REMOVAL PROGRAM
PRELIMINARY ASSESSMENT/
SITE INVESTIGATION REPORT
FOR THE
FAY STREET SITE
LOWELL, MIDDLESEX COUNTY, MASSACHUSETTS
23 AND 24 JULY 2013

Prepared For:

U.S. Environmental Protection Agency
Region I
Emergency Planning and Response Branch
5 Post Office Square, Suite 100
Boston, Massachusetts 02109-3912

CONTRACT NO. EP-W-05-042

TDD NO. 01-13-06-0001

TASK NO. 0881

DC NO. R-7539

Submitted By:

Weston Solutions, Inc.
Region I
Superfund Technical Assessment and Response Team (START)
3 Riverside Drive
Andover, MA 01810

October 2013

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I. Preliminary Assessment/Site Investigation Forms

EPA REGION I
REMOVAL PRELIMINARY ASSESSMENT

Site Name and Location

Name: Fay Street **Location:** 86 Fay Street
Town: Lowell **County:** Middlesex **State:** Massachusetts

Site Status: **( ) NPL** **( ) NON-NPL** **( ) RCRA** **( ) TSCA**
(X) ACTIVE **( ) ABANDONED** **(X) OTHER**

(X) Attached USGS Map of Location **(X) Site I.D. No.:** 01LH

Latitude: 42º 37′ 26.3″ North **Longitude:** 71º 18′ 10.2″ West

Referral

( ) Citizen **( ) City/Town** **(X) State** **( ) Preremedial** **( ) RCRA**
( ) Other:

Name of referring party: Massachusetts Department of Environmental Protection (MassDEP)
Address: 205B Lowell Street, Wilmington, Massachusetts 01887
Telephone: (978) 694-3200

Contacts Identified
1) Valerie Thompson, MassDEP **Telephone:** (978) 694-3348
2) **Telephone:** ( )
3) **Telephone:** ( )

Source of Information

( ) Verbal:
(X) Report: TRC Environmental Corporation. 2012. *Phase I Initial Site Investigation Report and Tier Classification, 86 Fay Street, Lowell, Massachusetts*, MassDEP RTN 3-25722. June.

TRC Environmental Corporation. 2012. *Analysis of Brownfields Cleanup Alternatives and Release Abatement Measure Plan, 86 Fay Street, Lowell, Massachusetts*, MassDEP RTN 3-25722. August.

TRC Environmental Corporation. 2013. *Release Abatement Measure Completion Report, 86 Fay Street, Lowell, Massachusetts*, MassDEP RTN 3-25722. January.

( ) Other:

REMOVAL PRELIMINARY ASSESSMENT

Potential Responsible Parties

Owner: City of Lowell **Telephone:** (978) 674-4000
Address: 375 Merrimack Street, Lowell, Massachusetts 01852
Operator: Same **Telephone:** ( )
Address:

Site Access

Authorizing Person: Nancy Giblin (74 and 78 Fay Street); City of Lowell (86 Fay Street and 1170 Gorham Street); Condo Association President (106 Lundberg Street)
Date: July 2013 **(X)Obtained** **( )Verbal**
Telephone: ( ) **( )Not Obtained** **(X)Written**

Historical Preservation

( ) Site is Historically Significant or Eligible for Historic Preservation

Contacts Identified

1) State Historical Preservation Officer (SHPO)
Name: Ms. Judith B. McDonough **Telephone:** (617) 727-8470
2) Tribal Historical Preservation Officer (THPO)
Name: **Telephone:** ( )

Comments:

Physical Site Characterization

Background Information: The Fay Street site (the site) is located at 86 Fay Street, Lowell, Middlesex County, Massachusetts (MA). The geographic coordinates, as measured from the approximate center of the 86 Fay Street property, are 42° 37' 26.3" north latitude and 71° 18' 10.2" west longitude. The parcel is a vacant lot identified on the Lowell Tax Assessor's Office on Map Number (No.) 186, Lot No. 86. The site is comprised of four individual parcels surrounding 86 Fay Street. These parcels are identified by the City of Lowell Tax Assessor's Office on Map No. 168 as Lot Nos. 74 and 78; on Map No. 185 as Lot No. 1170; and on Map No. 207 as Lot No. 106. Lot Nos. 74 and 78 (74 and 78 Fay Street) are 0.14-acre and 0.28-acre residentially zoned lots, which contain a residence and adjacent lawn. Lot No. 1170 (1170 Gorham Street/O'Donnell Park) is approximately 11.45 acres and contains Shaughnessy Elementary school, a baseball field, and a grassy lot. Lot No. 106 (106 Lundberg Street) is approximately 2 acres and contains eight residential condominium buildings and associated grounds. Residential properties are located to the south and west of the site. A baseball field and Shaughnessy Elementary School are located to the north of the site, and railroad tracks owned by Massachusetts Bay Transportation Authority (MBTA) are located immediately east of the site. The entrance to the site has a locked gate; but the remainder of the site is not fenced, with the

exception of fencing on the private residences which make up a portion of the site. There is no fencing along the grassy lot that abuts the 86 Fay Street property to the north.

The site is currently co-owned by the City of Lowell and Lowell Public Schools. Based on historical documents, the site was acquired by the City between 1945 and 1950 for tax purposes. Prior to the City's acquisition of the property, records indicate that the property was in the possession of the Thissel family from 1880 through 1943. Historical data indicate the site has been vacant since at least 1880. Properties in the vicinity of the site have been mainly residential since at least 1880. An exception is the property to the south of the site. In 1896 it housed a structure known as J.A. Ready Boiler Works, which was demolished between 1904 and 1906. Additionally, the 1924 City of Lowell Atlas shows another building on the property, which was demolished by 1938. Another exception is the property bordering the site to the north, which was occupied by the Middlesex North Agricultural Fairgrounds from 1860 until about 1910, when it was divided by the North Land Company. The property is currently occupied by two schools, the Butler Middle School and Shaughnessy Elementary School. Previous site investigations and historical data suggest the site was used for land disposal of ash prior to 1938.

On 30 May 2006, as part of a limited environmental assessment on behalf of the City of Lowell, Engineering & Consulting Resources, Inc. (ECR) advanced four soil borings, which were completed as 2-inch-diameter polyvinyl chloride (PVC) groundwater monitoring wells (MW-1 through MW-4). As of 2012, the groundwater monitoring wells remained intact, with the exception of MW-2.

Soil samples collected during groundwater monitoring well installation indicated that soils on the site consist of approximately 3 feet of topsoil mixed with ash. The topsoil was laid over ash fill, which ranged from 9 to 14 feet below ground surface (bgs). The ash fill layer was underlain by sand and silt to at least 20 feet bgs. Depth to groundwater on the site ranged from 9 to 14 feet. The water table was generally found to be within the ash layer. Analytical results of the soil samples indicated concentrations of arsenic, barium, cadmium, chromium, lead, nickel, thallium, and zinc above Massachusetts Contingency Plan (MCP) S-1 soil standards in at least one of the eight soil samples collected. Extractable petroleum hydrocarbons (EPHs) and polycyclic aromatic hydrocarbons (PAHs) were detected in two of four samples, with concentrations of benzo(a)anthracene, chrysene, benzo(b)fluoranthene, and benzo(a)pyrene above MCP S-1 soil standards. In addition, two of the soil samples with the highest total lead concentrations were also analyzed by toxicity characteristic leaching procedure (TCLP). The results indicated that lead and cadmium were detected, but below Resource Conservation and Recovery Act (RCRA) hazardous waste limits.

Analytical results of groundwater samples collected from the installed wells indicated that barium, lead, and zinc were detected in two of the monitoring wells. The lead concentrations were above GW-3 standards in one well. The barium and zinc concentrations were below GW-3 standards. Analytical results indicated that EPH and volatile petroleum hydrocarbons (VPH) concentrations were below laboratory detection limits.

On 20 July 2010, Hager Geosciences, Inc. conducted an electromagnetic (EM) and ground penetrating radar (GPR) survey to assist in the evaluation of possible horizontal and vertical extents of the ash fill, and fill across the site, and to guide the selection of test pit investigations.

REMOVAL PRELIMINARY ASSESSMENT

Depth to the ash fill layer was inferred to be between 3.5 and 4.5 feet deep across the site, as surveyed by GPR. The bottom of the ash fill layer was inferred to be highest at about 8.5 feet deep on the southern portion of the site and increased steadily in depth to about 14.5 feet deep at the northern portion of the site. The total depth of the ash fill layer was inferred to be thinnest on the southern portion of the site (4-5 feet thick) and steadily increased to thickest on the northern portion of the site (9-10 feet thick) [8-10].

On 23 August 2010, 10 test pits (TP-1 through TP-10) were excavated to 5 feet bgs at the site by Mill City Environmental, Inc., under the supervision of a TRC Environmental Corporation (TRC) engineer. Soil samples were collected from test pit locations TP-1 through TP-10 and were submitted to Con-test Analytical Laboratories for analysis of MCP 14 metals and PAHs. Soil analytical results indicated that PAHs were identified at concentrations exceeding the applicable MCP soil standards. Arsenic, barium, cadmium, chromium, lead, and nickel were detected at concentrations above applicable standards in at least one test pit location. In addition, TRC collected two debris pile samples (DP-1 and DP-2) from the piles observed on site. The debris pile samples were submitted to Con-test Analytical Laboratories for analysis of VOCs, MCP 14 metals, EPHs, and PAHs. Analytical results indicated that EPHs were identified in both samples. Fractions of EPHs were C_{19}-C_{36} aliphatics and C_{11}-C_{22} aromatics. Both were detected at concentrations below applicable S-1 standards.

On 27 August 2010, TRC collected groundwater samples from groundwater monitoring wells MW-1 through MW-4. Groundwater samples were submitted to Con-test Laboratories for analysis of total lead and dissolved lead. Total lead and dissolved lead were detected at concentrations well below the applicable MCP GW-3 standards.

On 21 January 2011, TRC personnel collected five surface soil samples approximately 10 feet from the location of TP-1. Surface soil samples were submitted to Con-test Laboratories for arsenic analysis. These samples were collected to evaluate a potential Imminent Hazard (IH) condition regarding arsenic concentrations exceeding 40 mg/Kg in soils from 0-3 feet below grade at TP-01.

On 7 March 2012, TRC personnel collected five surface soil samples (SS-6 through SS-10) along the slope of the northeastern boundary of the site. Surface soil samples were submitted for laboratory analysis of PAHs and MCP-14 metals. These samples were collected for evaluation of a surficial contaminant migration concern toward the wetland area located northeast of the site. Analytical results revealed the presence of arsenic, lead, nickel, benzo(a)pyrene, and dibenzo(a,h)anthracene in at least one surface soil sample, exceeding the applicable MCP soil standards.

The Phase I Site Investigation report completed by TRC in June 2012 indicates the site may have been used as local landfill for a fairground located north of the site, which was in operation from about 1860 through 1910. TRC and other previous consultants have observed surface debris including granite blocks, asphalt, electronic parts, used oil filters, television parts, plastic and glass bottles, and lawn clippings, indicating the potential of more recent dumping on the site.

The Phase I investigation completed by TRC indicated the presence of multiple metals and PAHs in soil at concentrations above the applicable MCP Method 1 S-1/GW-3 standards. This

contamination is believed to be derived from historical fill at the site. Contaminants of concern were not detected in groundwater at concentrations above applicable MCP Method 1 GW-3 or Groundwater Reporting Category (RCGW)-2 criteria. Numerical Ranking System (NRS) Site Scoring resulted in a score of 308, classifying the site as a Tier II Disposal Site.

In 2012, a Release Abatement Measure (RAM) was completed at the site to achieve MCP Site closure by demonstrating that a condition of No Significant Risk to human health and the environment has been achieved. Excavation of the top 1.5-3 feet of soil was conducted in order to achieve final lead Exposure Point Concentrations (EPCs) of less than 400 mg/Kg within the upper 3 feet of soil. On 12 through 18 December 2012, City of Lowell contractors Corporate Environmental Advisors (CEA), Inc., of West Boylston, MA, completed excavation of soil and ash fill to depths of approximately 1.5 to 3 feet in Areas 1 and 2. A measured total of 1,949.7 tons of soils were excavated and removed from the site for off-site disposal. Approximately 1,500 cubic yards (yd^3) of soil were removed. Excavation activities were terminated at a maximum depth of approximately 3 feet below grade.

On 19 and 20 December 2012, the excavated areas were backfilled by CEA with an estimated 2,145 tons of imported clean backfill from Patterson's Construction. Clean backfill was spread with a bulldozer and compacted with a 10-ton vibratory roller. The site was left with a bare, clean, backfill gravel surface until redevelopment plans were finalized. On 28 December 2012, a post-RAM inspection conducted by TRC indicated that the clean fill cover was in good condition, with minor ½-inch erosion after several heavy precipitation events.

Description of Substances Possibly Present, Known or Alleged: Metals including arsenic and lead; and PAHs in soil.

Existing Analytical Data

( ) Real-Time Monitoring Data:

(X) Sampling Data: Soil and groundwater sampling conducted by ECR in May 2006.

Soil, debris pile, test pit, and groundwater sampling conducted by TRC from August 2010 through January 2011.

Potential Threat

Description of potential hazards to environment and/or population-identify any of the criteria for a Removal Action (from NCP) that may be met by the site under 40 CFR 300.415 [b] [2].

i. Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances, pollutants or contaminants.

ii. Actual or potential contamination of drinking water supplies or sensitive ecosystems.

iii. Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers, that may pose a threat of release.

iv. High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate.

v. Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released.

vi. Threat of fire or explosion.

vii. The availability of other appropriate federal or state response mechanisms to respond to the release.

viii. Other situations or factors that may pose threats to public health or welfare or the environment.

Prior Response Activities

(X) PRP ( ) STATE ( ) FEDERAL ( ) OTHER
Brief Description: The City of Lowell conducted a Release Abatement Measure at the site, excavating up to 3 feet of soil to achieve final lead EPCs less than 400 mg/Kg.

Priority for Site Investigation

(X) High ( ) Medium Low ( ) None ( )
Comments:

Report Generation

Originator:	Bonnie Firriello	**Date:**	9 August 2013
Affiliation:	Weston Solutions, Inc. (START)	**Telephone:**	(978) 552-2131
TDD No.:	01-13-06-0001	**Task No.:**	0881

EPA REGION I
REMOVAL SITE INVESTIGATION

Inspection Information

Site Name: Fay Street **Address:** 86 Fay Street
Town: Lowell **County:** Middlesex **State:** Massachusetts
Date of Inspection: 23 July 2013 **Time of Inspection:** 0800 hours
Weather Conditions: 75 ° Fahrenheit; Overcast, on/off light to heavy rain.
Date of Inspection: 24 July 2013 **Time of Inspection:** 0730 hours
Weather Conditions: 85 ° Fahrenheit; Partly cloudy, hazy, hot, and humid.
Site Status at Time of Inspection: **( ) ACTIVE (X) INACTIVE**
Comments: The site consists of a vacant lot and three surrounding properties.

Agencies/Personnel Performing Inspection

	Names	Program
(X) EPA:	Mike Nalipinski Eric Vanderboom	U.S. Environmental Protection Agency (EPA) Region I, Emergency Planning and Response Branch (EPRB), On- Scene Coordinator (OSC).
(X) EPA Contractor:	Eric Ackerman Bonnie Mace Paul Callahan Jonathan Saylor	Weston Solutions, Inc. (WESTON), Superfund Technical Assessment and Response Team III (START).
(X) State:	Valerie Thompson	Massachusetts Department of Environmental Protection (MassDEP).

Current Owner Based on Field Interview: City of Lowell and Lowell Public Schools

REMOVAL SITE INVESTIGATION

Physical Site Characteristics

Parameter		Quantities/Extent
( ) Cylinders:		
( ) Drums:		
( ) Lagoons:		
( ) Tanks:	**( ) Above:**	
	( ) Below:	
( ) Asbestos:		
( ) Piles:		
( ) Stained Soil:		
( ) Sheens:		
( ) Stressed Vegetation:		
(X) Landfill:		The site was historically used to dispose of ash material.
(X) Population in Vicinity:		The site is adjacent to residential properties to the west and south.
(X) Wells:	**( ) Drinking:**	
	(X) Monitoring:	There were four monitoring wells installed at the site, but only three remain.
( ) Other:		

Physical Site Observations

The 86 Fay Street property is currently a vacant lot. The entrance to the site has a locked gate, but the remainder of the site is not fenced, with the exception of fencing along the abutting private residences which make up a portion of the site. There is no fencing along the grassy lot that abuts the 86 Fay Street property to the north. The site is comprised of four individual parcels surrounding 86 Fay Street: 74 and 78 Fay Street are 0.14-acre and 0.28-acre residentially zoned lots, which contain a residence and adjacent lawn; 1170 Gorham Street/O'Donnell Park is approximately 11.45 acres and contains Shaughnessy Elementary school, a baseball field, and a grassy lot; 106 Lundberg Street is approximately 2 acres and contains eight residential condominium buildings and associated grounds. In addition, railroad tracks owned by Massachusetts Bay Transportation Authority (MBTA) are located immediately east of the site.

Field Sampling and Analysis

Matrix/Analytical		**Field Instrumentation**				
Parameter		**CGI/O_2**	**RAD**	**PID**	**FID**	**Other**
Background Readings:		0.0%/20.9%	8-10 µR/hr	0.0	--	--
Air:		0.0%/20.9%	8-10 µR/hr	0.0	--	--
Soil:		0.0%/20.9%	8-10 µR/hr	0.0	--	--
Surface:						
Water:						
Tanks:						

Matrix/Analytical Parameter		Field Instrumentation				
		CGI/O_2	RAD	PID	FID	Other
Drums:						
Vats:						
Lagoons:						
Spillage:						
Run Off:						
Piles:						
Sediments:						
Groundwater:						
Other:						

Field Quality Control Procedures

(X) SOP Followed **( ) Deviation From SOP**

Comments: START followed the protocol outlined in the document entitled, *Sampling and Analysis Plan for the Fay Street Site, Lowell, Middlesex County, Massachusetts*, dated July 2013.

Description of Sampling Conducted

On 23 July 2013, START collected a total of 54 samples, including four field duplicates. Specifically, 41 soil samples, including three field duplicates, were collected from property F-01; and 13 soil samples, including one field duplicate, were collected from property F-02. On 24 July 2013, START personnel collected a total of 79 surface and subsurface soil samples, including six field duplicates, from properties F-01, F-02, and F-03. Specifically, 12 soil samples, including one field duplicate, were collected from property F-01; 26 soil samples, including two field duplicates, were collected from property F-02; and 41 soil samples, including three field duplicates, were collected from property F-03. All of the soil samples were collected for on-site metals screening via XRF by START member Mace. Approximately 10% of the samples were selected for confirmatory metals analysis at the EPA Office of Environmental Measurement and Evaluation (OEME) laboratory located in North Chelmsford, Massachusetts.

Analyses

Analytical Parameter	Media	Laboratory
( ) VOC	**( ) AIR**	**(X) NERL**
( ) PCB	**( ) WATER**	**( ) CLP**
( ) PESTICIDE	**(X) SOIL**	**( ) PRIVATE**
(X) METALS	**( ) SOURCE**	**( ) DAS**
( ) CYANIDE	**( ) SEDIMENT**	**( ) SOW**
( ) SVOC	**( ) SOIL GAS**	**(X) FIELD**
( ) TOXICITY		
( ) DIOXIN		
( ) ASBESTOS		
( ) OTHER		

Analytical results: [see attached]

Receptors

		Comments
( ) Drinking Water:	**( ) Private:**	
	( ) Municipal:	
(X) Groundwater:		There were four monitoring wells installed at the site, but only three remain.
(X) Unrestricted Access:		The entrance to the site has a locked gate; but the remainder of the site is not fenced, with the exception of fencing along the private residences that abut to the west and south.
(X) Population in Proximity:		The site is adjacent to residential properties to the west and south.
( ) Sensitive Ecosystem:		
( ) Other:		

Additional Procedures for Site Determination

( ) Biological Evaluation **( ) ATSDR**

To be determined by the On-Scene Coordinator (OSC).

Site Determination

Depending on further information, criteria that may be met by the site include 40 CFR 300.415 [b] [2], parts:

i. Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances, pollutants or contaminants.

ii. Actual or potential contamination of drinking water supplies or sensitive ecosystems.

iii. Hazardous substances or pollutants or contaminants in drums, barrels, tanks, or other bulk storage containers, that may pose a threat of release.

iv. High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate.

v. Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released.

vi. Threat of fire or explosion.

vii. The availability of other appropriate federal or state response mechanisms to respond to the release.

viii. Other situations or factors that may pose threats to public health or welfare or the environment.

