in Gallons per Minute (GPM)

Clean in Place (CIP)

Appendix I
ATP Operations Summary - April 2020
Shepley's Hill Landfill
Devens, Massachusetts

Date	Hours Online	Gallons Discharged	Average Effluent Flowrate	Status
4/1/2020	24	78,100	54.2	System online and operating. Air sparged IPC. Manually pumped excess sludge.
4/2/2020	24	78,000	54.2	System online and operating.
4/3/2020	24	78,300	54.4	System online and operating. Air sparged IPC. Manually pumped excess sludge.
4/4/2020	24	78,100	54.2	System online and operating.
4/5/2020	24	78,000	54.2	System online and operating.
4/6/2020	9	30,800	57.0	System offline at 0900 for CIP activities.
4/7/2020	9	28,800	53.3	System online at 1500 following CIP activities. FBRO pump out.
4/8/2020	24	74,800	51.9	System online and operating. Air sparged IPC. Manually pumped excess sludge.
4/9/2020	24	78,000	54.2	System online and operating.
4/10/2020	24	78,400	54.4	System online and operating. Air sparged IPC. Manually pumped excess sludge.
4/11/2020	24	78,800	54.7	System online and operating.
4/12/2020	5	17,100	63.3	System offline at 0430 due to a leak in effluent pump number 2 and failure of the basket strainer transducer.
4/13/2020	12.50	41,000	54.7	System online at 1230 upon repair to the effluent pump and basket strainer transducer.
4/14/2020	24	77,800	54.0	System online and operating.
4/15/2020	24	78,400	54.4	System online and operating. Air sparged IPC. Manually pumped excess sludge.
4/16/2020	24	78,500	54.5	System online and operating.
4/17/2020	24	78,100	54.2	System online and operating. Air sparged IPC. Manually pumped excess sludge.
4/18/2020	24	77,900	54.1	System online and operating.
4/19/2020	24	78,000	54.2	System online and operating.
4/20/2020	24	81,700	56.7	System online and operating. Air sparged IPC. Manually pumped excess sludge.
4/21/2020	24	83,200	57.8	System online and operating. Air sparged IPC. Manually pumped excess sludge. FBRO pumped out.
4/22/2020	24	84,300	58.5	System online and operating.
4/23/2020	24	84,200	58.5	System online and operating.
4/24/2020	24	84,100	58.4	System online and operating. Air sparged IPC. Manually pumped excess sludge.
4/25/2020	24	84,500	58.7	System online and operating.
4/26/2020	24	84,400	58.6	System online and operating.
4/27/2020	24	81,700	56.7	System online and operating. Air sparged IPC. Manually pumped excess sludge.
4/28/2020	24	77,700	54.0	System online and operating.
4/29/2020	24	77,800	54.0	System online and operating. Air sparged IPC. Manually pumped excess sludge.
4/30/2020	24	78,700	54.7	System online and operating.

Total	**659.0**	**2,189,200**	
Total Available Hours	**720**	**Average On-line Flow**	**55.4**
Percent Online	**92**		

Note:

Flowrate in Gallons per Minute (GPM)

Clean in Place (CIP)

Appendix I
ATP Operations Summary - May 2020
Shepley's Hill Landfill
Devens, Massachusetts

Date	Hours Online	Gallons Discharged	Average Effluent Flowrate	Status
5/1/2020	24	77,600	53.9	System online and operating. Air sparged IPC. Manually pumped excess sludge.
5/2/2020	24	78,900	54.8	System online and operating.
5/3/2020	24	77,300	53.7	System online and operating.
5/4/2020	8.25	27,700	56.0	System offline at 0815 for CIP activities.
5/5/2020	11	37,100	56.2	System online at 1230 following CIP activities. System offline from 1300 to 1330 due to high thickener alarm.
5/6/2020	24	77,400	53.8	System online and operating. Air sparged IPC. Manually pumped excess sludge. FBRO pumped out.
5/7/2020	24	79,000	54.9	System online and operating.
5/8/2020	24	77,200	53.6	System online and operating. Air sparged IPC. Manually pumped excess sludge.
5/9/2020	24	78,800	54.7	System online and operating.
5/10/2020	24	78,600	54.6	System online and operating.
5/11/2020	24	77,400	53.8	System online and operating. Air sparged IPC. Manually pumped excess sludge.
5/12/2020	24	78,300	54.4	System online and operating.
5/13/2020	24	78,500	54.5	System online and operating. Air sparged IPC. Manually pumped excess sludge.
5/14/2020	24	78,400	54.4	System online and operating.
5/15/2020	24	77,700	54.0	System online and operating. Air sparged IPC. Manually pumped excess sludge.
5/16/2020	24	78,200	54.3	System online and operating.
5/17/2020	24	77,900	54.1	System online and operating.
5/18/2020	24	78,300	54.4	System online and operating. Air sparged IPC. Manually pumped excess sludge.
5/19/2020	23.50	76,900	54.5	System offline from 1000 to 1015 for floor sump pump out. System offline from 1345 to 1400 for Cl2 tank changeover. FBRO pump out.
5/20/2020	24	78,000	54.2	System online and operating.
5/21/2020	24	78,100	54.2	System online and operating.
5/22/2020	24	78,500	54.5	System online and operating. Air sparged IPC. Manually pumped excess sludge.
5/23/2020	24	78,200	54.3	System online and operating.
5/24/2020	24	78,100	54.2	System online and operating.
5/25/2020	24	78,100	54.2	System online and operating.
5/26/2020	24	77,200	53.6	System online and operating. Air sparged IPC. Manually pumped excess sludge.
5/27/2020	24	77,900	54.1	System online and operating.
5/28/2020	24	78,100	54.2	System online and operating.
5/29/2020	24	78,300	54.4	System online and operating. Air sparged IPC. Manually pumped excess sludge.
5/30/2020	24	78,100	54.2	System online and operating.
5/31/2020	24	78,200	54.3	System online and operating.

Total	**714.8**	**2,328,000**	
Total Available Hours	**744**	**Average On-line Flow**	**54.3**
Percent Online	**96**		

Note:

Flowrate in Gallons per Minute (GPM)

Clean in Place (CIP)

Appendix I
ATP Operations Summary - June 2020
Shepley's Hill Landfill
Devens, Massachusetts

Date	Hours Online	Gallons Discharged	Average Effluent Flowrate	Status
6/1/2020	8.5	28,500	55.9	System offline at 0830 for CIP activities.
6/2/2020	8.75	28,300	53.9	System online at 1515 following CIP activities. FBRO pump out
6/3/2020	24	78,000	54.2	System online and operating. Air sparged IPC. Manually pumped excess sludge.
6/4/2020	24	78,200	54.3	System online and operating.
6/5/2020	24	78,000	54.2	System online and operating. Air sparged IPC. Manually pumped excess sludge.
6/6/2020	24	78,700	54.7	System online and operating.
6/7/2020	24	78,100	54.2	System online and operating.
6/8/2020	24	78,700	54.7	System online and operating. Air sparged IPC. Manually pumped excess sludge.
6/9/2020	24	77,900	54.1	System online and operating.
6/10/2020	24	77,900	54.1	System online and operating. Air sparged IPC. Manually pumped excess sludge.
6/11/2020	24	78,400	54.4	System online and operating.
6/12/2020	24	78,200	54.3	System online and operating. Air sparged IPC. Manually pumped excess sludge.
6/13/2020	24	78,300	54.4	System online and operating.
6/14/2020	24	78,300	54.4	System online and operating.
6/15/2020	24	78,100	54.2	System online and operating. Air sparged IPC. Manually pumped excess sludge.
6/16/2020	23.50	76,400	54.2	System online and operating. Air sparged IPC. Manually pumped excess sludge. System offline between 1000 and 1030 for FBRO pumped out.
6/17/2020	24	78,100	54.2	System online and operating.
6/18/2020	24	78,100	54.2	System online and operating.
6/19/2020	24	78,200	54.3	System online and operating. Air sparged IPC. Manually pumped excess sludge.
6/20/2020	24	78,100	54.2	System online and operating.
6/21/2020	24	77,900	54.1	System online and operating.
6/22/2020	24	78,500	54.5	System online and operating. Air sparged IPC. Manually pumped excess sludge.
6/23/2020	24	77,600	53.9	System online and operating.
6/24/2020	24	78,200	54.3	System online and operating.
6/25/2020	24	78,600	54.6	System online and operating.
6/26/2020	24	78,200	54.3	System online and operating. Air sparged IPC. Manually pumped excess sludge.
6/27/2020	24	77,800	54.0	System online and operating.
6/28/2020	24	79,100	54.9	System online and operating.
6/29/2020	24	77,400	53.8	System online and operating. Air sparged IPC. Manually pumped excess sludge.
6/30/2020	21	69,300	55.0	System online and operating. Air sparged IPC. Manually pumped excess sludge. System offline between 0800 and 1100 for FBRO pumped out.

Total	**685.8**	**2,235,100**	
Total Available Hours	**720**	**Average On-line Flow**	**54.3**
Percent Online	**95**		

Note:

Flowrate in Gallons per Minute (GPM)

Clean in Place (CIP)

Appendix I
ATP Operations Summary - July 2020
Shepley's Hill Landfill
Devens, Massachusetts

Date	Hours Online	Gallons Discharged	Average Effluent Flowrate	Status
7/1/2020	24	78,300	54.4	System online and operating.
7/2/2020	24	78,000	54.2	System online and operating. Air sparged IPC. Manually pumped excess sludge.
7/3/2020	24	77,500	53.8	System online and operating.
7/4/2020	24	78,400	54.4	System online and operating.
7/5/2020	24	78,400	54.4	System online and operating.
7/6/2020	8.25	27,800	56.2	System offline at 0815 for CIP activities.
7/7/2020	9.00	29,900	55.4	System online at 1500 following CIP activities.
7/8/2020	24	78,200	54.3	System online and operating. Air sparged IPC. Manually pumped excess sludge.
7/9/2020	24	78,300	54.4	System online and operating.
7/10/2020	24	78,300	54.4	System online and operating. Air sparged IPC. Manually pumped excess sludge.
7/11/2020	24	77,800	54.0	System online and operating.
7/12/2020	24	78,400	54.4	System online and operating.
7/13/2020	24	78,300	54.4	System online and operating. Air sparged IPC. Manually pumped excess sludge.
7/14/2020	24	77,800	54.0	System online and operating. Air sparged IPC. Manually pumped excess sludge. FBRO pumped out.
7/15/2020	24	77,600	53.9	System online and operating.
7/16/2020	24	79,100	54.9	System online and operating.
7/17/2020	24	77,900	54.1	System online and operating. Air sparged IPC. Manually pumped excess sludge.
7/18/2020	24	77,600	53.9	System online and operating.
7/19/2020	24	78,900	54.8	System online and operating.
7/20/2020	24	77,400	53.8	System online and operating. Air sparged IPC. Manually pumped excess sludge.
7/21/2020	24	77,800	54.0	System online and operating.
7/22/2020	24	79,100	54.9	System online and operating. Air sparged IPC. Manually pumped excess sludge.
7/23/2020	24	77,400	53.8	System online and operating.
7/24/2020	24	78,700	54.7	System online and operating. Air sparged IPC. Manually pumped excess sludge.
7/25/2020	24	77,700	54.0	System online and operating.
7/26/2020	24	78,300	54.4	System online and operating.
7/27/2020	24	77,900	54.1	System online and operating. Air sparged IPC. Manually pumped excess sludge.
7/28/2020	22.50	73,800	54.7	System online and operating. Air sparged IPC. Manually pumped excess sludge. System offline between 0930 and 1100 for FBRO pumped out.
7/29/2020	24	77,400	53.8	System online and operating.
7/30/2020	24	77,800	54.0	System online and operating.
7/31/2020	24	78,300	54.4	System online and operating. Air sparged IPC. Manually pumped excess sludge.

