

**DRAFT**  
**FIVE YEAR LANDFILL GROUNDWATER MONITORING  
AND ANNUAL INSPECTION REPORT  
UNITED STATES MILITARY ACADEMY  
WEST POINT, NEW YORK**

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*Prepared for:*



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## **1. INTRODUCTION - WEST POINT ANNUAL LANDFILL INSPECTION AND FIVE YEAR GROUNDWATER MONITORING PROGRAM - 2015**

Weston Solutions, Inc., working under subcontract to Bay West, LLC, conducted annual inspections and five year groundwater quality monitoring for 13 Landfills at the U.S. Army Garrison, West Point, New York from 21-23 September 2015. The monitoring program is conducted in accordance with the Long Term Monitoring Program (LTMP) outlined in the 15 August 2012 LTMP letter to the New York State Department of Environmental Conservation (NYSDEC) for 14 landfills at West Point.

NYSDEC approved the proposed LTMP without change in a letter dated 3 October 2012. The inspection and monitoring results from the Motor Pool landfill, the 14<sup>th</sup> of these landfills is provided as a separate letter report (West Point Former Motor Pool Landfill (WPTST-11) Draft Annual Groundwater Sampling Event Letter Report, January, 2016).

The monitoring program includes a visual inspection of the landfill cap and cover, drainage, structures, and groundwater monitoring points as well as collection of samples from select wells for laboratory analysis of groundwater quality. No potential issues were identified during the inspections. The following sections summarize observations from the site inspections and the results of the groundwater sample collection.

Table A-1 in Attachment A presents the 2015 sample schedule for the 2015 groundwater monitoring program. The 2012 approved LTMP reduced the monitoring requirement for each of the 13 landfills to a sample frequency of once every five years. The sampling frequency would increase to once every two and a half years if a non-nutrient metal was detected in exceedance of a NYSDEC screening criteria.

The validated laboratory analytical results from groundwater samples collected from the landfill monitoring wells are presented in Table A-2, and the analytical results in comparison to historical results, are presented in Table A-3.

Groundwater samples were collected from 9 of the 13 landfills. Two landfills (Mitchie Stadium Lot B and the High School Landfill) do not have a groundwater monitoring requirement. The monitoring wells scheduled to be sampled from two of the landfills (Post Exchange PX and the Building 706 Parking Lot Landfills) were dry at the time of sampling.

Attachment B contains the analytical data validation report and Attachment C includes the complete laboratory analytical data packages on CD.

## **2. POST EXCHANGE PX LANDFILL (WSTPT-01)**

### **2.1 LANDFILL CAP INSPECTION**

The Post Exchange Landfill cap and structures appeared in good condition during the 2015 inspection. There were no indications of subsidence or drainage issues.

### **2.2 MONITORING WELL NETWORK**

The Post Exchange Landfill is monitored by wells PXMW-01, PXMW-02, PXMW-03, and PXMW-04. These wells appeared in good condition during the 2015 inspection, free of damage, and secured with locks.

### **2.3 MONITORING WELL GROUNDWATER SAMPLE ANALYTICAL RESULTS**

Post Exchange Landfill monitoring well PXMW-01 is scheduled to be sampled for total and soluble metals once every five years. This well was purged on 22 September 2015 and was purged dry using low flow purging rates of less than 1 liter per minute (LPM). There was no water present on 23 September 2015, so no sample could be collected.

### 3. MICHIE STADIUM LOT A (WSTPT-02)

#### 3.1 LANDFILL CAP INSPECTION

The Michie Stadium Lot A Landfill cap and structures appeared in good condition during the 2015 inspection. There were no indications of subsidence or drainage issues.

#### 3.2 MONITORING WELL NETWORK

Michie Stadium Landfill Lot A is monitored by wells LAMW-01 and LAMW-03. The wells appeared in good condition during the 2015 inspection, free of damage, and were secured with locks.

#### 3.3 MONITORING WELL GROUNDWATER SAMPLE ANALYTICAL RESULTS

Groundwater samples are collected from Michie Stadium Lot A Landfill monitoring well LAMW-03 for total and soluble metals once every five years. Groundwater monitoring results for total and soluble metals resulted in exceedance of NYSDEC screening values for iron, manganese, sodium and thallium for both filtered and unfiltered samples.

Total chromium at a concentration of 74 µg/L was greater than the 50 µg/L NYSDEC screening value. The 17 µg/L detected concentration of chromium from the filtered sample was below the NYSDEC value.

Filtered analytical results with historic exceedances of the NYSDEC value are presented below:

**Table 3-1: Groundwater Exceedances at the Michie Stadium Lot A Landfill  
Monitoring Well LAMW-03**

Analyte	Screening Value <sup>(1)</sup>	2010	2011	2013 <sup>2</sup>	2015
Manganese	300	556	ND	1,360	890 Q
Iron	300	1,170	2,980	13,800	1,300
Sodium	20,000	329,000	145,000	266,000	210,000
Thallium	8	ND	ND	ND	8.6 J

**Note:** All Results (µg/L)

<sup>1</sup>Values from the NYSDEC Class GA Groundwater Quality Standards

<sup>2</sup>2013 Report did not indicate whether the samples were filtered or unfiltered

Q – One or more quality control criteria failed

J – Estimated: The analyte was positively identified; the quantitation is an estimate

ND – Not detected

NA – Not available

## **4. MICHIE STADIUM LOT B (WSTPT-03)**

### **4.1 LANDFILL CAP INSPECTION**

The Mitchie Stadium Lot B Landfill cap and structures appeared in good condition during the 2015 inspection. There were no indications of subsidence or drainage issues.

### **4.2 MONITORING WELL NETWORK**

Mitchie Stadium Lot B Landfill is monitored by wells LBMW-01, LBMW-02 and LBMW-03. These wells appeared in good condition during the 2015 inspection, free of damage, and were secured with locks.

### **4.3 MONITORING WELL GROUNDWATER SAMPLE ANALYTICAL RESULTS**

No groundwater monitoring is conducted at Mitchie Stadium Lot B. The downgradient monitoring conducted at Mitchie Stadium Lot A serves as the monitoring program for both Lots A and B.



## 5. MICHIE STADIUM LOT C (WSTPT-04)

### 5.1 LANDFILL CAP INSPECTION

The Michie Stadium Lot C Landfill cap and structures appeared in good condition during the 2015 inspection. There were no indications of subsidence or drainage issues.

### 5.2 MONITORING WELL NETWORK

Michie Stadium Landfill Lot C is monitored by wells LCMW-02 and LCMW-03. These wells appeared in good condition during the 2015 inspection, free of damage, and were secured with locks.

### 5.3 MONITORING WELL GROUNDWATER SAMPLE ANALYTICAL RESULTS

Groundwater samples are collected from Michie Stadium Lot C Landfill monitoring well LCMW-03 for total and soluble metals once every five years. Groundwater monitoring results for total and soluble metals resulted in exceedance of NYSDEC screening values for iron, manganese and sodium for both filtered and unfiltered samples.

Total thallium was detected at a concentration greater than the NYSDEC screening value of 8 µg/L. However, the detection of 5.5 µg/L from the filtered sample was less than the screening value.

