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

Former Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

Contract Number: W9133L-14-D-0008

Task Order Number: 0003

Laboratory SDG 280-104206-1

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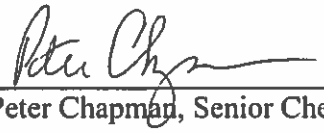
CONTRACTOR STATEMENT OF INDEPENDENT TECHNICAL REVIEW

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

Erica Fisher, Validator, TEC-WESTON JV — 1/22/2018 Date



Peter Chapman, Senior Chemist, TEC-WESTON JV — 1/22/18 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) **280-104206-1**.

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 Modified	Sacramento, CA
Metals	6010C/6020A/7470A	Denver, CO
Perchlorate	6860	Denver, CO
Alkalinity	2320B	Denver, CO
Total Cyanide	9012B	Denver, CO
Nitrocellulose	WS-WC-0050	Sacramento, CA
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	VOCs	SVOCs (phthalates)	SVOCs (full list)	PAHs	Pesticides	PCBs	Explosives	Nitroguanidine	Perchlorate	Metals	Total Cyanide	Alkalinity	Nitrocellulose
BKGmw-022-120117-GW	280-104206-1	12/01/17	Groundwater		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
BKGmw-023-120117-GW	280-104206-2	12/01/17	Groundwater		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
FWGmw-005-120117-GW	280-104206-3	12/01/17	Groundwater											✓		✓	
TB-120117	280-104206-4	12/01/17	Groundwater		✓												
BKGmw-005-120117-GW	280-104206-10	12/01/17	Groundwater											✓		✓	
BKGmw-005-D-120117-GW	280-104206-11	12/01/17	Groundwater	Field Duplicate										✓		✓	
BKGmw-025-120117-GW	280-104206-12	12/01/17	Groundwater		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
BKGmw-025-D-120117-GW	280-104206-13	12/01/17	Groundwater	Field Duplicate	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
BKGmw-023-D-120117-GW	280-104206-14	12/01/17	Groundwater	Field Duplicate	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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

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 December 2, 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 4°C.

Nitroguanidine and nitrocellulose analyses were performed by TestAmerica Sacramento.

One set of sample container labels did not match the chain of custody (COC) information. Container labels read BKGmw-022-120117-GW and COC read BKGmw-022-120117. The laboratory logged the samples per the sample containers to be consistent with all other samples.

Sample times were not recorded on the containers for samples BKGmw-005-120117-GW and BKGmw-005-D-120117-GW. The laboratory logged the sample times per the COC documentation.

The laboratory did not receive a 125 ml bottle for the requested perchlorate analysis for sample BKGmw-022-120117-GW. However, the laboratory received two 125 ml containers with sample labels BKGmw-023-120117-gw. One of the sample containers was annotated with a sample time and one was not. The laboratory logged the sample container with no sample time as BKGmw-022-120117-GW via process of elimination as all other containers were labelled for perchlorate analysis.

The laboratory did not receive 250 ml amber glass containers for pesticide analysis for samples BKGmw-023-120117-GW and BKGmw-023-D-120117-GW. The laboratory logged the duplicate sample (BKGmw-023-D-120117-GW) 250 ml amber glass container received for polyaromatic hydrocarbon (PAH) analysis as the pesticide bottle for the primary sample (BKGmw-023-120117-GW) and sub-sampled sufficient volume from a 1 L amber glass bottle received for the duplicate sample (BKGmw-023-D-120117-GW) to facilitate pesticide and PAH analysis. The laboratory appropriately noted all procedural deviations in the laboratory report.

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.
UJ	S	Estimated non-detection; surrogate outlier.
UJ	L	Estimated non-detection; LCS/LCSD percent recovery or RPD exceedance.
J	CC	Estimated detection; continuing calibration criteria not met.
UJ	CC	Estimated non-detection; continuing calibration criteria not met.

