

**Data Validation Report**  
**Remedial Investigation at RVAAP-66 Facility Wide Groundwater**  
**Semi-Annual & Quarterly Sampling Event for April/May 2017**

**Former Ravenna Army Ammunition Plant**  
**Portage and Trumbull Counties, Ohio**

**Contract Number: W9133L-14-D-0008**

**Task Order Number: 0003**

**Laboratory SDG 280-96600-1**

**Prepared For:**



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**CONTRACTOR STATEMENT OF INDEPENDENT TECHNICAL REVIEW**

TEC-WESTON Joint Venture has completed this Data Validation Report. Data validation was performed by the Validation Chemist and Secondary QC Review was performed by a Senior Chemist. Signatures indicate the report is approved for release.



Travis Withers

2017.06.08 12:19:39 -06'00'

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## INTRODUCTION

This report summarizes the results of the **EPA Stage 2B** data validation performed on groundwater samples and quality control (QC) sample data for the Remedial Investigation for RVAAP-66, Former Ravenna Army Ammunition Plant, Portage and Trumbull Counties, Ohio. Results are reported in laboratory sample delivery group (SDG) **280-96600-1**.

TestAmerica, Inc., Denver, Colorado performed the analyses listed in the table below:

Parameters	Analytical Method	Laboratory Location
Semivolatile Organic Compounds (SVOCs)	8270D	Denver, CO
Organochlorine Pesticides	8081B	Denver, CO
Explosives	8330B	Denver, CO
Total Metals	6010C/6020A/7470A	Denver, CO
Dissolved Metals	6010C/6020A/7470A	Denver, CO
Alkalinity	2320B	Denver, CO
Total Cyanide	9012B	Denver, CO
Hexavalent Chromium	7196A	Denver, CO
Sulfide	9034	Denver, CO
Chloride, Sulfate, Nitrate, Nitrite	9056A	Denver, CO

The data were reviewed using guidance and quality control criteria documented in the *Draft Remedial Investigation Work Plan for Groundwater and Environmental Services for RVAAP-66 Facility-Wide Groundwater, Appendix A: Sampling Analysis Plan, A.2: Uniform Federal Policy Quality Assurance Project Plan (UFP-QAPP) Former Ravenna Army Ammunition Plant, Portage and Trumbull Counties, Ohio Attachment A Data Validation Evaluation Sheets (January 2016)* which are based on the *Department of Defense Quality Systems Manual (DoD QSM), Version 5.0*; *USEPA National Functional Guidelines for Organic Data Review (EPA 2014)*; and *USEPA National Functional Guidelines for Inorganic Data Review (EPA 2014)*, the analytical methods, and professional judgment.

During data validation, qualifiers are assigned to assist in proper data interpretation. If values are estimated, data may be used for site evaluation purposes but reasons for data qualification should be taken into consideration when interpreting sample concentrations. Data that have been rejected (R) should not be used for any purpose. Results with no qualifiers meet all data quality goals as outlined in the UFP-QAPP.

The data was reviewed and validated by calculating Relative Percent Difference (RPD) between spiked sample values according to the *USEPA National Functional Guidelines for Organic Data Review (EPA 2014)* and *USEPA National Functional Guidelines for Inorganic Data Review (EPA 2014)*. Therefore, the RPDs were calculated using the percent recovery values as stated in the above referenced USEPA documents. SW-846 Methods were utilized for this project and they recommend using the actual spiked sample values to calculate RPD values. However, the laboratory used varying spike amounts due to sample aliquot and percent moisture differences which lead to variations in the spike amounts making it very difficult to compare the spiked sample values. These differences would have created poor precision results for the spiked sample values that were not necessarily indicative of the data quality. The use of comparing spike recovery values in this case was a much better indicator of analytical precision.

The following samples were validated:

Sample ID	Laboratory ID	Sample Date	Matrix	QC Sample	SVOC's (phthalates)	Pesticides	Explosives	Total Metals	Dissolved Metals	Alkalinity	Total Cyanide	Hexavalent Chromium
FBQmw-171-050217-GW	280-96600-1	05/02/17	Groundwater							✓	✓	✓
FBQmw-502-050217-GW	280-96600-2	05/02/17	Groundwater	Field duplicate						✓	✓	✓
FBQmw-172-050217-GW	280-96600-3	05/02/17	Groundwater							✓	✓	✓
FBQmw-174-050217-GW	280-96600-4	05/02/17	Groundwater		✓		✓			✓		✓
FBQmw-175-050217-GW	280-96600-5	05/02/17	Groundwater				✓			✓		✓
FW.Gmw-011-050217-GW	280-96600-6	05/02/17	Groundwater		✓		✓	✓		✓		✓
FW.Gmw-002-050217-GW	280-96600-7	05/02/17	Groundwater				✓	✓		✓		✓
FW.Gmw-012-050217-GW	280-96600-8	05/02/17	Groundwater							✓		✓
FW.Gmw-010-050217-GW	280-96600-9	05/02/17	Groundwater							✓		✓
FW.Gmw-011-050217-GF	280-96600-10	05/02/17	Groundwater	Field filtered					✓			
LL3mw-236-050217-GW	280-96600-11	05/02/17	Groundwater				✓					

Some samples were analyzed for natural attenuation parameters. Natural attenuation parameters are reported, but not validated in accordance with the QAPP.

Sample FBQmw-502-050217-GW is the field duplicate of sample FBQmw-171-050217-GW.

Additional analyses reported for sample FBQmw-172-050217-GW are reported and validated under separate cover.

# DATA VALIDATION REPORT

## 1.1 DATA PACKAGE COMPLETENESS

The laboratory submitted all required deliverables. The laboratory followed adequate corrective action processes and all anomalies were discussed in the case narrative. All requested target analytes were reported for each sample.

## 1.2 SAMPLE RECEIPT

The samples were received by the laboratory on May 3, 2017; the samples were received in good condition, under chain-of-custody, and custody seals intact. Samples were properly preserved and cooler temperatures were less than 6°C.

The container labels for sample FBQmw-502-050217-GW listed the sample ID as FBQmw-502-0502-17-GW. The sample IDs were logged per the chain of custody.

## 1.3 DEFINITIONS

**Detection limit (DL):** The smallest analyte concentration that can be demonstrated to be different from zero or a blank concentration with 99% confidence. At the DL, the false positive rate is 1%. A DL may be used as the lowest concentration for reliably reporting a detection of a specific matrix with a specific method with 99% confidence.

**Limit of detection (LOD):** The smallest concentration of a substance that must be present in a sample in order to be detected at the DL with 99% confidence. At the LOD, the false negative rate is 1%. An LOD may be used as the lowest concentration for reliably reporting a non-detect of a specific analyte in a specific matrix with a specific method with 99% confidence.

**Limits of Quantitation (LOQ):** The smallest concentration that produces a quantitative result with known and recorded precision and bias. For DoD/DOE projects, the LOQ shall be set at or above the concentration of the lowest initial calibration standard and within the calibration range.

The following validation flags and reason codes were applied:

Validation Flag	Reason Code	Description
U	B	Non-detection at the LOQ; target analyte detected in blank.



<b>Validation Flag</b>	<b>Reason Code</b>	<b>Description</b>
UJ	L	Estimated non-detection; LCS/LCSD recovery or RPD criteria not met.
J	L	Estimated detection; LCS/LCSD recovery or RPD criteria not met.
J	S	Estimated detection; surrogate outlier.

## 1.4 TECHNICAL DATA VALIDATION

### 1.4.1 Semivolatile Organic Compounds by Method 8270D

The following parameters were evaluated and met the required criteria. No validation flags were assigned based on the following:

- Holding times
- Method blanks
- LCS recoveries
- Surrogate recoveries
- LODs and LOQs
- Instrument tuning
- Internal standard area counts
- Initial calibration
- Initial calibration verification
- Continuing calibration verification
- Closing calibration verification

No analytical or quality parameters required further discussion for Method 8270D.

### 1.4.2 Organochlorine Pesticides by Method 8081B

The following parameters were evaluated and met the required criteria. No validation flags were assigned based on the following:

- Holding times
- LODs and LOQs
- Surrogate recoveries
- Method blank
- LCS recoveries
- MS/MSD recoveries and RPDs
- Initial calibration
- Initial calibration verification
- Internal standards
- Endrin/DDT breakdown check
- Second column confirmation

All analytical or quality parameters requiring further discussion for Method 8081B are described in the sections below.

### **1.4.2.1 Continuing Calibration Verification**

4,4'-DDT (20.7%D) and methoxychlor (29.5%D) recovered above control limits ( $\pm 20\%$ D) in the continuing calibration verification CCV 280-373137/53. All associated samples were non-detect for 4,4'-DDT and methoxychlor; therefore, no qualification was necessary.