Report Generation			
Originator:	Bonnie J. Mace	**Date:**	12 August 2013
Affiliation:	Weston Solutions, Inc. (START)	**Telephone:**	(978) 552-2131
TDD No.:	01-13-06-0001	**Task No.:**	0881

II. Narrative Chronology

Narrative Chronology

Site Description

The Fay Street site (the site) is located at 86 Fay Street, Lowell, Middlesex County, Massachusetts (MA). The geographic coordinates, as measured from the approximate center of the 86 Fay Street property, are 42° 37' 26.3" north latitude and 71° 18' 10.2" west longitude (see Appendix A, Figure 1) [1]. The parcel is a vacant lot identified on the Lowell Tax Assessor's Office on Map Number (No.) 186, Lot No. 86 [2]. The site is comprised of four individual parcels surrounding 86 Fay Street. These parcels are identified by the City of Lowell Tax Assessor's Office on Map No. 168 as Lot Nos. 74 and 78; on Map No. 185 as Lot No. 1170; and on Map No. 207 as Lot No. 106 (see Appendix A, Figure 2) [3-7]. Lot Nos. 74 and 78 (74 and 78 Fay Street) are 0.14-acre and 0.28-acre residentially zoned lots, which contain a residence and adjacent lawn. Lot No. 1170 (1170 Gorham Street/O'Donnell Park) is approximately 11.45 acres and contains Shaughnessy Elementary school, a baseball field, and a grassy lot. Lot No. 106 (106 Lundberg Street) is approximately 2 acres and contains eight residential condominium buildings and associated grounds. Residential properties are located to the south and west of the site. A baseball field and Shaughnessy Elementary School are located to the north of the site, and railroad tracks owned by Massachusetts Bay Transportation Authority (MBTA) are located immediately east of the site. The entrance to the site has a locked gate; but the remainder of the site is not fenced, with the exception of fencing on the private residences which make up a portion of the site.

Site Background

The site is currently co-owned by the City of Lowell and Lowell Public Schools. Based on historical documents, the site was acquired by the City between 1945 and 1950 for tax purposes. Prior to the City's acquisition of the property, records indicate that the property was in the possession of the Thissel family from 1880 through 1943. Historical data indicate the site has been vacant since at least 1880. Properties in the vicinity of the site have been mainly residential since at least 1880. An exception is the property to the south of the site. In 1896 it housed a structure known as J.A. Ready Boiler Works, which was demolished between 1904 and 1906. Additionally, the 1924 City of Lowell Atlas shows another building on the property, which was demolished by 1938. Another exception is the property bordering the site to the north, which was occupied by the Middlesex North Agricultural Fairgrounds from 1860 until about 1910, when it was divided by the North Land Company. The property is currently occupied by two schools, the Butler Middle School and Shaughnessy Elementary School. Previous site investigations and historical data suggest the site was used for land disposal of ash prior to 1938 [8-10].

On 30 May 2006, as part of a limited environmental assessment on behalf of the City of Lowell, Engineering & Consulting Resources, Inc. (ECR) advanced four soil borings, which were completed as 2-inch-diameter polyvinyl chloride (PVC) groundwater monitoring wells (MW-1 through MW-4). As of 2012, the groundwater monitoring wells remained intact, with the exception of MW-2 [8-10].

Soil samples collected during groundwater monitoring well installation indicated that soils on the site consist of approximately 3 feet of topsoil mixed with ash. The topsoil was laid over ash fill,

which ranged from 9 to 14 feet below ground surface (bgs). The ash fill layer was underlain by sand and silt to at least 20 feet bgs. Depth to groundwater on the site ranged from 9 to 14 feet. The water table was generally found to be within the ash layer. Analytical results of the soil samples indicated concentrations of arsenic, barium, cadmium, chromium, lead, nickel, thallium, and zinc above Massachusetts Contingency Plan (MCP) S-1 soil standards in at least one of the eight soil samples collected. Extractable petroleum hydrocarbons (EPHs) and polycyclic aromatic hydrocarbons (PAHs) were detected in two of four samples, with concentrations of benzo(a)anthracene, chrysene, benzo(b)fluoranthene, and benzo(a)pyrene above MCP S-1 soil standards. In addition, two of the soil samples with the highest total lead concentrations were also analyzed by toxicity characteristic leaching procedure (TCLP). The results indicated that lead and cadmium were detected, but below Resource Conservation and Recovery Act (RCRA) hazardous waste limits [8-10].

Analytical results of groundwater samples collected from the installed wells indicated that barium, lead, and zinc were detected in two of the monitoring wells. The lead concentrations were above GW-3 standards in one well. The barium and zinc concentrations were below GW-3 standards. Analytical results indicated that EPH and volatile petroleum hydrocarbons (VPH) concentrations were below laboratory detection limits [8-10].

On 20 July 2010, Hager Geosciences, Inc. conducted an electromagnetic (EM) and ground penetrating radar (GPR) survey to assist in the evaluation of possible horizontal and vertical extents of the ash fill, and fill across the site, and to guide the selection of test pit investigations. Depth to the ash fill layer was inferred to be between 3.5 and 4.5 feet deep across the site, as surveyed by GPR. The bottom of the ash fill layer was inferred to be highest at about 8.5 feet deep on the southern portion of the site and increased steadily in depth to about 14.5 feet deep at the northern portion of the site. The total depth of the ash fill layer was inferred to be thinnest on the southern portion of the site (4-5 feet thick) and steadily increased to thickest on the northern portion of the site (9-10 feet thick) [8-10].

On 23 August 2010, 10 test pits (TP-1 through TP-10) were excavated to 5 feet bgs at the site by Mill City Environmental, Inc., under the supervision of a TRC Environmental Corporation (TRC) engineer. Soil samples were collected from test pit locations TP-1 through TP-10 and were submitted to Con-test Analytical Laboratories for analysis of MCP 14 metals and PAHs. Soil analytical results indicated that PAHs were identified at concentrations exceeding the applicable MCP soil standards. Arsenic, barium, cadmium, chromium, lead, and nickel were detected at concentrations above applicable standards in at least one test pit location. In addition, TRC collected two debris pile samples (DP-1 and DP-2) from the piles observed on site. The debris pile samples were submitted to Con-test Analytical Laboratories for analysis of VOCs, MCP 14 metals, EPHs, and PAHs. Analytical results indicated that EPHs were identified in both samples. Fractions of EPHs were C_{19}-C_{36} aliphatics and C_{11}-C_{22} aromatics. Both were detected at concentrations below applicable S-1 standards [8-10].

On 27 August 2010, TRC collected groundwater samples from groundwater monitoring wells MW-1 through MW-4. Groundwater samples were submitted to Con-test Laboratories for analysis of total lead and dissolved lead. Total lead and dissolved lead were detected at concentrations well below the applicable MCP GW-3 standards [8-10].

On 21 January 2011, TRC personnel collected five surface soil samples approximately 10 feet from the location of TP-1. Surface soil samples were submitted to Con-test Laboratories for arsenic analysis. These samples were collected to evaluate a potential Imminent Hazard (IH) condition regarding arsenic concentrations exceeding 40 mg/Kg in soils from 0-3 feet below grade at TP-01 [8-10].

On 7 March 2012, TRC personnel collected five surface soil samples (SS-6 through SS-10) along the slope of the northeastern boundary of the site. Surface soil samples were submitted for laboratory analysis of PAHs and MCP-14 metals. These samples were collected for evaluation of a surficial contaminant migration concern toward the wetland area located northeast of the site. Analytical results revealed the presence of arsenic, lead, nickel, benzo(a)pyrene, and dibenzo(a,h)anthracene in at least one surface soil sample, exceeding the applicable MCP soil standards [8-10].

The Phase I Site Investigation report completed by TRC in June 2012 indicates the site may have been used as local landfill for a fairground located north of the site, which was in operation from about 1860 through 1910. TRC and other previous consultants have observed surface debris including granite blocks, asphalt, electronic parts, used oil filters, television parts, plastic and glass bottles, and lawn clippings, indicating the potential of more recent dumping on the site [8].

The Phase I investigation completed by TRC indicated the presence of multiple metals and PAHs in soil at concentrations above the applicable MCP Method 1 S-1/GW-3 standards. This contamination is believed to be derived from historical fill at the site. Contaminants of concern were not detected in groundwater at concentrations above applicable MCP Method 1 GW-3 or Groundwater Reporting Category (RCGW)-2 criteria. Numerical Ranking System (NRS) Site Scoring resulted in a score of 308, classifying the site as a Tier II Disposal Site [8].

In 2012, a Release Abatement Measure (RAM) was completed at the site to achieve MCP Site closure by demonstrating that a condition of No Significant Risk to human health and the environment has been achieved. Excavation of the top 1.5-3 feet of soil was conducted in order to achieve final lead Exposure Point Concentrations (EPCs) of less than 400 mg/Kg within the upper 3 feet of soil. On 12 through 18 December 2012, City of Lowell contractors Corporate Environmental Advisors (CEA), Inc., of West Boylston, MA, completed excavation of soil and ash fill to depths of approximately 1.5 to 3 feet in Areas 1 and 2. A measured total of 1,949.7 tons of soils were excavated and removed from the site for off-site disposal. Approximately 1,500 cubic yards (yd^3) of soil were removed. Excavation activities were terminated at a maximum depth of approximately 3 feet below grade [9-10].

On 19 and 20 December 2012, the excavated areas were backfilled by CEA with an estimated 2,145 tons of imported clean backfill from Patterson's Construction. Clean backfill was spread with a bulldozer and compacted with a 10-ton vibratory roller. The site was left with a bare, clean, backfill gravel surface until redevelopment plans were finalized. On 28 December 2012, a post-RAM inspection conducted by TRC indicated that the clean fill cover was in good condition, with minor ½-inch erosion after several heavy precipitation events [10].

Site Activities

On 23 July 2013, EPA On-Scene Coordinator (OSC) Eric Vanderboom and START members Eric Ackerman, Bonnie Mace, Paul Callahan, and Jonathan Saylor mobilized to the site to establish a 25-foot grid on properties adjacent to the site and to conduct surface and subsurface soil sampling. START personnel established a support zone and calibrated the air monitoring instruments, including a MultiRAE and a radiation meter (MicroR) [11-12]. Background levels were recorded in the Health and Safety Plan (HASP) as follows: volatile organic compound (VOC) = 0.0 parts per million (ppm); lower explosive limit (LEL) = 0%; oxygen (O_2) = 20.9%; and MicroR = 12-15 microRoentgens per hour (µR/hr). START member Callahan conducted a safety and operations meeting, and on-site personnel reviewed and signed the site HASP. The HASP was prepared as a separate document, entitled *Weston Solutions, Inc., Region I START Site Health and Safety Plan (HASP) for the Fay Street Site, Lowell, Massachusetts*, dated July 2013.

START personnel began establishing a 25-foot grid on properties designated as F-01 (74 and 78 Fay Street, residential property west of the site) and F-02 (1170 Gorham Street, grassy field north of site). START personnel established 13 locations (F-01 SB-01 through F-01 SB-13) on property F-01, and 10 locations (F-02 SB-01 through F-02 SB-10) on property F-02 (see Appendix A, Figures 3, 3A, and 3B). START personnel collected a total of 54 samples, including four field duplicates [13]. Specifically, 41 soil samples, including three field duplicates, were collected from property F-01; and 13 soil samples, including one field duplicate, were collected from property F-02 (see Appendix B, Table 1). All of the soil samples were collected for on-site metals screening via X-Ray Fluorescence (XRF) by START member Mace [14]. Approximately 10% of the samples were selected for confirmatory metals analysis. Sampling activities were performed in accordance with the site sampling and analysis plan (SAP), which was prepared as a separate document, entitled *Sampling and Analysis Plan for the Fay Street Site, Lowell, Middlesex County, Massachusetts.*

On 24 July 2013, EPA OSCs Vanderboom and Mike Nalipinski and START members Ackerman, Mace, Callahan, and Saylor mobilized to the site to complete surface and subsurface soil sampling. START personnel established a support zone and calibrated the air monitoring instrument, a MultiRAE. Background levels were recorded in the HASP as follows: VOC = 0.0 ppm; LEL = 0%; and O_2 = 20.9%. START member Callahan conducted a safety and operations meeting, and on-site personnel reviewed and signed the daily tailgate meeting sign-in sheet in the site HASP.

START personnel continued establishing a 25-foot grid on the property designated as F-03 (106 Lundberg Street, condominiums south of the site) (see Appendix A, Figures 3, 3A, 3B and 3C). In addition, START added additional sampling locations on the three properties based on visual observations and XRF results, as requested by OSC Nalipinski, and completed soil sampling. START personnel collected a total of 79 soil samples, including six field duplicates, from properties F-01, F-02, and F-03. Specifically, 12 soil samples, including one field duplicate, were collected from property F-01; 26 soil samples, including two field duplicates, were collected from property F-02; and 41 soil samples, including three field duplicates, were collected from property F-03. All of the soil samples were collected for on-site metals screening via XRF by START member Mace. Approximately 10% of the samples were selected for confirmatory metals analysis. In addition, START member Mace utilized the Trimble™ Pathfinder Pro XRS Global Position System (GPS) unit

to record sample locations and site features (see Appendix A, Figure 3), and photodocumented sample locations and site features (see Appendix C, Photodocumentation Log) [15].

Following sample collection activities, START personnel completed a chain-of-custody (COC) record to document the history of samples from the time of sample collection through transportation and analysis (see Appendix D, Chain-of-Custody Record). Selected soil samples were sent to EPA Office of Environmental Measurement and Evaluation (OEME) laboratory, located in North Chelmsford, Massachusetts, for confirmatory metals analysis. Please refer to Appendix B for a summary of analytical results.

On 5 September 2013, START received the analytical data results from OEME [16]. These data are summarized in Appendix B (see Appendix B, Tables 2 through 5). Complete laboratory data results may be found in Appendix E.

Analytical Data Summaries

Lead was detected in all 123 surface and subsurface soil samples that were screened on site with the XRF analyzer, ranging from 43 parts per million (ppm) to 3,205 ppm (see Appendix A, Figures 3A, 3B, and 3C; and Appendix B, Tables 2, 3, and 4).

Eighteen metals were detected in the confirmatory surface soil samples and include the following (maximum concentration in mg/Kg, and sample location in parentheses): aluminum (13,000 mg/Kg in F-03 SB-06C); arsenic (160 mg/Kg in F-03 SB-05C); barium (1,200 mg/Kg in F-03 SB-05C); beryllium (1.6 mg/Kg in F-03 SB-05C); calcium (8,500 mg/Kg in F-01 SB-11A); cadmium (13 mg/Kg in F-01 SB-04A); cobalt (16 mg/Kg in F-03 SB-06C); chromium (150 mg/Kg in F-03 SB-06C); copper (430 mg/Kg in F-03 SB-05C); iron (25,000 mg/Kg in F-01 SB-11A); magnesium (3,000 mg/Kg in F-03 SB-13A); manganese (1,110 mg/Kg in F-01 SB-04A); nickel (36 mg/Kg in F-01 SB-13C and F-03 SB-06C); lead (7,300 mg/Kg in F-03 SB-06C); antimony (10 mg/Kg in F-03 SB-06C); selenium (5.8 mg/Kg in F-03 SB-05C); vanadium (64 mg/Kg in F-01 SB-05A); and zinc (1,400 mg/Kg in F-01 SB-04A). In addition, two metals (arsenic and lead) were detected above their respective Massachusetts Contingency Plan Soil Category S-2 (MCP S-2) standards in one or more surface and subsurface soil samples (see Appendix A, Figures 4A, 4B, and 4C; Appendix B, Table 5; and Appendix E, Reference 16).

REFERENCES

[1] U.S. Geological Survey (USGS). 1979. Billerica and Lowell, Massachusetts. (7.5-minute series topographic map).

[2] City of Lowell, Massachusetts. 2013. Tax Assessor's Property Card for Parcel ID 0186 2270 0086 0000.

[3] City of Lowell, Massachusetts. 2013. Tax Assessor's Property Card for Parcel ID 0186 2270 0074 0000.

[4] City of Lowell, Massachusetts. 2013. Tax Assessor's Property Card for Parcel ID 0186 2270 0078 0000.

[5] City of Lowell, Massachusetts. 2013. Tax Assessor's Property Card for Parcel ID 0185 2675 1170 0000.

[6] City of Lowell, Massachusetts. 2013. Tax Assessor's Property Card for Parcel ID 0207 106.

[7] ESRI, i-cubed, USDA FSA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGP. 2011. ArcGIS.com World Imagery Map. 30 March.

[8] TRC Environmental Corporation. 2012. *Phase I Initial Site Investigation Report and Tier Classification.* June.

[9] TRC Environmental Corporation. 2012. *Analysis of Brownfields Cleanup Alternatives and Release Abatement Measure Plan.* August.

[10] TRC Environmental Corporation. 2013. *Release Abatement Measure Plan Completion Report.* January.

[11] Weston Solutions, Inc. May 2011. Standard Operating Procedure for PID-MultiRAE (Multi-gas monitor with VOC detection and LEL) RAE Model PGM-50 Multi-Gas Monitor (MultiRAE), SOP NO. WSI/S3-018, Superfund Technical Assessment and Response Team III (START), Andover, MA.

[12] Weston Solutions, Inc. May 2011. Standard Operating Procedure for Ludlum Model 19 Micro R Meter, SOP No. WSI/S3-022, Superfund Technical Assessment and Response Team III (START), Andover, MA.

[13] Weston Solutions, Inc. May 2011. Standard Operating Procedure for Surface and Subsurface Soil Sampling, SOP No. WSI/S3-001, Superfund Technical Assessment and Response Team III (START), Andover, MA.

[14] Weston Solutions, Inc. May 2011. Standard Operating Procedure for Field Screening of Metals in Soil Samples Using the INNOV-X-XRF Analyzer, SOP No. WSI/S3-021, Superfund Technical Assessment and Response Team III (START), Andover, MA.

[15] Weston Solutions, Inc. May 2011. Standard Operating Procedure for Trimble™ GeoExplorer® 2008 Series Global Positioning System, SOP No. WSI/S3-020, Superfund Technical Assessment and Response Team III (START), Andover, MA.

[16] U.S. Environmental Protection Agency. 3 September 2013. Office of Environmental Measurement and Evaluation. Laboratory Report. Project No.13070042. [86 Fay Street, Lowell, MA – Metals in Soil Medium Level by ICP].

III. Appendices

Appendix A

Figures

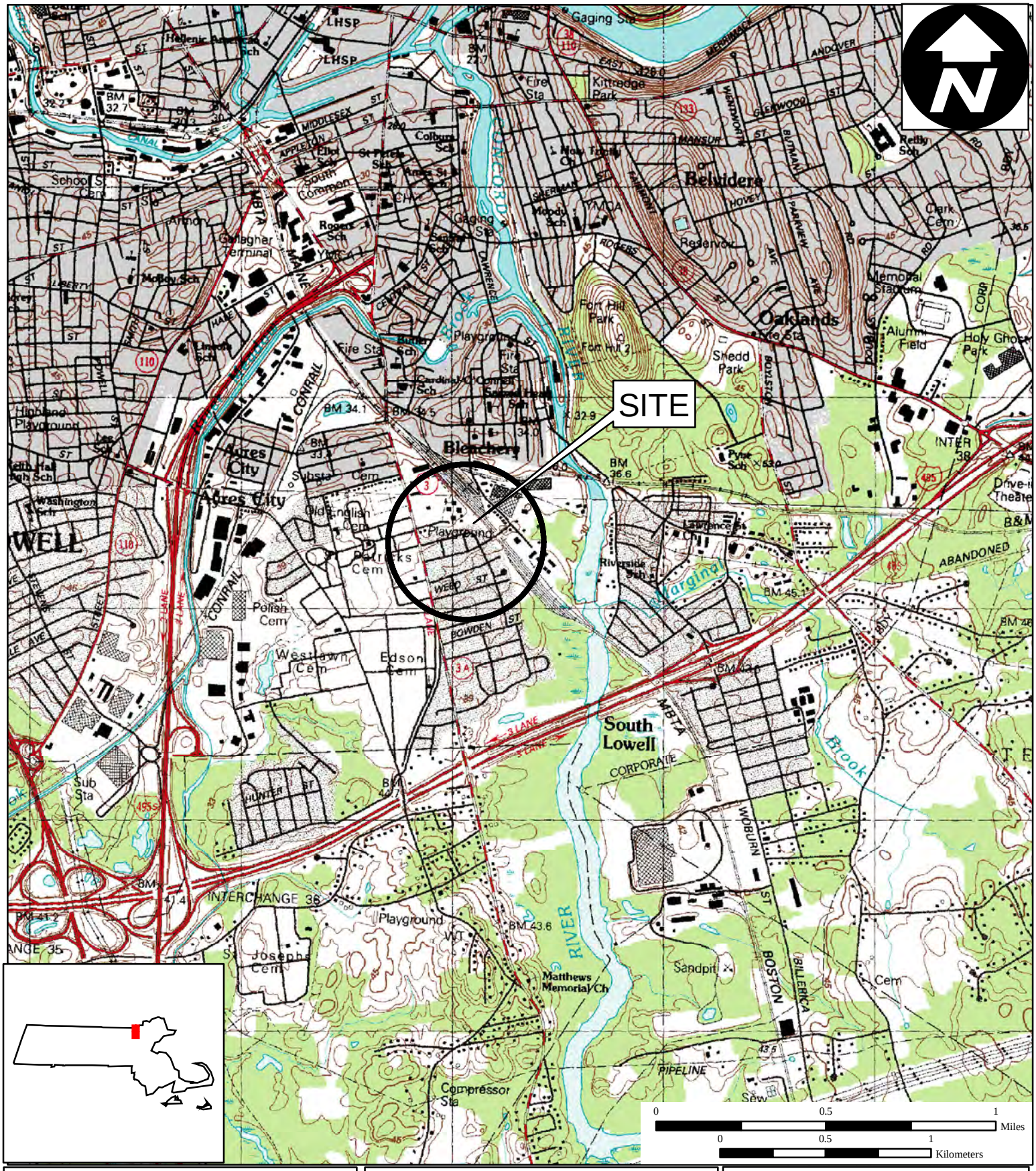

Figure 1

Site Location Map

Fay Street
86 Fay Street
Lowell, Massachusetts

EPA Region I
Superfund Technical Assessment and Response Team (START) III
Contract No. EP-W-05-042