Total	**711.8**	**2,318,100**	
Total Available Hours	**744**	**Average On-line Flow**	**54.3**

Percent Online	**96**

Note:

Flowrate in Gallons per Minute (GPM)

Clean in Place (CIP)

Appendix I
ATP Operations Summary - August 2020
Shepley's Hill Landfill
Devens, Massachusetts

Date	Hours Online	Gallons Discharged	Average Effluent Flowrate	Status
8/1/2020	24	78,300	54.4	System online and operating.
8/2/2020	24	77,800	54.0	System online and operating.
8/3/2020	24	78,000	54.2	System online and operating. Air sparged IPC. Manually pumped excess sludge.
8/4/2020	24	78,200	54.3	System online and operating.
8/5/2020	24	78,000	54.2	System online and operating.
8/6/2020	24	78,300	54.4	System online and operating.
8/7/2020	24	77,900	54.1	System online and operating. Air sparged IPC. Manually pumped excess sludge.
8/8/2020	24	78,100	54.2	System online and operating.
8/9/2020	24	77,900	54.1	System online and operating.
8/10/2020	8.25	28,400	57.4	System offline at 0815 for CIP activities.
8/11/2020	10.0	31,700	52.8	System online at 1400 following CIP activities. FBRO pumped out.
8/12/2020	23.0	76,800	55.7	System offline between 1345 and 1445 to diagnose air compressor pressure loss. Air sparged IPC. Manually pumped excess sludge.
8/13/2020	7.75	28,700	61.7	System offline at 0745 due to failure of air compressor pressure switch.
8/14/2020	13.25	42,200	53.1	System online at 1045 following installation of new air compressor pressure switch. Air sparged IPC. Manually pumped excess sludge.
8/15/2020	24	78,300	54.4	System online and operating.
8/16/2020	24	78,100	54.2	System online and operating.
8/17/2020	24	77,800	54.0	System online and operating. Air sparged IPC. Manually pumped excess sludge.
8/18/2020	24	77,800	54.0	System online and operating.
8/19/2020	24	78,200	54.3	System online and operating. Air sparged IPC. Manually pumped excess sludge.
8/20/2020	24	78,100	54.2	System online and operating. Air sparged IPC. Manually pumped excess sludge.
8/21/2020	22.5	73,800	54.7	System offline between 0800 and 0930 to install manifold for pilot test. Air sparged IPC. Manually pumped excess sludge.
8/22/2020	24	78,100	54.2	System online and operating.
8/23/2020	24	78,000	54.2	System online and operating.
8/24/2020	24	78,100	54.2	System online and operating. Air sparged IPC. Manually pumped excess sludge.
8/25/2020	24	76,900	53.4	System online and operating. Air sparged IPC. Manually pumped excess sludge. FBRO pumped out.
8/26/2020	24	77,900	54.1	System online and operating.
8/27/2020	24	78,100	54.2	System online and operating.
8/28/2020	23.25	75,100	53.8	System offline between 0845 and 0930 to install new effluent pH meter. Air sparged IPC. Manually pumped excess sludge.
8/29/2020	24	78,000	54.2	System online and operating.
8/30/2020	24	77,500	53.8	System online and operating.
8/31/2020	20.0	68,400	57.0	System offline at 2000 due to microfilter I/O card failure. Air sparged IPC. Manually pumped excess sludge.

Total	**680.0**	**2,218,500**	
Total Available Hours	**744**	**Average On-line Flow**	**54.4**
Percent Online	**91**		

Note:

Flowrate in Gallons per Minute (GPM)

Clean in Place (CIP)

Appendix I
ATP Operations Summary - September 2020
Shepley's Hill Landfill
Devens, Massachusetts

Date	Hours Online	Gallons Discharged	Average Effluent Flowrate	Status
9/1/2020	14.75	48,000	54.2	System offline due to microfilter I/O card failure. Replaced I/O card and restarted system at 0915. Air sparged IPC. Manually pumped excess sludge.
9/2/2020	24	78,000	54.2	System online and operating. Air sparged IPC. Manually pumped excess sludge.
9/3/2020	24	78,100	54.2	System online and operating.
9/4/2020	24	78,000	54.2	System online and operating. Air sparged IPC. Manually pumped excess sludge.
9/5/2020	24	78,000	54.2	System online and operating.
9/6/2020	24	78,100	54.2	System online and operating.
9/7/2020	24	77,900	54.1	System online and operating.
9/8/2020	22.75	73,600	53.9	System offline between 0945 and 1100 for FBRO pump out. Air sparged IPC. Manually pumped excess sludge.
9/9/2020	24	77,800	54.0	System online and operating. Air sparged IPC. Manually pumped excess sludge.
9/10/2020	24	77,700	54.0	System online and operating.
9/11/2020	24	77,700	54.0	System online and operating. Air sparged IPC. Manually pumped excess sludge.
9/12/2020	24	77,800	54.0	System online and operating.
9/13/2020	24	77,900	54.1	System online and operating.
9/14/2020	24	77,800	54.0	System online and operating. Air sparged IPC. Manually pumped excess sludge.
9/15/2020	24	77,800	54.0	System online and operating.
9/16/2020	24	78,200	54.3	System online and operating. Air sparged IPC. Manually pumped excess sludge.
9/17/2020	24	77,900	54.1	System online and operating.
9/18/2020	24	78,400	54.4	System online and operating. Air sparged IPC. Manually pumped excess sludge.
9/19/2020	24	77,500	53.8	System online and operating.
9/20/2020	24	77,900	54.1	System online and operating.
9/21/2020	8.0	26,500	55.2	System offline at 0800 for CIP activities.
9/22/2020	11.25	37,500	55.6	System online at 1245 following CIP activities. FBRO pumped out.
9/23/2020	24	78,000	54.2	System online and operating. Air sparged IPC. Manually pumped excess sludge.
9/24/2020	24	78,100	54.2	System online and operating.
9/25/2020	24	78,300	54.4	System online and operating. Air sparged IPC. Manually pumped excess sludge.
9/26/2020	24	77,900	54.1	System online and operating.
9/27/2020	24	77,800	54.0	System online and operating.
9/28/2020	24	78,600	54.6	System online and operating. Air sparged IPC. Manually pumped excess sludge.
9/29/2020	24	78,300	54.4	System online and operating.
9/30/2020	24	78,200	54.3	System online and operating. Air sparged IPC. Manually pumped excess sludge.

Total	**680.8**	**2,213,300**	
Total Available Hours	**720**	**Average On-line Flow**	**54.2**
Percent Online	**95**		

Note:

Flowrate in Gallons per Minute (GPM)

Clean in Place (CIP)

Appendix I
ATP Operations Summary - October 2020
Shepley's Hill Landfill
Devens, Massachusetts

Date	Hours Online	Gallons Discharged	Average Effluent Flowrate	Status
10/1/2020	24	78,000	54.2	System online and operating.
10/2/2020	24	78,100	54.2	System online and operating. Air sparged IPC. Manually pumped excess sludge.
10/3/2020	24	78,000	54.2	System online and operating.
10/4/2020	24	78,200	54.3	System online and operating.
10/5/2020	8.5	29,100	57.1	System offline at 0830 for CIP activities.
10/6/2020	10.5	35,100	55.7	System online at 1330 following CIP activities. FBRO pumped out.
10/7/2020	24	78,300	54.4	System online and operating. Air sparged IPC. Manually pumped excess sludge.
10/8/2020	24	77,600	53.9	System online and operating.
10/9/2020	24	78,500	54.5	System online and operating. Air sparged IPC. Manually pumped excess sludge.
10/10/2020	24	77,800	54.0	System online and operating.
10/11/2020	24	78,700	54.7	System online and operating.
10/12/2020	24	78,300	54.4	System online and operating. Air sparged IPC. Manually pumped excess sludge.
10/13/2020	24	78,200	54.3	System online and operating.
10/14/2020	24	77,500	53.8	System online and operating. Air sparged IPC. Manually pumped excess sludge.
10/15/2020	24	78,800	54.7	System online and operating.
10/16/2020	24	78,500	54.5	System online and operating. Air sparged IPC. Manually pumped excess sludge.
10/17/2020	24	77,900	54.1	System online and operating.
10/18/2020	24	78,300	54.4	System online and operating.
10/19/2020	24	78,700	54.7	System online and operating. Air sparged IPC. Manually pumped excess sludge.
10/20/2020	24	77,000	53.5	System online and operating. FBRO pumped out. Air sparged IPC. Manually pumped excess sludge.
10/21/2020	24	77,500	53.8	System online and operating. Air sparged IPC. Manually pumped excess sludge.
10/22/2020	24	78,100	54.2	System online and operating.
10/23/2020	24	78,400	54.4	System online and operating. Air sparged IPC. Manually pumped excess sludge.
10/24/2020	24	77,600	53.9	System online and operating.
10/25/2020	24	78,700	54.7	System online and operating.
10/26/2020	24	77,100	53.5	System online and operating. Air sparged IPC. Manually pumped excess sludge.
10/27/2020	24	78,100	54.2	System online and operating.
10/28/2020	23.75	76,900	54.0	System offline between 0915 and 0930 for Cl2 Cylinder change. Air sparged IPC. Manually pumped excess sludge.
10/29/2020	24	78,100	54.2	System online and operating.
10/30/2020	24	78,300	54.4	System online and operating. Air sparged IPC. Manually pumped excess sludge.
10/31/2020	24	77,300	53.7	System online and operating.

Total	**714.8**	**2,326,700**	
Total Available Hours	**744**	**Average On-line Flow**	**54.3**
Percent Online	**96**		

Note:

Flowrate in Gallons per Minute (GPM)

Clean in Place (CIP)

Appendix I
ATP Operations Summary - November 2020
Shepley's Hill Landfill
Devens, Massachusetts

Date	Hours Online	Gallons Discharged	Average Effluent Flowrate	Status
11/1/2020	24	81,500	56.6	System online and operating.
11/2/2020	7.5	26,000	57.8	System offline at 0730 for CIP activities.
11/3/2020	11.25	36,200	53.6	System online at 1245 following CIP activities. FBRO pumped out.
11/4/2020	24	78,400	54.4	System online and operating. Air sparged IPC. Manually pumped excess sludge.
11/5/2020	24	77,800	54.0	System online and operating.
11/6/2020	24	78,200	54.3	System online and operating. Air sparged IPC. Manually pumped excess sludge.
11/7/2020	24	78,200	54.3	System online and operating.
11/8/2020	24	78,000	54.2	System online and operating.
11/9/2020	24	77,300	53.7	System online and operating. Air sparged IPC. Manually pumped excess sludge.
11/10/2020	24	78,000	54.2	System online and operating.
11/11/2020	24	77,600	53.9	System online and operating.
11/12/2020	24	77,700	54.0	System online and operating.
11/13/2020	24	78,400	54.4	System online and operating. Air sparged IPC. Manually pumped excess sludge.
11/14/2020	24	77,200	53.6	System online and operating.
11/15/2020	24	78,100	54.2	System online and operating.
11/16/2020	24	77,200	53.6	System online and operating. Air sparged IPC. Manually pumped excess sludge.
11/17/2020	24	77,200	54.2	System offline between 0945 and 1000 for FBRO pump out. Air sparged IPC. Manually pumped excess sludge.
11/18/2020	24	77,800	54.0	System online and operating.
11/19/2020	24	77,200	53.6	System online and operating.
11/20/2020	24	78,400	54.4	System online and operating. Air sparged IPC. Manually pumped excess sludge.
11/21/2020	24	77,200	53.6	System online and operating.
11/22/2020	24	78,600	54.6	System online and operating.
11/23/2020	24	77,200	53.6	System online and operating. Air sparged IPC. Manually pumped excess sludge.
11/24/2020	24	77,600	53.9	System online and operating.
11/25/2020	24	77,400	53.8	System online and operating. Air sparged IPC. Manually pumped excess sludge.
11/26/2020	24	78,300	54.4	System online and operating.
11/27/2020	24	77,500	53.8	System online and operating.
11/28/2020	24	78,500	54.5	System online and operating.
11/29/2020	24	77,200	53.6	System online and operating.
11/30/2020	24	78,000	54.2	System online and operating. Air sparged IPC. Manually pumped excess sludge.

Total	**690.5**	**2,243,900**	
Total Available Hours	**720**	**Average On-line Flow**	**54.2**

Percent Online	**96**

Note:

Flowrate in Gallons per Minute (GPM)

Clean in Place (CIP)

Appendix I
ATP Operations Summary - December 2020
Shepley's Hill Landfill
Devens, Massachusetts

Date	Hours Online	Gallons Discharged	Average Effluent Flowrate	Status
12/1/2020	24	77,400	53.8	System online and operating. Air sparged IPC. Manually pumped excess sludge. FBRO pump out.
12/2/2020	24	77,500	53.8	System online and operating.
12/3/2020	24	77,400	53.8	System online and operating.
12/4/2020	19.5	63,800	54.5	System offline between 0530 and 1000 due to due faulty recycle pump relay. Air sparged IPC. Manually pumped excess sludge.
12/5/2020	24	78,300	54.4	System online and operating.
12/6/2020	24	77,100	53.5	System online and operating.
12/7/2020	24	77,800	54.0	System online and operating. Air sparged IPC. Manually pumped excess sludge.
12/8/2020	24	77,600	53.9	System online and operating.
12/9/2020	24	77,700	54.0	System online and operating.
12/10/2020	24	77,900	54.1	System online and operating.
12/11/2020	24	77,700	54.0	System online and operating. Air sparged IPC. Manually pumped excess sludge.
12/12/2020	24	77,600	53.9	System online and operating.
12/13/2020	24	77,400	53.8	System online and operating.
12/14/2020	7.5	25,600	56.9	System offline at 0730 for CIP activities.
12/15/2020	11.5	38,300	55.5	System online at 1230 following CIP activities. FBRO pumped out.
12/16/2020	17.5	58,200	55.4	System offline between 0130 and 0800 due to faulty recycle pump relay. Air sparged IPC. Manually pumped excess sludge.
12/17/2020	24	77,600	53.9	System online and operating.
12/18/2020	8.25	33,100	66.9	System offline between 0000 and 1000 due to faulty recycle pump relay. Air sparged IPC. Manually pumped excess sludge. System offline again at 1815 due to faulty recycle pump relay.
12/19/2020	13.0	48,600	62.3	The recyle pump was taken out of service, and a new temporary pump was installed to bypass the faulty pump until a new relay could be installed. The system was subsequently restarted at 0900. The system was then offline between 1315 and 1515 due to a high level thickner alarm. The temporary bypass pump was readjusted and the system restarted.
12/20/2020	24	77,600	53.9	System online and operating.
12/21/2020	18.75	62,500	55.6	System offline between 1145 and 1230 for Cl2 tank replacement. Air sparged IPC. Manually pumped excess sludge. System offline at 1930 due to a ClO2 low flow alarm.
12/22/2020	15.0	49,100	54.6	The ClO2 injection valve was serviced and the system restarted at 0900.
12/23/2020	24	77,300	53.7	System online and operating. Air sparged IPC. Manually pumped excess sludge.
12/24/2020	24	78,100	54.2	System online and operating.
12/25/2020	24	78,000	54.2	System online and operating.
12/26/2020	24	77,900	54.1	System online and operating.
12/27/2020	24	77,800	54.0	System online and operating.
12/28/2020	24	77,000	53.5	System online and operating. Replaced recycle pump relay and recylce pump back online. Air sparged IPC. Manually pumped excess sludge.
12/29/2020	23.25	75,400	54.1	System offline between 1145 and 1230 for FBRO pump out.
12/30/2020	24	77,400	53.8	System online and operating.
12/31/2020	24	77,700	54.0	System online and operating. Air sparged IPC. Manually pumped excess sludge.