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
- LCS recoveries
- Method blanks
- MS/MSD recoveries and RPDs
- LODs and LOQs
- Instrument tuning
- Internal standard area counts
- Initial calibration
- Initial calibration verification
- Closing calibration verification

- Field duplicates

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

1.4.1.1 Trip Blank

Acetone (16 µg/L) was detected in the trip blank (TB-120117) associated with the samples in this SDG greater than the LOQ (10 µg/L). 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
- Method blanks
- Surrogate recoveries
- LODs and LOQs
- Instrument tuning
- Internal standard area counts
- Initial calibration
- Initial calibration verification
- Continuing calibration verification
- Closing calibration verification
- Field duplicates

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

1.4.2.1 LCS/LCSD Recoveries and RPDs

All LCS/LCSD recoveries and RPDs were within control limits with the exception of the exceedances presented in the following table:

Analyte	LCS %R	LCSD %R	%R QC Limits	RPD	RPD Limits
1,3-Dichlorobenzene	45	57	28-110	**23**	20
2,2'-oxybis[1-chloropropane]	57	72	37-130	**23**	20
2-Chlorophenol	53	66	38-117	**22**	20
2-Methylphenol	53	67	30-117	**23**	20
2-Nitrophenol	59	74	47-123	**22**	20
4-Nitrophenol	**40**	**43**	59-129	7	20
Benzoic acid	**31**	53	41-129	17	20

Bis(2-chloroethyl)ether	55	70	43-118	**24**	20
Hexachloroethane	45	58	21-115	**24**	20
Nitrobenzene	55	68	45-121	**21**	20
Phenol	**26**	**32**	61-120	**23**	20

%R = percent recovery
Bolded values are outside control limits.

The RPD limits for 1,3-dichlorobenzene, 2,2'-oxybis[1-chloropropane], 2-chlorophenol, 2-methylphenol, 2-nitrophenol, bis(2-chloroethyl)ether, hexachloroethane and nitrobenzene exceed the QC limit (20%). However, as the LCS and LCSD recoveries are within acceptable limits, no qualification is necessary.

The LCS recovery for benzoic acid (31%) was below the acceptable limit (41-129%). However, as the LCSD recovery and the RPD were within QC limits, no qualification is necessary.

4-Nitrophenol recovered below the acceptable range (59-129%) in both the LCS (40%) and LCSD (43%), although the RPD was within acceptable limits. All associated samples are therefore qualified estimated (UJ L).

Phenol recovered below the acceptable range (61-120%) in both the LCS (26%) and LCSD (32%), and the RPD (23%) exceeded the QC limit (20%). All associated samples are therefore qualified estimated (UJ L).

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
- Method blank
- Surrogate recoveries blanks
- LCS/LCSD recoveries and RPDs
- LODs and LOQs
- Instrument tuning
- Internal standard area counts
- Initial calibration
- Initial calibration verification
- Closing calibration verification
- Field duplicates

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

1.4.3.1 Sample Preparation

A portion of sample BKGmw-023-D-120117-GW was extracted from a larger container and used for PAH analysis due to the laboratory not receiving the required sample volume container for PAH analysis. Therefore, the solvent rinse of the original container could not be performed. No qualification is required for this deviation from the method procedure.

1.4.3.2 LCS/LCSD Recoveries and RPDs

All LCS/LCSD recoveries and RPDs were within control limits with the exception of the exceedances presented in the following table:

Analyte	LCS %R	LCSD %R	%R QC Limits	RPD	RPD Limits
Anthracene	74	60	53-119	**21**	20
Benzo[b]fluoranthene	70	96	53-126	**32**	20
Benzo[k]fluoranthene	74	92	54-125	**22**	20
Benzo[a]pyrene	67	94	53-120	**33**	20
Indeno[1,2,3-cd]pyrene	64	79	48-130	**22**	20

%R = percent recovery
Bolded values are outside control limits.

