Final

Facility-wide Groundwater Monitoring Program
RVAAP-66 Facility-wide Groundwater
Annual Report for 2019

Former Ravenna Army Ammunition Plant
Portage and Trumbull Counties, Ohio

Contract No. W912QR-16-D-0003
Delivery Order No. W912QR-18-F-0337

Prepared for:

U.S. Army Corps of Engineers
Louisville District

Prepared by:

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8866 Commons Boulevard, Suite 201
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June 12, 2020

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Annual Report for 2019
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Ravenna Army Ammunition Plant Restoration Program
Portage and Trumbull Counties, Ohio

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None.

14. ABSTRACT

This Annual Report summarizes activities conducted in 2019 as part of the Facility-wide Groundwater Monitoring Program (FWGWMP) in support of the Ravenna Army Ammunition Plant Restoration Program. This report provides a description of field activities performed, presents field and analytical results, updates potentiometric surfaces, analyzes chemical data collected to date, and provides conclusions of the 2019 activities and recommendations for the 2020 FWGWMP activities.

15. SUBJECT TERMS

groundwater, monitoring well, statistics, hydraulic gradient, trend lines

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Ohio Environmental Protection Agency

Mike DeWine, Governor
Jon Husted, Lt. Governor
Laurie A. Stevenson, Director

July 7, 2020

RE: US Army Ammunition Plt RVAAP
Remediation Response
Project Records
Remedial Response
Portage County
ID # 267000859036

Mr. Kevin M. Sedlak
Army National Guard
Installation and Environment
Clean-up Branch
IPA Designation
1438 State Route 534 SW
Newton Falls, OH 44444

TRANSMITTED ELECTRONICALLY

Subject: Approval of the "Final Facility-wide Groundwater Program Plan, RVAAP-66 Facility-wide Groundwater Annual Report for 2019"

Dear Mr. Sedlak:

Ohio EPA has received the "Final Facility-wide Groundwater Program Plan, RVAAP-66 Facility-wide Groundwater Annual Report for 2019" at the Former Ravenna Army Ammunition Plant, Portage and Trumbull Counties, Ohio dated June 12, 2020. This document was received via email at Ohio EPA's Northeast District Office (NEDO), Division of Environmental Response and Revitalization (DERR) on June 12, 2020. The document was prepared for the U.S. Army Corps of Engineers on behalf of the Army National Guard Directorate by Leidos.

The final document was reviewed by personnel from Ohio EPA's DERR. Pursuant to the Director's Findings and Orders paragraph 39 (b), Ohio EPA considers the document final and approved.

If you have any questions, please contact me via email at kevin.palombo@epa.ohio.gov, or call me at (330) 963-1292.

Sincerely,

Kevin M. Palombo
Environmental Specialist
Division of Environmental Response and Revitalization

KP/sc

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JUL 07 2020

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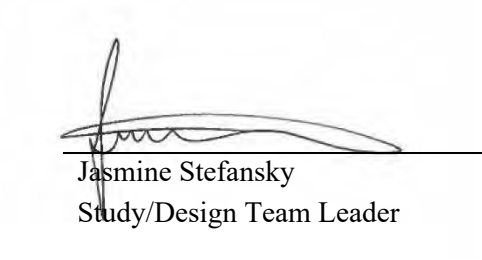
CONTRACTOR STATEMENT OF INDEPENDENT TECHNICAL REVIEW

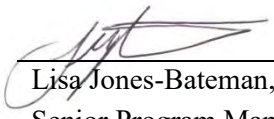
Leidos has completed the Facility-wide Groundwater Monitoring Program, RVAAP-66 Facility-wide Groundwater Annual Report for 2019. Notice is hereby given that an independent technical review has been conducted that is appropriate to the level of risk and complexity inherent in the project. During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of data quality objectives; technical assumptions; methods, procedures, and materials to be used; the appropriateness of data used and level of data obtained; and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing U.S. Army Corps of Engineers (USACE) policy.



Jasmine Stefansky — June 12, 2020
Study/Design Team Leader — Date

Jed Thomas, P.E., PMP — June 12, 2020
Independent Review Team Leader — Date

Significant concerns and the explanation of the resolution are documented within the project file. As noted above, all concerns resulting from independent technical review of the project have been considered.



Lisa Jones-Bateman, PMP — June 12, 2020
Senior Program Manager — Date

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June 12, 2020

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ARNG = Army National Guard.
NEDO = Northeast District Office.
OHARNG = Ohio Army National Guard.
Ohio EPA = Ohio Environmental Protection Agency.
SWDO = Southwest District Office.
USACE = U.S. Army Corps of Engineers.

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ACRONYMS AND ABBREVIATIONS

amsl	Above Mean Sea Level
AOC	Area of Concern
Army	U.S. Department of the Army
bgs	Below Ground Surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CJAG	Camp James A. Garfield
DFFO	Director's Final Findings and Orders
DNB	Dinitrobenzene
DNT	Dinitrotoluene
FCR	Field Change Request
FS	Feasibility Study
FWCUG	Facility-wide Cleanup Goal
FWGW	Facility-wide Groundwater
FWGWMP	Facility-wide Groundwater Monitoring Program
FWSAP	Facility-wide Sampling and Analysis Plan
gpm	Gallons per Minute
GSI	Groundwater-Surface Water Interface
IDW	Investigation-derived Waste
MCL	Maximum Contaminant Level
NTU	Nephelometric Turbidity Unit
OHARNG	Ohio Army National Guard
Ohio EPA	Ohio Environmental Protection Agency
PCB	Polychlorinated Biphenyl
PP	Proposed Plan
RCRA	Resource Conservation and Recovery Act
RDX	Hexahydro-1,3,5-Trinitro-1,3,5-Triazine
RI	Remedial Investigation
RIWP	Remedial Investigation Work Plan
ROD	Record of Decision
RSL	Regional Screening Level
RVAAP	Ravenna Army Ammunition Plant
S.U.	Standard Unit
SVOC	Semi-volatile Organic Compound
TestAmerica	Laboratories, Inc.
TNT	2,4,6-Trinitrotoluene
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USP&FO	U.S. Property and Fiscal Officer
VOC	Volatile Organic Compound

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1.0 INTRODUCTION

Leidos has been contracted by the U.S. Army Corps of Engineers (USACE), Louisville District to execute the performance work statement titled "Groundwater Investigation and Reporting Services, Ravenna Army Ammunition Plant (RVAAP) Restoration Program, Camp James A. Garfield (CJAG) Joint Military Training Center, Portage and Trumbull Counties, Ohio." This work is being performed under a firm-fixed price basis in accordance with USACE, Louisville District Contract No. W912QR-16-D-0003, Delivery Order No. W912QR-18-F-0337.

1.1 PURPOSE

The Director's Final Findings and Orders (DFFO) were issued to the U.S. Department of the Army (Army) on June 10, 2004. The purpose of the DFFO (Ohio EPA 2004) is for the Army to develop and implement:

- A remedial investigation (RI)/feasibility study (FS), proposed plan (PP), record of decision (ROD), or other appropriate document and remedy for each area of concern (AOC) or appropriate group of AOCs at the former RVAAP; and
- A facility-wide groundwater (FWGW) investigation, monitoring, and remediation program at the former RVAAP.

Section 15 of the DFFO outlines the requirements of the Facility-wide Groundwater Monitoring Program (FWGWMP). The purpose of this 2019 Annual Report is to satisfy the requirements of Section 15d that specifies the FWGWMP Plan will "utilize an iterative process, with an annual review and revision cycle to accommodate the addition or deletion of wells from the groundwater monitoring network."

1.2 SCOPE

The scope of this 2019 Annual Report is to describe the FWGWMP sampling events that occurred in Spring and Fall 2019, as specified in the *Facility-wide Groundwater Monitoring Addendum for 2019* (Leidos 2019a; herein referred to as the 2019 Addendum) and applicable field change requests (FCRs). In addition, sample results from the final three of four quarterly sampling events at the Sand Creek Disposal Road Landfill monitoring wells are presented and discussed in this report.

This report provides groundwater elevations from the April 2019 facility-wide well gauging event, and analytical results, discussion, conclusions, and recommendations as to how the FWGWMP should proceed. This report also discusses changes to the FWGWMP in 2019.

1.3 REPORT ORGANIZATION

The remaining sections of this 2019 Annual Report are organized as follows:

- Section 2.0 Project Description,
- Section 3.0 Facility Description,
- Section 4.0 2019 Monitoring Program,
- Section 5.0 Groundwater Elevations,
- Section 6.0 2019 Results and Discussion,
- Section 7.0 Time-Trend Graphs,
- Section 8.0 Conclusions and Recommendations, and
- Section 9.0 References.

2.0 PROJECT DESCRIPTION

This section provides a history of groundwater investigations within the former RVAAP and explains the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process for evaluating and remediating (if necessary) potential contamination within groundwater at the facility.

2.1 BACKGROUND

In 2004, the Army and Ohio Environmental Protection Agency (Ohio EPA) finalized the *Facility-wide Groundwater Monitoring Program Plan for the Ravenna Army Ammunition Plant, Ravenna, Ohio* (Portage Environmental 2004) for the former RVAAP, now known as CJAG Joint Military Training Center. The FWGWMP was initiated in April 2005 with quarterly sampling of 36 FWGWMP monitoring wells. Fourteen of these wells were identified as "background wells," and the remaining wells were located at various AOCs within the facility. Five Resource Conservation and Recovery Act (RCRA) wells (RQLmw-007, RQLmw-008, RQLmw-009, DETmw-003, and DETmw-004) were incorporated into the FWGWMP after May 2005 and are sampled semi-annually. Beginning in fiscal year 2008, the FWGWMP was expanded to include the characterization of groundwater from 243 existing monitoring wells at the facility.

Annual reports have been submitted since 2005. Since 2012, addendums have been developed to specify the sampling scheme for each year. In 2016, the *Remedial Investigation Work Plan for Groundwater and Environmental Services for RVAAP-66 Facility-Wide Groundwater* (herein referred to as the RIWP; TEC-Weston 2016) was developed. This RIWP serves as a supplement to the FWGWMP Plan and specifies aspects of the RI with the goal of adequately characterizing pertinent physical and chemical groundwater conditions in the multi-aquifer hydrostratigraphic units variably present across CJAG, so that potential current and future risks to potential human and environmental receptors can be ascertained, effectively managed, and mitigated as needed.

The FWGWMP monitoring well network currently contains 301 permanent wells, 76 of which were sampled in 2019. In addition to these wells, nine permanent wells at RVAAP-69 Building 1048 Fire Station and three permanent wells at RVAAP-74 Building 1034 Motor Pool Hydraulic Lift are not currently incorporated into the FWGWMP monitoring well network as they were installed and sampled to support their current site-specific investigations.

2.2 CHANGES TO THE FWGWMP IN 2019

The following subsection summarizes the changes to the FWGWMP that occurred in 2019. Monitoring wells that have been installed or abandoned in 2019 are summarized in Section 4.

2.2.1 Monitoring Well Construction Details

Table 2-1 of the *Facility-wide Groundwater Monitoring Program RVAAP-66 Facility-wide Groundwater Annual Report for 2017 (TEC-Weston 2018;* herein referred to as the 2017 Annual Report) presents the monitoring well construction details and the associated monitored zone for each

well. A comprehensive review of all monitoring well logs and survey reports was conducted to ensure the correct survey data, well construction details, and monitoring zones (aquifers) were identified for each monitoring well. Table 2-1 presents the updated and revised monitoring well construction details.

2.2.2 Background Concentrations

The *Background Study for Metals for RVAAP-66 Facility-wide Groundwater* (Leidos 2019b) was approved by Ohio EPA on September 9, 2019. This study calculated background concentrations for metals within the varying groundwater aquifers (Unconsolidated, Homewood Sandstone, Upper Sharon, and Basal Sharon Conglomerate) within CJAG. The background concentrations for metals in each aquifer is presented in Table 4-5 of the background study.

2.3 CERCLA PROCESS

CERCLA, commonly known as Superfund, was enacted by Congress on December 11, 1980. This law created a tax on the chemical and petroleum industries and provided broad federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. CERCLA established prohibitions and requirements concerning closed and abandoned hazardous waste sites, provided for liability of persons responsible for releases of hazardous waste at these sites, and established a trust fund to provide for cleanup when no responsible party could be identified.

The law authorizes two kinds of response actions:

- Short-term removals, where actions may be taken to address releases or threatened releases requiring prompt response; and
- Long-term remedial response actions that permanently and significantly reduce the dangers associated with releases or threats of releases of hazardous substances that are serious, but not immediately life threatening.

Although the former RVAAP is not on the National Priorities List, the objective of the DFFO was for the Army and Ohio EPA to:

> "Contribute to the protection of public health, safety, and welfare and the environment from the disposal, discharge, or release of contaminants at or from the site, through implementation of a CERCLA-based environmental remediation program. This program will include the development by respondent of an RI/FS for each AOC or appropriate group of AOCs at the site, and upon completion and publication of a PP and ROD or other appropriate document for each AOC or appropriate group of AOCs, the design, construction, operation, and maintenance of the selected remedy as set forth in the ROD or other appropriate document for each AOC or appropriate group of AOCs."

The basic stages of the CERCLA process are as follows:

- Preliminary Assessment/Site Investigation – An initial evaluation of a site to determine if further investigations or responses are necessary.
- RI/FS – A detailed investigation to determine the nature and extent of contamination at a site, test whether certain technologies are capable of treating the contamination, and evaluate the cost and performance of technologies that could be used to clean up the site.
- PP – A plan presented to the public that summarizes the findings of the RI/FS phase, highlighting the key factors that led to identifying a preferred alternative. The PP is made available for public comment.
- ROD – A decision document presenting the remedial action plan for a site that 1) certifies that the remedy selection process was carried out in accordance with CERCLA; 2) describes the technical parameters of the remedy, specifying the methods selected to protect human health and the environment, including treatment, engineering, and institutional control components, as well as cleanup levels; and 3) provides the public with a consolidated summary of information about the site and the chosen remedy, including the rationale behind the selection.
- Remedial Design/Remedial Action – The engineering phase during which additional technical information and data identified are incorporated into technical drawings and specifications developed for the subsequent remedial action and the implementation phase of site cleanup.

The FWGW AOC at the former RVAAP is currently in the RI/FS phase of the CERCLA process.

2.4 GROUNDWATER MODELING

As presented in the RIWP (TEC-Weston 2016), a numerical groundwater model has been developed for the site. This model will continue to be refined during the RI and will ultimately be used to evaluate contaminant fate and transport, including potential off-site migration of contaminants. Once refined, fully calibrated, and verified, the groundwater model will be used to make predictive simulations for presentation in reports, such as annual monitoring reports, using current groundwater chemistry and flow data.

2.5 ASSESSMENT OF GROUNDWATER REMEDIAL ACTION EFFECTIVENESS

Groundwater remedial actions have not been conducted at CJAG. Contaminant source removals through soil excavations have been implemented to reduce groundwater impacts. Following the completion of the FWGW RI and FS, a determination will be made as to whether remedial actions are warranted for groundwater.

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Table 2-1. Monitoring Well Construction Details

RVAAP Area	Well ID	Surveyed Data (NAD83 for Easting/Northing, NAVD88 for elevation)				Monitoring Well Construction Details							Monitored Zone (Aquifer)
		Ohio State Plane Easting	Ohio State Plane Northing	TOC Elevation (ft, amsl)	Ground Level Elevation (ft, amsl)	Well Head Type[c]	Stickup height (ft, AGS)	Top of Screen (ft, bgs)	Bottom of Screen (ft, bgs)	Bottom of Inner Casing Plug or End Cap (ft, bgs)	Reported Bottom of Inner Casing (ft, BTOC)	Borehole Depth (ft, bgs)	
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-006	2375927.71	566091.26	995.39	993.52	A	1.87	19.4	39.4	39.6	41.4	39.9	Upper Sharon
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-007	2375872.56	566544.36	965.91	963.86	A	2.05	6.0	16.0	16.2	18.2	16.2	Upper Sharon
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-008	2376011.08	566327.94	966.08	963.82	A	2.26	6.0	16.0	16.2	18.5	16.2	Upper Sharon
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-009	2376253.65	566351.20	964.58	962.60	A	1.98	5.9	15.9	16.4	18.4	16.4	Upper Sharon
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-010	2376048.58	566857.39	982.14	980.04	A	2.10	12.5	32.5	33.0	35.1	32.9	Upper Sharon
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-011	2376398.19	566819.66	976.57	974.60	A	1.97	12.4	32.4	32.6	34.6	32.6	Upper Sharon
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-012	2376558.19	566551.95	977.65	975.12	A	2.53	19.8	29.8	30.0	32.5	30.5	Upper Sharon
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-013	2376204.93	566928.09	980.71	978.04	A	2.67	23.7	33.7	33.9	36.6	34.4	Upper Sharon
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-014	2376519.38	566941.29	973.49	970.83	A	2.66	18.6	28.6	28.9	31.6	29.4	Upper Sharon
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-015	2375490.96	566560.90	991.26	989.19	A	2.07	29.2	39.2	39.5	41.6	40.1	Upper Sharon
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-016	2375649.55	566177.68	996.60	994.02	A	2.58	28.5	38.5	39.0	41.6	39.5	Upper Sharon
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-017	2376124.18	565931.38	991.23	988.69	A	2.54	19.8	29.8	30.0	32.5	30.5	Upper Sharon
RVAAP-02 Erie Burning Grounds	EBGmw-123	2380049.21	571747.04	947.28	945.05	A	2.23	21.0	31.0	31.5	33.7	32.0	Unconsolidated
RVAAP-02 Erie Burning Grounds	EBGmw-124	2380030.24	571618.07	940.85	938.48	A	2.37	20.0	30.0	30.5	32.9	32.0	Unconsolidated
RVAAP-02 Erie Burning Grounds	EBGmw-125	2379679.20	571655.63	949.35	947.01	A	2.34	14.0	24.0	24.5	26.8	25.0	Unconsolidated
RVAAP-02 Erie Burning Grounds	EBGmw-126	2380307.31	572348.81	940.07	937.66	A	2.41	15.2	25.2	25.5	27.9	26.5	Unconsolidated
RVAAP-02 Erie Burning Grounds	EBGmw-127	2380172.16	571083.61	942.53	939.67	A	2.86	19.0	29.0	29.5	32.4	30.0	Unconsolidated
RVAAP-02 Erie Burning Grounds	EBGmw-128	2379892.79	570970.32	944.59	941.93	A	2.66	15.0	25.0	25.3	28.0	26.0	Unconsolidated
RVAAP-02 Erie Burning Grounds	EBGmw-129	2379240.52	572035.68	943.82	941.43	A	2.39	16.0	26.0	26.0	28.4	29.0	Unconsolidated
RVAAP-02 Erie Burning Grounds	EBGmw-130	2379220.69	570695.61	943.46	940.64	A	2.82	15.2	25.2	25.5	28.3	26.0	Unconsolidated
RVAAP-02 Erie Burning Grounds	EBGmw-131	2379666.00	571655.00	949.54	947.00	A	2.54	60.5	70.5	70.8	73.3	71.0	Upper Sharon
RVAAP-04 Open Demolition Area #2	DA2mw-104	2354773.79	561129.59	1073.89	1070.82	A	3.07	16.3	26.3	26.5	29.6	27.0	Unconsolidated
RVAAP-04 Open Demolition Area #2	DA2mw-105	2354557.62	560572.58	1045.34	1042.66	A	2.68	8.3	13.3	13.5	16.2	14.0	Unconsolidated
RVAAP-04 Open Demolition Area #2	DA2mw-106	2354848.85	560560.49	1043.79	1041.19	A	2.60	8.3	15.3	15.5	18.1	16.0	Unconsolidated
RVAAP-04 Open Demolition Area #2	DA2mw-107	2354924.29	560480.05	1041.63	1039.18	A	2.45	8.8	13.8	14.0	16.5	15.0	Unconsolidated
RVAAP-04 Open Demolition Area #2	DA2mw-108	2355604.43	560181.78	1032.36	1029.92	A	2.44	9.3	14.3	14.5	16.9	15.0	Upper Sharon
RVAAP-04 Open Demolition Area #2	DA2mw-109	2354793.14	559897.89	1071.29	1068.66	A	2.63	11.3	21.3	21.5	24.1	24.0	Unconsolidated
RVAAP-04 Open Demolition Area #2	DA2mw-110	2355195.91	559927.02	1063.78	1061.39	A	2.39	9.3	19.3	19.5	21.9	20.0	Unconsolidated
RVAAP-04 Open Demolition Area #2	DA2mw-111	2354728.33	560222.94	1042.12	1039.63	A	2.49	7.1	12.1	12.3	14.8	12.6	Upper Sharon
RVAAP-04 Open Demolition Area #2	DA2mw-112	2355018.98	560378.36	1037.44	1034.87	A	2.57	8.8	13.8	14.0	16.6	15.0	Unconsolidated
RVAAP-04 Open Demolition Area #2	DA2mw-113	2355153.13	560394.81	1037.11	1034.51	A	2.60	8.3	13.3	13.5	16.1	14.0	Unconsolidated
RVAAP-04 Open Demolition Area #2	DA2mw-114	2355785.00	560109.00	1031.36	1029.00	A	2.40	9.2	19.2	19.4	21.9	19.5	Upper Sharon
RVAAP-04 Open Demolition Area #2	DA2mw-115	2355269.00	560459.00	1037.54	1034.90	A	2.68	33.8	43.8	44.0	46.7	44.0	Upper Sharon
RVAAP-04 Open Demolition Area #2	DETmw-001B	2354959.47	560820.03	1065.85	1064.35	A	1.50	34.0	39.0	39.0	40.5	39.0	Unconsolidated
RVAAP-04 Open Demolition Area #2	DETmw-002	2355360.33	560664.71	1061.24	1060.24	A	1.00	34.0	39.0	39.0	40.0	39.0	Unconsolidated
RVAAP-04 Open Demolition Area #2	DETmw-003	2355204.94	560456.10	1036.81	1035.81	A	1.00	7.0	12.0	12.0	13.0	15.0	Unconsolidated
RVAAP-04 Open Demolition Area #2	DETmw-004	2355072.36	560454.22	1038.68	1037.68	A	1.00	6.0	11.0	11.0	12.0	11.0	Unconsolidated
RVAAP-05 Winklepeck Burning Grounds	WBGmw-005	2357163.55	563037.18	1052.20	1049.69	A	2.51	8.3	18.3	18.6	21.1	19.0	Unconsolidated
RVAAP-05 Winklepeck Burning Grounds	WBGmw-006	2359087.79	563008.87	1012.16	1009.93	A	2.23	7.6	17.6	17.9	20.4	19.0	Unconsolidated
RVAAP-05 Winklepeck Burning Grounds	WBGmw-007	2360420.44	562479.87	998.09	995.77	A	2.32	13.5	23.5	23.8	26.3	24.0	Unconsolidated
RVAAP-05 Winklepeck Burning Grounds	WBGmw-008	2359700.57	562010.35	1005.71	1003.70	A	2.01	8.1	18.2	18.5	21.0	18.5	Unconsolidated
RVAAP-05 Winklepeck Burning Grounds	WBGmw-009	2357159.20	561603.54	1045.03	1042.72	A	2.31	11.4	21.4	21.5	24.0	24.0	Unconsolidated
RVAAP-05 Winklepeck Burning Grounds	WBGmw-010	2356051.96	562893.20	1069.85	1067.10	A	2.75	10.5	20.5	20.8	23.6	21.0	Unconsolidated
RVAAP-05 Winklepeck Burning Grounds	WBGmw-011	2356187.29	562609.18	1072.38	1069.70	A	2.68	11.0	21.0	21.3	24.0	22.0	Unconsolidated

Table 2-1. Monitoring Well Construction Details (Continued)

RVAAP Area	Well ID	Surveyed Data (NAD83 for Easting/Northing, NAVD88 for elevation)				Monitoring Well Construction Details							Monitored Zone (Aquifer)
		Ohio State Plane Easting	Ohio State Plane Northing	TOC Elevation (ft, amsl)	Ground Level Elevation (ft, amsl)	Well Head Type[c]	Stickup height (ft, AGS)	Top of Screen (ft, bgs)	Bottom of Screen (ft, bgs)	Bottom of Inner Casing Plug or End Cap (ft, bgs)	Reported Bottom of Inner Casing (ft, BTOC)	Borehole Depth (ft, bgs)	
RVAAP-05 Winklepeck Burning Grounds	WBGmw-012	2354810.65	562240.90	1079.11	1076.50	A	2.61	19.0	29.0	29.3	31.9	30.0	Unconsolidated
RVAAP-05 Winklepeck Burning Grounds	WBGmw-013	2355223.25	561518.27	1071.70	1069.10	A	2.60	11.0	21.0	21.3	23.9	22.0	Unconsolidated
RVAAP-05 Winklepeck Burning Grounds	WBGmw-014	2360439.22	562061.26	996.78	994.10	A	2.68	12.0	22.0	22.3	25.0	23.0	Unconsolidated
RVAAP-05 Winklepeck Burning Grounds	WBGmw-015	2359182.41	562340.12	1011.60	1009.10	A	2.50	11.0	21.0	21.3	23.8	22.0	Unconsolidated
RVAAP-05 Winklepeck Burning Grounds	WBGmw-016	2360645.88	562709.13	997.03	994.90	A	2.13	13.0	23.0	23.3	25.4	24.0	Unconsolidated
RVAAP-05 Winklepeck Burning Grounds	WBGmw-017	2359603.84	562913.24	1006.62	1004.00	A	2.62	11.0	21.0	21.3	23.9	22.0	Unconsolidated
RVAAP-05 Winklepeck Burning Grounds	WBGmw-018	2361302.00	562659.00	990.91	990.00	A	0.95	13.5	23.5	23.8	24.7	24.0	Unconsolidated
RVAAP-05 Winklepeck Burning Grounds	WBGmw-019	2361304.00	562645.00	989.71	988.80	A	0.95	39.6	49.6	49.8	50.8	49.8	Upper Sharon
RVAAP-05 Winklepeck Burning Grounds	WBGmw-020	2357161.00	561623.00	1043.77	1042.90	A	0.91	32.9	42.9	43.3	44.2	43.3	Upper Sharon
RVAAP-05 Winklepeck Burning Grounds	WBGmw-021	2359106.00	563009.00	1010.38	1009.50	A	0.92	32.0	42.0	42.5	43.2	42.5	Upper Sharon
RVAAP-06 C Block Quarry	CBLmw-001	2343657.08	559403.12	1181.08	1178.50	A	2.58	39.0	49.0	49.0	51.6	50.0	Homewood
RVAAP-06 C Block Quarry	CBLmw-002	2343845.22	559044.48	1175.24	1172.50	A	2.74	34.5	44.5	44.5	47.2	45.3	Homewood
RVAAP-06 C Block Quarry	CBLmw-003	2343970.00	559695.52	1175.06	1172.22	A	2.84	33.0	43.0	43.0	45.8	44.0	Homewood
RVAAP-06 C Block Quarry	CBLmw-004	2343688.76	559951.58	1174.84	1172.08	A	2.76	34.0	44.0	44.0	46.8	45.0	Homewood
RVAAP-06 C Block Quarry	CBLmw-005	2344572.00	558686.00	1157.56	1155.10	A	2.50	22.0	30.0	30.2	32.7	31.0	Homewood
RVAAP-08 Load Line 1	LL1mw-063	2376841.36	563650.53	994.30	991.66	A	2.64	17.1	27.1	27.4	30.0	27.4	Unconsolidated
RVAAP-08 Load Line 1	LL1mw-064	2380286.97	563118.74	934.56	931.77	A	2.78	8.0	18.0	18.4	21.1	18.4	Unconsolidated
RVAAP-08 Load Line 1	LL1mw-065	2380452.00	560916.92	943.86	940.98	A	2.88	10.2	20.2	20.5	23.4	20.5	Unconsolidated
RVAAP-08 Load Line 1	LL1mw-067	2376545.30	565201.14	979.82	977.01	A	2.81	12.8	22.5	22.8	25.6	23.4	Upper Sharon
RVAAP-08 Load Line 1	LL1mw-078	2376275.85	564623.87	995.84	993.40	A	2.44	28.7	38.2	38.7	41.1	40.0	Upper Sharon
RVAAP-08 Load Line 1	LL1mw-079	2376228.31	563739.63	997.87	995.30	A	2.57	29.5	38.9	39.5	42.0	39.7	Upper Sharon
RVAAP-08 Load Line 1	LL1mw-080	2376845.07	562479.73	996.27	993.70	A	2.57	9.5	19.0	19.5	22.0	24.5	Upper Sharon
RVAAP-08 Load Line 1	LL1mw-081	2376672.66	563462.73	998.92	996.40	A	2.52	29.4	38.9	39.4	41.9	40.4	Upper Sharon
RVAAP-08 Load Line 1	LL1mw-082	2376977.38	562956.86	1006.45	1003.70	A	2.75	28.9	38.5	39.0	41.8	39.5	Upper Sharon
RVAAP-08 Load Line 1	LL1mw-083	2377074.80	563612.75	995.20	992.80	A	2.40	29.1	38.6	39.3	41.7	39.5	Upper Sharon
RVAAP-08 Load Line 1	LL1mw-084	2377316.02	563160.44	998.73	996.40	A	2.33	26.7	36.3	37.0	39.3	37.2	Upper Sharon
RVAAP-08 Load Line 1	LL1mw-085	2377246.94	562046.25	996.84	994.30	A	2.54	32.2	41.6	42.1	44.7	45.0	Upper Sharon
RVAAP-08 Load Line 1	LL1mw-086	2380437.00	561714.00	940.09	937.50	A	2.63	64.5	74.5	74.8	77.4	75.0	Unconsolidated
RVAAP-08 Load Line 1	LL1mw-087	2378732.00	560375.00	943.78	941.30	A	2.52	7.0	17.0	17.2	19.7	17.5	Unconsolidated
RVAAP-08 Load Line 1	LL1mw-088	2380525.00	561746.00	938.09	935.09	A	2.33	13.9	23.9	24.2	26.5	24.0	Unconsolidated
RVAAP-08 Load Line 1	LL1mw-089	2378111.78	563764.06	980.29	977.54	A	2.75	26.5	36.5	37.0	39.8	37.0	Unconsolidated
RVAAP-09 Load Line 2	LL2mw-059	2375453.00	558020.00	966.13	963.79	A	2.34	9.3	19.1	19.5	21.8	22.9	Upper Sharon
RVAAP-09 Load Line 2	LL2mw-060	2375978.00	558022.00	961.03	958.39	A	2.64	8.08	17.94	18.3	20.9	19.2	Upper Sharon
RVAAP-09 Load Line 2	LL2mw-261	2373317.01	561898.59	1011.40	1009.55	A	1.85	9.8	19.8	20.0	21.9	20.5	Upper Sharon
RVAAP-09 Load Line 2	LL2mw-262	2373971.46	562219.47	1012.62	1011.12	A	1.50	10.6	20.62	20.8	22.3	21.2	Upper Sharon
RVAAP-09 Load Line 2	LL2mw-263	2374290.29	561590.92	1011.47	1009.42	A	2.05	10.8	20.8	21.0	23.0	22.2	Upper Sharon
RVAAP-09 Load Line 2	LL2mw-264	2374532.76	561173.63	1011.88	1010.10	A	1.78	9.75	19.75	20.0	21.7	20.5	Upper Sharon
RVAAP-09 Load Line 2	LL2mw-265	2375594.06	557972.08	961.24	959.47	A	1.77	11.82	21.82	22.0	23.8	22.5	Upper Sharon
RVAAP-09 Load Line 2	LL2mw-266	2373744.61	561982.68	1016.28	1014.09	A	2.19	9.8	19.8	20.0	22.2	20.5	Upper Sharon
RVAAP-09 Load Line 2	LL2mw-267	2373714.17	561393.73	1014.81	1012.81	A	2.00	9.8	19.8	20.0	22.0	20.5	Upper Sharon
RVAAP-09 Load Line 2	LL2mw-268	2374156.40	560831.44	1017.28	1015.47	A	1.81	17.29	27.31	27.5	29.3	28.75	Upper Sharon
RVAAP-09 Load Line 2	LL2mw-269	2374756.74	559483.90	1011.62	1009.49	A	2.13	17.1	27.1	27.3	29.4	28	Upper Sharon
RVAAP-09 Load Line 2	LL2mw-270	2372858.94	562658.18	1010.18	1009.93	A	0.25	9.8	19.8	20.0	20.3	20.5	Upper Sharon
RVAAP-09 Load Line 2	LL2mw-271	2375714.00	557827.00	960.65	958.20	A	2.49	14.6	24.6	24.8	27.3	25	Upper Sharon
RVAAP-09 Load Line 2	LL2mw-272	2373780.35	560724.46	1017.80	1015.00	A	2.80	19.2	29.2	30.0	32.8	30.0	Upper Sharon
RVAAP-10 Load Line 3	LL3mw-232	2369863.32	561365.12	1000.41	998.59	A	1.82	26.8	36.8	37.0	38.8	37.8	Upper Sharon
RVAAP-10 Load Line 3	LL3mw-233	2369933.58	560750.64	1004.36	1002.47	A	1.89	20.13	30.13	30.3	32.2	31.1	Upper Sharon

Table 2-1. Monitoring Well Construction Details (Continued)

RVAAP Area	Well ID	Surveyed Data (NAD83 for Easting/Northing, NAVD88 for elevation)				Monitoring Well Construction Details							Monitored Zone (Aquifer)
		Ohio State Plane Easting	Ohio State Plane Northing	TOC Elevation (ft, amsl)	Ground Level Elevation (ft, amsl)	Well Head Type[c]	Stickup height (ft, AGS)	Top of Screen (ft, bgs)	Bottom of Screen (ft, bgs)	Bottom of Inner Casing Plug or End Cap (ft, bgs)	Reported Bottom of Inner Casing (ft, BTOC)	Borehole Depth (ft, bgs)	
RVAAP-10 Load Line 3	LL3mw-234	2370296.54	560059.47	1006.56	1004.47	A	2.09	9.8	19.8	20.0	22.1	20.5	Upper Sharon
RVAAP-10 Load Line 3	LL3mw-235	2370642.38	559811.55	1009.94	1008.05	A	1.89	10.1	20.1	20.3	22.2	21.2	Upper Sharon
RVAAP-10 Load Line 3	LL3mw-236	2371178.58	559867.34	1011.70	1008.94	A	2.23	13.77	23.8	24.0	26.2	25.5	Upper Sharon
RVAAP-10 Load Line 3	LL3mw-237	2371474.81	559327.11	1005.57	1003.57	A	2.00	12.73	22.7	22.9	24.9	23.9	Upper Sharon
RVAAP-10 Load Line 3	LL3mw-238	2370624.55	559569.39	1006.91	1004.75	A	2.16	10.5	20.5	20.7	22.9	20.7	Upper Sharon
RVAAP-10 Load Line 3	LL3mw-239	2370894.17	559101.84	1003.50	1001.70	A	1.80	24.85	34.9	35.0	36.8	35.65	Upper Sharon
RVAAP-10 Load Line 3	LL3mw-240	2371308.54	558204.42	1007.52	1005.60	A	1.92	24.42	34.4	34.6	36.5	35.5	Upper Sharon
RVAAP-10 Load Line 3	LL3mw-241	2370332.94	559299.00	994.65	992.41	A	2.24	12.71	22.71	22.9	25.1	23.8	Upper Sharon
RVAAP-10 Load Line 3	LL3mw-242	2371993.44	557035.28	999.32	997.39	A	1.93	9.8	19.8	20.0	21.9	20.5	Upper Sharon
RVAAP-10 Load Line 3	LL3mw-243	2371532.06	556688.50	991.16	989.36	A	1.80	13.8	23.8	24.0	25.8	24.5	Upper Sharon
RVAAP-10 Load Line 3	LL3mw-244	2371456.00	556033.00	988.24	985.70	A	2.58	34.5	44.5	44.7	47.3	45.0	Upper Sharon
RVAAP-10 Load Line 3	LL3mw-245	2369249.00	558573.00	980.70	978.20	A	2.54	36.5	46.5	46.7	49.2	47.0	Upper Sharon
RVAAP-10 Load Line 3	LL3mw-246	2371441.00	555969.00	988.30	986.00	A	2.34	32.75	42.75	43.0	45.3	43.0	Upper Sharon
RVAAP-11 Load Line 4	LL4mw-193	2364236.52	554960.27	982.92	980.88	A	2.04	11.3	21.32	21.5	23.5	21.9	Unconsolidated
RVAAP-11 Load Line 4	LL4mw-194	2364584.86	555089.22	983.76	981.87	A	1.89	11.3	21.32	21.5	23.4	22	Unconsolidated
RVAAP-11 Load Line 4	LL4mw-195	2365198.86	555046.75	982.59	980.83	A	1.76	10.32	20.32	20.5	22.3	21	Unconsolidated
RVAAP-11 Load Line 4	LL4mw-196	2365297.10	555213.52	984.55	982.56	A	1.99	9.17	19.19	19.4	21.4	20.0	Unconsolidated
RVAAP-11 Load Line 4	LL4mw-197	2365384.91	555397.05	985.46	983.79	A	1.67	10.8	20.8	21.0	22.7	21.7	Unconsolidated
RVAAP-11 Load Line 4	LL4mw-198	2364991.19	555442.04	983.42	981.61	A	1.81	10.3	20.3	20.5	22.3	22.0	Unconsolidated
RVAAP-11 Load Line 4	LL4mw-199	2365420.78	554621.62	977.28	975.20	A	2.08	10.3	20.3	20.5	22.6	22.0	Unconsolidated
RVAAP-11 Load Line 4	LL4mw-200	2365903.05	554580.15	987.93	985.97	A	1.96	12.6	22.6	23.0	25.0	23.5	Unconsolidated
RVAAP-11 Load Line 4	LL4mw-201	2365417.00	554607.00	977.48	975.40	A	2.12	56.5	66.5	66.7	68.8	67.0	Upper Sharon
RVAAP-12 Load Line 12	LL12mw-088	2368667.10	556393.61	981.06	978.94	A	2.12	14.8	24.8	25.0	27.1	29.0	Unconsolidated
RVAAP-12 Load Line 12	LL12mw-107	2368595.04	556758.74	980.15	978.03	A	2.12	20.7	30.7	31.0	33.1	33.0	Unconsolidated
RVAAP-12 Load Line 12	LL12mw-113	2368224.40	558345.63	980.18	977.67	A	2.51	12.3	22.3	22.5	25.0	23.0	Unconsolidated
RVAAP-12 Load Line 12	LL12mw-128	2368292.51	557371.32	978.24	976.21	A	2.03	21.1	31.1	31.3	33.3	34.0	Unconsolidated
RVAAP-12 Load Line 12	LL12mw-153	2368138.58	557823.69	977.85	975.34	A	2.51	12.3	22.3	22.5	25.0	26.0	Unconsolidated
RVAAP-12 Load Line 12	LL12mw-154	2368184.18	557753.99	979.06	977.00	A	2.06	16.4	26.4	26.6	28.6	29.0	Unconsolidated
RVAAP-12 Load Line 12	LL12mw-182	2368853.04	555891.03	984.42	982.20	A	2.22	25.2	35.2	35.5	37.7	36.1	Unconsolidated
RVAAP-12 Load Line 12	LL12mw-182ss	2368867.00	555897.00	984.48	981.80	A	2.72	25.3	35.3	35.5	38.2	36.0	Unconsolidated
RVAAP-12 Load Line 12	LL12mw-183	2369225.00	556067.67	982.98	980.59	A	2.39	23.3	33.3	33.6	36.0	36.0	Unconsolidated
RVAAP-12 Load Line 12	LL12mw-184	2368998.16	556399.95	983.16	980.96	A	2.20	18.8	28.8	29.0	31.2	29.5	Unconsolidated
RVAAP-12 Load Line 12	LL12mw-185	2368830.45	556947.17	981.31	979.09	A	2.22	10.8	20.8	21.0	23.2	24.0	Unconsolidated
RVAAP-12 Load Line 12	LL12mw-186	2367911.63	559065.62	978.31	976.34	A	1.97	8.8	18.8	19.0	21.0	23.0	Unconsolidated
RVAAP-12 Load Line 12	LL12mw-187	2368524.72	557633.56	979.94	977.90	A	2.04	17.2	27.2	27.4	29.4	29.0	Unconsolidated
RVAAP-12 Load Line 12	LL12mw-188	2367909.05	558131.81	980.63	978.46	A	2.17	9.8	19.8	20.0	22.2	20.5	Unconsolidated
RVAAP-12 Load Line 12	LL12mw-189	2367946.67	558569.23	978.04	976.17	A	1.87	7.5	17.5	17.7	19.6	18.5	Unconsolidated
RVAAP-12 Load Line 12	LL12mw-242	2368545.29	558020.51	981.20	978.40	A	2.80	15.5	25.5	25.5	28.3	26.3	Unconsolidated
RVAAP-12 Load Line 12	LL12mw-243	2368190.04	557376.32	980.79	978.10	A	2.69	13.0	23.0	23.0	25.7	24.0	Unconsolidated
RVAAP-12 Load Line 12	LL12mw-244	2368751.42	557377.17	980.65	978.10	A	2.55	19.5	29.5	29.5	32.1	30.0	Unconsolidated
RVAAP-12 Load Line 12	LL12mw-245	2368370.74	557044.55	980.04	977.50	A	2.54	18.0	28.0	28.0	30.5	29.0	Unconsolidated
RVAAP-12 Load Line 12	LL12mw-246	2369432.17	556658.89	984.83	982.00	A	2.83	21.5	31.5	31.5	34.3	32.0	Unconsolidated
RVAAP-12 Load Line 12	LL12mw-247	2368932.00	555141.00	983.71	980.80	A	2.95	10.0	20.0	20.2	23.2	20.5	Unconsolidated
RVAAP-13 Building 1200	B12mw-010	2371292.81	565827.43	1005.92	1002.72	A	3.20	10.0	20.0	20.0	23.2	21.0	Upper Sharon
RVAAP-13 Building 1200	B12mw-011	2371416.15	565687.82	1006.70	1003.76	A	2.94	14.0	24.0	24.0	26.9	24.7	Upper Sharon
RVAAP-13 Building 1200	B12mw-012	2371430.41	565828.01	1006.32	1003.43	A	2.89	12.0	22.0	22.0	24.9	22.3	Upper Sharon
RVAAP-13 Building 1200	B12mw-013	2371221.00	565904.00	1003.94	1001.30	A	2.68	11.5	21.5	21.7	24.4	22.0	Upper Sharon
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-166	2349584.33	553123.86	1108.86	1104.87	A	3.99	5.5	15.5	16.0	20.0	16.0	Unconsolidated