Filtered analytical results with historic exceedances of the NYSDEC screening values are presented below:

**Table 5-1: Groundwater Exceedances at the Michie Stadium Lot C Landfill Monitoring Well LCMW-03**

Analyte	Screening Value <sup>(1)</sup>	2008	2015
Iron	300	40,800 R	20,000
Sodium	20,000	199,000	580,000
Manganese	300	1,240 R	490 Q

**Note:** All Results (µg/L)

<sup>1</sup>Values from the NYSDEC Class GA Groundwater Quality Standards

R – Data has been rejected by the validator

U – Undetected at the Limit of Detection (LOD)

Q – One or more quality control criteria failed

## 6. MICHIE STADIUM LOT D (WSTPT-05)

### 6.1 LANDFILL CAP INSPECTION

The Michie Stadium Lot D Landfill cap and structures appeared in good condition during the 2015 inspection. There were no indications of subsidence or drainage issues.

### 6.2 MONITORING WELL NETWORK

Michie Stadium Landfill Lot D is monitored by wells LDMW-01, LDMW-04 and LDMW-05. These wells appeared in good condition during the 2015 inspection, free of damage, and were secured with locks.

### 6.3 MONITORING WELL GROUNDWATER SAMPLE ANALYTICAL RESULTS

Groundwater samples are collected from Michie Stadium Lot D Landfill monitoring well LDMW-04 for total and soluble metals once every five years. Groundwater monitoring results for total and soluble metals resulted in exceedance of the NYSDEC screening value for sodium for both filtered and unfiltered samples. The total iron result also exceeded the NYSDEC screening value.

Filtered analytical results with historic exceedances of the NYSDEC screening value are presented below:

**Table 6-1: Groundwater Exceedances at the Michie Stadium Lot D Landfill Monitoring Well LDMW-04**

Analyte	Screening Value <sup>(1)</sup>	2008	2009	2010	2015
Sodium	20,000	138,000	13,800 J	130,000	120,000

**Note:** All Results (µg/L)

<sup>1</sup>Values from the NYSDEC Class GA Groundwater Quality Standards

J – Estimated: The analyte was positively identified; the quantitation is an estimate

## 7. MICHIE STADIUM LOT E (WSTPT-06)

### 7.1 LANDFILL CAP INSPECTION

The Michie Stadium Lot E Landfill cap and structures appeared in good condition during the 2015 inspection. There were no indications of subsidence or drainage issues.

### 7.2 MONITORING WELL NETWORK

Michie Stadium Landfill Lot E is monitored by wells LEMW-01, LEMW-02, LEMW-03, LEMW-04 and LEMW-05. These wells appeared in good condition during the 2015 inspection, free of damage, and were secured with locks.

### 7.3 MONITORING WELL GROUNDWATER SAMPLE ANALYTICAL RESULTS

Groundwater samples are collected from Michie Stadium Lot E Landfill monitoring well LEMW-04 for total and soluble metals once every five years. Groundwater monitoring results for total and soluble metals resulted in exceedance of the NYSDEC screening values for iron, magnesium, manganese and sodium for both filtered and unfiltered samples.

Thallium was also detected at a concentration in exceedance of the NYSDEC screening value for the soluble but not the total sample.

Filtered analytical results with historic exceedances the NYSDEC screening values are presented below:

**Table 7-1: Groundwater Exceedances at the Michie Stadium Lot E Landfill Monitoring Well LEMW-04**

1

Analyte	Screening Value <sup>(1)</sup>	2007	2008	2015
Magnesium	35,000	NA	NA	46,000
Manganese	300	774	863	1,000 Q
Iron	300	39,900	39,000	21,000
Sodium	20,000	72,600	273,000	400,000
Thallium	8	ND	ND	8.6 J

**Note:** All Results (µg/L)

<sup>1</sup> Values from the NYSDEC Class GA Groundwater Quality Standards

Q – One or more quality control criteria failed

J – Estimated: The analyte was positively identified; the quantitation is an estimate

NA – Not available

ND – Not detected

## 8. MICHIE STADIUM LOT F (WSTPT-7A)

### 8.1 LANDFILL CAP INSPECTION

The Mitchie Stadium Lot F Landfill cap and structures appeared in good condition during the 2015 inspection. There were no indications of subsidence or drainage issues.

### 8.2 MONITORING WELL NETWORK

Mitchie Stadium Landfill Lot F is monitored by wells LF-01, LF-02, LF-03 and LFMW-04. These wells appeared in good condition during the 2015 inspection, free of damage, and were secured with locks.

### 8.3 MONITORING WELL GROUNDWATER SAMPLE ANALYTICAL RESULTS

Groundwater samples are collected from Mitchie Stadium Lot F Landfill monitoring well LF-01 for total and soluble metals once every five years. Groundwater monitoring results for total and soluble metals resulted in exceedance of the NYSDEC screening values for iron, manganese, sodium and thallium for both filtered and unfiltered samples.

Filtered analytical results with historic exceedances of the NYSDEC screening values are presented below:

**Table 8-1: Groundwater Exceedances at the Mitchie Stadium Lot F Landfill Monitoring Well LF-01**

Analyte	Screening Value <sup>(1)</sup>	2007	2008	2009	2010	2015
Manganese	300	312	325	1,110 J	807	690 Q
Iron	300	56,900	65,600 J	61,700 J	24,800	46,000
Sodium	20,000	364,000	910,000	1,290,000	1,100,000	1,900,000
Thallium	8	ND	ND	ND	ND	8.5 J

**Note:** All Results (µg/L)

<sup>1</sup>Values from the NYSDEC Class GA Groundwater Quality Standards

Q – One or more quality control criteria failed

J – Estimated: The analyte was positively identified; the quantitation is an estimate

ND – Not detected

## 9. SKI LOT LANDFILL (WSTPT-09)

### 9.1 LANDFILL CAP INSPECTION

The Ski Lot Landfill cap and structures appeared in good condition during the 2015 inspection. There were no indications of subsidence or drainage issues.

### 9.2 MONITORING WELL NETWORK

The Ski Lot Landfill is monitored by wells SL-01, SL-02, SL-03, SL-04 and SL-05. These wells appeared in good condition during the 2015 inspection, free of damage, and were secured with locks.

### 9.3 MONITORING WELL GROUNDWATER SAMPLE ANALYTICAL RESULTS

Groundwater samples are collected from the Ski Lot Landfill monitoring well SL-05 for total and soluble metals once every five years. Groundwater monitoring results for total and soluble metals resulted in exceedance of the NYSDEC screening values for iron, manganese and sodium for both filtered and unfiltered samples.

Filtered analytical results with historic exceedances of the NYSDEC screening values are presented below:

**Table 9-1: Groundwater Exceedances at the Ski Lot Landfill Analyte Monitoring Well SL-05**

Analyte	Screening Value <sup>(1)</sup>	2007	2008	2015
Manganese	300	324	441	400 Q
Iron	300	1,800	7,770	1,300
Sodium	20,000	286,000	538,000	500,000

**Note:** All Results ( $\mu\text{g/L}$ )

<sup>1</sup>Values from the NYSDEC Class GA Groundwater Quality Standards

Q – One or more quality control criteria failed

## 10. POST SCHOOL LANDFILL (WSTPT-10)

### 10.1 LANDFILL CAP INSPECTION

The Post School Landfill cap and structures appeared in good condition during the 2015 inspection. There were no indications of subsidence or drainage issues.