All analytes in the above table reported RPDs above the acceptable limit of 20%. However, all of the analytes reported LCS and LCSD recoveries within the acceptable ranges, therefore no qualification is 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/LCSD recoveries and RPDs
- Initial calibration
- Initial calibration verification
- Continuing calibration verification
- Internal standards
- Endrin/DDT breakdown check
- Second column confirmation
- Field duplicates

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

1.4.4.1 Sample Preparation

A portion of sample BKGmw-023-D-120117-GW was extracted from a larger container and used for PAH analysis due to the laboratory not receiving the required sample volume container for PAH analysis. Therefore, the solvent rinse of the original container could not be performed. No qualification is required for this deviation from the method procedure.

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
- Field duplicates

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

1.4.5.1 Sample Preparation

It was noted in the case narrative all samples in this SDG analyzed for PCBs required sulfuric acid clean-up via EPA Method 3665A to reduce matrix interference. This is appropriate and therefore no qualification is necessary.

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 blank
- LCS/LCSD recoveries and RPDs
- Initial calibration
- Initial calibration verification
- LODs and LOQs
- Second column confirmation

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

1.4.6.1 Sample Preparation

Samples BKGmw-022-120117-GW, BKGmw-023-120117-GW and BKGmw-023-D-120117-GW were filtered prior to analysis to reduce matrix interferences.

1.4.6.2 Surrogate Recoveries

Surrogate 1,2-dinitrobenzene recovered below control limits (83-119%) in samples BKGmw-022-120117-GW (77%) and BKGmw-023-D-120117-GW (72%). All associated sample results were qualified as estimated (UJ S). The laboratory noted in the case narrative that evidence of matrix interference was present, therefore the samples were not re-extracted.

1.4.6.3 Continuing Calibration Verification

The percent difference (%D) for 4-nitrotoluene (21.5%) exceeded the QC limit (20%) in continuing calibration verification sample CCV 280-397892/29 bracketing the samples in the SDG. All associated sample 4-nitrotoluene results are therefore qualified estimated (UJ CC).

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 blank
- LCS recoveries
- MS/MSD recovery and RPD
- Initial calibration
- Initial calibration verification
- Continuing calibration verification
- LODs and LOQs
- Field duplicates

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
- Initial calibration blank
- Continuing calibration verification
- Continuing calibration blank
- Detection limit check
- Interference check standards
- Field duplicates

No analytical or quality parameters required further discussion 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/LCSD recoveries and RPDs
- Post digestion spike
- Serial dilution
- Contract required detection limit standard
- Instrument tuning
- Interference check solutions
- MS/MSD recoveries and RPDs

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 Initial and Continuing Calibration Blanks

Antimony (0.481 µg/L) and thallium (0.06 µg/L) were detected in initial calibration blank sample ICB 280-398230/9 at concentrations below their respective LOQs (6 µg/L and 1 µg/L).

Antimony was not detected in any of the associated samples, therefore no qualification is necessary. Thallium was detected in one associated sample, FWGmw-005-120117-GW at a concentration (0.13 µg/L) below the LOQ, and is subsequently qualified non-detect at the LOQ due to blank contamination (U B). All other samples were non-detect for thallium and therefore no qualification is necessary.

Silver was detected in continuing calibration blanks CCB 280-398230/53 (0.034 µg/L) and CCB 280-398230/63 at concentrations below the LOQ (5.0 µg/L). Silver was not detected in the associated samples, therefore no qualification is necessary.

Beryllium (0.101 µg/L), silver (0.043 µg/L), thallium (0.051 µg/L) and vanadium (0.606 µg/L) were detected in CCB 280-398230/72 below their respective LOQs (1.0 µg/L, 5.0 µg/L, 1.0 µg/L and 6.0 µg/L).

Beryllium was detected below the LOQ in associated samples FWGmw-005-120117-GW (0.28 µg/L) and BKGmw-005-120117-GW (0.082 µg/L). These samples are qualified non-detect at the LOQ due to blank contamination (U B). All other associated samples were non-detect for beryllium and are therefore not qualified.

Silver (0.033 µg/L) and thallium (0.13 µg/L) were detected below their LOQs in associated sample FWGmw-005-120117-GW and are qualified non-detect at the LOQ due to blank contamination (U B). All other associated samples were non-detect for silver and thallium and therefore no qualification is necessary.