Table 2-1. Monitoring Well Construction Details (Continued)

RVAAP Area	Well ID	Surveyed Data (NAD83 for Easting/Northing, NAVD88 for elevation)				Monitoring Well Construction Details							Monitored Zone (Aquifer)
		Ohio State Plane Easting	Ohio State Plane Northing	TOC Elevation (ft, amsl)	Ground Level Elevation (ft, amsl)	Well Head Type[c]	Stickup height (ft, AGS)	Top of Screen (ft, bgs)	Bottom of Screen (ft, bgs)	Bottom of Inner Casing Plug or End Cap (ft, bgs)	Reported Bottom of Inner Casing (ft, BTOC)	Borehole Depth (ft, bgs)	
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-167	2349675.45	553556.12	1115.90	1112.05	A	3.85	5.0	15.0	18.0	21.9	18.0	Unconsolidated
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-168	2350066.87	553620.85	1133.91	1131.27	A	2.64	9.0	19.0	19.5	22.1	19.5	Unconsolidated
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-169	2349730.90	553681.21	1120.58	1117.36	A	3.22	5.0	15.0	16.0	19.2	16.0	Unconsolidated
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-170	2350102.41	553975.40	1142.26	1139.67	A	2.59	20.0	30.0	30.5	33.1	30.5	Homewood
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-171	2350072.44	554230.93	1143.55	1140.49	A	3.06	18.0	28.0	30.0	33.1	30.0	Homewood
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-172	2349907.37	554322.17	1150.09	1145.71	A	4.38	20.0	30.0	33.0	37.4	33.0	Homewood
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-173	2350449.01	554491.35	1165.94	1162.43	A	3.51	29.5	49.5	50.0	53.5	50.0	Homewood
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-174	2350289.81	554142.44	1139.97	1135.78	A	4.19	12.0	22.0	22.5	26.7	22.5	Homewood
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-175	2350297.98	553989.24	1140.73	1137.16	A	3.57	12.0	22.0	22.5	26.1	22.5	Homewood
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-176	2350219.45	553273.33	1131.91	1129.57	A	2.34	11.0	21.0	21.5	23.8	21.5	Unconsolidated
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-177	2350112.18	553321.94	1128.57	1125.73	A	2.84	12.0	22.0	22.5	25.3	22.5	Unconsolidated
RVAAP-19 Landfill North of Winklepeck Burning Grounds	LNWmw-024	2358403.21	564825.89	1038.00	1035.30	A	2.70	10.0	20.0	20.0	22.7	24.0	Unconsolidated
RVAAP-19 Landfill North of Winklepeck Burning Grounds	LNWmw-025	2358417.06	565071.92	1029.13	1027.20	A	1.93	8.0	18.0	18.0	19.9	19.0	Unconsolidated
RVAAP-19 Landfill North of Winklepeck Burning Grounds	LNWmw-026	2358952.24	564658.16	1027.80	1025.00	A	2.80	13.0	23.0	23.0	25.8	24.0	Unconsolidated
RVAAP-19 Landfill North of Winklepeck Burning Grounds	LNWmw-027	2358628.75	564517.41	1027.13	1024.40	A	2.73	14.0	24.0	24.0	26.7	25.0	Upper Sharon
RVAAP-28 Suspected Mustard Agent Burial Site	MBSmw-001	2345323.00	550759.50	1082.20	1079.68	A	2.52	19.0	28.7	29.0	31.5	30.0	Unconsolidated
RVAAP-28 Suspected Mustard Agent Burial Site	MBSmw-002	2345322.30	550886.20	1083.22	1080.50	A	2.72	18.0	27.3	28.0	30.7	30.0	Unconsolidated
RVAAP-28 Suspected Mustard Agent Burial Site	MBSmw-003	2345172.40	550922.80	1084.45	1082.45	A	2.00	18.5	28.2	28.5	30.5	30.0	Unconsolidated
RVAAP-28 Suspected Mustard Agent Burial Site	MBSmw-004	2345134.20	550767.90	1081.80	1079.55	A	2.25	14.7	24.4	24.7	27.0	26.0	Unconsolidated
RVAAP-28 Suspected Mustard Agent Burial Site	MBSmw-005	2345354.10	550800.70	1082.42	1080.50	A	1.92	18.0	28.0	28.0	29.9	28.0	Unconsolidated
RVAAP-28 Suspected Mustard Agent Burial Site	MBSmw-006	2345282.30	550726.10	1081.83	1080.29	A	1.54	18.0	28.0	28.0	29.5	28.0	Unconsolidated
RVAAP-29 Upper and Lower Cobbs Ponds	CPmw-001	2368948.81	560440.91	975.26	975.46	F	-0.20	5.5	15.5	15.5	15.3	16.0	Unconsolidated
RVAAP-29 Upper and Lower Cobbs Ponds	CPmw-002	2368239.23	560311.26	972.31	972.72	F	-0.41	5.5	15.5	15.5	15.1	16.0	Unconsolidated
RVAAP-29 Upper and Lower Cobbs Ponds	CPmw-003	2368796.49	560676.30	972.92	973.27	F	-0.35	8.0	18.0	18.0	17.7	18.5	Unconsolidated
RVAAP-29 Upper and Lower Cobbs Ponds	CPmw-004	2368674.31	561843.46	981.20	978.51	A	2.69	9.5	19.5	19.5	22.2	20.0	Unconsolidated
RVAAP-29 Upper and Lower Cobbs Ponds	CPmw-005	2367900.41	561846.78	973.58	970.71	A	2.87	29.5	39.5	39.5	42.4	40.0	Unconsolidated
RVAAP-29 Upper and Lower Cobbs Ponds	CPmw-006	2367727.13	562830.13	965.13	962.97	A	2.16	8.0	18.0	18.0	20.2	18.5	Unconsolidated
RVAAP-33 Load Line 6	LL6mw-001	2353153.23	554214.84	1124.16	1124.16	F	0.00	7.0	17.0	17.0	16.9	18.0	Unconsolidated
RVAAP-33 Load Line 6	LL6mw-002	2353820.09	553589.88	1129.36	1125.58	A	3.78	12.5	22.5	22.5	24.8	23.0	Unconsolidated
RVAAP-33 Load Line 6	LL6mw-003	2353048.68	553544.34	1125.38	1122.03	A	3.35	12.5	22.5	22.5	25.3	23.4	Unconsolidated
RVAAP-33 Load Line 6	LL6mw-004	2353368.79	553431.82	1125.39	1122.81	A	2.58	12.5	22.5	22.5	24.9	23.0	Unconsolidated
RVAAP-33 Load Line 6	LL6mw-005	2353194.52	553170.76	1120.47	1117.51	A	2.96	9.5	19.5	19.5	22.5	19.9	Unconsolidated
RVAAP-33 Load Line 6	LL6mw-006	2352419.15	553165.28	1124.37	1124.37	F	0.00	7.0	17.0	17.0	17.1	20.0	Unconsolidated
RVAAP-33 Load Line 6	LL6mw-007	2353354.89	552677.17	1115.62	1115.62	F	0.00	9.5	19.5	19.5	19.5	20.0	Unconsolidated
RVAAP-33 Load Line 6	LL6mw-008	2353616.00	553154.00	1123.61	1120.80	A	2.85	7.2	17.2	17.5	20.4	17.9	Unconsolidated
RVAAP-33 Load Line 6	LL6mw-009	2353604.00	553149.00	1123.21	1120.90	A	2.35	29.0	39.0	39.3	41.6	39.5	Homewood
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-001	2366826.47	563423.40	951.37	952.06	F	-0.69	4.0	9.0	9.1	8.4	12.0	Unconsolidated
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-002	2366769.51	563379.98	951.71	952.14	F	-0.43	3.0	8.0	8.1	7.7	8.5	Unconsolidated
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-003	2366830.57	563276.42	972.20	969.70	A	2.50	15.0	25.0	25.3	27.8	26.0	Unconsolidated
RVAAP-38 NACA Test Area	NTAmw-107	2345433.40	551697.29	1080.30	1077.65	A	2.65	12.0	22.0	22.0	24.7	23.0	Unconsolidated
RVAAP-38 NACA Test Area	NTAmw-108	2345781.60	551916.22	1085.62	1083.22	A	2.40	12.0	22.0	22.0	24.4	23.0	Unconsolidated
RVAAP-38 NACA Test Area	NTAmw-109	2345997.72	551293.25	1079.84	1076.89	A	2.95	8.0	18.0	18.0	21.0	19.0	Unconsolidated
RVAAP-38 NACA Test Area	NTAmw-110	2346438.94	551351.46	1082.62	1080.03	A	2.59	17.0	27.0	27.0	29.6	28.0	Unconsolidated
RVAAP-38 NACA Test Area	NTAmw-111	2346638.01	551538.60	1080.94	1078.07	A	2.87	9.5	19.5	19.5	22.4	20.0	Unconsolidated

Table 2-1. Monitoring Well Construction Details (Continued)

RVAAP Area	Well ID	Surveyed Data (NAD83 for Easting/Northing, NAVD88 for elevation)				Monitoring Well Construction Details							Monitored Zone (Aquifer)
		Ohio State Plane Easting	Ohio State Plane Northing	TOC Elevation (ft, amsl)	Ground Level Elevation (ft, amsl)	Well Head Type[c]	Stickup height (ft, AGS)	Top of Screen (ft, bgs)	Bottom of Screen (ft, bgs)	Bottom of Inner Casing Plug or End Cap (ft, bgs)	Reported Bottom of Inner Casing (ft, BTOC)	Borehole Depth (ft, bgs)	
RVAAP-38 NACA Test Area	NTAmw-112	2346889.48	551712.14	1078.33	1075.36	A	2.97	13.9	23.9	23.9	26.9	23.9	Unconsolidated
RVAAP-38 NACA Test Area	NTAmw-113	2347082.83	551488.52	1075.68	1072.61	A	3.07	17.0	27.0	27.0	30.1	27.5	Unconsolidated
RVAAP-38 NACA Test Area	NTAmw-114	2347301.57	551592.94	1078.71	1075.61	A	3.10	9.5	19.5	19.5	22.6	20.0	Unconsolidated
RVAAP-38 NACA Test Area	NTAmw-115	2347581.16	551791.78	1089.65	1086.91	A	2.74	12.5	22.5	22.5	25.2	24.0	Unconsolidated
RVAAP-38 NACA Test Area	NTAmw-116	2348196.39	551748.00	1094.33	1091.68	A	2.65	10.0	20.0	20.0	22.7	22.0	Unconsolidated
RVAAP-38 NACA Test Area	NTAmw-117	2347994.83	551584.57	1094.54	1091.67	A	2.87	14.5	24.5	24.5	27.4	25.0	Unconsolidated
RVAAP-38 NACA Test Area	NTAmw-118	2347609.41	551335.04	1081.44	1078.86	A	2.58	12.0	22.0	22.0	24.6	22.5	Unconsolidated
RVAAP-38 NACA Test Area	NTAmw-119	2346013.00	551286.00	1079.53	1076.90	A	2.67	90.0	100.0	100.2	102.9	130.0	Unconsolidated
RVAAP-38 NACA Test Area	NTAmw-120	2347112.93	551501.64	1075.20	1072.67	A	2.53	109.5	119.5	119.5	122.0	120.0	Upper Sharon
RVAAP-39 Load Line 5	LL5mw-001	2354625.07	554319.25	1127.92	1125.00	A	2.92	14.0	24.0	24.0	26.9	26.0	Unconsolidated
RVAAP-39 Load Line 5	LL5mw-002	2354571.52	554604.01	1128.68	1125.80	A	2.88	15.0	25.0	25.0	27.9	25.0	Unconsolidated
RVAAP-39 Load Line 5	LL5mw-003	2354964.47	554535.41	1127.70	1124.70	A	3.00	11.0	21.0	21.0	24.0	21.0	Unconsolidated
RVAAP-39 Load Line 5	LL5mw-004	2355006.44	554073.73	1125.81	1122.90	A	2.91	12.0	22.0	22.0	24.9	22.4	Unconsolidated
RVAAP-39 Load Line 5	LL5mw-005	2354422.02	554152.73	1129.42	1126.50	A	2.92	17.0	27.0	27.0	29.9	27.8	Unconsolidated
RVAAP-39 Load Line 5	LL5mw-006	2354730.78	553984.82	1128.00	1125.10	A	2.90	14.0	24.0	24.0	26.9	24.5	Unconsolidated
RVAAP-40 Load Line 7	LL7mw-001	2352192.91	554925.77	1129.64	1126.90	A	2.74	19.5	29.5	29.5	32.2	30.0	Homewood
RVAAP-40 Load Line 7	LL7mw-002	2351918.23	555126.55	1129.55	1126.70	A	2.85	15.0	25.0	25.0	27.9	26.5	Homewood
RVAAP-40 Load Line 7	LL7mw-003	2352351.04	555417.04	1120.84	1118.23	A	2.61	21.0	31.0	31.0	33.6	31.5	Homewood
RVAAP-40 Load Line 7	LL7mw-004	2352035.20	555581.14	1126.32	1123.30	A	3.02	19.5	29.5	29.5	32.5	29.5	Homewood
RVAAP-40 Load Line 7	LL7mw-005	2351741.47	555581.80	1135.87	1133.30	A	2.57	18.0	28.0	28.0	30.6	28.2	Homewood
RVAAP-40 Load Line 7	LL7mw-006	2351879.92	555990.59	1123.56	1120.70	A	2.86	17.5	27.5	27.5	30.4	28.0	Homewood
RVAAP-41 Load Line 8	LL8mw-001	2351666.10	552607.06	1121.46	1118.69	A	2.77	14.0	24.0	24.0	26.8	24.0	Unconsolidated
RVAAP-41 Load Line 8	LL8mw-002	2351010.33	552408.18	1124.51	1121.67	A	2.84	20.0	30.0	30.0	32.8	30.4	Unconsolidated
RVAAP-41 Load Line 8	LL8mw-003	2351359.25	552231.14	1119.05	1116.30	A	2.75	10.5	20.5	20.5	23.3	21.0	Unconsolidated
RVAAP-41 Load Line 8	LL8mw-004	2351261.83	551807.58	1115.75	1112.73	A	3.02	10.0	20.0	20.0	23.0	20.5	Unconsolidated
RVAAP-41 Load Line 8	LL8mw-005	2351748.32	551522.48	1115.73	1112.51	A	3.22	14.0	24.0	24.0	27.2	24.0	Unconsolidated
RVAAP-41 Load Line 8	LL8mw-006	2351483.58	551296.77	1117.15	1114.33	A	2.82	14.0	24.0	24.0	26.8	24.2	Unconsolidated
RVAAP-42 Load Line 9	LL9mw-001	2355817.04	556125.81	1134.62	1131.86	A	2.76	10.5	20.5	20.5	23.3	21.6	Homewood
RVAAP-42 Load Line 9	LL9mw-002	2355907.76	556755.11	1127.30	1124.88	A	2.42	10.0	20.0	20.0	22.5	21.0	Homewood
RVAAP-42 Load Line 9	LL9mw-003	2356635.21	556445.31	1135.76	1132.81	A	2.95	11.5	21.5	21.5	24.5	22.0	Homewood
RVAAP-42 Load Line 9	LL9mw-004	2357338.76	556002.00	1131.83	1129.14	A	2.69	22.0	32.0	32.0	34.7	33.0	Homewood
RVAAP-42 Load Line 9	LL9mw-005	2356505.95	557063.36	1130.93	1127.43	A	3.50	10.0	20.0	20.0	23.5	20.6	Homewood
RVAAP-42 Load Line 9	LL9mw-006	2357446.67	556434.79	1129.88	1127.10	A	2.78	16.0	26.0	26.0	28.8	26.8	Homewood
RVAAP-42 Load Line 9	LL9mw-007	2357024.34	557000.56	1119.99	1120.01	F	-0.02	8.5	18.5	18.5	18.5	19.0	Homewood
RVAAP-43 Load Line 10	LL10mw-001	2355272.22	555816.25	1132.77	1130.00	A	2.77	17.0	27.0	27.0	29.8	28.0	Homewood
RVAAP-43 Load Line 10	LL10mw-002	2355710.51	555523.36	1127.13	1124.40	A	2.73	17.0	27.0	27.0	29.7	28.0	Homewood
RVAAP-43 Load Line 10	LL10mw-003	2355389.92	555494.71	1130.28	1127.40	A	2.88	16.0	26.0	26.0	28.9	26.4	Homewood
RVAAP-43 Load Line 10	LL10mw-004	2355438.20	555236.59	1122.39	1119.60	A	2.79	21.0	31.0	31.0	33.8	31.2	Homewood
RVAAP-43 Load Line 10	LL10mw-005	2355943.55	555380.53	1125.67	1122.90	A	2.77	16.5	26.5	26.5	29.3	27.0	Homewood
RVAAP-43 Load Line 10	LL10mw-006	2355654.80	554995.25	1123.83	1121.20	A	2.63	13.5	23.5	23.5	26.1	24.0	Unconsolidated
RVAAP-44 Load Line 11	LL11mw-001	2352778.82	557504.99	1100.16	1097.46	A	2.70	11.4	21.4	21.4	24.1	22.0	Unconsolidated
RVAAP-44 Load Line 11	LL11mw-002	2353354.22	558310.52	1080.00	1080.29	F	-0.29	6.3	16.3	16.3	16.0	17.0	Unconsolidated
RVAAP-44 Load Line 11	LL11mw-003	2352737.22	557999.62	1088.49	1088.45	F	0.04	5.9	15.9	15.9	15.9	17.0	Unconsolidated
RVAAP-44 Load Line 11	LL11mw-004	2352737.29	558164.29	1084.73	1084.60	F	0.12	6.1	16.1	16.1	16.2	17.0	Unconsolidated
RVAAP-44 Load Line 11	LL11mw-005	2352847.62	558501.21	1079.41	1079.60	F	-0.20	6.2	16.2	16.2	16.0	17.0	Unconsolidated
RVAAP-44 Load Line 11	LL11mw-006	2352521.51	558263.54	1086.50	1086.61	F	-0.11	5.6	15.6	15.6	15.4	17.0	Unconsolidated
RVAAP-44 Load Line 11	LL11mw-007	2352094.87	558189.94	1082.00	1079.22	A	2.78	12.4	22.4	22.4	25.1	23.0	Unconsolidated
RVAAP-44 Load Line 11	LL11mw-008	2352388.57	557981.26	1087.74	1087.90	F	-0.16	5.6	15.6	15.6	15.4	17.0	Unconsolidated

Table 2-1. Monitoring Well Construction Details (Continued)

RVAAP Area	Well ID	Surveyed Data (NAD83 for Easting/Northing, NAVD88 for elevation)				Monitoring Well Construction Details							Monitored Zone (Aquifer)
		Ohio State Plane Easting	Ohio State Plane Northing	TOC Elevation (ft, amsl)	Ground Level Elevation (ft, amsl)	Well Head Type[c]	Stickup height (ft, AGS)	Top of Screen (ft, bgs)	Bottom of Screen (ft, bgs)	Bottom of Inner Casing Plug or End Cap (ft, bgs)	Reported Bottom of Inner Casing (ft, BTOC)	Borehole Depth (ft, bgs)	
RVAAP-44 Load Line 11	LL11mw-009	2352577.22	557901.21	1091.54	1088.38	A	3.16	6.7	16.7	16.7	19.8	17.0	Unconsolidated
RVAAP-44 Load Line 11	LL11mw-010	2352038.91	557675.59	1082.68	1080.23	A	2.45	10.9	20.9	20.9	23.3	22.0	Unconsolidated
RVAAP-44 Load Line 11	LL11mw-011	2351119.00	558680.00	1079.66	1076.90	A	2.80	7.8	17.8	18.0	20.8	18.5	Unconsolidated
RVAAP-44 Load Line 11	LL11mw-012	2351125.00	558691.00	1079.82	1077.40	A	2.46	104.5	114.5	114.7	117.2	115.0	Upper Sharon
RVAAP-49 Central Burn Pits	CBPmw-001	2367095.37	561616.01	975.84	972.71	A	3.13	21.8	31.8	31.8	34.9	32.3	Unconsolidated
RVAAP-49 Central Burn Pits	CBPmw-002	2367295.66	561865.83	970.04	967.33	A	2.71	19.5	29.5	29.5	32.2	30.0	Unconsolidated
RVAAP-49 Central Burn Pits	CBPmw-003	2366768.68	561944.14	974.67	972.04	A	2.63	14.5	24.5	24.5	27.1	25.0	Unconsolidated
RVAAP-49 Central Burn Pits	CBPmw-004	2366978.80	562123.80	971.13	968.58	A	2.55	17.0	27.0	27.0	29.6	27.5	Unconsolidated
RVAAP-49 Central Burn Pits	CBPmw-005	2366919.66	562311.88	971.59	968.83	A	2.76	14.5	24.5	24.5	27.3	25.0	Unconsolidated
RVAAP-49 Central Burn Pits	CBPmw-006	2367243.68	562311.87	967.64	965.01	A	2.63	12.5	22.5	22.5	25.1	23.0	Unconsolidated
RVAAP-49 Central Burn Pits	CBPmw-007	2366512.62	562006.41	976.37	973.47	A	2.90	19.5	29.5	29.5	32.4	30.0	Unconsolidated
RVAAP-49 Central Burn Pits	CBPmw-008	2366757.21	562668.84	973.19	970.57	A	2.62	15.0	25.0	25.0	27.6	25.5	Unconsolidated
RVAAP-49 Central Burn Pits	CBPmw-009	2367174.00	561797.00	971.94	969.40	A	2.58	54.0	64.0	64.3	66.8	65.0	Upper Sharon
RVAAP-50 Atlas Scrap Yard	ASYmw-001	2366260.85	558404.04	981.13	978.40	A	2.73	11.0	21.0	21.0	23.7	22.0	Unconsolidated
RVAAP-50 Atlas Scrap Yard	ASYmw-002	2366170.86	557887.86	985.24	982.00	A	3.24	9.5	19.5	19.5	22.7	20.0	Unconsolidated
RVAAP-50 Atlas Scrap Yard	ASYmw-003	2366651.49	558015.94	982.21	979.70	A	2.51	11.0	21.0	21.0	23.5	21.5	Unconsolidated
RVAAP-50 Atlas Scrap Yard	ASYmw-004	2367166.04	557640.81	979.66	977.10	A	2.56	17.0	27.0	27.0	29.6	27.8	Unconsolidated
RVAAP-50 Atlas Scrap Yard	ASYmw-005	2367448.16	557783.01	979.80	977.60	A	2.20	14.0	24.0	24.0	26.2	25.0	Unconsolidated
RVAAP-50 Atlas Scrap Yard	ASYmw-006	2366746.73	557257.72	983.01	980.20	A	2.81	16.0	26.0	26.0	28.8	27.0	Unconsolidated
RVAAP-50 Atlas Scrap Yard	ASYmw-007	2366834.49	556818.08	984.16	981.40	A	2.76	16.0	26.0	26.0	28.8	28.0	Unconsolidated
RVAAP-50 Atlas Scrap Yard	ASYmw-008	2367475.07	557087.66	978.85	976.20	A	2.65	15.0	25.0	25.0	27.7	26.0	Unconsolidated
RVAAP-50 Atlas Scrap Yard	ASYmw-009	2366631.94	557603.68	982.70	979.90	A	2.80	11.5	21.5	21.5	24.3	22.0	Unconsolidated
RVAAP-50 Atlas Scrap Yard	ASYmw-010	2366985.37	557270.61	981.05	978.20	A	2.85	17.0	27.0	27.0	29.9	28.0	Unconsolidated
RVAAP-66 Facility-wide Groundwater	FWGmw-001	2368321.00	565739.00	956.08	953.10	A	3.02	7.0	17.0	17.3	20.3	17.5	Unconsolidated
RVAAP-66 Facility-wide Groundwater	FWGmw-002	2367606.00	571015.00	972.56	970.10	A	2.50	57.0	67.0	67.3	69.8	68.0	Unconsolidated
RVAAP-66 Facility-wide Groundwater	FWGmw-003	2344042.00	563118.00	1131.42	1128.90	A	2.56	8.5	18.5	18.8	21.3	18.9	Unconsolidated
RVAAP-66 Facility-wide Groundwater	FWGmw-004	2356970.00	549319.00	1036.61	1034.00	A	2.65	9.5	19.5	19.8	22.4	20.1	Unconsolidated
RVAAP-66 Facility-wide Groundwater	FWGmw-005	2338973.00	558510.00	1169.56	1167.00	A	2.56	19.3	29.3	29.5	32.1	29.5	Homewood
RVAAP-66 Facility-wide Groundwater	FWGmw-006	2335421.00	553142.00	1183.79	1181.40	A	2.43	7.5	17.5	17.8	20.2	18.0	Unconsolidated
RVAAP-66 Facility-wide Groundwater	FWGmw-007	2344785.00	548356.00	1074.87	1072.30	A	2.61	19.5	29.5	29.8	32.4	30.0	Unconsolidated
RVAAP-66 Facility-wide Groundwater	FWGmw-008	2341569.00	555735.00	1111.07	1108.50	A	2.61	10.0	20.0	20.3	22.9	21.0	Unconsolidated
RVAAP-66 Facility-wide Groundwater	FWGmw-009	2341998.00	556784.00	1101.60	1099.00	A	2.64	8.0	18.0	18.3	20.9	18.5	Unconsolidated
RVAAP-66 Facility-wide Groundwater	FWGmw-010	2379060.00	565077.00	961.61	959.00	A	2.65	6.0	16.0	16.5	18.9	17.3	Unconsolidated
RVAAP-66 Facility-wide Groundwater	FWGmw-011	2380390.00	566801.00	941.07	938.50	A	2.61	6.0	16.0	16.2	18.8	16.5	Unconsolidated
RVAAP-66 Facility-wide Groundwater	FWGmw-012	2380389.00	566790.00	940.85	938.40	A	2.49	29.5	39.5	39.8	42.2	40.0	Upper Sharon
RVAAP-66 Facility-wide Groundwater	FWGmw-013	2357460.00	559483.00	1058.97	1056.60	A	2.41	24.0	34.0	34.3	36.7	34.5	Upper Sharon
RVAAP-66 Facility-wide Groundwater	FWGmw-014	2341064.00	560957.00	1137.03	1034.50	A	2.57	8.3	18.3	18.5	21.1	18.5	Unconsolidated
RVAAP-66 Facility-wide Groundwater	FWGmw-015	2358353.00	550179.00	1013.97	1011.60	A	2.41	13.5	23.5	23.8	26.2	26.0	Unconsolidated
RVAAP-66 Facility-wide Groundwater	FWGmw-016	2358364.00	550171.00	1013.85	1011.10	A	2.49	54.5	64.5	64.8	67.2	65.0	Upper Sharon
RVAAP-66 Facility-wide Groundwater	FWGmw-017	2375764.73	557642.98	961.26	958.53	A	2.73	133.5	143.5	143.5	146.2	148.0	Basal Sharon Congl
RVAAP-66 Facility-wide Groundwater	FWGmw-018	2369765.30	555057.99	984.03	981.12	A	2.91	136.2	146.2	146.2	149.1	154.0	Basal Sharon Congl
RVAAP-66 Facility-wide Groundwater	FWGmw-019	2356237.11	555611.64	1132.23	1129.58	A	2.65	224.5	234.5	234.5	237.2	240.0	Basal Sharon Congl
RVAAP-66 Facility-wide Groundwater	FWGmw-020	2369740.98	555068.87	984.58	981.73	A	2.85	34.7	44.7	44.7	47.6	45.7	Upper Sharon
RVAAP-66 Facility-wide Groundwater	FWGmw-021	2371523.19	555833.19	987.97	984.88	A	3.09	34.4	44.4	44.4	47.5	44.9	Upper Sharon
RVAAP-66 Facility-wide Groundwater	FWGmw-022	2356248.55	555591.37	1132.31	1129.61	A	2.70	153.8	163.8	163.8	166.5	165.0	Upper Sharon
RVAAP-66 Facility-wide Groundwater	FWGmw-023	2351466.22	554124.25	1152.37	1149.66	A	2.71	203.5	213.5	213.5	216.2	215.0	Upper Sharon
RVAAP-66 Facility-wide Groundwater	FWGmw-024	2375689.84	557670.98	963.16	960.30	A	2.86	23.7	33.7	33.7	36.6	35.0	Upper Sharon
RVAAP-66 Facility-wide Groundwater	SCFmw-001	2353178.98	554768.62	1120.17	1117.99	A	2.18	201.0	211.0	212.0	213.2	230.0	Basal Sharon Congl

Table 2-1. Monitoring Well Construction Details (Continued)

RVAAP Area	Well ID	Surveyed Data (NAD83 for Easting/Northing, NAVD88 for elevation)				Monitoring Well Construction Details							Monitored Zone (Aquifer)
		Ohio State Plane Easting	Ohio State Plane Northing	TOC Elevation (ft, amsl)	Ground Level Elevation (ft, amsl)	Well Head Type[c]	Stickup height (ft, AGS)	Top of Screen (ft, bgs)	Bottom of Screen (ft, bgs)	Bottom of Inner Casing Plug or End Cap (ft, bgs)	Reported Bottom of Inner Casing (ft, BTOC)	Borehole Depth (ft, bgs)	
RVAAP-66 Facility-wide Groundwater	SCFmw-002	2368927.36	555152.38	984.02	981.74	A	2.28	137.0	147.0	148.0	150.3	153.0	Basal Sharon Congl
RVAAP-66 Facility-wide Groundwater	SCFmw-003	2375843.20	557957.67	957.92	955.59	A	2.33	125.5	135.5	136.0	138.3	140.0	Basal Sharon Congl
RVAAP-66 Facility-wide Groundwater	SCFmw-004	2378730.23	560361.03	943.62	941.32	A	2.30	100.0	110.0	111.0	113.3	120.0	Basal Sharon Congl
RVAAP-66 Facility-wide Groundwater	SCFmw-005	2377014.05	567302.35	960.26	957.89	A	2.37	139.0	154.0	155.0	157.4	160.1	Basal Sharon Congl
RVAAP-66 Facility-wide Groundwater	SCFmw-006	2369394.54	569583.41	965.38	963.15	A	2.23	76.0	86.0	87.0	89.2	90.0	Basal Sharon Congl
RVAAP-66 Facility-wide Groundwater	BKGmw-004	2368852.97	569464.76	965.16	962.63	A	2.53	9.2	19.2	19.5	22.1	19.5	Unconsolidated
RVAAP-66 Facility-wide Groundwater	BKGmw-005	2340835.86	562288.45	1149.44	1147.09	A	2.35	8.2	18.2	18.5	20.9	19.0	Unconsolidated
RVAAP-66 Facility-wide Groundwater	BKGmw-006	2358643.96	571910.47	1026.38	1023.87	A	2.51	24.7	34.7	35.1	37.6	35.1	Upper Sharon
RVAAP-66 Facility-wide Groundwater	BKGmw-008	2372741.08	569654.23	970.40	968.14	A	2.26	14.7	24.7	25.0	27.3	25.0	Upper Sharon
RVAAP-66 Facility-wide Groundwater	BKGmw-010	2371372.94	565540.71	1006.29	1003.89	A	2.40	8.9	18.9	19.2	21.5	22.0	Upper Sharon
RVAAP-66 Facility-wide Groundwater	BKGmw-012	2367795.23	563918.86	997.57	995.22	A	2.35	39.6	59.6	59.8	62.1	59.8	Upper Sharon
RVAAP-66 Facility-wide Groundwater	BKGmw-013	2361627.39	558269.16	986.59	984.38	A	2.21	15.2	25.2	25.5	27.7	25.5	Unconsolidated
RVAAP-66 Facility-wide Groundwater	BKGmw-015	2361482.22	569339.87	1037.90	1035.71	A	2.19	30.1	50.1	50.4	52.6	51.0	Upper Sharon
RVAAP-66 Facility-wide Groundwater	BKGmw-016	2342407.08	553983.50	1098.42	1096.10	A	2.32	8.4	18.5	18.6	21.0	19.0	Unconsolidated
RVAAP-66 Facility-wide Groundwater	BKGmw-017	2346115.35	562452.04	1132.80	1130.69	A	2.11	23.2	33.3	33.6	35.7	34.8	Unconsolidated
RVAAP-66 Facility-wide Groundwater	BKGmw-018	2354993.91	570873.35	1043.06	1040.82	A	2.24	14.5	24.5	24.7	26.9	24.7	Upper Sharon
RVAAP-66 Facility-wide Groundwater	BKGmw-019	2349882.14	559864.55	1108.24	1105.85	A	2.39	23.0	33.0	33.2	35.6	34.0	Unconsolidated
RVAAP-66 Facility-wide Groundwater	BKGmw-020	2357856.24	558756.24	1065.00	1062.68	A	2.32	20.5	30.5	30.7	33.0	30.7	Upper Sharon
RVAAP-66 Facility-wide Groundwater	BKGmw-021	2367622.95	571016.75	972.16	969.71	A	2.45	7.7	17.8	18.1	20.5	19.0	Unconsolidated
RVAAP-66 Facility-wide Groundwater	BKGmw-022	2331489.12	559503.15	1167.32	1164.62	A	2.70	27.5	37.5	37.5	40.2	38.0	Homewood
RVAAP-66 Facility-wide Groundwater	BKGmw-023	2335743.37	560763.62	1183.62	1181.07	A	2.55	33.5	43.5	43.5	46.1	44.0	Homewood
RVAAP-66 Facility-wide Groundwater	BKGmw-024	2355001.54	570853.52	1043.78	1041.19	A	2.59	146.3	156.3	156.3	158.9	164.0	Basal Sharon Congl
RVAAP-66 Facility-wide Groundwater	BKGmw-025	2328380.82	554970.37	1110.60	1107.99	A	2.61	267.0	277.0	277.0	279.6	282.5	Basal Sharon Congl
RVAAP-69 Building 1048 Fire Station	069mw-001	2357766.03	551524.76	1027.25	1024.69	A	2.56	5.0	15.0	15.0	17.6	15.0	Unconsolidated
RVAAP-69 Building 1048 Fire Station	069mw-002	2357718.33	551537.19	1028.28	1025.11	A	3.17	5.0	15.0	15.0	18.2	16.0	Unconsolidated
RVAAP-69 Building 1048 Fire Station	069mw-003	2357765.97	551516.85	1027.28	1024.73	A	2.55	23.0	28.0	28.0	30.6	28.0	Upper Sharon
RVAAP-69 Building 1048 Fire Station	069mw-004	2357873.25	551415.01	1024.19	1024.79	F	-0.60	8.0	18.0	18.0	17.4	20.0	Unconsolidated
RVAAP-69 Building 1048 Fire Station	069mw-005	2357920.65	551478.08	1023.18	1023.84	F	-0.66	6.0	16.0	16.0	15.3	20.0	Unconsolidated
RVAAP-69 Building 1048 Fire Station	069mw-006	2357685.00	551597.00	1028.39	1025.44	A	2.95	5.5	15.0	15.0	18.0	20.0	Unconsolidated
RVAAP-69 Building 1048 Fire Station	069mw-007	2357745.00	551417.00	1029.35	1026.32	A	3.03	7.0	17.0	17.0	20.0	20.0	Unconsolidated
RVAAP-69 Building 1048 Fire Station	069mw-008	2357919.00	551340.00	1023.87	1024.28	F	-0.41	7.0	17.0	17.0	16.6	24.0	Unconsolidated
RVAAP-69 Building 1048 Fire Station	069mw-009	2358007.00	551267.00	1023.54	1023.71	F	-0.17	7.0	17.0	17.0	16.8	32.0	Unconsolidated
RVAAP-74 Building 1034 Motor Pool Hydraulic Lift	074mw-001	2358218.16	551042.40	1022.01	1022.46	F	-0.45	12.0	22.0	22.0	21.9	24.0	Unconsolidated
RVAAP-74 Building 1034 Motor Pool Hydraulic Lift	074mw-002	2358243.37	551039.63	1021.64	1022.45	F	-0.81	10.0	20.0	20.0	20.3	24.0	Unconsolidated
RVAAP-74 Building 1034 Motor Pool Hydraulic Lift	074mw-003	2358250.05	551012.62	1020.81	1021.24	F	-0.43	10.0	20.0	20.0	20.1	24.0	Unconsolidated
Temporary Wells													
RVAAP-68 Electric Substation No. 3	ES3tw-001	2353960.93	556899.33	1091.80	1089.30	A	2.50	3.0	8.0	8.1	10.6	8.5	Unconsolidated
RVAAP-68 Electric Substation No. 3	ES3tw-002	2354026.14	556949.37	1091.87	1089.57	A	2.30	4.0	9.0	9.1	11.4	10.0	Unconsolidated
RVAAP-68 Electric Substation No. 3	ES3tw-003	2353920.02	556943.62	1093.01	1089.71	A	3.30	4.0	9.0	9.1	12.4	10.0	Unconsolidated
RVAAP-03 Open Demolition Area #1	DA1tw-001	2346205.58	551199.53	1081.40	1078.49	A	2.91	7.0	17.0	17.3	20.2	18.0	Unconsolidated

Wells highlighted in gray were abandoned in 2018/2019

Well Head Type: A = above grade completion; F = flush-mount completion

ft = Feet.
AGS = Above ground surface.
amsl = Above mean sea level.
bgs = Below ground surface.
BTOC = Below top of casing.
ID = Identifier.
NAD83 North American Datum of 1983.
NAD88 = North American Datum of 1988.
RVAAP = Ravenna Army Ammunition Plant.
TOC = Top of casing.

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3.0 FACILITY DESCRIPTION

This section provides a brief history of activities at the former RVAAP, as well as describes the site geology and hydrogeology that is pertinent in understanding and evaluating FWGW.

3.1 FACILITY DESCRIPTION

The former RVAAP, now known as CJAG, located in northeastern Ohio within Portage and Trumbull counties, is approximately 3 miles east/northeast of the city of Ravenna and 1 mile north/northwest of the city of Newton Falls (Figure 3-1). The facility is approximately 11 miles long and 3.5 miles wide. The facility is bounded by State Route 5, the Michael J. Kirwan Reservoir, and the CSX System Railroad to the south; Garrett, McCormick, and Berry Roads to the west; the Norfolk Southern Railroad to the north; and State Route 534 to the east. In addition, the facility is surrounded by the communities of Windham, Garrettsville, Charlestown, and Wayland. The facility is federal property, which has had multiple accountability transfers amongst multiple Army agencies, making the property ownership and transfer history complex. The most recent administrative accountability transfer occurred in September 2013 when the remaining acreage (not previously transferred) was transferred to the U.S. Property and Fiscal Officer for Ohio (USP&FO) and subsequently licensed to the Ohio Army National Guard (OHARNG) for use as a military training site (Camp James A. Garfield).

3.2 SITE GEOLOGY

Surface geology at CJAG generally consists of glacial till deposits from the Wisconsinan glacial advance, with occasional outcrops of bedrock of the Pottsville Formation. North-south trending pre-glacial valleys in the central and western portions of CJAG were generally deepened by scouring and subsequently buried during two minor glacial advances and retreats. The Wisconsinan glacial advances first deposited the Lavery Till and later deposited the Hiram Till. Figure 3-2 presents a figure depicting the unconsolidated deposits at CJAG.

The uppermost bedrock underlying CJAG consists of several units of the Pennsylvanian-age Pottsville Formation, as shown in Figure 3-3. Figure 3-4 is a cross-section location map, and Figures 3-5 and 3-6, adapted from the 2017 Annual Report (TEC-Weston 2018), present cross-sections trending east-west and north-south, respectively, which illustrate the geology underlying CJAG. The Pottsville Formation varies significantly in composition both vertically and laterally, ranging from coarse, permeable sandstones to impermeable shales.

Due to the variation in composition, the Pottsville Formation is subdivided into the members and units discussed in the subsections below. The base unit of the Pottsville Formation is sandstone, which is locally conglomeratic and underlain by Mississippian-age shale of the Cuyahoga Formation (Winslow and White 1966).

3.2.1 Unconsolidated

The surface of the eastern two-thirds of the CJAG property is composed of the clay-rich and relatively impermeable Hiram Till and associated outwash plain deposits. The western third of CJAG is covered by the Lavery Till, a silty, sandy deposit with occasional cobbles and sporadic boulders (Winslow and White 1966). The first Wisconsinan glacial advance deposited the Lavery Till at a thickness of 20–40 ft. The second advance covered only the eastern two-thirds of CJAG, depositing the Hiram Till (Kammer 1982). The Hiram Till consists of 12% sand, 41% silt, and 47% illite and chlorite clay minerals, and ranges in thickness from 5–15 ft below ground surface (bgs). In the far northeastern corner of CJAG, the Hiram Till overlies thin beds of sandy outwash material. Across CJAG, the thickness of unconsolidated deposits ranges from less than 3 ft to approximately 45 ft (Author unknown 1998; as cited in the Integrated Natural Resources Management Plan [OHARNG 2014]).

3.2.2 Homewood Sandstone

The Homewood Sandstone Member is the uppermost Member of the Pottsville Formation, and it is present in the western portion of CJAG. The Homewood Member consists of a range of well-sorted, coarse-grained, white quartzose sandstone to a tan, poorly sorted, clay-bonded, micaceous, medium- to fine-grained sandstone. Thin shale layers are prevalent in the Homewood Member, as indicated by a darker gray shade of color. The Homewood Sandstone Member lies unconformably upon the Mercer Member of the Pottsville Formation and often forms a caprock (Winslow and White 1966).

3.2.3 Mercer Shale

The Mercer Shale Member consists of silty to carbonaceous shale, thin coal, underclay, and limestone layers with abundant thin, discontinuous sandstone lenses in the upper portion. This member occurs in the western portion of CJAG along eroded/incised slopes; however, it is not well documented at CJAG. The Mercer Member is underlain by the Massillon Sandstone Member (Winslow and White 1966).

3.2.4 Massillon Sandstone

The Massillon Sandstone Member consists of coarse- to medium-grained micaceous sandstone beds, which are commonly cross-bedded and often separated by shale beds. The separating silty sandy shale beds can be up to 50 ft thick and contain plant fragments. The sandstone beds contain rounded granules and quartz pebbles in some locations, but do not create thick conglomerate beds. The Massillon Sandstone unconformably overlies the Shale unit of the Sharon Member of the Pottsville Formation (Winslow and White 1966).