Total	**662.3**	**2,162,400**	
Total Available Hours	**744**	**Average On-line Flow**	**54.4**
Percent Online	**89**		

Note:

Flowrate in Gallons per Minute (GPM)

Clean in Place (CIP)

Appendix I
ATP Monthly Discharge Totals - 2020
Shepley's Hill Landfill
Devens, Massachusetts

Month	Discharge Flow (gallons)	Month	Discharge Flow (gallons)	Month	Discharge Flow (gallons)	Month	Discharge Flow (gallons)
startup 8&9/2005	213,900	Nov-10	1,869,600	Aug-15	2,454,900	May-20	2,328,000
Mar-06	555,800	Dec-10	1,833,600	Sep-15	2,530,300	Jun-20	2,235,100
Apr-06	833,600	Jan-11	1,907,600	Oct-15	2,577,600	Jul-20	2,318,100
May-06	941,700	Feb-11	1,766,400	Nov-15	2,522,000	Aug-20	2,218,500
Jun-06	979,000	Mar-11	1,413,900	Dec-15	2,399,400	Sep-20	2,213,300
Jul-06	646,600	Apr-11	1,834,200	Jan-16	2,583,000	Oct-20	2,326,700
Aug-06	327,200	May-11	2,064,700	Feb-16	2,209,000	Nov-20	2,243,900
Sep-06	453,500	Jun-11	1,872,000	Mar-16	2,359,700	Dec-20	2,162,400
Oct-06	597,500	Jul-11	1,642,500	Apr-16	2,242,200		
Nov-06	562,500	Aug-11	1,904,500	May-16	2,366,500		
Dec-06	606,800	Sep-11	1,825,500	Jun-16	2,277,300		
Jan-07	739,600	Oct-11	1,438,700	Jul-16	2,369,200		
Feb-07	0	Nov-11	1,907,200	Aug-16	2,344,800		
Mar-07	672,400	Dec-11	1,843,300	Sep-16	2,292,000		
Apr-07	854,000	Jan-12	1,814,900	Oct-16	2,347,300		
May-07	974,700	Feb-12	1,641,400	Nov-16	2,259,400		
Jun-07	942,200	Mar-12	1,530,400	Dec-16	2,332,600		
Jul-07	970,500	Apr-12	1,512,300	Jan-17	2,318,600		
Aug-07	1,563,400	May-12	1,374,700	Feb-17	2,072,500		
Sep-07	1,809,100	Jun-12	1,938,100	Mar-17	2,325,100		
Oct-07	1,616,000	Jul-12	1,557,500	Apr-17	2,182,300		
Nov-07	1,436,200	Aug-12	1,595,800	May-17	2,287,400		
Dec-07	1,629,200	Sep-12	1,807,400	Jun-17	2,234,300		
Jan-08	1,589,100	Oct-12	1,729,100	Jul-17	2,289,200		
Feb-08	1,418,100	Nov-12	1,979,100	Aug-17	2,249,500		
Mar-08	1,596,600	Dec-12	1,915,900	Sep-17	2,337,900		
Apr-08	1,586,500	Jan-13	1,776,000	Oct-17	2,328,400		
May-08	1,616,300	Feb-13	1,310,700	Nov-17	1,975,400		
Jun-08	1,424,400	Mar-13	1,926,400	Dec-17	2,049,700		
Jul-08	1,591,800	Apr-13	2,055,600	Jan-18	2,347,800		
Aug-08	1,101,700	May-13	1,492,100	Feb-18	2,108,500		
Sep-08	1,652,800	Jun-13	2,055,700	Mar-18	2,340,000		
Oct-08	1,238,900	Jul-13	2,023,050	Apr-18	2,208,300		
Nov-08	1,649,500	Aug-13	2,185,000	May-18	2,285,700		
Dec-08	1,521,400	Sep-13	1,679,300	Jun-18	2,244,200		
Jan-09	1,602,500	Oct-13	1,697,700	Jul-18	2,301,600		
Feb-09	1,625,700	Nov-13	1,865,600	Aug-18	2,313,500		
Mar-09	909,400	Dec-13	2,054,300	Sep-18	2,215,300		
Apr-09	1,292,500	Jan-14	1,905,500	Oct-18	2,276,800		
May-09	1,631,000	Feb-14	1,773,000	Nov-18	903,800		
Jun-09	1,793,400	Mar-14	2,108,500	Dec-18	1,404,300		
Jul-09	1,830,700	Apr-14	1,696,300	Jan-19	2,004,100		
Aug-09	1,935,700	May-14	2,124,000	Feb-19	2,066,100		
Sep-09	1,879,100	Jun-14	1,943,600	Mar-19	2,268,000		
Oct-09	1,832,600	Jul-14	2,019,100	Apr-19	2,246,200		
Nov-09	1,909,100	Aug-14	2,182,900	May-19	2,329,900		
Dec-09	1,773,100	Sep-14	1,871,900	Jun-19	393,300		
Jan-10	2,030,000	Oct-14	1,646,600	Jul-19	2,265,400		
Feb-10	1,695,500	Nov-14	1,980,900	Aug-19	2,309,700		
Mar-10	1,922,900	Dec-14	1,948,100	Sep-19	2,237,100		
Apr-10	1,986,900	Jan-15	1,600,100	Oct-19	2,308,000		
May-10	1,997,200	Feb-15	1,779,800	Nov-19	2,241,200		
Jun-10	1,882,400	Mar-15	1,992,100	Dec-19	2,284,500		
Jul-10	1,606,700	Apr-15	2,198,900	Jan-20	2,322,300		
Aug-10	1,552,700	May-15	2,118,300	Feb-20	2,168,200		
Sep-10	1,207,200	Jun-15	2,071,100	Mar-20	2,313,900		
Oct-10	1,768,600	Jul-15	2,037,000	Apr-20	2,189,200		

Cumulative Total	324,277,250

Appendix I
ATP Filter Bed Roll-Off Disposal Totals
Shepley's Hill Landfill
Devens, MA

Date	Sludge Removed for Disposal (Tons)
1/14/2020	11.13
1/28/2020	11.74
2/11/2020	10.91
2/25/2020	11.37
3/10/2020	10.75
3/24/2020	10.67
4/7/2020	10.11
4/21/2020	10.10
5/6/2020	9.76
5/19/2020	10.16
6/2/2020	10.35
6/16/2020	9.06
6/30/2020	10.47
7/14/2020	11.02
7/28/2020	9.95
8/11/2020	11.80
8/25/2020	10.17
9/8/2020	10.67
9/22/2020	9.78
10/6/2020	9.97
10/20/2020	11.00
11/3/2020	10.19
11/17/2020	11.09
12/1/2020	10.95
12/15/2020	12.07
12/29/2020	10.35
YEARLY TOTAL	**275.54**

Note:

All Filter Bed Roll-off disposal activities completed by Gobal Remediation Services Inc. (East Taunton, MA)

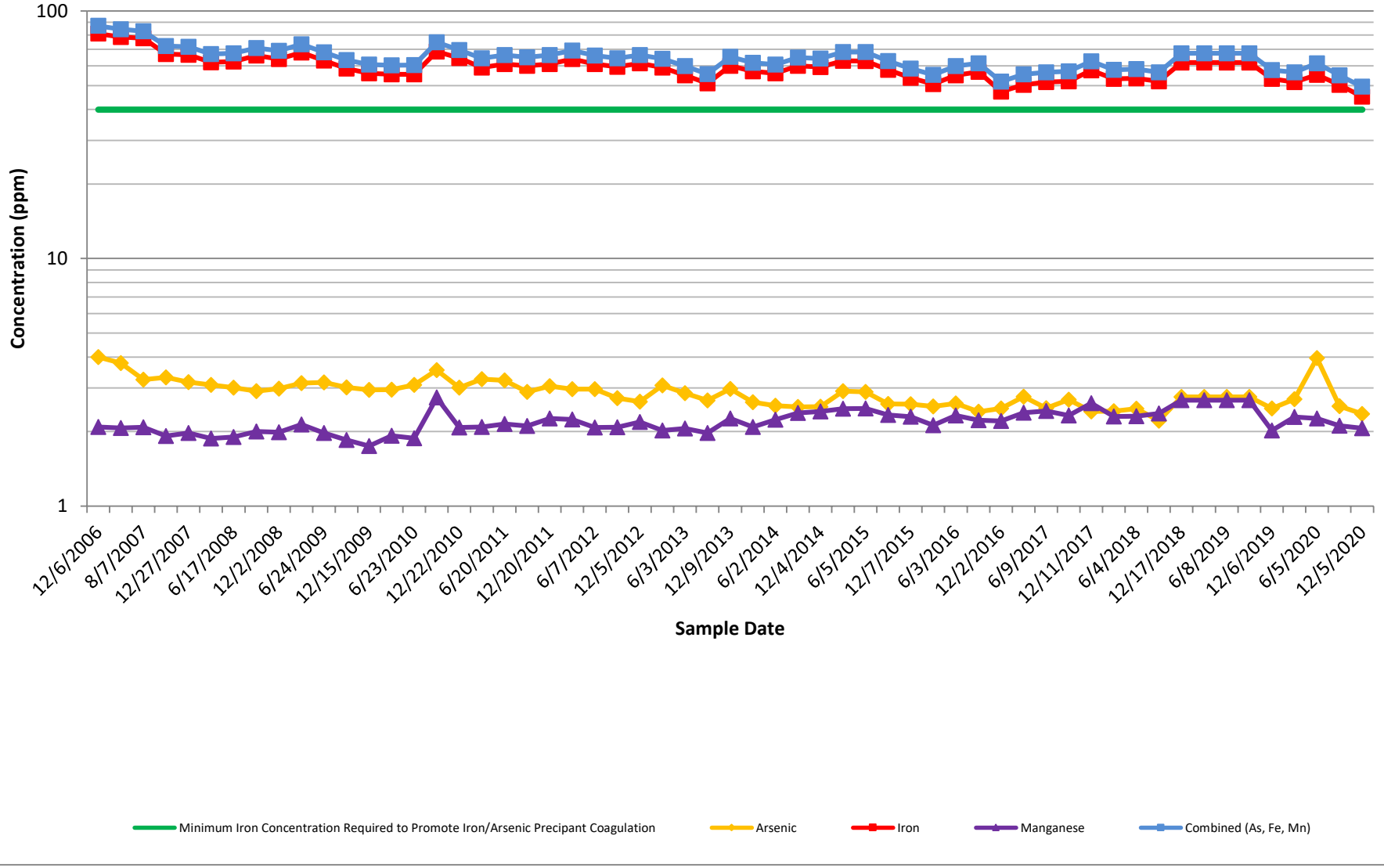
All Filter Bed Roll-off sludge disposed of at Tradebe Treatment & Recycling (Stoughton, MA)

Appendix I
ATP Routine and Non-Routine System Maintenance, Repairs, and Upgrades - 2020
Shepley's Hill Landfill
Devens, MA