All associated samples were non-detect for vanadium, therefore no qualification is necessary.

1.4.9.2 Initial/Continuing Calibrations Verifications

Barium (134%) recovered above control limits (80-120%) in the low-level continuing calibration verification CCVL 280-398230/64. All associated barium detections were qualified as estimated (J CC).

Nickel (78%) recovered below control limits in the low-level continuing calibration verification CCVL 280-398230/73. All associated nickel detections were qualified as estimated (J CC).

1.4.9.3 Field Duplicates

Three field duplicate samples (BKGmw-005-D-120117-GW, BKGmw-025-D-120117-GW and BKGmw-023-D-120117-GW) were analyzed for metals as part of this SDG. For detections less than 5x the LOQ, the difference in values was compared to ± the LOQ. For detections greater that 5x the LOQ, the relative percent difference was calculated and compared to the RPD limit. The following table shows the detections in the parent and duplicate sample:

Primary/ Duplicate Sample ID	Analyte	Primary Sample Result (µg/L)	Field Duplicate Result (µg/L)	LOQ (µg/L)	Absolute Diff. (µg/L)	RPD (%)	RPD Limit (%)[1]
BKGmw-005-120117-GW / BKGmw-005-D-120117-GW	Aluminum	750	580	300	170	N/A	± LOQ
	Calcium	63000	62000	1000	N/A	2	40
	Iron	1000	820	100	N/A	20	40
	Magnesium	17000	16000	500	N/A	6	40
	Potassium	1800 (J)	1700 (J)	3000	100	N/A	± LOQ
	Sodium	8200	7700	5000	500	N/A	± LOQ
	Arsenic	0.49 (J)	0.64 (J)	5	0.15	N/A	± LOQ
	Barium	18	19	3	N/A	5	40
	Beryllium	0.082 (J)	0.3 (U)	1	0.218	N/A	± LOQ
	Chromium	0.98 (J)	1.2 (J)	10	0.22	N/A	± LOQ
	Cobalt	0.39 (J)	0.38 (J)	1	0.01	N/A	± LOQ
	Copper	1.1 (J)	1.2 (J)	2	0.1	N/A	± LOQ
	Lead	0.68 (J)	0.7 (J)	3	0.02	N/A	± LOQ
	Manganese	50	52	3.5	N/A	4	40
	Nickel	0.92 (J)	1.1 (J)	3	0.18	N/A	± LOQ
	Zinc	3.2 (J)	4.4 (J)	20	1.2	N/A	± LOQ

Primary/ Duplicate Sample ID	Analyte	Primary Sample Result (µg/L)	Field Duplicate Result (µg/L)	LOQ (µg/L)	Absolute Diff. (µg/L)	RPD (%)	RPD Limit (%)[1]
BKGmw-025-120117-GW / BKGmw-025-D-120117-GW	Calcium	64000	64000	1000	N/A	0	40
	Iron	540	460	100	N/A	16	40
	Magnesium	17000	17000	500	0	N/A	± LOQ
	Potassium	950 (J)	920 (J)	3000	30	N/A	± LOQ
	Sodium	8800	9100	5000	300	N/A	± LOQ
	Arsenic	22	22	5	0	N/A	± LOQ
	Barium	81	84	3	N/A	7	40
	Cobalt	2.3	2.2	1	0.1	N/A	± LOQ
	Manganese	300	310	3.5	N/A	3	40
	Nickel	3.7	3.6	3	0.1	N/A	± LOQ
BKGmw-023-120117-GW / BKGmw-023-D-120117-GW	Calcium	64000	68000	1000	N/A	6	40
	Iron	130	150	100	20	N/A	± LOQ
	Magnesium	19000	19000	500	0	N/A	± LOQ
	Potassium	730 (J)	730 (J)	3000	0	N/A	± LOQ
	Sodium	9900	9100	5000	800	N/A	± LOQ
	Barium	20	22	3	N/A	10	40