TDD Number:	13-06-0001
Created by:	C. Cardin
Created on:	13 June 2013
Modified by:	B. Mace
Modified on:	15 August 2013

Data Sources:
Topos: MicroPath/USGS
Quadrangle Names: Billerica and Lowell, MA
All other data: START

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Figure 2

Site Diagram

Fay Street
86 Fay Street
Lowell, Massachusetts

EPA Region I
Superfund Technical Assessment and Response Team (START) III
Contract No. EP-W-05-042

TDD Number:	13-06-0001
Created by:	B. Mace
Created on:	20 June 2013
Modified by:	B. Mace
Modified on:	15 August 2013

Legend

Property Boundary

N

0 50 100 Feet

Data Sources:
Imagery: Bing Maps Aerial (Microsoft)
Topos: MicroPath
All other data: START

WESTON SOLUTIONS

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Figure 3

Sample Location Map

Fay Street
86 Fay Street
Lowell, Massachusetts

EPA Region I
Superfund Technical Assessment and Response Team (START) III
Contract No. EP-W-05-042

TDD Number:	13-06-0001
Created by:	B. Mace
Created on:	20 June 2013
Modified by:	B. Mace
Modified on:	29 July 2013

Legend

- Property Boundary
- Soil Sample Locations
- Electrical Line

N

0 50 100

Feet

Data Sources:
Imagery: Bing Maps Aerial (Microsoft)
Topos: MicroPath
All other data: START

WESTON SOLUTIONS

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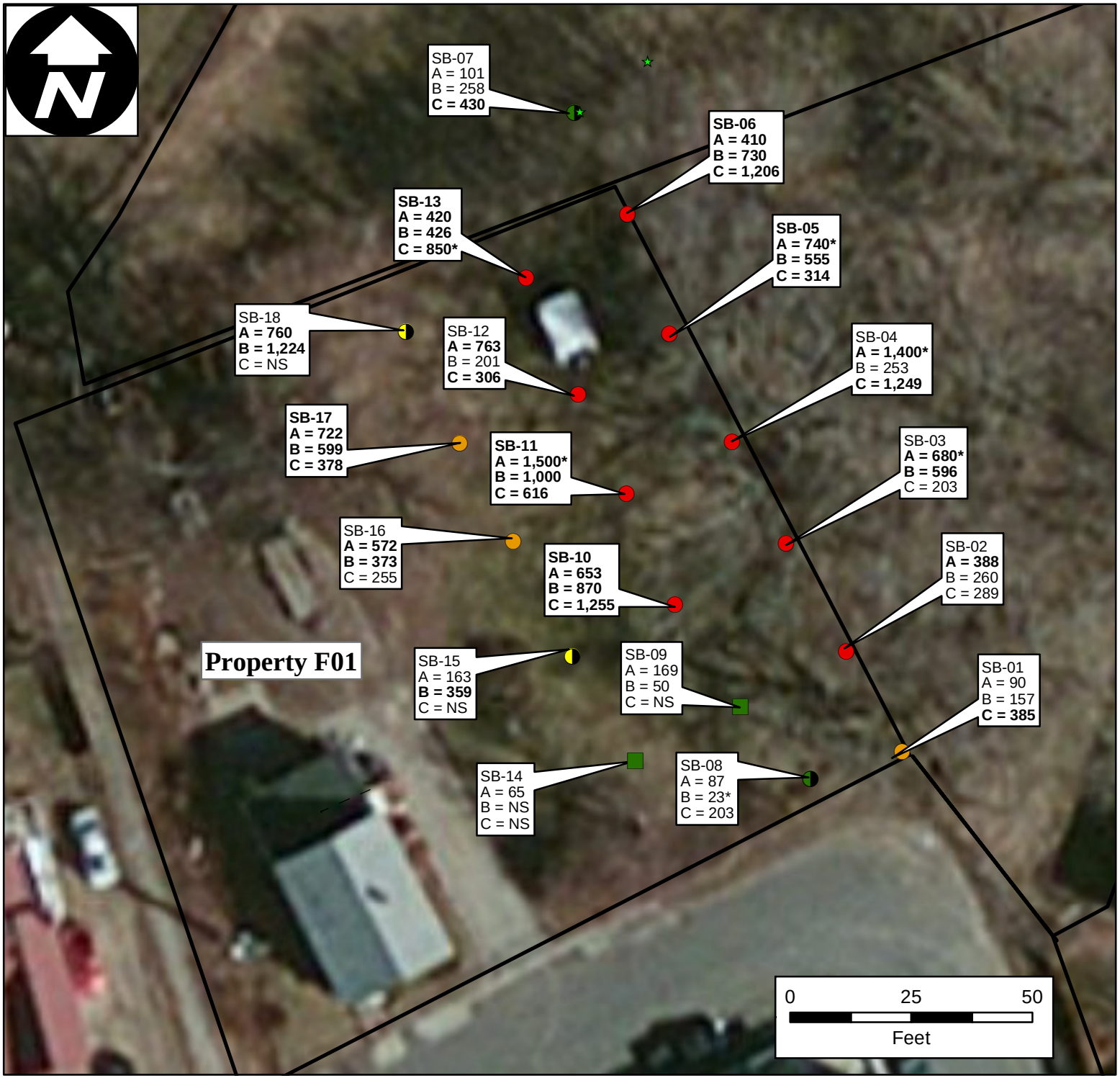

Figure 3A

Sample Location and Lead XRF Results Map (Property F-01)

Fay Street
86 Fay Street
Lowell, Massachusetts

EPA Region I
Superfund Technical Assessment and Response Team (START) III
Contract No. EP-W-05-042

TDD Number:	13-06-0001
Created by:	B. Mace
Created on:	20 June 2013
Modified by:	B. Mace
Modified on:	24 October 2013

Legend

- Property Boundary
- No ash layer
- B Layer Only
- C Layer Only
- B & C Layers
- A, B, & C Layers
- Electrical Line

A Layer = 0 to 6 inches
B Layer = 6 to 12 inches
C Layer = 12 to up to 24 inches
XRF = X-Ray Fluorescence.
All results in milligrams/Kilogram (mg/Kg).
Bolded results exceed Massachusetts Contingency Plan (MCP) Soil Category S-2 standard for lead (300 mg/Kg).
NS = Not Sampled.
* = Confirmatory Lab Result.

Data Sources:
Imagery: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP
Topos: MicroPath
All other data: START

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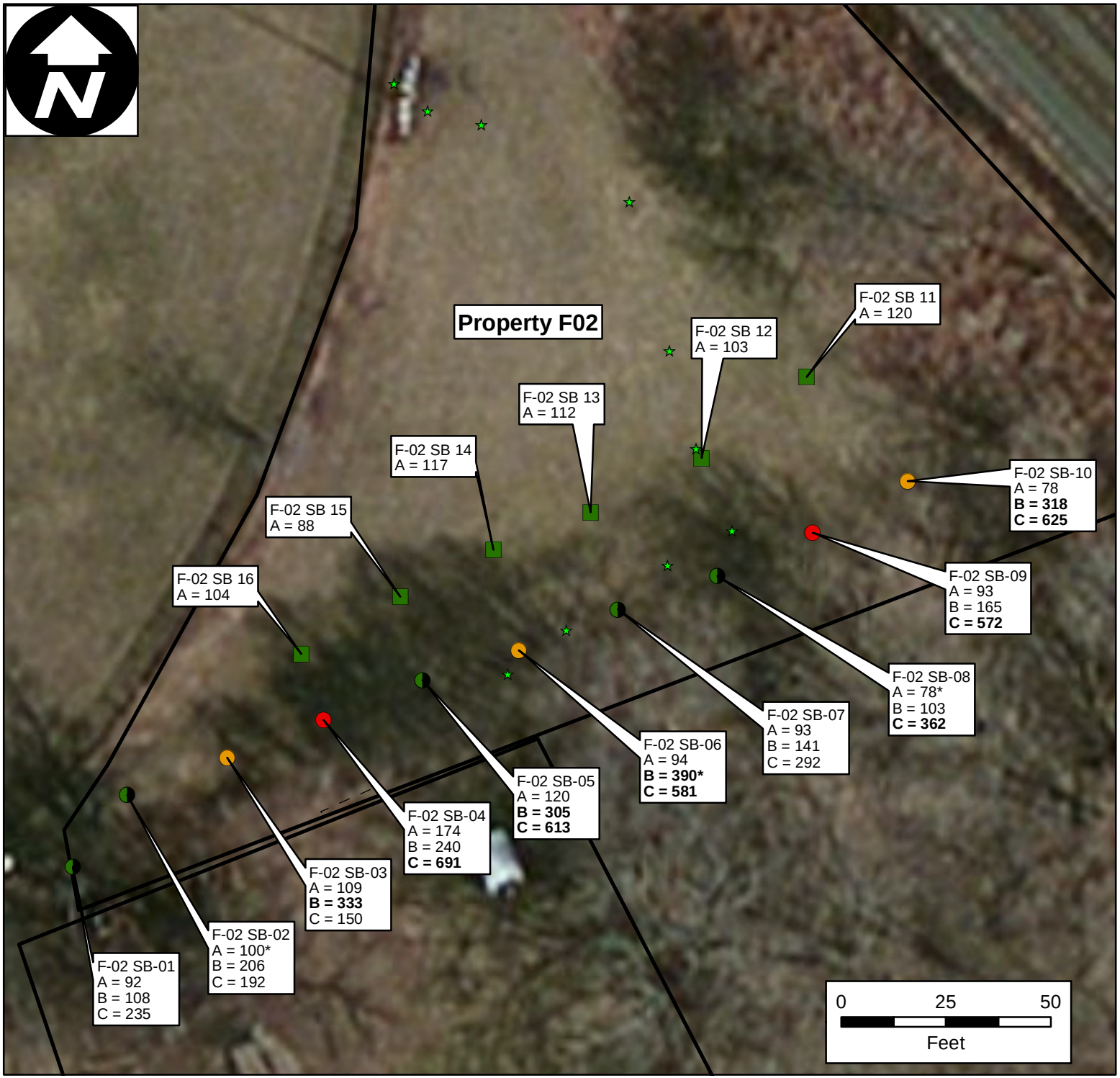

Figure 3B

Sample Location and Lead XRF Results Map (Property F-02)

Fay Street
86 Fay Street
Lowell, Massachusetts

EPA Region I
Superfund Technical Assessment and Response Team (START) III
Contract No. EP-W-05-042

TDD Number:	13-06-0001
Created by:	B. Mace
Created on:	20 June 2013
Modified by:	B. Mace
Modified on:	24 October 2013

Legend

- Property Boundary
- No Ash Layer
- C Layer Only
- B & C Layers
- A, B, & C Layers
- Electrical Line

A Layer = 0 to 6 inches
B Layer = 6 to 12 inches
C Layer = 12 to up to 24 inches
XRF = X-Ray Fluorescence.
All results in milligrams/Kilogram (mg/Kg).
Bolded results exceed Massachusetts Contingency Plan (MCP) Soil Category S-2 standard for lead (300 mg/Kg).
* = Confirmatory Lab Result.

Data Sources:

Imagery: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP
Topos: MicroPath
All other data: START

WESTON SOLUTIONS

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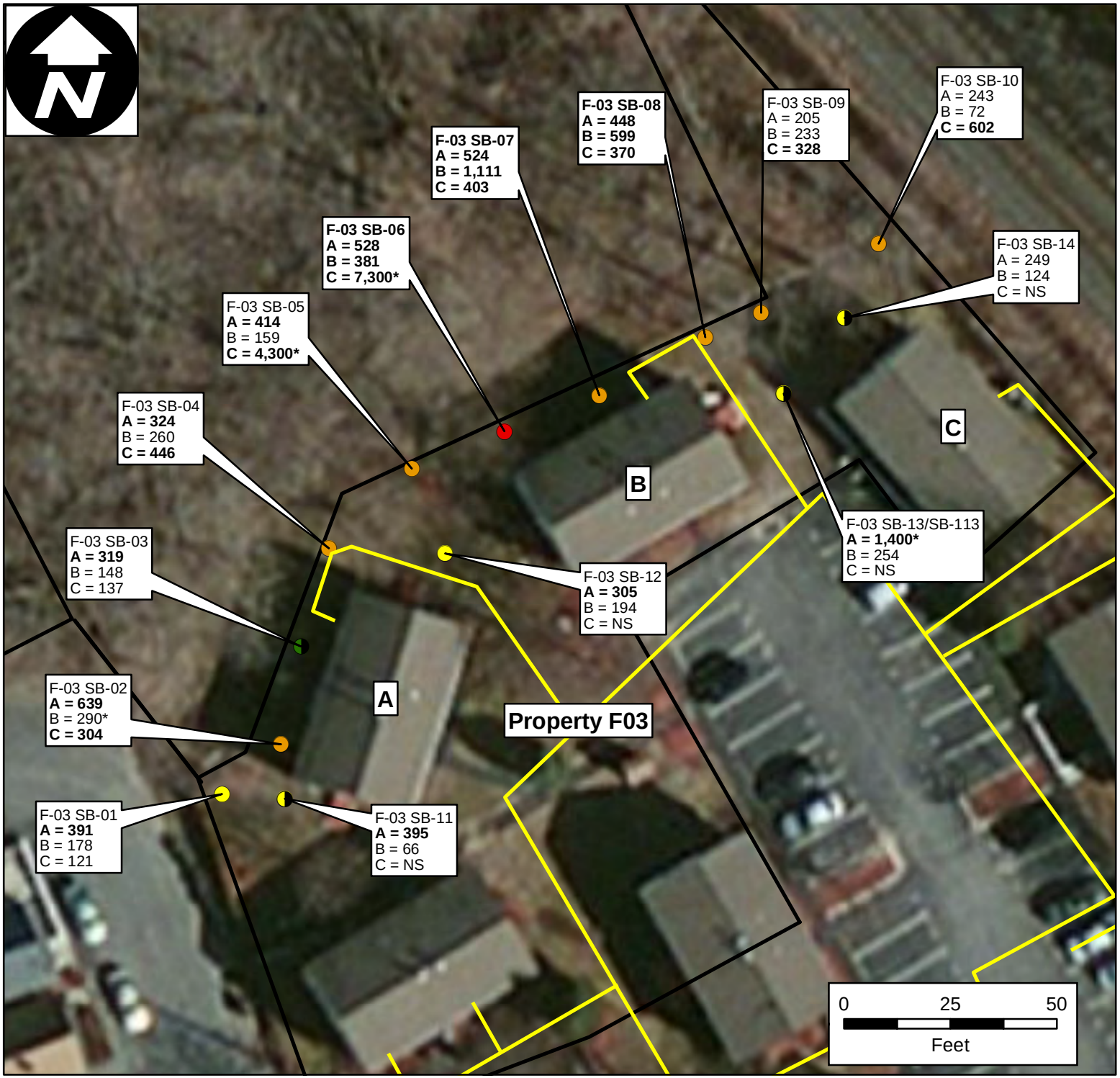

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Figure 3C

Sample Location and Lead XRF Results Map (Property F-03)

Fay Street
86 Fay Street
Lowell, Massachusetts

EPA Region I
Superfund Technical Assessment and Response Team (START) III
Contract No. EP-W-05-042

TDD Number:	13-06-0001
Created by:	B. Mace
Created on:	20 June 2013
Modified by:	B. Mace
Modified on:	24 October 2013

Legend

- Property Boundary
- Approximate Gas Lines
- B Layer Only
- C Layer Only
- A & B Layers
- B & C Layers
- A, B, & C Layers

A Layer = 0 to 6 inches
B Layer = 6 to 12 inches
C Layer = 12 to up to 24 inches
XRF = X-Ray Fluorescence.
All results in milligrams/Kilogram (mg/Kg).
Bolded results exceed Massachusetts Contingency Plan (MCP) Soil Category S-2 standard for lead (300 mg/Kg).
NS = Not Sampled.
* = Confirmatory Lab Results

Data Sources:
Imagery: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP
Topos: MicroPath
All other data: START

WESTON SOLUTIONS

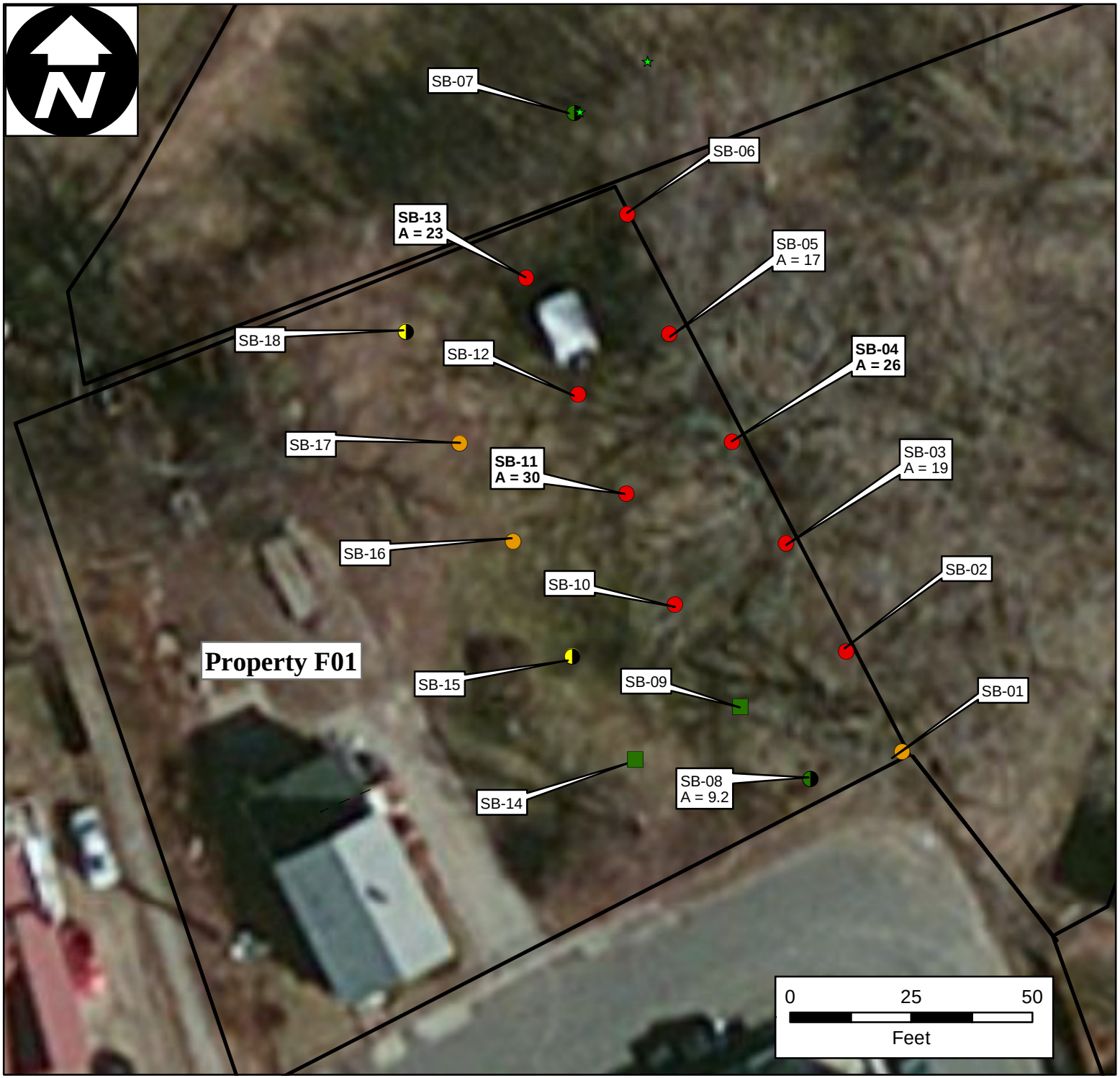

Figure 4A

Sample Location and Arsenic Results Map (Property F-01)

Fay Street
86 Fay Street
Lowell, Massachusetts

EPA Region I
Superfund Technical Assessment and Response Team (START) III
Contract No. EP-W-05-042

TDD Number:	13-06-0001
Created by:	B. Mace
Created on:	20 June 2013
Modified by:	B. Mace
Modified on:	24 October 2013

Legend

- Property Boundary
- No ash layer
- B Layer Only
- C Layer Only
- B & C Layers
- A, B, & C Layers
- Electrical Line

A Layer = 0 to 6 inches
B Layer = 6 to 12 inches
C Layer = 12 to up to 24 inches
All results in milligrams/Kilogram (mg/Kg).
Bolded results exceed Massachusetts Contingency Plan (MCP) Soil Category S-2 standard for arsenic (20 mg/Kg).