### 10.2 MONITORING WELL NETWORK

The Post School Landfill is monitored by wells PS-1, PS-2, PS-3 and PS-4. The wells appeared in good condition during the 2015 inspection, free of damage, and were secured with locks.

A fifth well labeled as PS-5 was likely mislabeled as PS-4 as described in the 2001 Long-Term Monitoring and Maintenance Program Report.

### 10.3 MONITORING WELL GROUNDWATER SAMPLE ANALYTICAL RESULTS

Groundwater samples are collected from the Post School Landfill monitoring well PS-4 for total and soluble metals once every five years. Groundwater monitoring results for total and soluble metals resulted in exceedance of the NYSDEC screening values for iron, manganese and sodium for both filtered and unfiltered samples.

Filtered analytical results with historic exceedances of the NYSDEC screening values are presented below:

**Table 10-1: Groundwater Exceedances at the Post School Landfill Monitoring Well PS-4**

Analyte	Screening Value <sup>(1)</sup>	2007	2008	2015
Manganese	300	2,680	1,300	800 Q
Iron	300	7,000	32,600	3,900
Sodium	20,000	14,800	17,200	26,000

**Note:** All Results ( $\mu\text{g/L}$ )

<sup>1</sup>Values from the NYSDEC Class GA Groundwater Quality Standards

Q – One or more quality control criteria failed

## **11. HIGH SCHOOL LANDFILL (WSTPT-15B)**

### **11.1 LANDFILL CAP INSPECTION**

The High School Landfill cap and structures appeared in good condition during the 2015 inspection. There were no indications of subsidence or drainage issues.

### **11.2 MONITORING WELL NETWORK**

The High School Landfill is monitored by a single monitoring well. This well could not be located during the 2015 monitoring event due to the presence of heavy vegetation during the inspection.

### **11.3 MONITORING WELL GROUNDWATER SAMPLE ANALYTICAL RESULTS**

The High School Landfill does not have a groundwater monitoring requirement.

## **12. ORGANIC COMPOST LANDFILL (WSTPT-16)**

### **12.1 LANDFILL CAP INSPECTION**

The Organic Compost Landfill cap and structures appeared in good condition during the 2015 inspection. There were no indications of subsidence or drainage issues.

### **12.2 MONITORING WELL NETWORK**

The Organic Compost Landfill is monitored by wells OC-1, OC-2, OC-3, OC-4 and OC-5. These wells appeared in good condition during the 2015 inspection, free of damage, and were secured with locks.

The well on the historical map labeled as OC-5, appears to be well OC-2A based on the 1 May 1995 drilling log. It is not clear whether the groundwater samples reported as OC-2 from 2008 through 2013 were collected from this well or the adjacent well labeled as OC-2 which was dry during this monitoring event.

### **12.3 MONITORING WELL GROUNDWATER SAMPLE ANALYTICAL RESULTS**

Groundwater samples are collected from the Organic Compost Landfill monitoring well OC-2 for total and soluble metals once every five years. The well labeled as OC-5 was sampled and submitted to the laboratory as OC-5. As discussed above it is not known if this sample was labeled OC-2 during the 2008 through 2013 monitoring events. Groundwater monitoring results for total and soluble metals resulted in exceedance of the NYSDEC screening value for sodium for both filtered and unfiltered samples.

Filtered analytical results with historic exceedances of the NYSDEC screening values are presented below:

**Table 12-1: Groundwater Exceedances at the Organic Compost Landfill  
Monitoring Well OC-2/OC-5**

<b>Well ID</b>		<b>OC-5</b>	<b>OC-2</b>	<b>OC-2</b>	<b>OC-5</b>
<b>Analyte</b>	<b>Screening Value <sup>(1)</sup></b>	<b>2008</b>	<b>2009</b>	<b>2010</b>	<b>2015</b>
<b>Sodium</b>	<b>20,000</b>	<b>83,500</b>	<b>59,200 J</b>	<b>106,000</b>	<b>94,000</b>

**Note:** All Results (µg/L)

<sup>1</sup>Values from the NYSDEC Class GA Groundwater Quality Standards

J – Estimated: The analyte was positively identified; the quantitation is an estimate



## 13. CAMP BUCKNER LANDFILL (WSTPT-35A)

### 13.1 LANDFILL CAP INSPECTION

The Camp Buckner Landfill cap and structures appeared in good condition during the 2015 inspection. There were no indications of subsidence or drainage issues.

### 13.2 MONITORING WELL NETWORK

The Camp Buckner Landfill is monitored by wells CBMW-01, CBMW-02 and CBMW-03. These wells appeared in good condition during the 2015 inspection, free of damage, and were secured with locks.

### 13.3 MONITORING WELL GROUNDWATER SAMPLE ANALYTICAL RESULTS

Groundwater samples are collected from the Camp Buckner Landfill monitoring well CBMW-03 for total and soluble metals once every five years. Groundwater monitoring results for total and soluble metals resulted in exceedance of the NYSDEC screening values for iron and manganese for both filtered and unfiltered samples.

Filtered analytic results with historic exceedances of the NYSDEC screening values are presented below:

**Table 13-1: Groundwater Exceedances at the Camp Buckner Landfill Monitoring Well CBMW-03**

Analyte	Screening Value <sup>(1)</sup>	2007	2008	2015
Manganese	300	1,160	1,210	1,300
Iron	300	4,070	10,500	5,600

**Note:** All Results ( $\mu\text{g/L}$ )

<sup>1</sup>Values from the NYSDEC Class GA Groundwater Quality Standards

## **14. BUILDING 706 PARKING LOT LANDFILL (WSTPT-48)**

### **14.1 LANDFILL CAP INSPECTION**

The Building 706 Parking Lot Landfill cap and structures appeared in good condition during the 2015 inspection. There were no indications of subsidence or drainage issues.

### **14.2 MONITORING WELL NETWORK**

The Building 706 Parking Lot Landfill is monitored by wells LDMW-01 and MW48-01. These wells appeared in good condition during the 2015 inspection, free of damage, and were secured with locks.

### **14.3 MONITORING WELL GROUNDWATER SAMPLE ANALYTICAL RESULTS**

The Building 706 Parking Lot Landfill monitoring well MW48-01 is scheduled to be sampled for total and soluble metals once every five years. There was no water present on 22 September 2015, so no sample could be collected.

## **15. CONCLUSIONS AND RECOMMENDATIONS**

The landfill site inspections did not indicate any potential issues during the site inspections conducted in September 2015.

Groundwater monitoring results for the samples collected from 9 of the 13 landfills were compared against NYSDEC screening values. Analytes detected in exceedance of a corresponding NYSDEC screening value included total and soluble iron, magnesium, manganese, and thallium from one or more locations and total chromium from a single location.