3.2.5 Sharon Shale

The Sharon Member of the Pottsville Formation contains two distinct units: the Upper Sharon and the Basal Sharon Conglomerate. The Upper Sharon is composed of thin gray to black sandy to micaceous shale lenses, containing thin coal, underclay, and sandstone lenses. This unit is present in the western portion of CJAG, but was eroded from the eastern portion of the property before the Massillon

Sandstone was deposited. The Sharon Shale unit overlies the Sharon Sandstone/Conglomerate unit (Winslow and White 1966).

3.2.6 Basal Sharon Conglomerate

The Basal Sharon Conglomerate unit is the basal portion of the Pottsville Formation and is a highly porous, loosely cemented, permeable, cross-bedded, frequently fractured, and weathered sandstone. The conglomerate portion consists of well-rounded quartz pebbles and granules with little sand-sized matrix or cement. The conglomerate typically occurs within the lower (deeper) portions of the unit, which lies unconformably upon the Mississippian-age shale of the Cuyahoga Formation (Winslow and White 1966).

3.2.7 Cuyahoga Shale

The Meadville Shale is the uppermost unit of the Mississippian-age Cuyahoga Group. It consists of micaceous, blue-gray sandy shale with flagstone and clay-ironstone layers. The Meadville Shale overlies the Sharpsville Sandstone of the Cuyahoga Group, which overlies the Orangeville Shale of the Cuyahoga Group (Winslow and White 1966). While previously mapped in limited extent on the eastern portion of CJAG (Portage Environmental 2004), subsequent studies (TEC-Weston 2016) indicate the mapped unit is actually the Sharon Member.

3.3 SITE HYDROGEOLOGY

Throughout CJAG, depth to groundwater ranges from less than 1 ft bgs to more than 115 ft bgs, with static water elevations occurring from approximately 930–1,176 ft above mean sea level (amsl). Table 3-1 provides the aquifer depths relative to ground surface and sea level.

Table 3-1. Aquifer Depths Relative to Ground Surface and Sea Level

Aquifer	Aquifer Depths			
	Below Ground Surface		Elevation	
	Minimum Depth	Maximum Depth	Upper Elevation	Lower Elevation
Unconsolidated	1 ft bgs	11 ft bgs	930 ft amsl	1,175 ft amsl
Homewood	7.5 ft bgs	47 ft bgs	1,105 ft amsl	1,176 ft amsl
Upper Sharon	3 ft bgs	118 ft bgs	938 ft amsl	1,060 ft amsl
Basal Sharon Conglomerate	2 ft bgs	116 ft bgs	942 ft amsl	1,068 ft amsl

amsl = Above mean sea level.
bgs = Below ground surface.
ft = Feet.

Observed gradients indicate groundwater flows from bedrock highs in the western portion of the property toward stream valleys in the eastern portion. These latter areas act as discharge areas, as indicated by the static water levels in monitoring wells across the installation (Kammer 1982).

The majority of CJAG is composed of clay-rich glacial tills with low permeability and underlying bedrock formations with extremely variable, but relatively low, permeability. Typical yields from wells were reported in the 1982 study as penetrating the "Sharon Conglomerate" range from 5–200 gallons

per minute (gpm); yields from the overlying unconsolidated deposits are usually considerably lower. In addition, the thickness and permeability of the bedrock water-bearing formations at CJAG vary considerably and have a strong effect on well yields, transmissivity, and hydraulic conductivity (Kammer 1982).

3.3.1 Unconsolidated

Groundwater occurs within the unconsolidated deposits in many areas of the facility. The thickness of the unconsolidated deposits at the facility ranges from thin to absent in the eastern and northeastern portions of the facility to an estimated 150 ft in pre-glacial valleys near the central portion of the facility. Because of the heterogeneous nature of the unconsolidated glacial material, groundwater flow paths likely exhibit local variations, which are difficult to determine.

The hydraulic gradient in the Unconsolidated aquifer predominantly trends in an eastward direction; however, the unconsolidated zone shows numerous local flow variations influenced by topography and stream drainage patterns, with localized flow along preferential pathways (e.g., sand seams, channel deposits, or other stratigraphic discontinuities) having higher permeabilities than surrounding clay or silt-rich material. The local variations in flow direction suggest 1) groundwater in the unconsolidated deposits is generally in direct hydraulic communication with surface water, and 2) surface water drainageways may also act as groundwater discharge locations. In addition, topographic ridges between surface water drainage features act as groundwater divides in the unconsolidated deposits.

In the region of CJAG, groundwater recharge occurs via surface infiltration of precipitation along root zones, desiccation cracks, partings within the soil column, and general percolation through sand and gravel within buried valleys. Two large buried valleys occur southwest and northwest of the facility; wells in the Unconsolidated aquifers in these valleys can yield up to 1,600 gpm. Monitoring wells that currently exist in unconsolidated material on the CJAG property range in depth from 14–130 ft bgs. Figure 5-1 shows the potentiometric surface of groundwater in unconsolidated material within the facility in April 2019.

3.3.2 Homewood Sandstone

The uppermost bedrock aquifer at CJAG is the Homewood Sandstone, which is reportedly only capable of well yields less than 10 gpm (Kammer 1982). The Homewood aquifer is present in the central and western portions of the property. It is usually bound above by unconsolidated glacial till and below by the Mercer Member. Existing monitoring wells screened within the Homewood Sandstone Member range in depth from 19–50 ft bgs. Figure 5-2 shows the potentiometric surface of Homewood Sandstone groundwater within the facility in April 2019.

Review of regional geology maps (Winslow and White 1996) and historical monitored formation interval designations at CJAG during preparation of the FWGW RIWP indicated certain groundwater monitoring wells in the area of the Fuze and Booster Quarry, including Load Lines 5 through 10, known as Fuze and Booster Hill, were likely incorrectly identified to be installed within the Homewood Sandstone Formation. Site stratigraphic descriptions collected during the installation of new monitoring

wells in the Fuze and Booster Hill portion of the facility will be used to evaluate the lithology and presence of the Homewood Sandstone Formation in this area. Results of the lithologic review, the indicated effect of low-permeability shale units on groundwater vertical migration, and any recommended revisions to monitored formation designations for groundwater wells in this portion of CJAG will be included in the pending RI Report.

3.3.3 Upper Sharon

The principal water-bearing aquifer at CJAG is the Sharon Sandstone/Conglomerate unit of the Pottsville Formation. Depending on the existence and depth of overburden, the Sharon Sandstone/Conglomerate unit ranges from an unconfined to a leaky artesian (semi-confined) aquifer. The Sharon Shale is a confining unit to the Upper Sharon aquifer where present in the western portion of the property. Water yields from area wells completed in the Sharon Sandstone/Conglomerate unit ranged from 30–400 gpm (USATHAMA 1978). Well yields of 5–200 gpm were reported for on-site bedrock wells completed in the Sharon Sandstone/Conglomerate unit (Kammer 1982). Existing monitoring wells screened within the Upper Sharon unit, including those in the Sharon Shale, range in depth from 12.6– 213.5 ft bgs.

Figure 5-3 shows the potentiometric surface of Upper Sharon groundwater within the facility in April 2019. This bedrock potentiometric map shows a more uniform and regional eastward flow direction that is less affected by local surface topography than unconsolidated material and Homewood Sandstone groundwater.

3.3.4 Basal Sharon Conglomerate

The Sharon Sandstone/Conglomerate unit is the most productive unit of the Pottsville Formation and is the major bedrock aquifer in northeastern Ohio. A 1982 study reported that of the 71 groundwater wells that had been installed at the installation, 57 were completed in the Sharon Conglomerate, indicated by the study including the entire Sandstone/Conglomerate unit of the Sharon Member, rather than the Basal Sharon Conglomerate aquifer currently described for CJAG. Data from the 1982 study indicated that the thickness of the Sharon Conglomerate ranges from 44–177 ft (Kammer 1982). Existing monitoring wells screened within the Sharon Conglomerate range in depth from 90–277 ft bgs.

Figure 5-4 shows the potentiometric surface of Basal Sharon Conglomerate groundwater within the facility in April 2019. The bedrock potentiometric map shows a more uniform and regional eastward flow direction that is less affected by local surface topography than the overlying aquifers.

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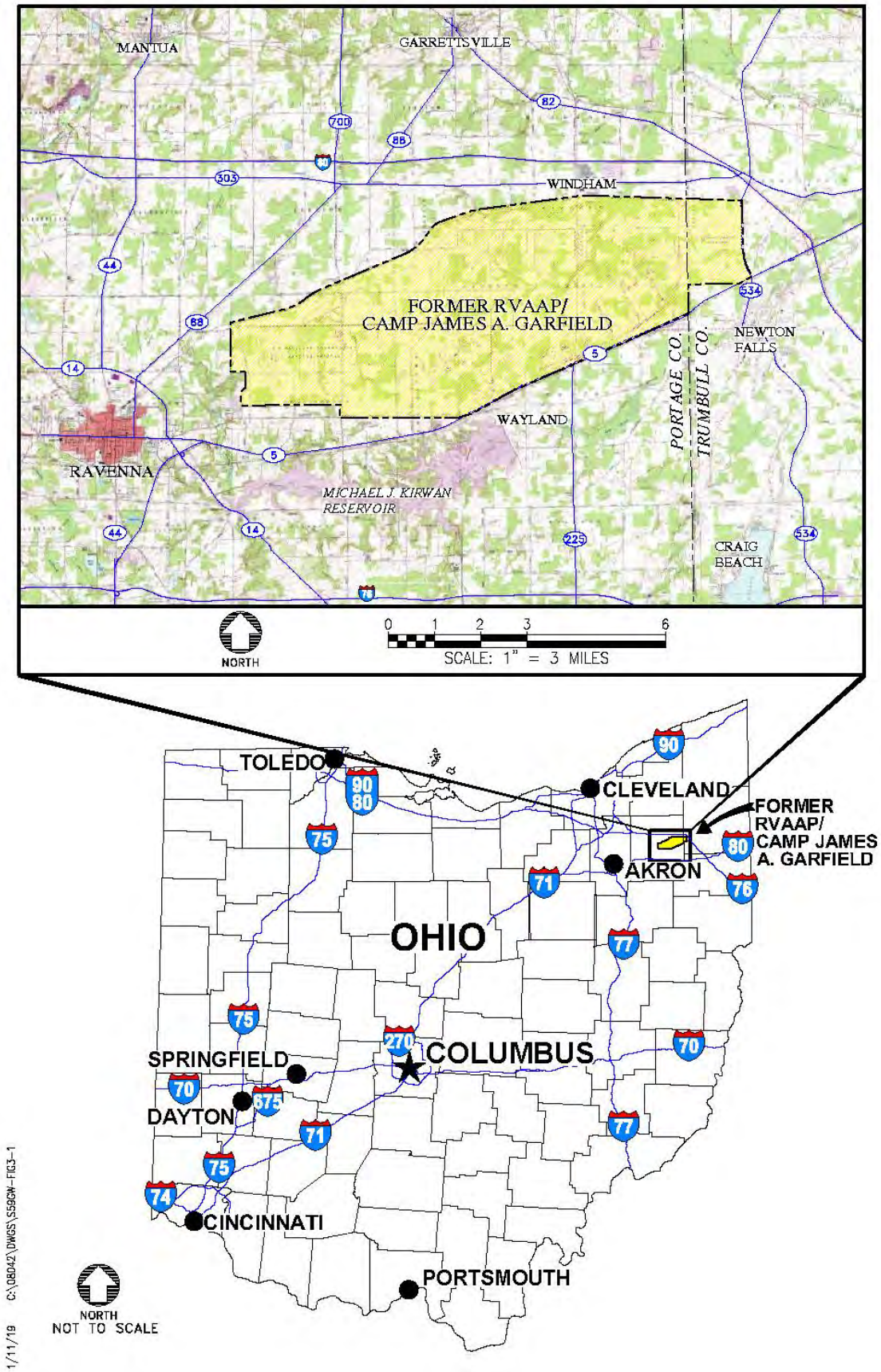

Figure 3-1. General Location and Orientation of Camp James A. Garfield

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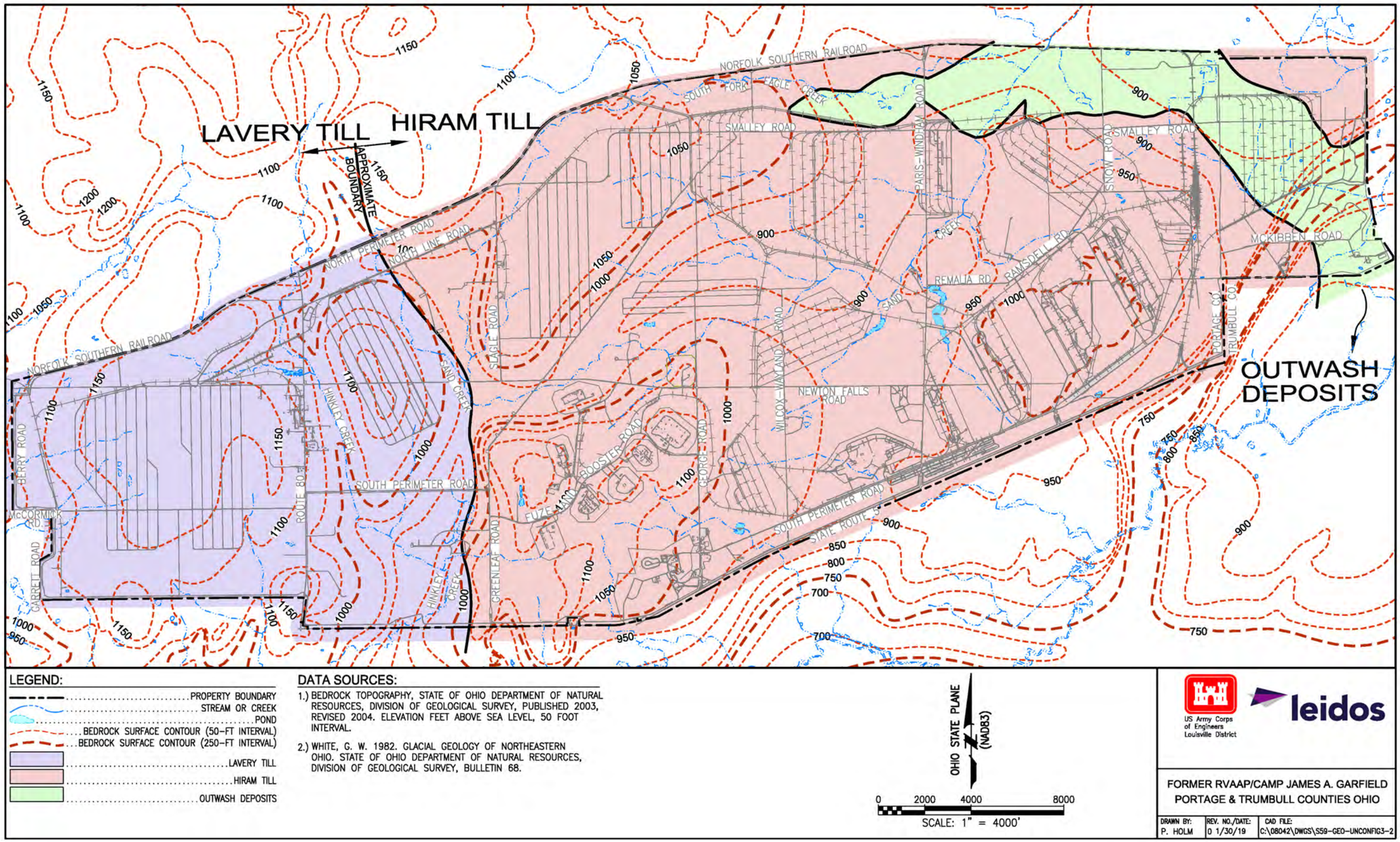


Figure 3-2. Geologic Map of Unconsolidated Deposits at Camp James A. Garfield

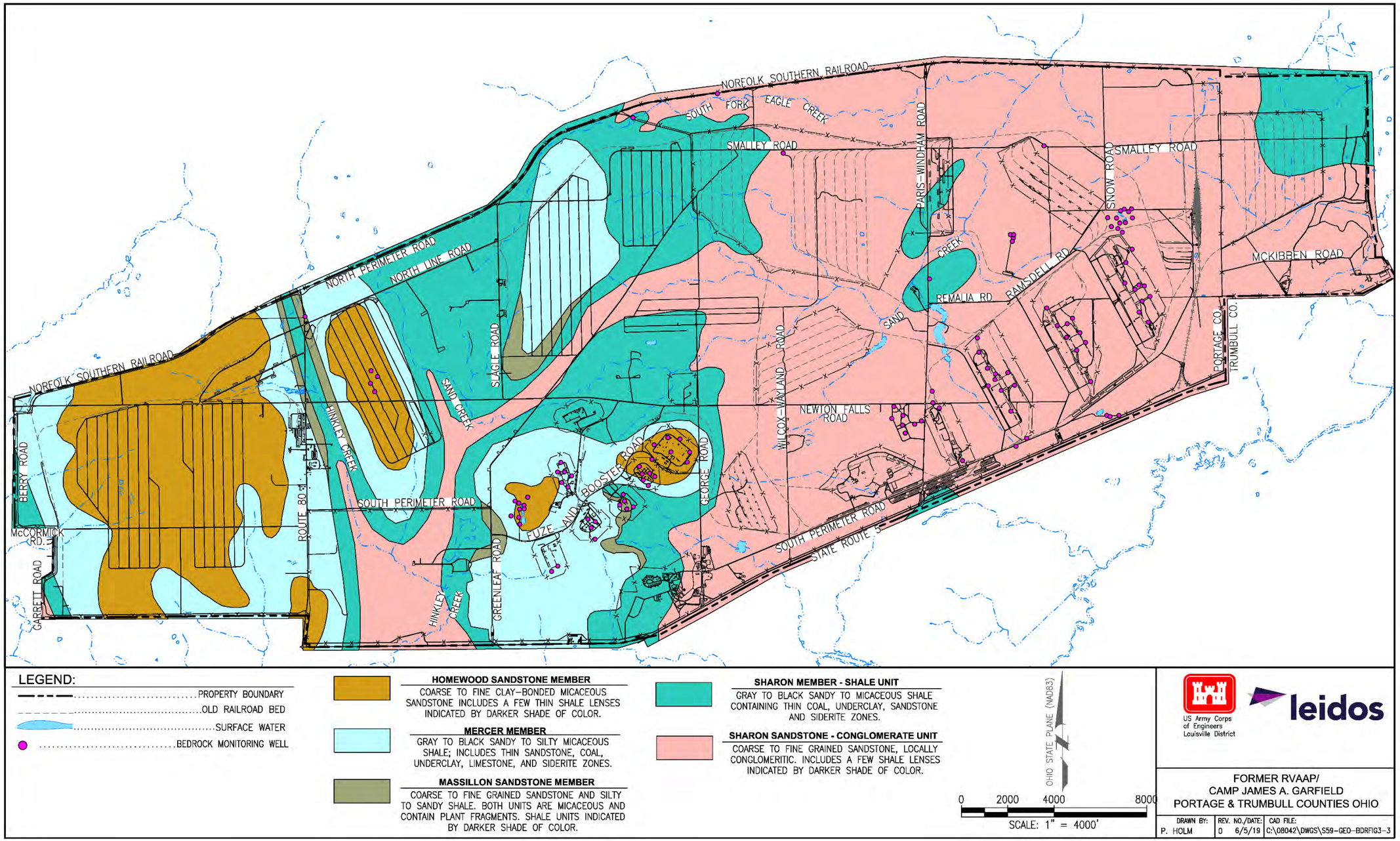


Figure 3-3. Geologic Bedrock Map and Stratigraphic Description of Units at Camp James A. Garfield

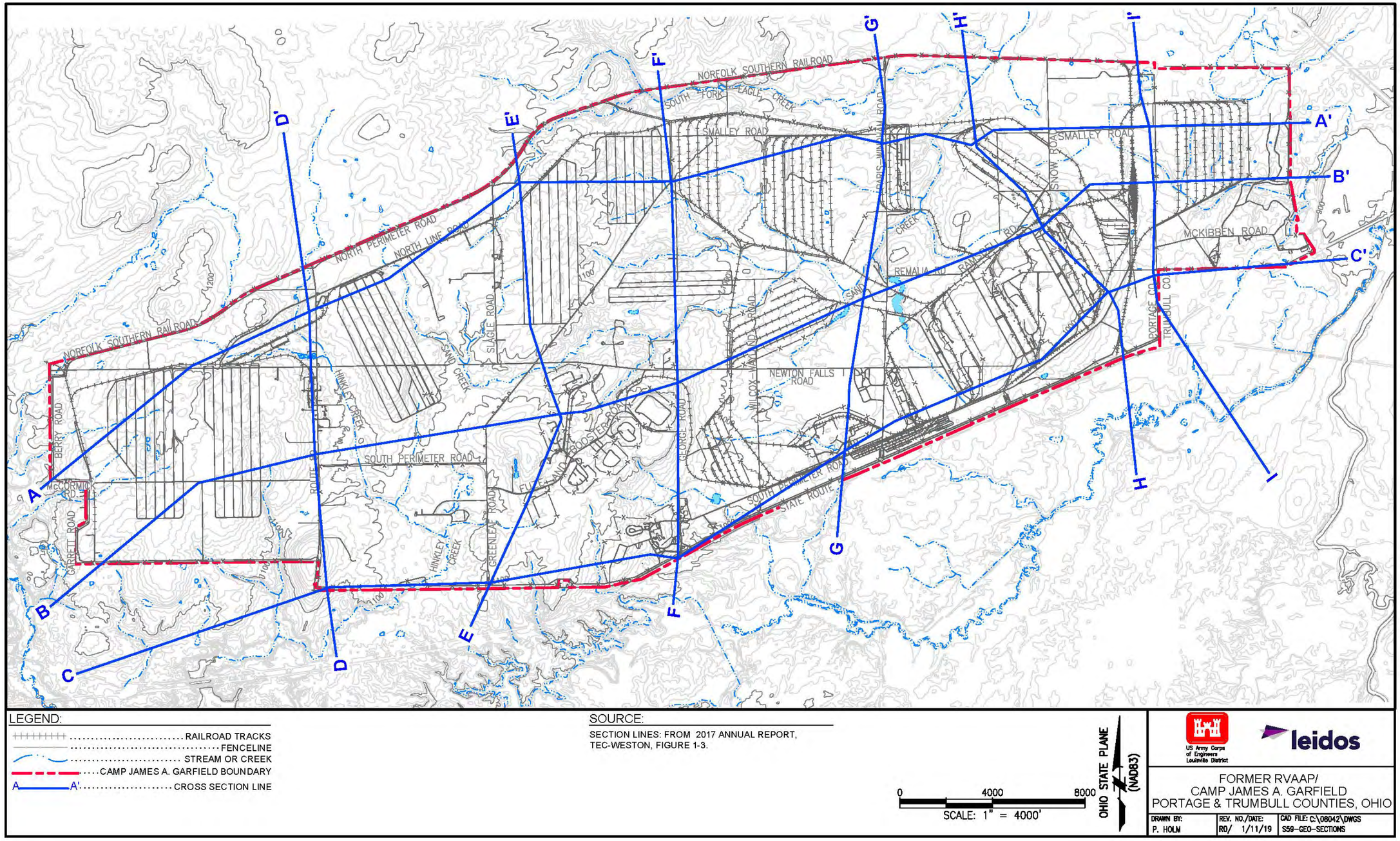
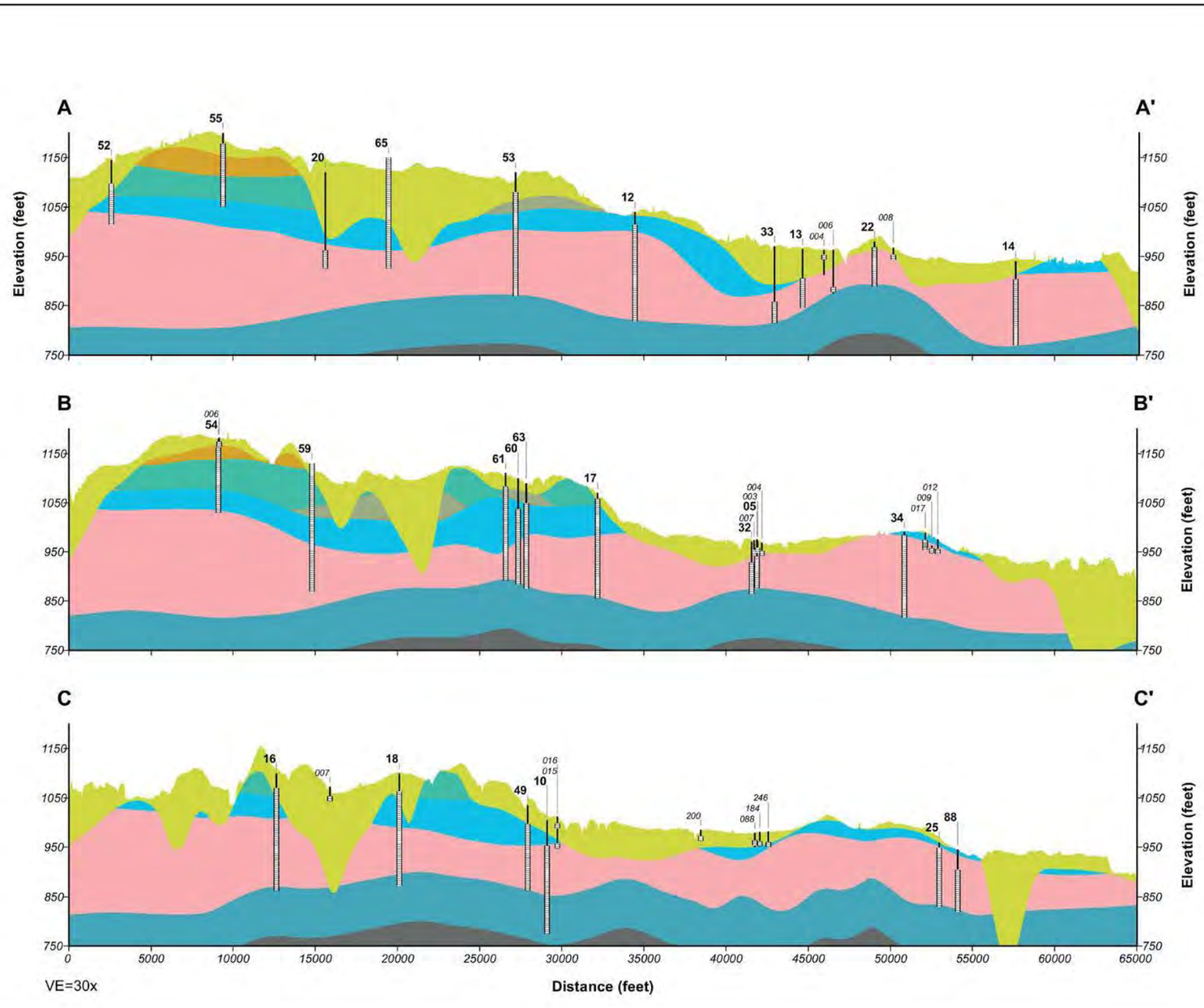
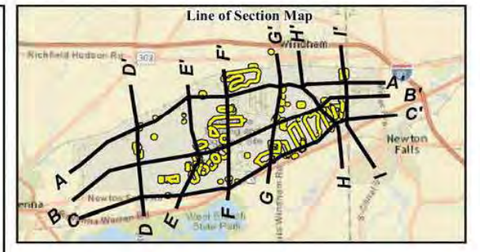


Figure 3-4. Line of Section Map





Legend

- AOC boundary
- Lines of Section

Site Wells

- Leader
- Casing
- Screen

Geology

- Unconsolidated
- Homewood Sandstone Member
- Mercer Member
- Massillon Sandstone Member
- Sharon Member, Shale Unit
- Sharon Member, Sandstone/Conglomerate Unit

Pottsville Formation

- Cuyahoga Group
- Berea Sandstone

SOURCE:

CROSS SECTIONS: FROM 2017 ANNUAL REPORT, TEC-WESTON, FIGURE 1-4.

US Army Corps of Engineers Louisville District

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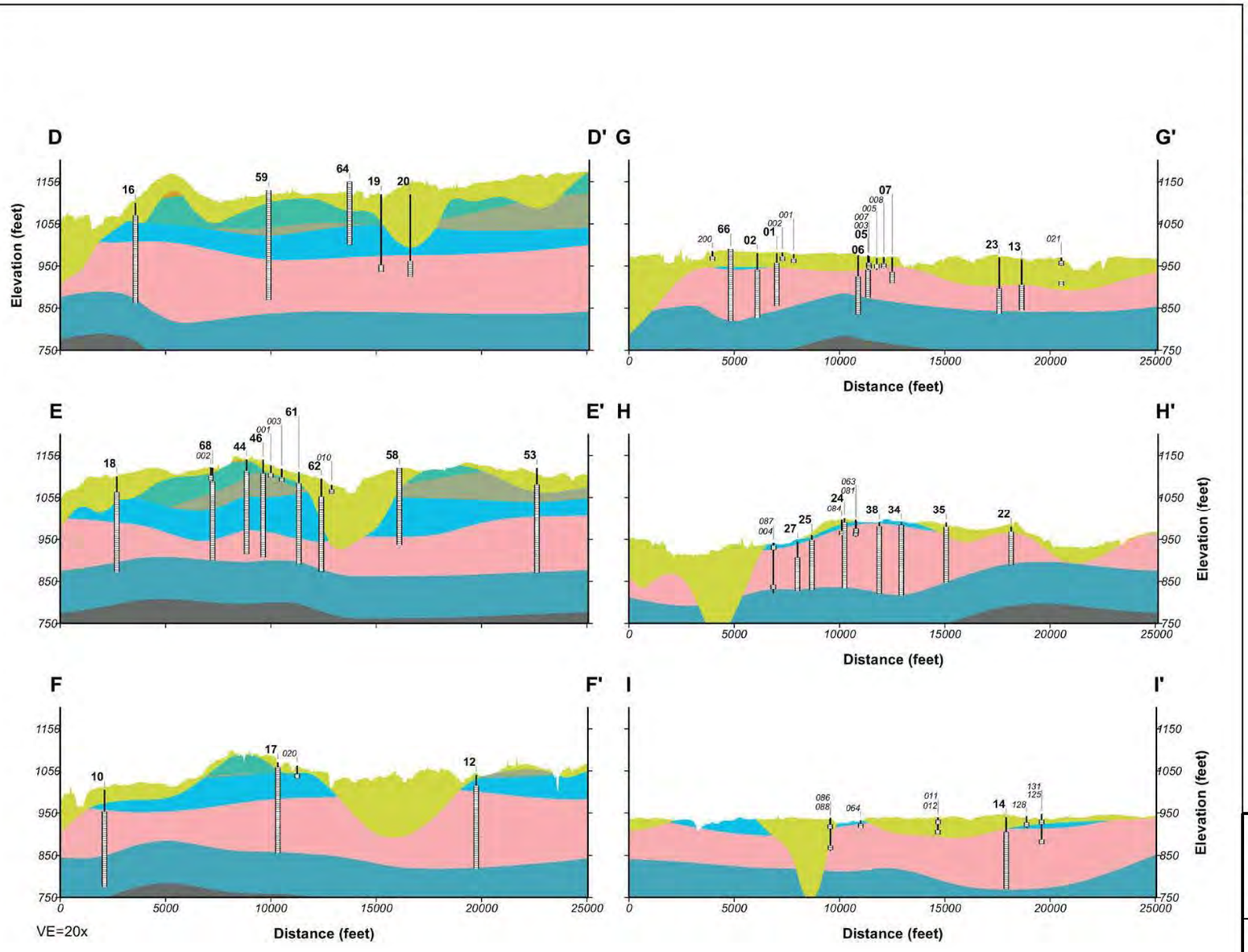
FORMER RVAAP/
CAMP JAMES A. GARFIELD
PORTAGE & TRUMBULL COUNTIES, OHIO

DRAWN BY:	REV. NO./DATE:	CAD FILE: C:\D8042\DWGS
P. HOLM	1/11/19	S59-GEO-CS-EW

Figure 3-5. East-West Cross-Sections (A-C)



Legend

- AOC boundary
- Lines of Section

Site Wells

- Leader
- Casing
- Screen

Geology

- Unconsolidated
- Homewood Sandstone Member
- Mercer Member
- Massillon Sandstone Member
- Sharon Member, Shale Unit
- Sharon Member, Sandstone/Conglomerate Unit

Pottsville Formation

- Cuyahoga Group
- Berea Sandstone

SOURCE:

CROSS SECTIONS: FROM 2017 ANNUAL REPORT, TEC-WESTON, FIGURE 1-4.

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PORTAGE & TRUMBULL COUNTIES, OHIO

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P. HOLM	1/11/19	S59-GEO-CS-NS

Figure 3-6. North-South Cross-Sections (D-I)

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4.0 2019 MONITORING PROGRAM

This section summarizes activities conducted during implementation of the 2019 monitoring program.

4.1 MONITORING WELL GAUGING AND INSPECTIONS

From April 23 to April 29, 2019, Leidos conducted the annual groundwater elevation monitoring event (discussed in Section 5.1). During this event, permanent monitoring wells within the FWGWMP monitoring well network were inspected, the condition of each well was documented, and the groundwater water elevations were recorded. The groundwater elevations for six wells were unable to be recorded, as explained below:

- Groundwater elevations were not obtained from RQLmw-017, DETmw-004, SCLmw-001, and SCLmw-002 due to the top of the permanent pump being above the groundwater level.
- Groundwater elevations at DA2mw-105 and WBGmw-013 were not obtained because the casing contained active bee nests. The Army agreed that collection of the groundwater level was not warranted in lieu of the safety concerns.

The 2019 monitoring well inspection report was provided to the Army and contained the well inspection field forms and photographs. The groundwater monitoring well conditions and repair recommendations are summarized in Appendix H.

4.2 FWGWMP MONITORING WELLS INSTALLED AND ABANDONED

The following subsections describe wells that were installed and abandoned in 2019 as part of the FWGWMP.

4.2.1 Monitoring Wells Installed

No monitoring wells were installed in 2019 under the FWGWMP.

4.2.2 Monitoring Wells Abandoned

The following subsections describe the well abandonment activities that were performed in 2019. Appendix A contains the Water Well Sealing Report for the Ohio Department of Natural Resources.

4.2.2.1 Open Demolition Area #1

On June 12, 2019, Frontz Drilling abandoned temporary monitoring well DA1tw-001 (depth of 18 ft bgs). This monitoring well was located south of the Open Demolition Area #1 AOC boundary. The casing was cut to a depth below ground surface, and the well was sealed with bentonite.

4.2.2.2 Electric Substation No. 3

On June 12, 2019, Frontz Drilling abandoned temporary monitoring wells ES3tw-001 (depth of 8.5 ft bgs), ES3tw-002 (depth of 10 ft bgs), and ES3tw-003 (depth of 10 ft bgs), which were located within the footprint of the former Electric Substation No. 3. The well casing was removed at each well, and each hole was sealed with bentonite.

4.3 MONITORING WELL SAMPLING EVENTS

The following subsections briefly describe the two semi-annual sampling events that occurred in 2019 per the 2019 Addendum (Leidos 2019a) and the quarterly sampling events at the Sand Creek Disposal Road Landfill wells. Tables 4-1 through 4-3 summarize wells sampled in 2019 and the associated chemical groups that were analyzed. Figure 4-1 presents the locations of all wells sampled in 2019. Appendix B contains the reports, logbooks, calibration logs, and purge forms associated with 2019 field events, and Appendix C presents the laboratory analytical results.

4.3.1 Spring 2019 Sampling Event

The Spring 2019 FWGWMP sampling event was conducted from April 29 to May 13, 2019. In accordance with the 2019 Addendum (Leidos 2019a), a total of 72 monitoring wells were sampled during the first semi-annual event of 2019. This included three wells at the Sand Creek Disposal Road Landfill (SCLmw-001, SCLmw-002, and SCLmw-003). The Sand Creek Disposal Road Landfill wells were sampled on May 8, 2019 for the third of four quarters required for newly installed permanent monitoring wells, as discussed in Section 4.3.3.

Table 3-2 of the 2019 Addendum specified some constituents at specified wells (marked with the footnote "1") to be analyzed in Spring 2019 due to missed tests or rejected results in 2018. This footnote states "Indicates monitoring well or constituents to be sampled in spring 2019 due to missed tests or rejected results in 2018. Additional sampling during 2019 for these wells and constituents will be based on review of spring 2019 results." The results associated with these re-collected samples are discussed below.

- FWGmw-019 – Nitroguanidine and nitrocellulose were analyzed in Spring 2019, and neither chemical was detected.
- FWGmw-022 – Nitroguanidine and nitrocellulose were analyzed in Spring 2019, and neither chemical was detected.
- FWGmw-023 – Nitroguanidine and nitrocellulose were analyzed in Spring 2019, and neither chemical was detected.
- NTAmw-120 – Hexachlorocyclopentadiene was analyzed in Spring 2019 but was not detected.

Since none of the chemicals were detected in the specific wells, further analysis in Fall 2019 was not required. The overall results of the Spring 2019 FWGWMP sampling event are further discussed in Section 6.0.

4.3.2 Fall 2019 Sampling Event

The Fall 2019 FWGWMP sampling event was conducted from September 30 to October 9, 2019. A total of 69 monitoring wells were sampled. In addition to what was specified in the 2019 Addendum, the following wells were sampled in accordance with FCR LEIDOS_FWGW_009:

- Monitoring wells FWGmw-002, BKGmw-021, LL1mw-080, B12mw-012, and EBGmw-125 were analyzed for metals to further understand nature and extent of contamination. (LL1mw-080 and EBGmw-125 were specified to be sampled in Fall 2019 per the 2019 Addendum, but the specified analyses did not include metals.)
- Monitoring well LL1mw-063 was sampled and analyzed for explosives, propellants, and cyanide to ensure data gaps are addressed upon submission of the RI Report.
- Monitoring well FWGmw-004 was sampled and analyzed for cyanide in Fall 2019 to ensure data gaps are addressed upon submission of the RI Report. (FWGmw-004 was specified to be sampled in Fall 2019 per the 2019 Addendum, but the specified analyses did not include cyanide.)

The three permanent wells at the Sand Creek Disposal Road Landfill were not sampled in Fall 2019, as the fourth quarter of sampling at these wells was conducted in August 2019, and a review of the analytical results indicated that additional characterization of groundwater at this site was not warranted.

The overall results of the Fall 2019 FWGWMP sampling event are discussed in Section 6.0.

4.3.3 Sand Creek Disposal Road Landfill Quarterly Sampling Events

From October 25 to October 31, 2018, three permanent monitoring wells (SCLmw-001, SCLmw-002, and SCLmw-003) were installed and developed at the Sand Creek Disposal Road Landfill AOC. Monitoring wells SCLmw-001 and SCLmw-002 were installed within the floodplain of Sand Creek, downgradient from the hillside where waste/debris was dumped. Monitoring well SCLmw-003 was on the hillside, upgradient from where waste/debris was dumped. The well installation is summarized in the 2018 Annual Report (Leidos 2019c).

As per facility protocol for newly installed permanent wells, these wells were sampled for four quarters and analyzed for the RVAAP full suite of chemicals. The first quarter sampling event was conducted on November 1, 2018, and is summarized in the 2018 Annual Report (Leidos 2019c). The following subsections summarize the results of the second, third, and fourth quarter sampling events that were conducted in 2019.

Table 4-3 summarizes the chemical groups analyzed, Table 4-6 summarizes the field parameter measurements, Table 4-7 summarizes screening level exceedances, and Figure 4-2 presents the screening level exceedances at the Sand Creek Disposal Road Landfill wells.

4.3.3.1 Second Quarter Sampling Event

The second quarter sampling event at the Sand Creek Disposal Road Landfill wells was conducted on January 28, 2019. The analytical results are summarized below:

- Metals
  - Manganese exceeded the screening level in all three wells at concentrations ranging from 0.33 to 1.2J mg/L, above the background concentration of 0.075 mg/L.
  - Iron exceeded the screening level in SCLmw-002 only, with a concentration of 11 mg/L, above the background concentration of 1.91 mg/L.
  - No other metals had concentrations exceeding their screening level.
- Explosives – No explosives were detected in any well.
- Semi-volatile organic compounds (SVOCs)
  - Benzoic acid was detected in wells SCLmw-002 and SCLmw-003 at low, estimated concentrations of 9.8J µg/L and 11J µg/L, respectively. These concentrations are below the tapwater regional screening level (RSL) at 7,500 µg/L.
  - Naphthalene was detected at SCLmw-001 at a low, estimated concentration of 0.017J µg/L. This concentration was below the tapwater RSL at 0.17 µg/L.
  - No other SVOCs were detected in any well.
- Volatile organic compounds (VOCs)
  - Methylene chloride was detected in the sample from SCLmw-002, at an estimated concentration of 0.33J µg/L, which is below the MCL of 5 µg/L.
  - No other VOCs were detected in any well.
- Pesticides/PCBs – No pesticides or PCBs were detected in any well.

4.3.3.2 Third Quarter Sampling Event

The third quarter sampling event at the Sand Creek Disposal Road Landfill wells was conducted on May 8, 2019. The analytical results are summarized below:

- Metals
  - Manganese exceeded the screening level in all three wells at concentrations ranging from 0.23 to 1.1J mg/L, above the background concentration of 0.075 mg/L.
  - Iron exceeded the screening level in SCLmw-002 only with a concentration of 10 mg/L, above the background concentration of 1.91 mg/L.
  - No other metals had concentrations exceeding their screening level.
- Explosives – No explosives were detected in any well.
- SVOCs – No SVOCs were detected in any well.
- VOCs – The only VOC detected was acetone in SCLmw-002 and SCLmw-003, both at an estimated concentration of 2.1J µg/L, which is below the tapwater RSL at 1,400 µg/L.
- Pesticides/PCBs – No pesticides or PCBs were detected in any well.