Activity	Type	Description	Shutdown Period
Routine MF Skid CIPs	Routine	Routine MF Skid CIPs are conducted monthly, or as needed, to clean and maintain each MF module.	January - 1/13/20 at 08:00 to 1/14/20 at 14:00 February - 2/3/20 at 8:00 to 2/4/20 at 13:15 March - 3/2/20 at 10:00 to 3/3/20 at 14:00 April - 4/6/20 at 09:00 to 4/7/20 at 15:00 May - 5/4/20 at 08:15 to 5/5/20 at 12:30 June - 6/1/20 at 08:00 to 6/2/20 at 15:15 July - 7/6/20 at 08:15 to 7/7/20 at 15:00 August - 8/10/20 at 08:15 to 8/11/20 at 14:00 September - 9/21/20 at 08:00 to 9/22/20 at 12:45 October - 10/5/20 at 08:30 to 10/6/20 at 13:30 November - 11/2/20 at 07:30 to 11/3/20 at 12:45 December- 12/14/20 at 07:30 to 12/15/20 at 12:30
Chlorine Gas Cylinder Replacement	Routine	Chlorine gas cylinders are replaced as necessary as part of plant operations. During replacement activities, the system is offline.	3/10/20 from 10:30 to 11:00 5/19/20 from 13:45 to 14:00 8/10/20 Conducted during routine CIP to minimize downtime. 10/28/20 from 09:15 to 09:30 12/22/20 from 11:45 to 12:30
Sewer Line Repair	Non-Routine	On 3/18/20, downstream sewer line repairs by Devens DPW.	3/18/20 - System offline between 0745 and 0945.
Chlorite Rotometer Fitting Repair	Non-Routine	On 3/23/20, a fitting on the sodium chlorite rotometer was observed to be leaking. It was repaired, and the system was brought back online.	3/23/20 - System offline between 1015 and 1100.
Effluent Pump and Basket Strainer Tansducer Repair	Non-Routine	On 4/12/20, a leak in effluent pump 2 sprayed and caused the basket strainer transducer to fail. The pump and transducer were repaired on 4/13/20.	The system was offline from 4/12/2020 at 0430 until 4/13/2020 at 1230.
Air Compressor Pressure Switch Replacement	Non-Routine	On 8/12/20, the system was offline to diagnose a loss of pressure. The air compressor pressure switch failed on 8/13/20 and was subsequently replaced on 8/14/20.	8/12/20 - The system was offline between 1345 and 1445 to diagnose pressure loss. 8/13/20 at 0745 to 8/14/20 at 1045 - System was offline due to a faulty air compressor pressure switch.
Effluent and MF pH Meter Replacement	Non-Routine	On 8/28/20, new effluent and MF pH meters were installed due to normal operational wear of the previous meters.	8/28/20 - System was offline from 0845 to 0930.
Microfilter I/O Card Replacement	Non-Routine	On 8/31/20, the microfilter I/O card failed. A new I/O card was installed on 9/1/20.	The system was offline from 8/31/2020 at 2000 until 9/1/2020 at 0915.
Recycle Pump Relay Replacement	Non-Routine	On 12/4/20 between 0530 and 1000, the system was offline due to a faulty recycle pump relay. The recycle pump relay failed again on 12/16/20 and 12/18/20. A temporary pump was installed on 12/19/20 to bypass the recycle pump, and the system was brought back online. The recycle pump relay was subsequently replaced on 12/28/20.	The system was offline: 12/4/20 - 0530 to 1000 12/18/20 at 0000 to 1000 12/18/20 at 1815 until 12/19/20 at 0900 12/19/20 at 1315 to 1515.
Chlorine Gas Injection Valve Service	Non-Routine	On 12/21/20, the system shutdown due to a clogged chlorine injection valve. The valve was serviced, and the system was brought back online on 12/22/2020.	The system was offline from 12/21/20 at 1930 until 12/22/20 at 0900.

Notes
CIP = Clean-in-Place
MF = Microfilter

Appendix I
Influent Metals Concentrations - GWTP
Shepley's Hill Landfill



Appendix I
ATP As/Fe/Mn Influent Concentrations - 2020
Shepley's Hill Landfill
Devens, MA

		EW-01			EW-04			Total			
Date	**Flow**	**As**	**Fe**	**Mn**	**As**	**Fe**	**Mn**	**As**	**Fe**	**Mn**	**Total**
12/6/2006	40	2.77	92.0	2.47	5.00	72.0	1.75	3.89	82.0	2.11	88.00
12/6/2006	50	2.76	90.0	2.45	5.24	72.0	1.73	4.00	81.0	2.09	87.09
12/7/2006	25	2.64	87.0	2.43	4.93	70.0	1.71	3.79	78.5	2.07	84.36
8/7/2007	55	2.40	88.0	2.46	4.09	67.0	1.71	3.25	77.5	2.09	82.83
9/11/2007	55	2.58	80.0	2.32	4.04	54.0	1.52	3.31	67.0	1.92	72.23
12/27/2007	51	2.45	77.0	2.29	3.88	56.0	1.66	3.17	66.5	1.98	71.64
3/6/2008	52	2.43	74.0	2.2	3.74	50.0	1.55	3.09	62.0	1.88	66.96
6/17/2008	52	2.43	75.0	2.20	3.59	50.0	1.60	3.01	62.5	1.90	67.41
9/10/2008	52	2.22	78.0	2.22	3.60	54.0	1.78	2.91	66.0	2.00	70.91
12/2/2008	52	2.33	78.0	2.25	3.63	50.0	1.73	2.98	64.0	1.99	68.97
4/13/2009	53	2.51	81.0	2.37	3.77	55.0	1.90	3.14	68.0	2.14	73.28
6/24/2009	53	2.41	78.0	2.22	3.91	48.0	1.73	3.16	63.0	1.98	68.14
9/15/2009	54	2.32	76.0	2.14	3.72	41.0	1.56	3.02	58.5	1.85	63.37
12/15/2009	52	2.36	72.0	1.99	3.53	40.0	1.51	2.95	56.0	1.75	60.70
3/16/2010	52	2.37	73.0	2.19	3.54	38.0	1.66	2.96	55.5	1.93	60.38
6/23/2010	52	2.4	72.0	2.09	3.78	39.0	1.67	3.09	55.5	1.88	60.47
9/24/2010	50	2.79	81.0	3.3	4.29	56.0	2.19	3.54	68.5	2.75	74.79
12/22/2010	55	2.21	81.0	2.17	3.81	48.0	1.99	3.01	64.5	2.08	69.59
3/16/2011	55	2.14	76.0	2.22	4.38	42.0	1.96	3.26	59.0	2.09	64.35
6/20/2011	56	2.08	72.0	2.12	4.36	50.0	2.17	3.22	61.0	2.15	66.37
9/13/2011	56	2.04	74.0	2.05	3.75	46.0	2.16	2.90	60.0	2.11	65.00
12/20/2011	56	2.19	77.0	2.26	3.91	45.0	2.26	3.05	61.0	2.26	66.31
3/6/2012	49	2.23	81.0	2.26	3.71	47.0	2.22	2.97	64.0	2.24	69.21
6/7/2012	50	2.28	74.0	2.03	3.66	48.0	2.13	2.97	61.0	2.08	66.05
9/14/2012	50	2.31	76.0	2.13	3.15	43.0	2.04	2.73	59.5	2.09	64.31
12/5/2012	50	2.04	78.0	2.25	3.25	45.0	2.12	2.64	61.5	2.19	66.33
3/1/2013	50	2.29	73.0	2.04	3.85	45.0	2.00	3.07	59.0	2.02	64.09
6/3/2013	50	2.05	63.0	1.86	3.67	47.0	2.26	2.86	55.0	2.06	59.92
9/10/2013	50	1.91	65.0	1.97	3.44	37.0	1.98	2.68	51.0	1.98	55.65
12/9/2013	52	2.13	78.0	2.33	3.82	42.0	2.19	2.97	60.0	2.26	65.23
3/6/2014	50	1.98	72.0	2.10	3.28	42.0	2.08	2.63	57.0	2.09	61.72
6/2/2014	49	1.90	73.0	2.26	3.19	39.0	2.21	2.54	56.0	2.24	60.78
9/5/2014	50	1.83	76.1	2.32	3.20	43.9	2.44	2.52	60.0	2.38	64.90
12/4/2014	50.1	1.80	73.6	2.29	3.24	45.0	2.52	2.52	59.3	2.41	64.23
3/5/2015	56.2	2.00	75.5	2.34	3.82	50.3	2.61	2.91	62.9	2.48	68.29
6/5/2015	57.6	2.09	75.5	2.35	3.69	50.1	2.61	2.89	62.8	2.48	68.17
9/9/2015	61.7	1.89	72.5	2.28	3.28	43.3	2.39	2.59	57.9	2.34	62.82
12/7/2015	62.0	1.92	68.3	2.24	3.24	39.0	2.35	2.58	53.7	2.30	58.53
3/2/2016	55.1	1.87	64.7	2.06	3.18	36.5	2.18	2.53	50.6	2.12	55.25
6/3/2016	55.3	1.82	68.6	2.18	3.38	41.4	2.47	2.60	55.0	2.33	59.93
9/7/2016	55.3	1.82	71.7	2.13	2.99	41.9	2.32	2.41	56.8	2.23	61.43
12/2/2016	54.5	1.82	57.4	1.99	3.14	37.0	2.43	2.48	47.2	2.21	51.89
3/2/2017	54.5	1.81	61.9	2.21	3.73	38.7	2.56	2.77	50.3	2.39	55.46
6/9/2017	54.5	1.71	62.1	2.19	3.26	41.1	2.66	2.49	51.6	2.43	56.51
9/13/2017	55.0	1.91	64.1	2.18	3.47	39.9	2.47	2.69	52.0	2.33	57.02
12/11/2017	45.9	1.74	68.6	2.36	3.08	46.6	2.85	2.41	57.6	2.61	62.62
3/8/2018	54.9	1.74	64.3	2.11	3.10	42.0	2.49	2.42	53.2	2.30	57.87
6/4/2018	55.1	1.75	65.4	2.14	3.20	41.4	2.47	2.48	53.4	2.31	58.18
9/7/2018	55.4	1.60	65.1	2.25	2.83	38.8	2.49	2.22	52.0	2.37	56.54
12/17/2018	53.7	1.74	68.0	2.22	3.78	55.9	3.14	2.76	62.0	2.68	67.39
3/12/2019	55.7	1.61	64.6	2.09	3.28	41.8	2.42	2.45	53.2	2.26	57.90
7/8/2019	54.1	1.62	69.3	2.17	3.52	47.8	2.56	2.57	58.6	2.37	63.49
9/6/2019	54.2	1.63	65.3	2.09	3.11	40.1	2.29	2.37	52.7	2.19	57.26
12/6/2019	54.3	1.64	65.9	1.92	3.32	40.5	2.12	2.48	53.2	2.02	57.70
3/6/2020	54.3	1.74	65.5	2.22	3.67	37.6	2.36	2.71	51.6	2.29	56.55
6/5/2020	54.3	1.55	68.8	2.13	6.37	41.7	2.39	3.96	55.3	2.26	61.47
9/4/2020	54.2	1.75	64.8	2.05	3.32	35.9	2.17	2.54	50.4	2.11	55.00
12/5/2020	54.4	1.67	58.5	1.97	3.04	31.6	2.16	2.36	45.1	2.07	49.47

Note:
Concentrations reported in mg/l (ppm)
Flow reported in gallons per minute (gpm)

Appendix I
ATP Influent VOC Dissolved Gases Concentrations - September 2020
Shepley's Hill Landfill
Devens, Massachusetts

EW-01			EW-04	
Analyte	Result		Analyte	Result
1,1,1,2-Tetrachloroethane	ND		1,1,1,2-Tetrachloroethane	ND
1,1,1-Trichloroethane	ND		1,1,1-Trichloroethane	ND
1,1,2,2-Tetrachloroethane	ND		1,1,2,2-Tetrachloroethane	ND
1,1,2-Trichloroethane	ND		1,1,2-Trichloroethane	ND
1,1-Dichloroethane	ND		1,1-Dichloroethane	ND
1,1-Dichloroethene	ND		1,1-Dichloroethene	ND
1,1-Dichloropropene	ND		1,1-Dichloropropene	ND
1,2,3-Trichlorobenzene	ND		1,2,3-Trichlorobenzene	ND
1,2,3-Trichloropropane	ND		1,2,3-Trichloropropane	ND
1,2,4-Trichlorobenzene	ND		1,2,4-Trichlorobenzene	ND
1,2,4-Trimethylbenzene	ND		1,2,4-Trimethylbenzene	ND
1,2-Dibromo-3-chloropropane	ND		1,2-Dibromo-3-chloropropane	ND
1,2-Dibromoethane	ND		1,2-Dibromoethane	ND
1,2-Dichlorobenzene	ND		1,2-Dichlorobenzene	ND
1,2-Dichloroethane	ND		1,2-Dichloroethane	ND
1,2-Dichloropropane	ND		1,2-Dichloropropane	ND
1,3,5-Trimethylbenzene	ND		1,3,5-Trimethylbenzene	ND
1,3-Dichlorobenzene	ND		1,3-Dichlorobenzene	ND
1,3-Dichloropropane	ND		1,3-Dichloropropane	ND
1,4-Dichlorobenzene	1.1		1,4-Dichlorobenzene	ND
1,4-Dioxane	ND		1,4-Dioxane	ND
2,2-Dichloropropane	ND		2,2-Dichloropropane	ND
2-Butanone	ND		2-Butanone	ND
2-Hexanone	ND		2-Hexanone	ND
4-Methyl-2-pentone	ND		4-Methyl-2-pentone	ND
Acetone	ND		Acetone	ND
Benzene	1.1		Benzene	ND
Bromobenzene	ND		Bromobenzene	ND
Bromochloromethane	ND		Bromochloromethane	ND
Bromodichloromethane	ND		Bromodichloromethane	ND
Bromoform	ND		Bromoform	ND
Bromomethane	ND		Bromomethane	ND
Carbon disulfide	ND		Carbon disulfide	ND
Carbon Tetrachloride	ND		Carbon Tetrachloride	ND
Chlorobenzene	0.71	J	Chlorobenzene	ND
Chloroethane	ND		Chloroethane	ND
Chloroform	ND		Chloroform	ND
Chloromethane	ND		Chloromethane	ND
cis-1,2-Dichlorothene	0.66	J	cis-1,2-Dichlorothene	ND
cis-1,3-Dichloropropene	ND		cis-1,3-Dichloropropene	ND
Dibromochloromethane	ND		Dibromochloromethane	ND
Dichlorodifluoromethane	ND		Dichlorodifluoromethane	ND
Di-Isopropyl Ether	ND		Di-Isopropyl Ether	ND
Ethyl ether	6.7		Ethyl ether	2.2
Ethylbenzene	ND		Ethylbenzene	ND
Ethyl-tert-butyl-ether	ND		Ethyl-tert-butyl-ether	ND
Hexachlorobutadiene	ND		Hexachlorobutadiene	ND
Isopropylbenzene	ND		Isopropylbenzene	ND
Methyl tert butyl ether	ND		Methyl tert butyl ether	ND
Methylene Bromide	ND		Methylene Bromide	ND
Methylene Chloride	ND		Methylene Chloride	ND
Naphthalene	ND		Naphthalene	ND
n-Butylbenzene	ND		n-Butylbenzene	ND
n-Propylbenzene	ND		n-Propylbenzene	ND
o-Chlorotoluene	ND		o-Chlorotoluene	ND