The 12 August 2012 Long Term Monitoring Plan (LTMP) recommended the monitoring frequency for the eleven wells sampled or attempted to be sampled during this monitoring event be conducted on a five-year frequency unless a non-nutrient metal was detected in exceedance of a NYSDEC screening value. Exceedance of a metal other than the nutrient metals (i.e., aluminum, calcium, iron, magnesium, manganese, potassium and sodium) would result in an increased sampling frequency from every five years to every two and a half years.

Exceedance of NYSDEC screening values occurred for the non-nutrient metals thallium from samples collected from Mitchie Stadium Lots A, C, E and F and for chromium from Mitchie Stadium Lot A. The chromium result from Lot A and the thallium result from Lot C were detected in exceedance of the NYSDEC screening value from the total metals sample only.

All of the total and soluble thallium detections are estimated concentrations, (J value) detections. The maximum thallium detection was at a concentration of 9.3 J  $\mu\text{g/L}$ , just above the 8  $\mu\text{g/L}$  NYSDEC screening value. The low level exceedance of the screening value and the uncertainty of the estimated concentration due to detection below the laboratory LOQ does not warrant an increased sampling frequency for these landfills.

Similarly, the exceedance of chromium in the total and not the filtered sample for the sample collected from Mitchie Stadium Lot A indicate that the detected chromium is not mobile and does not warrant an increased sampling frequency.

Based upon the results of the 2015 landfill inspection and monitoring there does not appear to be any reason to alter the 2012 approved LTMP, hence the next scheduled monitoring event should be conducted in 2020, with the exception of the Motor Pool Landfill (WSTPT-011) which is monitored on an annual schedule.

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**ATTACHMENT A**  
**LONG TERM MONITORING AND LABORATORY DATA TABLES**  
**TABLE A-1: LONG TERM MONITORING PROGRAM**

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**Table A-1.  
NYSDEC Approved LTMP Sample Schedule  
Landfills at West Point, New York**

Landfill ID	Landfill Name	Landfill Inspection Frequency	No. of GW Samples	Monitoring Well	Analysis	Current Groundwater Sample Frequency
WSTPT-01	PX Landfill	Annual	1	PXMW-01	TAL Metals	Five Years**
WSTPT-02	Michie Stadium - Lot A	Annual	1	LAMW-03	TAL Metals	Five Years**
WSTPT-03	Michie Stadium - Lot B	Annual	0	No Sampling Requirements (annual inspections required)		
WSTPT-04	Michie Stadium - Lot C	Annual	1	LCMW-03	TAL Metals	Five Years**
WSTPT-05	Michie Stadium - Lot D	Annual	1	LDMW-04	TAL Metals	Five Years**
WSTPT-06	Michie Stadium - Lot E	Annual	1	LEMW-04	TAL Metals	Five Years**
WSTPT-07A	Michie Stadium - Lot F	Annual	1	LF-01	TAL Metals	Five Years**
WSTPT-09	Ski Lot Landfill	Annual	1	SL-5	TAL Metals	Five Years**
WSTPT-10	Post School Landfill	Annual	1	PS-4	TAL Metals	Five Years**
WSTPT-11	Motor Pool Landfill*	Annual	4	Multiple	Multiple	Annual
WSTPT-15B	High School Landfill	Annual	0	No Sampling Requirements (annual inspections required)		
WSTPT-16	Organic Compost Landfill	Annual	1	OC-2	TAL Metals	Five Years**
WSTPT-35A	Camp Buckner Landfill	Annual	1	CBMW-03	TAL Metals	Five Years**
WSTPT-48	Building 706 Parking Lot Landfill	Annual	1	MW48-01	TAL Metals	Five Years**

**Key:**

TAL - Target Analyte List

\* - Motor Pool Landfill requirements are separate from the other landfills and are fulfilled under a separate contract.

\*\* - Based on analytical results, sampling frequency may increase based on LTMP NYSDEC approved criteria (see 2012 letter).

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**ATTACHMENT A**  
**LONG TERM MONITORING AND LABORATORY DATA TABLES**  
**TABLE A-2: THIRD RCRA PERIODIC REVIEW ANALYTICAL RESULTS**

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**Table A-2**  
**Third RCRA Periodic Review Analytical Results Table**  
**Landfills at West Point, New York**

Analyte	CAS Number	Units	Screening Value	WSTPT-02-LAMW-03	WSTPT-04-LCMW-03	WSTPT-05-LDMW-04	WSTPT-06-LEMW-04	WSTPT-07A-LF-1	WSTPT-09-SL-5	WSTPT-10-PS-4	WSTPT-16-OC-5	WSTPT-35-CBMW-03	Equipment Blank
<b>Metals</b>													
Silver, Dissolved	7440-22-4	ug/l	50	3.5 U	3.5 U	3.5 U	3.5 U	1.2 J	3.5 U	3.5 U	3.5 U	3.5 U	NS
Sodium, Dissolved	7440-23-5	ug/l	20,000	<b>210,000</b>	<b>580,000</b>	<b>120,000</b>	<b>400,000</b>	<b>1,900,000</b>	<b>500,000</b>	<b>26,000</b>	<b>94,000</b>	10,000	NS
Thallium, Dissolved	7440-28-0	ug/l	8	<b>8.6 J</b>	<b>5.5 J</b>	19 U	<b>8.6 J</b>	<b>8.5 J</b>	<b>7.7 J</b>	<b>6.5 J</b>	<b>6.6 J</b>	<b>6.4 J</b>	NS
Tin, Dissolved	7440-31-5	ug/l		20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	20 U	NS
Vanadium, Dissolved	7440-62-2	ug/l	14	1.2 J Q	4.0 U Q	4.0 U	4.0 U Q	4.0 U Q	4.0 U Q	4.0 U	4.0 U Q	4.0 U Q	NS
Zinc, Dissolved	7440-66-6	ug/L	Variable <sup>b</sup>	15 U	10 J	15 U	15 U	15 U	15 U	15 U	4.8 J	15 U	NS

Note:

U - Undetected at the Limit of Detection (LOD).

J - Estimated: The analyte was positively identified; the quantification is an estimation.

Q - One or more quality control criteria failed.

B - Analyte was detected in associated blank.

NS - Not Sampled

mg/L - milligrams per liter

ug/L - micrograms per liter

<sup>a</sup> 11 µg/L when hardness is ≤75 ppm; 1,100 when hardness > 75 ppm.

