Data Validation Report
Remedial Investigation at RVAAP-66 Facility Wide Groundwater
Quarterly Sampling Event for January 2017

Former Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

Contract Number: W9133L-14-D-0008

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Laboratory SDG 280-93104-1

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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 Validator and Secondary QC Review was performed by the Project Chemist. Signatures indicate the report is approved for release.

Erica Fisher, Validator, TEC-WESTON JV — 03/16/2017 Date

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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) **280-93104-1**.

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
Polychlorinated Biphenyls (PCBs)	8082A	Denver, CO
Explosives	8330B	Denver, CO
Total Cyanide	9012B	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	VOCs	SVOCs	PAHs	PCBs	Explosives	Cyanide
SCFmw-001-011717-GW	280-93104-1	01/17/17	Groundwater		✓	✓	✓	✓	✓	✓
TRIP BLANK-011717	280-93104-3	01/17/17			✓					✓

The IDW sample, IDW-011717, is also listed on the chain of custody. These sample results are reported 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 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
UJ	CC	Estimated non-detection; continuing calibration verification did not meet acceptance criteria.

1.3 SAMPLE RECEIPT

The samples were received by the laboratory on January 18, 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.

A trip blank associated with sample SCFmw-001-011717-GW was submitted for analysis, but was not listed on the chain of custody. The trip blank was logged as TRIP BLANK-011717 with a sample date and time of 01/17/17 at 11:20 per the information on the sample labels.

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
- Method blank
- LODs and LOQs
- Laboratory control sample
- Surrogate recoveries
- Instrument tuning
- Initial calibration verification
- Continuing calibration verification
- Internal standard recoveries
- Trip blank

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

1.4.1.1 Method Blanks

Methylene chloride was detected in method blank MB 280-359454/6 (0.496 µg/L). However, as methylene chloride was not detected in associated sample SCFmw-001-011717-GW or TRIP BLANK-0111717, 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:

- Holding times
- Surrogate recoveries
- LODs and LOQs
- Method blank
- Instrument tuning
- Initial calibration verification
- Continuing calibration verification
- Internal standard recoveries

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

1.4.2.1 Laboratory Control Sample/Laboratory Control Sample Duplicates

Recoveries and RPDs were above the acceptance criteria for several analytes in the laboratory control sample (LCS) and laboratory control sample duplicate (LCSD). The following table shows analytes outside the acceptance criteria in samples LCS 280-359616/2-A and LCSD 280-359616/3-A:

Analyte	LCS %R	LCSD %R	%R QC Limits	RPD	RPD Limits	Assigned Flags
1,2,4-Trichlorobenzene	68	**123**	29-116	**58**	20	None
1,2-Dichlorobenzene	72	58	32-111	**22**	20	None
1,3-Dichlorobenzene	67	54	28-110	**22**	20	None
1,4-Dichlorobenzene	71	**133**	29-112	**61**	20	None
2,4-Dinitrotoluene	103	**207**	57-128	**67**	20	None
2-Chlorophenol	91	**230**	38-117	**86**	20	None
4-Chloro-3-methylphenol	93	**220**	52-119	**81**	20	None
4-Nitrophenol	84	**154**	59-129	**59**	20	None
Hexachlorobutadiene	61	44	22-124	**33**	20	None
Hexachlorocyclopentadiene	26	21	10-120	**21**	20	None
Hexachloroethane	63	47	21-115	**30**	20	None
N-Nitrosodi-n-propylamine	81	**166**	49-119	**68**	20	None
Pentachlorophenol	89	**167**	35-138	**61**	20	None
Phenol	90	**221**	61-120	**84**	20	None

Bold type indicates parameter outside acceptance criteria.

All recoveries were within control limits for the LCS. A total of nine analytes exceeded the upper control limit in the LCSD and also the RPD limit. An additional five analytes yielded RPDs above the RPD limit. As the associated sample was reported as undetected for these fourteen analytes, no qualifications were assigned.