4.3.3.3 Fourth Quarter Sampling Event

The fourth quarter sampling event at the Sand Creek Disposal Road Landfill wells was conducted on August 13, 2019. The analytical results are summarized below:

- Metals
  - Manganese exceeded the screening level in all three wells at concentrations ranging from 0.26 to 0.74 mg/L, above the background concentration of 0.075 mg/L.
  - Iron exceeded the screening level in SCLmw-002 only with a concentration of 7.9 mg/L, above the background concentration of 1.91 mg/L.
  - No other metals had concentrations exceeding their screening level.
- Explosives
  - Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) was detected in SCLmw-002 at a concentration of 0.54 µg/L, which is below the tapwater RSL of 0.97 mg/L.
  - No other explosives were detected in any well.
- SVOCs – No SVOCs were detected in any well.
- VOCs – No VOCs were detected in any well.
- Pesticides/PCBs – No pesticides or PCBs were detected in any well.

4.4 SEDIMENTATION AND TURBIDITY

Historically, elevated turbidity readings have been measured in many of the RVAAP restoration program monitoring wells. Mitigation efforts to reduce elevated turbidity in groundwater samples were implemented in 2016.

The primary approach to reduce turbidity was to install permanent bladder pumps in the monitoring wells that are to be sampled on a regular basis. The permanent pumps eliminate the need to lower and raise equipment in the well, which disturbs the sediment at the bottom of the well. All existing wells selected for sampling in 2019 had previously installed bladder pumps, with the exception of SCFmw-004. SCFmw-004 is an artesian well; therefore, a well packer is used to inhibit groundwater from perpetually flooding the well casing. A minimum of 48 hours prior to sampling, the well packer was removed and a bladder pump was installed.

4.4.1 Turbidity Results

Turbidity was measured during groundwater sampling using YSI ProDSS and Horiba U-52 turbidity meters during the Spring 2019 sampling event. During the Fall 2019 sampling event, turbidity was measured using an Aqua TROLL 600 Multiparameter Sonde.

In accordance with turbidity stabilization requirements for sampling procedures at the facility, turbidity was considered stable when readings less than or equal to 10 nephelometric turbidity units (NTUs) were achieved or the turbidity was less than 50 NTUs after 2 hours of purging the well. In cases where a metal analysis was required and the final turbidity reading was greater than 50 NTUs after 2 hours, a field-filtered sample was collected through a minimum 5-micron filter for analysis of dissolved metals.

The Spring 2019 sampling event included collecting groundwater samples from 72 monitoring wells. Final turbidity readings prior to sampling ranged from 0.09–87.06 NTUs. Ten of 72 readings were between 10 and 50 NTUs, and one well (LL1mw-086) had a final turbidity reading greater than 50 NTUs. As a metal analysis was specified for LL1mw-086, both field-filtered and nonfiltered samples for metal analyses were collected at this well. A field filtered sample also was collected at LL12mw-242, although the turbidity was only 29.01 NTU. Table 4-4 presents all final turbidity readings from the Spring 2019 sampling event.

The Fall 2019 sampling event included collecting groundwater samples from 69 monitoring wells. Final turbidity readings prior to sampling ranged from 0.1–509.99 NTUs. One of the wells (FWGmw-011 at 18.22 NTU) had turbidity between 10 and 50 NTUs after purging for 2 hours. Three wells (LL12mw-242 at 158.88 NTU, LL1mw-086 at 216.31 NTU, and FWGmw-002 at 509.99 NTU) had final turbidity readings greater than 50 NTU. A metal analysis was specified for LL12mw-242, LL1mw-086, and FWGmw-002; therefore, both field-filtered and nonfiltered samples for metal analyses were collected at these wells. Table 4-5 presents all final turbidity readings from the Fall 2019 sampling event.

4.4.2 Well Redevelopment

As part of the ongoing FWGWMP, wells will be selected for redevelopment to remove accumulated sediment and fines from the filter packs. Redevelopment of monitoring wells, as stated in the RIWP, will occur if one of the following criteria is met:

- Monitoring wells have turbidity levels between 10 and 20 NTUs, if there is greater than 0.5 ft of sedimentation in the bottom of the well, all previous rounds showed exceedingly high NTU, and the well is a non-producer (i.e., low yield).
- Turbidity levels were greater than 20 NTUs, unless turbidity levels were less than 10 NTUs in the three previous rounds and unless the well is located within a naturally high turbidity water-bearing zone/aquifer.

During the Spring 2019 sampling event, turbidity readings were greater than 20 NTUs for wells FBQmw-176, LL12mw-242, LL1mw-086, LL2mw-267, and SCFmw-004, as discussed below:

- FBQmw-176 – Turbidity in Spring 2019 was 39.35 NTU and 4.95 NTU in Fall 2019. Three of the previous four samples prior to 2019 had a turbidity less than 10 NTU.
- LL12mw-242 – Turbidity in Spring 2019 was 29.01 NTU and 158.88 NTU in Fall 2019. Three previous samples prior to 2019 had a turbidity greater than 10 NTU.
- LL1mw-086 – Turbidity in Spring 2019 was 87.06 NTU and 216.31 NTU in Fall 2019. Three of the previous four samples prior to 2019 had a turbidity greater than 10 NTU.
- LL2mw-267 – Turbidity in Spring 2019 was 39.6 NTU and 7.6 NTU in Fall 2019. Three samples prior to 2019 had a turbidity less than 10 NTU.
- SCFmw-004 – Turbidity in Spring 2019 was 37.7 NTU and 3.9 NTU in Fall 2019. Three samples prior to 2019 had a turbidity less than 10 NTU.

During the Fall 2019 sampling event, turbidity readings were greater than 20 NTUs for wells FWGmw-002, FWGmw-011, L12mw-242, and LL1mw-086. However, FWGmw-011 had a turbidity reading less than 20 NTU during the Spring 2019 sampling event. FWGmw-002 was not sampled during the Spring 2019 sampling event, but the most recent sampling at this well on May 2, 2017 (305 NTU) and December 5, 2017 (23.1 NTU) had turbidity exceeding 20 NTU.

No well redevelopment was performed in 2019. Turbidity readings at LL1mw-086 and LL12mw-242 were above 20 NTUs in both sampling events, and the two most recent sampling events at FWGmw-002 was above 20 NTU. These three wells are recommended for redevelopment in 2020.

4.5 pH MONITORING

As part of each sampling event, field parameter readings of pH are collected during the purging and well stabilization process, as presented in Tables 4-4 and 4-5 for Spring and Fall 2019, respectively. The typical pH range for groundwater in the vicinity of the facility is approximately 5–9 standard units (S.U.s). Section 6.0 provides a discussion of pH results in each aquifer.

4.6 LABORATORY ANALYSIS

For the FWGWMP samples collected during the October 2019 sampling event, White Water Associates in Amasa, Michigan, and their subcontracted partner, TestAmerica Laboratories, Inc. (herein referred to as TestAmerica) in Denver, Colorado, performed the analysis of the samples. The TestAmerica facility in Denver, Colorado, performed all analyses, except nitroguanidine and nitrocellulose, which were performed at the TestAmerica facility in Sacramento, California, and hexavalent chromium, which was performed at the TestAmerica facility in North Canton, Ohio. Split samples collected were submitted to CT Laboratories in Baraboo, Wisconsin, and the results were provided directly to USACE, Louisville District.

Appendix C contains the laboratory data associated with the Spring and Fall 2019 semi-annual sampling events.

4.7 DATA VALIDATION

Appendix D contains the laboratory data packages, data validation reports, and data validation summaries associated with the Spring and Fall 2019 semi-annual sampling events.

4.8 GROUNDWATER ANALYTICAL RESULTS

The groundwater analytical results for the Spring and Fall 2019 sampling events are presented in Appendix C. The tables in this appendix present the groundwater results by analyte group (e.g., VOCs, SVOCs) and indicate the AOC and aquifer associated with each monitoring well, as applicable. The tables also include the appropriate screening level and identify data that are equal to or exceed the screening level.

Table 4-8 presents summary statistics of field parameters and chemical analysis by aquifer from the samples collected in 2019.

4.9 INVESTIGATION-DERIVED WASTE

On March 12, 2019,11, 55-gallon drums of liquid investigation-derived waste (IDW) and 5, 55-gallon drums of solid IDW generated during the 2018 well installation and sampling activities (October 18 to November 6, 2018) were properly transported and disposed of. This waste stream also included 9 gallons of liquid IDW from the January 28, 2019 sampling event of the Sand Creek Disposal Road Landfill AOC wells. The IDW was characterized as non-hazardous waste based on analytical results. An IDW Report was approved by OHARNG on January 29, 2019. Appendix E contains the IDW Waste Characterization and Disposal Report, waste profiles, waste manifests, inspections, and supporting laboratory data.

The IDW generated in 2019 consisted of the following:

- Purge water collected from monitoring wells during low-flow sampling activities. Minimal purge water IDW volume was generated during sampling because of the use of dedicated sampling equipment.
- Purge water collected during the production well abandonment activities.
- Decontamination fluids used to decontaminate instruments and equipment before and after purging and sampling at each monitoring well.

Purge water and decontamination fluids were transferred to staged drums within Building 1036 by the end of each day. All drums were properly labeled and inspected.

During the Spring 2019 sampling event, four 55-gallon drums of liquid IDW were generated. This IDW was classified as non-hazardous waste using generator knowledge (based on prior analytical results). On June 13, 2019, the four IDW drums were properly transported and disposed of. Appendix E contains the IDW Waste Characterization and Disposal Report, waste profiles, waste manifests, inspections, and supporting laboratory data.

During the Fall 2019 sampling event and third quarterly Sand Creek Disposal Road Landfill AOC well sampling event, two 55-gallon drums of liquid IDW was generated. This IDW was classified as non-hazardous using generator knowledge (based on prior analytical results). In addition, the production well abandonment activities generated eight 55-gallon drums of liquid IDW. The IDW was classified as non-hazardous waste based on analytical results. Proper transport and disposal of the IDW will be conducted in 2020, and the IDW report, waste profile, waste manifest, inspections, and analytical data will be provided in the 2020 Annual Report.

4.10 FIELD CHANGE REQUESTS

Prior to and during the implementation of the Fall 2019 sampling event, two FCRs pertinent to the FWGWMP field activities were provided and are presented in Appendix F. These FCRs are summarized below:

- LEIDOS_FWGW_009 – Specifies more sample locations and analyses beyond what was specified in the 2019 Addendum (Leidos 2019a) to be conducted in Fall 2019. The additional sampling is summarized below:
  - FWGmw-002, BKGmw-021, LL1mw-080, B12mw-012, and EBGmw-125 for metals analysis to further understand nature and extent of contamination.
  - LL1mw-063 for explosives, propellants, and cyanide to address potential data gaps.
  - FWGmw-004 for cyanide to address a potential data gap.
- LEIDOS_FWGW_010 – Specifies that post-sample readings will not be obtained following groundwater sampling procedures. (NOTE: This FCR was approved near the completion of the Fall 2019 sampling event, and therefore was not implemented in Fall 2019. This FCR will be implemented in future FWGWMP sampling events.)

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Table 4-1. Wells Sampled and Chemical Groups Analyzed in Spring 2019

RVAAP Area	Well ID	Aquifer	VOCs	SVOCs	PCBs	Explosives	Pesticides	Cyanide	Other	Metals, Total
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-007	Upper Sharon	X	X[235]	X	X	X	X	phosphorus	X
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-008	Upper Sharon	X	X[235]	X	X	X	X		X
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-009	Upper Sharon	X	X[235]	X	X	X	X		X
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-011	Upper Sharon							anions, alkalinity	
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-012	Upper Sharon						X	anions, alkalinity	
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-013	Upper Sharon							anions, alkalinity	
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-016	Upper Sharon						X		
RVAAP-02 Erie Burning Grounds	EBGmw-125	Unconsolidated						X		
RVAAP-02 Erie Burning Grounds	EBGmw-131	Upper Sharon						X		
RVAAP-04 Open Demolition Area #2	DA2mw-115	Upper Sharon								X
RVAAP-04 Open Demolition Area #2	DETmw-003	Unconsolidated	X	X[2345]	X	X	X	X		X
RVAAP-04 Open Demolition Area #2	DETmw-004	Unconsolidated	X	X[2345]	X	X	X	X		X
RVAAP-05 Winklepeck Burning Grounds	WBGmw-006	Unconsolidated				X				X
RVAAP-05 Winklepeck Burning Grounds	WBGmw-009	Unconsolidated				X				X
RVAAP-05 Winklepeck Burning Grounds	WBGmw-020	Upper Sharon				X				X
RVAAP-05 Winklepeck Burning Grounds	WBGmw-021	Upper Sharon				X				X
RVAAP-08 Load Line 1	LL1mw-064	Unconsolidated								X
RVAAP-08 Load Line 1	LL1mw-065	Unconsolidated				X				X
RVAAP-08 Load Line 1	LL1mw-080	Upper Sharon				X				
RVAAP-08 Load Line 1	LL1mw-081	Upper Sharon				X		X		
RVAAP-08 Load Line 1	LL1mw-083	Upper Sharon				X			anions, alkalinity	
RVAAP-08 Load Line 1	LL1mw-084	Upper Sharon				X			anions, alkalinity	X
RVAAP-08 Load Line 1	LL1mw-086	Unconsolidated						X	alkalinity	X[1]
RVAAP-08 Load Line 1	LL1mw-087	Unconsolidated				X				X
RVAAP-08 Load Line 1	LL1mw-088	Unconsolidated				X			alkalinity	X
RVAAP-08 Load Line 1	LL1mw-089	Unconsolidated				X			propellants[7]	
RVAAP-09 Load Line 2	LL2mw-059	Upper Sharon				X				X
RVAAP-09 Load Line 2	LL2mw-264	Upper Sharon						X		
RVAAP-09 Load Line 2	LL2mw-267	Upper Sharon				X				X
RVAAP-09 Load Line 2	LL2mw-272	Upper Sharon						X		
RVAAP-10 Load Line 3	LL3mw-234	Upper Sharon						X		
RVAAP-10 Load Line 3	LL3mw-237	Upper Sharon				X				
RVAAP-10 Load Line 3	LL3mw-244	Upper Sharon				X				X
RVAAP-10 Load Line 3	LL3mw-246	Upper Sharon				X			perchlorate	X
RVAAP-11 Load Line 4	LL4mw-200	Unconsolidated						X		
RVAAP-12 Load Line 12	LL12mw-183	Unconsolidated						X		
RVAAP-12 Load Line 12	LL12mw-185	Unconsolidated							nitrate	
RVAAP-12 Load Line 12	LL12mw-187	Unconsolidated							nitrate	X
RVAAP-12 Load Line 12	LL12mw-242	Unconsolidated							nitrate	X1
RVAAP-12 Load Line 12	LL12mw-245	Unconsolidated				X			nitrate	X
RVAAP-12 Load Line 12	LL12mw-247	Unconsolidated							nitrate	X
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-171	Homewood Sandstone						X	anions, alkalinity	
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-172	Homewood Sandstone						X		
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-174	Homewood Sandstone				X			anions, alkalinity	
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-175	Homewood Sandstone							anions, alkalinity	CR [VI]
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-176	Unconsolidated						X		
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-001	Unconsolidated	X	X[5]	X	X	X	X	anions, alkalinity, propellants, perchlorate, phosphorus	X
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-002	Unconsolidated	X	X[5]	X	X	X	X	anions, alkalinity, propellants, perchlorate, phosphorus	X
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-003	Unconsolidated	X	X[5]	X	X	X	X	anions, alkalinity, propellants, perchlorate, phosphorus	X

Table 4-1. Wells Sampled and Chemical Groups Analyzed in Spring 2019 (Continued)

RVAAP Area	Well ID	Aquifer	VOCs	SVOCs	PCBs	Explosives	Pesticides	Cyanide	Other	Metals, Total
RVAAP-38 NACA Test Area	NTAmw-119	Unconsolidated		X[5]		X				X
RVAAP-38 NACA Test Area	NTAmw-120	Upper Sharon		X[6]						
RVAAP-40 Load Line 7	LL7mw-001	Homewood Sandstone						X		X
RVAAP-40 Load Line 7	LL7mw-006	Homewood Sandstone				X				
RVAAP-43 Load Line 10	LL10mw-003	Homewood Sandstone	X							
RVAAP-43 Load Line 10	LL10mw-005	Homewood Sandstone								X
RVAAP-44 Load Line 11	LL11mw-005	Unconsolidated						X		
RVAAP-49 Central Burn Pits	CBPmw-008	Unconsolidated						X		
RVAAP-49 Central Burn Pits	CBPmw-009	Upper Sharon						X		
RVAAP-66 Facility-wide Groundwater	FWGmw-004	Unconsolidated				X				X
RVAAP-66 Facility-wide Groundwater	FWGmw-007	Unconsolidated				X				X
RVAAP-66 Facility-wide Groundwater	FWGmw-011	Unconsolidated				X				X
RVAAP-66 Facility-wide Groundwater	FWGmw-012	Upper Sharon				X				X
RVAAP-66 Facility-wide Groundwater	FWGmw-015	Unconsolidated				X				X
RVAAP-66 Facility-wide Groundwater	FWGmw-016	Upper Sharon				X				X
RVAAP-66 Facility-wide Groundwater	FWGmw-018	Basal Sharon Conglomerate	X					X		X
RVAAP-66 Facility-wide Groundwater	FWGmw-019	Basal Sharon Conglomerate							propellants[7]	
RVAAP-66 Facility-wide Groundwater	FWGmw-020	Upper Sharon	X					X		X
RVAAP-66 Facility-wide Groundwater	FWGmw-021	Upper Sharon				X				X
RVAAP-66 Facility-wide Groundwater	FWGmw-022	Upper Sharon							propellants[7]	
RVAAP-66 Facility-wide Groundwater	FWGmw-023	Upper Sharon							propellants[7]	
RVAAP-66 Facility-wide Groundwater	FWGmw-024	Upper Sharon				X				X
RVAAP-66 Facility-wide Groundwater	SCFmw-004	Basal Sharon Conglomerate								X

1 = Field filtered metals sample collected in addition to normal metals sample due to high turbidity.
2 = Phthalates
3 = Phenols
4 = Nitroaromatics
5 = Low-Level Polycyclic Aromatic Hydrocarbons
6 = Hexachlorocyclopentadiene, re-collected from 2018
7 = Propellants re-collected from 2018
Anions = Sulfate, Sulfide, Nitrate, Nitrite
Propellants = Nitroguanidine/Nitrocellulose
ID = Identifier.
PCB = Polychlorinated biphenyl.
RVAAP = Ravenna Army Ammunition Plant.
SVOC = Semi-volatile organic compound.
VOC = Volatile organic compound.

Table 4-2. Wells Sampled and Chemical Groups Analyzed in Fall 2019

RVAAP Area	Well ID	Aquifer	VOCs	SVOCs	PCBs	Explosives	Pesticides	Cyanide	Other	Metals
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-007	Upper Sharon	X	X[2,3,5]	X	X	X	X	phosphorus	X
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-008	Upper Sharon	X	X[2,3,5]	X	X	X	X		X
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-009	Upper Sharon	X	X[2,3,5]	X	X	X	X		X
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-011	Upper Sharon							anions, alkalinity	
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-012	Upper Sharon						X	anions, alkalinity	
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-013	Upper Sharon							anions, alkalinity	
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-016	Upper Sharon						X		
RVAAP-02 Erie Burning Grounds	EBGmw-125	Unconsolidated						X		X
RVAAP-02 Erie Burning Grounds	EBGmw-131	Upper Sharon						X		
RVAAP-04 Open Demolition Area #2	DA2mw-115	Upper Sharon								X
RVAAP-04 Open Demolition Area #2	DETmw-003	Unconsolidated	X	X[2,3,4,5]	X	X	X	X		X
RVAAP-04 Open Demolition Area #2	DETmw-004	Unconsolidated	X	X[2,3,4,5]	X	X	X	X		X
RVAAP-05 Winklepeck Burning Grounds	WBGmw-006	Unconsolidated				X				X
RVAAP-05 Winklepeck Burning Grounds	WBGmw-009	Unconsolidated				X				X
RVAAP-05 Winklepeck Burning Grounds	WBGmw-020	Upper Sharon				X				X
RVAAP-05 Winklepeck Burning Grounds	WBGmw-021	Upper Sharon				X				X
RVAAP-08 Load Line 1	LL1mw-063	Unconsolidated				X		X	propellants	
RVAAP-08 Load Line 1	LL1mw-064	Unconsolidated								X
RVAAP-08 Load Line 1	LL1mw-065	Unconsolidated				X				X
RVAAP-08 Load Line 1	LL1mw-080	Upper Sharon				X				X
RVAAP-08 Load Line 1	LL1mw-081	Upper Sharon				X		X		
RVAAP-08 Load Line 1	LL1mw-083	Upper Sharon				X			anions, alkalinity	
RVAAP-08 Load Line 1	LL1mw-084	Upper Sharon				X			anions, alkalinity	X
RVAAP-08 Load Line 1	LL1mw-086	Unconsolidated						X	alkalinity	X[1]
RVAAP-08 Load Line 1	LL1mw-087	Unconsolidated				X				X
RVAAP-08 Load Line 1	LL1mw-088	Unconsolidated				X			alkalinity	X
RVAAP-08 Load Line 1	LL1mw-089	Unconsolidated				X				
RVAAP-09 Load Line 2	LL2mw-059	Upper Sharon				X				X
RVAAP-09 Load Line 2	LL2mw-264	Upper Sharon						X		
RVAAP-09 Load Line 2	LL2mw-267	Upper Sharon				X				X
RVAAP-09 Load Line 2	LL2mw-272	Upper Sharon						X		
RVAAP-10 Load Line 3	LL3mw-234	Upper Sharon						X		
RVAAP-10 Load Line 3	LL3mw-237	Upper Sharon				X				
RVAAP-10 Load Line 3	LL3mw-244	Upper Sharon				X				X
RVAAP-10 Load Line 3	LL3mw-246	Upper Sharon				X			perchlorate	X
RVAAP-11 Load Line 4	LL4mw-200	Unconsolidated						X		
RVAAP-12 Load Line 12	LL12mw-183	Unconsolidated						X		
RVAAP-12 Load Line 12	LL12mw-185	Unconsolidated							nitrate	
RVAAP-12 Load Line 12	LL12mw-187	Unconsolidated							nitrate	X
RVAAP-12 Load Line 12	LL12mw-242	Unconsolidated							nitrate	X[1]
RVAAP-12 Load Line 12	LL12mw-245	Unconsolidated				X			nitrate	X
RVAAP-12 Load Line 12	LL12mw-247	Unconsolidated							nitrate	X
RVAAP-13 Building 1200	B12mw-012	Upper Sharon								X
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-171	Homewood Sandstone						X	anions, alkalinity	
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-172	Homewood Sandstone						X		
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-174	Homewood Sandstone				X			anions, alkalinity	
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-175	Homewood Sandstone							anions, alkalinity	Cr [VI]
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-176	Unconsolidated						X		
RVAAP-38 NACA Test Area	NTAmw-119	Unconsolidated		X[5]		X				X
RVAAP-40 Load Line 7	LL7mw-001	Homewood Sandstone						X		X

Table 4-2. Wells Sampled and Chemical Groups Analyzed in Fall 2019 (Continued)

RVAAP Area	Well ID	Aquifer	VOCs	SVOCs	PCBs	Explosives	Pesticides	Cyanide	Other	Metals
RVAAP-40 Load Line 7	LL7mw-006	Homewood Sandstone				X				
RVAAP-43 Load Line 10	LL10mw-003	Homewood Sandstone	X							
RVAAP-43 Load Line 10	LL10mw-005	Homewood Sandstone								X
RVAAP-44 Load Line 11	LL11mw-005	Unconsolidated						X		
RVAAP-49 Central Burn Pits	CBPmw-008	Unconsolidated						X		
RVAAP-49 Central Burn Pits	CBPmw-009	Upper Sharon						X		
RVAAP-66 Facility-wide Groundwater	BKGmw-021	Unconsolidated								X
RVAAP-66 Facility-wide Groundwater	FWGmw-002	Unconsolidated								X[1]
RVAAP-66 Facility-wide Groundwater	FWGmw-004	Unconsolidated				X		X		X
RVAAP-66 Facility-wide Groundwater	FWGmw-007	Unconsolidated				X				X
RVAAP-66 Facility-wide Groundwater	FWGmw-011	Unconsolidated				X				X
RVAAP-66 Facility-wide Groundwater	FWGmw-012	Upper Sharon				X				X
RVAAP-66 Facility-wide Groundwater	FWGmw-015	Unconsolidated				X				X
RVAAP-66 Facility-wide Groundwater	FWGmw-016	Upper Sharon				X				X
RVAAP-66 Facility-wide Groundwater	FWGmw-018	Basal Sharon Conglomerate	X					X		X
RVAAP-66 Facility-wide Groundwater	FWGmw-020	Upper Sharon	X					X		X
RVAAP-66 Facility-wide Groundwater	FWGmw-021	Upper Sharon				X				X
RVAAP-66 Facility-wide Groundwater	FWGmw-024	Upper Sharon				X				X
RVAAP-66 Facility-wide Groundwater	SCFmw-004	Basal Sharon Conglomerate								X

1 = Field filtered metals sample collected in addition to normal metals sample due to high turbidity.
2 = Phthalates
3 = Phenols
4 = Nitroaromatics
5 = Low-Level Polycyclic Aromatic Hydrocarbons
Anions = Sulfate, sulfide, nitrate, nitrite
Propellants = Nitroguanidine/nitrocellulose
ID = Identifier.
PCB = Polychlorinated biphenyl.
RVAAP = Ravenna Army Ammunition Plant.
SVOC = Semi-volatile organic compound.
VOC = Volatile organic compound.

Table 4-3. Wells Sampled and Chemical Groups Analyzed at Sand Creek Disposal Road Landfill in 2019

RVAAP Area	Well ID	Aquifer	Date	VOCs	SVOCs	PCBs	Explosives	Pesticides	Cyanide	Other	Metals, Total
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-001	Unconsolidated	1/28/2019	X	X[1]	X	X	X	X	anions, alkalinity, propellants, perchlorate, phosphorus	X, CR [VI]
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-002	Unconsolidated	1/28/2019	X	X[1]	X	X	X	X	anions, alkalinity, propellants, perchlorate, phosphorus	X, CR [VI]
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-003	Unconsolidated	1/28/2019	X	X[1]	X	X	X	X	anions, alkalinity, propellants, perchlorate, phosphorus	X, CR [VI]
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-001	Unconsolidated	5/8/2019	X	X[1]	X	X	X	X	anions, alkalinity, propellants, perchlorate, phosphorus	X
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-002	Unconsolidated	5/8/2019	X	X[1]	X	X	X	X	anions, alkalinity, propellants, perchlorate, phosphorus	X
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-003	Unconsolidated	5/8/2019	X	X[1]	X	X	X	X	anions, alkalinity, propellants, perchlorate, phosphorus	X
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-001	Unconsolidated	8/13/2019	X	X[1]	X	X	X	X	anions, alkalinity, propellants, perchlorate, phosphorus	X, CR [VI]
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-002	Unconsolidated	8/13/2019	X	X[1]	X	X	X	X	anions, alkalinity, propellants, perchlorate, phosphorus	X, CR [VI]
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-003	Unconsolidated	8/13/2019	X	X[1]	X	X	X	X	anions, alkalinity, propellants, perchlorate, phosphorus	X, CR [VI]

1 = LL PAHs
Anions = Sulfate, sulfide, nitrate, nitrite
Propellants = Nitroguanidine/nitrocellulose
ID = Identifier.
PCB = Polychlorinated biphenyl.
RVAAP = Ravenna Army Ammunition Plant.
SVOC = Semi-volatile organic compound.
VOC = Volatile organic compound.

Table 4-4. Field Parameter Readings – Spring 2019 Sampling Event

RVAAP Area	Well ID	Date Sampled	Water Temperature (°C)	Conductivity (ms/cm)	pH (S.U.)	Turbidity (NTU)	Oxygen (mg/L)	Oxidation/Reduction Potential (mV)	Depth to Water (ft BTOC)
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-007	5/9/2019	11.1	0.593	6.18	3.72	0.72	261.40	6.16
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-008	5/9/2019	11.1	0.946	6.68	4.13	0.17	-68.80	6.51
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-009	5/9/2019	12.8	0.237	6.35	8.30	0.83	82.70	4.94
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-011	5/9/2019	12.2	0.244	4.07	3.00	4.36	387.10	21.25
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-012	5/9/2019	11.8	0.321	5.14	0.65	6.96	236.20	21.08
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-013	5/9/2019	12.7	0.403	3.98	2.00	0.83	332.30	23.59
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-016	5/9/2019	14.2	2.407	6.11	2.10	0.75	-35.00	36.93
RVAAP-02 Erie Burning Grounds	EBGmw-125	5/7/2019	9.5	0.417	6.84	2.70	0	-9.60	12.40
RVAAP-02 Erie Burning Grounds	EBGmw-131	5/7/2019	10.3	0.594	7.24	2.80	0.03	-36.00	8.65
RVAAP-04 Open Demolition Area #2	DA2mw-115	4/29/2019	9.1	1.291	7.21	0.44	1.83	-40.90	5.93
RVAAP-04 Open Demolition Area #2	DETmw-003	4/29/2019	8.2	0.723	7.21	2.60	0.94	-26.10	8.96
RVAAP-04 Open Demolition Area #2	DETmw-004	4/29/2019	7.3	0.784	6.52	1.74	2.87	225.70	9.84
RVAAP-05 Winklepeck Burning Grounds	WBGmw-006	4/30/2019	9.0	1.419	7.28	7.79	0.67	218.50	5.69
RVAAP-05 Winklepeck Burning Grounds	WBGmw-009	4/30/2019	10.1	0.851	6.28	1.21	0.78	201.40	11.89
RVAAP-05 Winklepeck Burning Grounds	WBGmw-020	4/30/2019	10.6	0.27	7.19	6.00	0.90	-37.10	11.60
RVAAP-05 Winklepeck Burning Grounds	WBGmw-021	4/30/2019	9.9	0.522	7.36	8.50	0.80	100.10	8.21
RVAAP-08 Load Line 1	LL1mw-064	5/7/2019	11.2	0.446	7.65	0.92	0.05	-134.40	0.37
RVAAP-08 Load Line 1	LL1mw-065	5/7/2019	10.4	0.713	7.3	1.09	0.55	216.90	9.15
RVAAP-08 Load Line 1	LL1mw-080	5/7/2019	10.3	0.297	6.72	3.50	8.69	345.40	10.55
RVAAP-08 Load Line 1	LL1mw-081	5/6/2019	11.5	1.128	6.63	17.50	0.39	-5.50	29.55
RVAAP-08 Load Line 1	LL1mw-083	5/6/2019	11.9	0.807	4.44	6.08	5.97	357.00	34.33
RVAAP-08 Load Line 1	LL1mw-084	5/6/2019	11.4	0.867	5.57	0.68	4.94	223.00	27.30
RVAAP-08 Load Line 1	LL1mw-086	5/7/2019	10.5	0.541	10.44	87.06	0.58	83.80	5.48
RVAAP-08 Load Line 1	LL1mw-087	5/2/2019	17.3	0.666	7.08	7.20	1.91	249.00	4.25
RVAAP-08 Load Line 1	LL1mw-088	5/8/2019	10.8	0.866	7.53	19.25	0.5	-83.90	4.52
RVAAP-08 Load Line 1	LL1mw-089	5/7/2019	9.9	0.101	4.75	1.90	1.17	331.20	25.64
RVAAP-09 Load Line 2	LL2mw-059	5/6/2019	9.6	0.272	5.97	8.70	0.92	254.20	14.08
RVAAP-09 Load Line 2	LL2mw-264	5/2/2019	10.1	0.434	7.01	5.42	0.53	-4.10	4.71
RVAAP-09 Load Line 2	LL2mw-267	5/2/2019	11.0	0.32	6.44	39.60	-0.12	41.00	7.60
RVAAP-09 Load Line 2	LL2mw-272	5/6/2019	12.1	0.412	6.74	8.91	0.74	-9.20	6.91
RVAAP-10 Load Line 3	LL3mw-234	5/6/2019	14	0.466	6.92	13.77	0.4	11.00	7.90
RVAAP-10 Load Line 3	LL3mw-237	5/6/2019	11.5	0.326	6.56	7.70	3.96	344.00	13.43
RVAAP-10 Load Line 3	LL3mw-244	5/6/2019	9.9	0.215	6.08	1.80	4.26	291.10	7.04
RVAAP-10 Load Line 3	LL3mw-246	5/9/2019	10.6	0.227	5.90	1.52	4.16	226.60	17.75
RVAAP-11 Load Line 4	LL4mw-200	5/2/2019	12.6	1.32	6.95	2.80	7.44	210.70	17.98
RVAAP-12 Load Line 12	LL12mw-183	5/1/2019	13	0.974	7.12	8.96	1.54	-34.60	11.96
RVAAP-12 Load Line 12	LL12mw-185	5/1/2019	21.2	5.571	6.45	4.40	2.12	301.00	7.10
RVAAP-12 Load Line 12	LL12mw-187	5/2/2019	13.2	15.89	6.4	8.05	1.04	241.60	9.30
RVAAP-12 Load Line 12	LL12mw-242	5/1/2019	14	0.892	7.27	29.01	0.42	-47.30	8.55
RVAAP-12 Load Line 12	LL12mw-245	5/2/2019	14.5	1.401	6.97	9.44	1.93	174.20	8.12
RVAAP-12 Load Line 12	LL12mw-247	5/1/2019	13.6	1.008	7.06	17.00	1.12	156.60	4.75
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-171	4/30/2019	9.7	0.144	5.76	2.10	7.35	357.70	16.18
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-172	4/30/2019	9.8	2.226	6.63	2.38	5.53	205.70	23.41
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-174	4/30/2019	8.7	0.159	5.15	1.24	10.28	254.20	14.81
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-175	5/7/2019	10.6	0.103	5.61	16.77	10.28	247.70	16.04
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-176	5/7/2019	8.8	0.143	6.25	39.35	0.41	18.00	7.08
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-001	5/8/2019	11.0	1.048	7.26	5.66	1.25	-35.00	NA
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-002	5/8/2019	8.7	1.1	6.83	6.50	0.39	-43.20	NA
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-003	5/8/2019	11.1	1.514	6.88	2.25	2.66	138.10	16.75

Table 4-4. Field Parameter Readings – Spring 2019 Sampling Event (Continued)

RVAAP Area	Well ID	Date Sampled	Water Temperature (°C)	Conductivity (ms/cm)	pH (S.U.)	Turbidity (NTU)	Oxygen (mg/L)	Oxidation/Reduction Potential (mV)	Depth to Water (ft BTOC)
RVAAP-38 NACA Test Area	NTAmw-119	4/30/2019	9.8	1.890	7.22	6.26	0.51	-82.50	11.19
RVAAP-38 NACA Test Area	NTAmw-120	4/30/2019	10.7	0.92	7.49	3.30	0.16	-40.60	33.13
RVAAP-40 Load Line 7	LL7mw-001	5/1/2019	10.8	0.686	6.19	6.30	0.47	-4.10	19.94
RVAAP-40 Load Line 7	LL7mw-006	5/1/2019	12.9	0.315	5.47	6.07	1.85	200.00	9.45
RVAAP-43 Load Line 10	LL10mw-003	5/1/2019	14.4	0.512	6.77	6.17	6.7	178.00	17.25
RVAAP-43 Load Line 10	LL10mw-005	5/1/2019	15.9	0.454	6.84	6.41	1.39	163.90	12.12
RVAAP-44 Load Line 11	LL11mw-005	5/1/2019	15.9	0.221	5.4	9.27	7.68	232.00	4.67
RVAAP-49 Central Burn Pits	CBPmw-008	5/8/2019	13	2.297	6.98	2.60	4.56	188.00	15.83
RVAAP-49 Central Burn Pits	CBPmw-009	5/9/2019	11.7	0.701	7.33	0.69	0.72	-30.00	9.02
RVAAP-66 Facility-wide Groundwater	FWGmw-004	5/8/2019	9.8	0.924	6.95	2.10	1.46	251.00	11.00
RVAAP-66 Facility-wide Groundwater	FWGmw-007	4/30/2019	11.6	1.208	7.21	6.51	1.82	92.20	24.43
RVAAP-66 Facility-wide Groundwater	FWGmw-011	5/7/2019	9.7	0.407	7.2	14.40	1.04	-78.00	1.60
RVAAP-66 Facility-wide Groundwater	FWGmw-012	5/7/2019	10.1	0.254	6.12	5.50	0.74	116.30	0.25
RVAAP-66 Facility-wide Groundwater	FWGmw-015	5/8/2019	11.4	3.264	6.89	2.10	1.4	269.20	4.23
RVAAP-66 Facility-wide Groundwater	FWGmw-016	4/29/2019	12	1.252	7.14	0.09	0.68	-43.50	15.87
RVAAP-66 Facility-wide Groundwater	FWGmw-018	5/9/2019	11.6	0.812	7.29	8.76	0.81	-60.90	20.90
RVAAP-66 Facility-wide Groundwater	FWGmw-019	5/2/2019	11	0.834	7.09	1.20	0.97	-66.00	114.50
RVAAP-66 Facility-wide Groundwater	FWGmw-020	5/13/2019	10.1	0.901	7.08	8.80	4.67	172.00	21.47
RVAAP-66 Facility-wide Groundwater	FWGmw-021	5/9/2019	11.7	0.226	6.01	6.64	3.95	222.10	18.18
RVAAP-66 Facility-wide Groundwater	FWGmw-022	5/2/2019	10.9	0.781	7.04	9.60	1.04	12.00	113.57
RVAAP-66 Facility-wide Groundwater	FWGmw-023	5/1/2019	11.7	0.701	7.09	1.69	0.53	-21.90	115.51
RVAAP-66 Facility-wide Groundwater	FWGmw-024	5/9/2019	11.9	0.598	7	9.96	-0.12	-45.20	14.03
RVAAP-66 Facility-wide Groundwater	SCFmw-004	5/2/2019	9.8	1.376	7.2	37.70	2.96	261.00	-0.03

BTOC = Below top of casing.
ft = Feet.
ID = Identifier.
mS/cm = Millisiemens per centimeter.
mg/L = Milligrams per liter.
mV = Millivolts.
NTU = Nephelometric turbidity unit.
RVAAP = Ravenna Army Ammunition Plant.
S.U. = Standard Unit.
NA = Not applicable. Water level below top of pump.