Appendix I
ATP Influent VOC Dissolved Gases Concentrations - September 2020
Shepley's Hill Landfill
Devens, Massachusetts

EW-01		EW-04	
Analyte	**Result**	**Analyte**	**Result**
o-Xylene	ND	o-Xylene	ND
p/m-Xylene	6.4	p/m-Xylene	ND
p-Chorotoluene	ND	p-Chorotoluene	ND
p-Isopropyltoluene	ND	p-Isopropyltoluene	ND
sec-Butylbenzene	ND	sec-Butylbenzene	ND
Styrene	ND	Styrene	ND
tert-Butylbenzene	ND	tert-Butylbenzene	ND
Tertiary-amyl Methyl Ether	ND	Tertiary-amyl Methyl Ether	ND
Tetrachloroethene	ND	Tetrachloroethene	ND
Tetrahydrofuran	ND	Tetrahydrofuran	ND
Toluene	ND	Toluene	ND
trans-1,2-Dichloroethene	ND	trans-1,2-Dichloroethene	ND
trans-1,3-Dichloropropene	ND	trans-1,3-Dichloropropene	ND
Trichloroethene	ND	Trichloroethene	ND
Trichlorofluoromethane	ND	Trichlorofluoromethane	ND
Vinyl chloride	ND	Vinyl chloride	ND
EW-01 Totals	**16.67**	**EW-04 Totals**	**2.2**

EW-01			EW-04		
Analyte	**Result**		**Analyte**	**Result**	
Methane	1,370	J	Methane	671	J
Ethane	0.30		Ethane	ND	

Notes:
J = Value is estimated. It is below the reportable detection limit but greater than the method detection limits.

ND = Non-detect at laboratory detection limit.
All units in µg/L.

Appendix I
ATP Monthly Effluent Arsenic Sampling Results - 2020
Shepley's Hill Landfill
Devens, Massachusetts

Date	Effluent Arsenic Concentration (ppb)	Date	Effluent Arsenic Concentration (ppb)	Date	Effluent Arsenic Concentration (ppb)	Date	Effluent Arsenic Concentration (ppb)
8/29/2005	1.5	11/17/2009	11.6	7/1/2014	45.3	5/10/2019	19.6
8/30/2005	1.2	12/15/2009	43.0	8/7/2014	68.0	7/8/2019	16.2
8/31/2005	17.1	12/22/2009	9.4	9/5/2014	37.7	8/9/2019	25.3
9/1/2005	1.0	1/7/2010	25.2	10/1/2014	10.6	9/6/2019	24.8
9/2/2005	1.0	2/18/2010	33.1	11/6/2014	**742.0**	10/4/2019	24.9
9/6/2005	1.0	3/16/2010	3.2	11/14/2014	5.2	11/8/2019	31.5
9/8/2005	0.9	4/21/2010	14.4	12/4/2014	11.1	12/6/2019	34.6
9/9/2005	3.0	5/13/2010	10.4	1/2/2015	34.8	1/3/2020	25.8
3/10/2006	0.9	6/23/2010	24.6	2/12/2015	27.5	2/7/2020	24.0
3/15/2006	2.0	7/15/2010	17.5	3/5/2015	58.4	3/6/2020	20.0
3/23/2006	1.0	8/19/2010	29.0	4/10/2015	6.6	4/3/2020	34.1
4/7/2006	2.0	9/24/2010	13.9	5/7/2015	6.5	5/8/2020	17.9
4/14/2006	1.3	10/27/2010	22.3	6/5/2015	11.1	6/5/2020	37.8
4/20/2006	9.0	11/23/2010	26.1	7/10/2015	11.2	7/10/2020	36.9
4/27/2006	2.0	12/22/2010	10.3	8/10/2015	37.4	8/7/2020	44.6
5/22/2006	2.0	1/24/2011	55.8	9/9/2015	5.5	9/4/2020	60.6
6/27/2006	ND	2/16/2011	9.8	10/6/2015	6.2	10/9/2020	28.5
7/12/2006	2.0	3/16/2011	14.1	11/2/2015	15.5	11/4/2020	23.7
8/31/2006	13.0	4/21/2011	17.4	12/7/2015	5.9	12/4/2020	55.4
9/28/2006	28.0	5/16/2011	7.7	1/4/2016	11.7		
10/16/2006	4.0	6/20/2011	5.2	2/1/2016	13.5		
11/14/2006	2.0	7/22/2011	4.6	3/2/2016	19.5		
12/26/2006	34.0	8/11/2011	2.3	4/4/2016	11.3		
1/5/2007	19.0	9/13/2011	38.1	5/2/016	16.0		
1/16/2007	2.0	10/24/2011	20.3	6/3/2016	18.6		
1/23/2007	4.0	11/21/2011	12.5	7/5/2016	16.0		
1/30/2007	1.0	12/20/2011	15.1	8/1//16	17.4		
3/22/2007	1.0	1/24/2012	18.2	9/7/2016	15.3		
4/11/2007	ND	2/7/2012	28.1	10/3/2016	13.5		
5/16/2007	1.2	3/6/2012	16.1	11/1/2016	15.3		
6/13/2007	1.3	4/13/2012	**269.3**	12/2/2016	45.1		
7/12/2007	1.4	4/30/2012	14.9	1/6/2017	13.3		
8/7/2007	1.5	5/14/2012	**90.5**	2/8/2017	13.1		
9/11/2007	1.3	5/25/2012	8.7	3/2/2017	39.4		
10/10/2007	1.2	6/7/2012	12.7	4/12/2017	16.8		
11/6/2007	1.3	7/2/2012	23.0	5/18/2017	17.7		
12/27/2007	1.2	8/3/2012	17.1	6/9/2017	20.6		
1/10/2008	3.0	9/14/2012	23.9	7/14/2017	12.1		
2/13/2008	1.0	10/10/2012	15.6	8/16/2017	13.8		
3/6/2008	1.1	11/6/2012	32.9	9/13/2017	1.0		
4/10/2008	1.0	12/5/2012	11.9	10/10/2017	2.7		
5/15/2008	1.0	1/2/2013	14.3	11/10/2017	0.96 J		
6/17/2008	1.0	2/6/2013	15.7	12/11/2017	3.3		
7/8/2008	1.3	3/1/2013	15.1	1/8/2018	7.5		
8/6/2008	1.0	4/3/2013	14.1	2/7/2018	42.8		
9/10/2008	5.3	5/1/2013	13.9	3/8/2018	1.4 J		
10/14/2008	1.1	6/3/2013	20.5	4/5/2018	38.4		
11/4/2008	1.0	7/8/2013	15.5	5/4/2018	14.4		
12/2/2008	0.9	8/5/2013	15.0	6/4/2018	13.7		
1/13/2009	1.3	9/10/2013	11.0	7/6/2018	10.9		
2/3/2009	1.6	10/2/2013	13.9	8/10/2018	9.8		
3/5/2009	1.1	11/12/2013	19.2	9/7/2018	10.5		
4/13/2009	24.7	12/9/2013	20.7	10/4/2018	11.7		
5/26/2009	6.1	1/6/2014	17.8	11/12/2018	10.6		
6/24/2009	25.2	2/6/2014	20.2	12/17/2018	12.5		
7/16/2009	6.3	3/6/2014	19.2	1/11/2019	10.9		
8/18/2009	9.7	4/3/2014	15.1	2/8/2019	18.1		
9/15/2009	3.5	5/5/2014	19.3	3/12/2019	38.4		
10/20/2009	15.5	6/9/2014	7.2	4/5/2019	35.0		

Notes:

= Above effluent limitation of 75 ppb

Tables Includes all daily/weekly (when required) Arsenic sampling results

ND - Non-detect

Appendix I
Quarterly Effluent Sampling Results - GWTP
Shepley's Hill Landfill
Devens, Massachusetts

Sample Date	9/2/2005	3/15/2006	6/27/2006	9/2/2006	12/26/2006	3/22/2007	6/13/2007	9/11/2007	12/27/2007	3/6/2008	6/17/2008	9/10/2008	12/2/2008	4/13/2009	6/24/2009	9/15/2009	12/8/2009	3/16/2010	6/23/2010	9/24/2010	12/22/2010	3/16/2011	6/20/2011	9/13/2011
Analyte																								
Chloride	54	44	50	100	50	68	56	60	67	80	60	58	62	63	58	58	62	68	67	59	73	44	28	44
Nitrogen, Nitrate	ND	ND	ND	ND	ND	ND	0.18	0.32	0.21	0.36	0.26	0.16	0.3	0.19	0.14	0.14	0.18	0.38	0.69	0.15	0.35	0.06	0.12	0.09 J
Sulfate	ND	ND	ND	2.6	160	70	2.2	2.7	3.3	3	3.1	2.8	3.2	3.3	7.9	7.9	4.3	4.6	5.3	4.4	3.9	4	3.5	3.6
Total Metals																								
Barium	ND	0.02	0.03	0.02	0.015	0.029	0.023	0.023	0.023	0.023	0.022	0.024	0.022	0.022	0.023	0.024	0.021	0.022	0.018	0.025	0.021	0.024	0.018	0.023
Magnesium	ND	8.5	8.8	9.1	8.4	8.1	7.5	7.1	7.6	6.9	6.9	7.1	6.8	6.8	6.9	6.6	6.5	6.4	5.7	5.7	6	6	5.9	5.8
Manganese	ND	0.87	2.1	0.26	0.876	0.709	0.001	0.0026	0.0011 J	0.0008 J	ND	0.0026 J	ND	0.017	0.02	0.0041 J	0.029	0.0026 J	0.017	0.656	0.007	1.09	0.912	0.66

Notes:
NA: Not Analyzed
ND: Non-detect at laboratory detection limit
J: Estimated concentration

Appendix I
Quarterly Effluent Sampling Results - GWTP
Shepley's Hill Landfill
Devens, Massachusetts

Sample Date	12/20/2011	3/6/2012	6/7/2012	9/14/2012	12/5/2012	3/1/2013	6/3/2013	9/10/2013	12/9/2013	3/6/2014	6/2/2014	9/5/2014	12/4/2014	3/5/2015	6/5/2015	9/9/2015	12/7/2015	3/2/2016	6/3/2016	9/7/2016	12/2/2016	3/2/2017	6/9/2017	9/13/2017
Analyte																								
Chloride	42	46	36	28	43	41.2	28	35	39	37	41	39	38.7	38.0	34.0	33.7	33.5	34.5	34.0	33.5	33.2	34.4	34.1	35.0
Nitrogen, Nitrate	0.09 J	0.06 J	0.07 J	0.099 J	0.12	ND	0.081 J	0.10	0.054 J	0.077 J	0.098 J	0.43	0.43	ND	0.20	0.34	0.22	0.13 J	0.19	0.24	0.34	0.35	0.30	0.22
Sulfate	3.5	3.4	2.6	58	3.9	3.35	2.97	3.64	4.30	4.97	4.74	4.8 J	6.0 J	3.4 J	3.5	3.7 J	6.5 J	3.5 J	4.3 J	4.1 J	5.3 J	4.9 J	5.1 J	6.0
Total Metals																								
Barium	0.023	0.023	0.022	0.020	0.023	0.023	0.020	0.021	0.023	0.025	0.023	0.025	ND	ND	ND	ND	ND	ND	ND	ND	0.0206 J	0.0206 J	0.0188 J	0.0198 J
Magnesium	6.2	6.2	5.9	5.2	6.2	5.6	5.5	5.1	5.8	6.3	5.3	6.14	6.37	6.06	6.11	5.88	5.74	5.27	5.62	5.45	5.33	5.32	5.23	5.03 J
Manganese	1.1	0.757	1.15	0.031	0.279	1.27	1.19	1.40	0.908	1.59	1.64	1.62	1.55	1.69	1.67	1.75	1.77	1.44	1.53	1.46	1.40	1.61	1.57	1.66

Notes:
NA: Not Analyzed
ND: Non-detect at laboratory
J: Estimated concentration

Appendix I
Quarterly Effluent Sampling Results - GWTP
Shepley's Hill Landfill
Devens, Massachusetts