Primary/ Duplicate Sample ID	Analyte	Primary Sample Result (µg/L)	Field Duplicate Result (µg/L)	LOQ (µg/L)	Absolute Diff. (µg/L)	RPD (%)	RPD Limit (%)[1]
	Cobalt	1.7	1.6	1	0.1	N/A	± LOQ
	Manganese	310	270	3.5	N/A	14	40
	Nickel	2.1 (J)	1.4 (J)	3	0.7	N/A	± LOQ
	Zinc	8 (U)	2.4 (J)	20	5.6	N/A	± LOQ

[1] The RPD limit is 40% for detections greater than 5x the LOQ; ± the LOQ for detections less than 5x the LOQ.

Bold values exceed the RPD limit.

J Laboratory flag indicating the result is less than the LOQ and is estimated.

NA Not applicable

All duplicate pair results are within QC limits (40% or ± LOQ), therefore no qualification is required.

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
- Initial calibration verification
- Continuing calibration verification
- Initial calibration blank
- Continuing calibration blank
- Field duplicates

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

1.4.11 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 sample recovery and RPD
- Initial calibration verification
- Continuing calibration verification
- Initial calibration blank
- Continuing calibration blank
- Low and high level control sample recoveries
- Field duplicates

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

1.4.11.1 Sample Preparation

The laboratory noted in the case narrative that sample BKGmw-023-D-120117-GW was improperly preserved in the field. The laboratory received and appropriately preserved the sample. All other sample preparation requirements were met, therefore no qualification is considered necessary.

1.4.11.2 Method Blanks

Total cyanide (2.96 mg/L) was detected in two method blanks at concentrations (3.19 µg/L and 2.79 µg/L) below the LOQ (10 µg/L).

Total cyanide was not detected in associated sample BKGmw-022-120117-GW, therefore no qualification is necessary.

Total cyanide was detected below the LOQ (10 µg/L) in associated samples BKGmw-023-120117-GW (2.8 µg/L) and BKGmw-025-120117-GW (2.6 µg/L). Therefore, these samples are qualified estimated at the LOQ due to blank contamination (U B).

1.4.12 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
- Initial calibration verification
- Continuing calibration verification
- Initial calibration blank
- Field duplicates

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

1.4.12.1 Method Blanks

Alkalinity (2.96 mg/L) was detected in the method blank at a concentration below the LOQ (5.0 mg/L). Alkalinity was detected at a concentration above the LOQ in all associated samples; therefore, no qualification was necessary.