Table 4-5. Field Parameter Readings – Fall 2019 Sampling Event

RVAAP Area	Well ID	Date Sampled	Water Temperature (°C)	Conductivity (mS/cm)	pH (S.U.)	Turbidity (NTU)	Oxygen (mg/L)	Oxidation/Reduction Potential (mV)	Depth to Water (ft BTOC)
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-007	10/7/2019	15.49	0.79	6.23	0.56	0.20	-74.50	6.80
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-008	10/7/2019	14.89	0.87	6.39	6.06	0.18	-65.40	7.00
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-009	10/7/2019	15.86	0.33	6.04	0.86	0.44	-44.50	5.63
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-011	10/7/2019	13.16	0.39	5.60	0.89	0.29	191.80	22.76
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-012	10/7/2019	12.53	0.47	5.13	0.73	2.82	232.30	22.55
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-013	10/7/2019	12.93	0.33	4.37	0.92	0.60	276.80	26.04
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-016	10/7/2019	13.02	2.13	6.26	1.65	0.33	-85.50	35.95
RVAAP-02 Erie Burning Grounds	EBGmw-125	10/7/2019	12.62	0.41	6.93	1.29	0.36	-68.70	12.98
RVAAP-02 Erie Burning Grounds	EBGmw-131	10/7/2019	11.62	0.57	6.87	0.58	0.12	-44.40	10.55
RVAAP-04 Open Demolition Area #2	DA2mw-115	9/30/2019	13.57	0.74	6.88	0.88	2.05	-22.20	6.75
RVAAP-04 Open Demolition Area #2	DET-003	10/1/2019	14.81	0.68	7.16	4.67	0.69	-51.50	9.40
RVAAP-04 Open Demolition Area #2	DET-004	10/1/2019	18.40	626.35*	6.63	5.31	0.00	144.00	NA
RVAAP-05 Winklepeck Burning Grounds	WBGmw-006	9/30/2019	15.94	0.42	6.96	1.02	1.07	235.60	8.42
RVAAP-05 Winklepeck Burning Grounds	WBGmw-009	9/30/2019	15.25	0.48	6.65	0.97	0.64	29.80	14.48
RVAAP-05 Winklepeck Burning Grounds	WBGmw-020	9/30/2019	14.38	0.24	6.91	3.32	0.27	-69.40	13.65
RVAAP-05 Winklepeck Burning Grounds	WBGmw-021	9/30/2019	15.02	0.49	7.30	3.78	0.17	-52.40	10.51
RVAAP-08 Load Line 1	LL1mw-063	10/9/2019	12.12	0.08	4.35	0.10	7.44	277.30	25.90
RVAAP-08 Load Line 1	LL1mw-064	10/3/2019	14.29	0.38	7.51	6.39	0.15	-119.20	1.91
RVAAP-08 Load Line 1	LL1mw-065	10/8/2019	12.27	0.61	7.13	0.75	0.45	223.00	12.85
RVAAP-08 Load Line 1	LL1mw-080	10/9/2019	15.49	0.75	6.38	1.01	2.46	196.40	14.07
RVAAP-08 Load Line 1	LL1mw-081	10/8/2019	13.58	0.43	6.56	9.68	0.21	-4.60	30.40
RVAAP-08 Load Line 1	LL1mw-083	10/9/2019	11.36	0.31	4.40	1.57	3.36	337.90	33.90
RVAAP-08 Load Line 1	LL1mw-084	10/9/2019	12.21	0.34	5.34	0.45	3.77	281.50	31.15
RVAAP-08 Load Line 1	LL1mw-086	10/8/2019	12.87	0.52	8.17	216.31	0.19	-186.60	9.00
RVAAP-08 Load Line 1	LL1mw-087	10/3/2019	18.57	0.77	7.10	3.44	1.67	118.00	8.66
RVAAP-08 Load Line 1	LL1mw-088	10/3/2019	12.76	0.74	7.20	5.04	0.33	-65.90	6.71
RVAAP-08 Load Line 1	LL1mw-089	10/9/2019	11.31	0.09	4.99	0.91	0.54	193.20	25.35
RVAAP-09 Load Line 2	LL2mw-059	10/2/2019	15.00	0.23	5.95	3.55	0.31	210.50	14.73
RVAAP-09 Load Line 2	LL2mw-264	10/7/2019	14.05	0.39	6.89	5.70	0.21	0.30	9.16
RVAAP-09 Load Line 2	LL2mw-267	10/7/2019	13.42	0.37	6.57	7.60	0.22	-17.50	11.34
RVAAP-09 Load Line 2	LL2mw-272	10/8/2019	12.66	0.37	6.49	6.97	0.31	-16.50	12.20
RVAAP-10 Load Line 3	LL3mw-234	10/8/2019	15.03	0.42	6.70	9.37	0.59	10.30	10.94
RVAAP-10 Load Line 3	LL3mw-237	10/7/2019	13.65	0.27	6.50	4.23	0.83	143.40	17.97
RVAAP-10 Load Line 3	LL3mw-244	10/2/2019	11.65	0.20	5.77	0.71	1.37	413.70	13.45
RVAAP-10 Load Line 3	LL3mw-246	10/3/2019	13.83	0.19	5.87	1.49	1.84	177.60	21.51
RVAAP-11 Load Line 4	LL4mw-200	10/1/2019	15.19	1.06	6.67	0.66	7.58	221.70	18.77
RVAAP-12 Load Line 12	L12mw-183	10/7/2019	12.64	0.84	7.17	5.16	0.99	-32.60	13.91
RVAAP-12 Load Line 12	L12mw-185	10/8/2019	12.82	5.08	6.63	3.96	0.31	242.00	8.71
RVAAP-12 Load Line 12	L12mw-187	10/8/2019	11.88	13.22	6.30	0.63	0.20	253.70	12.65
RVAAP-12 Load Line 12	L12mw-242	10/8/2019	17.71	0.73	7.27	158.88	1.18	-53.90	11.22
RVAAP-12 Load Line 12	L12mw-245	10/8/2019	15.00	1.40	6.92	2.44	NR	55.10	8.65
RVAAP-12 Load Line 12	L12mw-247	10/3/2019	16.18	0.84	7.13	7.43	0.83	-20.70	6.62
RVAAP-13 Building 1200	B12mw-012	10/3/2019	16.19	0.44	6.11	8.88	1.31	137.30	18.59
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-171	10/2/2019	15.97	0.14	5.70	0.85	6.39	227.80	19.45
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-172	10/1/2019	14.95	0.86	6.70	4.28	5.67	223.40	27.44
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-174	10/2/2019	17.51	0.05	5.38	0.92	7.29	269.50	15.62
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-175	10/1/2019	15.94	0.09	5.59	7.76	9.42	206.80	18.20
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-176	10/1/2019	16.19	0.12	5.93	4.95	0.18	15.50	10.26
RVAAP-38 NACA Test Area	NTAmw-119	10/2/2019	11.73	0.55	6.90	0.78	0.28	-60.20	13.16

Table 4-5. Field Parameter Readings – Fall 2019 Sampling Event (Continued)

RVAAP Area	Well ID	Date Sampled	Water Temperature (°C)	Conductivity (mS/cm)	pH (S.U.)	Turbidity (NTU)	Oxygen (mg/L)	Oxidation/Reduction Potential (mV)	Depth to Water (ft BTOC)
RVAAP-40 Load Line 7	LL7mw-001	10/2/2019	13.07	0.35	6.26	9.29	0.36	4.30	22.91
RVAAP-40 Load Line 7	LL7mw-006	10/2/2019	14.28	0.15	5.40	8.32	0.30	144.20	13.51
RVAAP-43 Load Line 10	L10mw-003	10/2/2019	15.68	0.38	6.51	3.09	2.35	153.00	21.62
RVAAP-43 Load Line 10	L10mw-005	10/2/2019	13.66	0.42	6.41	6.65	1.08	206.60	17.08
RVAAP-44 Load Line 11	LL11mw-005	10/2/2019	16.75	0.11	5.26	1.93	5.44	243.70	8.98
RVAAP-49 Central Burn Pits	CBPmw-008	9/30/2019	15.80	1.71	6.90	5.41	0.89	27.90	17.10
RVAAP-49 Central Burn Pits	CBPmw-009	9/30/2019	13.89	0.35	7.24	1.45	0.23	-128.30	11.51
RVAAP-66 Facility-wide Groundwater	BKGmw-021	10/2/2019	17.27	0.65	6.79	1.77	5.51	182.10	15.67
RVAAP-66 Facility-wide Groundwater	FWGmw-002	10/2/2019	12.20	0.42	7.33	509.99	0.18	-120.20	23.58
RVAAP-66 Facility-wide Groundwater	FWGmw-004	10/1/2019	21.79	0.70	6.89	0.84	1.09	224.30	14.84
RVAAP-66 Facility-wide Groundwater	FWGmw-007	10/2/2019	14.33	0.95	6.84	6.44	0.58	133.50	24.14
RVAAP-66 Facility-wide Groundwater	FWGmw-011	10/3/2019	13.60	0.36	7.20	18.22	1.25	-81.80	3.20
RVAAP-66 Facility-wide Groundwater	FWGmw-012	10/3/2019	12.61	0.19	5.73	9.00	0.58	108.70	1.94
RVAAP-66 Facility-wide Groundwater	FWGmw-015	9/30/2019	20.02	1.49	6.97	1.50	0.69	147.40	7.24
RVAAP-66 Facility-wide Groundwater	FWGmw-016	9/30/2019	14.68	0.70	7.08	0.87	0.34	-36.00	17.69
RVAAP-66 Facility-wide Groundwater	FWGmw-018	10/3/2019	11.61	0.66	7.02	0.84	0.14	-69.90	21.97
RVAAP-66 Facility-wide Groundwater	FWGmw-020	10/3/2019	12.00	0.76	7.12	4.13	0.48	-12.50	22.85
RVAAP-66 Facility-wide Groundwater	FWGmw-021	10/3/2019	11.26	0.18	5.93	8.80	0.93	100.20	21.53
RVAAP-66 Facility-wide Groundwater	FWGmw-024	10/3/2019	12.69	0.49	7.01	9.41	0.11	-51.20	14.79
RVAAP-66 Facility-wide Groundwater	SCFmw-004	10/3/2019	14.74	1.19	6.87	3.90	0.22	-96.10	0.01

*Conductivity reading inaccurate due to Aqua Troll calibration issue, considered stable since three readings were within 3%.
BTOC = Below top of casing.
ft = Feet.
ID = Identifier.
mS/cm = Millisiemens per centimeter.
mg/L = Milligrams per liter.
mV = Millivolts.
NTU = Nephelometric turbidity unit.
RVAAP = Ravenna Army Ammunition Plant.
S.U. = Standard Unit.
NA = Not applicable. Water level below top of pump.
NR = No reading due to instrument error.

Table 4-6. Field Parameter Readings – Sand Creek Disposal Road Landfill in 2019

RVAAP Area	Well ID	Date Sampled	Water Temperature (°C)	Conductivity (ms/cm)	pH (S.U.)	Turbidity (NTU)	Oxygen (mg/L)	Oxidation/Reduction Potential (mV)	Depth to Water (ft BTOC)
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-001	1/28/2019	5.9	0.894	7.3	9.07	1.07	6.3	2.84
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-002	1/28/2019	7.8	0.984	6.71	0.0	0.0	-108	NA
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-003	1/28/2019	7.5	1.34	6.89	0.0	1.79	54.7	17.02
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-001	8/13/2019	17	1.821	6.75	9.6	1.29	-30	NA
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-002	8/13/2019	14.1	2.066	6.33	7.8	0.27	-64.1	NA
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-003	8/13/2019	15.8	2.597	6.69	7.43	0.98	42.1	NA
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-003	5/8/2019	11.1	1.514	6.88	2.25	2.66	138.10	16.75
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-001	5/8/2019	11.0	1.048	7.26	5.66	1.25	-35.00	NA
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-002	5/8/2019	8.7	1.1	6.83	6.50	0.39	-43.20	NA

BTOC = Below top of casing.
ft = Feet.
ID = Identifier.
mS/cm = Millisiemens per centimeter.
mg/L = Milligrams per liter.
mV = Millivolts.
NTU = Nephelometric turbidity unit.
RVAAP = Ravenna Army Ammunition Plant.
S.U. = Standard Unit.
NA = Not applicable. Water level below top of pump.

Table 4-7. Screening Level Exceedances – Sand Creek Disposal Road Landfill Wells 2019

Aquifer Zone	Well	Date Collected	Sample ID	Sample Type	Analysis Type	Chemical	Result	Units	Validation Qualifier	GW Screening Level	GW Screening Level Source
Unconsolidated	SCLmw-001	1/28/2019	SCLmw-001-190101-GW	Grab	Anions	Sulfate	170	mg/L		None	NA
Unconsolidated	SCLmw-001	5/8/2019	SCLmw-001-190401-GW	Grab	Anions	Sulfate	160	mg/L		None	NA
Unconsolidated	SCLmw-001	1/28/2019	SCLmw-001-190101-GW	Grab	Metals, Total	Calcium	130	mg/L		None	NA
Unconsolidated	SCLmw-001	5/8/2019	SCLmw-001-190401-GW	Grab	Metals, Total	Calcium	130	mg/L		None	NA
Unconsolidated	SCLmw-001	1/28/2019	SCLmw-001-190101-GW	Grab	Metals, Total	Magnesium	37	mg/L		None	NA
Unconsolidated	SCLmw-001	5/8/2019	SCLmw-001-190401-GW	Grab	Metals, Total	Magnesium	42	mg/L		None	NA
Unconsolidated	SCLmw-001	1/28/2019	SCLmw-001-190101-GW	Grab	Metals, Total	Manganese	0.39	mg/L		0.075	BKG
Unconsolidated	SCLmw-001	5/8/2019	SCLmw-001-190401-GW	Grab	Metals, Total	Manganese	0.31	mg/L		0.075	BKG
Unconsolidated	SCLmw-001	1/28/2019	SCLmw-001-190101-GW	Grab	Metals, Total	Potassium	4	mg/L		None	NA
Unconsolidated	SCLmw-001	5/8/2019	SCLmw-001-190401-GW	Grab	Metals, Total	Potassium	3.8	mg/L		None	NA
Unconsolidated	SCLmw-001	1/28/2019	SCLmw-001-190101-GW	Grab	Metals, Total	Sodium	20	mg/L		None	NA
Unconsolidated	SCLmw-001	5/8/2019	SCLmw-001-190401-GW	Grab	Metals, Total	Sodium	19	mg/L		None	NA
Unconsolidated	SCLmw-001	1/28/2019	SCLmw-001-190101-GW	Grab	Miscellaneous	Total Phosphorus as P	0.017	mg/L	J	None	NA
Unconsolidated	SCLmw-001	5/8/2019	SCLmw-001-190401-GW	Grab	Miscellaneous	Total Phosphorus as P	0.018	mg/L	J	None	NA
Unconsolidated	SCLmw-002	1/28/2019	SCLmw-002-190102-GW	Field Duplicate	Anions	Sulfate	200	mg/L		None	NA
Unconsolidated	SCLmw-002	1/28/2019	SCLmw-002-190101-GW	Grab	Anions	Sulfate	220	mg/L		None	NA
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190401-GW	Grab	Anions	Sulfate	190	mg/L		None	NA
Unconsolidated	SCLmw-002	1/28/2019	SCLmw-002-190101-GW	Grab	Metals, Total	Calcium	210	mg/L	J	None	NA
Unconsolidated	SCLmw-002	1/28/2019	SCLmw-002-190102-GW	Field Duplicate	Metals, Total	Calcium	210	mg/L		None	NA
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190402-GW	Field Duplicate	Metals, Total	Calcium	190	mg/L		None	NA
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190401-GW	Grab	Metals, Total	Calcium	190	mg/L		None	NA
Unconsolidated	SCLmw-002	1/28/2019	SCLmw-002-190102-GW	Field Duplicate	Metals, Total	Iron	11	mg/L		1.91	BKG
Unconsolidated	SCLmw-002	1/28/2019	SCLmw-002-190101-GW	Grab	Metals, Total	Iron	11	mg/L	J	1.91	BKG
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190401-GW	Grab	Metals, Total	Iron	10	mg/L		1.91	BKG
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190402-GW	Field Duplicate	Metals, Total	Iron	10	mg/L		1.91	BKG
Unconsolidated	SCLmw-002	1/28/2019	SCLmw-002-190102-GW	Field Duplicate	Metals, Total	Magnesium	19	mg/L		None	NA
Unconsolidated	SCLmw-002	1/28/2019	SCLmw-002-190101-GW	Grab	Metals, Total	Magnesium	19	mg/L		None	NA
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190401-GW	Grab	Metals, Total	Magnesium	16	mg/L		None	NA
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190402-GW	Field Duplicate	Metals, Total	Magnesium	16	mg/L		None	NA
Unconsolidated	SCLmw-002	1/28/2019	SCLmw-002-190102-GW	Field Duplicate	Metals, Total	Manganese	1.1	mg/L		0.075	BKG
Unconsolidated	SCLmw-002	1/28/2019	SCLmw-002-190101-GW	Grab	Metals, Total	Manganese	1.2	mg/L	J	0.075	BKG
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190401-GW	Grab	Metals, Total	Manganese	1.1	mg/L		0.075	BKG
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190402-GW	Field Duplicate	Metals, Total	Manganese	1	mg/L		0.075	BKG
Unconsolidated	SCLmw-002	1/28/2019	SCLmw-002-190102-GW	Field Duplicate	Metals, Total	Potassium	4.5	mg/L		None	NA
Unconsolidated	SCLmw-002	1/28/2019	SCLmw-002-190101-GW	Grab	Metals, Total	Potassium	4.6	mg/L		None	NA
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190402-GW	Field Duplicate	Metals, Total	Potassium	4	mg/L		None	NA
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190401-GW	Grab	Metals, Total	Potassium	4	mg/L		None	NA
Unconsolidated	SCLmw-002	1/28/2019	SCLmw-002-190102-GW	Field Duplicate	Metals, Total	Sodium	4.7	mg/L	J	None	NA
Unconsolidated	SCLmw-002	1/28/2019	SCLmw-002-190101-GW	Grab	Metals, Total	Sodium	4.8	mg/L	J	None	NA
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190402-GW	Field Duplicate	Metals, Total	Sodium	3.3	mg/L	J	None	NA
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190401-GW	Grab	Metals, Total	Sodium	3.3	mg/L	J	None	NA
Unconsolidated	SCLmw-002	1/28/2019	SCLmw-002-190101-GW	Grab	Miscellaneous	Total Phosphorus as P	0.099	mg/L	J	None	NA
Unconsolidated	SCLmw-002	1/28/2019	SCLmw-002-190102-GW	Field Duplicate	Miscellaneous	Total Phosphorus as P	0.099	mg/L	J	None	NA
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190401-GW	Grab	Miscellaneous	Total Phosphorus as P	0.1	mg/L	J	None	NA
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190402-GW	Field Duplicate	Miscellaneous	Total Phosphorus as P	0.11	mg/L	J	None	NA
Unconsolidated	SCLmw-003	1/28/2019	SCLmw-003-190101-GW	Grab	Anions	Sulfate	260	mg/L		None	NA
Unconsolidated	SCLmw-003	5/8/2019	SCLmw-003-190401-GW	Grab	Anions	Sulfate	240	mg/L		None	NA
Unconsolidated	SCLmw-003	1/28/2019	SCLmw-003-190101-GW	Grab	Metals, Total	Calcium	140	mg/L		None	NA
Unconsolidated	SCLmw-003	5/8/2019	SCLmw-003-190401-GW	Grab	Metals, Total	Calcium	160	mg/L		None	NA

Table 4-7. Screening Level Exceedances – Sand Creek Disposal Road Landfill Wells 2019 (Continued)

Aquifer Zone	Well	Date Collected	Sample ID	Sample Type	Analysis Type	Chemical	Result	Units	Validation Qualifier	GW Screening Level	GW Screening Level Source
Unconsolidated	SCLmw-003	1/28/2019	SCLmw-003-190101-GW	Grab	Metals, Total	Magnesium	57	mg/L		None	NA
Unconsolidated	SCLmw-003	5/8/2019	SCLmw-003-190401-GW	Grab	Metals, Total	Magnesium	67	mg/L		None	NA
Unconsolidated	SCLmw-003	1/28/2019	SCLmw-003-190101-GW	Grab	Metals, Total	Manganese	0.33	mg/L		0.075	BKG
Unconsolidated	SCLmw-003	5/8/2019	SCLmw-003-190401-GW	Grab	Metals, Total	Manganese	0.23	mg/L		0.075	BKG
Unconsolidated	SCLmw-003	1/28/2019	SCLmw-003-190101-GW	Grab	Metals, Total	Potassium	5	mg/L		None	NA
Unconsolidated	SCLmw-003	5/8/2019	SCLmw-003-190401-GW	Grab	Metals, Total	Potassium	6	mg/L		None	NA
Unconsolidated	SCLmw-003	1/28/2019	SCLmw-003-190101-GW	Grab	Metals, Total	Sodium	36	mg/L		None	NA
Unconsolidated	SCLmw-003	5/8/2019	SCLmw-003-190401-GW	Grab	Metals, Total	Sodium	38	mg/L	J	None	NA

BKG = Background screening level.
GW = Groundwater.
mg/L = Milligrams per liter.
NA = Not applicable.

Table 4-8. 2019 Summary Statistics of Field Parameters and Chemical Analysis

Aquifer	Analysis Type	Analyte	Units	CAS Number	Results >Detection Limit	Minimum Detect	Maximum Detect	Average Result	GW Screening Level	GW Screening Level Source	Number Exceeding GW Screening Level	Station at Max Detect	Date Collected at Max Detect
Basal Sharon Conglomerate	Field Measurements	Depth to Water	ft BTOC	WDEPTH	5/5	-0.03	114.5	31.5			0	FWGmw-019	05/02/19
Basal Sharon Conglomerate	Field Measurements	Oxidation/Reduction Potential	mV	ORP	5/5	-96.1	261	-6.38			0	SCFmw-004	05/02/19
Basal Sharon Conglomerate	Field Measurements	Oxygen	mg/L	17778-80-2	5/5	0.14	2.96	1.02			0	SCFmw-004	05/02/19
Basal Sharon Conglomerate	Field Measurements	Turbidity	NTU	TURBID	5/5	0.84	37.7	10.5			0	SCFmw-004	05/02/19
Basal Sharon Conglomerate	Field Measurements	Water Temperature	°C	WTEMP	5/5	9.8	14.74	11.8			0	SCFmw-004	10/03/19
Basal Sharon Conglomerate	Field Measurements	pH	S.U.	N704	5/5	6.87	7.29	7.09			0	FWGmw-018	05/09/19
Basal Sharon Conglomerate	Metals, Total	Aluminum	mg/L	7429-90-5	1/4	0.021	0.021	0.0315	2	RSL	0	SCFmw-004	10/03/19
Basal Sharon Conglomerate	Metals, Total	Antimony	mg/L	7440-36-0	1/4	0.00041	0.00041	0.000478	0.006	MCL	0	FWGmw-018	05/09/19
Basal Sharon Conglomerate	Metals, Total	Arsenic	mg/L	7440-38-2	2/4	0.019	0.02	0.01	0.048	BKG	0	FWGmw-018	05/09/19
Basal Sharon Conglomerate	Metals, Total	Barium	mg/L	7440-39-3	4/4	0.05	0.07	0.0608	2	MCL	0	FWGmw-018	05/09/19
Basal Sharon Conglomerate	Metals, Total	Calcium	mg/L	7440-70-2	4/4	82	160	119			0	SCFmw-004	10/03/19
Basal Sharon Conglomerate	Metals, Total	Chromium	mg/L	7440-47-3	2/4	0.00081	0.0013	0.000978	0.1	MCL	0	SCFmw-004	05/02/19
Basal Sharon Conglomerate	Metals, Total	Cobalt	mg/L	7440-48-4	3/4	0.00014	0.0023	0.00123	0.0208	RC	0	FWGmw-018	10/03/19
Basal Sharon Conglomerate	Metals, Total	Copper	mg/L	7440-50-8	2/4	0.001	0.028	0.0077	1.3	MCL	0	SCFmw-004	05/02/19
Basal Sharon Conglomerate	Metals, Total	Iron	mg/L	7439-89-6	4/4	0.061	0.44	0.243	2.56	BKG	0	FWGmw-018	05/09/19
Basal Sharon Conglomerate	Metals, Total	Lead	mg/L	7439-92-1	2/4	0.0004	0.0083	0.00235	0.015	MCL	0	SCFmw-004	05/02/19
Basal Sharon Conglomerate	Metals, Total	Magnesium	mg/L	7439-95-4	4/4	25	64	43.3			0	SCFmw-004	10/03/19
Basal Sharon Conglomerate	Metals, Total	Manganese	mg/L	7439-96-5	3/4	0.13	0.77	0.368	1.03	BKG	0	SCFmw-004	10/03/19
Basal Sharon Conglomerate	Metals, Total	Nickel	mg/L	7440-02-0	3/4	0.0029	0.01	0.00428	0.039	RSL	0	SCFmw-004	05/02/19
Basal Sharon Conglomerate	Metals, Total	Potassium	mg/L	7440-09-7	4/4	1.9	2.9	2.4			0	SCFmw-004	05/02/19
Basal Sharon Conglomerate	Metals, Total	Sodium	mg/L	7440-23-5	4/4	11	15	13.5			0	FWGmw-018	05/09/19
Basal Sharon Conglomerate	Metals, Total	Zinc	mg/L	7440-66-6	1/4	0.39	0.39	0.1	0.6	RSL	0	SCFmw-004	05/02/19
Basal Sharon Conglomerate	Miscellaneous	Cyanide	mg/L	57-12-5	1/2	0.0065	0.0065	0.00575	0.2	MCL	0	FWGmw-018	05/09/19
Homewood Sandstone	Anions	Nitrate	mg/L	14797-55-8	6/6	0.3	1.6	0.93	10	MCL	0	FBQmw-175	05/07/19
Homewood Sandstone	Anions	Nitrite	mg/L	14797-65-0	1/6	0.05	0.05	0.05	1	MCL	0	FBQmw-175	10/01/19
Homewood Sandstone	Anions	Sulfate	mg/L	14808-79-8	6/6	12	24	18.7			0	FBQmw-171	04/30/19
Homewood Sandstone	Anions	Sulfide	mg/L	18496-25-8	1/6	0.8	0.8	0.925			0	FBQmw-175	10/01/19
Homewood Sandstone	Explosives/Propellants	2,4,6-Trinitrotoluene	µg/L	118-96-7	1/4	10	10	2.66	0.98	RSL	1	FBQmw-174	04/30/19
Homewood Sandstone	Explosives/Propellants	2,4-Dinitrotoluene	µg/L	121-14-2	1/4	0.67	0.67	0.245	0.24	RSL	1	FBQmw-174	04/30/19
Homewood Sandstone	Explosives/Propellants	2-Amino-4,6-Dinitrotoluene	µg/L	35572-78-2	1/4	15	15	3.8	3.9	RSL	1	FBQmw-174	04/30/19
Homewood Sandstone	Explosives/Propellants	4-Amino-2,6-Dinitrotoluene	µg/L	19406-51-0	1/4	14	14	3.55	3.9	RSL	1	FBQmw-174	04/30/19
Homewood Sandstone	Explosives/Propellants	HMX	µg/L	2691-41-0	2/4	0.15	0.17	0.133	100	RSL	0	LL7mw-006	05/01/19
Homewood Sandstone	Explosives/Propellants	RDX	µg/L	121-82-4	3/4	0.42	1.2	0.573	0.97	RSL	1	FBQmw-174	04/30/19
Homewood Sandstone	Field Measurements	Depth to Water	ft BTOC	WDEPTH	16/16	9.45	27.44	17.8			0	FBQmw-172	10/01/19
Homewood Sandstone	Field Measurements	Oxidation/Reduction Potential	mV	ORP	16/16	-4.1	357.7	190			0	FBQmw-171	04/30/19
Homewood Sandstone	Field Measurements	Oxygen	mg/L	17778-80-2	16/16	0.3	10.28	4.79			0	FBQmw-174	04/30/19
Homewood Sandstone	Field Measurements	Turbidity	NTU	TURBID	16/16	0.85	16.77	5.54			0	FBQmw-175	05/07/19
Homewood Sandstone	Field Measurements	Water Temperature	°C	WTEMP	16/16	8.7	17.51	13.4			0	FBQmw-174	10/02/19
Homewood Sandstone	Field Measurements	pH	S.U.	N704	16/16	5.15	6.84	6.02			0	LL10mw-005	05/01/19
Homewood Sandstone	Metals, Total	Arsenic	mg/L	7440-38-2	2/4	0.0017	0.0022	0.00123	0.01	MCL	0	LL7mw-001	10/02/19
Homewood Sandstone	Metals, Total	Barium	mg/L	7440-39-3	4/4	0.0088	0.022	0.0152	2	MCL	0	LL7mw-001	05/01/19
Homewood Sandstone	Metals, Total	Beryllium	mg/L	7440-41-7	1/4	0.00015	0.00015	0.00015	0.004	MCL	0	LL7mw-001	10/02/19
Homewood Sandstone	Metals, Total	Calcium	mg/L	7440-70-2	4/4	38	60	49			0	LL10mw-005	10/02/19
Homewood Sandstone	Metals, Total	Cobalt	mg/L	7440-48-4	2/4	0.0054	0.0061	0.00294	0.0208	RC	0	LL7mw-001	05/01/19
Homewood Sandstone	Metals, Total	Copper	mg/L	7440-50-8	1/4	0.00083	0.00083	0.000883	1.3	MCL	0	LL7mw-001	10/02/19
Homewood Sandstone	Metals, Total	Iron	mg/L	7439-89-6	4/4	0.025	9.1	4.44	22.3	BKG	0	LL7mw-001	10/02/19

Table 4-8. 2019 Summary Statistics of Field Parameters and Chemical Analysis (Continued)

Aquifer	Analysis Type	Analyte	Units	CAS Number	Results >Detection Limit	Minimum Detect	Maximum Detect	Average Result	GW Screening Level	GW Screening Level Source	Number Exceeding GW Screening Level	Station at Max Detect	Date Collected at Max Detect
Homewood Sandstone	Metals, Total	Lead	mg/L	7439-92-1	1/4	0.00031	0.00031	0.00034	0.015	MCL	0	LL7mw-001	10/02/19
Homewood Sandstone	Metals, Total	Magnesium	mg/L	7439-95-4	4/4	12	14	13.3			0	LL10mw-005	05/01/19
Homewood Sandstone	Metals, Total	Manganese	mg/L	7439-96-5	3/4	0.38	2.2	0.848	0.56	BKG	1	LL10mw-005	10/02/19
Homewood Sandstone	Metals, Total	Nickel	mg/L	7440-02-0	4/4	0.00057	0.0088	0.00467	0.039	RSL	0	LL7mw-001	05/01/19
Homewood Sandstone	Metals, Total	Potassium	mg/L	7440-09-7	3/4	0.73	1.1	0.811			0	LL7mw-001	10/02/19
Homewood Sandstone	Metals, Total	Sodium	mg/L	7440-23-5	4/4	3.4	5.9	4.55			0	LL7mw-001	10/02/19
Homewood Sandstone	Metals, Total	Thallium	mg/L	7440-28-0	2/4	0.00011	0.00012	0.000108	0.002	MCL	0	LL7mw-001	10/02/19
Homewood Sandstone	Metals, Total	Zinc	mg/L	7440-66-6	2/4	0.048	0.05	0.0262	0.6	RSL	0	LL7mw-001	05/01/19
Homewood Sandstone	VOCs	Acetone	µg/L	67-64-1	1/2	4.2	4.2	3.7	1400	RSL	0	LL10mw-003	05/01/19
Homewood Sandstone	VOCs	Carbon tetrachloride	µg/L	56-23-5	2/2	0.86	2.7	1.78	5	MCL	0	LL10mw-003	10/02/19
Homewood Sandstone	VOCs	Chloroform	µg/L	67-66-3	1/2	0.29	0.29	0.245	80	MCL	0	LL10mw-003	10/02/19
Unconsolidated	Anions	Nitrate	mg/L	14797-55-8	5/19	0.12	1600	93.8	10	MCL	3	LL12mw-187	05/02/19
Unconsolidated	Anions	Sulfate	mg/L	14808-79-8	9/9	150	260	199			0	SCLmw-003	01/28/19
Unconsolidated	Explosives/Propellants	1,3-Dinitrobenzene	µg/L	99-65-0	1/38	0.41	0.41	0.113	0.2	RSL	1	LL1mw-063	10/09/19
Unconsolidated	Explosives/Propellants	2,4,6-Trinitrotoluene	µg/L	118-96-7	2/38	0.4	0.46	0.213	0.98	RSL	0	LL12mw-245	05/02/19
Unconsolidated	Explosives/Propellants	2,4-Dinitrotoluene	µg/L	121-14-2	1/38	0.22	0.22	0.108	0.24	RSL	0	LL1mw-063	10/09/19
Unconsolidated	Explosives/Propellants	2-Amino-4,6-Dinitrotoluene	µg/L	35572-78-2	1/38	3.7	3.7	0.159	3.9	RSL	0	LL1mw-063	10/09/19
Unconsolidated	Explosives/Propellants	4-Amino-2,6-Dinitrotoluene	µg/L	19406-51-0	1/38	5.9	5.9	0.217	3.9	RSL	1	LL1mw-063	10/09/19
Unconsolidated	Explosives/Propellants	4-Nitrotoluene	µg/L	99-99-0	1/38	0.63	0.63	0.222	5.01	RA	0	NTAmw-119	10/02/19
Unconsolidated	Explosives/Propellants	HMX	µg/L	2691-41-0	7/38	0.67	3.4	0.427	100	RSL	0	WBGmw-006	04/30/19
Unconsolidated	Explosives/Propellants	Nitrobenzene	µg/L	98-95-3	1/38	0.27	0.27	0.109	0.521	RC	0	LL1mw-063	10/09/19
Unconsolidated	Explosives/Propellants	Nitrocellulose	µg/L	9004-70-0	1/11	630	630	512	6000000	RSL	0	LL1mw-089	05/07/19
Unconsolidated	Explosives/Propellants	RDX	µg/L	121-82-4	8/38	0.33	11	0.873	0.97	RSL	5	WBGmw-006	04/30/19
Unconsolidated	Field Measurements	Depth to Water	ft BTOC	WDEPTH	57/57	0.37	25.9	11.2			0	LL1mw-063	10/09/19
Unconsolidated	Field Measurements	Oxidation/Reduction Potential	mV	ORP	61/61	-186.6	331.2	86.6			0	LL1mw-089	05/07/19
Unconsolidated	Field Measurements	Oxygen	mg/L	17778-80-2	60/60	0	7.68	1.54			0	LL11mw-005	05/01/19
Unconsolidated	Field Measurements	Turbidity	NTU	TURBID	61/61	0	509.99	21.3			0	FWGmw-002	10/02/19
Unconsolidated	Field Measurements	Water Temperature	°C	WTEMP	61/61	5.9	21.79	13			0	FWGmw-004	10/01/19
Unconsolidated	Field Measurements	pH	S.U.	N704	61/61	4.35	10.44	6.87			0	LL1mw-086	05/07/19
Unconsolidated	Metals, Filtered	Aluminum	mg/L	7429-90-5	4/4	0.053	0.75	0.541	2	RSL	0	LL12mw-242	10/08/19
Unconsolidated	Metals, Filtered	Antimony	mg/L	7440-36-0	2/5	0.00087	0.00095	0.000664	0.006	MCL	0	LL1mw-086	05/07/19
Unconsolidated	Metals, Filtered	Arsenic	mg/L	7440-38-2	5/5	0.0016	0.018	0.00838	0.01	MCL	2	LL12mw-242	10/08/19
Unconsolidated	Metals, Filtered	Barium	mg/L	7440-39-3	5/5	0.034	0.13	0.0626	2	MCL	0	FWGmw-002	10/02/19
Unconsolidated	Metals, Filtered	Beryllium	mg/L	7440-41-7	4/5	0.000087	0.00016	0.000123	0.004	MCL	0	FWGmw-002	10/02/19
Unconsolidated	Metals, Filtered	Calcium	mg/L	7440-70-2	5/5	32	75	55.2			0	LL12mw-242	10/08/19
Unconsolidated	Metals, Filtered	Chromium	mg/L	7440-47-3	4/5	0.0024	0.006	0.00308	0.1	MCL	0	FWGmw-002	10/02/19
Unconsolidated	Metals, Filtered	Cobalt	mg/L	7440-48-4	5/5	0.00056	0.0015	0.00107	0.0208	RC	0	FWGmw-002	10/02/19
Unconsolidated	Metals, Filtered	Copper	mg/L	7440-50-8	3/5	0.0012	0.0016	0.00111	1.3	MCL	0	FWGmw-002	10/02/19
Unconsolidated	Metals, Filtered	Iron	mg/L	7439-89-6	5/5	0.12	2.4	1.64	1.91	BKG	3	FWGmw-002	10/02/19
Unconsolidated	Metals, Filtered	Lead	mg/L	7439-92-1	1/5	0.00067	0.00067	0.000535	0.015	MCL	0	LL12mw-242	05/01/19
Unconsolidated	Metals, Filtered	Magnesium	mg/L	7439-95-4	5/5	14	46	31.4			0	LL12mw-242	10/08/19
Unconsolidated	Metals, Filtered	Manganese	mg/L	7439-96-5	5/5	0.041	0.35	0.139	0.075	BKG	3	LL1mw-086	10/08/19
Unconsolidated	Metals, Filtered	Nickel	mg/L	7440-02-0	5/5	0.0018	0.0032	0.00236	0.039	RSL	0	FWGmw-002	10/02/19
Unconsolidated	Metals, Filtered	Potassium	mg/L	7440-09-7	5/5	1.9	21	7.46			0	LL1mw-086	05/07/19
Unconsolidated	Metals, Filtered	Sodium	mg/L	7440-23-5	5/5	7.7	26	17.5			0	LL12mw-242	05/01/19
Unconsolidated	Metals, Filtered	Vanadium	mg/L	7440-62-2	2/5	0.0032	0.0032	0.00224	0.0086	RSL	0	LL12mw-242	05/01/19

Table 4-8. 2019 Summary Statistics of Field Parameters and Chemical Analysis (Continued)

Aquifer	Analysis Type	Analyte	Units	CAS Number	Results >Detection Limit	Minimum Detect	Maximum Detect	Average Result	GW Screening Level	GW Screening Level Source	Number Exceeding GW Screening Level	Station at Max Detect	Date Collected at Max Detect
Unconsolidated	Metals, Total	Aluminum	mg/L	7429-90-5	24/48	0.019	3.1	0.256	2	RSL	2	LL1mw-086	05/07/19
Unconsolidated	Metals, Total	Antimony	mg/L	7440-36-0	4/48	0.00051	0.0017	0.000531	0.006	MCL	0	SCLmw-001	01/28/19
Unconsolidated	Metals, Total	Arsenic	mg/L	7440-38-2	37/48	0.00034	0.028	0.00512	0.01	MCL	6	LL1mw-088	10/03/19
Unconsolidated	Metals, Total	Barium	mg/L	7440-39-3	48/48	0.0087	0.28	0.0517	2	MCL	0	LL12mw-187	05/02/19
Unconsolidated	Metals, Total	Beryllium	mg/L	7440-41-7	5/48	0.000093	0.00056	0.000154	0.004	MCL	0	SCLmw-002	05/08/19
Unconsolidated	Metals, Total	Cadmium	mg/L	7440-43-9	1/48	0.00039	0.00039	0.000498	0.005	MCL	0	DETmw-004	10/01/19
Unconsolidated	Metals, Total	Calcium	mg/L	7440-70-2	48/48	42	1100	146			0	LL12mw-187	10/08/19
Unconsolidated	Metals, Total	Chromium	mg/L	7440-47-3	11/48	0.0005	0.0031	0.00106	0.1	MCL	0	LL12mw-242	05/01/19
Unconsolidated	Metals, Total	Cobalt	mg/L	7440-48-4	35/48	0.000066	0.011	0.00117	0.0208	RC	0	LL12mw-187	10/08/19
Unconsolidated	Metals, Total	Copper	mg/L	7440-50-8	16/48	0.00057	0.0042	0.00115	1.3	MCL	0	DETmw-003	10/01/19
Unconsolidated	Metals, Total	Iron	mg/L	7439-89-6	38/48	0.045	11	2.1	1.91	BKG	12	SCLmw-002	01/28/19
Unconsolidated	Metals, Total	Lead	mg/L	7439-92-1	16/48	0.00018	0.0032	0.000531	0.015	MCL	0	LL1mw-086	10/08/19
Unconsolidated	Metals, Total	Magnesium	mg/L	7439-95-4	48/48	9.7	330	55.4			0	LL12mw-187	10/08/19
Unconsolidated	Metals, Total	Manganese	mg/L	7439-96-5	44/47	0.00058	2.9	0.354	0.075	BKG	35	LL12mw-187	05/02/19
Unconsolidated	Metals, Total	Mercury	mg/L	7439-97-6	1/48	0.000027	0.000027	0.0000397	0.002	MCL	0	NTAmw-119	10/02/19
Unconsolidated	Metals, Total	Nickel	mg/L	7440-02-0	27/48	0.00033	0.015	0.00192	0.039	RSL	0	LL12mw-187	05/02/19
Unconsolidated	Metals, Total	Potassium	mg/L	7440-09-7	46/48	0.61	58	5.17			0	LL12mw-187	05/02/19
Unconsolidated	Metals, Total	Selenium	mg/L	7782-49-2	4/48	0.0004	0.0011	0.000542	0.05	MCL	0	FWGmw-004	05/08/19
Unconsolidated	Metals, Total	Silver	mg/L	7440-22-4	4/48	0.000034	0.00028	0.000057	0.0094	RSL	0	SCLmw-001	01/28/19
Unconsolidated	Metals, Total	Sodium	mg/L	7440-23-5	48/48	2.2	44	15.8			0	FWGmw-015	05/08/19
Unconsolidated	Metals, Total	Thallium	mg/L	7440-28-0	5/48	0.000072	0.00075	0.000126	0.002	MCL	0	LL12mw-187	05/02/19
Unconsolidated	Metals, Total	Vanadium	mg/L	7440-62-2	4/48	0.0012	0.0027	0.0015	0.0086	RSL	0	LL1mw-086	10/08/19
Unconsolidated	Metals, Total	Zinc	mg/L	7440-66-6	16/48	0.002	0.05	0.0063	0.6	RSL	0	DETmw-004	10/01/19
Unconsolidated	Miscellaneous	Cyanide	mg/L	57-12-5	5/29	0.005	0.015	0.00794	0.2	MCL	0	SCLmw-001	05/08/19
Unconsolidated	Miscellaneous	Perchlorate	mg/L	14797-73-0	3/9	0.0000099	0.000014	7.32E-06	0.0014	RSL	0	SCLmw-002	01/28/19
Unconsolidated	Miscellaneous	Total Phosphorus as P	mg/L	7723-14-0	6/9	0.017	0.11	0.0493			0	SCLmw-002	05/08/19
Unconsolidated	SVOCs	Benzoic acid	µg/L	65-85-0	2/9	9.8	11	14.7	7500	RSL	0	SCLmw-003	01/28/19
Unconsolidated	SVOCs	Naphthalene	µg/L	91-20-3	1/15	0.017	0.017	0.023	0.17	RSL	0	SCLmw-001	01/28/19
Unconsolidated	VOCs	Acetone	µg/L	67-64-1	4/13	2.1	5.1	3.15	1400	RSL	0	DETmw-004	04/29/19
Unconsolidated	VOCs	Methylene chloride	µg/L	75-09-2	1/13	0.41	0.41	0.862	5	MCL	0	SCLmw-002	01/28/19
Upper Sharon	Anions	Nitrate	mg/L	14797-55-8	6/10	0.33	1.9	0.449	10	MCL	0	RQLmw-012	10/07/19
Upper Sharon	Anions	Sulfate	mg/L	14808-79-8	10/10	110	190	146			0	RQLmw-012	10/07/19
Upper Sharon	Anions	Sulfide	mg/L	18496-25-8	1/10	0.8	0.8	0.935			0	LL1mw-084	05/06/19
Upper Sharon	Explosives/Propellants	1,3,5-Trinitrobenzene	µg/L	99-35-4	6/36	1.3	5.1	0.647	59	RSL	0	LL1mw-083	10/09/19
Upper Sharon	Explosives/Propellants	1,3-Dinitrobenzene	µg/L	99-65-0	7/36	0.27	2.5	0.356	0.2	RSL	7	LL1mw-084	10/09/19
Upper Sharon	Explosives/Propellants	2,4,6-Trinitrotoluene	µg/L	118-96-7	5/36	0.42	3.6	0.501	0.98	RSL	4	LL1mw-084	10/09/19
Upper Sharon	Explosives/Propellants	2,4-Dinitrotoluene	µg/L	121-14-2	6/36	0.23	2.8	0.326	0.24	RSL	5	LL1mw-083	05/06/19
Upper Sharon	Explosives/Propellants	2-Amino-4,6-Dinitrotoluene	µg/L	35572-78-2	17/36	0.22	12	1.41	3.9	RSL	4	LL1mw-083	10/09/19
Upper Sharon	Explosives/Propellants	4-Amino-2,6-Dinitrotoluene	µg/L	19406-51-0	16/36	0.23	20	2.41	3.9	RSL	5	LL1mw-083	10/09/19
Upper Sharon	Explosives/Propellants	HMX	µg/L	2691-41-0	4/36	0.57	7.2	0.425	100	RSL	0	LL1mw-080	10/09/19
Upper Sharon	Explosives/Propellants	Nitrobenzene	µg/L	98-95-3	1/36	0.1	0.1	0.104	0.521	RC	0	LL3mw-237	10/07/19
Upper Sharon	Explosives/Propellants	RDX	µg/L	121-82-4	5/36	0.16	24	1.28	0.97	RSL	3	LL1mw-080	10/09/19
Upper Sharon	Field Measurements	Depth to Water	ft BTOC	WDEPTH	62/62	0.25	115.51	19			0	FWGmw-023	05/01/19
Upper Sharon	Field Measurements	Oxidation/Reduction Potential	mV	ORP	62/62	-128.3	413.7	91.8			0	LL3mw-244	10/02/19
Upper Sharon	Field Measurements	Oxygen	mg/L	17778-80-2	62/62	-0.12	8.69	1.49			0	LL1mw-080	05/07/19
Upper Sharon	Field Measurements	Turbidity	NTU	TURBID	62/62	0.09	39.6	5.13			0	LL2mw-267	05/02/19
Upper Sharon	Field Measurements	Water Temperature	°C	WTEMP	62/62	9.1	16.19	12.4			0	B12mw-012	10/03/19

Table 4-8. 2019 Summary Statistics of Field Parameters and Chemical Analysis (Continued)

Aquifer	Analysis Type	Analyte	Units	CAS Number	Results >Detection Limit	Minimum Detect	Maximum Detect	Average Result	GW Screening Level	GW Screening Level Source	Number Exceeding GW Screening Level	Station at Max Detect	Date Collected at Max Detect
Upper Sharon	Field Measurements	pH	S.U.	N704	62/62	3.98	7.49	6.33			0	NTAmw-120	04/30/19
Upper Sharon	Metals, Total	Aluminum	mg/L	7429-90-5	16/34	0.019	0.39	0.0521	2	RSL	0	LL1mw-084	10/09/19
Upper Sharon	Metals, Total	Antimony	mg/L	7440-36-0	10/34	0.00042	0.00099	0.000529	0.006	MCL	0	FWGmw-021	05/09/19
Upper Sharon	Metals, Total	Arsenic	mg/L	7440-38-2	24/34	0.00066	0.031	0.00464	0.01	MCL	4	FWGmw-020	10/03/19
Upper Sharon	Metals, Total	Barium	mg/L	7440-39-3	34/34	0.002	0.1	0.0286	2	MCL	0	RQLmw-008	10/07/19
Upper Sharon	Metals, Total	Beryllium	mg/L	7440-41-7	8/34	0.000081	0.00052	0.000156	0.004	MCL	0	FWGmw-021	05/09/19
Upper Sharon	Metals, Total	Cadmium	mg/L	7440-43-9	2/34	0.0012	0.0015	0.00055	0.005	MCL	0	LL1mw-084	10/09/19
Upper Sharon	Metals, Total	Calcium	mg/L	7440-70-2	34/34	18	150	54.7			0	LL1mw-080	10/09/19
Upper Sharon	Metals, Total	Chromium	mg/L	7440-47-3	3/34	0.00051	0.00082	0.000883	0.1	MCL	0	FWGmw-021	05/09/19
Upper Sharon	Metals, Total	Cobalt	mg/L	7440-48-4	23/34	0.00018	0.015	0.00212	0.0208	RC	0	LL1mw-084	10/09/19
Upper Sharon	Metals, Total	Copper	mg/L	7440-50-8	10/34	0.00059	0.0051	0.00118	1.3	MCL	0	LL1mw-084	10/09/19
Upper Sharon	Metals, Total	Iron	mg/L	7439-89-6	29/34	0.022	53	3.66	2.08	BKG	12	RQLmw-008	10/07/19
Upper Sharon	Metals, Total	Lead	mg/L	7439-92-1	10/34	0.0002	0.0014	0.000379	0.015	MCL	0	RQLmw-009	05/09/19
Upper Sharon	Metals, Total	Magnesium	mg/L	7439-95-4	34/34	3.1	79	19.9			0	RQLmw-008	10/07/19
Upper Sharon	Metals, Total	Manganese	mg/L	7439-96-5	31/34	0.00051	1.7	0.272	0.198	BKG	16	RQLmw-007	10/07/19
Upper Sharon	Metals, Total	Nickel	mg/L	7440-02-0	28/34	0.00036	0.039	0.00547	0.039	RSL	1	RQLmw-007	10/07/19
Upper Sharon	Metals, Total	Potassium	mg/L	7440-09-7	34/34	0.71	4.7	2.13			0	RQLmw-007	10/07/19
Upper Sharon	Metals, Total	Selenium	mg/L	7782-49-2	3/34	0.00072	0.0023	0.000589	0.05	MCL	0	LL3mw-244	05/06/19
Upper Sharon	Metals, Total	Sodium	mg/L	7440-23-5	30/34	1.2	17	5.61			0	B12mw-012	10/03/19
Upper Sharon	Metals, Total	Thallium	mg/L	7440-28-0	4/34	0.00011	0.00044	0.000117	0.002	MCL	0	LL1mw-084	10/09/19
Upper Sharon	Metals, Total	Zinc	mg/L	7440-66-6	11/34	0.0021	0.038	0.00646	0.6	RSL	0	LL3mw-244	05/06/19
Upper Sharon	Miscellaneous	Cyanide	mg/L	57-12-5	7/24	0.0053	0.04	0.00733	0.2	MCL	0	RQLmw-012	05/09/19
Upper Sharon	Miscellaneous	Perchlorate	mg/L	14797-73-0	2/2	0.000062	0.00007	0.000066	0.0014	RSL	0	LL3mw-246	10/03/19
Upper Sharon	SVOCs	Bis(2-ethylhexyl)phthalate	µg/L	117-81-7	1/6	2.8	2.8	1.34	6	MCL	0	RQLmw-007	10/07/19
Upper Sharon	SVOCs	Butyl benzyl phthalate	µg/L	85-68-7	1/6	2.1	2.1	1.23	16	RSL	0	RQLmw-007	10/07/19
Upper Sharon	SVOCs	Di-n-butyl phthalate	µg/L	84-74-2	1/6	1.3	1.3	2.13	90	RSL	0	RQLmw-007	10/07/19
Upper Sharon	SVOCs	Di-n-octylphthalate	µg/L	117-84-0	1/6	4.2	4.2	1.13	20	RSL	0	RQLmw-007	10/07/19

BKG = Background screening level.
BTOC = Below top of casing.
CAS = Chemical Abstract Service.
GW = Groundwater.
HMX = Octahydro-1,3,5,7- tetranitro-1,3,5,7-tetrazocine.
MCL = Maximum contaminant level.
mg/L = Milligrams per liter.
mV = Millivolt.
NTU = Nephelometric turbidity unit.
RA = Resident Adult Facility-wide Cleanup Goal.
RC = Resident Child Facility-wide Cleanup Goal.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
RSL = Regional screening level.
S.U. = Standard Unit.
SVOC = Semi-volatile organic compound.
VOC = Volatile organic compound.

