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 280-96181-1

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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.

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Travis Withers, Validation Chemist, TEC-WESTON JV Date

6/5/17

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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) **280-96181-1**.

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

Parameters	Analytical Method	Laboratory Location
Volatile Organic Compounds (VOCs)	8260B	Denver, CO
Semivolatile Organic Compounds (SVOCs)	8270D	Denver, CO
Polycyclic Aromatic Hydrocarbons (PAHs)	8270D SIM	Denver, CO
Organochlorine Pesticides	8081B	Denver, CO
Polychlorinated Biphenyls (PCBs)	8082A	Denver, CO
Explosives	8330B	Denver, CO
Nitroguanidine	8330	Sacramento, CA
Metals	6010C/6020A/7470A	Denver, CO
Perchlorate	6860	Denver, CO
Total Cyanide	9012B	Denver, CO
Hexavalent Chromium	7196A	Denver, CO
Nitrocellulose	353.2	Sacramento, CA

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	VOCs	SVOCs (phthalates)	SVOCs (full list)	PAHs	Pesticides	PCBs	Explosives	Nitroguanidine	Perchlorate	Metals	Total Cyanide	Hexavalent Chromium	Nitrocellulose
BKGmw-017-042017-GW	280-96181-1	04/20/17	Groundwater													✓	
BKGmw-023-042017-GW	280-96181-2	04/20/17	Groundwater													✓	
BKGmw-024-042017-GW	280-96181-3	04/20/17	Groundwater													✓	
BKGmw-018-042017-GW	280-96181-4	04/20/17	Groundwater													✓	
BKGmw-509-042017-GW	280-96181-5	04/20/17	Groundwater	Field Duplicate												✓	
WBGmw-006-042017-GW	280-96181-6	04/20/17	Groundwater			✓				✓	✓			✓			
WBGmw-009-042017-GW	280-96181-7	04/20/17	Groundwater			✓					✓			✓			
WBGmw-015-042017-GW	280-96181-8	04/20/17	Groundwater		✓						✓				✓		
WBGmw-020-042017-GW	280-96181-9	04/20/17	Groundwater			✓				✓	✓			✓			
WBGmw-021-042017-GW	280-96181-10	04/20/17	Groundwater			✓				✓	✓			✓			
LNWmw-026-042017-GW	280-96181-11	04/20/17	Groundwater								✓						
TB-042017-2	280-96181-12	04/20/17	Groundwater	Trip Blank	✓												
FWGmw-023-041917-GW	280-96181-13	04/19/17	Groundwater		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
TB-042017-1	280-96181-14	04/19/17	Groundwater	Trip Blank	✓												

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 April 21, 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.

Nitroguanidine and nitrocellulose analyses were performed by TestAmerica Sacramento.

Two chains of custody that were received by TestAmerica Canton (courier) were not relinquished before being shipped to TestAmerica Denver.

Sample ID LNVmw-026-042017-GW was incorrectly written on the chain of custody. Sample ID changed to LNWmw-026-042017-GW.

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; blank detection.
J	CC	Estimated detection; continuing calibration exceedance
R	L	Rejected; LCS/LCSD recovery or RPD exceedance

1.4 TECHNICAL DATA VALIDATION

1.4.1 Volatile Organic Compounds by Method 8260B

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

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

All analytical or quality parameters requiring further discussion for Method 8260B are described in the sections below.

1.4.1.1 Surrogate Recoveries

Surrogate 4-Bromofluorobenzene (116%) was recovered above the control limits (85-114%) in sample FWGmw-023-041917-GW. All associated sample results were non-detect; therefore, no qualification was necessary.

1.4.2 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
- Surrogate recoveries
- LODs and LOQs
- Instrument tuning
- Internal standard area counts
- Initial calibration
- Initial calibration verification
- Closing calibration verification

All analytical or quality parameters requiring further discussion for Method 8270D are described in the sections below.

1.4.2.1 Method Blanks

Several analytes were detected at concentrations below their LOQs in the method blank. These detections are outlined in the table below:

Analyte	Detection (µg/L)	LOQ (µg/L)
2,4,6-Trichlorophenol	0.348	20
3 & 4 Methylphenol	0.281	20
Bis(2-ethylhexyl) phthalate	5.48	10
Dibenzofuran	0.354	10
Dimethyl phthalate	0.316	20
N-Nitrosodi-n-propylamine	0.406	20

All sample results associated with the exceedances in the above table were non-detect; therefore, no qualification was necessary.

1.4.2.2 Laboratory Control Samples

Hexachlorocyclopentadiene (0%) recovered below control limits (10-120%). All associated hexachlorocyclopentadiene sample results were qualified as rejected due to the extremely low (<10%) recovery (R L). It is noted that hexachlorocyclopentadiene is a poor performer for this method.

1.4.3 Polycyclic Aromatic Hydrocarbons by Method 8270D SIM

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

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

All analytical or quality parameters requiring further discussion for Method 8270D SIM are described in the sections below.

1.4.3.1 Laboratory Control Samples

Chrysene recovered above the control limits (57-120%) in the LCS (121%) and the LCSD (121%). All associated chrysene sample results were non-detect; therefore, no qualification was necessary.

1.4.4 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
- 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.

1.4.4.1 Continuing Calibration Verification

Endrin (23.5%) recovered above control limits (±20%) in CCV 280-372191/30. All associated endrin sample results were non-detect; therefore, no qualification was necessary.

1.4.5 Polychlorinated Biphenyls by Method 8082A

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
- Initial calibration
- Initial calibration verification
- Continuing calibration verification
- Internal standards
- Second column confirmation

All analytical or quality parameters requiring further discussion for Method 8082A are described in the sections below.