<sup>b</sup>  $\exp[\ln(\text{hardness})]+0.5$



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**ATTACHMENT A**  
**LONG TERM MONITORING AND LABORATORY DATA TABLES**  
**TABLE A-3: THIRD RCRA PERIODIC REVIEW HISTORICAL**  
**ANALYTICAL RESULTS**

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**ATTACHMENT B**  
**DATA VALIDATION REPORT**

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## Laboratory Analytical Data Validation

**Site:** West Point  
**Date Completed:** 12/29/2015  
**Submitted by:** Chemists Linda Adams and Gretchen Fodor  
**Sample Collection Date(s):** 09/21/2015, 09/22/2015, 09/23/2015  
**TestAmerica Project Number(s) (LPN):** 280-74684-1 and 280-74684-4

This data validation memo describes the validation of fourteen groundwater samples and two field blanks collected on September 21, 22, and 23, 2015 by Weston Solutions, Inc. (WESTON) and analyzed for volatile organic compounds (VOCs) via SW-846 Method 8260B, organochlorine pesticides via SW-846 Method 8081A, and/or total and dissolved metals via SW-846 Methods 6010C and 7470A at TestAmerica Laboratories in Denver, Colorado as sample delivery group (SDG) 280-74684-1 and 280-74684-4. Sample collection was conducted in accordance with the Long Term Monitoring Program LTMP schedule for 14 Landfills at West Point approved by the New York State Department of Environmental Conservation in a letter dated 3 October 2012. Samples included as part of this validation are listed below:

Landfill Name (Landfill ID)	Sample ID	Date Collected	Lab ID	VOC 8260B	Pesticides 8081A	Total Metals 6010C/ 7470A	Dissolved Metals 6010C/7470 A
Mitchie Stadium – Lot E (WSTPT-06)	WSTPT-06-LEMW-04	09/21/2015	280-74684-1			X	X
Mitchie Stadium – Lot A (WSTPT-02)	WSTPT-02-LAMW-03	09/21/2015	280-74684-2			X	X
Mitchie Stadium – Lot F (WSTPT-07A)	WSTPT-07A-LF-1	09/21/2015	280-74684-3			X	X
Mitchie Stadium – Lot D (WSTPT-05)	WSTPT-05-LDMW-04	09/21/2015	280-74684-4			X	X
Mitchie Stadium – Lot C (WSTPT-04)	WSTPT-04-LCMW-03	09/22/2015	280-74684-5			X	X
Organic Compost (WSTPT-16)	WSTPT-16-OC-5	09/22/2015	280-74684-6			X	X
Motor Pool (WSTPT-11)	WP11-MPLE-1-092215	09/22/2015	280-74684-7	X	X	X	X
	WP11-MP-2-092215	09/22/2015	280-74684-8	X		X	X
	WP11-MP-2-092215- DUP	09/22/2015	280-74684-9FD	X		X	X
	WP11-MP-3-092215	09/22/2015	280-74684-10	X		X	X
	WP11-MP-4-092215	09/22/2015	280-74684-11	X		X	X
Post School (WSTPT-10)	WSTPT-10-PS-4	09/22/2015	280-74684-12			X	X
Ski Lot (WSTPT-09)	WSTPT-09-SL-5	09/23/2015	280-74684-13			X	X
Camp Buckner (WSTPT- 35A)	WSTPT-35-CBMW-03	09/23/2015	280-74684-14			X	X
Blank Sample	WQTB01-092215	09/22/2015	280-74684-15TB	X			
Blank Sample	WQEB01-092215	09/22/2015	280-74684-16EB	X		X (6010C only)	

Analytical sample results from the Motor Pool Landfill (WSTPT-11) are provided in a letter report titled West Point Former Motor Pool Landfill (WSTPT-11) Annual Groundwater Sampling Event. The remaining analytical sample results are reported in the Five Year Landfill Groundwater

Monitoring and Annual Inspection Report. The data validation and quality assurance and quality control samples pertain to both documents.

### Data Qualification Summary Tables

Data validation qualifiers were applied to the following samples and results were reported at the Limit of Quantitation (LOQ):

Sample ID	Date Sampled	TestAmerica, Denver	
		<i>Lab ID</i>	<i>VOC 8260B</i>
WP11-MPLE-1-092215	09/22/2015	280-74684-7	U: methylene chloride
WP11-MP-2-092215	09/22/2015	280-74684-8	U: methylene chloride
WP11-MP-2-092215-DUP	09/22/2015	280-74684-9FD	U: methylene chloride
WP11-MP-3-092215	09/22/2015	280-74684-10	U: methylene chloride
WP11-MP-4-092215	09/22/2015	280-74684-11	U: methylene chloride
WQEB01-092215	09/22/2015	280-74684-16EB	U: methylene chloride

Sample ID	Date Sampled	TestAmerica, Denver	
		<i>Lab ID</i>	<i>Metals 6010C/7470A</i>
WSTPT-02-LAMW-03	09/21/2015	280-74684-2	U: dissolved boron
WSTPT-07A-LF-1	09/21/2015	280-74684-3	U: dissolved boron
WSTPT-05-LDMW-04	09/21/2015	280-74684-4	U: dissolved boron
WSTPT-04-LCMW-03	09/22/2015	280-74684-5	U: dissolved boron
WSTPT-16-OC-5	09/22/2015	280-74684-6	U: dissolved boron, dissolved iron, and dissolved manganese
WP11-MPLE-1-092215	09/22/2015	280-74684-7	U: dissolved boron
WP11-MP-2-092215-DUP	09/22/2015	280-74684-9FD	U: dissolved iron
WP11-MP-3-092215	09/22/2015	280-74684-10	U: dissolved boron
WSTPT-10-PS-4	09/22/2015	280-74684-12	U: dissolved boron
WSTPT-09-SL-5	09/23/2015	280-74684-13	U: dissolved boron
WSTPT-35-CBMW-03	09/23/2015	280-74684-14	U: dissolved boron
WQEB01-092215	09/22/2015	280-74684-16	U: total silver and total sodium

Validation was conducted according to this hierarchy of validation guidance: Department of Defense (DoD) Quality Systems Manual for Environmental Laboratories, version 4.2 (QSM 4.2), October 2010 (DoD, 2010), United States Environmental Protection Agency (USEPA) Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review (USEPA, 2008), and USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (USEPA, 2010). The site Quality Assurance Project Plan (QAPP) (WESTON, 2013) and analytical methods were also consulted during the data validation.

### Data Validation Detail:

- **Data Package Completeness**

The Level IV data package was reviewed to make certain that it contained the data contractually required in the deliverable. This included checking the data package for

the results of each analyte requested for each field sample submitted in the analytical batch, along with requested quality control (QC) documentation for the method.

The following issues were noted during the review of the data package:

- Upon receipt of the data package, it was determined that equipment blank sample WQEB01-092215 was inadvertently not requested for metals analysis on the chain-of-custody (COC). By the time that the error was discovered, the holding time for mercury had expired but the holding time for metals by inductively-coupled plasma (ICP) was still achievable. WESTON requested that the equipment blank be only analyzed for ICP metals; the sample was relogged in for analysis and reported under TestAmerica Denver report 280-74684-4. Two metals, silver and sodium, were detected in equipment blank sample WQEB01-092215. For the purposes of data validation, the equipment blank data package was reviewed only for method blank and instrument blank contamination for silver and sodium and qualified on that basis, as described in the appropriate section below.
- The raw data and the Form 5 for the 4-Bromofluorobenzene (BFB) tune analyzed July 8, 2015 at 14:48 on instrument VMS\_Z was missing from the data package. WESTON contacted the laboratory regarding this discrepancy. The tuning information was provided in the resubmitted data package. No further action was needed.
- The total and dissolved boron and selenium raw data for the analytical run analyzed 10/17/2015 on instrument MT\_026 was missing from the data package. The laboratory inadvertently included 6020A raw data for an analytical run analyzed 10/15/2015, which was not associated with this data package. WESTON contacted the laboratory regarding these discrepancies. The laboratory resubmitted the data package removing the 6020A data and adding the missing ICP boron and selenium data. No further action was needed.