Sample Date	12/11/2017	3/8/2018	6/4/2018	9/7/2018	12/17/2018	3/12/2019	7/8/2019	12/6/2019	3/6/2020	6/5/2020	9/4/2020	12/4/2020
Analyte												
Chloride	34.6	36.0	35.6	36.1	37.4	32.6	37.9	35.5	34.9	35.8	32.4	36.6
Nitrogen, Nitrate	0.37	0.11	0.40	0.23	0.22	0.098J	0.21	0.28	0.26	0.17	0.29	0.25
Sulfate	5.6	5.8	6.3	6.0	3.6	7.9	5.7	5.7	6.8	4.9	5.1	5.6
Total Metals												
Barium	0.0229 J	0.0221 J	0.0231 J	0.0221 J	0.0216 J	0.0147J	0.0142J	0.0144J	0.0156J	0.0145J	.0154 J	0.0135 J
Magnesium	5.62	5.6	5.6	5.44	6.23	5.51	5.94	5.33	5.83	5.55	5.13	4.66 J
Manganese	1.91	1.65	1.60	1.55	1.16	0.0434	0.0184	0.0373	0.0269	0.0445	0.0669	0.0606

Notes:
NA: Not Analyzed
ND: Non-detect at laboratory
J: Estimated concentration

Appendix I
ATP Annual Effluent Sampling Results - 2020
Shepley's Hill Landfill
Devens, Massachusetts

Analyte	Conc. (mg/L)	Analyte	Conc. (mg/L)	Analyte	Conc. (mg/L)	Analyte	Effluent Limitation (mg/L)	Conc. (mg/L)
VOCs		**SVOCs**		**Pesticides & PCBs**		**Metals, TPH, and TTO**		
Acetone	0.0034 J	1,2,4-Trichlorobenzene	ND	Aldrin	ND	Cadmium	0.045	ND
Acrolein	ND	1-Methylnaphthalene	ND	Alpha-BHC	ND	Chromium (Total)	0.40	ND
Acrylonitrile	ND	1,2-Dichlorobenzene	ND	Beta-BHC	ND	Copper	0.75	0.013
Benzene	0.00067 J	1,2-Diphenylhydrazine	ND	Delta-BHC	ND	Lead	0.20	ND
Bromodichloromethane	ND	1,3-Dichlorobenzene	ND	Chlordane	ND	Mercury	0.001	ND
Bromoform	ND	1,4-Dichlorobenzene	ND	cis-Chlordane	ND	Selenium	0.03	ND
Bromomethane	ND	2,4,5-Trichlorophenol	ND	trans-Chlordane	ND	Silver	0.30	ND
2-Butanone	ND	2,4,6-Trichlorophenol	ND	Dieldrin	ND			
Carbon disulfide	ND	2,4-Dichlorophenol	ND	4,4'-DDD	ND	TPH	100	ND
Carbon tetrachloride	ND	2,4-Dinitrololuene	ND	4,4'-DDE	ND			
Chlorobenzene	0.00052 J	2,6-Dinitrololuene	ND	4,4'-DDT	ND	TTO*	5.0	0.00554 J
Chloroethane	ND	2,4-Dimethylphenol	ND	Endosulfan I	ND			
2-Chloroethyl vinyl ether	ND	2,4-Dinitrophenol	ND	Endosulfan II	ND			
Chloroform	ND	3,3'-Dichlorobenzidine	ND	Endosulfan sulfate	ND			
Chloromethane	ND	2-Chloronaphthalene	ND	Endrin	ND			
Dibromochloromethane	ND	2-Chlorophenol	ND	Endrin aldehyde	ND			
Dibromomethane	ND	2-Methylnapthalene	ND	Endrin ketone	ND			
1,2-Dichlorobenzene	ND	2-Methylphenol	ND	Heptachlor	ND			
1,3-Dichlorobenzene	ND	2-Nitroaniline	ND	Heptachlor epoxide	ND			
1,4-Dichlorobenzene	ND	2-Nitrophenol	ND	Lindane	ND			
1,1-Dichloroethane	ND	3-Methylphenol/4-Methylphenol	ND	Methoxychlor	ND			
1,2-Dichloroethane	ND	3-Nitroaniline	ND	Toxaphene	ND			
1,1-Dichloroethene	ND	4,6-Dinitro-o-cresol	ND					
cis-1,2-Dichloroethene	ND	4-Bromophenyl phenyl ether	ND	Aroclor 1016	ND			
trans-1,2-Dichloroethene	ND	4-Chloroaniline	ND	Aroclor 1221	ND			
1,2-Dichloropropane	ND	4-Chlorophenyl phenyl ether	ND	Aroclor 1232	ND			
cis-1,3-Dichloropropene	ND	4-Nitroaniline	ND	Aroclor 1242	ND			
trans-1,3-Dichloropropene	ND	4-Nitrophenol	ND	Aroclor 1248	ND			
Ethylbenzene	ND	Acenaphthylene	ND	Aroclor 1254	ND			
2-Hexanone	ND	Acenapthene	ND	Aroclor 1260	ND			
4-Methyl-2-pentanone	ND	Aniline	ND					
Methylene chloride	ND	Anthracene	ND					
Styrene	ND	Benzidine	ND					
1,1,2,2-Tetrachloroethane	ND	Benzo(a)anthracene	ND					
Tetrachloroethene	ND	Benzo(a)pyrene	ND					
Toluene	ND	Benzo(b)fluoranthene	ND					
1,1,1-Trichloroethane	ND	Benzo(ghi)perylene	ND					
1,1,2-Trichloroethane	ND	Benzo(k)fluoranthene	ND					
Trichloroethene	ND	Benzoic Acid	ND					
Trichlorofluoromethane	ND	Benzyl Alcohol	ND					
Vinyl acetate	ND	Bis(2-chloroethoxy) methane	ND					
Vinyl chloride	ND	Bis(2-chloroethyl)ether	ND					
o-Xylene	ND	Bis(2-chloroisopropyll)ether	ND					
p/m-Xylene	0.00095 J	Bis(2-ethylhexy)phthalate	ND					
Xylene (Total)	0.00095 J	Butyl benzyl phthalate	ND					
		Carbazole	ND					
		Chrysene	ND					
		Dibenzo(a,h)anthracene	ND					
		Dibenzofuran	ND					
		Diethyl phthalate	ND					
		Dimethyl phthalate	ND					
		Di-n-butylphthalate	ND					
		Di-n-octylphthalate	ND					
		Flourene	ND					
		Fluoranthene	ND					
		Hexachlorobenzene	ND					
		Hexachlorobutadiene	ND					
		Hexachlorocyclopentadiene	ND					
		Hexachloroethane	ND					
		Indeno(1,2,3-cd)pyrene	ND					
		Isophorone	ND					
		Naphthalene	ND					
		Nitrobenzene	ND					
		n-Nitrosodimethylamine	ND					
		n-Nitrosodi-n-propylamine	ND					
		N-Nitrosodiphenylamine	ND					
		p-Chloro-m-cresol	ND					
		Pentachlorophenol	ND					
		Phenanthrene	ND					
		Phenol	ND					
		Pyrene	ND					

Notes:
ND - Non-detect
J: Estimated value - the target analyte concentration is below the laboratory reporting limit but above the method detection limit.
TTO is equal to the sum of total VOCs, SVOCs, pesticides, and PCBs
mg/L: milograms per liter

Appendix J

LUCIP Documentation

Appendix J
LUCIP Documentation
Shepley's Hill Landfill
Former Fort Devens Army Installation, Devens, MA

Land Use Controls			
Name of Interviewer: Ian Martz (Arcadis)			
Name of Interviewees: Mark Wetzel (DPW), Bridgette Braley (Nashoba Associated-BOH), Charles Schultz (Town of Ayer), Penelope Reddy (USACE)			
Contact Information: mwetzel@ayer.ma.us, 978-772-8240; bbraley@nashoba.org, 978-772-3335 x303; cshultz@ayer.ma.us, 978-772-8214**;** penelope.reddy@usace.army.mil, 978-318-8160			
Interview Notes: Emailed 2019 AR LUCIP form and updated informational pamphlet to interviewees on 1/27/2021. Received responses from all parties on 2/16/2021, answers to interview questions are provided below.			
Site Update: The Army is currently investigating PFAS which have been detected at the Former Fort Devens. A record-of-decision has not been completed for PFAS.			
Item	**Yes**	**No**	**Comments**
BOH, DPW and Building Department personnel familiar with LUC implementation, LUC coverage area, and informational pamphlet?	X		
Any issues reported with the implementation of the LUCs?		X	
Any changes to the SHL or Northern Impact Area (NIA)?		X	The Ayer DPW (Mark Wetzel) indicated that they are in the process of designing water main and drainage improvement on Sculley Road; LUC controls will be incorporated in the bid documents.
Affirmative Measures			
Item	**Yes**	**No**	**Comments**
Annual distribution of educational materials completed?	X		Mailed LUC informational pamphlet to all property owners and addresses located within the LUC area in September 2020. A copy of the pamphlet is included in this Appendix.
Updated list of land owners and residents within the LUC area prepared?	X		Confirmed current owners names and addresses through the Ayer Assessors website in September 2020. Created updated table of addresses, a copy of which is included in this Appendix.
Door-to-door survey completed?		X	Survey is only required every 5 years, and the last survey was completed on September 3-5, 2019. The next door-to-door survey will be completed in 2024.
Met with DPW and Building Department to confirm water supply connections, and assess presence of private wells within LUC area?		X	A review of water supply connections and private wells is completed every 5 years, with the next review to be completed in 2024.

Appendix J
LUCIP Documentation - Mailing List for Ayer, MA Properties within LUC Area
Shepley's Hill Landfill
Former Fort Devens Army Installation, Devens, MA