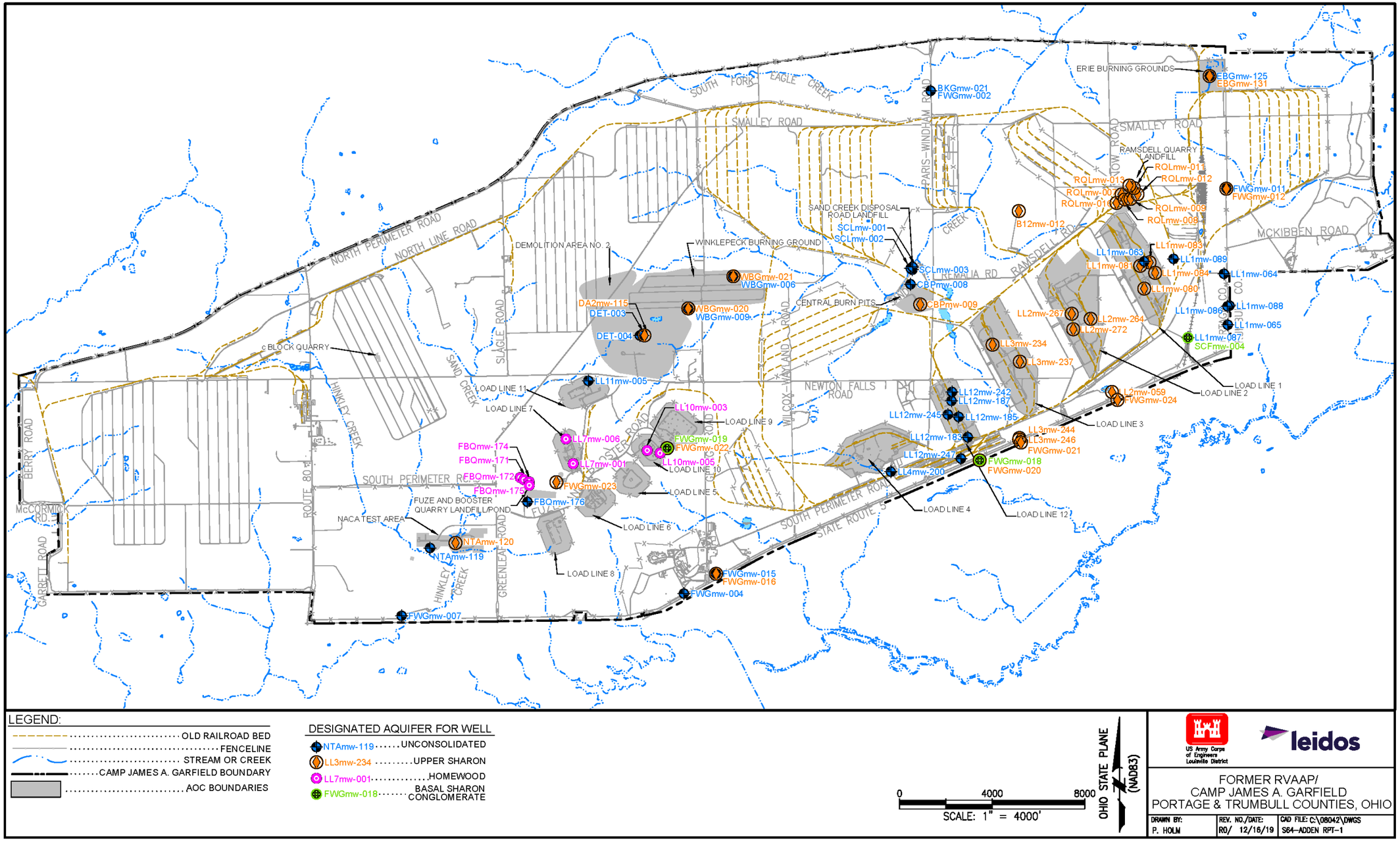

Figure 4-1. FWGWMP Wells Sampled in 2019

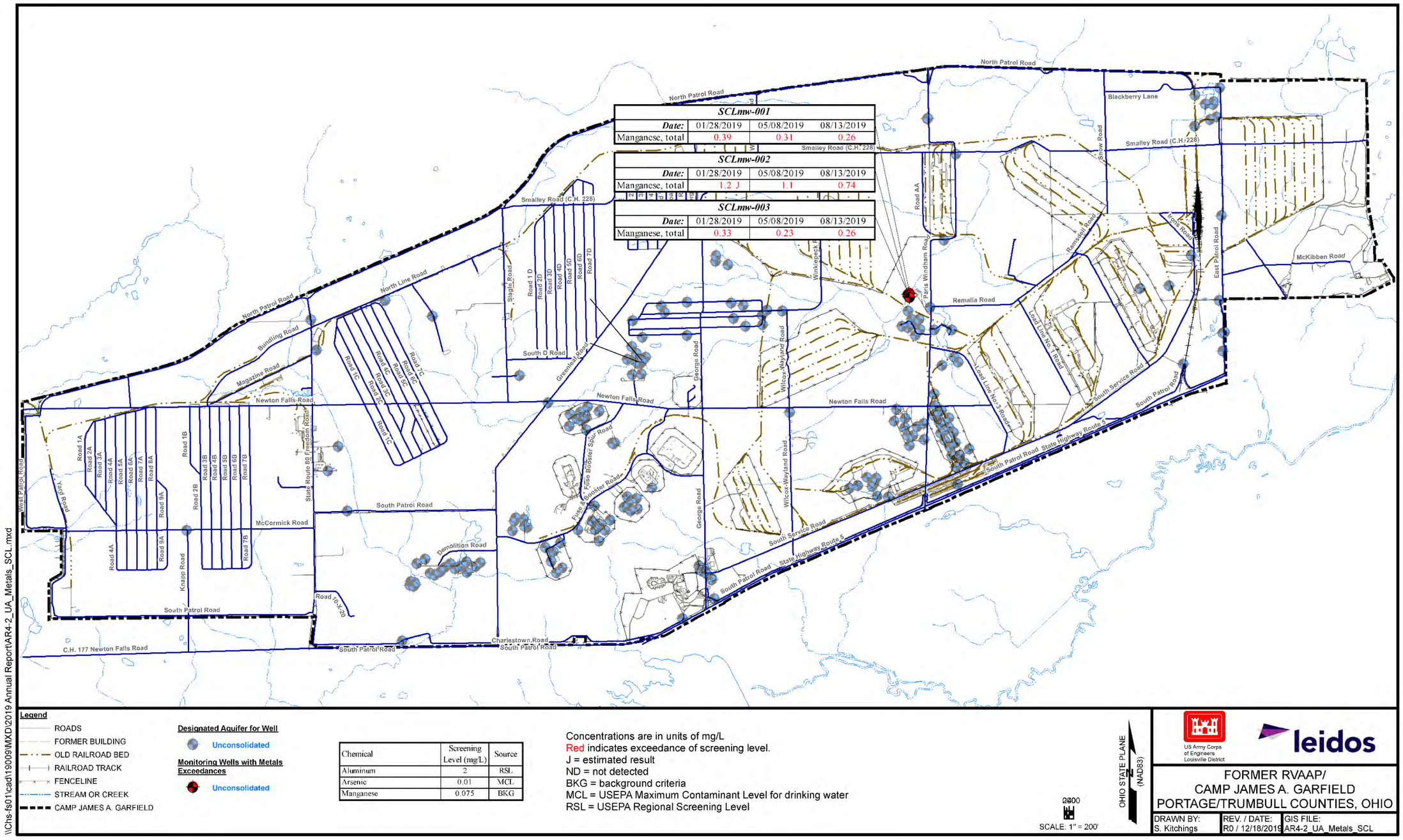

Figure 4-2. Sand Creek Disposal Road Landfill – 2019 Exceedances

5.0 GROUNDWATER ELEVATIONS

This section discusses the process for obtaining groundwater elevations in 2019, presents updated potentiometric surfaces for the four aquifers at CJAG, and compares and contrasts the current potentiometric surfaces with previous surfaces.

5.1 GROUNDWATER ELEVATION MONITORING

The annual water level measurements were collected in April 2019 in accordance with procedures in Section 5.4.3.1 of the Facility-wide Sampling and Analysis Plan (FWSAP) (SAIC 2011) and the RIWP (TEC-Weston 2016). Table 5-1 presents the water level measurements at each well.

During the field activities, groundwater level measurements could not be obtained from four wells (RQLmw-017, DETmw-004, SCLmw-001, and SCLmw-002) due to the top of the permanent pump being above the groundwater level. At two wells (DA2mw-105 and WBGmw-013), bee nests were encountered and the wells were not measured for safety reasons. In addition, FWGmw-017 was abandoned in 2018 prior to the April 2019 gauging event.

Therefore, groundwater elevations from 295 FWGWMP monitoring wells were used to generate the potentiometric surfaces presented in Figures 5-1 through 5-4. These figures show potentiometric surfaces for the Unconsolidated, Homewood Sandstone, Upper Sharon Sandstone, and Basal Sharon Conglomerate aquifers. These depictions include groundwater-surface water interface (GSI) interpretations made based on available topographic and groundwater elevation information; however, staff gauges in surface water bodies are not available. The remainder of this subsection discusses the groundwater flow directions in each of the aquifers, vertical and horizontal flow gradients, and potential off-site migration pathways.

5.2 HORIZONTAL GRADIENTS AND FLOW VELOCITIES

5.2.1 Unconsolidated Aquifer

Figure 5-1 illustrates the potentiometric surface of the Unconsolidated aquifer. The site-wide hydraulic gradient in the Unconsolidated aquifer generally includes an easterly component, but local variations include radial, northerly, and/or southerly flow components. Variations in gradient direction are associated with the influence of topography, streams and waterbodies, land use, subsurface heterogeneity, and presence/absence of unconsolidated materials. In many portions of the site, streams likely serve as discharge locations for the Unconsolidated aquifer.

Where the Unconsolidated aquifer is absent due to erosion or insufficient thickness, the Homewood Formation or the Sharon Sandstone is the uppermost aquifer, as shown in Figure 5-1 with a hatched pattern. The Homewood Formation and Sharon Sandstone are in direct hydraulic communication with the Unconsolidated aquifer, where present.

Horizontal hydraulic gradients, ranging from 0.008 to 0.020 ft/ft, were calculated for the Unconsolidated aquifer at the three locations shown in Figure 5-1. The average linear groundwater velocity (seepage velocity) was calculated using the three gradients, the average porosity values (EQM 2012) from previous Shelby tube samples, and the average hydraulic conductivity values derived from rising head/falling head tests conducted on 10 wells in November 2012 (TEC-Weston 2018). The calculated velocities (0.035, 0.044, and 0.088 ft/day) correspond to approximately 13, 16, and 32 ft/yr. Table 5-2 summarizes the horizontal hydraulic gradient and average linear groundwater velocity data for the various aquifers using the April 2019 groundwater elevation measurement data.

5.2.2 Homewood Sandstone Aquifer

Figure 5-2 illustrates the potentiometric surface of the Homewood Formation. The hydraulic gradient within the Homewood Formation varies across CJAG. The gradient near C Block Quarry trends south to southeast, the gradient near Fuze and Booster Quarry is generally eastward, and the gradient near Load Lines 9 and 10 forms a radial pattern around a topographic high point.

Horizontal hydraulic gradients were calculated for the Homewood Sandstone aquifer at the four locations shown in Figure 5-2. The gradients ranged from 0.004–0.019 ft/ft. Seepage velocities were calculated using the four gradients, average porosity values from previous core samples (EQM 2012), and average hydraulic conductivity values derived from hydraulic testing (slug testing) conducted on two Homewood Sandstone aquifer wells (TEC-Weston 2018). The calculated seepage velocities (0.229, 0.287, 0.401, and 1.089 ft/day) correspond to velocities between 84 and 398 ft/yr, as shown in Table 5-2.

5.2.3 Upper Sharon Aquifer

Figure 5-3 presents the potentiometric surface of the Sharon Sandstone aquifer (also referred to as the Upper Sharon). The site-wide hydraulic gradient in the Upper Sharon generally has an easterly component, but local variations include radial, northerly, and/or southerly flow components. Notable features of the potentiometric surface include a groundwater divide in the central portion of CJAG with gradients north of the divide trending northeast and gradients south of the divide trending southeast. In addition, a radial pattern is noted along the topographic high point near Load Line 2.

As stated in previous reports, the Upper Sharon is in direct hydraulic communication with the Unconsolidated aquifer for much of its extent in the central and eastern portions of CJAG. It is inferred that where streams have eroded the unconsolidated deposits, the Upper Sharon is in direct hydraulic communication with the local stream system. Portions of these streams are likely groundwater discharge zones for the Upper Sharon.

Horizontal hydraulic gradients were calculated for the Sharon Sandstone aquifer at the three locations shown in Figure 5-3. The gradients range from 0.015–0.022 ft/ft. Seepage velocities were calculated using the three gradients, average porosity values from previous core samples (EQM 2012), and average hydraulic conductivity values derived from hydraulic testing (slug testing) conducted on two Sharon

Sandstone aquifer wells (TEC-Weston 2018). The calculated seepage velocities (1.806, 2.046, and 2.648 ft/day) correspond to approximately or 695, 747, and 967 ft/yr, as listed in Table 5-2.

5.2.4 Basal Sharon Conglomerate Aquifer

The deepest aquifer zone monitored at CJAG is the Basal Sharon Conglomerate, which occurs within the lower portions of the Sharon Member – Sandstone/Conglomerate unit. The hydraulic gradient in the Basal Sharon Conglomerate is generally eastward with local trends to the northeast and southeast, as illustrated in Figure 5-4.

Horizontal hydraulic gradients were calculated for the Basal Sharon Conglomerate at the three locations shown in Figure 5-4. The gradients range from 0.003–0.006 ft/ft. Seepage velocities were calculated using the three gradients, porosity values obtained from previous cores in the Upper Sharon (EQM 2012), and hydraulic conductivity value obtained from literary sources for sandstone formations (Bear 1972). The calculated seepage velocities (0.008, 0.011, and 0.016 ft/day) correspond to approximately 3, 4, and 6 ft/yr, as listed in Table 5-2.

5.3 VERTICAL GRADIENTS

To evaluate the potential for vertical groundwater flow between aquifers, groundwater elevations were evaluated at 13 well clusters. For the purpose of this evaluation, a well cluster is defined as two wells located within 20 ft of one another and screened in different aquifers. Figure 5-5 presents locations of the well clusters within CJAG.

Table 5-3 lists the well clusters evaluated along with the April 2019 groundwater elevations, midpoint elevation of each well screen interval, and calculated vertical hydraulic gradients. The vertical gradient at a well cluster was calculated as the quotient of the change in groundwater elevations (head) and vertical distance between screen midpoints. A negative vertical gradient indicates an upward gradient, and a positive vertical gradient indicates a downward gradient.

5.3.1 Unconsolidated and Homewood Aquifers

One well cluster (LL6mw-008/LL6mw-009) was evaluated to determine the vertical hydraulic gradient between the Unconsolidated and Homewood aquifers. As listed in Table 5-3, the calculated gradient for the well cluster in Load Line 6 is 0.003 ft/ft downwards. The magnitude of this vertical gradient is minor, and it may be inferred that the aquifers are hydraulically connected with minimal confining layers present.

5.3.2 Unconsolidated and Upper Sharon Aquifers

Seven well clusters screened in the Unconsolidated and Upper Sharon aquifers were evaluated to determine the vertical hydraulic gradient between the aquifers. One of the seven well clusters (EBGmw-125/EBGmw-131) displayed an upward vertical gradient of -0.082 ft/ft from the Upper Sharon to the Unconsolidated aquifer.

The six remaining well clusters exhibited a downward vertical gradient from the Unconsolidated aquifer toward the Upper Sharon aquifer. The downward gradients ranged from 0.040–0.318 ft/ft. At the two well clusters (FWGmw-015/FWGmw-016 and NTAmw-113/NTAmw-120) with the largest vertical gradient, a shale layer is present between the Unconsolidated aquifer and the Upper Sharon Sandstone, as evidenced in the boring logs. The gradient observed at these locations is likely attributable to the shale acting as an aquitard; however, the shale is limited in areal extent.

5.3.3 Unconsolidated and Basal Sharon Conglomerate Aquifers

Groundwater elevations in two well clusters (LL1mw-087/SCFmw-004 and LL12mw-247/SCFmw-002) were evaluated to estimate the vertical hydraulic gradient between the Unconsolidated and the Basal Sharon Conglomerate aquifers. As listed in Table 5-3, the LL1mw-08/SCFmw-004 cluster exhibits an upward gradient of approximately -0.052 ft/ft, while the LL12mw-247/SCFmw-002 cluster exhibits a downward gradient of approximately 0.113 ft/ft.

The LL1mw-087/SCFmw-004 cluster is located in the eastern portion of CJAG, close to the southern property boundary. The upward gradient observed in this cluster is corroborated by artesian conditions observed during historical gauging activities. Southwest of LL1mw-087/SCFmw-004, well cluster LL12mw-247/SCFmw-002 exhibits a downward gradient, potentially indicating an area of recharge for the Basal Sharon Conglomerate.

In the south-central portion of CJAG, near Load Lines 5 and 9, the groundwater elevation at SCFmw-001 and FWGmw-019 is approximately 80 to 90 ft lower than the groundwater elevation encountered in the Unconsolidated aquifer. Geologic mapping (Winslow and White 1966) indicates the Mercer Member (shale), Massillon Sandstone, and Sharon Member are present in this area. Shales within the Mercer Member and the Sharon Member-Shale unit likely act as aquitards, locally inhibiting flow between the Unconsolidated and Homewood aquifers to the Basal Sharon Conglomerate. A vertical gradient was not calculated for this area because suitable well pairs (i.e., located within 20 ft of each other) are not present.

To the east of SCFmw-001, where the Homewood, Massillon Sandstone, and the Mercer Member have been eroded, the difference in groundwater elevations and the vertical gradient between the Basal Sharon Conglomerate and overlying aquifers decreases rapidly.

5.3.4 Upper Sharon and Basal Sharon Conglomerate Aquifers

Three well clusters screened in the Upper Sharon Sandstone and Basal Sharon Conglomerate were evaluated to estimate the vertical hydraulic gradient between these aquifers. Wells BKGmw-018 and BKGmw-024 were used as a replacement cluster for the previous FWGmw-017/FWGmw-024 cluster, as FWGmw-017 was abandoned in 2018. The BKGmw-018/BKGmw-024 cluster indicated an upward gradient of -0.044. At Load Line 12, well cluster FWGmw-020/FWGmw-018 exhibited a minor -0.003 upward gradient. At Load Line 10, well cluster FWGmw-022/FWGmw-019 exhibited a downward gradient of 0.014. The gradients calculated between the Upper Sharon and Basal Sharon Conglomerate were relatively minor, indicating the two aquifers are hydraulically connected with minimal confining layers.

5.4 VARIANCES FROM RECENT POTENTIOMETRIC SURFACES

This section and its associated subsections compare and contrast the April 2019 potentiometric surface maps with the October 2018 potentiometric surface maps. The following subsections discuss variance between the 2019 and 2018 potentiometric surfaces for each of the four aquifers.

5.4.1 Unconsolidated

In general, the groundwater elevations observed in the unconsolidated aquifer during the April 2019 gauging event were similar to those observed during the October 2018 event. On average, October 2018 groundwater elevations were approximately 1.71 ft lower than during the April 2019 gauging event. The overall gradients indicated by the two events are similar, with the primary gradient toward the east, with localized variances toward the north and south, as well as localized radial flow.

The most notable difference between the 2018 and 2019 potentiometric maps is the interpretation of contours near FWGmw-001, which is located west of the Building 1200 AOC. In 2019, the relatively low groundwater elevation measured at FWGmw-001 was depicted as a small closed contour, whereas in 2018, the potentiometric surface in the area was depicted with a bending, S-shaped contour line.

5.4.2 Homewood Sandstone

A total of 27 wells were utilized to develop the 2018 Homewood aquifer potentiometric surface map compared to 33 wells utilized for the 2019 map. Despite the difference in number of wells used, the overall gradients indicated by the two events are similar, with the primary gradient toward the east/southeast, with a localized radial pattern near Load Line 9. On average, October 2018 groundwater elevations were approximately 3.0 ft lower than during the April 2019 gauging event. In addition, BKGmw-022, BKGmw-023, FWGmw-005, and the Load Line 7 monitoring wells were used in interpretation in April 2019 and not in October 2018. The inclusion of these wells expands the depiction of the Homewood potentiometric surface westward.

5.4.3 Upper Sharon

A total of 76 wells were utilized to develop the 2018 Upper Sharon aquifer potentiometric surface map compared to 77 wells utilized for the 2019 map. The overall gradients indicated by the two events are similar, with the primary gradient toward the east/southeast/northeast with a localized radial pattern near Load Line 2. On average, October 2018 groundwater elevations were approximately 2.99 ft lower than during the April 2019 gauging event.

The primary difference between the 2018 and 2019 potentiometric maps is at well BKGmw-020. In 2018, BKGmw-020 was not included in contouring, since the groundwater elevation was significantly higher than wells in the nearby vicinity. In 2019, BKGmw-020 is interpreted as a local highpoint with a closed contour.

5.4.4 Basal Sharon Conglomerate

In general, the overall gradients indicated by the 2019 and 2018 gauging events are similar, with the primary gradient directed toward the east, with a northeasterly trend in the northeastern portion of CJAG. On average, October 2018 groundwater elevations were approximately 5.88 ft lower than during the April 2019 gauging event.

The primary differences between the 2019 and 2018 potentiometric maps related to the groundwater elevations were observed at wells SCFmw-005 and SCFmw-006. In 2019, groundwater elevations were 951.06 ft amsl at SCFmw-005 and 949.03 ft amsl at SCFmw-006, a difference of 2.03 ft, whereas in 2018, the elevations were 947.40 ft amsl at SCFmw-005 and 947.01 ft amsl at SCFmw-006, a difference of 0.39 ft. The difference in groundwater elevation between these two wells in 2019 created a bend in the contour toward the northwest. In contrast, since the 2018 data were closer in elevation, the resulting contours did not have as drastic of a bend. In addition, a trough-like feature between wells SCFmw-005 and SCFmw-006 is evident, since the groundwater elevations at these wells are 951.06 and 949.03 ft amsl, respectively, and the well in between (SCFmw-004) has a groundwater elevation of 943.65 ft amsl. Although this is similar to 2018, contours were not interpreted to show a trough as they are in 2019. The remainder of the contour patterns is similar between the two events.

Table 5-1. Groundwater Elevations – April 2019

RVAAP Area	Well ID	Date Gauged	Water Level Depth (ft)	Groundwater Elevation (ft amsl)
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-006	4/29/2019	35.38	960.01
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-007	4/29/2019	5.28	960.63
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-008	4/29/2019	5.76	960.32
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-009	4/29/2019	4.00	960.58
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-010	4/29/2019	24.70	957.44
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-011	4/29/2019	21.00	955.57
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-012	4/29/2019	20.92	956.73
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-013	4/29/2019	24.31	956.4
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-014	4/29/2019	18.76	954.73
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-015	4/29/2019	31.93	959.33
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-016	4/29/2019	36.52	960.08
RVAAP-01 Ramsdell Quarry Landfill	RQLmw-017	4/29/2019	top of pump	top of pump
RVAAP-02 Erie Burning Grounds	EBGmw-123	4/25/2019	9.98	937.302
RVAAP-02 Erie Burning Grounds	EBGmw-124	4/25/2019	3.82	937.031
RVAAP-02 Erie Burning Grounds	EBGmw-125	4/25/2019	12.54	936.812
RVAAP-02 Erie Burning Grounds	EBGmw-126	4/25/2019	1.91	938.16
RVAAP-02 Erie Burning Grounds	EBGmw-127	4/25/2019	5.25	937.281
RVAAP-02 Erie Burning Grounds	EBGmw-128	4/25/2019	6.87	937.721
RVAAP-02 Erie Burning Grounds	EBGmw-129	4/25/2019	5.17	938.654
RVAAP-02 Erie Burning Grounds	EBGmw-130	4/25/2019	6.42	937.043
RVAAP-02 Erie Burning Grounds	EBGmw-131	4/25/2019	8.93	940.61
RVAAP-04 Open Demolition Area #2	DA2mw-104	4/23/2019	21.49	1052.4
RVAAP-04 Open Demolition Area #2	DA2mw-105	4/23/2019	bee nest	bee nest
RVAAP-04 Open Demolition Area #2	DA2mw-106	4/23/2019	3.92	1039.87
RVAAP-04 Open Demolition Area #2	DA2mw-107	4/23/2019	7.05	1034.58
RVAAP-04 Open Demolition Area #2	DA2mw-108	4/23/2019	5.88	1026.48
RVAAP-04 Open Demolition Area #2	DA2mw-109	4/23/2019	11.47	1059.82
RVAAP-04 Open Demolition Area #2	DA2mw-110	4/23/2019	6.01	1057.77
RVAAP-04 Open Demolition Area #2	DA2mw-111	4/23/2019	7.53	1034.59
RVAAP-04 Open Demolition Area #2	DA2mw-112	4/23/2019	6.73	1030.71
RVAAP-04 Open Demolition Area #2	DA2mw-113	4/23/2019	7.20	1029.91
RVAAP-04 Open Demolition Area #2	DA2mw-114	4/23/2019	4.83	1026.53
RVAAP-04 Open Demolition Area #2	DA2mw-115	4/23/2019	6.03	1031.51
RVAAP-04 Open Demolition Area #2	DETmw-001B	4/23/2019	22.31	1043.54
RVAAP-04 Open Demolition Area #2	DETmw-002	4/23/2019	32.25	1028.99
RVAAP-04 Open Demolition Area #2	DETmw-003	4/23/2019	9.25	1027.56
RVAAP-04 Open Demolition Area #2	DETmw-004	4/23/2019	top of pump	top of pump
RVAAP-05 Winklepeck Burning Grounds	WBGmw-005	4/23/2019	4.49	1047.71
RVAAP-05 Winklepeck Burning Grounds	WBGmw-006	4/23/2019	5.88	1006.28
RVAAP-05 Winklepeck Burning Grounds	WBGmw-007	4/23/2019	16.35	981.74
RVAAP-05 Winklepeck Burning Grounds	WBGmw-008	4/23/2019	13.95	991.76
RVAAP-05 Winklepeck Burning Grounds	WBGmw-009	4/23/2019	12.08	1032.95
RVAAP-05 Winklepeck Burning Grounds	WBGmw-010	4/23/2019	7.05	1062.8
RVAAP-05 Winklepeck Burning Grounds	WBGmw-011	4/23/2019	9.79	1062.59
RVAAP-05 Winklepeck Burning Grounds	WBGmw-012	4/23/2019	24.45	1054.66
RVAAP-05 Winklepeck Burning Grounds	WBGmw-013	4/23/2019	bee nest	bee nest
RVAAP-05 Winklepeck Burning Grounds	WBGmw-014	4/23/2019	15.22	981.56
RVAAP-05 Winklepeck Burning Grounds	WBGmw-015	4/23/2019	11.26	1000.34
RVAAP-05 Winklepeck Burning Grounds	WBGmw-016	4/23/2019	15.94	981.09
RVAAP-05 Winklepeck Burning Grounds	WBGmw-017	4/23/2019	7.70	998.92
RVAAP-05 Winklepeck Burning Grounds	WBGmw-018	4/23/2019	13.62	977.29
RVAAP-05 Winklepeck Burning Grounds	WBGmw-019	4/23/2019	16.59	973.12

Table 5-1. Groundwater Elevations – April 2019 (Continued)

RVAAP Area	Well ID	Date Gauged	Water Level Depth (ft)	Groundwater Elevation (ft amsl)
RVAAP-05 Winklepeck Burning Grounds	WBGmw-020	4/23/2019	11.68	1032.09
RVAAP-05 Winklepeck Burning Grounds	WBGmw-021	4/23/2019	8.36	1002.02
RVAAP-06 C Block Quarry	CBLmw-001	4/24/2019	41.30	1139.78
RVAAP-06 C Block Quarry	CBLmw-002	4/24/2019	35.97	1139.27
RVAAP-06 C Block Quarry	CBLmw-003	4/24/2019	32.85	1142.21
RVAAP-06 C Block Quarry	CBLmw-004	4/24/2019	33.85	1140.99
RVAAP-06 C Block Quarry	CBLmw-005	4/24/2019	25.52	1132.04
RVAAP-08 Load Line 1	LL1mw-063	4/25/2019	24.61	969.692
RVAAP-08 Load Line 1	LL1mw-064	4/25/2019	0.25	934.305
RVAAP-08 Load Line 1	LL1mw-065	4/25/2019	10.70	933.163
RVAAP-08 Load Line 1	LL1mw-067	4/25/2019	20.30	959.521
RVAAP-08 Load Line 1	LL1mw-078	4/25/2019	34.19	961.65
RVAAP-08 Load Line 1	LL1mw-079	4/25/2019	33.68	964.19
RVAAP-08 Load Line 1	LL1mw-080	4/25/2019	10.96	985.31
RVAAP-08 Load Line 1	LL1mw-081	4/25/2019	29.90	969.02
RVAAP-08 Load Line 1	LL1mw-082	4/25/2019	27.60	978.85
RVAAP-08 Load Line 1	LL1mw-083	4/25/2019	34.79	960.41
RVAAP-08 Load Line 1	LL1mw-084	4/25/2019	27.91	970.82
RVAAP-08 Load Line 1	LL1mw-085	4/25/2019	36.74	960.1
RVAAP-08 Load Line 1	LL1mw-086	4/25/2019	7.12	932.97
RVAAP-08 Load Line 1	LL1mw-087	4/25/2019	4.95	938.83
RVAAP-08 Load Line 1	LL1mw-088	4/25/2019	4.90	933.19
RVAAP-08 Load Line 1	LL1mw-089	4/25/2019	26.04	954.25
RVAAP-09 Load Line 2	LL2mw-059	4/25/2019	14.44	951.687
RVAAP-09 Load Line 2	LL2mw-060	4/25/2019	10.49	950.538
RVAAP-09 Load Line 2	LL2mw-261	4/29/2019	5.45	1005.95
RVAAP-09 Load Line 2	LL2mw-262	4/29/2019	5.83	1006.79
RVAAP-09 Load Line 2	LL2mw-263	4/29/2019	6.26	1005.21
RVAAP-09 Load Line 2	LL2mw-264	4/29/2019	5.05	1006.83
RVAAP-09 Load Line 2	LL2mw-265	4/29/2019	10.48	950.76
RVAAP-09 Load Line 2	LL2mw-266	4/29/2019	9.25	1007.03
RVAAP-09 Load Line 2	LL2mw-267	4/29/2019	7.91	1006.9
RVAAP-09 Load Line 2	LL2mw-268	4/29/2019	13.30	1003.98
RVAAP-09 Load Line 2	LL2mw-269	4/29/2019	15.45	996.17
RVAAP-09 Load Line 2	LL2mw-270	4/29/2019	5.63	1004.55
RVAAP-09 Load Line 2	LL2mw-271	4/29/2019	11.38	949.27
RVAAP-09 Load Line 2	LL2mw-272	4/29/2019	7.02	1010.78
RVAAP-10 Load Line 3	LL3mw-232	4/25/2019	17.12	983.29
RVAAP-10 Load Line 3	LL3mw-233	4/25/2019	25.68	978.68
RVAAP-10 Load Line 3	LL3mw-234	4/25/2019	9.30	997.26
RVAAP-10 Load Line 3	LL3mw-235	4/25/2019	16.43	993.51
RVAAP-10 Load Line 3	LL3mw-236	4/25/2019	15.81	995.89
RVAAP-10 Load Line 3	LL3mw-237	4/25/2019	13.81	991.76
RVAAP-10 Load Line 3	LL3mw-238	4/25/2019	15.42	991.49
RVAAP-10 Load Line 3	LL3mw-239	4/25/2019	23.63	979.87
RVAAP-10 Load Line 3	LL3mw-240	4/25/2019	26.74	980.78
RVAAP-10 Load Line 3	LL3mw-241	4/25/2019	8.54	986.11
RVAAP-10 Load Line 3	LL3mw-242	4/25/2019	13.58	985.74
RVAAP-10 Load Line 3	LL3mw-243	4/25/2019	10.69	980.47
RVAAP-10 Load Line 3	LL3mw-244	4/25/2019	8.70	979.54
RVAAP-10 Load Line 3	LL3mw-245	4/25/2019	13.22	967.48
RVAAP-10 Load Line 3	LL3mw-246	4/24/2019	19.22	969.08
RVAAP-11 Load Line 4	LL4mw-193	4/25/2019	5.85	977.07
RVAAP-11 Load Line 4	LL4mw-194	4/25/2019	6.80	976.96

Table 5-1. Groundwater Elevations – April 2019 (Continued)

RVAAP Area	Well ID	Date Gauged	Water Level Depth (ft)	Groundwater Elevation (ft amsl)
RVAAP-11 Load Line 4	LL4mw-195	4/25/2019	12.58	970.01
RVAAP-11 Load Line 4	LL4mw-196	4/25/2019	9.93	974.62
RVAAP-11 Load Line 4	LL4mw-197	4/25/2019	13.97	971.49
RVAAP-11 Load Line 4	LL4mw-198	4/25/2019	5.93	977.49
RVAAP-11 Load Line 4	LL4mw-199	4/25/2019	7.20	970.08
RVAAP-11 Load Line 4	LL4mw-200	4/25/2019	18.17	969.76
RVAAP-11 Load Line 4	LL4mw-201	4/25/2019	10.01	967.47
RVAAP-12 Load Line 12	LL12mw-088	4/25/2019	6.63	974.43
RVAAP-12 Load Line 12	LL12mw-107	4/25/2019	9.31	970.84
RVAAP-12 Load Line 12	LL12mw-113	4/25/2019	5.45	974.73
RVAAP-12 Load Line 12	LL12mw-128	4/25/2019	9.28	968.96
RVAAP-12 Load Line 12	LL12mw-153	4/25/2019	6.02	971.83
RVAAP-12 Load Line 12	LL12mw-154	4/25/2019	8.62	970.44
RVAAP-12 Load Line 12	LL12mw-182	4/25/2019	8.90	975.52
RVAAP-12 Load Line 12	LL12mw-182ss	4/25/2019	8.42	976.06
RVAAP-12 Load Line 12	LL12mw-183	4/25/2019	11.99	970.99
RVAAP-12 Load Line 12	LL12mw-184	4/25/2019	12.38	970.78
RVAAP-12 Load Line 12	LL12mw-185	4/25/2019	7.05	974.26
RVAAP-12 Load Line 12	LL12mw-186	4/25/2019	5.74	972.57
RVAAP-12 Load Line 12	LL12mw-187	4/25/2019	9.31	970.63
RVAAP-12 Load Line 12	LL12mw-188	4/25/2019	4.34	976.29
RVAAP-12 Load Line 12	LL12mw-189	4/25/2019	3.42	974.62
RVAAP-12 Load Line 12	LL12mw-242	4/25/2019	8.55	972.65
RVAAP-12 Load Line 12	LL12mw-243	4/25/2019	9.28	971.51
RVAAP-12 Load Line 12	LL12mw-244	4/25/2019	9.52	971.13
RVAAP-12 Load Line 12	LL12mw-245	4/25/2019	8.22	971.82
RVAAP-12 Load Line 12	LL12mw-246	4/25/2019	16.65	968.18
RVAAP-12 Load Line 12	LL12mw-247	4/25/2019	4.73	978.98
RVAAP-13 Building 1200	B12mw-010	4/25/2019	17.08	988.84
RVAAP-13 Building 1200	B12mw-011	4/25/2019	19.32	987.38
RVAAP-13 Building 1200	B12mw-012	4/25/2019	20.75	985.57
RVAAP-13 Building 1200	B12mw-013	4/25/2019	21.21	982.73
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-166	4/24/2019	5.03	1103.83
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-167	4/24/2019	3.81	1112.09
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-168	4/24/2019	10.06	1123.85
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-169	4/24/2019	5.42	1115.16
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-170	4/24/2019	16.95	1125.31
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-171	4/24/2019	16.09	1127.46
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-172	4/24/2019	23.20	1126.89
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-173	4/24/2019	42.95	1122.99
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-174	4/24/2019	14.69	1125.28
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-175	4/24/2019	16.24	1124.49
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-176	4/24/2019	7.34	1124.57
RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-177	4/24/2019	10.65	1117.92
RVAAP-19 Landfill North of Winklepeck Burning Grounds	LNWmw-024	4/23/2019	10.73	1027.27
RVAAP-19 Landfill North of Winklepeck Burning Grounds	LNWmw-025	4/23/2019	4.33	1024.8
RVAAP-19 Landfill North of Winklepeck Burning Grounds	LNWmw-026	4/23/2019	3.52	1024.28
RVAAP-19 Landfill North of Winklepeck Burning Grounds	LNWmw-027	4/23/2019	5.60	1021.53
RVAAP-28 Suspected Mustard Agent Burial Site	MBSmw-001	4/24/2019	17.31	1064.89
RVAAP-28 Suspected Mustard Agent Burial Site	MBSmw-002	4/24/2019	17.95	1065.27