- **Laboratory Case Narrative/Cooler Receipt Form**

Issues were noted in the review of the chain-of-custody (COC) documentation, case narrative, and sample receiving documents:

- Two of four coolers were received slightly below the acceptance criteria. Based on professional judgment, no validation action was taken due to low temperature since the samples were received not frozen.
- Total and Dissolved metals were not analyzed for WSTPT-01-PXMW-01 since the laboratory narrated that no volume was received.
- The laboratory narrated that the container labels for samples WSTPT-06-LEMW-04, WSTPT-02-LAMW-03, WSTPT-07A-LF-1, and WSTPT-05-LDMW-04 listed a collection date of 9/22/2015 however, the COC indicated that the collection date for these samples was 9/21/2015. Based on communications with WESTON, these samples were logged as per the COC. No validation action was taken on this basis.
- Samples WP11-MPLE-1-092215, WP11-MP-2-092215, WP11-MP-3-092215, and WP11-MP-4-092215 were listed on the COC twice for total and dissolved metals. Based on communications with WESTON, these samples were logged only once for total and dissolved metals. No validation action was taken on this basis.

- **Holding Times, Storage, and Preservation**

Review of the sample collection and analysis dates involved comparing the COC, the summary forms, and the data report for holding time compliance. Samples for the analyses validated were received correctly, intact, and properly preserved. All samples were prepared and analyzed within the turnaround time required by the project.

- **Instrument Performance Check**

VOC

The instrument met all applicable performance check requirements. The instrument performance check included verification of 4-Bromofluorobenzene (BFB) tunes for VOCs. Samples were analyzed within 12 hours of the BFB tunes.

**Initial Calibration (ICAL)/Initial Calibration Verification (ICV)**

VOC

ICAL and ICV acceptance criteria for relative response factors (RRFs), percent relative standard deviations (%RSD), the correlation coefficients (r) and/or coefficient of determinations ( $r^2$ ) were met for all compounds.

Pesticides

The percent breakdown of endrin and 4,4'-DDT in the performance evaluation checks met the DoD QSM 4.2 acceptance criteria of  $\leq 15\%$ .

A six-point ICAL was analyzed. ICAL acceptance criteria for the coefficient of determination ( $r^2$ ) were met for all compounds per DoD QSM 4.2.

- **Continuing Calibration Verification (CCV)**

VOC

CCV acceptance criteria for RRFs and percent differences or percent drifts (%Ds) were met for all compounds.

Pesticides

The percent breakdown of endrin and 4,4'-DDT in the performance evaluation checks met the DoD QSM 4.2 acceptance criteria of  $\leq 15\%$ .

The laboratory analyzed a mid-point calibration standard for toxaphene and all single component pesticides. The %Ds were met for all the single component pesticides as per DoD QSM 4.2. The average %D of toxaphene was met.

Metals

Initial calibration was performed for methods 6010C and 7470A per DoD QSM 4.2.

The laboratory analyzed mid-level ICVs and CCVs as well as low-level ICVs and CCVs required by SW-846 Method 6010C. The concentration of the target analytes in the mid-level ICVs and CCVs were at the same concentration as the standard used in the ICAL



while the concentration of the target analytes in the low-level ICVs and CCVs were at or below the LOQ. The percent recoveries (%R) of all target analytes in the mid-level ICVs and CCVs were within DoD QSM 4.2 limits of 90-110%. The percent recoveries of all target analytes in the low-level ICVs and CCVs were within the SW-846 Method 6010C and laboratory's SOP criteria of 70-130% with the following exceptions.

Date and Time Analyzed	Analyte	%R	Associated Samples	Sample Qualifications
10/08/2015 16:44	Iron	141%	<u>Dissolved Metals</u> WP11-MPLE-1-092215	Qualification of the data was not required since iron was detected at a concentration above the LOQ.
10/08/2015 17:04	Iron	139%		

CCVL = Continuing calibration verification low-level

Per DoD QSM 4.2, the laboratory analyzed low-level check samples [Contract-Required Quantitation Level (CRQL) check standards] that were associated with all samples. All target analytes were spiked in the low-level check samples and all criteria met the limits of 80-120%R specified in DoD QSM 4.2.

- Method Blank and Field Blanks**

VOC

Target analytes were not detected in trip blank WQTB01-092215. Methylene chloride was detected below the LOQ in the laboratory method blank associated with samples WP11-MPLE-1-092215, WP11-MP-2-092215, WP11-MP-2-092215-DUP, WP11-MP-3-092215, WP11-MP-4-092215, and equipment blank WQEB01-092215; 1,2,3-trichlorobenzene was detected below the Limit of Detection (LOD) in the laboratory method blank associated with trip blank WQTB01-092215.

The following table summarizes the VOC contamination detected and sample qualifications based on blank actions.

Blank Type or ID (QC Batch No.)	Compound	Conc. (µg/L)	Associated Samples	Sample Qualifications
MB 280-297307/6 Analyzed 10/01/2015	1,2,3-trichlorobenzene	0.278 J	WQTB01-092215	None; 1,2,3-trichlorobenzene was not detected in trip blank WQTB01-092215.
MB 280-297679/6 Analyzed 10/02/2015	methylene chloride	1.12 J	WP11-MPLE-1-092215 WP11-MP-2-092215 WP11-MP-2-092215-DUP WP11-MP-3-092215 WP11-MP-4-092215 WQEB01-092215	WP11-MPLE-1-092215, WP11-MP-2-092215, WP11-MP-2-092215-DUP, WP11-MP-3-092215, WP11-MP-4-092215, and WQEB01-092215: methylene chloride was reported as non-detected (U) and the detection limit was raised to the LOQ.

MB = Laboratory Method Blank    LOQ = Limit of Quantitation    µg/L = micrograms per liter

Pesticides

Target analytes were not detected the method blank. The equipment blank was not analyzed for pesticides. Data qualifiers were not applied.

Metals

The equipment blank was inadvertently not requested for metals on the COC and, upon receipt of the data package, the error on the COC was discovered (i.e., the analysis was not requested on the COC for metals for equipment blank sample WQEB01-092215). WESTON subsequently requested analysis by ICP metals only. The mercury holding time had expired by the time the error was discovered, therefore the equipment blank was not analyzed for mercury. The equipment blank metals results were reported in SDG 280-74684-4 and a Stage 2A level of validation was performed for the equipment blank sample package.

Several target analytes were detected in the laboratory method preparation blanks and in the initial and continuing calibration blanks (ICBs and CCBs) associated with the groundwater samples. The following table summarizes laboratory method blank contamination and sample qualifications applied based on method blank actions.