Data Sources:

Imagery: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP
Topos: MicroPath
All other data: START

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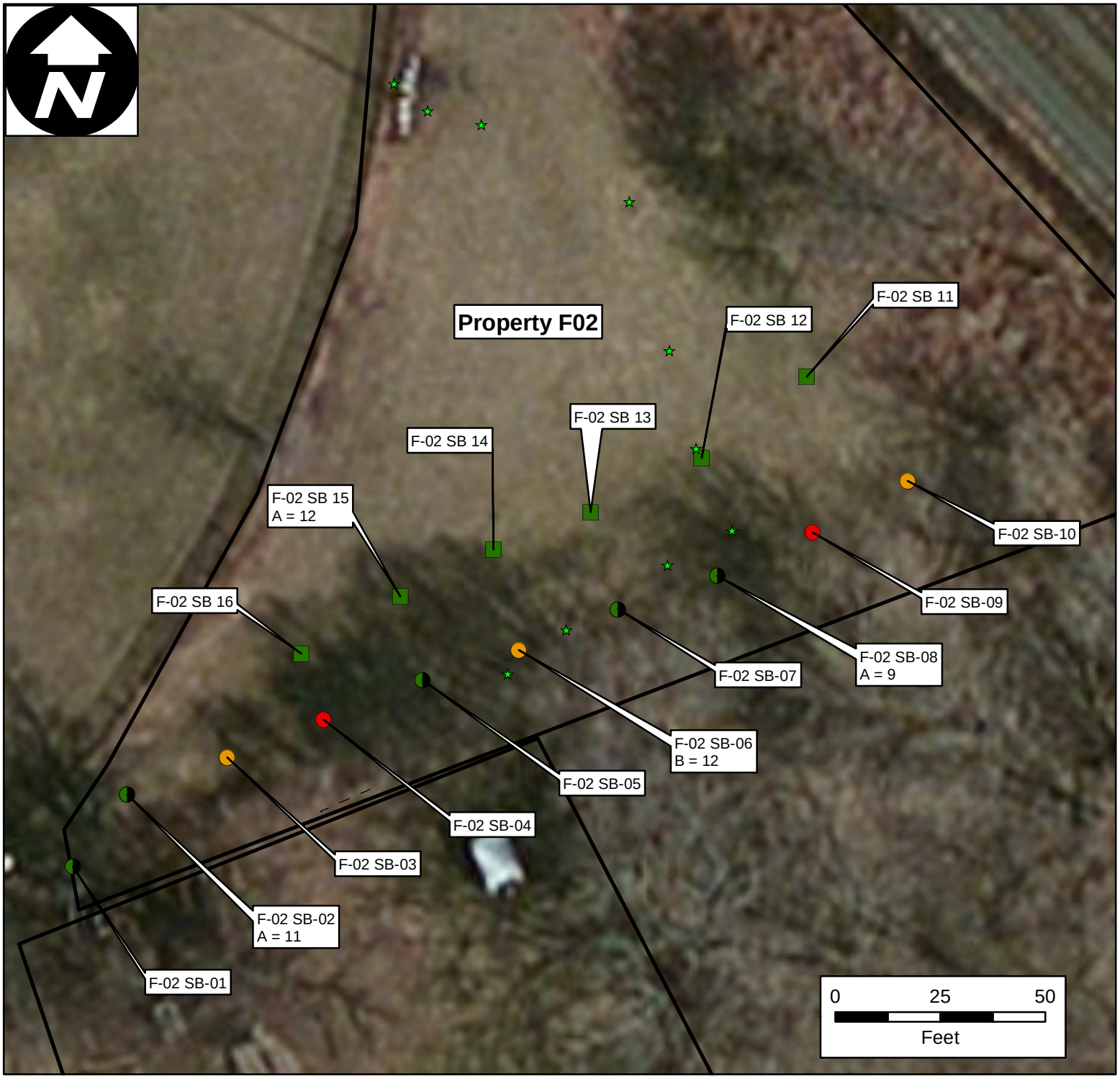

Figure 4B

Sample Location and Arsenic Results Map (Property F-02)

Fay Street
86 Fay Street
Lowell, Massachusetts

EPA Region I
Superfund Technical Assessment and Response Team (START) III
Contract No. EP-W-05-042

TDD Number:	13-06-0001
Created by:	B. Mace
Created on:	20 June 2013
Modified by:	B. Mace
Modified on:	24 October 2013

Legend

- Property Boundary
- No Ash Layer
- C Layer Only
- B & C Layers
- A, B, & C Layers
- Electrical Line

A Layer = 0 to 6 inches
B Layer = 6 to 12 inches
C Layer = 12 to up to 24 inches
All results in milligrams/Kilogram (mg/Kg).
Bolded results exceed Massachusetts Contingency Plan (MCP) Soil Category S-2 standard for arsenic (20 mg/Kg).

Data Sources:

Imagery: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP
Topos: MicroPath
All other data: START

WESTON SOLUTIONS

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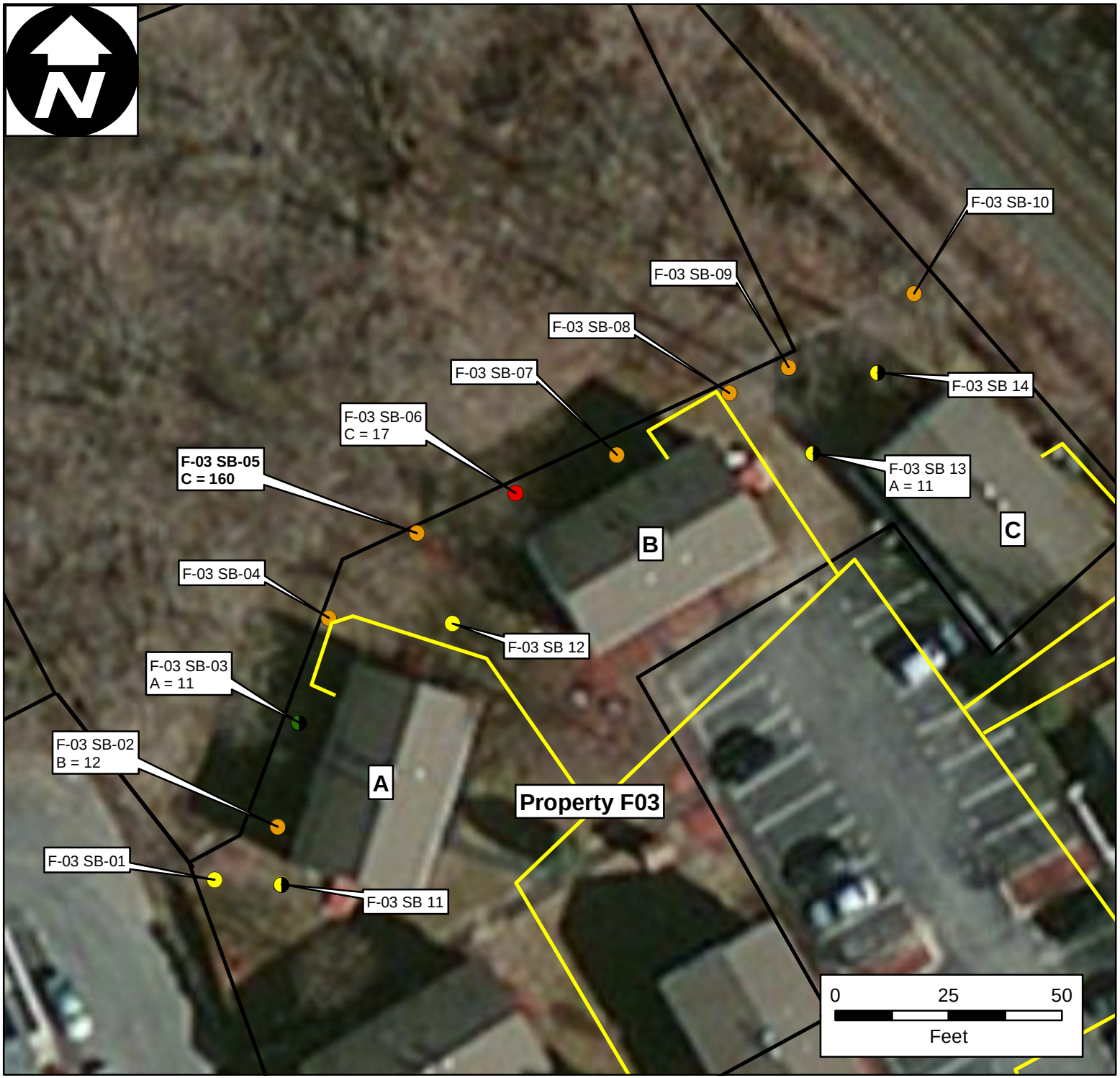

Figure 4C

Sample Location and Arsenic Results Map (Property F-03)

Fay Street
86 Fay Street
Lowell, Massachusetts

EPA Region I
Superfund Technical Assessment and Response Team (START) III
Contract No. EP-W-05-042

TDD Number:	13-06-0001
Created by:	B. Mace
Created on:	20 June 2013
Modified by:	B. Mace
Modified on:	24 October 2013

Legend

- Property Boundary
- Approximate Gas Lines
- B Layer Only
- C Layer Only
- A & B Layers
- B & C Layers
- A, B, & C Layers

A Layer = 0 to 6 inches
B Layer = 6 to 12 inches
C Layer = 12 to up to 24 inches
All results in milligrams/Kilogram (mg/Kg).
Bolded results exceed Massachusetts Contingency Plan (MCP) Soil Category S-2 standard for arsenic (20 mg/Kg).

Data Sources:

Imagery: Esri, i-cubed, USDA, USGS, AEX, GeoEye, Getmapping, Aerogrid, IGN, IGP
Topos: MicroPath
All other data: START

WESTON SOLUTIONS

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Appendix B

Tables and Spreadsheets

TABLE 1

SOIL SAMPLE DESCRIPTIONS
FAY STREET SITE
LOWELL, MASSACHUSETTS

Sample Location	Sample Number	Sample Depth (inches)	Collection Date	Sample Type	Sample Description	Comments
F-01 SB-01A	0881-0001	0 - 6	7/23/2013	Grab	SAND and SILT, some organics.	
F-01 SB-01B	0881-0002	6 - 12	7/23/2013	Grab	6-10" - SAND and SILT, 10-12" ASH and DEBRIS (broken glass).	
F-01 SB-01C	0881-0003	12 - 24	7/23/2013	Grab	ASH and DEBRIS.	
F-01 SB-02A	0881-0004	0 - 6	7/23/2013	Grab	Dark brown, TOPSOIL, some debris (burnt material).	
F-01 SB-02B	0881-0005	6 - 12	7/23/2013	Grab	ASH and DEBRIS (wood).	
F-01 SB-02C	0881-0006	12 - 24	7/23/2013	Grab	ASH and DEBRIS (wood).	
F-01 SB-03A	0881-0007	0 - 6	7/23/2013	Grab	Dark brown, medium SAND and SILT, some fine-to-medium gravel (rock and coal fragments), some debris (glass).	
F-01 SB-03B	0881-0008	6 - 12	7/23/2013	Grab	Brown-to-grey coarse SAND, some debris (ash, clinkers, pottery shards).	
F-01 SB-03C	0881-0009	12 - 24	7/23/2013	Grab	Grey coarse SAND, some ash and debris (clinkers, pottery shards, glass).	
F-01 SB-04A	0881-0010	0 - 6	7/23/2013	Grab	SAND and SILT, some ash and debris at the 4-6" interval.	
F-01 SB-04B	0881-0011	6 - 12	7/23/2013	Grab	ASH and DEBRIS.	
F-01 SB-04C	0881-0012	12 - 24	7/23/2013	Grab	ASH and DEBRIS.	
F-01 SB-05A	0881-0013	0 - 6	7/23/2013	Grab	Dark brown, TOPSOIL, ash layer encountered at 2".	
F-01 SB-05B	0881-0014	6 - 12	7/23/2013	Grab	ASH and DEBRIS (wood/building debris).	
F-01 SB-05C	0881-0015	12 - 24	7/23/2013	Grab	ASH and DEBRIS (wood/building debris).	
F-01 SB-06A	0881-0016	0 - 6	7/23/2013	Grab	0-2" - SAND and SILT; 2-6" - ASH and DEBRIS.	
F-01 SB-106A	0881-0125	0 - 6	7/23/2013	Grab	Field Duplicate of F-01 SB-06A.	
F-01 SB-06B	0881-0017	6 - 12	7/23/2013	Grab	ASH and DEBRIS.	
F-01 SB-06C	0881-0018	12 - 24	7/23/2013	Grab	ASH and DEBRIS.	
F-01 SB-07A	0881-0019	0 - 6	7/23/2013	Grab	Light to brown fine SAND and SILT, trace fine roots, trace gravel.	
F-01 SB-07B	0881-0020	6 - 12	7/23/2013	Grab	Light brown fine SAND and SILT, trace fine roots, trace gravel.	
F-01 SB-07C	0881-0021	12 - 24	7/23/2013	Grab	Dark brown fine-to-medium SAND and SILT, some ash, trace gravel.	
F-01 SB-08A	0881-0022	0 - 6	7/23/2013	Grab	SAND and SILT, trace organics.	
F-01 SB-08B	0881-0023	6 - 12	7/23/2013	Grab	SAND and SILT.	
F-01 SB-08C	0881-0024	12 - 24	7/23/2013	Grab	SAND and SILT, trace ash and debris.	
F-01 SB-09A	0881-0025	0 - 6	7/23/2013	Grab	Dark brown, fine TOPSOIL, some sand.	
F-01 SB-09B	0881-0026	6 - 12	7/23/2013	Grab	Light brown, fine SAND.	
F-01 SB-10A	0881-0028	0 - 6	7/23/2013	Grab	Dark brown-to-gray, coarse SAND and DEBRIS (glass/ash), trace fine roots, trace coarse gravel.	
F-01 SB-10B	0881-0029	6 - 12	7/23/2013	Grab	Gray coarse SAND and ASH, some debris (bottle fragments, rusty nails, coal fragments).	
F-01 SB-10C	0881-0030	12 - 24	7/23/2013	Grab	Gray coarse SAND and ASH, some debris (bottle fragments, rusty nails, coal fragments).	
F-01 SB-11A	0881-0031	0 - 6	7/23/2013	Grab	0-2" - SAND and SILT; 2-6"- ASH and DEBRIS.	
F-01 SB-11B	0881-0032	6 - 12	7/23/2013	Grab	6-12" - ASH and DEBRIS (rusty metal).	
F-01 SB-11C	0881-0033	12 - 24	7/23/2013	Grab	ASH and DEBRIS.	
F-01 SB-12A	0881-0034	0 - 6	7/23/2013	Grab	Dark brown, TOPSOIL, ash layer encountered at 5".	
F-01 SB-12B	0881-0035	6 - 12	7/23/2013	Grab	ASH and DEBRIS (metal).	
F-01 SB-112B	0881-0126	6 - 12	7/23/2013	Grab	Field duplicate of F-01 SB-12B.	
F-01 SB-12C	0881-0036	12 - 24	7/23/2013	Grab	ASH and DEBRIS (metal).	
F-01 SB-13A	0881-0037	0 - 6	7/23/2013	Grab	0-2" - TOPSOIL; 2-6" - ASH and DEBRIS.	
F-01 SB-13B	0881-0038	6 - 12	7/23/2013	Grab	ASH and DEBRIS.	
F-01 SB-13C	0881-0039	12 - 24	7/23/2013	Grab	ASH and DEBRIS.	
F-01 SB-113C	0881-0127	12 - 24	7/23/2013	Grab	Field duplicate of F-01 SB-13C.	
F-01 SB-14A	0881-0108	0 - 6	7/24/2013	Grab	Light brown, SAND.	

TABLE 1

SOIL SAMPLE DESCRIPTIONS
FAY STREET SITE
LOWELL, MASSACHUSETTS

Sample Location	Sample Number	Sample Depth (inches)	Collection Date	Sample Type	Sample Description	Comments
F-01 SB-15A	0881-0109	0 - 6	7/24/2013	Grab	Dark brown-to-black SAND, trace debris (brick).	
F-01 SB-15B	0881-0110	6 - 12	7/24/2013	Grab	Dark brown-to-black, SAND, trace debris (coal clinkers).	
F-01 SB-16A	0881-0111	0 - 6	7/24/2013	Grab	Dark brown, fine SAND and SILT, trace fine roots and fine gravel (rock fragments, glass, clay/pottery, porcelain fragments).	
F-01 SB-16B	0881-0112	6 - 12	7/24/2013	Grab	Brown fine SAND and SILT, trace fine roots, trace gravel (rock/glass), trace debris (ash/coal fragments).	
F-01 SB-16C	0881-0113	12 - 24	7/24/2013	Grab	Medium brown, SAND and SILT, trace medium gravel (rock fragments/glass), trace debris (ash/coal fragments).	
F-01 SB-17A	0881-0114	0 - 6	7/24/2013	Grab	SAND and SILT, trace ash and debris.	
F-01 SB-17B	0881-0115	6 - 12	7/24/2013	Grab	6-8" - SAND and SILT; 8-12" - ASH and DEBRIS (glass).	
F-01 SB-17C	0881-0116	12 - 24	7/24/2013	Grab	ASH and DEBRIS.	
F-01 SB-18A	0881-0117	0 - 6	7/24/2013	Grab	Dark brown, SAND, some debris (glass).	
F-01 SB-18B	0881-0118	6 - 12	7/24/2013	Grab	SAND, some ash and debris.	
F-01 SB-118B	0881-0133	6 - 12	7/24/2013	Grab	Field duplicate of F-01 SB-18B.	
F-02 SB-01A	0881-0067	0 - 6	7/24/2013	Grab	Dark brown, fine SAND and SILT, trace fine gravel, trace debris (plastic, glass).	
F-02 SB-01B	0881-0068	6 - 12	7/24/2013	Grab	Brown, fine SAND and SILT, trace fine gravel.	
F-02 SB-01C	0881-0069	12 - 24	7/24/2013	Grab	Dark brown-to-black coarse SAND, trace medium roots, some debris (ash, clinkers, coal fragments, metals).	
F-02 SB-02A	0881-0064	0 - 6	7/24/2013	Grab	Dark brown, TOPSOIL.	
F-02 SB-02B	0881-0065	6 - 12	7/24/2013	Grab	Dark brown, TOPSOIL.	
F-02 SB-02C	0881-0066	12 - 24	7/24/2013	Grab	Dark black, ASH and DEBRIS (building debris), some sand.	
F-02 SB-03A	0881-0061	0 - 6	7/24/2013	Grab	SAND and SILT, trace organics.	
F-02 SB-03B	0881-0062	6 - 12	7/24/2013	Grab	6-10" - SAND and SILT; 10-12" -ASH and DEBRIS (broken glass).	
F-02 SB-03C	0881-0063	12 - 24	7/24/2013	Grab	SAND and SILT, some ash and debris.	Refusal at 18".
F-02 SB-04A	0881-0058	0 - 6	7/24/2013	Grab	Dark brown, fine SAND and SILT, trace fine roots, trace fine-to-medium gravel, trace debris (clinkers, glass, porcelain).	
F-02 SB-04B	0881-0059	6 - 12	7/24/2013	Grab	Brown fine, SAND and SILT, trace medium-to-fine gravel, trace debris (ash, glass, clinkers, wood fragments).	
F-02 SB-04C	0881-0060	12 - 24	7/24/2013	Grab	Brown-to-black and white, coarse SAND, some debris (ash, metal, glass, clinkers, porcelain shards, gravel).	
F-02 SB-05A	0881-0055	0 - 6	7/24/2013	Grab	Dark brown, TOPSOIL, trace debris (glass).	
F-02 SB-105A	0881-0129	0 - 6	7/24/2013	Grab	Field duplicate of SB-05A.	
F-02 SB-05B	0881-0056	6 - 12	7/24/2013	Grab	Dark brown, TOPSOIL.	
F-02 SB-05C	0881-0057	12 - 24	7/24/2013	Grab	SAND, some ash and debris (building debris).	
F-02 SB-06A	0881-0052	0 - 6	7/24/2013	Grab	Dark brown, fine-to-medium SAND and SILT.	
F-02 SB-06B	0881-0053	6 - 12	7/24/2013	Grab	6-9" - SAND and SILT; 9-12" - ASH and DEBRIS.	
F-02 SB-06C	0881-0054	12 - 24	7/24/2013	Grab	ASH and DEBRIS.	
F-02 SB-07A	0881-0049	0 - 6	7/23/2013	Grab	Dark brown, TOPSOIL.	
F-02 SB-07B	0881-0050	6 - 12	7/23/2013	Grab	Light brown, SAND.	
F-02 SB-07C	0881-0051	12 - 24	7/23/2013	Grab	SAND, some ash and debris.	
F-02 SB-08A	0881-0046	0 - 6	7/23/2013	Grab	Brown, fine SAND and SILT, some fine roots, trace gravel, trace debris (glass).	
F-02 SB-108A	0881-0128	0 - 6	7/23/2013	Grab	Field duplicate of F-02 SB-08A.	
F-02 SB-08B	0881-0047	6 - 12	7/23/2013	Grab	Brown, fine SAND and SILT, trace medium-to-fine gravel.	