Map ID	LUC Street Address	Address Checked on Ayer Assessor Site (Y/N)	Received Mailing of Public Educational Pamphlet (Y/N)	Additional Notes from 2019 Door-to-Door Survey
25-1	139 WEST MAIN STREET	Y; 9/3/2020	Y; 9/21/2020	
25-2	137 OLD WEST MAIN STREET	Y; 9/3/2020	Y; 9/21/2020	
25-3	131 WEST MAIN STREET	Y; 9/3/2020	Y; 9/21/2020	
25-3	131 -1/2 WEST MAIN STREET	Y; 9/3/2020	Y; 9/21/2020	
25-3	133 WEST MAIN STREET	Y; 9/3/2020	Y; 9/21/2020	
25-4	127 WEST MAIN STREET	Y; 9/3/2020	Y; 9/21/2020	Duplex
25-5	123 WEST MAIN STREET, Apt. 1	Y; 9/3/2020	Y; 9/21/2020	Duplex
25-5	123 WEST MAIN STREET, Apt. 2	Y; 9/3/2020	Y; 9/21/2020	Duplex
25-5	123-1/2 WEST MAIN STREET Apt. 1	Y; 9/3/2020	Y; 9/21/2020	
25-5	123-1/2 WEST MAIN STREET Apt. 2	Y; 9/3/2020	Y; 9/21/2020	
25-5	123-1/2 WEST MAIN STREET Apt. 3	Y; 9/3/2020	Y; 9/21/2020	
25-5	123-1/2 WEST MAIN STREET Apt. 4	Y; 9/3/2020	Y; 9/21/2020	
25-5	123-1/2 WEST MAIN STREET Apt. 5	Y; 9/3/2020	Y; 9/21/2020	
25-5	123-1/2 WEST MAIN STREET Apt. 6	Y; 9/3/2020	Y; 9/21/2020	
25-5	123-1/2 WEST MAIN STREET Apt. 7	Y; 9/3/2020	Y; 9/21/2020	
25-5	123-1/2 WEST MAIN STREET Apt. 8	Y; 9/3/2020	Y; 9/21/2020	
25-5	123-1/2 WEST MAIN STREET Apt. 9	Y; 9/3/2020	Y; 9/21/2020	
25-5	123-1/2 WEST MAIN STREET Apt. 10	Y; 9/3/2020	Y; 9/21/2020	
25-5	125 WEST MAIN STREET	Y; 9/3/2020	Y; 9/21/2020	
25-6	117 WEST MAIN STREET	Y; 9/3/2020	Y; 9/21/2020	Appears Abandoned
25-7	111 WEST MAIN STREET	Y; 9/3/2020	Y; 9/21/2020	Duplex
25-9	109 WEST MAIN STREET	Y; 9/3/2020	Y; 9/21/2020	
25-10	107 WEST MAIN STREET	Y; 9/3/2020	Y; 9/21/2020	
25-12	130 WEST MAIN STREET	Y; 9/3/2020	Y; 9/21/2020	
25-13	2 ROGERS STREET, Apt. 1	Y; 9/3/2020	Y; 9/21/2020	Duplex
25-13	2 ROGERS STREET, Apt. 2	Y; 9/3/2020	Y; 9/21/2020	Duplex
25-14	122 WEST MAIN STREET	Y; 9/3/2020	Y; 9/21/2020	
25-15	118 WEST MAIN STREET	Y; 9/3/2020	Y; 9/21/2020	
25-16	116 WEST MAIN STREET, Apt. 1	Y; 9/3/2020	Y; 9/21/2020	
25-16	116 WEST MAIN STREET, Apt. 2	Y; 9/3/2020	Y; 9/21/2020	
25-17	114 WEST MAIN STREET	Y; 9/3/2020	Y; 9/21/2020	
25-18	108 WEST MAIN STREET	Y; 9/3/2020	Y; 9/21/2020	
25-19	65 SHIRLEY STREET	Y; 9/3/2020	Y; 9/21/2020	
25-20	59 SHIRLEY STREET	Y; 9/3/2020	Y; 9/21/2020	
25-21	57 SHIRLEY STREET	Y; 9/3/2020	Y; 9/21/2020	
25-22	55 SHIRLEY STREET	Y; 9/3/2020	Y; 9/21/2020	
26-32	95 WEST MAIN STREET	Y; 9/3/2020	Y; 9/21/2020	
26-33	91 WEST MAIN STREET, Apt. L1	Y; 9/3/2020	Y; 9/21/2020	Apartment
26-33	91 WEST MAIN STREET, Apt. L2	Y; 9/3/2020	Y; 9/21/2020	Apartment
26-33	91 WEST MAIN STREET, Apt. L3	Y; 9/3/2020	Y; 9/21/2020	Apartment
26-33	91 WEST MAIN STREET, Apt. R1	Y; 9/3/2020	Y; 9/21/2020	Apartment
26-33	91 WEST MAIN STREET, Apt. R2	Y; 9/3/2020	Y; 9/21/2020	Apartment
26-332	82 WEST MAIN STREET	Y; 9/3/2020	Y; 9/21/2020	
26-339	65 WEST MAIN STREET	Y; 9/3/2020	Y; 9/21/2020	
26-34	87 WEST MAIN STREET, Apt. 1	Y; 9/3/2020	Y; 9/21/2020	Duplex
26-34	87 WEST MAIN STREET, Apt. 2	Y; 9/3/2020	Y; 9/21/2020	Duplex
26-35	83 WEST MAIN STREET, Apt. 1	Y; 9/3/2020	Y; 9/21/2020	
26-35	83 WEST MAIN STREET, Apt. 2	Y; 9/3/2020	Y; 9/21/2020	Apartment
26-351	5 MECHANIC STREET	Y; 9/3/2020	Y; 9/21/2020	
26-36	81 WEST MAIN STREET, Apt. 1	Y; 9/3/2020	Y; 9/21/2020	Duplex
26-36	81 WEST MAIN STREET, Apt. 2	Y; 9/3/2020	Y; 9/21/2020	Duplex
26-37	73 WEST MAIN STREET, Apt. 1	Y; 9/3/2020	Y; 9/21/2020	
26-37	73 WEST MAIN STREET, Apt. 2	Y; 9/3/2020	Y; 9/21/2020	
26-37	75 WEST MAIN STREET, Apt. 1	Y; 9/3/2020	Y; 9/21/2020	
26-37	75 WEST MAIN STREET, Apt. 2	Y; 9/3/2020	Y; 9/21/2020	
26-38	71 WEST MAIN STREET, Apt. 1R	Y; 9/3/2020	Y; 9/21/2020	
26-38	71 WEST MAIN STREET, Apt. 2R	Y; 9/3/2020	Y; 9/21/2020	Apartment
26-38	71 WEST MAIN STREET, Apt. 1L	Y; 9/3/2020	Y; 9/21/2020	
26-38	71 WEST MAIN STREET, Apt. 2R	Y; 9/3/2020	Y; 9/21/2020	Apartment
26-39	61 -WEST MAIN STREET, Apt 1	Y; 9/3/2020	Y; 9/21/2020	Apartment
26-39	61 -WEST MAIN STREET, Apt 2	Y; 9/3/2020	Y; 9/21/2020	Apartment
26-39	63 -WEST MAIN STREET, Apt 1	Y; 9/3/2020	Y; 9/21/2020	
26-39	63 -WEST MAIN STREET, Apt 3	Y; 9/3/2020	Y; 9/21/2020	Apartment
26-42	53 SHIRLEY STREET	Y; 9/3/2020	Y; 9/21/2020	
26-44	0 SHIRLEY STREET	Y; 9/3/2020	Y; 9/21/2020	
26-45	98 WEST MAIN STREET	Y; 9/3/2020	Y; 9/21/2020	
26-46	3 UNION STREET	Y; 9/3/2020	Y; 9/21/2020	
26-47	5 UNION STREET	Y; 9/3/2020	Y; 9/21/2020	
26-48	7 UNION STREET	Y; 9/4/2020	Y; 9/21/2020	Duplex
26-50	50 SHIRLEY STREET	Y; 9/4/2020	Y; 9/21/2020	
26-51	44 SHIRLEY STREET, Apt. A	Y; 9/4/2020	Y; 9/21/2020	
26-51	44 SHIRLEY STREET, Apt. B	Y; 9/4/2020	Y; 9/21/2020	
26-51	44 SHIRLEY STREET, Apt. C	Y; 9/4/2020	Y; 9/21/2020	
26-53	22 SHIRLEY STREET	Y; 9/4/2020	Y; 9/21/2020	
26-54	20 SHIRLEY STREET	Y; 9/4/2020	Y; 9/21/2020	
26-55, 26-56	12 SHIRLEY STREET	Y; 9/4/2020	Y; 9/21/2020	
26-61	92 WEST MAIN STREET	Y; 9/4/2020	Y; 9/21/2020	
26-63	41 SHIRLEY STREET	Y; 9/4/2020	Y; 9/21/2020	
26-64	86 WEST MAIN STREET, Apt.1	Y; 9/4/2020	Y; 9/21/2020	

Appendix J
LUCIP Documentation - Mailing List for Ayer, MA Properties within LUC Area
Shepley's Hill Landfill
Former Fort Devens Army Installation, Devens, MA

Map ID	LUC Street Address	Address Checked on Ayer Assessor Site (Y/N)	Received Mailing of Public Educational Pamphlet (Y/N)	Additional Notes from 2019 Door-to-Door Survey
26-64	86 WEST MAIN STREET, Apt.2	Y; 9/4/2020	Y; 9/21/2020	
26-64	88 WEST MAIN STREET, Apt.1	Y; 9/4/2020	Y; 9/21/2020	
26-64	88 WEST MAIN STREET, Apt.2	Y; 9/4/2020	Y; 9/21/2020	
26-65	84 WEST MAIN STREET	Y; 9/4/2020	Y; 9/21/2020	
26-66	76 WEST MAIN STREET	Y; 9/4/2020	Y; 9/21/2020	Duplex
26-66	78 WEST MAIN STREET	Y; 9/4/2020	Y; 9/21/2020	Duplex
26-67	70 WEST MAIN STREET, Apt.1	Y; 9/4/2020	Y; 9/21/2020	Duplex
26-67	70 WEST MAIN STREET, Apt.2	Y; 9/4/2020	Y; 9/21/2020	Duplex
26-68	29 SHIRLEY STREET	Y; 9/4/2020	Y; 9/21/2020	
26-68	29 SHIRLEY STREET	Y; 9/4/2020	Y; 9/21/2020	
26-69	64 WEST MAIN STREET	Y; 9/4/2020	Y; 9/21/2020	
26-69	66 WEST MAIN STREET	Y; 9/4/2020	Y; 9/21/2020	
26-70	23 SHIRLEY STREET	Y; 9/4/2020	Y; 9/21/2020	
26-71	17 SHIRLEY STREET	Y; 9/4/2020	Y; 9/21/2020	Duplex
26-71	19 SHIRLEY STREET	Y; 9/4/2020	Y; 9/21/2020	Duplex
26-72	60 WEST MAIN STREET	Y; 9/4/2020	Y; 9/21/2020	Commercial Building
26-73	13 SHIRLEY STREET	Y; 9/4/2020	Y; 9/21/2020	Duplex
26-73	15 SHIRLEY STREET	Y; 9/4/2020	Y; 9/21/2020	Duplex
26-74	11 SHIRLEY STREET	Y; 9/4/2020	Y; 9/21/2020	Condemned Two-Family home
26-75	50 WEST MAIN STREET	Y; 9/4/2020	Y; 9/21/2020	Commercial Building
26-77	9 SHIRLEY STREET, Apt 1	Y; 9/4/2020	Y; 9/21/2020	Duplex
26-77	9 SHIRLEY STREET, Apt 2	Y; 9/4/2020	Y; 9/21/2020	Duplex
32-10	71 SHIRLEY STREET	Y; 9/4/2020	Y; 9/21/2020	
32-2	161 WEST MAIN STREET, Apt. 1	Y; 9/4/2020	Y; 9/21/2020	
32-2	161 WEST MAIN STREET, Apt. 2	Y; 9/4/2020	Y; 9/21/2020	
32-2	161 WEST MAIN STREET, Apt. 3	Y; 9/4/2020	Y; 9/21/2020	
32-24	173 WEST MAIN STREET	Y; 9/4/2020	Y; 9/21/2020	
32-28	2 SCULLY ROAD	Y; 9/4/2020	Y; 9/21/2020	
32-29	4 SCULLY ROAD	Y; 9/4/2020	Y; 9/21/2020	
32-3	157 WEST MAIN STREET	Y; 9/4/2020	Y; 9/21/2020	
32-4	149 WEST MAIN STREET	Y; 9/4/2020	Y; 9/21/2020	
32-43	7 SCULLY ROAD	Y; 9/4/2020	Y; 9/21/2020	
32-44	11 SCULLY ROAD	Y; 9/4/2020	Y; 9/21/2020	
32-45	13 SCULLY ROAD, Apt. A	Y; 9/4/2020	Y; 9/21/2020	Duplex
32-45	13 SCULLY ROAD, Apt. B	Y; 9/4/2020	Y; 9/21/2020	Duplex
32-46	17 SCULLY ROAD	Y; 9/4/2020	Y; 9/21/2020	
32-47	19 SCULLY ROAD	Y; 9/4/2020	Y; 9/21/2020	
32-49	33 SCULLY ROAD	Y; 9/4/2020	Y; 9/21/2020	
32-5	147 WEST MAIN STREET	Y; 9/4/2020	Y; 9/21/2020	
33-4	0 SCULLY ROAD	Y; 9/4/2020	Y; 9/21/2020	
32-52	31 SCULLY ROAD	Y; 9/4/2020	Y; 9/21/2020	
32-8	134 WEST MAIN STREET, Apt. 1L	Y; 9/4/2020	Y; 9/21/2020	Buildings Actual Number is 136
32-8	134 WEST MAIN STREET, Apt. 2L	Y; 9/4/2020	Y; 9/21/2020	
32-8	134 WEST MAIN STREET, Apt. 1R	Y; 9/4/2020	Y; 9/21/2020	
32-8	134 WEST MAIN STREET, Apt. 2R	Y; 9/4/2020	Y; 9/21/2020	
32-9	132 WEST MAIN STREET	Y; 9/4/2020	Y; 9/21/2020	
33-32	1 SCULLY ROAD	Y; 9/4/2020	Y; 9/21/2020	

How Are People Being Protected from Arsenic In Groundwater?

In August 2014, the Army released the final report called a "Land Use Control Implementation Plan" (LUCIP), based on the land use controls (LUCs) established per the Shepley Hill Landfill remedy. The LUCIP is part of the remedy for Shepley's Hill landfill. It establishes the framework for land use controls to protect people from exposure to contaminated groundwater. The final LUCIP is available at:

- Town of Ayer website (www.ayer.ma.us)
- Ayer Public Library
- Ayer Town Hall
  - The Board of Health Office
  - The Board of Selectman's Office
  - The Town Clerk

The Army has implemented Land Use Controls that will reduce the risk of arsenic exposure by:

- Supporting compliance with the Ayer Zoning By-laws and the Subdivision Control Regulations.
- Supporting compliance with a Moratorium on Groundwater Use issued by the Town of Ayer Board of Health limiting groundwater use where arsenic groundwater contamination is present.
- Supporting compliance with the Ayer Board of Health Well Regulations (Adopted January 10, 2001) – Town of Ayer permitting requirements for the installation and use of new drinking water wells.
- Continued public education and outreach.
- Continued groundwater monitoring and inspections where arsenic groundwater contamination is present.
- Conducting meetings with the Ayer Board of Health at least once a year.

Where to Get More Information

Comments on the Land Use Control Implementation Plan can be sent to the Army by mail or email:

Army BRAC Environmental Coordinator
30 Quebec Street (Unit 100)
Devens, MA 01434-4479
Robert.j.simeone.civ@mail.mil

If you have a water well in or near the affected area contact the Army and the Board of Health with your comments and well information:

Ayer Board of Health
1 Main Street (3rd Floor)
Ayer, MA -1432

References & Other Resources

Arsenic in Drinking Water-EPA Fact Sheet
http://www.epa.gov/dwreginfo/chemical-contaminant-rules

Toxicological Profile for Arsenic
http://www.atsdr.cdc.gov/substances/toxsubstance.asp?toxid=3

Town of Ayer 2018 Annual Drinking Water Quality Report
http://www.ayer.ma.us/sites/ayerma/files/uploads/water_quality_report_2018.pdf

Town of Ayer Water Department
http://www.ayer.ma.us/water-department

Fort Devens Restoration Program Website
https://ftdevens.org

Land Use Control Implementation Plan:

Restriction of Groundwater Use

SHEPLEY'S HILL LANDFILL

Introduction

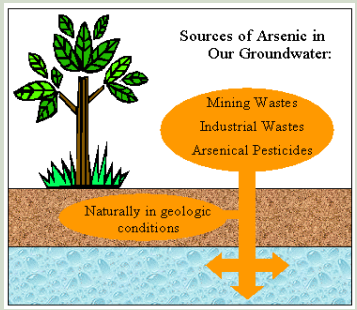
A Land Use Control Implementation Plan has been established by the Army to protect human health and the environment from arsenic contamination in groundwater affecting a localized portion of the aquifer in the Town of Ayer. Arsenic contamination in groundwater is attributable to both naturally occurring causes and groundwater discharge from the former Shepley's Hill Landfill (SHL). SHL is located on the northeast corner of the former Main Post at Fort Devens.