Blank Type or ID (QC Batch No.)	Analyte	Conc. (µg/L)	Associated Samples	Sample Qualifications
MB (280-297176/1-A)	Barium	0.68 J	<u>Dissolved Metals</u> WP11-MPLE-1-092215	None
MB (280-304772/1-A)	Sodium	149 J	<u>Total Metals</u> WQEB01-092215	WQEB01-092215: The total sodium results were raised to the LOQ and qualified as U.
MB (280-303640/1-A)	Silver	2.17 J	<u>Total Metals</u> WQEB01-092215	WQEB01-092215: The total silver results were raised to the LOQ and qualified as U.
MB (280-297263/1-A)	Iron	34.2 J	<u>Dissolved Metals</u> WSTPT-06-LEMW-04 WSTPT-02-LAMW-03 WSTPT-07A-LF-1 WSTPT-05-LDMW-04 WSTPT-04-LCMW-03 WSTPT-16-OC-5 WP11-MPLE-1-092215 WP11-MP-2-092215 WP11-MP-2-092215-DUP WP11-MP-3-092215 WP11-MP-4-092215 WSTPT-10-PS-4 WSTPT-09-SL-5 WSTPT-35-CBMW-03	WSTPT-16-OC-5 and WP11-MP-2-092215-DUP: The dissolved iron results were raised to the LOQ and qualified as U.  <i>(Dissolved iron results were not detected or equal to or exceeded the LOQ in the remaining samples. No qualifiers applied.)</i>
	Manganese	0.520 J		WSTPT-16-OC-5: The dissolved manganese result was raised to the LOQ and qualified as U.  <i>(Dissolved manganese results were not detected or equal to or exceeded the LOQ in the remaining samples. No qualifiers applied.)</i>
	Boron	5.11 J		WSTPT-02-LAMW-03, WSTPT-07A-LF-1, WSTPT-05-LDMW-04, WSTPT-04-LCMW-03, WSTPT-16-OC-5, WP11-MP-3-092215, WSTPT-10-PS-4, WSTPT-09-SL-5, and WSTPT-35-CBMW-03: The dissolved boron results were raised to the LOQ and qualified as U.  <i>(Dissolved boron results were not detected or equal to or exceeded the LOQ in the remaining samples. No qualifiers applied.)</i>

The following table summarizes laboratory instrument blank contamination and sample qualifications applied based on instrument blank actions.

Blank Type or ID (QC Batch No.)	Analyte	Conc. (µg/L)	Associated Samples	Sample Qualifications
CCB Analyzed 10/17/2015 at 18:02	Boron	6.79 J	<u>Dissolved Metals</u> WSTPT-06-LEMW-04 WSTPT-02-LAMW-03 WSTPT-07A-LF-1 WSTPT-05-LDMW-04 WSTPT-04-LCMW-03 WSTPT-16-OC-5 WP11-MP-2-092215	WSTPT-02-LAMW-03, WSTPT-07A-LF-1, WSTPT-05-LDMW-04, WSTPT-04-LCMW-03, WSTPT-16-OC-5 – The dissolved boron results were raised to the LOQ and qualified as U.  WSTPT-06-LEMW-04 and WP11-MP-2-092215 – The dissolved boron result exceeded the LOQ. No qualifiers applied.
CCB Analyzed 10/08/2015 at 16:42	Boron	5.32 J	<u>Dissolved Metals</u> WP11-MPLE-1-092215	The dissolved boron result was raised to the LOQ and qualified as U.
	Sodium	172 J		None
CCB Analyzed 10/14/2015 at 19:49	Sodium	208 J	<u>Dissolved Metals</u> WSTPT-35-CBMW-03	None
CCB Analyzed 10/16/2015 at 17:46	Sodium	161 J	<u>Dissolved Metals</u> WSTPT-06-LEMW-04 WSTPT-02-LAMW-03 WSTPT-07A-LF-1 WSTPT-05-LDMW-04 WSTPT-04-LCMW-03 WSTPT-16-OC-5 WP11-MP-2-092215 WP11-MP-2-092215-DUP WP11-MP-3-092215 WP11-MP-4-092215 WSTPT-10-PS-4 WSTPT-09-SL-5	None

CCB = Continuing Calibration Blank  
U = Undetected

LOQ = Limit of Quantitation  
µg/L = micrograms per liter

- **Surrogate Spikes**

- VOC

- Surrogates were added to all samples and QC samples as required by the analytical method. All surrogate recoveries met the required QC criteria.

- Pesticides

- Surrogates were added to all samples and QC samples as required by the analytical method. All surrogate recoveries met the required QC criteria.

- **Matrix Spike/Matrix Spike Duplicates (MS/MSD)**

- VOC

- MS/MSD analyses were performed on sample WP11-MP-4-092215 in association with these field samples. All target analyte recoveries and RPDs were compared to the QAPP and the DoD QSM 4.2. All percent recoveries and RPDs were within the acceptance criteria in the MS/MSD analyses. Data validation qualifiers were not required.

### Pesticides

MS/MSD analyses were not performed on the sample analyzed for pesticides in this data set. Data validation qualifiers were not required.

### Metals

MS/MSD analyses were performed on total and dissolved mercury sample WP11-MPLE-1-092215 and WP11-MP-4-092215 in association with these field samples. All target analyte recoveries and RPDs were compared to the QAPP and the DoD QSM 4.2 with the exceptions of boron and tin which were not listed in the QAPP or QSM DoD 4.2. The laboratory reported the laboratory's in-house limits for boron and tin.

All percent recoveries and RPDs were within the acceptance criteria in the MS/MSD analyses for total and dissolved sample WP11-MPLE-1-092215 and WP11-MP-4-092215.

The percent recovery of manganese (65%R) fell below the laboratory's acceptance criteria in the post-digestion spike of dissolved metals sample WP11-MP-4-092215. Qualification of the sample data on this basis was not required because the MS and MSD recoveries were within QC limits.

- **Laboratory Control Sample (LCS)**

All LCS recoveries were within the QAPP and the DoD QSM 4.2 acceptance criteria.

- **Field Duplicates**

### VOC

Field duplicate samples WP11-MP-2-092215 and WP11-MP-2-092215-DUP were submitted as the field duplicate samples with this SDG. Methylene chloride was detected in field duplicate samples WP11-MP-2-092215 and WP11-MP-2-092215-DUP, however the detection limit for methylene chloride in these samples was raised to the LOQ and reported as non-detected (U) based on laboratory blank contamination. VOC field duplicate precision was deemed acceptable.

### Pesticides

Field duplicate samples were not submitted with the sample in this data set, so no validation qualifiers were applied.

### Metals

Precision is evaluated by calculating the RPD between the field duplicate results. The EPA National Functional Guidelines (NFG) have not established acceptance criteria for field duplicate precision, however, the QAPP specifies an RPD acceptance criteria of  $\leq 30\%$  when both sample results are greater than the LOQ. Additionally, based on professional judgment, the control limit used when either or both field duplicate samples contained analytes at concentrations less than five times the LOQ was  $\pm 2x$  LOQ.

Groundwater Data Validation, West Point, New York  
Groundwater Data Validation  
December 2015

Field duplicate total metals and dissolved metals results are summarized in the table below. Results qualified due to laboratory or field blank actions were not listed in the table. All criteria were met for field duplicate samples.