### **1.4.3 Explosives by Method 8330B**

The following parameters were evaluated and met the required criteria. No validation flags were assigned:

- Holding times
- Initial calibration
- Initial calibration verification
- Initial calibration blank
- Continuing calibration verification
- Continuing calibration blank
- LODs and LOQs
- Initial calibration verification
- 2<sup>nd</sup> column confirmation

All analytical or quality parameters requiring further discussion for Method 8330B are described in the sections below.

#### **1.4.3.1 Sample Preparation**

Sample FWGmw-011-050217-GW was filtered prior to analysis to reduce matrix interferences.

#### **1.4.3.2 Dilutions**

Sample FBQmw-174-050217-GW required a 10x dilution prior to analysis due to high target analyte concentration. The reporting limits are elevated accordingly.

#### **1.4.3.3 Surrogate Recoveries**

Surrogate 1,2-dinitrobenzene (164%) recovered above control limits (83-119%) in sample FBQmw-174-050217-GW. All associated detected analytes were qualified as estimated (J S).

#### **1.4.3.4 Method Blanks**

Nitrobenzene (0.157  $\mu\text{g/L}$ ) was detected in the method blank at a concentration below the LOQ (0.4  $\mu\text{g/L}$ ). Nitrobenzene was also detected at a concentration below the LOQ in sample FWGmw-011-050217-GW (0.20  $\mu\text{g/L}$ ). This sample result was qualified as non-detect at the LOQ (U B).

**1.4.3.5 Laboratory Control Sample**

4-Amino-2,6-dinitrotoluene (72%) recovered below control limits (76-125%) in the LCS. All associated sample results were qualified as estimated (J/UJ L).

**1.4.4 Total/Dissolved Metals by Method 6010C/6020A/7470A**

The following parameters were evaluated and met the required criteria. No validation flags were assigned based on the following:

- Holding times
- LODs and LOQs
- LCS recoveries
- Post digestion spike
- Serial dilution
- Continuing calibration verification
- Contract required detection limit standard
- Instrument tuning
- Interference check solutions
- Field duplicates

All analytical or quality issues requiring further discussion for Methods 6010C, 6020A, and/or 7470A are described in the sections below.

**1.4.4.1 Method Blanks**

Iron (32.1 µg/L) and sodium (156 µg/L) were detected in the method blank at concentrations below their respective LOQs (100 µg/L, 5000 µg/L). All iron or sodium sample results were above the LOQ; therefore, no qualification was necessary.

**1.4.4.2 Continuing calibration Blanks**

Several analytes were detected in the calibration blanks bracketing the samples. The following table presents the calibration blank detections:

Calibration Blank	Associated Samples	Analyte	Blank Detection (µg/L)	LOQ (µg/L)	Assigned Flags	Samples Qualified
CCB 280-373288/90	FWGmw-012-050217-GW	Potassium	265	3000	N/A	None
ICB 280-373525/10	FWGmw-011-050217-GW	Antimony	0.9	2	N/A	None
	FWGmw-012-050217-GW	Vanadium	0.764	5	U B	FWGmw-011-050217-GW
ICB 280-373270/10	FWGmw-011-050217-GF	Antimony	0.625	2	N/A	None
		Vanadium	0.676	5	N/A	None

CCB 280-373270/34	FWGmw-011-050217-GF	Thallium	0.054	1	N/A	None
		Vanadium	0.955	5	N/A	None

CCB = continuing calibration blank

ICB = initial calibration blank

Detections less than the LOQ in associated samples are qualified as not detected at the LOQ (U B).

#### 1.4.4.3 Initial Calibration Verification

Antimony (123%) recovered above control limits (80-120%) in the low-level initial calibration verification ICVL 280-373525/11. All associated samples were non-detect for antimony; therefore, no qualification was necessary.

#### 1.4.5 Hexavalent Chromium by Method 7196A

The following parameters were evaluated and met the required criteria. No validation flags were assigned based on the following:

- Holding times
- LODs and LOQs
- LCS recoveries
- Method blank
- Initial calibration verification
- Continuing calibration verification
- Initial calibration blank
- Continuing calibration blank
- Field duplicates

No analytical or quality issues required further discussion for Method 7196A.