TABLE 1

SOIL SAMPLE DESCRIPTIONS
FAY STREET SITE
LOWELL, MASSACHUSETTS

Sample Location	Sample Number	Sample Depth (inches)	Collection Date	Sample Type	Sample Description	Comments
F-02 SB-08C	0881-0048	12 - 24	7/23/2013	Grab	Brown, medium-to-fine SAND and SILT, some medium gravel, some debris (ash, wire, glass, clinkers).	
F-02 SB-09A	0881-0043	0 - 6	7/23/2013	Grab	SAND and SILT, trace ash and debris at 6".	
F-02 SB-09B	0881-0044	6 - 12	7/23/2013	Grab	SAND and SILT, some organics, trace ash and debris.	
F-02 SB-09C	0881-0045	12 - 24	7/23/2013	Grab	ASH and DEBRIS (fiberglass at 14").	
F-02 SB-10A	0881-0040	0 - 6	7/23/2013	Grab	Dark brown, fine SAND and SILT, some fine roots, trace fine gravel.	
F-02 SB-10B	0881-0041	6 - 12	7/23/2013	Grab	Brown, fine-to-medium SAND and SILT, some fine-to-medium gravel, some debris (ash, clinkers, glass).	
F-02 SB-10C	0881-0042	12 - 24	7/23/2013	Grab	Brown, medium SAND and SILT, some medium gravel, some debris (ash, clinkers, asphalt, clay, glass, coal fragments).	
F-02 SB-11A	0881-0119	0 - 6	7/24/2013	Grab	SAND and SILT, trace organics.	
F-02 SB-12A	0881-0120	0 - 6	7/24/2013	Grab	SAND and SILT, trace organics.	
F-02 SB-13A	0881-0121	0 - 6	7/24/2013	Grab	SAND and SILT, trace organics.	
F-02 SB-14A	0881-0122	0 - 6	7/24/2013	Grab	SAND and SILT, trace organics.	
F-02 SB-114A	0881-0132	0 - 6	7/24/2013	Grab	SAND and SILT, trace organics.	
F-02 SB-15A	0881-0123	0 - 6	7/24/2013	Grab	SAND and SILT, trace organics.	
F-02 SB-16A	0881-0124	0 - 6	7/24/2013	Grab	SAND and SILT, trace organics.	
F-03 SB-01A	0881-0070	0 - 6	7/24/2013	Grab	SAND and SILT, trace ash and debris.	
F-03 SB-01B	0881-0071	6 - 12	7/24/2013	Grab	Brown SAND and SILT, trace ash and debris.	
F-03 SB-01C	0881-0072	12 - 24	7/24/2013	Grab	12-16" - SAND and SILT; 16-18" - Medium GRAVEL; 18-24" - brown, fine SAND.	
F-03 SB-02A	0881-0073	0 - 6	7/24/2013	Grab	SAND and SILT/topsoil, trace organics.	
F-03 SB-02B	0881-0074	6 - 12	7/24/2013	Grab	6-9" - SAND and SILT; 9-10" - ASH and DEBRIS (glass); 10-12" - light brown SAND.	
F-03 SB-02C	0881-0075	12 - 24	7/24/2013	Grab	12-20" - SAND and SILT; some ash and debris (glass); 20-24" - brown SAND and SILT.	
F-03 SB-03A	0881-0076	0 - 6	7/24/2013	Grab	Brown SAND, some debris and gravel.	
F-03 SB-03B	0881-0077	6 - 12	7/24/2013	Grab	Light brown, SAND.	
F-03 SB-03C	0881-0078	12 - 24	7/24/2013	Grab	Light brown, SAND, some ash and debris.	
F-03 SB-04A	0881-0079	0 - 6	7/24/2013	Grab	Dark brown, fine SAND and SILT, trace medium gravel, trace fine roots.	
F-03 SB-04B	0881-0080	6 - 12	7/24/2013	Grab	Brown-to-tan fine SAND and SILT, trace gravel, trace fine roots.	
F-03 SB-04C	0881-0081	12 - 24	7/24/2013	Grab	Brown and grey, medium SAND, some debris (clinkers, ash, glass, metal), trace fine-to-medium gravel.	
F-03 SB-05A	0881-0082	0 - 6	7/24/2013	Grab	SAND and SILT, trace debris (glass).	
F-03 SB-05B	0881-0083	6 - 12	7/24/2013	Grab	ASH and DEBRIS, some sand and silt.	
F-03 SB-05C	0881-0084	12 - 24	7/24/2013	Grab	ASH and DEBRIS.	
F-03 SB-105C	0881-0130	12 - 24	7/24/2013	Grab	Field duplicate of F-03 SB-05C.	
F-03 SB-06A	0881-0085	0 - 6	7/24/2013	Grab	Brown-to-grey, fine-to-coarse SAND, trace fine roots, trace medium gravel, trace debris.	
F-03 SB-06B	0881-0086	6 - 12	7/24/2013	Grab	Brown-to-tan and grey, coarse SAND, some debris (clinkers, ash, glass, coal fragments).	
F-03 SB-06C	0881-0087	12 - 24	7/24/2013	Grab	ASH and DEBRIS (clinkers, ash, glass, coal fragments).	
F-03 SB-07A	0881-0088	0 - 6	7/24/2013	Grab	Dark brown, SAND, some debris.	
F-03 SB-07B	0881-0089	6 - 12	7/24/2013	Grab	Brown SAND, some ash and debris.	
F-03 SB-07C	0881-0090	12 - 24	7/24/2013	Grab	ASH and DEBRIS, some brown sand.	
F-03 SB-107C	0881-0131	12 - 24	7/24/2013	Grab	Field duplicate of F-03 SB-07C.	
F-03 SB-08A	0881-0091	0 - 6	7/24/2013	Grab	SAND and SILT.	
F-03 SB-08B	0881-0092	6 - 12	7/24/2013	Grab	6-12" - SAND and SILT; 8-12" - ASH and DEBRIS (glass).	
F-03 SB-08C	0881-0093	12 - 24	7/24/2013	Grab	SAND and SILT, some ash and debris (glass, metal, plastics).	

TABLE 1

SOIL SAMPLE DESCRIPTIONS
FAY STREET SITE
LOWELL, MASSACHUSETTS

Sample Location	Sample Number	Sample Depth (inches)	Collection Date	Sample Type	Sample Description	Comments
F-03 SB-09A	0881-0094	0 - 6	7/24/2013	Grab	Dark brown, fine SAND and SILT, trace fine roots, trace medium gravel.	
F-03 SB-09B	0881-0095	6 - 12	7/24/2013	Grab	Brown, fine SAND and SILT, trace fine roots, trace medium gravel, trace debris (clinkers, ash).	
F-03 SB-09C	0881-0096	12 - 24	7/24/2013	Grab	Medium brown, SAND and SILT, some gravel, trace debris.	
F-03 SB-10A	0881-0097	0 - 6	7/24/2013	Grab	SAND and SILT.	
F-03 SB-10B	0881-0098	6 - 12	7/24/2013	Grab	SAND and SILT, some ash and debris at 9-12".	
F-03 SB-10C	0881-0099	12 - 24	7/24/2013	Grab	ASH and Debris (glass).	
F-03 SB-11A	0881-0100	0 - 6	7/24/2013	Grab	Brown, SAND, trace debris (metal spike).	
F-03 SB-11B	0881-0101	6 - 12	7/24/2013	Grab	Light brown, SAND, some dark ash at 10-12".	
F-03 SB-12A	0881-0102	0 - 6	7/24/2013	Grab	Brown, fine SAND and SILT, trace fine roots, some gravel (rock fragments, coal fragments, glass, porcelain).	
F-03 SB-12B	0881-0103	6 - 12	7/24/2013	Grab	ASH and DEBRIS (clinkers, ash, rock, glass, porcelain, clay).	
F-03 SB-13A	0881-0104	0 - 6	7/24/2013	Grab	SAND and SILT.	
F-03 SB-113A	0881-0134	0 - 6	7/24/2013	Grab	Field duplicate of F-03 SB-13A.	
F-03 SB-13B	0881-0105	6 - 12	7/24/2013	Grab	SAND and SILT, little debris (plastic), little ash at 10".	
F-03 SB-14A	0881-0106	0 - 6	7/24/2013	Grab	Dark brown, fine SAND and SILT, trace gravel, trace fine-to-medium roots, trace debris (clinkers).	
F-03 SB-14B	0881-0107	6 - 12	7/24/2013	Grab	Brown, fine SAND and SILT, trace gravel, trace debris (brick, concrete, coal fragments).	

NOTES:
" = inches

TABLE 2
SUMMARY OF X-RAY FLUORESCENCE FIELD SCREENING RESULTS
SURFACE AND SUBSURFACE SOIL SAMPLES
PROPERTY F-01 - RESIDENTIAL
FAY STREET
LOWELL, MASSACHUSETTS

	XRF Lead Analysis (ppm)			Average per boring location
Sample Location	**0-6" (A)**	**6-12" (B)**	**12" up to 24" (C)**	
F-01 SB-01	90	157	**385**	211
F-01 SB-02	**388**	260	289	**312**
F-01 SB-03	**583**	**596**	203	**461**
F-01 SB-04	**787**	253	**1,249**	**763**
F-01 SB-05	**711**	**555**	**314**	**527**
F-01 SB-06	**410**	**730**	**1,206**	**782**
F-01 SB-07	101	258	**430**	263
F-01 SB-08	87	43	203	111
F-01 SB-09	169	50	-----	110
F-01 SB-10	**653**	**870**	**1,255**	**926**
F-01 SB-11	**850**	**1,000**	**616**	**822**
F-01 SB-12	**763**	201	**306**	**423**
F-01 SB-13	**420**	**426**	**379**	**408**
F-01 SB-14	65	-----	-----	65
F-01 SB-15	163	**359**	-----	261
F-01 SB-16	**572**	**373**	255	**400**
F-01 SB-17	**722**	**599**	**378**	**566**
F-01 SB-18	**760**	**1,224**	-----	**992**
Average per sample depth	**461**	**468**	**533**	

Average of all samples on the property:	**484**

NOTES:

1) Soil samples were analyzed by START with an X-Ray Fluorescence Spectrometry Analyzer (XRF) using Weston Solutions SOP WSI/S3029 For Field Screening Metals In Soil Samples.
2) Units in parts per million (ppm), equivalent to milligrams per Kilogram (mg/Kg).
3) For comparison purposes, the metals field screening data were compared to Massachusetts Contingency Plan (MCP) Soil Category S-2 standard for lead (300 mg/Kg).
4) Bolded values exceed MCP S-2 standard.
5) Highlighted values indicate that an ash layer or debris material was noted in the soil description for that sample location.
6) ----- Sample not collected at this depth.

TABLE 3
SUMMARY OF X-RAY FLUORESCENCE FIELD SCREENING RESULTS
SURFACE AND SUBSURFACE SOIL SAMPLES
PROPERTY F-02 - BALLFIELDS
FAY STREET
LOWELL, MASSACHUSETTS

	XRF Lead Analysis (ppm)			Average per boring location
Sample Location	**0-6" (A)**	**6-12" (B)**	**12" up to 24" (C)**	
F-02 SB-01	92	108	235	145
F-02 SB-02	92	206	192	163
F-02 SB-03	109	**333**	150	197
F-02 SB-04	174	240	**691**	**368**
F-02 SB-05	120	**305**	**613**	**346**
F-02 SB-06	94	**793**	**581**	**489**
F-02 SB-07	93	141	292	175
F-02 SB-08	87	103	**362**	184
F-02 SB-09	93	165	**572**	277
F-02 SB-10	78	**318**	**625**	**340**
F-02 SB-11	120	-----	-----	120
F-02 SB-12	103	-----	-----	103
F-02 SB-13	112	-----	-----	112
F-02 SB-14	117	-----	-----	117
F-02 SB-15	88	-----	-----	88
F-02 SB-16	104	-----	-----	104
Average per sample depth	105	271	**431**	

Average of all samples on the property:	242

NOTES:

1) Soil samples were analyzed by START with an X-Ray Fluorescence Spectrometry Analyzer (XRF) using Weston Solutions SOP WSI/S3029 For Field Screening Metals In Soil Samples.
2) Units in parts per million (ppm), equivalent to milligrams per Kilogram (mg/Kg).
3) For comparison purposes, the metals field screening data were compared to Massachusetts Contingency Plan (MCP) Soil Category S-2 standard for lead (300 mg/Kg).
4) Bolded values exceed MCP S-2 standard.
5) Highlighted values indicate that an ash layer or debris material was noted in the soil description for that sample location.
6) ----- Sample not collected at this depth.

TABLE 4
SUMMARY OF X-RAY FLUORESCENCE FIELD SCREENING RESULTS
SURFACE AND SUBSURFACE SOIL SAMPLES
PROPERTY F-03 - CONDOMINIUMS
FAY STREET
LOWELL, MASSACHUSETTS

Condo A				
	XRF Lead Analysis (ppm)			Average per boring location
Sample Location	0-6" (A)	6-12" (B)	12" up to 24" (C)	
F-03 SB-01	**391**	178	121	230
F-03 SB-02	**639**	**406**	**304**	**450**
F-03 SB-03	**319**	148	137	201
F-03 SB-04	**324**	260	**446**	**343**
F-03 SB-11	**395**	66	-----	231
F-03 SB-12	**305**	194	-----	250
Average per sample depth	**396**	209	252	
			Average of all samples on the property =	290

Condo B				
	XRF Lead Analysis (ppm)			Average per boring location
Sample Location	0-6" (A)	6-12" (B)	12" up to 24" (C)	
F-03 SB-05	**414**	159	**2,631**	**1,068**
F-03 SB-06	**528**	**381**	**3,205**	**1,371**
F-03 SB-07	**524**	**1,111**	**403**	**679**
F-03 SB-08	**448**	**599**	**370**	**472**
Average per sample depth	**479**	**562**	**1,652**	
			Average of all samples on the property =	**898**

Condo C				
	XRF Lead Analysis (ppm)			Average per boring location
Sample Location	0-6" (A)	6-12" (B)	12" up to 24" (C)	
F-03 SB-09	205	233	**328**	255
F-03 SB-10	243	72	**602**	**306**
F-03 SB-13	**931**	254	-----	**593**
F-03 SB-14	249	124	-----	186
Average per sample depth	**407**	171	**465**	
			Average of all samples on the property =	**324**

NOTES:

1) Soil samples were analyzed by START with an X-Ray Fluorescence Spectrometry Analyzer (XRF) using Weston Solutions SOP WSI/S3029 For Field Screening Metals In Soil Samples.
2) Units in parts per million (ppm), equivalent to milligrams per Kilogram (mg/Kg).
3) For comparison purposes, the metals field screening data were compared to Massachusetts Contingency Plan (MCP) Soil Category S-2 standard for lead (300 mg/Kg).
4) Bolded values exceed MCP S-2 standard.
5) Highlighted values indicate that an ash layer or debris material was noted in the soil description for that sample location.
6) ----- Sample not collected at this depth.

TABLE 5

SUMMARY OF CONFIRMATORY METALS RESULTS
SURFACE AND SUBSURFACE SOIL SAMPLES
FAY STREET SITE
LOWELL, MASSACHUSETTS

SAMPLE LOCATION	F-01 SB-03A	F-01 SB-04A	F-01 SB-05A	F-01 SB-08B	F-01 SB-11A	F-01 SB-13C	F-01 SB-113C	F-02 SB-02A	F-02 SB-06B	MCP S-2
SAMPLE NUMBER	0881-0007	0881-0010	0881-0013	0881-0023	0881-0031	0881-0039	0881-0127	0881-0064	0881-0053	
SAMPLE DATE	7/23/2013	7/23/2013	7/23/2013	7/23/2013	7/23/2013	7/23/2013	7/23/2013	7/24/2013	7/24/2013	
SAMPLE DEEPTH	0 - 6 inches	0 - 6 inches	0 - 6 inches	6 - 12 inches	0 - 6 inches	12 - 24 inches	12 - 24 inches	0 - 6 inches	6 - 12 inches	
PARAMETER										
Silver	ND	ND	ND	ND	ND	ND	ND	ND	ND	200
Aluminum	11,000	10,000	12,000	6,700	11,000	11,000	10,000	9,300	9,200	NL
Arsenic	19	**26**	17	7.2	**30**	**23**	**21**	11	12	20
Barium	260	420	200	19	450	300	280	38	130	3,000
Beryllium	1.1	1.2	1.2	ND	1.2	1.4	1.2	ND	ND	200
Calcium	7,100	4,600	3,400	800	8,500	3,700	3,300	900	2,700	NL
Cadmium	1.1	13	ND	ND	1.3	ND	ND	ND	ND	30
Cobalt	8.9	8.7	9.9	2.7	9.8	13	12	3.6	5.2	NL
Chromium	32	35	28	13	60	42	39	15	23	200
Copper	97	180	92	6.2	180	85	78	51	110	NL
Iron	18,000	21,000	20,000	6,100	25,000	17,000	17,000	13,000	13,000	NL
Magnesium	1,600	1,200	870	1,800	1,500	790	720	1,700	2,000	NL
Manganese	290	1,100	350	100	420	370	420	210	210	NL
Nickel	26	25	25	9.1	28	36	34	12	16	700
Lead	**680**	**1,400**	**740**	23	**1,500**	**850**	**830**	100	**390**	300
Antimony	ND	2.3	ND	ND	2.6	ND	ND	ND	ND	30
Selenium	4.1	ND	ND	ND	ND	ND	ND	ND	ND	800
Thallium	ND	ND	ND	ND	ND	ND	ND	ND	ND	60
Vanadium	54	57	64	12	58	51	46	18	24	1,000
Zinc	440	1,400	460	42	620	290	270	71	250	3,000

TABLE 5

SUMMARY OF CONFIRMATORY METALS RESULTS
SURFACE AND SUBSURFACE SOIL SAMPLES
FAY STREET SITE
LOWELL, MASSACHUSETTS

SAMPLE LOCATION	F-02 SB-08A	F-02 SB-15A	F-03 SB-02B	F-03 SB-03A	F-03 SB-05C	F-03 SB-06C	F-03 SB-13A	F-03 SB-113A	MCP S-2
SAMPLE NUMBER	0881-0046	0881-0123	0881-0074	0881-0076	0881-0084	0881-0087	0881-0104	0881-0134	
SAMPLE DATE	7/23/2013	7/24/2013	7/24/2013	7/24/2013	7/24/2013	7/24/2013	7/24/2013	7/24/2013	
SAMPLE DEPTH	0 - 6 inches	0 - 6 inches	6 - 12 inches	0 - 6 inches	12 - 24 inches	12 - 24 inches	0 - 6 inches	0 - 6 inches	
PARAMETER									
Silver	ND	ND	ND	ND	ND	ND	ND	ND	200
Aluminum	8,500	10,000	8,700	8,700	12,000	13,000	11,000	11,000	NL
Arsenic	9.0	12	12	11	**160**	17	11	11	20
Barium	38	44	74	90	1,200	480	73	66	3,000
Beryllium	ND	ND	ND	ND	1.6	ND	ND	ND	200
Calcium	1,600	1,500	1,200	1,200	4,900	6,200	1,300	1,300	NL
Cadmium	ND	ND	ND	ND	2.3	ND	ND	ND	30
Cobalt	3.2	3.1	3.5	3.9	11	16	4.7	4.3	NL
Chromium	14	15	17	21	41	150	29	28	200
Copper	28	31	43	51	430	380	38	35	NL
Iron	9,300	9,400	11,000	10,000	18,000	21,000	15,000	13,000	NL
Magnesium	1,700	1,800	1,800	2,100	1,500	1,100	3,000	2,800	NL
Manganese	170	160	150	170	290	500	210	190	NL
Nickel	10	10	13	13	30	36	17	15	700
Lead	78	82	290	**360**	**4,300**	**7,300**	**880**	**1,400**	300
Antimony	ND	ND	ND	ND	2.8	10	ND	ND	30
Selenium	ND	ND	ND	ND	5.8	ND	ND	ND	800
Thallium	ND	ND	ND	ND	ND	ND	ND	ND	60
Vanadium	16	18	17	19	48	51	25	24	1,000
Zinc	62	65	220	200	950	1,200	130	130	3,000

NOTES:

1) Samples analyzed by U.S. EPA Office of Environmental Measurement and Evaluation (OEME) USING EPA Region I SOP, EIASOP-OPTIMAS0, Metals in Soil Medium Level by Inductively Coupled Plasma (ICP).
2) All results in Milligrams per Kilogram (mg/Kg).
3) MCP S-2 = Massachusetts Contingency Plan Soil Category S-2 standard. Units in mg/Kg. Bolded and shaded results exceed MCP S-2.
4) ND = Not Detected.
5) NL = Not Listed.

Appendix C

Photodocumentation Log

PHOTODOCUMENTATION LOG
Fay Street ● Lowell, Massachusetts

TOP

SCENE: View of the demarcation layer (high-visibility plastic sheeting), which has been exposed due to erosion. Photograph taken facing west.
DATE: 23 July 2013 **TIME:** 1402 hours
PHOTOGRAPHER: Bonnie Mace **CAMERA:** iPhone 4S

SCENE: View of exposed demarcation layer (high-visibility plastic sheeting), caused by erosion. Photograph taken facing south.
DATE: 23 July 2013 **TIME:** 1402 hours
PHOTOGRAPHER: Bonnie Mace **CAMERA:** iPhone 4S

SCENE: View of exposed demarcation layer (high-visibility plastic sheeting), caused by erosion.

DATE: 23 July 2013 **TIME:** 1402 hours
PHOTOGRAPHER: Bonnie Mace **CAMERA:** iPhone 4S

SCENE: View of erosion along the eastern portion of the site (86 Fay Street). Photograph taken facing east.

DATE: 23 July 2013 **TIME:** 1403 hours
PHOTOGRAPHER: Bonnie Mace **CAMERA:** iPhone 4S

SCENE: View of sedimentation from erosion along eastern slope. Photograph taken facing east.