1.4.5.1 Sample Preparation

Samples WBGmw-020-042017-GW, WBGmw-021-042017-GW, and FWGmw-023-041917-GW underwent a sulfuric acid clean up, via EPA Method 3665A, prior to analysis to reduce matrix interferences.

1.4.6 Explosives by Method 8330B

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

- Holding times
- Method blanks
- LCS recoveries
- Initial calibration
- Initial calibration verification
- Initial calibration blank
- Continuing calibration verification
- Continuing calibration blank
- LODs and LOQs
- Initial calibration verification
- 2nd column confirmation

No analytical or quality parameters required further discussion for Method 8330B.

1.4.7 Nitroguanidine by Method 8330

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

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

No analytical or quality parameters required further discussion for Method 8330.

1.4.8 Perchlorate by Method 6860

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
- Detection limit check
- Interference check standards

No analytical or quality parameters requiring further discussion were identified for Method 6860.

1.4.9 Total 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
- Serial dilution
- Post-digestion spike
- Initial calibration verification
- Lower control interference check standard
- Contract required detection limit standard
- Instrument tuning
- Interference check standards

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

1.4.9.1 Method Blanks

Sodium (458 µg/L) and manganese (0.379 µg/L) were detected at concentrations below their respective LOQs (5000 µg/L, 3.5 µg/L) in the method blank. Manganese was detected at concentrations above the LOQ in all associated samples; therefore, no qualification was necessary. Sodium was detected at a concentration below the LOQ in samples WBGmw-009-042017-GW (4200 µg/L) and WBGmw-020-042017-GW (3800 µg/L). These sample results were qualified as non-detect at the LOQ (U B). All other associated sodium sample results were detected at concentrations above the LOQ; therefore, no qualification was necessary.

1.4.9.2 Calibration Blanks

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

Calibration Blank	Associated Samples	Analyte	Blank Detection (µg/L)	LOQ (µg/L)	Assigned Flags	Samples Qualified
CCB 280-371762/70	WBGmw-006-042017-GW WBGmw-009-042017-GW	Sodium	132	5000	U B	WBGmw-009-042017-GW

CCB 280-371762/84	WBGmw-006-042017-GW WBGmw-009-042017-GW WBGmw-020-042017-GW WBGmw-021-042017-GW FWGmw-023-041917-GW	Sodium	127	5000	U B	WBGmw-009-042017-GW WBGmw-020-042017-GW
ICB 280-371022/11	WBGmw-006-042017-GW WBGmw-009-042017-GW WBGmw-020-042017-GW WBGmw-021-042017-GW FWGmw-023-041917-GW	Vanadium	0.55	5	N/A	None
CCB 280-371022/120	WBGmw-006-042017-GW	Silver	0.034	5	N/A	None
		Thallium	0.054	1	N/A	None
CCB 280-371022/137	WBGmw-009-042017-GW WBGmw-020-042017-GW	Silver	0.033	5	N/A	None
	WBGmw-021-042017-GW FWGmw-023-041917-GW	Thallium	0.061	1	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).

1.4.9.3 Matrix Spike/Matrix Spike Duplicates

Manganese (85%) recovered below control limits (87-115%) in the MS. The MSD and RPD were within control limits; therefore, no qualification was necessary.

1.4.9.4 Continuing Calibration Verification

Manganese (121%) recovered above control limits (80-120%) in CCVL 280-371022/131. The associated manganese sample results in samples WBGmw-009-042017-GW, WBGmw-020-042017-GW, WBGmw-021-042017-GW, and FWGmw-023-041917-GW were qualified as estimated (J CC).

1.4.10 Nitrocellulose by Method 353.2

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
- MS/MSD recoveries and RPDs
- Initial calibration verification
- Continuing calibration verification
- Initial calibration blank

- Continuing calibration blank

No analytical or quality parameters required further discussion for Method 353.2.

1.4.11 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
- MS/MSD recoveries and RPDs
- Initial calibration verification
- Continuing calibration verification
- Initial calibration blank
- Continuing calibration blank

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

1.4.12 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
- Method blanks
- Initial calibration verification
- Continuing calibration verification
- Initial calibration blank
- Continuing calibration blank

No analytical or quality parameters required further discussion for Method 9012B.

DATA VALIDATION TABLE

SDG	Field Sample ID	Lab Sample ID	Matrix	Parameter	CAS Number	Units	Result	Lab Flag	DV Flag	Detection	LOQ	LOD	MDL	AnalyticMethod	Reason Code
280-96181-1	WBGmw-021-042017-GW	280-96181-10	Ground Water	Manganese	7439-96-5	µg/L	300	v	j	y	3.5	0.95	0.31	Metals	CC
280-96181-1	FWGmw-023-041917-GW	280-96181-13	Ground Water	Manganese	7439-96-5	µg/L	320	v	j	y	3.5	0.95	0.31	Metals	CC
280-96181-1	FWGmw-023-041917-GW	280-96181-13	Ground Water	Hexachlorocyclopentadiene	77-47-4	µg/L	29	u q	r	n	49	29	9.8	SVOCs	L
280-96181-1	WBGmw-009-042017-GW	280-96181-7	Ground Water	Sodium	7440-23-5	µg/L	5000	j	u	n	5000	350	120	Metals	B
280-96181-1	WBGmw-009-042017-GW	280-96181-7	Ground Water	Manganese	7439-96-5	µg/L	23	v	j	y	3.5	0.95	0.31	Metals	CC
280-96181-1	WBGmw-020-042017-GW	280-96181-9	Ground Water	Sodium	7440-23-5	µg/L	5000	j	u	n	5000	350	120	Metals	B
280-96181-1	WBGmw-020-042017-GW	280-96181-9	Ground Water	Manganese	7439-96-5	µg/L	240	v	j	y	3.5	0.95	0.31	Metals	CC