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:

- Holding times
- Surrogate recoveries
- LODs and LOQs
- Instrument tuning
- Initial calibration verification
- Continuing calibration verification
- Internal standard recoveries

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

1.4.3.1 Laboratory Control Sample/Laboratory Control Sample Duplicates

Recoveries and/or RPDs were above the acceptance criteria for three analytes in the LCS and LCSD. The following table shows analytes outside the acceptance criteria in samples LCS 280-359406/7-A and LCSD 280-359406/8-A:

Analyte	LCS %R	LCSD %R	%R QC Limits	RPD	RPD Limits	Assigned Flags
Chrysene	**125**	105	57-120	17	20	None
Phenanthrene	**117**	102	53-115	13	20	None
Fluorene	116	95	50-118	**21**	20	None

Bold type indicates parameter outside acceptance criteria.

All recoveries were within control limits for the LCSD. Chrysene and phenanthrene exceeded the upper control limit in the LCS. Both the LCS and LCSD recoveries for fluorene were within control limits, however, the RPD was above the acceptable limit. As the associated sample was reported as undetected for these three analytes, no qualifications were assigned.

1.4.3.2 Method Blanks

Benzo(a)anthracene (0.0349 µg/L), chrysene (0.0381 µg/L) and fluoranthene (0.0312 µg/L) were detected at a concentration below their respective LOQs (0.10 µg/L) in the method blank. The associated sample (SCFmw-001011717-GW) results were non-detect for these analytes; therefore, no qualification was necessary.

1.4.1 Polychlorinated Biphenyls by Method 8082A

The following parameters were evaluated and met the required criteria:

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

No analytical or quality parameters requiring further discussion for Method 8082A were identified.

1.4.2 Explosives by Method 8330B

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

- Holding times
- Surrogate recoveries
- LODs and LOQs
- Initial calibration
- Initial calibration verification
- Surrogate spikes
- 2nd column confirmation

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

1.4.2.1 Laboratory Control Sample/Laboratory Control Sample Duplicates

Nitrobenzene recovered above the acceptable limits of 65-135% in laboratory control sample LCS 280-359609/2-A (139%) and laboratory control duplicate sample LCSD 280-359609/3-A (147%) associated with analytical batch 359949. Nitrobenzene was not detected in the associated sample SCFmw-001-011717-GW; therefore, the sample results were not qualified.

1.4.2.2 Method Blank

1,3,5-Trinitrobenzene (0.495 µg/L), 2-nitrotoluene (0.164 µg/L), PETN (0.585 µg/L) and RDX (0.206 µg/L) were detected in method blank MB 280-359609/1-A above their respective LOQs (1.0 µg/L, 0.4 µg/L, 2.0 µg/L and 0.2 µg/L). However, as these analytes were not detected in associated sample SCFmw-001-011717-GW, no qualification was considered to be necessary.

1.4.2.3 Continuing Calibration Verification

Nitrobenzene (-20.2%), 4-nitrotoluene (-20.4%) and 3-nitrotoluene (-25.9%) were outside the acceptable difference (%D) criteria of ±20%D in continuing calibration verification CCV 280-359644/18 associated with analytical batch 359644. Analytes 4-nitrotoluene and 3-nitrotoluene are not associated with analytical batch 359644, therefore no qualifiers are assigned. Nitrobenzene, which was reported in analytical batch 359644, was not detected in associated sample SCFmw-001-011717-GW; therefore, the sample result is qualified as estimated (UJ CC).

1.4.3 Total Cyanide by Method 9012B

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

- Holding times
- LODs and LOQs
- LCS recoveries
- Method blank
- Low and high level control samples
- Initial calibration verification
- Continuing calibration verification
- Initial calibration blank
- Continuing calibration blank

No analytical or quality parameters requiring further discussion were identified 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	Analytical Method	Reason Code
280-93104-1	SCFmw-001-011717-GW	280-93104-1	Ground Water	Nitrobenzene	98-95-3	µg/L	0.22	u q	uj	n	0.44	0.22	0.1	Explosives and Propellants	CC

µg/L - micrograms per liter