DATE: 23 July 2013 **TIME:** 1403 hours
PHOTOGRAPHER: Bonnie Mace **CAMERA:** iPhone 4S

SCENE: View of metal debris, exposed by erosion. Photograph taken facing east.

DATE: 23 July 2013 **TIME:** 1404 hours
PHOTOGRAPHER: Bonnie Mace **CAMERA:** iPhone 4S

SCENE: View of exposed metal debris. Photograph taken facing east.

DATE: 23 July 2013 **TIME:** 1404 hours
PHOTOGRAPHER: Bonnie Mace **CAMERA:** iPhone 4S

SCENE: View of the northern portion of the site, with O'Donnell Park in the background. Photograph taken facing north.

DATE: 23 July 2013 **TIME:** 1406 hours
PHOTOGRAPHER: Bonnie Mace **CAMERA:** iPhone 4S

TOP

SCENE: View of a stake indicating excavation depths. Photograph taken facing north.

DATE: 23 July 2013 **TIME:** 1408 hours
PHOTOGRAPHER: Bonnie Mace **CAMERA:** iPhone 4S

SCENE: View of sample locations on the grassy area behind O'Donnell Park designated as property F-02. Photograph taken facing west.

DATE: 23 July 2013 **TIME:** 1409 hours
PHOTOGRAPHER: Bonnie Mace **CAMERA:** iPhone 4S

SCENE: View of sample location on property F-01 (74 and 78 Fay Street). Photograph taken facing north.

DATE: 23 July 2013 **TIME:** 1411 hours
PHOTOGRAPHER: Bonnie Mace **CAMERA:** iPhone 4S

TOP

SCENE: View of an area of asphalt on the lawn of property F-01. Photograph taken facing east.

DATE: 23 July 2013 **TIME:** 1412 hours
PHOTOGRAPHER: Bonnie Mace **CAMERA:** iPhone 4S

SCENE: View of the entrance of the site, with property F-03 (160 Lundberg Street) to the right. Photograph taken facing east.

DATE: 23 July 2013 **TIME:** 1413 hours
PHOTOGRAPHER: Bonnie Mace **CAMERA:** iPhone 4S

SCENE: View of low area on site that was flooded during heavy rain. Photograph taken facing northwest

DATE: 24 July 2013 **TIME:** 0754 hours
PHOTOGRAPHER: Bonnie Mace **CAMERA:** iPhone 4S

SCENE: View of sample locations on Property F-01. Photograph taken facing north.

DATE: 24 July 2013 **TIME:** 1534 hours
PHOTOGRAPHER: Bonnie Mace **CAMERA:** iPhone 4S

Appendix D

Chain-of-Custody Record

START Region 1
Weston Solutions
3 Riverside Drive
Andover, MA 01810

CHAIN OF CUSTODY RECORD
Fay Street Site
Contact Name: Bonnie Mace
Contact Phone: 978-621-1213

No: 1-080913-105056-0002
DateShipped: 7/23/2013
Lab: On-site XRF Field Screening
Lab Phone: 978-621-1213

Lab #	Sample #	Location	Analyses	Matrix	Collected	Sample Time	Numb Cont	Container	Preservative	MS/MSD
	0881-0001	F-01 SB-01A	Metals (XRF)	Soil	7/23/2013	09:30	1	Poly Bag	4 C	N
	0881-0002	F-01 SB-01B	Metals (XRF)	Soil	7/23/2013	09:40	1	Poly Bag	4 C	N
	0881-0003	F-01 SB-01C	Metals (XRF)	Soil	7/23/2013	09:50	1	Poly Bag	4 C	N
	0881-0004	F-01 SB-02A	Metals (XRF)	Soil	7/23/2013	09:40	1	Poly Bag	4 C	N
	0881-0005	F-01 SB-02B	Metals (XRF)	Soil	7/23/2013	09:50	1	Poly Bag	4 C	N
	0881-0006	F-01 SB-02C	Metals (XRF)	Soil	7/23/2013	10:00	1	Poly Bag	4 C	N
	0881-0007	F-01 SB-03A	Metals (XRF)	Soil	7/23/2013	09:55	1	Poly Bag	4 C	N
	0881-0008	F-01 SB-03B	Metals (XRF)	Soil	7/23/2013	10:05	1	Poly Bag	4 C	N
	0881-0009	F-01 SB-03C	Metals (XRF)	Soil	7/23/2013	10:20	1	Poly Bag	4 C	N
	0881-0010	F-01 SB-04A	Metals (XRF)	Soil	7/23/2013	10:10	1	Poly Bag	4 C	N
	0881-0011	F-01 SB-04B	Metals (XRF)	Soil	7/23/2013	10:20	1	Poly Bag	4 C	N
	0881-0012	F-01 SB-04C	Metals (XRF)	Soil	7/23/2013	10:30	1	Poly Bag	4 C	N
	0881-0013	F-01 SB-05A	Metals (XRF)	Soil	7/23/2013	10:40	1	Poly Bag	4 C	N
	0881-0014	F-01 SB-05B	Metals (XRF)	Soil	7/23/2013	10:45	1	Poly Bag	4 C	N
	0881-0015	F-01 SB-05C	Metals (XRF)	Soil	7/23/2013	10:50	1	Poly Bag	4 C	N
	0881-0016	F-01 SB-06A	Metals (XRF)	Soil	7/23/2013	10:45	1	Poly Bag	4 C	N
	0881-0017	F-01 SB-06B	Metals (XRF)	Soil	7/23/2013	10:55	1	Poly Bag	4 C	N
	0881-0018	F-01 SB-06C	Metals (XRF)	Soil	7/23/2013	11:00	1	Poly Bag	4 C	N
	0881-0019	F-01 SB-07A	Metals (XRF)	Soil	7/23/2013	10:55	1	Poly Bag	4 C	N

Special Instructions:	**SAMPLES TRANSFERRED FROM**
	CHAIN OF CUSTODY #

Items/Reason	Relinquished by	Date	Received by	Date	Time		Items/Reason	Relinquished By	Date	Received by	Date	Time

START Region 1
Weston Solutions
3 Riverside Drive
Andover, MA 01810

CHAIN OF CUSTODY RECORD
Fay Street Site
Contact Name: Bonnie Mace
Contact Phone: 978-621-1213

No: 1-080913-105056-0002
DateShipped: 7/23/2013
Lab: On-site XRF Field Screening
Lab Phone: 978-621-1213

Lab #	Sample #	Location	Analyses	Matrix	Collected	Sample Time	Numb Cont	Container	Preservative	MS/MSD
	0881-0020	F-01 SB-07B	Metals (XRF)	Soil	7/23/2013	11:10	1	Poly Bag	4 C	N
	0881-0021	F-01 SB-07C	Metals (XRF)	Soil	7/23/2013	11:20	1	Poly Bag	4 C	N
	0881-0022	F-01 SB-08A	Metals (XRF)	Soil	7/23/2013	12:25	1	Poly Bag	4 C	N
	0881-0023	F-01 SB-08B	Metals (XRF)	Soil	7/23/2013	12:35	1	Poly Bag	4 C	N
	0881-0024	F-01 SB-08C	Metals (XRF)	Soil	7/23/2013	12:45	1	Poly Bag	4 C	N
	0881-0025	F-01 SB-09A	Metals (XRF)	Soil	7/23/2013	12:10	1	Poly Bag	4 C	N
	0881-0026	F-01 SB-09B	Metals (XRF)	Soil	7/23/2013	12:20	1	Poly Bag	4 C	N
	0881-0028	F-01 SB-10A	Metals (XRF)	Soil	7/23/2013	12:20	1	Poly Bag	4 C	N
	0881-0029	F-01 SB-10B	Metals (XRF)	Soil	7/23/2013	12:25	1	Poly Bag	4 C	N
	0881-0030	F-01 SB-10C	Metals (XRF)	Soil	7/23/2013	12:30	1	Poly Bag	4 C	N
	0881-0031	F-01 SB-11A	Metals (XRF)	Soil	7/23/2013	13:40	1	Poly Bag	4 C	N
	0881-0032	F-01 SB-11B	Metals (XRF)	Soil	7/23/2013	13:50	1	Poly Bag	4 C	N
	0881-0033	F-01 SB-11C	Metals (XRF)	Soil	7/23/2013	14:00	1	Poly Bag	4 C	N
	0881-0034	F-01 SB-12A	Metals (XRF)	Soil	7/23/2013	14:00	1	Poly Bag	4 C	N
	0881-0035	F-01 SB-12B	Metals (XRF)	Soil	7/23/2013	14:05	1	Poly Bag	4 C	N
	0881-0036	F-01 SB-12C	Metals (XRF)	Soil	7/23/2013	14:10	1	Poly Bag	4 C	N
	0881-0037	F-01 SB-13A	Metals (XRF)	Soil	7/23/2013	14:20	1	Poly Bag	4 C	N
	0881-0038	F-01 SB-13B	Metals (XRF)	Soil	7/23/2013	14:25	1	Poly Bag	4 C	N
	0881-0039	F-01 SB-13C	Metals (XRF)	Soil	7/23/2013	14:30	1	Poly Bag	4 C	N

Special Instructions:	**SAMPLES TRANSFERRED FROM**
	CHAIN OF CUSTODY #

Items/Reason	Relinquished by	Date	Received by	Date	Time		Items/Reason	Relinquished By	Date	Received by	Date	Time

START Region 1
Weston Solutions
3 Riverside Drive
Andover, MA 01810

CHAIN OF CUSTODY RECORD
Fay Street Site
Contact Name: Bonnie Mace
Contact Phone: 978-621-1213

No: 1-080913-105056-0002
DateShipped: 7/23/2013
Lab: On-site XRF Field Screening
Lab Phone: 978-621-1213

Lab #	Sample #	Location	Analyses	Matrix	Collected	Sample Time	Numb Cont	Container	Preservative	MS/MSD
	0881-0040	F-02 SB-10A	Metals (XRF)	Soil	7/23/2013	14:00	1	Poly Bag	4 C	N
	0881-0041	F-02 SB-10B	Metals (XRF)	Soil	7/23/2013	14:10	1	Poly Bag	4 C	N
	0881-0042	F-02 SB-10C	Metals (XRF)	Soil	7/23/2013	14:15	1	Poly Bag	4 C	N
	0881-0043	F-02 SB-09A	Metals (XRF)	Soil	7/23/2013	14:50	1	Poly Bag	4 C	N
	0881-0044	F-02 SB-09B	Metals (XRF)	Soil	7/23/2013	14:55	1	Poly Bag	4 C	N
	0881-0045	F-02 SB-09C	Metals (XRF)	Soil	7/23/2013	15:05	1	Poly Bag	4 C	N
	0881-0046	F-02 SB-08A	Metals (XRF)	Soil	7/23/2013	14:55	1	Poly Bag	4 C	N
	0881-0047	F-02 SB-08B	Metals (XRF)	Soil	7/23/2013	15:00	1	Poly Bag	4 C	N
	0881-0048	F-02 SB-08C	Metals (XRF)	Soil	7/23/2013	15:05	1	Poly Bag	4 C	N
	0881-0049	F-02 SB-07A	Metals (XRF)	Soil	7/23/2013	15:00	1	Poly Bag	4 C	N
	0881-0050	F-02 SB-07B	Metals (XRF)	Soil	7/23/2013	15:05	1	Poly Bag	4 C	N
	0881-0051	F-02 SB-07C	Metals (XRF)	Soil	7/23/2013	15:10	1	Poly Bag	4 C	N
	0881-0125	F-01 SB-106A	Metals (XRF)	Soil	7/23/2013	10:45	1	Poly Bag	4 C	N
	0881-0126	F-01 SB-112B	Metals (XRF)	Soil	7/23/2013	14:05	1	Poly Bag	4 C	N
	0881-0127	F-01 SB-113C	Metals (XRF)	Soil	7/23/2013	14:30	1	Poly Bag	4 C	N
	0881-0128	F-02 SB-108A	Metals (XRF)	Soil	7/23/2013	14:55	1	Poly Bag	4 C	N

Special Instructions:	**SAMPLES TRANSFERRED FROM**
	CHAIN OF CUSTODY #

Items/Reason	Relinquished by	Date	Received by	Date	Time		Items/Reason	Relinquished By	Date	Received by	Date	Time

START Region 1
Weston Solutions
3 Riverside Drive
Andover, MA 01810

CHAIN OF CUSTODY RECORD
Fay Street Site
Contact Name: Bonnie Mace
Contact Phone: 978-621-1213

No: 1-080913-105558-0003
DateShipped: 7/24/2013
Lab: On-site XRF Field Screening
Lab Phone: 978-621-1213

Lab #	Sample #	Location	Analyses	Matrix	Collected	Sample Time	Numb Cont	Container	Preservative	MS/MSD
	0881-0052	F-02 SB-06A	Metals (XRF)	Soil	7/24/2013	08:40	1	Poly Bag	4 C	N
	0881-0053	F-02 SB-06B	Metals (XRF)	Soil	7/24/2013	08:50	1	Poly Bag	4 C	N
	0881-0054	F-02 SB-06C	Metals (XRF)	Soil	7/24/2013	08:55	1	Poly Bag	4 C	N
	0881-0055	F-02 SB-05A	Metals (XRF)	Soil	7/24/2013	08:45	1	Poly Bag	4 C	N
	0881-0056	F-02 SB-05B	Metals (XRF)	Soil	7/24/2013	08:50	1	Poly Bag	4 C	N
	0881-0057	F-02 SB-05C	Metals (XRF)	Soil	7/24/2013	08:55	1	Poly Bag	4 C	N
	0881-0058	F-02 SB-04A	Metals (XRF)	Soil	7/24/2013	08:45	1	Poly Bag	4 C	N
	0881-0059	F-02 SB-04B	Metals (XRF)	Soil	7/24/2013	08:50	1	Poly Bag	4 C	N
	0881-0060	F-02 SB-04C	Metals (XRF)	Soil	7/24/2013	09:00	1	Poly Bag	4 C	N
	0881-0061	F-02 SB-03A	Metals (XRF)	Soil	7/24/2013	09:10	1	Poly Bag	4 C	N
	0881-0062	F-02 SB-03B	Metals (XRF)	Soil	7/24/2013	09:20	1	Poly Bag	4 C	N
	0881-0063	F-02 SB-03C	Metals (XRF)	Soil	7/24/2013	09:30	1	Poly Bag	4 C	N
	0881-0064	F-02 SB-02A	Metals (XRF)	Soil	7/24/2013	09:50	1	Poly Bag	4 C	N
	0881-0065	F-02 SB-02B	Metals (XRF)	Soil	7/24/2013	10:00	1	Poly Bag	4 C	N
	0881-0066	F-02 SB-02C	Metals (XRF)	Soil	7/24/2013	10:05	1	Poly Bag	4 C	N
	0881-0067	F-02 SB-01A	Metals (XRF)	Soil	7/24/2013	09:45	1	Poly Bag	4 C	N
	0881-0068	F-02 SB-01B	Metals (XRF)	Soil	7/24/2013	09:50	1	Poly Bag	4 C	N
	0881-0069	F-02 SB-01C	Metals (XRF)	Soil	7/24/2013	09:55	1	Poly Bag	4 C	N
	0881-0070	F-03 SB-01A	Metals (XRF)	Soil	7/24/2013	10:15	1	Poly Bag	4 C	N

Special Instructions:	**SAMPLES TRANSFERRED FROM**
	CHAIN OF CUSTODY #

Items/Reason	Relinquished by	Date	Received by	Date	Time		Items/Reason	Relinquished By	Date	Received by	Date	Time

START Region 1
Weston Solutions
3 Riverside Drive
Andover, MA 01810

CHAIN OF CUSTODY RECORD
Fay Street Site
Contact Name: Bonnie Mace
Contact Phone: 978-621-1213

No: 1-080913-105558-0003
DateShipped: 7/24/2013
Lab: On-site XRF Field Screening
Lab Phone: 978-621-1213

Lab #	Sample #	Location	Analyses	Matrix	Collected	Sample Time	Numb Cont	Container	Preservative	MS/MSD
	0881-0071	F-03 SB-01B	Metals (XRF)	Soil	7/24/2013	10:20	1	Poly Bag	4 C	N
	0881-0072	F-03 SB-01C	Metals (XRF)	Soil	7/24/2013	10:30	1	Poly Bag	4 C	N
	0881-0073	F-03 SB-02A	Metals (XRF)	Soil	7/24/2013	10:50	1	Poly Bag	4 C	N
	0881-0074	F-03 SB-02B	Metals (XRF)	Soil	7/24/2013	11:00	1	Poly Bag	4 C	N
	0881-0075	F-03 SB-02C	Metals (XRF)	Soil	7/24/2013	11:10	1	Poly Bag	4 C	N
	0881-0076	F-03 SB-03A	Metals (XRF)	Soil	7/24/2013	11:15	1	Poly Bag	4 C	N
	0881-0077	F-03 SB-03B	Metals (XRF)	Soil	7/24/2013	11:20	1	Poly Bag	4 C	N
	0881-0078	F-03 SB-03C	Metals (XRF)	Soil	7/24/2013	11:25	1	Poly Bag	4 C	N
	0881-0079	F-03 SB-04A	Metals (XRF)	Soil	7/24/2013	11:20	1	Poly Bag	4 C	N
	0881-0080	F-03 SB-04B	Metals (XRF)	Soil	7/24/2013	11:25	1	Poly Bag	4 C	N
	0881-0081	F-03 SB-04C	Metals (XRF)	Soil	7/24/2013	11:30	1	Poly Bag	4 C	N
	0881-0082	F-03 SB-05A	Metals (XRF)	Soil	7/24/2013	11:20	1	Poly Bag	4 C	N
	0881-0083	F-03 SB-05B	Metals (XRF)	Soil	7/24/2013	11:30	1	Poly Bag	4 C	N
	0881-0084	F-03 SB-05C	Metals (XRF)	Soil	7/24/2013	11:35	1	Poly Bag	4 C	N
	0881-0085	F-03 SB-06A	Metals (XRF)	Soil	7/24/2013	12:30	1	Poly Bag	4 C	N
	0881-0086	F-03 SB-06B	Metals (XRF)	Soil	7/24/2013	12:35	1	Poly Bag	4 C	N
	0881-0087	F-03 SB-06C	Metals (XRF)	Soil	7/24/2013	12:40	1	Poly Bag	4 C	N
	0881-0088	F-03 SB-07A	Metals (XRF)	Soil	7/24/2013	12:25	1	Poly Bag	4 C	N
	0881-0089	F-03 SB-07B	Metals (XRF)	Soil	7/24/2013	12:30	1	Poly Bag	4 C	N

Special Instructions:	**SAMPLES TRANSFERRED FROM**
	CHAIN OF CUSTODY #

Items/Reason	Relinquished by	Date	Received by	Date	Time		Items/Reason	Relinquished By	Date	Received by	Date	Time

START Region 1
Weston Solutions
3 Riverside Drive
Andover, MA 01810

CHAIN OF CUSTODY RECORD
Fay Street Site
Contact Name: Bonnie Mace
Contact Phone: 978-621-1213

No: 1-080913-105558-0003
DateShipped: 7/24/2013
Lab: On-site XRF Field Screening
Lab Phone: 978-621-1213

Lab #	Sample #	Location	Analyses	Matrix	Collected	Sample Time	Numb Cont	Container	Preservative	MS/MSD
	0881-0090	F-03 SB-07C	Metals (XRF)	Soil	7/24/2013	12:40	1	Poly Bag	4 C	N
	0881-0091	F-03 SB-08A	Metals (XRF)	Soil	7/24/2013	12:30	1	Poly Bag	4 C	N
	0881-0092	F-03 SB-08B	Metals (XRF)	Soil	7/24/2013	12:35	1	Poly Bag	4 C	N
	0881-0093	F-03 SB-08C	Metals (XRF)	Soil	7/24/2013	12:45	1	Poly Bag	4 C	N
	0881-0094	F-03 SB-09A	Metals (XRF)	Soil	7/24/2013	12:50	1	Poly Bag	4 C	N
	0881-0095	F-03 SB-09B	Metals (XRF)	Soil	7/24/2013	12:55	1	Poly Bag	4 C	N
	0881-0096	F-03 SB-09C	Metals (XRF)	Soil	7/24/2013	13:00	1	Poly Bag	4 C	N
	0881-0097	F-03 SB-10A	Metals (XRF)	Soil	7/24/2013	13:30	1	Poly Bag	4 C	N
	0881-0098	F-03 SB-10B	Metals (XRF)	Soil	7/24/2013	13:40	1	Poly Bag	4 C	N
	0881-0099	F-03 SB-10C	Metals (XRF)	Soil	7/24/2013	13:45	1	Poly Bag	4 C	N
	0881-0100	F-03 SB-11A	Metals (XRF)	Soil	7/24/2013	14:50	1	Poly Bag	4 C	N
	0881-0101	F-03 SB-11B	Metals (XRF)	Soil	7/24/2013	15:00	1	Poly Bag	4 C	N
	0881-0102	F-03 SB-12A	Metals (XRF)	Soil	7/24/2013	15:00	1	Poly Bag	4 C	N
	0881-0103	F-03 SB-12B	Metals (XRF)	Soil	7/24/2013	15:05	1	Poly Bag	4 C	N
	0881-0104	F-03 SB-13A	Metals (XRF)	Soil	7/24/2013	14:45	1	Poly Bag	4 C	N
	0881-0105	F-03 SB-13B	Metals (XRF)	Soil	7/24/2013	14:55	1	Poly Bag	4 C	N
	0881-0106	F-03 SB-14A	Metals (XRF)	Soil	7/24/2013	14:50	1	Poly Bag	4 C	N
	0881-0107	F-03 SB-14B	Metals (XRF)	Soil	7/24/2013	14:55	1	Poly Bag	4 C	N
	0881-0108	F-01 SB-14A	Metals (XRF)	Soil	7/24/2013	13:45	1	Poly Bag	4 C	N