#### 1.4.6 Total Cyanide by Method 9012B

The following parameters were evaluated and met the required criteria. No validation flags were assigned based on the following:

- Holding times
- LODs and LOQs
- LCS recoveries
- MS/MSD recoveries and RPDs
- Initial calibration verification
- Continuing calibration verification
- Initial calibration blank
- Continuing calibration blank
- Field duplicates

All analytical or quality issues requiring further discussion for Method 9012B are described in the sections below.

#### **1.4.6.1 Method Blanks**

Total cyanide (2.29 µg/L) was detected in the method blank at a concentration below the LOQ (10 µg/L). Total cyanide was also detected at a concentration below the LOQ in samples FBQmw-502-050217-GW (2.8 µg/L), FWGmw-010-050217-GW (4.8 µg/L), and LL3mw-236-050217-GW (2.5 µg/L). These sample results were qualified as non-detect at the LOQ (U B).

#### **1.4.7 Alkalinity by Method 2320B**

The following parameters were evaluated and met the required criteria. No validation flags were assigned based on the following:

- Holding times
- LODs and LOQs
- LCS recoveries
- Method blanks
- Initial calibration verification
- Continuing calibration verification
- Initial calibration blank
- Continuing calibration blank
- Field duplicates

All analytical or quality issues requiring further discussion for Method 2320B are described in the sections below.

#### **1.4.7.1 Method Blanks**

Alkalinity (2.91 mg/L) was detected in the method blank at a concentration below the LOQ (5.0 mg/L). Alkalinity was also detected at a concentration below the LOQ in sample FBQmw-174-050217-GW (4.3 mg/L). This sample result was qualified as non-detect at the LOQ (U B). All other alkalinity sample results were above the LOQ; therefore, no qualification was necessary.

**DATA VALIDATION TABLE**

SDG	Field Sample ID	Lab Sample ID	Matrix	Parameter	CAS Number	Units	Result	Lab Flag	DV Flag	Detection	LOQ	LOD	MDL	Analytic Method	Reason Code
280-96600-1	LL3mw-236-050217-GW	280-96600-11	Ground Water	4-Amino-2,6-dinitrotoluene	19406-51-0	µg/L	0.13	u	uj	n	0.22	0.13	0.065	Explosives	L
280-96600-1	LL3mw-236-050217-GW	280-96600-11	Ground Water	Total Cyanide	57-12-5	µg/L	10	j	u	n	10	5	2	Total Cyanide	B
280-96600-1	FBQmw-502-050217-GW	280-96600-2	Ground Water	Total Cyanide	57-12-5	µg/L	10	j	u	n	10	5	2	Total Cyanide	B
280-96600-1	FBQmw-174-050217-GW	280-96600-4	Ground Water	2,4,6-Trinitrotoluene	118-96-7	µg/L	49	d q	j	y	4.4	2.2	0.79	Explosives	S
280-96600-1	FBQmw-174-050217-GW	280-96600-4	Ground Water	2-Amino-4,6-dinitrotoluene	35572-78-2	µg/L	18	d q	j	y	2.2	1.3	0.63	Explosives	S
280-96600-1	FBQmw-174-050217-GW	280-96600-4	Ground Water	4-Amino-2,6-dinitrotoluene	19406-51-0	µg/L	28	d q	j	y	2.2	1.3	0.63	Explosives	S L
280-96600-1	FBQmw-174-050217-GW	280-96600-4	Ground Water	Alkalinity (as CaCO3)		mg/L	5	j	u	n	5	3.2	1.1	Alkalinity	B
280-96600-1	FWGmw-011-050217-GW	280-96600-6	Ground Water	Vanadium	7440-62-2	µg/L	6	j	u	n	6	2	0.5	Metals	B
280-96600-1	FWGmw-011-050217-GW	280-96600-6	Ground Water	Nitrobenzene	98-95-3	µg/L	0.45	j	u	n	0.45	0.22	0.1	Explosives	B
280-96600-1	FWGmw-011-050217-GW	280-96600-6	Ground Water	4-Amino-2,6-dinitrotoluene	19406-51-0	µg/L	0.13	u	uj	n	0.22	0.13	0.064	Explosives	L
280-96600-1	FWGmw-012-050217-GW	280-96600-7	Ground Water	4-Amino-2,6-dinitrotoluene	19406-51-0	µg/L	0.13	u	uj	n	0.21	0.13	0.061	Explosives	L
280-96600-1	FWGmw-010-050217-GW	280-96600-9	Ground Water	Total Cyanide	57-12-5	µg/L	10	j	u	n	10	5	2	Total Cyanide	B