What Area is Affected?

Groundwater contaminated with arsenic is located north of the SHL. Approximately 65 to 70 homes in the Town of Ayer are located within the impacted area.

What Is Arsenic?

Arsenic is an odorless and tasteless metal that is both naturally occurring in the environment and also a by-product of agricultural, mining and industrial activities. It can enter the groundwater from runoff or infiltration through the ground.



http://www.idwr.idaho.gov/WaterInformation/GWQuality/FactSheets/Arsenic/Arsenic.htm

Where Does Arsenic Drinking Water Come From?

Arsenic in groundwater can be from anthropogenic sources, originating from human activity, or from natural sources, such as minerals in soil and bedrock. Many arsenic compounds dissolve in water and can enter the groundwater by dissolving in rain or snow or through the discharge of industrial wastes. The arsenic in groundwater in the Town of Ayer is occurring in groundwater because of both natural conditions and from the former operation of the SHL. The SHL has been closed and capped since 1993. Since its closure, the SHL has had long term monitoring and maintenance of the existing landfill cap and groundwater monitoring. A groundwater extraction and treatment system has operated at the SHL since 2006, however, arsenic is still present at high levels in groundwater in an area north of the landfill.

What Are Health Effects of Consuming Water With Arsenic?

Arsenic is known to cause cancer and is classified as a carcinogen by the Environmental Protection Agency (EPA). Specifically, exposure to arsenic can result in cancer of the bladder, lungs, skin, kidneys, nasal passages, liver and prostate. Arsenic in drinking water can result in the following symptoms:

- Discoloration of the skin
- Irritation of the stomach and intestines
- Fatigue
- Abnormal heart rhythm
- Blood-vessel damage resulting in bruising
- Impaired nerve function causing "pins and needles" sensation in your hands and feet

How to Avoid Arsenic

Not using private well water for drinking or irrigation purposes where arsenic groundwater contamination is present will prevent exposure of arsenic from groundwater. Drinking public water provided from the Town of Ayer and avoiding drinking private well water will mitigate the risk of arsenic exposure. The Town of Ayer's public drinking water supply meets all state and federal standards. The Town of Ayer Department of Public Works Water Division conducts annual water quality reports to document that the Town of Ayer drinking water quality is safe for drinking. **If you have a private well, you need to notify the Town of Ayer Board of Health at the contact number provided below.** The Ayer Board of Health will work with the Army to make necessary arrangements to properly abandon the well and obtain a new source of water, if necessary.

Appendix K

Response to Comments

Appendix K
Response to Comments
2020 Annual Operations, Maintenance, and Monitoring Report
Shepley's Hill Landfill
Former Fort Devens Army Installation
Devens, Massachusetts
August 2021

Comment No.	Reviewer	Section & Page Number	Comment	Response
1	David Chaffin / MassDEP	Section 2.3	The monitoring results are similar to the results reported in Annual Reports extending back to 2016, when sustained extraction rates of approximately 50 gallons per minute were first attained. Arsenic concentrations in groundwater downgradient of the landfill have stabilized at levels that greatly exceed the remedial goal. As explained in prior comments (e.g., 2019 Annual Report and recently submitted comments on the Phase I, Task 1g Tech Memo), the data indicate that the capture zone induced by the extraction wells as currently operated is too small to capture the full extent of arsenic-impacted groundwater exiting the landfill. In particular, the arsenic concentrations reported in the 2020 samples from monitoring wells and piezometers located north and east of the extraction wells, including SHM-96-5B (1,100 ug/L), SHM-93-22B (300 ug/L), and SHM-10-16 (1,100 ug/L), continue to indicate that a significant portion of the arsenic plume exiting the landfill by-passes the extraction wells to the east, sustaining the plume that extends to Nonacoicus Brook. MassDEP appreciates the Army's recent decision to undertake a focused feasibility study to identify and evaluate potential remedial alternatives that could address the situation.	The ATP was installed as a contingency remedy triggered by conditions of the ROD. ATP system performance, per the final May 2005 Remedial Design and Remedial Action Workplan by CH2M Hill, was "to be evaluated through hydraulic monitoring demonstrating appropriate capture zone dimensions for the containment system." The primary design criteria for the ATP were that it provide containment of the groundwater plume in the vicinity of the base boundary and meet POTW discharge requirements. The groundwater model by Geosyntec and Phase 1 Technical Memorandums prepared to date indicate that the ATP is meeting the objective of capturing groundwater containing dissolved arsenic exiting the north end of the landfill. Technical Memo 5 will evaluate the arsenic mass flux on the eastern boundary of the capture zone that may not be captured at all times; this represents a small percentage of the groundwater exiting the landfill. The Army does not expect the ATP to restore groundwater to meet MCLs; reducing aquifer geochemistry and many years of empirical data collected and summarized by the Army do not indicate that the ATP will restore groundwater quality at SHL to below MCLs. Extraction of groundwater by the ATP does have some effect on dissolved metals concentrations downgradient due to prevention of transport of some arsenic and chemically reduced groundwater downgradient. This being said, there are naturally occurring sources of arsenic that are not intercepted by the extraction system (i.e. there is no statistically significant trend for arsenic concentrations over time at Nearfield Area bedrock monitoring wells SHP-2016-6A, -6B, or -6C, which will be documented in Technical Memo 5) and there is a potential for groundwater in the NIA to be naturally reducing due to the presence of organic carbon in the wetland and native soils in that area (i.e. there was no statistically significant trend at downgradient NIA monitoring well SHM-13-03, as shown in Table 8 and in Appendix H). These conditions will persist regardless of ATP operation. In accordance with the SHL Informal Dispute SOW, potential remedial alternatives will be evaluated in a focused feasibility study that will be submitted for review and comment.
2	David Chaffin / MassDEP	Figure 6	Please confirm/correct the water levels posted for piezometers SHP-2017-01 and SHP-2017-02 and revise contours as appropriate.	The water levels and contours for piezometers SHP-2017-01 and SHP-2017-02 have been corrected on Figure 6 to match the verified values on Table 4.
3	David Chaffin / MassDEP	Table 4	Listings for several wells/piezometers appear to be incomplete: PZ-12-08, SHP-01-36X, SHP-01-37X, EPA-PZ-2012-5A, SHP-2016-6A, SHP-2016-6B, and SHP-2016-2A. Also, as indicated in footnotes, measurements at some locations were replaced by subsequent measurements – why were the earlier measurements replaced?	The missing groundwater elevation data for the indicated wells has been restored to Table 4. Some earlier measurements indicated in the footnotes were flagged as being erroneous or inconsistent with historical sampling/gauging events, the wells were either re-gauged or water levels values collected prior to collecting groundwater samples were used for the synoptic groundwater contour map.
4	David Chaffin / MassDEP	Table 6	Please confirm/correct the ORP value listed for well SHM-93-22B.	The correct ORP value is 87.1 mV. Table 6 and Appendix F have been updated accordingly.
5	David Chaffin / MassDEP	Appendix B	All of the lab reports for the ATP operations sampling should be included in the report (validation reports were included in Appendix C).	Appendix B has been updated to include all of the lab reports for the ATP operations sampling.
6	David Chaffin / MassDEP	Appendix D	Data listed for some of the wells identified in Comment 3 are inconsistent with the data listed in Table 4. To ensure the reliability of these data for future use, both tables should be reviewed/revised for accuracy and completeness.	The data in updated Table 4 has been compared to the data in Appendix D to verify consistency of the two data sets.
7	David Chaffin / MassDEP	Appendix E, Figure E-1, and Attachment E-1	Please confirm/correct the location of well SHP-01-38A and the boundaries of Triangles 14, 15, and 16.	SHP-01-38A has the coordinates 3027171.48 N and 630545.54 E and is consistent throughout the report. The coordinates in the report are the same as the coordinates retrieved from the Devens database. Also, Figures 2, 5, 6, 7, 8, and 9 show the well SHP-01-38A plotted in the same location on each illustration. Therefore, the boundaries are considered correct.

Response to Comments
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Shepley's Hill Landfill
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Devens, Massachusetts
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Comment No.	Reviewer	Section & Page Number	Comment	Response
8a	David Chaffin / MassDEP	Appendix F	To support before and after comparisons, the table of analytical results should include the results from all samples collected prior to start-up of the extraction system in 2006 (Table 5-7 of the 2019 Annual Report includes results from samples collected during 1991 through 2005).	Appendix F has been updated to include a summary of the historical total arsenic results from samples collected from 1991 through 2012 (Table F-1). The historical dissolved arsenic results are included in Table F-2.
8b	David Chaffin / MassDEP	Appendix F	The table of analytical results should include the results from the 2020 sample collected from well SHM-05-39B.	Appendix F Table F-2 has been updated to include the Fall 2020 sample results for well SHM-05-39B.
9	David Chaffin / MassDEP	Appendix G	The charts for wells SHM-96-5B, SHM-05-41B, and SHM-05-41C should include results from the 2020 spring and fall samples.	The referenced charts (SHM-96-5B, SHM-05-41B, and SHM-05-41C) have been updated to include the Spring and Fall 2020 sample results.
10	David Chaffin / MassDEP	Appendix I	Though extraction rates were not sufficient to fully capture the arsenic plume exiting the north end of the landfill, the operations data indicate the extraction wells and treatment system were well managed and efficiently operated during 2020. The second highest average annual extraction rate (~51.3 gpm) was maintained during the year.	Comment noted, the Army does not agree that the extraction rates were not sufficient. The groundwater model by Geosyntec and Phase 1 Technical Memorandums prepared to date indicate that the ATP is meeting the objective of capturing groundwater containing dissolved arsenic exiting the north end of the landfill. Technical Memo 5 will evaluate the arsenic mass flux on the eastern boundary of the capture zone that may not be captured at all times; this represents a small percentage of the groundwater exiting the landfill.
11	Carol A. Keating / U.S. EPA Region 1	General	Current sample data continue to support previously raised concerns regarding the existing extraction and treatment system's ability, as designed, constructed and operated, to provide sufficient containment/capture of the contamination migrating from SHL. Specifically, arsenic concentrations at monitoring locations to the north and east of the extraction wells continue to show that a portion of the groundwater plume is bypassing the extraction wells to the east and is migrating north towards West Main Street and Nonacoicus Brook. EPA looks forward to Army's completion of the SHL-specific tasks specified in EPA's September 28, 2020, Additional Work letter and development of potential remedial alternatives that can achieve restoration of the aquifer to drinking water standards within a reasonable period of time and assure long-term protection of human health and the environment. While EPA found other areas of the document worthy of comment (i.e. barrier wall performance, hydraulic head analyses, arsenic flux, geochemical trends analysis, etc.), it will refrain from raising specific concerns as written comments on the draft 2020 SHL Annual Report. in hopes that these issues can be discussed and resolved in the context of Army's future submittal of documents required per the aforementioned Additional Work letter.	The ATP was installed as a contingency remedy triggered by conditions of the ROD. ATP system performance, per the final May 2005 Remedial Design and Remedial Action Workplan by CH2M Hill, was "to be evaluated through hydraulic monitoring demonstrating appropriate capture zone dimensions for the containment system." The primary design criteria for the ATP were that it provide containment of the groundwater plume in the vicinity of the base boundary and meet POTW discharge requirements. The groundwater model by Geosyntec and Phase 1 Technical Memorandums prepared to date indicate that the ATP is meeting the objective of capturing groundwater containing dissolved arsenic exiting the north end of the landfill. Technical Memo 5 will evaluate the arsenic mass flux on the eastern boundary of the capture zone that may not be captured at all times; this represents a small percentage of the groundwater exiting the landfill. The Army does not expect the ATP to restore groundwater to meet MCLs; reducing aquifer geochemistry and many years of empirical data collected and summarized by the Army do not indicate that the ATP will restore groundwater quality at SHL to below MCLs. Extraction of groundwater by the ATP does have some effect on dissolved metals concentrations downgradient due to prevention of transport of some arsenic and chemically reduced groundwater downgradient. This being said, there are naturally occurring sources of arsenic that are not intercepted by the extraction system (i.e. there is no statistically significant trend for arsenic concentrations over time at Nearfield Area bedrock monitoring wells SHP-2016-6A, -6B, or -6C, which will be documented in Technical Memo 5) and there is a potential for groundwater in the NIA to be naturally reducing due to the presence of organic carbon in the wetland and native soils in that area (i.e. there was no statistically significant trend at downgradient NIA monitoring well SHM-13-03, as shown in Table 8 and in Appendix H). These conditions will persist regardless of ATP operation. In accordance with the SHL Informal Dispute SOW, potential remedial alternatives will be evaluated in a focused feasibility study that will be submitted for review and comment.