1.4.12.2 Continuing Calibration Blanks

Alkalinity was detected in the continuing calibration blanks (1.66 mg/L, 2.75 mg/L, 2.4 mg/L and 1.72 mg/L) below the LOQ (5 mg/L). Alkalinity was detected at a concentration above the LOQ in all associated samples; 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	AnalyticMethod	Reason Code
280-104206-1	BKGmw-022-120117-GW	280-104206-1	Ground Water	4-Nitrophenol	100-02-7	µg/L	3.8	u q	uj	n	48	3.8	0.97	SVOCs	L
280-104206-1	BKGmw-022-120117-GW	280-104206-1	Ground Water	Phenol	108-95-2	µg/L	1.9	u q	uj	n	9.6	1.9	0.54	SVOCs	L
280-104206-1	BKGmw-022-120117-GW	280-104206-1	Ground Water	1,3,5-Trinitrobenzene	99-35-4	µg/L	0.42	u q	uj	n	1.0	0.42	0.21	Explosives	S
280-104206-1	BKGmw-022-120117-GW	280-104206-1	Ground Water	1,3-Dinitrobenzene	99-65-0	µg/L	0.21	u q	uj	n	0.42	0.21	0.093	Explosives	S
280-104206-1	BKGmw-022-120117-GW	280-104206-1	Ground Water	2,4,6-Trinitrotoluene	118-96-7	µg/L	0.21	u q	uj	n	0.42	0.21	0.076	Explosives	S
280-104206-1	BKGmw-022-120117-GW	280-104206-1	Ground Water	2,4-Dinitrotoluene	121-14-2	µg/L	0.21	u q	uj	n	0.42	0.21	0.088	Explosives	S
280-104206-1	BKGmw-022-120117-GW	280-104206-1	Ground Water	2,6-Dinitrotoluene	606-20-2	µg/L	0.21	u q	uj	n	0.21	0.21	0.068	Explosives	S
280-104206-1	BKGmw-022-120117-GW	280-104206-1	Ground Water	2-Amino-4,6-dinitrotoluene	35572-78-2	µg/L	0.13	u q	uj	n	0.21	0.13	0.053	Explosives	S
280-104206-1	BKGmw-022-120117-GW	280-104206-1	Ground Water	2-Nitrotoluene	88-72-2	µg/L	0.21	u q	uj	n	0.42	0.21	0.090	Explosives	S
280-104206-1	BKGmw-022-120117-GW	280-104206-1	Ground Water	3-Nitrotoluene	99-08-1	µg/L	0.21	u q	uj	n	0.42	0.21	0.088	Explosives	S
280-104206-1	BKGmw-022-120117-GW	280-104206-1	Ground Water	4-Amino-2,6-dinitrotoluene	19406-51-0	µg/L	0.13	u q	uj	n	0.21	0.13	0.061	Explosives	S
280-104206-1	BKGmw-022-120117-GW	280-104206-1	Ground Water	4-Nitrotoluene	99-99-0	µg/L	0.42	u q	uj	n	1.0	0.42	0.21	Explosives	S CC
280-104206-1	BKGmw-022-120117-GW	280-104206-1	Ground Water	HMX	2691-41-0	µg/L	0.21	u q	uj	n	0.42	0.21	0.092	Explosives	S
280-104206-1	BKGmw-022-120117-GW	280-104206-1	Ground Water	Nitrobenzene	98-95-3	µg/L	0.21	u q	uj	n	0.42	0.21	0.096	Explosives	S
280-104206-1	BKGmw-022-120117-GW	280-104206-1	Ground Water	Nitroglycerin	55-63-0	µg/L	2.1	u q	uj	n	3.1	2.1	0.97	Explosives	S
280-104206-1	BKGmw-022-120117-GW	280-104206-1	Ground Water	PETN	78-11-5	µg/L	1.3	u q	uj	n	2.1	1.3	0.44	Explosives	S
280-104206-1	BKGmw-022-120117-GW	280-104206-1	Ground Water	RDX	121-82-4	µg/L	0.13	u q	uj	n	0.21	0.13	0.055	Explosives	S
280-104206-1	BKGmw-022-120117-GW	280-104206-1	Ground Water	Barium	7440-39-3	µg/L	85	q	j	y	3.0	0.95	0.29	Metals	CC
280-104206-1	BKGmw-022-120117-GW	280-104206-1	Ground Water	Tetryl	479-45-8	µg/L	0.21	u q	uj	n	0.25	0.21	0.083	Explosives	S