Table 5-1. Groundwater Elevations – April 2019 (Continued)

RVAAP Area	Well ID	Date Gauged	Water Level Depth (ft)	Groundwater Elevation (ft amsl)
RVAAP-28 Suspected Mustard Agent Burial Site	MBSmw-003	4/24/2019	18.35	1066.1
RVAAP-28 Suspected Mustard Agent Burial Site	MBSmw-004	4/24/2019	16.78	1065.02
RVAAP-28 Suspected Mustard Agent Burial Site	MBSmw-005	4/24/2019	17.56	1064.86
RVAAP-28 Suspected Mustard Agent Burial Site	MBSmw-006	4/24/2019	17.02	1064.81
RVAAP-29 Upper and Lower Cobbs Ponds	CPmw-001	4/25/2019	1.57	973.69
RVAAP-29 Upper and Lower Cobbs Ponds	CPmw-002	4/29/2019	-0.01	972.32
RVAAP-29 Upper and Lower Cobbs Ponds	CPmw-003	4/25/2019	1.28	971.64
RVAAP-29 Upper and Lower Cobbs Ponds	CPmw-004	4/25/2019	9.81	971.39
RVAAP-29 Upper and Lower Cobbs Ponds	CPmw-005	4/25/2019	11.20	962.38
RVAAP-29 Upper and Lower Cobbs Ponds	CPmw-006	4/25/2019	8.53	956.6
RVAAP-33 Load Line 6	LL6mw-001	4/24/2019	11.25	1112.91
RVAAP-33 Load Line 6	LL6mw-002	4/24/2019	19.35	1110.01
RVAAP-33 Load Line 6	LL6mw-003	4/24/2019	15.25	1110.13
RVAAP-33 Load Line 6	LL6mw-004	4/24/2019	16.16	1109.23
RVAAP-33 Load Line 6	LL6mw-005	4/24/2019	11.41	1109.06
RVAAP-33 Load Line 6	LL6mw-006	4/24/2019	13.20	1111.17
RVAAP-33 Load Line 6	LL6mw-007	4/24/2019	3.55	1112.07
RVAAP-33 Load Line 6	LL6mw-008	4/24/2019	13.84	1109.77
RVAAP-33 Load Line 6	LL6mw-009	4/24/2019	13.50	1109.71
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-001	4/23/2019	top of pump	top of pump
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-002	4/23/2019	top of pump	top of pump
RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-003	4/23/2019	16.88	955.32
RVAAP-38 NACA Test Area	NTAmw-107	4/24/2019	12.17	1068.13
RVAAP-38 NACA Test Area	NTAmw-108	4/24/2019	17.25	1068.37
RVAAP-38 NACA Test Area	NTAmw-109	4/24/2019	11.43	1068.41
RVAAP-38 NACA Test Area	NTAmw-110	4/24/2019	13.54	1069.08
RVAAP-38 NACA Test Area	NTAmw-111	4/24/2019	3.52	1077.42
RVAAP-38 NACA Test Area	NTAmw-112	4/24/2019	8.33	1070
RVAAP-38 NACA Test Area	NTAmw-113	4/24/2019	6.46	1069.22
RVAAP-38 NACA Test Area	NTAmw-114	4/24/2019	5.65	1073.06
RVAAP-38 NACA Test Area	NTAmw-115	4/24/2019	10.99	1078.66
RVAAP-38 NACA Test Area	NTAmw-116	4/24/2019	4.94	1089.39
RVAAP-38 NACA Test Area	NTAmw-117	4/24/2019	12.81	1081.73
RVAAP-38 NACA Test Area	NTAmw-118	4/24/2019	8.28	1073.16
RVAAP-38 NACA Test Area	NTAmw-119	4/24/2019	12.18	1067.35
RVAAP-38 NACA Test Area	NTAmw-120	4/24/2019	33.09	1042.11
RVAAP-39 Load Line 5	LL5mw-001	4/24/2019	18.96	1108.96
RVAAP-39 Load Line 5	LL5mw-002	4/24/2019	19.50	1109.18
RVAAP-39 Load Line 5	LL5mw-003	4/24/2019	17.36	1110.34
RVAAP-39 Load Line 5	LL5mw-004	4/24/2019	16.75	1109.06
RVAAP-39 Load Line 5	LL5mw-005	4/24/2019	20.45	1108.97
RVAAP-39 Load Line 5	LL5mw-006	4/24/2019	19.00	1109
RVAAP-40 Load Line 7	LL7mw-001	4/23/2019	20.13	1109.51
RVAAP-40 Load Line 7	LL7mw-002	4/23/2019	14.98	1114.57
RVAAP-40 Load Line 7	LL7mw-003	4/23/2019	11.24	1109.6
RVAAP-40 Load Line 7	LL7mw-004	4/23/2019	14.56	1111.76
RVAAP-40 Load Line 7	LL7mw-005	4/23/2019	21.17	1114.7
RVAAP-40 Load Line 7	LL7mw-006	4/23/2019	9.81	1113.75
RVAAP-41 Load Line 8	LL8mw-001	4/23/2019	9.85	1111.61
RVAAP-41 Load Line 8	LL8mw-002	4/24/2019	16.12	1108.39
RVAAP-41 Load Line 8	LL8mw-003	4/24/2019	10.84	1108.21
RVAAP-41 Load Line 8	LL8mw-004	4/24/2019	9.09	1106.66
RVAAP-41 Load Line 8	LL8mw-005	4/24/2019	10.24	1105.49
RVAAP-41 Load Line 8	LL8mw-006	4/24/2019	18.47	1098.68

Table 5-1. Groundwater Elevations – April 2019 (Continued)

RVAAP Area	Well ID	Date Gauged	Water Level Depth (ft)	Groundwater Elevation (ft amsl)
RVAAP-42 Load Line 9	LL9mw-001	4/24/2019	13.57	1121.05
RVAAP-42 Load Line 9	LL9mw-002	4/24/2019	11.10	1116.2
RVAAP-42 Load Line 9	LL9mw-003	4/24/2019	7.58	1128.18
RVAAP-42 Load Line 9	LL9mw-004	4/24/2019	18.65	1113.18
RVAAP-42 Load Line 9	LL9mw-005	4/24/2019	14.16	1116.77
RVAAP-42 Load Line 9	LL9mw-006	4/24/2019	16.79	1113.09
RVAAP-42 Load Line 9	LL9mw-007	4/24/2019	7.50	1112.49
RVAAP-43 Load Line 10	LL10mw-001	4/24/2019	23.89	1108.88
RVAAP-43 Load Line 10	LL10mw-002	4/24/2019	15.75	1111.38
RVAAP-43 Load Line 10	LL10mw-003	4/24/2019	18.81	1111.47
RVAAP-43 Load Line 10	LL10mw-004	4/24/2019	11.67	1110.72
RVAAP-43 Load Line 10	LL10mw-005	4/24/2019	13.59	1112.08
RVAAP-43 Load Line 10	LL10mw-006	4/24/2019	9.84	1113.99
RVAAP-44 Load Line 11	LL11mw-001	4/23/2019	8.28	1091.88
RVAAP-44 Load Line 11	LL11mw-002	4/23/2019	0.95	1079.05
RVAAP-44 Load Line 11	LL11mw-003	4/23/2019	0.71	1087.78
RVAAP-44 Load Line 11	LL11mw-004	4/23/2019	0.11	1084.62
RVAAP-44 Load Line 11	LL11mw-005	4/23/2019	5.49	1073.92
RVAAP-44 Load Line 11	LL11mw-006	4/23/2019	2.05	1084.45
RVAAP-44 Load Line 11	LL11mw-007	4/23/2019	13.48	1068.52
RVAAP-44 Load Line 11	LL11mw-008	4/23/2019	0.81	1086.93
RVAAP-44 Load Line 11	LL11mw-009	4/23/2019	1.80	1089.74
RVAAP-44 Load Line 11	LL11mw-010	4/23/2019	3.34	1079.34
RVAAP-44 Load Line 11	LL11mw-011	4/23/2019	7.76	1071.9
RVAAP-44 Load Line 11	LL11mw-012	4/23/2019	18.81	1061.01
RVAAP-49 Central Burn Pits	CBPmw-001	4/23/2019	13.31	962.53
RVAAP-49 Central Burn Pits	CBPmw-002	4/23/2019	8.95	961.09
RVAAP-49 Central Burn Pits	CBPmw-003	4/23/2019	12.00	962.67
RVAAP-49 Central Burn Pits	CBPmw-004	4/23/2019	10.86	960.27
RVAAP-49 Central Burn Pits	CBPmw-005	4/23/2019	12.16	959.43
RVAAP-49 Central Burn Pits	CBPmw-006	4/23/2019	7.94	959.7
RVAAP-49 Central Burn Pits	CBPmw-007	4/23/2019	15.40	960.97
RVAAP-49 Central Burn Pits	CBPmw-008	4/23/2019	16.15	957.04
RVAAP-49 Central Burn Pits	CBPmw-009	4/23/2019	10.31	961.63
RVAAP-50 Atlas Scrap Yard	ASYmw-001	4/24/2019	11.24	969.89
RVAAP-50 Atlas Scrap Yard	ASYmw-002	4/24/2019	14.64	970.6
RVAAP-50 Atlas Scrap Yard	ASYmw-003	4/24/2019	12.24	969.97
RVAAP-50 Atlas Scrap Yard	ASYmw-004	4/24/2019	9.39	970.27
RVAAP-50 Atlas Scrap Yard	ASYmw-005	4/24/2019	7.98	971.82
RVAAP-50 Atlas Scrap Yard	ASYmw-006	4/24/2019	14.05	968.96
RVAAP-50 Atlas Scrap Yard	ASYmw-007	4/24/2019	15.46	968.7
RVAAP-50 Atlas Scrap Yard	ASYmw-008	4/24/2019	5.13	973.72
RVAAP-50 Atlas Scrap Yard	ASYmw-009	4/24/2019	11.54	971.16
RVAAP-50 Atlas Scrap Yard	ASYmw-010	4/24/2019	12.39	968.66
RVAAP-66 Facility-wide Groundwater	FWGmw-001	4/29/2019	7.10	948.98
RVAAP-66 Facility-wide Groundwater	FWGmw-002	4/29/2019	21.71	950.85
RVAAP-66 Facility-wide Groundwater	FWGmw-003	4/24/2019	5.03	1126.39
RVAAP-66 Facility-wide Groundwater	FWGmw-004	4/29/2019	9.96	1026.65
RVAAP-66 Facility-wide Groundwater	FWGmw-005	4/24/2019	21.15	1148.41
RVAAP-66 Facility-wide Groundwater	FWGmw-006	4/24/2019	3.85	1179.94
RVAAP-66 Facility-wide Groundwater	FWGmw-007	4/24/2019	24.35	1050.52
RVAAP-66 Facility-wide Groundwater	FWGmw-008	4/24/2019	5.26	1105.81
RVAAP-66 Facility-wide Groundwater	FWGmw-009	4/24/2019	1.93	1099.67
RVAAP-66 Facility-wide Groundwater	FWGmw-010	4/25/2019	11.40	950.21

Table 5-1. Groundwater Elevations – April 2019 (Continued)

RVAAP Area	Well ID	Date Gauged	Water Level Depth (ft)	Groundwater Elevation (ft amsl)
RVAAP-66 Facility-wide Groundwater	FWGmw-011	4/25/2019	1.75	939.32
RVAAP-66 Facility-wide Groundwater	FWGmw-012	4/25/2019	0.25	940.6
RVAAP-66 Facility-wide Groundwater	FWGmw-013	4/23/2019	18.50	1040.47
RVAAP-66 Facility-wide Groundwater	FWGmw-014	4/24/2019	3.35	1133.68
RVAAP-66 Facility-wide Groundwater	FWGmw-015	4/29/2019	2.81	1011.16
RVAAP-66 Facility-wide Groundwater	FWGmw-016	4/29/2019	15.87	997.98
RVAAP-66 Facility-wide Groundwater	FWGmw-018	4/24/2019	21.12	962.91
RVAAP-66 Facility-wide Groundwater	FWGmw-019	4/24/2019	114.57	1017.66
RVAAP-66 Facility-wide Groundwater	FWGmw-020	4/24/2019	21.95	962.63
RVAAP-66 Facility-wide Groundwater	FWGmw-021	4/24/2019	19.60	968.37
RVAAP-66 Facility-wide Groundwater	FWGmw-022	4/24/2019	113.68	1018.63
RVAAP-66 Facility-wide Groundwater	FWGmw-023	4/23/2019	116.48	1035.89
RVAAP-66 Facility-wide Groundwater	FWGmw-024	4/24/2019	14.36	948.8
RVAAP-66 Facility-wide Groundwater	SCFmw-001	4/25/2019	88.68	1031.49
RVAAP-66 Facility-wide Groundwater	SCFmw-002	4/25/2019	19.27	964.75
RVAAP-66 Facility-wide Groundwater	SCFmw-003	4/25/2019	8.67	949.25
RVAAP-66 Facility-wide Groundwater	SCFmw-004	4/25/2019	-0.03	943.65
RVAAP-66 Facility-wide Groundwater	SCFmw-005	4/29/2019	9.20	951.06
RVAAP-66 Facility-wide Groundwater	SCFmw-006	4/29/2019	16.35	949.03
RVAAP-66 Facility-wide Groundwater	BKGmw-004	4/29/2019	11.80	953.36
RVAAP-66 Facility-wide Groundwater	BKGmw-005	4/24/2019	10.73	1138.71
RVAAP-66 Facility-wide Groundwater	BKGmw-006	4/24/2019	23.72	1002.66
RVAAP-66 Facility-wide Groundwater	BKGmw-008	4/25/2019	16.58	953.82
RVAAP-66 Facility-wide Groundwater	BKGmw-010	4/25/2019	14.54	991.75
RVAAP-66 Facility-wide Groundwater	BKGmw-012	4/29/2019	7.40	990.17
RVAAP-66 Facility-wide Groundwater	BKGmw-013	4/24/2019	11.76	974.83
RVAAP-66 Facility-wide Groundwater	BKGmw-015	4/24/2019	48.78	989.12
RVAAP-66 Facility-wide Groundwater	BKGmw-016	4/24/2019	5.82	1092.6
RVAAP-66 Facility-wide Groundwater	BKGmw-017	4/24/2019	17.24	1115.56
RVAAP-66 Facility-wide Groundwater	BKGmw-018	4/24/2019	15.70	1027.36
RVAAP-66 Facility-wide Groundwater	BKGmw-019	4/24/2019	20.83	1087.41
RVAAP-66 Facility-wide Groundwater	BKGmw-020	4/23/2019	7.46	1057.54
RVAAP-66 Facility-wide Groundwater	BKGmw-021	4/29/2019	11.52	960.64
RVAAP-66 Facility-wide Groundwater	BKGmw-022	4/24/2019	14.23	1153.09
RVAAP-66 Facility-wide Groundwater	BKGmw-023	4/24/2019	4.80	1178.82
RVAAP-66 Facility-wide Groundwater	BKGmw-024	4/24/2019	10.59	1033.19
RVAAP-66 Facility-wide Groundwater	BKGmw-025	4/24/2019	41.70	1068.9

ft = Feet.
ID = Identifier.
RVAAP = Ravenna Army Ammunition Plant.

Table 5-2. Hydraulic Gradient and Groundwater Flow Velocity

Formation	Hydraulic Gradient	General Gradient	Porosity	Hydraulic Conductivity		Seepage Velocity	
			%	cm/sec	ft/day	ft/day	ft/yr
Unconsolidated	0.008	East	27.40%	4.27E-04	1.21	0.035	13
Unconsolidated	0.01	Southwest	27.40%	4.27E-04	1.21	0.044	16
Unconsolidated	0.02	East	27.40%	4.27E-04	1.21	0.088	32
Homewood Sandstone	0.005	Southeast	13.90%	2.81E-03	7.97	0.287	105
Homewood Sandstone	0.004	Southeast	13.90%	2.81E-03	7.97	0.229	84
Homewood Sandstone	0.019	East	13.90%	2.81E-03	7.97	1.089	398
Homewood Sandstone	0.007	East-Northeast	13.90%	2.81E-03	7.97	0.401	146
Upper Sharon	0.022	East-Southeast	10.50%	4.46E-03	12.64	2.648	967
Upper Sharon	0.015	East-Northeast	10.50%	4.46E-03	12.64	1.806	659
Upper Sharon	0.017	East-Northeast	10.50%	4.46E-03	12.64	2.046	747
Basal Sharon Conglomerate	0.003	East-Northeast	10.50%	1.00E-04	0.28	0.008	3
Basal Sharon Conglomerate	0.004	East	10.50%	1.00E-04	0.28	0.011	4
Basal Sharon Conglomerate	0.006	East	10.50%	1.00E-04	0.28	0.016	6

cm/sec = Centimeters per second.
ft/day = Feet per day.
ft/yr = Feet per year.

Table 5-3. Vertical Gradient Calculations

RVAAP Area	Well ID	Monitored Zone/Aquifer	TOC Elevation (ft amsl)	Groundwater Elevation (ft amsl)	Screen Midpoint Elevation (ft amsl)	Vertical Hydraulic Gradient (ft/ft)	Vertical Gradient Direction	Comments
Unconsolidated and Homewood Aquifers								
Load Line 6	LL6mw-008	Unconsolidated	1123.61	1109.77	1108.60	0.003	Down	Minor downward gradient from unconsolidated toward Homewood aquifer
Load Line 6	LL6mw-009	Homewood Sandstone	1123.21	1109.71	1086.90			
Unconsolidated and Upper Sharon Aquifers								
Erie Burning Grounds	EBGmw-125	Unconsolidated	949.35	936.81	928.01	-0.082	Up	Upward gradient from Upper Sharon toward Unconsolidated aquifer
Erie Burning Grounds	EBGmw-131	Upper Sharon	949.54	940.61	881.50			
Facility Wide Groundwater	FWGmw-015	Unconsolidated	1013.97	1011.16	993.10	0.318	Down	Downward gradient from Unconsolidated toward Upper Sharon aquifer
Facility Wide Groundwater	FWGmw-016	Upper Sharon	1013.85	997.98	951.60			
Load Line 4	LL4mw-199	Unconsolidated	977.28	970.08	959.90	0.057	Down	Downward gradient from Unconsolidated toward Upper Sharon aquifer
Load Line 4	LL4mw-201	Upper Sharon	977.48	967.47	913.90			
NACA Testing Area	NTAmw-113	Unconsolidated	1075.68	1069.22	1050.61	0.293	Down	Downward gradient from Unconsolidated toward Upper Sharon aquifer
NACA Testing Area	NTAmw-120	Upper Sharon	1075.20	1042.11	958.17			
Winklepeck Burning Grounds	WBGmw-009	Unconsolidated	1045.03	1032.95	1026.32	0.040	Down	Downward gradient from Unconsolidated toward Upper Sharon aquifer
Winklepeck Burning Grounds	WBGmw-020	Upper Sharon	1043.77	1032.09	1005.00			
Winklepeck Burning Grounds	WBGmw-018	Unconsolidated	990.91	977.29	971.50	0.153	Down	Downward gradient from Unconsolidated toward Upper Sharon aquifer
Winklepeck Burning Grounds	WBGmw-019	Upper Sharon	989.71	973.12	944.20			
Winklepeck Burning Grounds	WBGmw-006	Unconsolidated	1012.16	1006.28	997.33	0.172	Down	Downward gradient from Unconsolidated toward Upper Sharon aquifer
Winklepeck Burning Grounds	WBGmw-021	Upper Sharon	1010.38	1002.02	972.50			

Table 5-3. Vertical Gradient Calculations (Continued)

RVAAP Area	Well ID	Monitored Zone/Aquifer	TOC Elevation (ft amsl)	Groundwater Elevation (ft amsl)	Screen Midpoint Elevation (ft amsl)	Vertical Hydraulic Gradient (ft/ft)	Vertical Gradient Direction	Comments
Unconsolidated and Basal Sharon Conglomerate Aquifers								
Load Line 1	LL1mw-087	Unconsolidated	943.78	938.83	929.3	-0.052	Up	Upward gradient from Basal Sharon Conglomerate toward Unconsolidated aquifer
Basal Sharon Conglomerate	SCFmw-004	Basal Sharon Conglomerate	943.62	943.65	836.32			
Load Line 12	LL12mw-247	Unconsolidated	983.71	978.98	965.8	0.113	Down	Downward gradient from Unconsolidated toward Basal Sharon Conglomerate aquifer
Basal Sharon Conglomerate	SCFmw-002	Basal Sharon Conglomerate	984.02	964.75	839.74			
Upper Sharon and Basal Sharon Conglomerate Aquifers								
Background	Bkgmw-018	Upper Sharon	1043.06	1027.36	1021.32	-0.044	Up	Upward gradient from Basal Sharon towards Upper Sharon aquifer
Background	Bkgmw-024	Basal Sharon Conglomerate	1043.78	1033.19	889.89			
Load Line 10	FWGmw-022	Upper Sharon	1132.31	1018.63	970.81	0.014	Down	Downward gradient from Upper Sharon toward Basal Sharon Conglomerate aquifer
Load Line 10	FWGmw-019	Basal Sharon Conglomerate	1132.23	1017.66	900.08			
Load Line 12	FWGmw-020	Upper Sharon	984.58	962.63	942.03	-0.003	Up	Minor upward gradient from Basal Sharon toward Upper Sharon aquifer
Load Line 12	FWGmw-018	Basal Sharon Conglomerate	984.03	962.91	839.92			

amsl = Above mean sea level.
ID = Identifier.
ft = Feet.
ft/ft = Feet per foot.
NACA = National Advisory Committee on Aeronautics.
RVAAP = Ravenna Army Ammunition Plant.
TOC = Total organic carbon.

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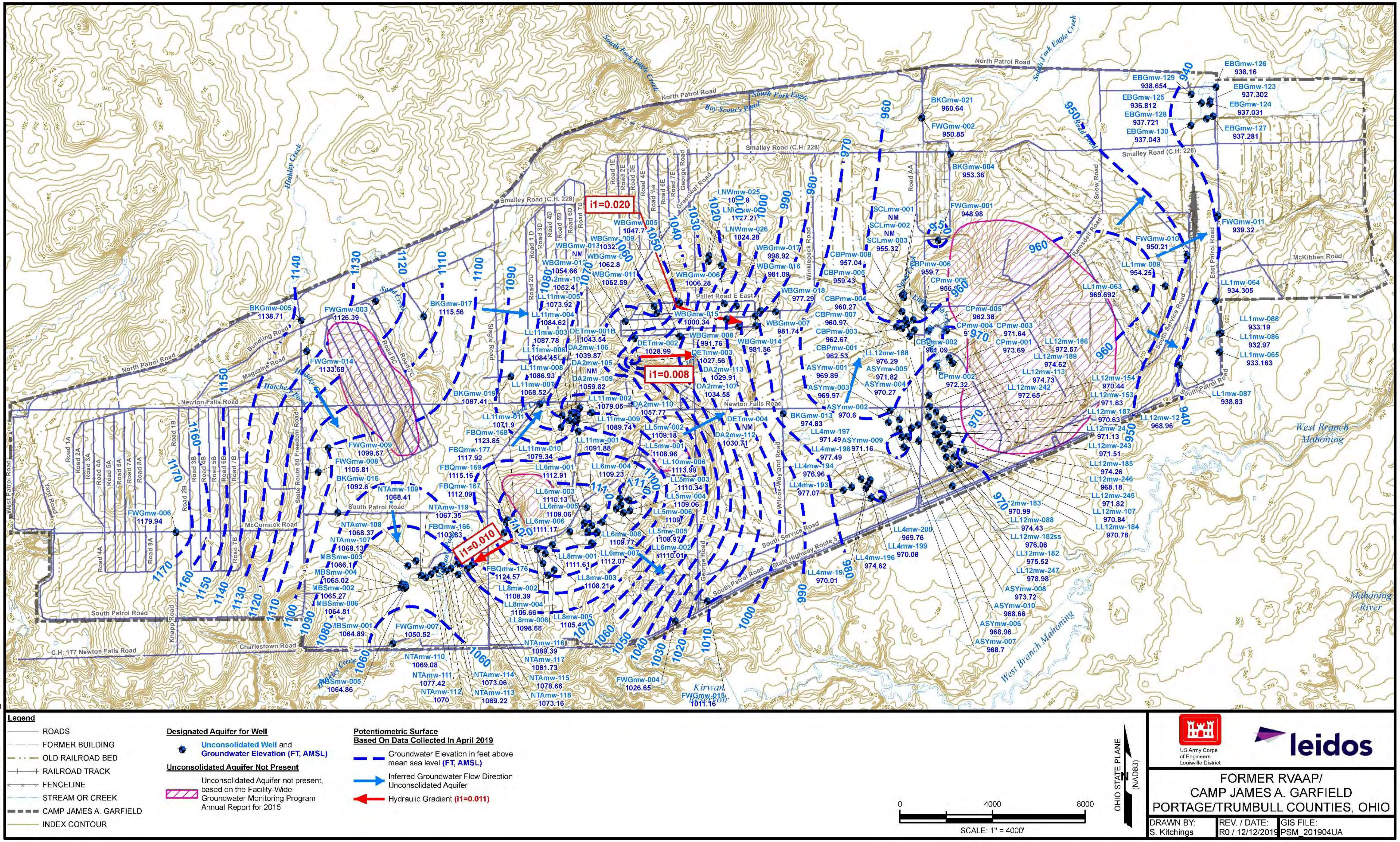


Figure 5-1. Potentiometric Surface Map, April 2019 – Unconsolidated Aquifer

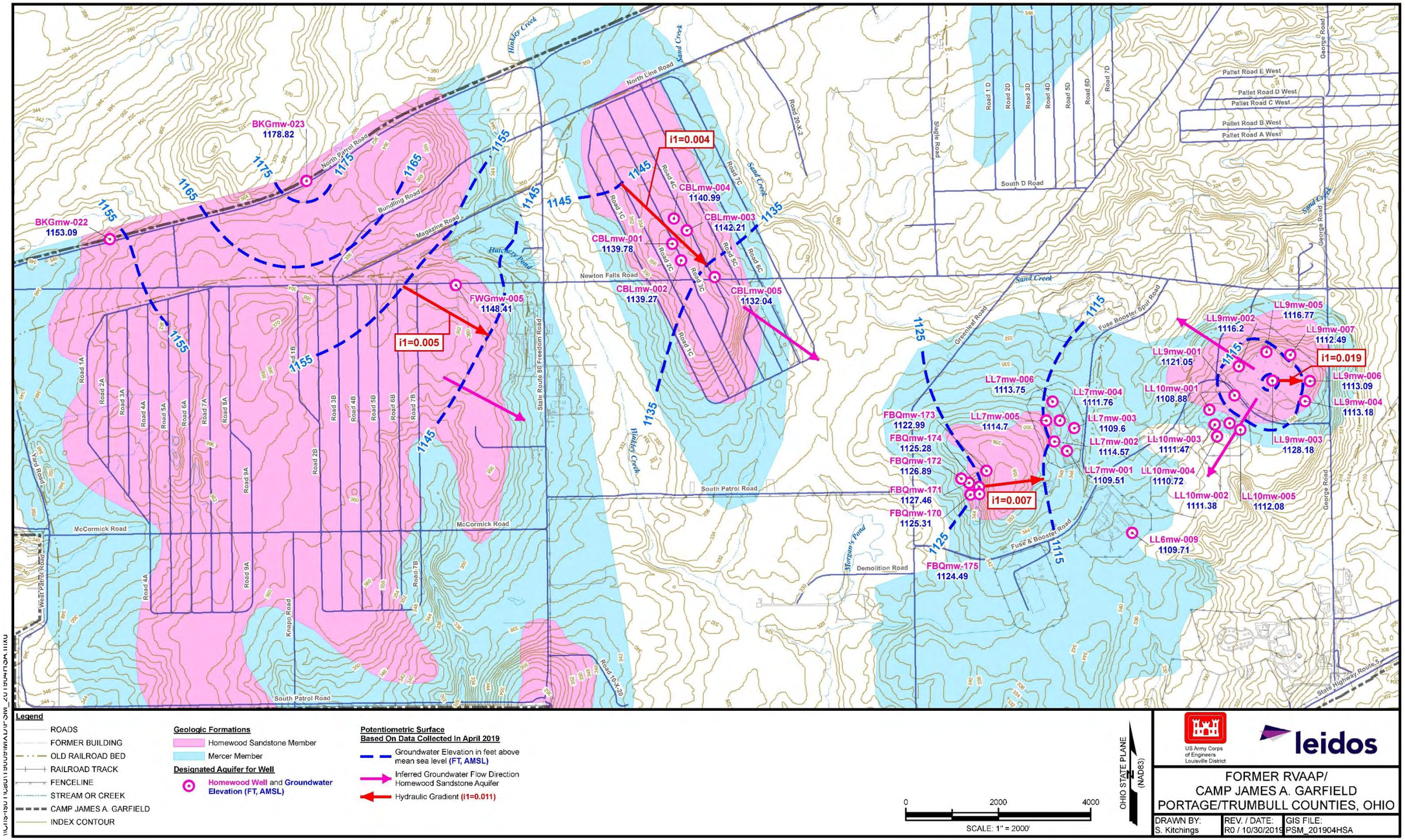
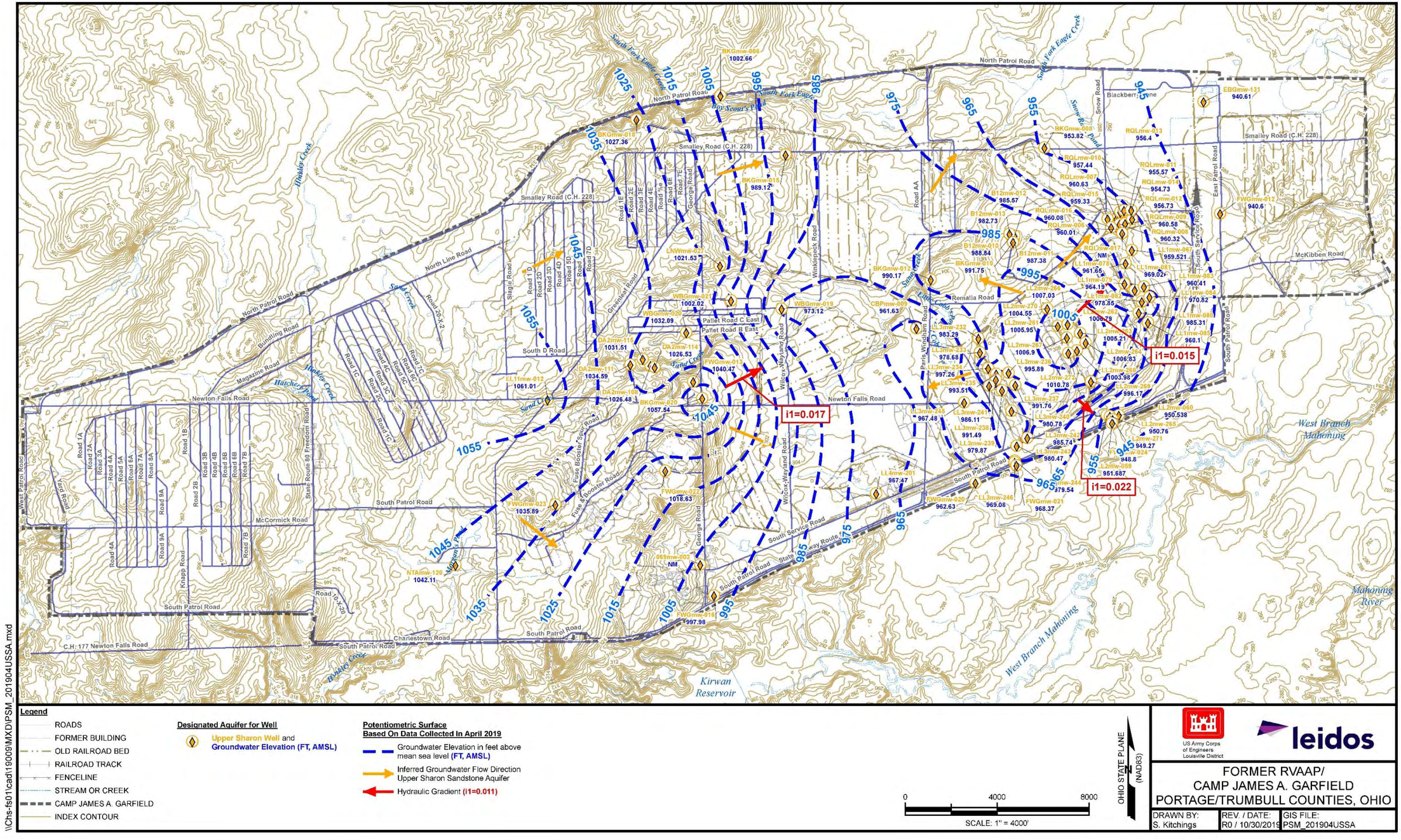


Figure 5-2. Potentiometric Surface Map, April 2019 – Homewood Sandstone Aquifer



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Legend

- ROADS
- FORMER BUILDING
- OLD RAILROAD BED
- RAILROAD TRACK
- FENCELINE
- STREAM OR CREEK
- CAMP JAMES A. GARFIELD
- INDEX CONTOUR

Designated Aquifer for Well

- Upper Sharon Well and Groundwater Elevation (FT, AMSL)

Potentiometric Surface Based On Data Collected In April 2019

- Groundwater Elevation in feet above mean sea level (FT, AMSL)
- Inferred Groundwater Flow Direction Upper Sharon Sandstone Aquifer
- Hydraulic Gradient (i1=0.011)

0 4000 8000

SCALE: 1" = 4000'

OHIO STATE PLANE (NAD83)

US Army Corps of Engineers Louisville District

leidos

FORMER RVAAP/
CAMP JAMES A. GARFIELD
PORTAGE/TRUMBULL COUNTIES, OHIO

DRAWN BY:	REV. / DATE:	GIS FILE:
S. Kitchings	R0 / 10/30/2019	PSM_201904USSA

Figure 5-3. Potentiometric Surface Map, April 2019 – Upper Sharon Sandstone Aquifer

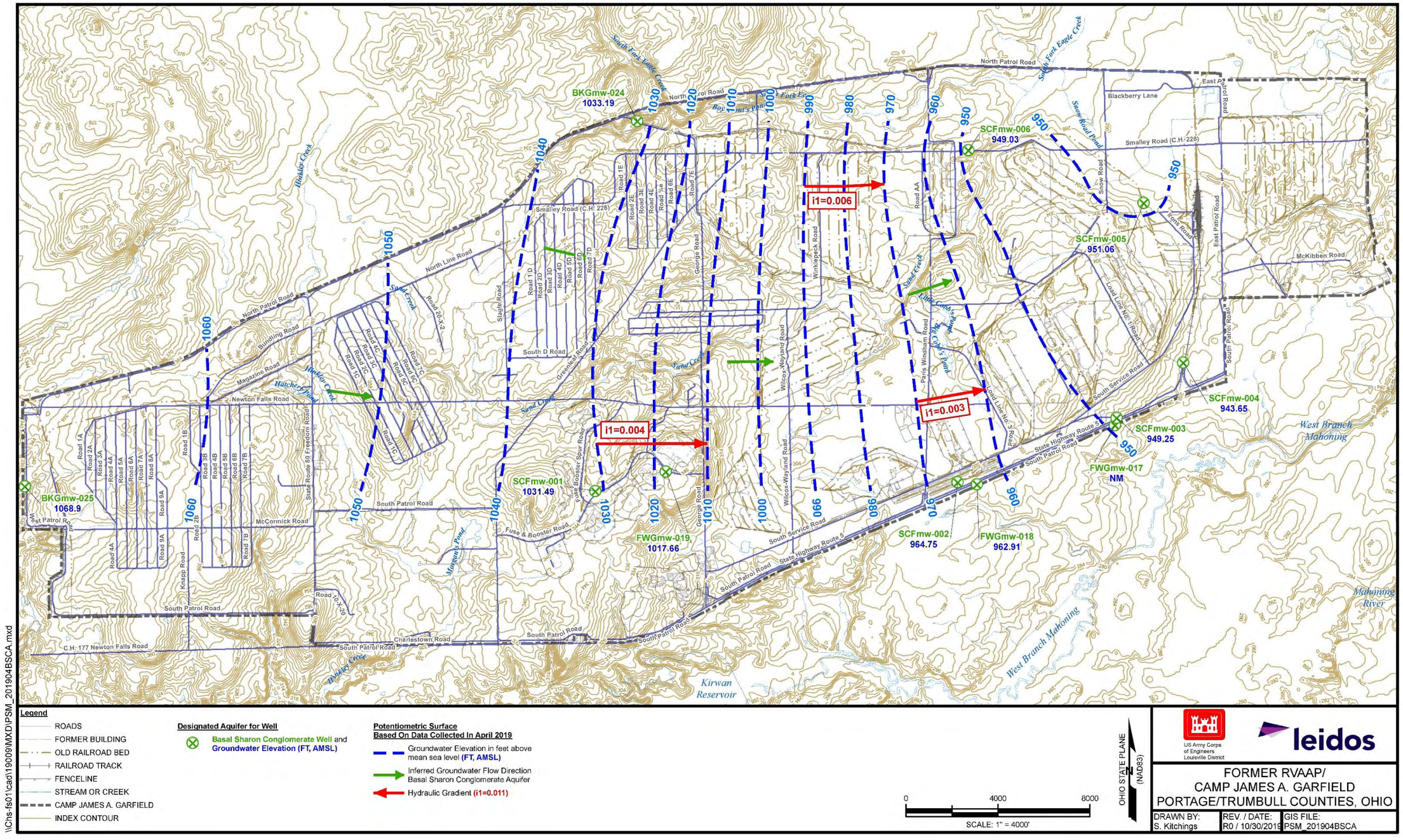

Figure 5-4. Potentiometric Surface Map, April 2019 – Basal Sharon Conglomerate Aquifer

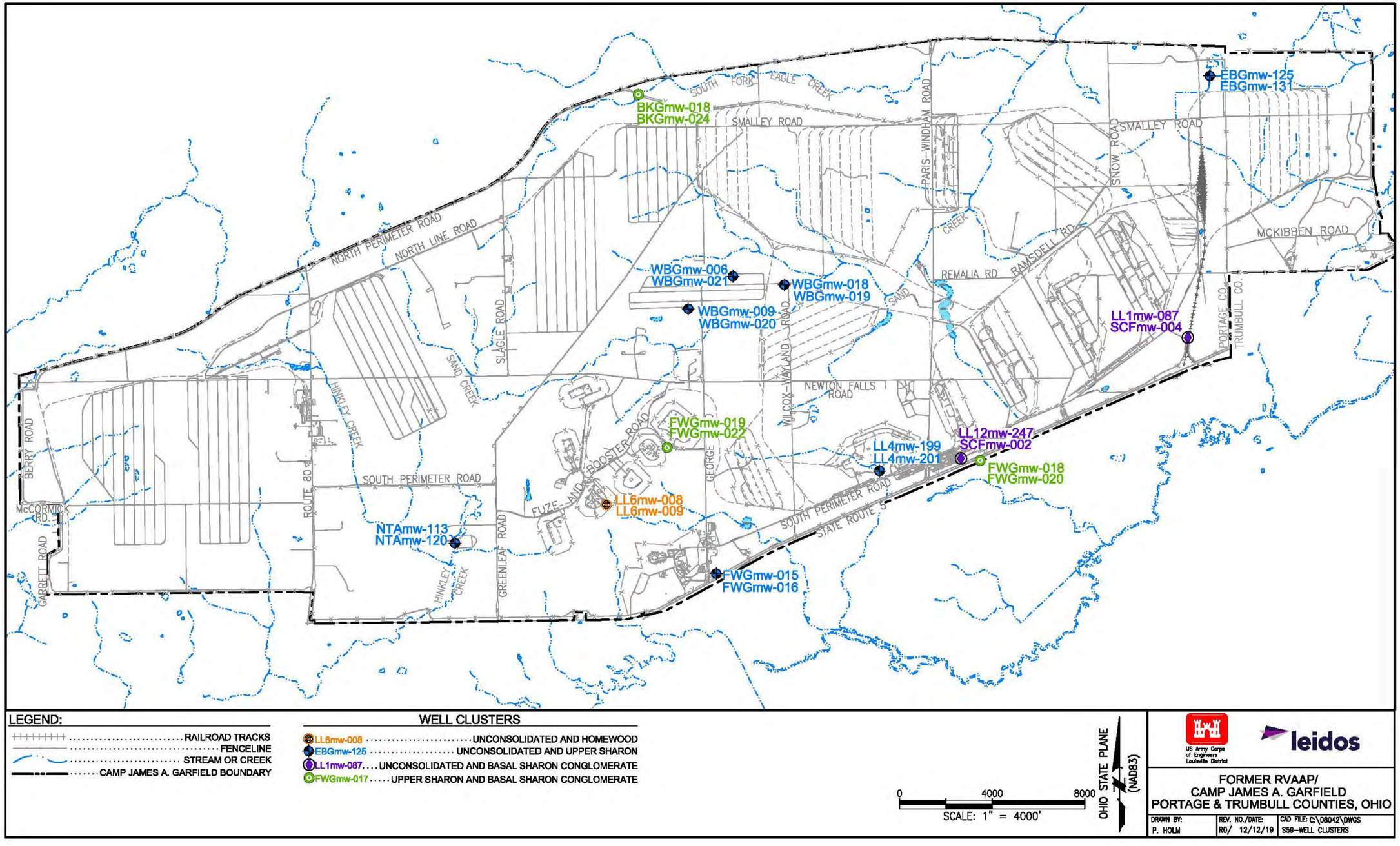

Figure 5-5. Monitoring Well Clusters within Camp James A. Garfield

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6.0 2019 RESULTS AND DISCUSSION

This section provides a discussion of the 2019 results for each analyzed chemical group for the four aquifers at CJAG. In addition, this section explains the screening level used to assess the reported chemical concentrations.