Analyte	WP11-MP-2-092215 Sample Conc. (µg/L)	WP11-MP-2-092215-DUP Field Duplicate Conc. (µg/L)	RPD	Action
Arsenic, Total	7.0 J	6.2 J	12	A
Arsenic, Dissolved	8.1 J	6.8 J	17	A
Barium, Total	120	120	9	A
Barium, Dissolved	110	120	9	A
Boron, Total	110	120	0	A
Boron, Dissolved	110	110	9	A
Calcium, Total	150,000	140,000	7	A
Calcium, Dissolved	140,000	150,000	7	A
Cobalt, Total	2.3 J	2.2 J	4	A
Cobalt, Dissolved	1.2 J	1.2 J	0	A
Copper, Total	2.1 J	2.4 J	13	A
Copper, Dissolved	1.6 J	2.7 J	51	A*
Iron, Total	44 J	35 J	23	A
Magnesium, Total	37,000	35,000	6	A
Magnesium, Dissolved	38,000	41,000	8	A
Manganese, Total	340	310	9	A
Manganese, Dissolved	220	240	9	A
Nickel, Total	2.6 J	2.8 J	5	A
Nickel, Dissolved	2.5 J	2.6 J	4	A
Selenium, Total	19 U	4.9 J	NC	A*
Potassium, Total	3800	3700	3	A
Potassium, Dissolved	3400	3600	6	A
Sodium, Total	130,000	130,000	0	A
Sodium, Dissolved	130,000	140,000	7	A
Thallium, Dissolved	8.4 J	6.2 J	30	A
Thallium, Total	8.5 J	9.9 J	15	A
Zinc, Total	6.7 J	15 U	NC	A*
A – Accept results without qualification A* - Accept since sample and duplicate results $\leq 5x$ the LOQ. NC – Not calculable µg/L = micrograms per liter				

- **Internal Standards**

VOC

All QC criteria were met for Internal Standards (IS) in all calibrations and field samples.

- **ICP Interference Check Samples**

Metals

Although Method 6010C only requires the analysis of an Interference Check Sample A (ICSA) solution and does not require the analysis of an Interference Check Sample AB (ICSAB) solution, the laboratory analyzed both an ICSA and an ICSAB as required by the QAPP and DoD QSM 4.2. The ICSA and ICSAB were analyzed at the proper frequency.

The ICSAB solution contained all target analytes of interest. Recoveries for the analytes of interest were within QAPP and DoD QSM 4.2 laboratory acceptance limits in the ICSAB analyses.

The ICSA solution associated with all total sample analyses contained chromium and manganese and the ICSA solution associated with all dissolved sample analyses contained manganese at a concentration which exceeded the QAPP and DoD QSM 4.2 criteria of <LOD. The laboratory narrated that antimony, manganese, and vanadium were confirmed to be trace impurities in the ICSA solution as noted by the ICSA vendor. No qualifications were applied since the concentration of the interferents (aluminum, calcium, iron, and magnesium) in all sample analyses were less than the concentration of interferents found in the ICSA solution.

- **Serial Dilution Results**

Metals

Serial dilution analyses were performed on total and dissolved sample WP11-MP-4-092215 for all analytes and on sample WP11-MPLE-1-092215 for total and dissolved mercury and dissolved thallium in association with these field samples. The percent differences of all target analytes which exceeded the LOQ by a factor of 50 were within the SW-846 Method 6010C acceptance criteria of <10% difference. No data qualifiers were applied.

- **Target Analyte Identification and Quantitation**

VOC

Target compound identification followed the analytical method. Retention times and mass spectra were consistent with the analytical standards. The LOQs are consistent with the LOQs listed in the QAPP. Dilutions were not required for any of the samples and therefore all LOQs, LODs, and Detection Limits (DLs) were not affected.

Non-detected results were reported to the LOD in accordance with DoD QSM 4.2. The laboratory also reported the LOQ for each analyte on the sample result sheet (Form 1). The laboratory reported target analytes, which were qualitatively identified at concentrations below the LOQs with a “J” qualifier to indicate that the result is estimated as required by DoD QSM 4.2. The “J” qualifier was retained by the validator.

### Pesticides

Target compound identification followed the analytical method. Retention times were consistent with the analytical standards. The LOQs are consistent with the LOQs listed in the QAPP. Dilutions were not required for sample WP11-MPLE-1-092215 and therefore all LOQs, LODs, and DLs were not affected.

Non-detected results were reported to the LOD in accordance with DoD QSM 4.2. The laboratory also reported the LOQ for each analyte on the sample result sheet (Form 1). Target analytes were not detected in sample WP11-MPLE-1-092215.

### Metals

The LOQs are consistent with the LOQs listed in the QAPP. Dilutions were not required for any of the samples and therefore all LOQs, LODs, and DLs were not affected.

Non-detected results were reported to the LOD in accordance with DoD QSM 4.2. The laboratory also reported the LOQ for each analyte on the sample result sheet (Form 1). The laboratory reported target analytes, which were qualitatively identified at concentrations below the LOQs, with a “J” qualifier to indicate that the result is estimated as required by DoD QSM 4.2. The “J” qualifier was retained by the validator.

## **Overall Evaluation**

Trace levels of methylene chloride were reported above the DL but below the LOD in five groundwater samples and above the LOD but below the LOQ in the equipment blank. The methylene chloride results were qualified as non-detected (U) at the LOQ for the five groundwater samples and the equipment blank.

Trace levels of barium, boron, iron, manganese, silver, and sodium were reported above the DL in the laboratory method blanks. The detection limits were raised to the LOQ and were reported as non-detected (U) in two groundwater samples for dissolved iron; in one groundwater sample for dissolved manganese; and in ten groundwater samples for dissolved boron. The detection limits were raised to the LOQ and were reported as non-detected (U) for silver and sodium in the equipment blank.

### Data Validation Qualifiers

Validation Qualifier	Definition
J	The reported positive result is considered estimated, because the result is less than the LOQ or because certain quality control criteria were not met.
U	The analyte was not detected and is reported as less than the LOD or as defined by the client.
UJ	The analyte was not detected in the sample. The LOD (or LOQ) should be considered estimated and may be inaccurate or imprecise.
R	The result for this analyte is unusable. The analyte may or may not be present.

### References

U.S. Department of Defense (DoD). DoD Quality Systems Manual for Environmental Laboratories, Version 4.2, October, 2010. (DoD, 2010).

U.S. Environmental Protection Agency (USEPA). USEPA Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, June, 2008. (USEPA, 2008).

USEPA Contract Laboratory Program (USEPA), National Functional Guidelines for Superfund Inorganic Superfund Data Review (USEPA, 2010).

Weston Solutions, Inc. (WESTON). Uniform Federal Policy Quality Assurance Project Plan, Annual Monitoring at Former Motor Pool Landfill (WPTST-11) United States Military Academy, West Point, New York, Version 00, June 2013. (WESTON, 2013)



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**ATTACHMENT C**  
**LABORATORY DATA PACKAGES**

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Laboratory results are provided on the CD-ROM accompanying this report.