280-104206-1	BKGmw-023-120117-GW	280-104206-2	Ground Water	4-Nitrophenol	100-02-7	µg/L	3.9	u q	uj	n	49	3.9	0.99	SVOCs	L
280-104206-1	BKGmw-023-120117-GW	280-104206-2	Ground Water	Phenol	108-95-2	µg/L	2.0	u q	uj	n	9.8	2.0	0.55	SVOCs	L
280-104206-1	BKGmw-023-120117-GW	280-104206-2	Ground Water	4-Nitrotoluene	99-99-0	µg/L	0.42	u	uj	n	1.1	0.42	0.21	Explosives	CC
280-104206-1	BKGmw-023-120117-GW	280-104206-2	Ground Water	Total Cyanide	57-12-5	µg/L	2.8	j	u	n	10.0	5.0	2.0	Total Cyanide	B
280-104206-1	BKGmw-023-120117-GW	280-104206-2	Ground Water	Barium	7440-39-3	µg/L	20	q	j	y	3.0	0.95	0.29	Metals	CC
280-104206-1	BKGmw-023-120117-GW	280-104206-2	Ground Water	Nickel	7440-02-0	µg/L	2.1	j	j	y	3.0	1.0	0.30	Metals	CC
280-104206-1	FWGmw-005-120117-GW	280-104206-3	Ground Water	Barium	7440-39-3	µg/L	62	q	j	y	3.0	0.95	0.29	Metals	CC
280-104206-1	FWGmw-005-120117-GW	280-104206-3	Ground Water	Beryllium	7440-41-7	µg/L	0.28	j	u	n	1.0	0.30	0.080	Metals	B
280-104206-1	FWGmw-005-120117-GW	280-104206-3	Ground Water	Thallium	7440-28-0	µg/L	0.13	j	u	n	1.0	0.20	0.050	Metals	B
280-104206-1	FWGmw-005-120117-GW	280-104206-3	Ground Water	Silver	7440-22-4	µg/L	0.033	j	u	n	5.0	0.10	0.033	Metals	B
280-104206-1	FWGmw-005-120117-GW	280-104206-3	Ground Water	Nickel	7440-02-0	µg/L	2.3	j	j	y	3.0	1.0	0.30	Metals	CC
280-104206-1	BKGmw-005-120117-GW	280-104206-10	Ground Water	Beryllium	7440-41-7	µg/L	0.082	j	u	n	1.0	0.30	0.080	Metals	B
280-104206-1	BKGmw-005-120117-GW	280-104206-10	Ground Water	Nickel	7440-02-0	µg/L	0.92	j	j	y	3.0	1.0	0.30	Metals	CC
280-104206-1	BKGmw-005-D-120117-GW	280-104206-11	Ground Water	Nickel	7440-02-0	µg/L	1.1	j	j	y	3.0	1.0	0.30	Metals	CC
280-104206-1	BKGmw-025-120117-GW	280-104206-12	Ground Water	4-Nitrophenol	100-02-7	µg/L	3.9	u q	uj	n	49	3.9	0.99	SVOCs	L
280-104206-1	BKGmw-025-120117-GW	280-104206-12	Ground Water	Phenol	108-95-2	µg/L	2.0	u q	uj	n	9.8	2.0	0.55	SVOCs	L
280-104206-1	BKGmw-025-120117-GW	280-104206-12	Ground Water	4-Nitrotoluene	99-99-0	µg/L	0.41	u	uj	n	1.0	0.41	0.21	Explosives	CC
280-104206-1	BKGmw-025-120117-GW	280-104206-12	Ground Water	Nickel	7440-02-0	µg/L	3.7	j	j	y	3.0	1.0	0.30	Metals	CC
280-104206-1	BKGmw-025-D-120117-GW	280-104206-13	Ground Water	4-Nitrophenol	100-02-7	µg/L	3.8	u q	uj	n	48	3.8	0.97	SVOCs	L
280-104206-1	BKGmw-025-D-120117-GW	280-104206-13	Ground Water	Phenol	108-95-2	µg/L	1.9	u q	uj	n	9.6	1.9	0.54	SVOCs	L
280-104206-1	BKGmw-025-D-120117-GW	280-104206-13	Ground Water	4-Nitrotoluene	99-99-0	µg/L	0.41	u	uj	n	1.0	0.41	0.20	Explosives	CC
280-104206-1	BKGmw-025-D-120117-GW	280-104206-13	Ground Water	Nickel	7440-02-0	µg/L	3.6	j	j	y	3.0	1.0	0.30	Metals	CC
280-104206-1	BKGmw-023-D-120117-GW	280-104206-14	Ground Water	Total Cyanide	57-12-5	µg/L	2.6	j	u	n	10.0	5.0	2.0	Total Cyanide	B
280-104206-1	BKGmw-023-D-120117-GW	280-104206-14	Ground Water	4-Nitrophenol	100-02-7	µg/L	4.5	u q	uj	n	56	4.5	1.1	SVOCs	L