Special Instructions:	**SAMPLES TRANSFERRED FROM**
	CHAIN OF CUSTODY #

Items/Reason	Relinquished by	Date	Received by	Date	Time		Items/Reason	Relinquished By	Date	Received by	Date	Time

START Region 1
Weston Solutions
3 Riverside Drive
Andover, MA 01810

CHAIN OF CUSTODY RECORD
Fay Street Site
Contact Name: Bonnie Mace
Contact Phone: 978-621-1213

No: 1-080913-105558-0003
DateShipped: 7/24/2013
Lab: On-site XRF Field Screening
Lab Phone: 978-621-1213

Lab #	Sample #	Location	Analyses	Matrix	Collected	Sample Time	Numb Cont	Container	Preservative	MS/MSD
	0881-0109	F-01 SB-15A	Metals (XRF)	Soil	7/24/2013	13:50	1	Poly Bag	4 C	N
	0881-0110	F-01 SB-15B	Metals (XRF)	Soil	7/24/2013	13:55	1	Poly Bag	4 C	N
	0881-0111	F-01 SB-16A	Metals (XRF)	Soil	7/24/2013	13:50	1	Poly Bag	4 C	N
	0881-0112	F-01 SB-16B	Metals (XRF)	Soil	7/24/2013	13:55	1	Poly Bag	4 C	N
	0881-0113	F-01 SB-16C	Metals (XRF)	Soil	7/24/2013	14:00	1	Poly Bag	4 C	N
	0881-0114	F-01 SB-17A	Metals (XRF)	Soil	7/24/2013	13:55	1	Poly Bag	4 C	N
	0881-0115	F-01 SB-17B	Metals (XRF)	Soil	7/24/2013	14:05	1	Poly Bag	4 C	N
	0881-0116	F-01 SB-17C	Metals (XRF)	Soil	7/24/2013	14:15	1	Poly Bag	4 C	N
	0881-0117	F-01 SB-18A	Metals (XRF)	Soil	7/24/2013	14:10	1	Poly Bag	4 C	N
	0881-0118	F-01 SB-18B	Metals (XRF)	Soil	7/24/2013	14:15	1	Poly Bag	4 C	N
	0881-0119	F-02 SB-11A	Metals (XRF)	Soil	7/24/2013	13:11	1	Poly Bag	4 C	N
	0881-0120	F-02 SB-12A	Metals (XRF)	Soil	7/24/2013	13:13	1	Poly Bag	4 C	N
	0881-0121	F-02 SB-13A	Metals (XRF)	Soil	7/24/2013	13:17	1	Poly Bag	4 C	N
	0881-0122	F-02 SB-14A	Metals (XRF)	Soil	7/24/2013	13:19	1	Poly Bag	4 C	N
	0881-0123	F-02 SB-15A	Metals (XRF)	Soil	7/24/2013	13:22	1	Poly Bag	4 C	N
	0881-0124	F-02 SB-16A	Metals (XRF)	Soil	7/24/2013	13:24	1	Poly Bag	4 C	N
	0881-0129	F-02 SB-105A	Metals (XRF)	Soil	7/24/2013	08:45	1	Poly Bag	4 C	N
	0881-0130	F-03 SB-105C	Metals (XRF)	Soil	7/24/2013	11:35	1	Poly Bag	4 C	N
	0881-0131	F-03 SB-107C	Metals (XRF)	Soil	7/24/2013	12:40	1	Poly Bag	4 C	N

Special Instructions:	**SAMPLES TRANSFERRED FROM**
	CHAIN OF CUSTODY #

Items/Reason	Relinquished by	Date	Received by	Date	Time		Items/Reason	Relinquished By	Date	Received by	Date	Time

START Region 1
Weston Solutions
3 Riverside Drive
Andover, MA 01810

CHAIN OF CUSTODY RECORD
Fay Street Site
Contact Name: Bonnie Mace
Contact Phone: 978-621-1213

No: 1-080913-105558-0003
DateShipped: 7/24/2013
Lab: On-site XRF Field Screening
Lab Phone: 978-621-1213

Lab #	Sample #	Location	Analyses	Matrix	Collected	Sample Time	Numb Cont	Container	Preservative	MS/MSD
	0881-0132	F-02 SB-114A	Metals (XRF)	Soil	7/24/2013	13:19	1	Poly Bag	4 C	N
	0881-0133	F-01 SB-118B	Metals (XRF)	Soil	7/24/2013	14:15	1	Poly Bag	4 C	N
	0881-0134	F-03 SB-113A	Metals (XRF)	Soil	7/24/2013	14:45	1	Poly Bag	4 C	N

Special Instructions:

SAMPLES TRANSFERRED FROM
CHAIN OF CUSTODY #

Items/Reason	Relinquished by	Date	Received by	Date	Time		Items/Reason	Relinquished By	Date	Received by	Date	Time

Appendix E

Analytical Data

United States Environmental Protection Agency
Office of Environmental Measurement & Evaluation
11 Technology Drive
North Chelmsford, MA 01863-2431

Laboratory Report

September 03, 2013

Mike Nalipinski / Eric Vanderboom
Mail Code OSRR02-2
US EPA New England R1

Project Number: 13070042
Project: 86 Fay Street - Lowell, MA
Analysis: Metals in Soil Medium Level by ICP
EPA Chemist: Janet Paquin

Date Samples Received by the Laboratory: 07/25/2013

Analytical Procedure:

All samples were received and logged in by the laboratory according to the USEPA New England Laboratory SOP for Sample Log-in.

Sample preparation and analysis was done following the EPA Region I SOP, EIASOP-OPTIMAS0.

Samples were prepared following the EPA Region I SOP, EIASOP-INGMETALSPREP8

Preparation and analysis SOP's are based on "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846, 3rd Edition, Revision 2, Final Update III, Methods 3050B and 6010B," respectively. Samples were analyzed using a Perkin Elmer Dual View Inductively Coupled Plasma - Optical Emission Spectrometer.

Samples were prepared and analyzed by ESAT contractors working at the USEPA New England Laboratory.

Data were reviewed in accordance with the internal verification procedures described in the EPA New England Quality Manual for NERL.

If you have any questions please call me at 617-918-8340 .

Sincerely,

Digitally signed by Dan Boudreau
DN: cn=Dan Boudreau, o=EPA, ou=EIA, email=boudreau.dan@epa.gov, c=US
Date: 2013.09.03 16:27:51 -04'00'

13070042$METMS_PE

Qualifiers:

RL Reporting limit
ND Not Detected above reporting limit
NA Not Applicable
NC Not calculated since analyte concentration is ND
J1 Estimated value due to MS recovery outside accceptance criteria
J2 Estimated value due to LFB result outside acceptance criteria
J3 Estimated value due to RPD result outside acceptance criteria
J4 Estimated value due to LCS result outside acceptance criteria
B Analyte is associated with the lab blank or trip blank contamination. Values are qualified when the observed concentration of the contamination in the sample extract is less than 10 times the concentration in the blank.
R No recovery was calculated since the analyte concentration is greater than four times the spike level.

All sample results, except the results for sample AB41797, reported in mg/Kg, dry weight basis.
The results for sample AB41797 reported mg/Kg, as received.

86 Fay Street - Lowell, MA

Metals in Soil Medium Level by ICP

Client Sample ID:	0881-0007	Lab Sample ID:	AB41779
Date of Collection:	7/23/2013	Matrix:	Soil
Date of Preparation:	8/16/2013	Amount Prepared:	N/A
Date of Analysis:	8/21/2013	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration mg/Kg	RL mg/Kg	Qualifier
7440-22-4	Silver	ND	1.0	
7429-90-5	Aluminum	**11000**	11	
7440-38-2	Arsenic	**19**	2.0	
7440-39-3	Barium	**260**	2.0	J1
7440-41-7	Beryllium	**1.1**	0.82	
7440-70-2	Calcium	**7100**	20	
7440-43-9	Cadmium	**1.1**	1.0	
7440-48-4	Cobalt	**8.9**	2.0	
7440-47-3	Chromium	**32**	2.0	
7440-50-8	Copper	**97**	2.0	
7439-89-6	Iron	**18000**	4.1	
7439-95-4	Magnesium	**1600**	20	
7439-96-5	Manganese	**290**	2.0	
7440-02-0	Nickel	**26**	2.0	
7439-92-1	Lead	**680**	2.0	
7440-36-0	Antimony	ND	2.0	J1
7782-49-2	Selenium	**4.1**	4.1	
7440-28-0	Thallium	ND	2.0	
7440-62-2	Vanadium	**54**	2.0	
7440-66-6	Zinc	**440**	2.0	

Comments:

86 Fay Street - Lowell, MA

Metals in Soil Medium Level by ICP

Client Sample ID:	0881-0010	Lab Sample ID:	AB41780
Date of Collection:	7/23/2013	Matrix:	Soil
Date of Preparation:	8/16/2013	Amount Prepared:	N/A
Date of Analysis:	8/21/2013	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration mg/Kg	RL mg/Kg	Qualifier
7440-22-4	Silver	ND	1.0	
7429-90-5	Aluminum	**10000**	11	
7440-38-2	Arsenic	**26**	2.0	
7440-39-3	Barium	**420**	2.0	
7440-41-7	Beryllium	**1.2**	0.80	
7440-70-2	Calcium	**4600**	20	
7440-43-9	Cadmium	**13**	1.0	
7440-48-4	Cobalt	**8.7**	2.0	
7440-47-3	Chromium	**35**	2.0	
7440-50-8	Copper	**180**	2.0	
7439-89-6	Iron	**21000**	4.0	
7439-95-4	Magnesium	**1200**	20	
7439-96-5	Manganese	**1100**	2.0	J3
7440-02-0	Nickel	**25**	2.0	
7439-92-1	Lead	**1400**	2.0	
7440-36-0	Antimony	**2.3**	2.0	J3
7782-49-2	Selenium	ND	4.0	
7440-28-0	Thallium	ND	2.0	
7440-62-2	Vanadium	**57**	2.0	
7440-66-6	Zinc	**1400**	2.0	

Comments:

86 Fay Street - Lowell, MA

Metals in Soil Medium Level by ICP

Client Sample ID:	0881-0013	Lab Sample ID:	AB41781
Date of Collection:	7/23/2013	Matrix:	Soil
Date of Preparation:	8/16/2013	Amount Prepared:	N/A
Date of Analysis:	8/21/2013	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration mg/Kg	RL mg/Kg	Qualifier
7440-22-4	Silver	ND	0.98	
7429-90-5	Aluminum	**12000**	11	
7440-38-2	Arsenic	**17**	2.0	
7440-39-3	Barium	**200**	2.0	
7440-41-7	Beryllium	**1.2**	0.78	
7440-70-2	Calcium	**3400**	20	
7440-43-9	Cadmium	ND	0.98	
7440-48-4	Cobalt	**9.9**	2.0	
7440-47-3	Chromium	**28**	2.0	
7440-50-8	Copper	**92**	2.0	
7439-89-6	Iron	**20000**	3.9	
7439-95-4	Magnesium	**870**	20	
7439-96-5	Manganese	**350**	2.0	
7440-02-0	Nickel	**25**	2.0	
7439-92-1	Lead	**740**	2.0	
7440-36-0	Antimony	ND	2.0	
7782-49-2	Selenium	ND	3.9	
7440-28-0	Thallium	ND	2.0	
7440-62-2	Vanadium	**64**	2.0	
7440-66-6	Zinc	**460**	2.0	

Comments:

86 Fay Street - Lowell, MA

Metals in Soil Medium Level by ICP

Client Sample ID:	0881-0023	Lab Sample ID:	AB41782
Date of Collection:	7/23/2013	Matrix:	Soil
Date of Preparation:	8/16/2013	Amount Prepared:	N/A
Date of Analysis:	8/21/2013	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration mg/Kg	RL mg/Kg	Qualifier
7440-22-4	Silver	ND	0.98	
7429-90-5	Aluminum	**6700**	11	
7440-38-2	Arsenic	**7.2**	2.0	
7440-39-3	Barium	**19**	2.0	
7440-41-7	Beryllium	ND	0.78	
7440-70-2	Calcium	**800**	20	
7440-43-9	Cadmium	ND	0.98	
7440-48-4	Cobalt	**2.7**	2.0	
7440-47-3	Chromium	**13**	2.0	
7440-50-8	Copper	**6.2**	2.0	
7439-89-6	Iron	**6100**	3.9	
7439-95-4	Magnesium	**1800**	20	
7439-96-5	Manganese	**100**	2.0	
7440-02-0	Nickel	**9.1**	2.0	
7439-92-1	Lead	**23**	2.0	
7440-36-0	Antimony	ND	2.0	
7782-49-2	Selenium	ND	3.9	
7440-28-0	Thallium	ND	2.0	
7440-62-2	Vanadium	**12**	2.0	
7440-66-6	Zinc	**42**	2.0	

Comments:

86 Fay Street - Lowell, MA

Metals in Soil Medium Level by ICP

Client Sample ID:	0881-0031	Lab Sample ID:	AB41783
Date of Collection:	7/23/2013	Matrix:	Soil
Date of Preparation:	8/16/2013	Amount Prepared:	N/A
Date of Analysis:	8/21/2013	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration mg/Kg	RL mg/Kg	Qualifier
7440-22-4	Silver	ND	1.0	
7429-90-5	Aluminum	**11000**	11	
7440-38-2	Arsenic	**30**	2.0	
7440-39-3	Barium	**450**	2.0	
7440-41-7	Beryllium	**1.2**	0.80	
7440-70-2	Calcium	**8500**	20	
7440-43-9	Cadmium	**1.3**	1.0	
7440-48-4	Cobalt	**9.8**	2.0	
7440-47-3	Chromium	**60**	2.0	
7440-50-8	Copper	**180**	2.0	
7439-89-6	Iron	**25000**	4.0	
7439-95-4	Magnesium	**1500**	20	
7439-96-5	Manganese	**420**	2.0	
7440-02-0	Nickel	**28**	2.0	
7439-92-1	Lead	**1500**	2.0	
7440-36-0	Antimony	**2.6**	2.0	
7782-49-2	Selenium	ND	4.0	
7440-28-0	Thallium	ND	2.0	
7440-62-2	Vanadium	**58**	2.0	
7440-66-6	Zinc	**620**	2.0	

Comments:

86 Fay Street - Lowell, MA

Metals in Soil Medium Level by ICP

Client Sample ID:	0881-0039	Lab Sample ID:	AB41784
Date of Collection:	7/23/2013	Matrix:	Soil
Date of Preparation:	8/16/2013	Amount Prepared:	N/A
Date of Analysis:	8/21/2013	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration mg/Kg	RL mg/Kg	Qualifier
7440-22-4	Silver	ND	1.0	
7429-90-5	Aluminum	**11000**	11	
7440-38-2	Arsenic	**23**	2.0	
7440-39-3	Barium	**300**	2.0	
7440-41-7	Beryllium	**1.4**	0.80	
7440-70-2	Calcium	**3700**	20	
7440-43-9	Cadmium	ND	1.0	
7440-48-4	Cobalt	**13**	2.0	
7440-47-3	Chromium	**42**	2.0	
7440-50-8	Copper	**85**	2.0	
7439-89-6	Iron	**17000**	4.0	
7439-95-4	Magnesium	**790**	20	
7439-96-5	Manganese	**370**	2.0	
7440-02-0	Nickel	**36**	2.0	
7439-92-1	Lead	**850**	2.0	
7440-36-0	Antimony	ND	2.0	
7782-49-2	Selenium	ND	4.0	
7440-28-0	Thallium	ND	2.0	
7440-62-2	Vanadium	**51**	2.0	
7440-66-6	Zinc	**290**	2.0	

Comments:

86 Fay Street - Lowell, MA

Metals in Soil Medium Level by ICP

Client Sample ID:	0881-0046	Lab Sample ID:	AB41785
Date of Collection:	7/23/2013	Matrix:	Soil
Date of Preparation:	8/16/2013	Amount Prepared:	N/A
Date of Analysis:	8/21/2013	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration mg/Kg	RL mg/Kg	Qualifier
7440-22-4	Silver	ND	0.98	
7429-90-5	Aluminum	**8500**	11	
7440-38-2	Arsenic	**9.0**	2.0	
7440-39-3	Barium	**38**	2.0	
7440-41-7	Beryllium	ND	0.78	
7440-70-2	Calcium	**1600**	20	
7440-43-9	Cadmium	ND	0.98	
7440-48-4	Cobalt	**3.2**	2.0	
7440-47-3	Chromium	**14**	2.0	
7440-50-8	Copper	**28**	2.0	
7439-89-6	Iron	**9300**	3.9	
7439-95-4	Magnesium	**1700**	20	
7439-96-5	Manganese	**170**	2.0	
7440-02-0	Nickel	**10**	2.0	
7439-92-1	Lead	**78**	2.0	
7440-36-0	Antimony	ND	2.0	
7782-49-2	Selenium	ND	3.9	
7440-28-0	Thallium	ND	2.0	
7440-62-2	Vanadium	**16**	2.0	
7440-66-6	Zinc	**62**	2.0	

Comments:

86 Fay Street - Lowell, MA

Metals in Soil Medium Level by ICP

Client Sample ID:	0881-0053	Lab Sample ID:	AB41786
Date of Collection:	7/24/2013	Matrix:	Soil
Date of Preparation:	8/16/2013	Amount Prepared:	N/A
Date of Analysis:	8/21/2013	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration mg/Kg	RL mg/Kg	Qualifier
7440-22-4	Silver	ND	1.0	
7429-90-5	Aluminum	**9200**	11	
7440-38-2	Arsenic	**12**	2.0	
7440-39-3	Barium	**130**	2.0	
7440-41-7	Beryllium	ND	0.80	
7440-70-2	Calcium	**2700**	20	
7440-43-9	Cadmium	ND	1.0	
7440-48-4	Cobalt	**5.2**	2.0	
7440-47-3	Chromium	**23**	2.0	
7440-50-8	Copper	**110**	2.0	
7439-89-6	Iron	**13000**	4.0	
7439-95-4	Magnesium	**2000**	20	
7439-96-5	Manganese	**210**	2.0	
7440-02-0	Nickel	**16**	2.0	
7439-92-1	Lead	**390**	2.0	
7440-36-0	Antimony	ND	2.0	
7782-49-2	Selenium	ND	4.0	
7440-28-0	Thallium	ND	2.0	
7440-62-2	Vanadium	**24**	2.0	
7440-66-6	Zinc	**250**	2.0	

Comments:

86 Fay Street - Lowell, MA

Metals in Soil Medium Level by ICP

Client Sample ID:	0881-0064	Lab Sample ID:	AB41787
Date of Collection:	7/24/2013	Matrix:	Soil
Date of Preparation:	8/16/2013	Amount Prepared:	N/A
Date of Analysis:	8/21/2013	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration mg/Kg	RL mg/Kg	Qualifier
7440-22-4	Silver	ND	1.0	
7429-90-5	Aluminum	**9300**	11	
7440-38-2	Arsenic	**11**	2.0	
7440-39-3	Barium	**38**	2.0	
7440-41-7	Beryllium	ND	0.80	
7440-70-2	Calcium	**900**	20	
7440-43-9	Cadmium	ND	1.0	
7440-48-4	Cobalt	**3.6**	2.0	
7440-47-3	Chromium	**15**	2.0	
7440-50-8	Copper	**51**	2.0	
7439-89-6	Iron	**13000**	4.0	
7439-95-4	Magnesium	**1700**	20	
7439-96-5	Manganese	**210**	2.0	
7440-02-0	Nickel	**12**	2.0	
7439-92-1	Lead	**100**	2.0	
7440-36-0	Antimony	ND	2.0	
7782-49-2	Selenium	ND	4.0	
7440-28-0	Thallium	ND	2.0	
7440-62-2	Vanadium	**18**	2.0	
7440-66-6	Zinc	**71**	2.0	

Comments:

86 Fay Street - Lowell, MA

Metals in Soil Medium Level by ICP

Client Sample ID:	0881-0074	Lab Sample ID:	AB41788
Date of Collection:	7/24/2013	Matrix:	Soil
Date of Preparation:	8/16/2013	Amount Prepared:	N/A
Date of Analysis:	8/21/2013	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration mg/Kg	RL mg/Kg	Qualifier
7440-22-4	Silver	ND	0.98	
7429-90-5	Aluminum	**8700**	11	
7440-38-2	Arsenic	**12**	2.0	
7440-39-3	Barium	**74**	2.0	
7440-41-7	Beryllium	ND	0.78	
7440-70-2	Calcium	**1200**	20	
7440-43-9	Cadmium	ND	0.98	
7440-48-4	Cobalt	**3.5**	2.0	
7440-47-3	Chromium	**17**	2.0	
7440-50-8	Copper	**43**	2.0	
7439-89-6	Iron	**11000**	3.9	
7439-95-4	Magnesium	**1800**	20	
7439-96-5	Manganese	**150**	2.0	
7440-02-0	Nickel	**13**	2.0	
7439-92-1	Lead	**290**	2.0	
7440-36-0	Antimony	ND	2.0	
7782-49-2	Selenium	ND	3.9	
7440-28-0	Thallium	ND	2.0	
7440-62-2	Vanadium	**17**	2.0	
7440-66-6	Zinc	**220**	2.0	