280-104206-1	BKGmw-023-D-120117-GW	280-104206-14	Ground Water	Phenol	108-95-2	µg/L	2.3	u q	uj	n	11	2.3	0.63	SVOCs	L
280-104206-1	BKGmw-023-D-120117-GW	280-104206-14	Ground Water	1,3,5-Trinitrobenzene	99-35-4	µg/L	0.43	u q	uj	n	1.1	0.43	0.21	Explosives	S
280-104206-1	BKGmw-023-D-120117-GW	280-104206-14	Ground Water	1,3-Dinitrobenzene	99-65-0	µg/L	0.21	u q	uj	n	0.43	0.21	0.094	Explosives	S
280-104206-1	BKGmw-023-D-120117-GW	280-104206-14	Ground Water	2,4,6-Trinitrotoluene	118-96-7	µg/L	0.21	u q	uj	n	0.43	0.21	0.077	Explosives	S
280-104206-1	BKGmw-023-D-120117-GW	280-104206-14	Ground Water	2,4-Dinitrotoluene	121-14-2	µg/L	0.21	u q	uj	n	0.43	0.21	0.089	Explosives	S
280-104206-1	BKGmw-023-D-120117-GW	280-104206-14	Ground Water	2,6-Dinitrotoluene	606-20-2	µg/L	0.21	u q	uj	n	0.21	0.21	0.069	Explosives	S
280-104206-1	BKGmw-023-D-120117-GW	280-104206-14	Ground Water	2-Amino-4,6-dinitrotoluene	35572-78-2	µg/L	0.13	u q	uj	n	0.21	0.13	0.054	Explosives	S
280-104206-1	BKGmw-023-D-120117-GW	280-104206-14	Ground Water	2-Nitrotoluene	88-72-2	µg/L	0.21	u q	uj	n	0.43	0.21	0.091	Explosives	S
280-104206-1	BKGmw-023-D-120117-GW	280-104206-14	Ground Water	3-Nitrotoluene	99-08-1	µg/L	0.21	u q	uj	n	0.43	0.21	0.089	Explosives	S
280-104206-1	BKGmw-023-D-120117-GW	280-104206-14	Ground Water	4-Amino-2,6-dinitrotoluene	19406-51-0	µg/L	0.13	u q	uj	n	0.21	0.13	0.061	Explosives	S
280-104206-1	BKGmw-023-D-120117-GW	280-104206-14	Ground Water	4-Nitrotoluene	99-99-0	µg/L	0.43	u q	uj	n	1.1	0.43	0.21	Explosives	S CC
280-104206-1	BKGmw-023-D-120117-GW	280-104206-14	Ground Water	HMX	2691-41-0	µg/L	0.21	u q	uj	n	0.43	0.21	0.093	Explosives	S
280-104206-1	BKGmw-023-D-120117-GW	280-104206-14	Ground Water	Nitrobenzene	98-95-3	µg/L	0.21	u q	uj	n	0.43	0.21	0.097	Explosives	S
280-104206-1	BKGmw-023-D-120117-GW	280-104206-14	Ground Water	Nitroglycerin	55-63-0	µg/L	2.1	u q	uj	n	3.2	2.1	0.98	Explosives	S
280-104206-1	BKGmw-023-D-120117-GW	280-104206-14	Ground Water	PETN	78-11-5	µg/L	1.3	u q	uj	n	2.1	1.3	0.44	Explosives	S
280-104206-1	BKGmw-023-D-120117-GW	280-104206-14	Ground Water	RDX	121-82-4	µg/L	0.13	u q	uj	n	0.21	0.13	0.056	Explosives	S
280-104206-1	BKGmw-023-D-120117-GW	280-104206-14	Ground Water	Tetryl	479-45-8	µg/L	0.21	u q	uj	n	0.26	0.21	0.084	Explosives	S
280-104206-1	BKGmw-023-D-120117-GW	280-104206-14	Ground Water	Nickel	7440-02-0	µg/L	1.4	j	j	y	3.0	1.0	0.30	Metals	CC