Comments:

86 Fay Street - Lowell, MA

Metals in Soil Medium Level by ICP

Client Sample ID:	0881-0076	Lab Sample ID:	AB41789
Date of Collection:	7/24/2013	Matrix:	Soil
Date of Preparation:	8/16/2013	Amount Prepared:	N/A
Date of Analysis:	8/21/2013	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration mg/Kg	RL mg/Kg	Qualifier
7440-22-4	Silver	ND	1.0	
7429-90-5	Aluminum	**8700**	11	
7440-38-2	Arsenic	**11**	2.0	
7440-39-3	Barium	**90**	2.0	
7440-41-7	Beryllium	ND	0.80	
7440-70-2	Calcium	**1200**	20	
7440-43-9	Cadmium	ND	1.0	
7440-48-4	Cobalt	**3.9**	2.0	
7440-47-3	Chromium	**21**	2.0	
7440-50-8	Copper	**51**	2.0	
7439-89-6	Iron	**10000**	4.0	
7439-95-4	Magnesium	**2100**	20	
7439-96-5	Manganese	**170**	2.0	
7440-02-0	Nickel	**13**	2.0	
7439-92-1	Lead	**360**	2.0	
7440-36-0	Antimony	ND	2.0	
7782-49-2	Selenium	ND	4.0	
7440-28-0	Thallium	ND	2.0	
7440-62-2	Vanadium	**19**	2.0	
7440-66-6	Zinc	**200**	2.0	

Comments:

86 Fay Street - Lowell, MA

Metals in Soil Medium Level by ICP

Client Sample ID:	0881-0084	Lab Sample ID:	AB41790
Date of Collection:	7/24/2013	Matrix:	Soil
Date of Preparation:	8/16/2013	Amount Prepared:	N/A
Date of Analysis:	8/21/2013	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration mg/Kg	RL mg/Kg	Qualifier
7440-22-4	Silver	ND	1.0	
7429-90-5	Aluminum	**12000**	11	
7440-38-2	Arsenic	**160**	2.0	
7440-39-3	Barium	**1200**	2.0	
7440-41-7	Beryllium	**1.6**	0.80	
7440-70-2	Calcium	**4900**	20	
7440-43-9	Cadmium	**2.3**	1.0	
7440-48-4	Cobalt	**11**	2.0	
7440-47-3	Chromium	**41**	2.0	
7440-50-8	Copper	**430**	2.0	
7439-89-6	Iron	**18000**	4.0	
7439-95-4	Magnesium	**1500**	20	
7439-96-5	Manganese	**290**	2.0	
7440-02-0	Nickel	**30**	2.0	
7439-92-1	Lead	**4300**	2.0	
7440-36-0	Antimony	**2.8**	2.0	
7782-49-2	Selenium	**5.8**	4.0	
7440-28-0	Thallium	ND	2.0	
7440-62-2	Vanadium	**48**	2.0	
7440-66-6	Zinc	**950**	2.0	

Comments:

86 Fay Street - Lowell, MA

Metals in Soil Medium Level by ICP

Client Sample ID:	0881-0087	Lab Sample ID:	AB41791
Date of Collection:	7/24/2013	Matrix:	Soil
Date of Preparation:	8/16/2013	Amount Prepared:	N/A
Date of Analysis:	8/21/2013	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	3
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration mg/Kg	RL mg/Kg	Qualifier
7440-22-4	Silver	ND	2.9	
7429-90-5	Aluminum	**13000**	32	
7440-38-2	Arsenic	**17**	5.9	
7440-39-3	Barium	**480**	5.9	
7440-41-7	Beryllium	ND	2.4	
7440-70-2	Calcium	**6200**	59	
7440-43-9	Cadmium	ND	2.9	
7440-48-4	Cobalt	**16**	5.9	
7440-47-3	Chromium	**150**	5.9	
7440-50-8	Copper	**380**	5.9	
7439-89-6	Iron	**21000**	12	
7439-95-4	Magnesium	**1100**	59	
7439-96-5	Manganese	**500**	5.9	
7440-02-0	Nickel	**36**	5.9	
7439-92-1	Lead	**7300**	5.9	
7440-36-0	Antimony	**10**	5.9	
7782-49-2	Selenium	ND	12	
7440-28-0	Thallium	ND	5.9	
7440-62-2	Vanadium	**51**	5.9	
7440-66-6	Zinc	**1200**	5.9	

Comments:

86 Fay Street - Lowell, MA

Metals in Soil Medium Level by ICP

Client Sample ID:	0881-0104	Lab Sample ID:	AB41792
Date of Collection:	7/24/2013	Matrix:	Soil
Date of Preparation:	8/16/2013	Amount Prepared:	N/A
Date of Analysis:	8/21/2013	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration mg/Kg	RL mg/Kg	Qualifier
7440-22-4	Silver	ND	0.98	
7429-90-5	Aluminum	**11000**	11	
7440-38-2	Arsenic	**11**	2.0	
7440-39-3	Barium	**73**	2.0	
7440-41-7	Beryllium	ND	0.78	
7440-70-2	Calcium	**1300**	20	
7440-43-9	Cadmium	ND	0.98	
7440-48-4	Cobalt	**4.7**	2.0	
7440-47-3	Chromium	**29**	2.0	
7440-50-8	Copper	**38**	2.0	
7439-89-6	Iron	**15000**	3.9	
7439-95-4	Magnesium	**3000**	20	
7439-96-5	Manganese	**210**	2.0	
7440-02-0	Nickel	**17**	2.0	
7439-92-1	Lead	**880**	2.0	
7440-36-0	Antimony	ND	2.0	
7782-49-2	Selenium	ND	3.9	
7440-28-0	Thallium	ND	2.0	
7440-62-2	Vanadium	**25**	2.0	
7440-66-6	Zinc	**130**	2.0	

Comments:

86 Fay Street - Lowell, MA

Metals in Soil Medium Level by ICP

Client Sample ID:	0881-0123	Lab Sample ID:	AB41793
Date of Collection:	7/24/2013	Matrix:	Soil
Date of Preparation:	8/16/2013	Amount Prepared:	N/A
Date of Analysis:	8/21/2013	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration mg/Kg	RL mg/Kg	Qualifier
7440-22-4	Silver	ND	1.0	
7429-90-5	Aluminum	**10000**	11	
7440-38-2	Arsenic	**12**	2.0	
7440-39-3	Barium	**44**	2.0	
7440-41-7	Beryllium	ND	0.80	
7440-70-2	Calcium	**1500**	20	
7440-43-9	Cadmium	ND	1.0	
7440-48-4	Cobalt	**3.1**	2.0	
7440-47-3	Chromium	**15**	2.0	
7440-50-8	Copper	**31**	2.0	
7439-89-6	Iron	**9400**	4.0	
7439-95-4	Magnesium	**1800**	20	
7439-96-5	Manganese	**160**	2.0	
7440-02-0	Nickel	**10**	2.0	
7439-92-1	Lead	**82**	2.0	
7440-36-0	Antimony	ND	2.0	
7782-49-2	Selenium	ND	4.0	
7440-28-0	Thallium	ND	2.0	
7440-62-2	Vanadium	**18**	2.0	
7440-66-6	Zinc	**65**	2.0	

Comments:

86 Fay Street - Lowell, MA

Metals in Soil Medium Level by ICP

Client Sample ID:	0881-0127	Lab Sample ID:	AB41794
Date of Collection:	7/23/2013	Matrix:	Soil
Date of Preparation:	8/16/2013	Amount Prepared:	N/A
Date of Analysis:	8/21/2013	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration mg/Kg	RL mg/Kg	Qualifier
7440-22-4	Silver	ND	1.0	
7429-90-5	Aluminum	**10000**	11	
7440-38-2	Arsenic	**21**	2.0	
7440-39-3	Barium	**280**	2.0	
7440-41-7	Beryllium	**1.2**	0.80	
7440-70-2	Calcium	**3300**	20	
7440-43-9	Cadmium	ND	1.0	
7440-48-4	Cobalt	**12**	2.0	
7440-47-3	Chromium	**39**	2.0	
7440-50-8	Copper	**78**	2.0	
7439-89-6	Iron	**17000**	4.0	
7439-95-4	Magnesium	**720**	20	
7439-96-5	Manganese	**420**	2.0	
7440-02-0	Nickel	**34**	2.0	
7439-92-1	Lead	**830**	2.0	
7440-36-0	Antimony	ND	2.0	
7782-49-2	Selenium	ND	4.0	
7440-28-0	Thallium	ND	2.0	
7440-62-2	Vanadium	**46**	2.0	
7440-66-6	Zinc	**270**	2.0	

Comments:

86 Fay Street - Lowell, MA

Metals in Soil Medium Level by ICP

Client Sample ID:	0881-0134	Lab Sample ID:	AB41795
Date of Collection:	7/24/2013	Matrix:	Soil
Date of Preparation:	8/16/2013	Amount Prepared:	N/A
Date of Analysis:	8/21/2013	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration mg/Kg	RL mg/Kg	Qualifier
7440-22-4	Silver	ND	0.98	
7429-90-5	Aluminum	**11000**	11	
7440-38-2	Arsenic	**11**	2.0	
7440-39-3	Barium	**66**	2.0	
7440-41-7	Beryllium	ND	0.78	
7440-70-2	Calcium	**1300**	20	
7440-43-9	Cadmium	ND	0.98	
7440-48-4	Cobalt	**4.3**	2.0	
7440-47-3	Chromium	**28**	2.0	
7440-50-8	Copper	**35**	2.0	
7439-89-6	Iron	**13000**	3.9	
7439-95-4	Magnesium	**2800**	20	
7439-96-5	Manganese	**190**	2.0	
7440-02-0	Nickel	**15**	2.0	
7439-92-1	Lead	**1400**	2.0	
7440-36-0	Antimony	ND	2.0	
7782-49-2	Selenium	ND	3.9	
7440-28-0	Thallium	ND	2.0	
7440-62-2	Vanadium	**24**	2.0	
7440-66-6	Zinc	**130**	2.0	

Comments:

86 Fay Street - Lowell, MA

Metals in Soil Medium Level by ICP

Client Sample ID:	0881-0136	Lab Sample ID:	AB41797
Date of Collection:	7/24/2013	Matrix:	PE sand
Date of Preparation:	8/16/2013	Amount Prepared:	N/A
Date of Analysis:	8/21/2013	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration mg/Kg	RL mg/Kg	Qualifier
7440-22-4	Silver	**37**	1.0	
7429-90-5	Aluminum	**2500**	11	
7440-38-2	Arsenic	**30**	2.0	
7440-39-3	Barium	**150**	2.0	
7440-41-7	Beryllium	**10**	0.80	
7440-70-2	Calcium	**1000**	20	
7440-43-9	Cadmium	ND	1.0	
7440-48-4	Cobalt	**32**	2.0	
7440-47-3	Chromium	**24**	2.0	
7440-50-8	Copper	**44**	2.0	
7439-89-6	Iron	**2600**	4.0	
7439-95-4	Magnesium	**450**	20	
7439-96-5	Manganese	**40**	2.0	
7440-02-0	Nickel	**35**	2.0	
7439-92-1	Lead	**32**	2.0	
7440-36-0	Antimony	**44**	2.0	
7782-49-2	Selenium	**9.2**	4.0	
7440-28-0	Thallium	ND	2.0	
7440-62-2	Vanadium	**62**	2.0	
7440-66-6	Zinc	**5.4**	2.0	

Comments:

86 Fay Street - Lowell, MA

Laboratory Reagent Blank

Client Sample ID:	N/A	Lab Sample ID:	N/A
Date of Collection:	N/A	Matrix:	PE sand
Date of Preparation:	8/16/2013	Amount Prepared:	N/A
Date of Analysis:	8/21/2013	Percent Solids:	N/A
Dry Weight Prepared:	N/A	Extract Dilution:	1
Wet Weight Prepared:	N/A	pH:	N/A

CAS Number	Compound	Concentration ug/L	RL ug/L	Qualifier
7440-22-4	Silver	ND	10	
7429-90-5	Aluminum	ND	110	
7440-38-2	Arsenic	ND	20	
7440-39-3	Barium	ND	20	
7440-41-7	Beryllium	ND	8.0	
7440-70-2	Calcium	ND	200	
7440-43-9	Cadmium	ND	10	
7440-48-4	Cobalt	ND	20	
7440-47-3	Chromium	ND	20	
7440-50-8	Copper	ND	20	
7439-89-6	Iron	ND	40	
7439-95-4	Magnesium	ND	200	
7439-96-5	Manganese	ND	20	
7440-02-0	Nickel	ND	20	
7439-92-1	Lead	ND	20	
7440-36-0	Antimony	ND	20	
7782-49-2	Selenium	ND	40	
7440-28-0	Thallium	ND	20	
7440-62-2	Vanadium	ND	20	
7440-66-6	Zinc	ND	20	

Comments:

86 Fay Street - Lowell, MA

MATRIX SPIKE (MS) RECOVERY

Sample ID: AB41779

PARAMETER	SPIKE ADDED mg/Kg	SAMPLE CONCENTRATION mg/Kg	MS CONCENTRATION mg/Kg	MS % REC	QC LIMITS (% REC)
Antimony	102.0	ND	33.6	33	75 - 125
Arsenic	102.0	19	119	98	75 - 125
Barium	102.0	260	528	263	75 - 125
Beryllium	40.8	1.1	42.6	102	75 - 125
Cadmium	51.0	1.1	51.1	98	75 - 125
Chromium	102.0	32	156	122	75 - 125
Cobalt	102.0	8.9	112	101	75 - 125
Copper	102.0	97	204	105	75 - 125
Lead	102.0	680	880	R	75 - 125
Manganese	102.0	290	389	97	75 - 125
Nickel	102.0	26	127	99	75 - 125
Selenium	102.0	4.1	97.0	91	75 - 125
Silver	20.4	ND	20.9	102	75 - 125
Thallium	102.0	ND	95.4	94	75 - 125
Vanadium	102.0	54	155	99	75 - 125
Zinc	102.0	440	517	R	75 - 125

86 Fay Street - Lowell, MA

Laboratory Duplicate Results

Sample ID: AB41780

PARAMETER	SAMPLE RESULT mg/Kg	SAMPLE DUPLICATE RESULT mg/Kg	PRECISION RPD %	QC LIMITS
Aluminum	10000	11000	9.5	30
Antimony	2.3	9.9	120	30
Arsenic	26	26	0	30
Barium	420	520	21	30
Beryllium	1.2	1.1	8.7	30
Cadmium	13	13	0	30
Calcium	4600	4600	0	30
Chromium	35	35	0	30
Cobalt	8.7	10	14	30
Copper	180	180	0	30
Iron	21000	24000	13	30
Lead	1400	1400	0	30
Magnesium	1200	1200	0	30
Manganese	1100	4100	120	30
Nickel	25	31	21	30
Selenium	ND	ND	NC	30
Silver	ND	ND	NC	30
Thallium	ND	ND	NC	30
Vanadium	57	61	6.8	30
Zinc	1400	1600	13	30

86 Fay Street - Lowell, MA

Laboratory Fortified Blank (LFB) Results

PARAMETER	LFB AMOUNT SPIKED ug/L	LFB RESULT ug/L	LFB RECOVERY %	QC LIMITS %
Aluminum	1000	1060	106	85 - 115
Antimony	1000	974	97	85 - 115
Arsenic	1000	973	97	85 - 115
Barium	1000	1010	101	85 - 115
Beryllium	400	410	102	85 - 115
Cadmium	500	514	103	85 - 115
Calcium	10000	10500	105	85 - 115
Chromium	1000	1070	107	85 - 115
Cobalt	1000	1030	103	85 - 115
Copper	1000	1060	106	85 - 115
Iron	1000	1080	108	85 - 115
Lead	1000	986	99	85 - 115
Magnesium	10000	10800	108	85 - 115
Manganese	1000	1060	106	85 - 115
Nickel	1000	1020	102	85 - 115
Selenium	1000	934	93	85 - 115
Silver	200	202	101	85 - 115
Thallium	1000	983	98	85 - 115
Vanadium	1000	1060	106	85 - 115
Zinc	1000	1010	101	85 - 115

Comments:

86 Fay Street - Lowell, MA

Solid Laboratory Control Sample (LCS) Results

PARAMETER	LCS RESULTS mg/Kg	CONTROL LIMITS mg/Kg
Aluminum	9670	3380 - 13300
Antimony	33.2	7.62 - 178
Arsenic	93.6	77.7 - 111
Barium	168	138 - 193
Beryllium	54.8	44.1 - 61.1
Cadmium	58.3	50.3 - 69.4
Calcium	6190	5070 - 7240
Chromium	70.2	56.4 - 82.2
Cobalt	102	84.6 - 117
Copper	83.5	65.3 - 90.6
Iron	11900	6480 - 19100
Lead	86.8	75.6 - 108
Magnesium	3240	2310 - 3750
Manganese	283	231 - 334
Nickel	56.6	46.5 - 66.7
Selenium	152	126 - 192
Silver	34.2	22.5 - 45.4
Thallium	114	96.5 - 142
Vanadium	57.3	41 - 71.6
Zinc	137	111 - 163

Comments:

Samples in Batch: AB41779, AB41780, AB41781, AB41782, AB41783, AB41784, AB41785, AB41786, AB41787, AB41788, AB41789, AB41790, AB41791, AB41792, AB41793, AB41794, AB41795, AB41797

PN-13070042

START Region 1
Weston Solutions
3 Riverside Drive
Andover, MA 01810

CHAIN OF CUSTODY RECORD
Fay Street Site
Contact Name: Eric Ackerman
Contact Phone: 978-621-1204

No: 1-072513-122909-0001
DateShipped: 7/25/2013
Lab: EPA OEME
Lab Phone: 617-918-8418

13070042$METW_PE
13070042$METMS_PE

Lab #	Sample #	Location	Analyses	Matrix	Collected	Sample Time	Numb Cont	Container	Preservative	MS/MSD
	0881-0007	F-01 SB-03A	Metals ($METMS)	Soil	7/23/2013	09:55	1	4 oz Jar	4 C	Y
	0881-0010	F-01 SB-04A	Metals ($METMS)	Soil	7/23/2013	10:10	1	4 oz Jar	4 C	N
	0881-0013	F-01 SB-05A	Metals ($METMS)	Soil	7/23/2013	10:40	1	4 oz Jar	4 C	N
	0881-0023	F-01 SB-08B	Metals ($METMS)	Soil	7/23/2013	12:35	1	4 oz Jar	4 C	N
	0881-0031	F-01 SB-11A	Metals ($METMS)	Soil	7/23/2013	13:40	1	4 oz Jar	4 C	N
	0881-0039	F-01 SB-13C	Metals ($METMS)	Soil	7/23/2013	14:30	1	4 oz Jar	4 C	N
	0881-0046	F-02 SB-08A	Metals ($METMS)	Soil	7/23/2013	14:55	1	4 oz Jar	4 C	N
	0881-0053	F-02 SB-06B	Metals ($METMS)	Soil	7/24/2013	08:50	1	4 oz Jar	4 C	N
	0881-0064	F-02 SB-02A	Metals ($METMS)	Soil	7/24/2013	09:50	1	4 oz Jar	4 C	N
	0881-0074	F-03 SB-02B	Metals ($METMS)	Soil	7/24/2013	11:00	1	4 oz Jar	4 C	N
	0881-0076	F-03 SB-03A	Metals ($METMS)	Soil	7/24/2013	11:15	1	4 oz Jar	4 C	N
	0881-0084	F-03 SB-05C	Metals ($METMS)	Soil	7/24/2013	11:35	1	4 oz Jar	4 C	N
	0881-0087	F-03 SB-06C	Metals ($METMS)	Soil	7/24/2013	12:40	1	4 oz Jar	4 C	N
	0881-0104	F-03 SB-13A	Metals ($METMS)	Soil	7/24/2013	14:45	1	4 oz Jar	4 C	N
	0881-0123	F-02 SB-15A	Metals ($METMS)	Soil	7/24/2013	13:22	1	4 oz Jar	4 C	N
	0881-0127	F-01 SB-113C	Metals ($METMS)	Soil	7/23/2013	14:30	1	4 oz Jar	4 C	N
	0881-0134	F-03 SB-113A	Metals ($METMS)	Soil	7/24/2013	14:45	1	4 oz Jar	4 C	N
	0881-0135	RB 01	Metals	Water	7/24/2013	16:00	1	500 mL Poly	HNO3 pH<2	N
	0881-0136	IS6824	Metals ($METMS)	Lab Sand	7/24/2013	16:00	1	2 oz Jar	4 C	N

Special Instructions:

SAMPLES TRANSFERRED FROM
CHAIN OF CUSTODY #

Items/Reason	Relinquished by	Date	Received by	Date	Time	Items/Reason	Relinquished By	Date	Received by	Date	Time
lab Delivery	Eric J. Ackerman	7/25/13	[signature]	7/25/13	16:03						