6.1 SCREENING LEVELS

Screening levels have been established for a basis of comparison against actual results. The chemical-specific screening level is the highest concentration amongst the maximum contaminant level (MCL), Resident facility-wide cleanup goal (FWCUG), or U.S. Environmental Protection Agency (USEPA) Residential tap water RSL. For metals, if the aquifer-specific background concentration is greater than the previously mentioned criteria, then that background concentration is used as the screening level. The concentrations are compared to the applicable screening criteria for each chemical.

For this evaluation, updated background concentrations per the *Background Study for Metals for RVAAP-66 Facility-wide Groundwater* (Leidos 2019b) are used. The FWCUGs are listed in Tables 5-8 through 5-10 in the *Facility-wide Human Health Cleanup Goals for the Ravenna Army Ammunition Plant* (SAIC 2010). If a chemical does not have one of these values, a cleanup goal may need to be developed in coordination with Ohio EPA.

Chemicals that are considered essential nutrients (e.g., calcium, chloride, iodine, iron, magnesium, potassium, phosphorus, and sodium) are an integral part of the human food supply and are often added to food as supplements. These essential nutrients are provided in the tables presenting exceedances of screening level; however, to streamline the narrative section, the essential nutrients are not discussed in the text provided in the following subsections.

The applicable screening level used in this report for each chemical are presented in Table 6-1. The cleanup goal or regulatory limit chosen for screening purposes is also presented in this table. Table 6-2 presents the exceedances during the Spring 2019 sampling event, and Table 6-3 presents the exceedances during the Fall 2019 sampling event.

6.2 UNCONSOLIDATED

A total of 32 wells screened in the Unconsolidated aquifer were sampled in 2019. This includes the quarterly sampling of wells SCLmw-001, SCLmw-002, and SCLmw-003, which are discussed in Section 4.3.3 and are therefore not summarized in this section. This also includes BKGmw-021, FWGmw-002, and LL1mw-063, which were sampled only in Fall 2019, as discussed in Section 4.3.2.

The following subsections summarize chemicals exceeding the screening level by chemical group.

6.2.1 Metals

Twenty-one wells screened in the Unconsolidated aquifer were sampled for total metals in Fall 2019 (including BKGmw-021, EBGmw-025, and FWGmw-002). Eighteen wells screened in the Unconsolidated aquifer were sampled for total metals in Spring 2019. With the exception of the essential nutrient iron, only aluminum, arsenic, and manganese exceeded the screening level. These chemicals are discussed below and presented in Figure 6-1.

Aluminum – The RSL (2.0 mg/L) was exceeded in the unfiltered sample collected at LL1mw-086 at a concentration of 3.1 mg/L in Spring 2019. The turbidity of this sample was at 87.06 NTU during sample collection; therefore, a field-filtered sample was collected. The field-filtered sample contained an estimated concentration of 0.053J mg/L, below the RSL.

The unfiltered sample collected at FWGmw-002 exceeded the RSL at a concentration of 2.2 mg/L in Fall 2019. The turbidity of this sample was at 509.99 NTU during sample collection; therefore, a field-filtered sample was collected. The field-filtered sample contained an estimated concentration of 0.74J mg/L, below the RSL.

Arsenic – Samples collected in Spring and Fall 2019 from the following wells exceeded the arsenic MCL (0.01 mg/L):

- LL12mw-242 filtered and unfiltered samples in Spring and Fall 2019 contained arsenic at concentrations that exceed the MCL; the maximum concentration was 0.022 mg/L.
- LL1mw-088 samples in Spring and Fall 2019 contained arsenic at concentrations that exceed the MCL; 0.028 mg/L of arsenic was detected in both samples. Filtered samples were not collected from this well.

Arsenic exceeded the MCL in samples collected during one event from the following wells:

- LL12mw-245 exceeded the MCL in Spring 2019 at a concentration of 0.012 mg/L. The sample from Fall 2019 contained 0.004J mg/L of arsenic, below the MCL. Filtered samples were not collected from this well.
- DETmw-003 exceeded the MCL in Fall 2019 at a concentration of 0.011 mg/L. The sample from Spring 2019 contained 0.0092 mg/L of arsenic, below the MCL. Filtered samples were not collected from this well.

Manganese – Numerous samples collected in 2019 exceeded the manganese background concentration (0.075 mg/L) in both Spring and Fall 2019. In Spring 2019, 10 wells exceeded the manganese screening level; the maximum concentration was 2.9 mg/L at LL12mw-187. In Fall 2019, 16 wells exceeded the manganese screening level; the maximum concentration was 2.6 mg/L at LL12mw-187.

6.2.2 Explosives and Propellants

Fourteen wells screened in the Unconsolidated aquifer were sampled for explosives in Spring 2019. Fifteen wells, including LL1mw-063, screened in the Unconsolidated aquifer were sampled for explosives/propellants in Fall 2019. RDX; 1-3-dinitrobenzene (DNB); and 4-amino-2,6-dinitrotoluene (DNT) exceeded their screening level in at least one well. Results are presented in Figure 6-2.

RDX – Samples collected from the following wells exceeded the RSL (0.97 µg/L) in Spring and Fall 2019: WBGmw-006 (11 µg/L and 8.2 µg/L) and WBGmw-009 (1.6 µg/L and 3.5 µg/L). The sample from DETmw-004 exceeded the RSL at a concentration of 1.4 µg/L in Spring 2019.

1,3-DNB – The sample collected from LL1mw-063 exceeded the RSL (0.2 µg/L) at an estimated concentration of 0.41J µg/L in Fall 2019. This well was not analyzed for explosives in Spring 2019.

4-Amino-2,6-DNT – The sample collected from LL1mw-063 exceeded the RSL (3.9 µg/L) at a concentration of 5.9 µg/L in Fall 2019. This well was not analyzed for explosives in Spring 2019.

6.2.3 Semi-volatile Organic Compounds

Three wells (DETmw-003, DETmw-004, and NTAmw-119) screened in the Unconsolidated aquifer were sampled for SVOCs in 2019. All SVOC concentrations were below their respective screening level.

6.2.4 Volatile Organic Compounds

Two wells (DETmw-003 and DETmw-004) screened in the Unconsolidated aquifer were sampled for VOCs in 2019. All VOC concentrations were below their respective screening level.

6.2.5 Pesticides and Polychlorinated Biphenyls

Two wells (DETmw-003 and DETmw-004) screened in the Unconsolidated aquifer were sampled for pesticides and PCBs in 2019. Pesticides and PCBs were not detected in any of the samples.

6.2.6 Cyanide

Nine wells screened in the Unconsolidated aquifer were sampled for cyanide in Spring 2019. Eleven wells, including FWGmw-004 and LL1-mw063, screened in the Unconsolidated aquifer were sampled for cyanide in Fall 2019. All concentrations were below the MCL of 0.2 mg/L.

6.2.7 Nitrate

Five wells screened in the Unconsolidated aquifer (all within Load Line 12) were sampled for nitrate in 2019. The results compared to the MCL of 10 mg/L are summarized below:

- Nitrate in LL12mw-242, LL12mw-245, and LL12-247 did not exceed the MCL.
- Nitrate in LL12mw-185 exceeded the MCL in both Spring 2019 (92 mg/L) and Fall 2019 (89 mg/L).
- Nitrate in LL12mw-187 exceeded the MCL in Spring 2019 (1,600 mg/L) but was not detected in Fall 2019.

6.2.8 pH

The typical pH range for naturally occurring groundwater is approximately 5–9 S.U. Previous annual reports have noted that the pH levels in seven Unconsolidated aquifer wells (LL1mw-086, LL1mw-089, LL10mw-005, FWGmw-002, FWGmw-010, FWGmw-011, and BKGmw-016) have been out of normal range. The pH for these wells in 2019 is summarized below:

- LL1mw-086 had a pH of 8.17 S.U. in Spring 2019 and 10.44 S.U. in Fall 2019.
- LL1mw-089 had a pH of 4.75 S.U. in Spring 2019 and 4.99 S.U. in Fall 2019.
- LL10mw-005, FWGmw-010, and BKGmw-016 were not sampled in 2019.
- FWGmw-002 has a pH of 7.33 S.U in Fall 2019. This well was not sampled in Spring 2019.
- FWGmw-011 had a pH of 7.2 in both Spring and Fall 2019.

In addition, LL1mw-063 had a pH of 4.35 S.U. in Fall 2019. This well was not sampled in Spring 2019; therefore, a pH field measurement was not collected. This pH is typical for field measurements collected from the well in 2008 during the four quarters of sampling and from the one sample collected in August 2011.

At LL1mw-086, pH readings have historically been erratic, ranging from a high of 13.06 S.U. to a low of approximately 7 S.U. Figure 6-7 presents the pH at LL1mw-086, LL1mw-088, and FWGmw-002 over time. LL1mw-089 was installed in 2016 and has only been sampled eight times to date; therefore, a trend graph was not generated.

6.3 HOMEWOOD SANDSTONE

Eight wells screened in the Homewood Sandstone were sampled in 2019. The following subsections summarize chemicals exceeding the screening level by chemical group.

6.3.1 Metals

Two wells (LL10mw-005 and LL7mw-001) screened in the Homewood Sandstone aquifer were sampled for total metals in 2019. All metal concentrations were below their respective screening level with the exception of manganese at LL10mw-005.

The sample from well LLmw-005 exceeded the manganese background concentration (0.56 mg/L) at a concentration of 2.2J mg/L in Fall 2019; however, manganese was not detected in this well in Spring 2019. Results are presented in Figure 6-3.

6.3.2 Explosives and Propellants

Two wells (FBQmw-174 and LL7mw-006) screened in the Homewood Sandstone aquifer were sampled for explosives/propellants in 2019. Screening levels at LL7mw-006 were not exceeded in Spring or Fall 2019, and screening levels at FBQmw-174 were not exceeded in Fall 2019.

The following concentrations from well FBQmw-174 exceeded the screening level in Spring 2019:

- 2,4,6-Trinitrotoluene (TNT) at 10 µg/L exceeded the RSL of 0.98 µg/L.
- 2,4-DNT at 0.67 µg/L exceeded the RSL of 0.24 µg/L.
- 2-amino-4,6-DNT at 15 µg/L exceeded the RSL of 3.9 µg/L.
- 4-amino-2,6-DNT at 14 µg/L exceeded the RSL of 3.9 µg/L.
- RDX at 1.2J µg/L exceeded the RSL of 0.97 mg/L.

These results are presented in Figure 6-4.

6.3.3 Volatile Organic Compounds

One well (LL10mw-003) screened in the Homewood Sandstone aquifer was sampled for VOCs. No screening levels were exceeded in 2019.

6.3.4 Cyanide

Three wells (FBQmw-171, FBQmw-172, and LL7mw-001) screened in the Homewood Sandstone aquifer were sampled for cyanide in 2019. Cyanide was not detected in any of these wells.

6.3.5 Hexavalent Chromium

One well (FBQmw-175) screened in the Homewood Sandstone aquifer was sampled for hexavalent chromium. Hexavalent chromium was not detected in this well.

6.3.6 Nitrate

Three wells (FBQmw-171, FBQmw-174, and FBQmw-175) screened in the Homewood Sandstone aquifer were sampled for nitrate in 2019. All concentrations were below the screening level.

6.3.7 Nitrite

Three wells (FBQmw-171, FBQmw-174, and FBQmw-175) screened in the Homewood Sandstone aquifer were sampled for nitrite in 2019. All concentrations were below the screening level.

6.3.8 Sulfate

Three wells (FBQmw-171, FBQmw-174, and FBQmw-175) screened in the Homewood Sandstone aquifer were sampled for sulfate. Sulfate was detected in all six samples collected in 2019. Sulfate does not have a screening level.

6.3.9 Sulfide

Three wells (FBQmw-171, FBQmw-174, and FBQmw-175) screened in the Homewood Sandstone aquifer were sampled for sulfide. Sulfide was detected at an estimated concentration in one of six samples. Sulfide does not have a screening level.

6.3.10 pH

The typical pH range for naturally occurring groundwater is approximately 5–9 S.U. Five Homewood Sandstone aquifer wells (CBLmw-001, CBLmw-002, FBQmw-171, FBQmw-174, and FBQmw-175) have current, or have had pH levels out of normal range. The pH for these wells in 2019 is summarized below:

- CBLmw-001 and CBLmw-002 were not sampled in 2019.
- FBQmw-171 had a pH of 5.76 S.U. in Spring 2019 and 5.7 S.U. in Fall 2019.
- FBQmw-174 had a pH of 5.15 S.U. in Spring 2019 and 5.38 S.U. in Fall 2019.
- FBQmw-175 had a pH of 5.61 S.U. in Spring 2019 and 5.59 S.U. in Fall 2019.

Three monitoring wells at Fuze and Booster Quarry Landfill (FBQmw-171, FBQmw-174, and FBQmw-175) were within the typical pH range in 2019. Figure 6-8 presents the pH of these three wells over time.

6.4 UPPER SHARON

A total of 33 wells screened in the Upper Sharon were sampled in 2019. FWGmw-022, FWGmw-023, and NTAmw-120 were sampled in Spring 2019 only, as discussed in Section 4.3.1, and B12mw-012 was sampled in Fall 2019 only, as discussed in Section 4.3.2.

Although they were screened within the Upper Sharon, wells FWGmw-020, FWGmw-021, and FWGmw-024 will be addressed separately as off-site wells in Section 6.6 and are not discussed with the other Upper Sharon wells. The following subsections summarize chemicals exceeding the screening level by chemical group.

6.4.1 Metals

Thirteen wells were sampled for total metals in Spring 2019, and 15 wells were sampled for metals in Fall 2019. With the exception of the essential nutrient iron, only arsenic, manganese, and nickel exceeded the screening level. These are discussed below and presented in Figure 6-5.

Arsenic – Groundwater samples from RQLmw-008 exceeded the arsenic MCL (0.01 mg/L) in Spring and Fall 2019 at concentrations of 0.011 and 0.031 mg/L.

Manganese – Samples collected from the following wells exceeded the background concentration (0.198 mg/L) in Spring and Fall 2019: WBGmw-020 (0.22 and 0.30 mg/L), WBGmw-021 (0.37 and 0.38 mg/L), RQLmw-007 (0.49 and 1.7J mg/L), RQLmw-008 (0.46 and 0.54J mg/L), and RQLmw-009 (0.3 and 0.65J mg/L). The sample from FWGmw-016 only exceeded the background concentration in Spring 2019 at a concentration of 0.22 mg/L. The sample from LL2mw-267 only exceeded the screening level in Fall 2019 at a concentration of 0.69 mg/L. The Fall 2019 sample at B12mw-012 exceeded the screening level at a concentration of 0.55J mg/L.

Nickel – The nickel RSL (0.039 mg/L) was met in Fall 2019 from the sample at RQLmw-007.

6.4.2 Explosives and Propellants

A total of 18 wells screened in the Upper Sharon aquifer were sampled for explosives in 2019. The explosives that exceeded their respective screening level were 1,3-DNB; TNT; 2,4-DNT; 2-Amino-4,6-DNT; 4-Amino-2,6-DNT; and RDX, predominantly at wells LL1mw-083 and LL1mw-084. These results are presented in Figure 6-6.

1,3-DNB – Samples collected from the following wells exceeded the RSL (0.2 µg/L) in Spring and Fall 2019: LL1mw-083 (2 and 1.7J µg/L), LL1mw-084 (2.4 and 2.5J µg/L), and LL2mw-059 (0.27J and 0.31J µg/L). The sample from LL1mw-080 exceeded the screening level in Fall 2019 at a concentration of 0.62 µg/L.

2,4,6-TNT – Samples collected from the following wells exceeded the RSL (0.98 µg/L) in Spring and Fall 2019: LL1mw-083 (1.9 and 2.3 µg/L) and LL1mw-084 (3.3 and 3.6 µg/L).

2,4-DNT – Samples collected from the following wells exceeded the RSL (0.24 µg/L) in Spring and Fall 2019: LL1mw-083 (2.8 and 2.8 µg/L) and LL1mw-084 (0.87 and 1.4J µg/L). The sample from LL2mw-059 exceeded the RSL in Spring 2019 at a concentration of 0.52 µg/L.

2-Amino-4,6-DNT – Samples collected from the following wells exceeded the RSL (3.9 µg/L) in Spring and Fall 2019: LL1mw-083 (11 and 12 µg/L) and LL1mw-084 (7.9 and 8.9 µg/L).

4-Amino-2,6-DNT – Samples collected from the following wells exceeded the RSL (3.9 µg/L) in Spring and Fall 2019: LL1mw-083 (14 and 20 µg/L) and LL1mw-084 (18 and 20 µg/L). The sample from LL3mw-237 exceeded the RSL in Spring 2019 at a concentration of 4 µg/L.

RDX – The sample collected from LL1mw-080 exceeded the RSL (0.97 µg/L) in Spring and Fall 2019 at concentrations of 13 and 24 µg/L. The sample from LL1mw-084 exceeded the RSL in Spring 2019 at a concentration of 2 µg/L.

6.4.3 Semi-volatile Organic Compounds

Four wells (RQLmw-007, RQLmw-008, RQLmw-009, and NTAmw-120) screened in the Upper Sharon aquifer were sampled for SVOCs in 2019. SVOC concentrations did not exceed their respective screening levels.

6.4.4 Volatile Organic Compounds

Three wells (RQLmw-007, RQLmw-008, and RQLmw-009) screened in the Upper Sharon aquifer were sampled for VOCs in 2019. VOCs were not detected in any sample.

6.4.5 Pesticides and Polychlorinated Biphenyls

Three wells (RQLmw-007, RQLmw-008, and RQLmw-009) screened in the Upper Sharon aquifer were sampled for pesticides and PCBs in 2019. Neither pesticides nor PCBs were detected in any sample.

6.4.6 Cyanide

A total of 11 wells screened in the Upper Sharon aquifer were sampled for cyanide in 2019. Cyanide concentrations did not exceed the screening level.

6.4.7 Perchlorate

One well (LL3mw-246) screened in the Upper Sharon aquifer was sampled for perchlorate in 2019. Perchlorate concentrations did not exceed the screening level.

6.4.8 Nitrate

Five wells screened in the Upper Sharon aquifer were sampled for nitrate in 2019. Nitrate did not exceed the screening level.

6.4.9 Nitrite

Five wells screened in the Upper Sharon aquifer were sampled for nitrite. Nitrite concentrations did not exceed the screening level.

6.4.10 Sulfate

Five wells screened in the Upper Sharon aquifer were sampled for sulfate. Sulfate was detected in all 10 samples collected in 2019. Sulfate does not have a screening level.

6.4.11 Sulfide

Five wells screened in the Upper Sharon aquifer were sampled for sulfide. Sulfide was detected at an estimated concentration in 1 of 10 samples. Sulfide does not have a screening level.

6.4.12 pH

The typical pH range for naturally occurring groundwater is approximately 5–9 S.U.s. Previous annual reports have noted that the pH levels in five Upper Sharon aquifer wells (LL1mw-083, LL1mw-084, RQLmw-011, RQLmw-012, and RQLmw-013) have been out of normal range, as summarized below:

- LL1mw-083 had a pH of 4.44 S.U. in Spring 2019 and 4.4 S.U. in Fall 2019.
- LL1mw-084 had a pH of 5.57 S.U. in Spring 2019 and 5.34 S.U. in Fall 2019.
- RQLmw-011 had a pH of 4.07 S.U. in Spring 2019 and 5.6 S.U. in Fall 2019.
- RQLmw-012 had a pH of 5.14 S.U. in Spring 2019 and 5.13 S.U. in Fall 2019.
- RQLmw-013 had a pH of 3.98 S.U. in Spring 2019 and 4.37 S.U. in Fall 2019.

Figure 6-9 presents the pH over time at LL1mw-083 and LL1mw-084. Figure 6-10 presents the pH over time at RQLmw-011, RQLmw-012, RQLmw-013, and RQLmw-014.

6.5 BASAL SHARON CONGLOMERATE

Three wells (FWGmw-018, FWGmw-019, and SCFmw-004) screened in the Basal Sharon Conglomerate were sampled in 2019. FWGmw-019 was sampled only in Spring 2019 for nitroguanidine and nitrocellulose, as those results were rejected in 2018. Although FWGmw-018 is screened within the Basal Sharon Conglomerate, it will be summarized separately as an off-site well in Section 6.6.

The following subsections summarize chemicals exceeding the screening level by chemical group.

6.5.1 Metals

Metal concentrations did not exceed their respective screening levels.

6.5.2 Explosives and Propellants

Explosive or propellants were not detected.

6.5.3 pH

None of the Basal Sharon Conglomerate aquifer wells had pH ranges outside of the standard 5–9 pH range.

6.6 OFF-SITE WELLS

Four off-site wells, located along State Route 5 and bordering the southern edge of the property, were sampled in 2019. Three wells were screened in the Upper Sharon (FWGmw-020, FWGmw-021, and FWGmw-024) and one well was screened in the Basal Sharon Conglomerate (FWGmw-018). The following subsections summarize chemicals exceeding the screening level by chemical group.

6.6.1 Metals

Four off-site wells were sampled for total metals in 2019. With the exception of the essential nutrient iron, only arsenic and manganese exceeded their screening level. The sample collected from FWGmw-020 exceeded the arsenic MCL of 0.01 mg/L in Spring and Fall 2019 at concentrations of 0.023 and 0.031J mg/L, respectively. The sample collected from FWGmw-024 exceeded the manganese background concentration (0.198 mg/L) in Spring and Fall 2019 at concentrations of 0.33 and 0.26J mg/L, respectively. The field duplicate sample from FWGmw-021 exceeded the manganese background concentration in Fall 2019 at an estimated concentration of 0.39J mg/L.

6.6.2 Explosives and Propellants

Two off-site wells were sampled for explosives/propellants. The only explosives/propellants detected were 2-amino-4,6-DNT and 4-amino-2,6-DNT from FWGmw-021; however, these concentrations were below the RSL of 3.9 µg/L.

6.6.3 Volatile Organic Compounds

Two off-site wells were sampled for VOCs; however, VOCs were not detected.

6.6.4 Cyanide

Two off-site wells were sampled for cyanide. All concentrations were below the screening level.

6.6.5 pH

None of the off-site wells had pH ranges outside of the standard 5–9 pH range.

Table 6-1. Groundwater Screening Levels

Aquifer Zone	Analysis Type	Chemical	Units	CAS No	NGT CUG	Resident CUG	MCL	Tapwater RSL	Background	GW Screening Level	GW Screening Level Source
Same for all zones	Anions	Nitrate	mg/L	14797-55-8	52.283	1.666	10	3.2	NA	10	MCL
Same for all zones	Anions	Nitrite	mg/L	14797-65-0	---	---	1	0.2	NA	1	MCL
Same for all zones	Anions	Sulfate	mg/L	14808-79-8	---	---	---	---	NA	None	NA
Same for all zones	Anions	Sulfide	mg/L	18496-25-8	---	---	---	---	NA	None	NA
Same for all zones	Miscellaneous	Cyanide	mg/L	57-12-5	---	---	0.2	0.00015	NA	0.2	MCL
Same for all zones	Miscellaneous	Perchlorate	mg/L	14797-73-0	---	---	---	0.0014	NA	0.0014	RSL
Same for all zones	Miscellaneous	Total Phosphorus as P	mg/L	7723-14-0	---	---	---	---	NA	None	NA
Same for all zones	Explosives/Propellants	1,3,5-Trinitrobenzene	mg/L	99-35-4	---	---	---	0.059	NA	0.059	RSL
Same for all zones	Explosives/Propellants	1,3-Dinitrobenzene	mg/L	99-65-0	0.00328	0.000104	---	0.0002	NA	0.0002	RSL
Same for all zones	Explosives/Propellants	2,4,6-Trinitrotoluene	mg/L	118-96-7	0.0164	0.000521	---	0.00098	NA	0.00098	RSL
Same for all zones	Explosives/Propellants	2,4-Dinitrotoluene	mg/L	121-14-2	0.00129	0.00012	---	0.00024	NA	0.00024	RSL
Same for all zones	Explosives/Propellants	2,6-Dinitrotoluene	mg/L	606-20-2	0.00131	0.000122	---	0.000049	NA	0.000122	RA
Same for all zones	Explosives/Propellants	2-Amino-4,6-Dinitrotoluene	mg/L	35572-78-2	0.00655	0.000209	---	0.0039	NA	0.0039	RSL
Same for all zones	Explosives/Propellants	2-Nitrotoluene	mg/L	88-72-2	0.00399	0.00037	---	0.00031	NA	0.00037	RA
Same for all zones	Explosives/Propellants	3-Nitrotoluene	mg/L	99-08-1	---	---	---	0.00017	NA	0.00017	RSL
Same for all zones	Explosives/Propellants	4-Amino-2,6-Dinitrotoluene	mg/L	19406-51-0	0.00655	0.000209	---	0.0039	NA	0.0039	RSL
Same for all zones	Explosives/Propellants	4-Nitrotoluene	mg/L	99-99-0	0.054	0.00501	---	0.0043	NA	0.00501	RA
Same for all zones	Explosives/Propellants	HMX	mg/L	2691-41-0	---	---	---	0.1	NA	0.1	RSL
Same for all zones	Explosives/Propellants	Nitrobenzene	mg/L	98-95-3	0.0164	0.000521	---	0.00014	NA	0.000521	RC
Same for all zones	Explosives/Propellants	Nitrocellulose	mg/L	9004-70-0	---	---	---	6000	NA	6000	RSL
Same for all zones	Explosives/Propellants	Nitroglycerin	mg/L	55-63-0	0.054	0.00501	---	0.0002	NA	0.00501	RA
Same for all zones	Explosives/Propellants	Nitroguanidine	mg/L	556-88-7	---	---	---	0.2	NA	0.2	RSL
Same for all zones	Explosives/Propellants	PETN	mg/L	78-11-5	---	---	---	0.0039	NA	0.0039	RSL
Same for all zones	Explosives/Propellants	RDX	mg/L	121-82-4	0.00834	0.000774	---	0.00097	NA	0.00097	RSL
Same for all zones	Explosives/Propellants	Tetryl	mg/L	479-45-8	---	---	---	0.0039	NA	0.0039	RSL
Same for all zones	SVOCs	1,2,4-Trichlorobenzene	mg/L	120-82-1	---	---	0.07	0.0004	NA	0.07	MCL
Same for all zones	SVOCs	1,2-Dichlorobenzene	mg/L	95-50-1	---	---	0.6	0.03	NA	0.6	MCL
Same for all zones	SVOCs	1,3-Dichlorobenzene	mg/L	541-73-1	---	---	---	0	NA	None	NA
Same for all zones	SVOCs	1,4-Dichlorobenzene	mg/L	106-46-7	---	---	0.075	0.00048	NA	0.075	MCL
Same for all zones	SVOCs	1,4-Dioxane	mg/L	123-91-1	---	---	---	0.00046	NA	0.00046	RSL
Same for all zones	SVOCs	1-Methylnaphthalene	mg/L	90-12-0	---	---	---	0.0011	NA	0.0011	RSL
Same for all zones	SVOCs	2,4,5-Trichlorophenol	mg/L	95-95-4	---	---	---	0.12	NA	0.12	RSL
Same for all zones	SVOCs	2,4,6-Trichlorophenol	mg/L	88-06-2	---	---	---	0.0012	NA	0.0012	RSL
Same for all zones	SVOCs	2,4-Dichlorophenol	mg/L	120-83-2	---	---	---	0.0046	NA	0.0046	RSL
Same for all zones	SVOCs	2,4-Dimethylphenol	mg/L	105-67-9	---	---	---	0.036	NA	0.036	RSL
Same for all zones	SVOCs	2,4-Dinitrophenol	mg/L	51-28-5	---	---	---	0.0039	NA	0.0039	RSL
Same for all zones	SVOCs	2,4-Dinitrotoluene	mg/L	121-14-2	0.00129	0.00012	---	0.00024	NA	0.00024	RSL
Same for all zones	SVOCs	2,6-Dinitrotoluene	mg/L	606-20-2	0.00131	0.000122	---	0.000049	NA	0.000122	RA
Same for all zones	SVOCs	2-Chloronaphthalene	mg/L	91-58-7	---	---	---	0.075	NA	0.075	RSL
Same for all zones	SVOCs	2-Chlorophenol	mg/L	95-57-8	---	---	---	0.0091	NA	0.0091	RSL
Same for all zones	SVOCs	2-Methyl-4,6-dinitrophenol	mg/L	534-52-1	---	---	---	0.00015	NA	0.00015	RSL
Same for all zones	SVOCs	2-Methylnaphthalene	mg/L	91-57-6	---	---	---	0.0036	NA	0.0036	RSL
Same for all zones	SVOCs	2-Methylphenol	mg/L	95-48-7	---	---	---	0.093	NA	0.093	RSL
Same for all zones	SVOCs	2-Nitrobenzenamine	mg/L	88-74-4	---	---	---	0.019	NA	0.019	RSL
Same for all zones	SVOCs	2-Nitrophenol	mg/L	88-75-5	---	---	---	0	NA	None	NA
Same for all zones	SVOCs	3,3'-Dichlorobenzidine	mg/L	91-94-1	---	---	---	0.00013	NA	0.00013	RSL
Same for all zones	SVOCs	3-Nitrobenzenamine	mg/L	99-09-2	---	---	---	0	NA	None	NA

Table 6-1. Groundwater Screening Levels (Continued)

Aquifer Zone	Analysis Type	Chemical	Units	CAS No	NGT CUG	Resident CUG	MCL	Tapwater RSL	Background	GW Screening Level	GW Screening Level Source
Same for all zones	SVOCs	4-Bromophenyl phenyl ether	mg/L	101-55-3	---	---	---	0	NA	None	NA
Same for all zones	SVOCs	4-Chloro-3-methylphenol	mg/L	59-50-7	---	---	---	0.14	NA	0.14	RSL
Same for all zones	SVOCs	4-Chlorobenzenamine	mg/L	106-47-8	---	---	---	0.00037	NA	0.00037	RSL
Same for all zones	SVOCs	4-Chlorophenyl phenyl ether	mg/L	7005-72-3	---	---	---	0	NA	None	NA
Same for all zones	SVOCs	4-Nitrobenzenamine	mg/L	100-01-6	0.0437	0.00313	---	0.0038	NA	0.0038	RSL
Same for all zones	SVOCs	4-Nitrophenol	mg/L	100-02-7	---	---	---	0	NA	None	NA
Same for all zones	SVOCs	Acenaphthene	mg/L	83-32-9	---	---	---	0.053	NA	0.053	RSL
Same for all zones	SVOCs	Acenaphthylene	mg/L	208-96-8	---	---	---	0.012	NA	0.012	RSL
Same for all zones	SVOCs	Anthracene	mg/L	120-12-7	---	---	---	0.18	NA	0.18	RSL
Same for all zones	SVOCs	Benz(a)anthracene	mg/L	56-55-3	0.000042	0.000004	---	0.00003	NA	0.00003	RSL
Same for all zones	SVOCs	Benzenemethanol	mg/L	100-51-6	---	---	---	0.2	NA	0.2	RSL
Same for all zones	SVOCs	Benzo(a)pyrene	mg/L	50-32-8	0.000002	0.00000023	0.0002	0.000025	NA	0.0002	MCL
Same for all zones	SVOCs	Benzo(b)fluoranthene	mg/L	205-99-2	0.000024	0.000002	---	0.00025	NA	0.00025	RSL
Same for all zones	SVOCs	Benzo(ghi)perylene	mg/L	191-24-2	---	---	---	0.012	NA	0.012	RSL
Same for all zones	SVOCs	Benzo(k)fluoranthene	mg/L	207-08-9	---	---	---	0.0025	NA	0.0025	RSL
Same for all zones	SVOCs	Benzoic acid	mg/L	65-85-0	---	---	---	7.5	NA	7.5	RSL
Same for all zones	SVOCs	Bis(2-chloroethoxy)methane	mg/L	111-91-1	---	---	---	0.0059	NA	0.0059	RSL
Same for all zones	SVOCs	Bis(2-chloroethyl) ether	mg/L	111-44-4	---	---	---	0.000014	NA	0.000014	RSL
Same for all zones	SVOCs	Bis(2-chloroisopropyl) ether	mg/L	108-60-1	---	---	---	0.071	NA	0.071	RSL
Same for all zones	SVOCs	Bis(2-ethylhexyl)phthalate	mg/L	117-81-7	0.0097	0.0009	0.006	0.0056	NA	0.006	MCL
Same for all zones	SVOCs	Butyl benzyl phthalate	mg/L	85-68-7	---	---	---	0.016	NA	0.016	RSL
Same for all zones	SVOCs	Carbazole	mg/L	86-74-8	---	---	---	0	NA	None	NA
Same for all zones	SVOCs	Chrysene	mg/L	218-01-9	---	---	---	0.025	NA	0.025	RSL
Same for all zones	SVOCs	Di-n-butyl phthalate	mg/L	84-74-2	---	---	---	0.09	NA	0.09	RSL
Same for all zones	SVOCs	Di-n-octylphthalate	mg/L	117-84-0	---	---	---	0.02	NA	0.02	RSL
Same for all zones	SVOCs	Dibenz(a,h)anthracene	mg/L	53-70-3	0.000002	0.00000015	---	0.000025	NA	0.000025	RSL
Same for all zones	SVOCs	Dibenzofuran	mg/L	132-64-9	---	---	---	0.00079	NA	0.00079	RSL
Same for all zones	SVOCs	Diethyl phthalate	mg/L	84-66-2	---	---	---	1.5	NA	1.5	RSL
Same for all zones	SVOCs	Dimethyl phthalate	mg/L	131-11-3	---	---	---	0	NA	None	NA
Same for all zones	SVOCs	Fluoranthene	mg/L	206-44-0	---	---	---	0.08	NA	0.08	RSL
Same for all zones	SVOCs	Fluorene	mg/L	86-73-7	---	---	---	0.029	NA	0.029	RSL
Same for all zones	SVOCs	Hexachlorobenzene	mg/L	118-74-1	---	---	0.001	0.0000098	NA	0.001	MCL
Same for all zones	SVOCs	Hexachlorobutadiene	mg/L	87-68-3	---	---	---	0.00014	NA	0.00014	RSL
Same for all zones	SVOCs	Hexachlorocyclopentadiene	mg/L	77-47-4	---	---	0.05	0.000041	NA	0.05	MCL
Same for all zones	SVOCs	Hexachloroethane	mg/L	67-72-1	---	---	---	0.00033	NA	0.00033	RSL
Same for all zones	SVOCs	Indeno(1,2,3-cd)pyrene	mg/L	193-39-5	0.000024	0.000002	---	0.00025	NA	0.00025	RSL
Same for all zones	SVOCs	Isophorone	mg/L	78-59-1	---	---	---	0.078	NA	0.078	RSL
Same for all zones	SVOCs	N-Nitroso-di-n-propylamine	mg/L	621-64-7	---	---	---	0.000011	NA	0.000011	RSL
Same for all zones	SVOCs	N-Nitrosodiphenylamine	mg/L	86-30-6	---	---	---	0.012	NA	0.012	RSL
Same for all zones	SVOCs	Naphthalene	mg/L	91-20-3	---	---	---	0.00017	NA	0.00017	RSL
Same for all zones	SVOCs	Nitrobenzene	mg/L	98-95-3	0.0164	0.000521	---	0.00014	NA	0.000521	RC
Same for all zones	SVOCs	Pentachlorophenol	mg/L	87-86-5	0.000797	0.000074	0.001	0.000041	NA	0.001	MCL
Same for all zones	SVOCs	Phenanthrene	mg/L	85-01-8	---	---	---	0.012	NA	0.012	RSL
Same for all zones	SVOCs	Phenol	mg/L	108-95-2	---	---	---	0.58	NA	0.58	RSL
Same for all zones	SVOCs	Pyrene	mg/L	129-00-0	---	---	---	0.012	NA	0.012	RSL
Same for all zones	SVOCs	Total Cresols	mg/L	1319-77-3	---	---	---	0.15	NA	0.15	RSL
Same for all zones	Pesticides	4,4'-DDD	mg/L	72-54-8	0.000639	0.000059	---	0.0000063	NA	0.000059	RA
Same for all zones	Pesticides	4,4'-DDE	mg/L	72-55-9	0.000503	0.000047	---	0.000046	NA	0.000047	RA
Same for all zones	Pesticides	4,4'-DDT	mg/L	50-29-3	0.000294	0.000027	---	0.00023	NA	0.00023	RSL

Table 6-1. Groundwater Screening Levels (Continued)

Aquifer Zone	Analysis Type	Chemical	Units	CAS No	NGT CUG	Resident CUG	MCL	Tapwater RSL	Background	GW Screening Level	GW Screening Level Source
Same for all zones	Pesticides	Aldrin	mg/L	309-00-2	0.000051	0.000005	---	0.00000092	NA	0.000005	RA
Same for all zones	Pesticides	Dieldrin	mg/L	60-57-1	0.000038	0.000004	---	0.0000018	NA	0.000004	RA
Same for all zones	Pesticides	Endosulfan I	mg/L	959-98-8	---	---	---	0.01	NA	0.01	RSL
Same for all zones	Pesticides	Endosulfan II	mg/L	33213-65-9	---	---	---	0.01	NA	0.01	RSL
Same for all zones	Pesticides	Endosulfan sulfate	mg/L	1031-07-8	---	---	---	0.01	NA	0.01	RSL
Same for all zones	Pesticides	Endrin	mg/L	72-20-8	---	---	0.002	0.00023	NA	0.002	MCL
Same for all zones	Pesticides	Endrin aldehyde	mg/L	7421-93-4	---	---	---	0.00023	NA	0.00023	RSL
Same for all zones	Pesticides	Endrin ketone	mg/L	53494-70-5	---	---	---	0.00023	NA	0.00023	RSL
Same for all zones	Pesticides	Heptachlor	mg/L	76-44-8	0.000153	0.000014	0.0004	0.0000014	NA	0.0004	MCL
Same for all zones	Pesticides	Heptachlor epoxide	mg/L	1024-57-3	0.000101	0.000009	0.0002	0.0000014	NA	0.0002	MCL
Same for all zones	Pesticides	Lindane	mg/L	58-89-9	0.00055	0.000051	0.0002	0.000042	NA	0.0002	MCL
Same for all zones	Pesticides	Methoxychlor	mg/L	72-43-5	---	---	0.04	0.0037	NA	0.04	MCL
Same for all zones	PCBs	PCB-1016	mg/L	12674-11-2	---	---	---	0.00014	NA	0.00014	RSL
Same for all zones	PCBs	PCB-1221	mg/L	11104-28-2	---	---	---	0.0000047	NA	0.0000047	RSL
Same for all zones	PCBs	PCB-1232	mg/L	11141-16-5	---	---	---	0.0000047	NA	0.0000047	RSL
Same for all zones	PCBs	PCB-1242	mg/L	53469-21-9	0.00229	0.000213	---	0.0000078	NA	0.000213	RA
Same for all zones	PCBs	PCB-1248	mg/L	12672-29-6	---	---	---	0.0000078	NA	0.0000078	RSL
Same for all zones	PCBs	PCB-1254	mg/L	11097-69-1	0.000655	0.000021	---	0.0000078	NA	0.000021	RC
Same for all zones	PCBs	PCB-1260	mg/L	11096-82-5	0.00229	0.000213	---	0.0000078	NA	0.000213	RA
Same for all zones	Pesticides	Toxaphene	mg/L	8001-35-2	0.000518	0.000048	0.003	0.000071	NA	0.003	MCL
Same for all zones	Pesticides	alpha-BHC	mg/L	319-84-6	0.000146	0.000014	---	0.0000072	NA	0.000014	RA
Same for all zones	Pesticides	alpha-Chlordane	mg/L	5103-71-9	---	---	---	0.00002	NA	0.00002	RSL
Same for all zones	Pesticides	beta-BHC	mg/L	319-85-7	0.00051	0.000047	---	0.000025	NA	0.000047	RA
Same for all zones	Pesticides	delta-BHC	mg/L	319-86-8	---	---	---	0	NA	None	NA
Same for all zones	Pesticides	gamma-Chlordane	mg/L	5103-74-2	---	---	---	0.00002	NA	0.00002	RSL
Same for all zones	VOCs	1,1,1-Trichloroethane	mg/L	71-55-6	---	---	0.2	0.8	NA	0.2	MCL
Same for all zones	VOCs	1,1,2,2-Tetrachloroethane	mg/L	79-34-5	0.000744	0.000069	---	0.000076	NA	0.000076	RSL
Same for all zones	VOCs	1,1,2-Trichloroethane	mg/L	79-00-5	---	---	0.005	0.000041	NA	0.005	MCL
Same for all zones	VOCs	1,1-Dichloroethane	mg/L	75-34-3	---	---	---	0.0028	NA	0.0028	RSL
Same for all zones	VOCs	1,1-Dichloroethene	mg/L	75-35-4	---	---	0.007	0.028	NA	0.007	MCL
Same for all zones	VOCs	1,2-Dibromoethane	mg/L	106-93-4	---	---	0.00005	0.0000075	NA	0.00005	MCL
Same for all zones	VOCs	1,2-Dichloroethane	mg/L	107-06-2	0.00167	0.000155	0.005	0.00017	NA	0.005	MCL
Same for all zones	VOCs	1,2-Dichloroethene	mg/L	540-59-0	---	---	0.07	0.0036	NA	0.07	MCL
Same for all zones	VOCs	1,2-Dichloropropane	mg/L	78-87-5	---	---	0.005	0.00082	NA	0.005	MCL
Same for all zones	VOCs	2-Butanone	mg/L	78-93-3	---	---	---	0.56	NA	0.56	RSL
Same for all zones	VOCs	2-Hexanone	mg/L	591-78-6	---	---	---	0.0038	NA	0.0038	RSL
Same for all zones	VOCs	4-Methyl-2-pentanone	mg/L	108-10-1	---	---	---	0.63	NA	0.63	RSL
Same for all zones	VOCs	Acetone	mg/L	67-64-1	---	---	---	1.4	NA	1.4	RSL
Same for all zones	VOCs	Benzene	mg/L	71-43-2	0.00464	0.000431	0.005	0.00046	NA	0.005	MCL
Same for all zones	VOCs	Bromobenzene	mg/L	108-86-1	---	---	---	0.0062	NA	0.0062	RSL
Same for all zones	VOCs	Bromochloromethane	mg/L	74-97-5	---	---	---	0.0083	NA	0.0083	RSL
Same for all zones	VOCs	Bromodichloromethane	mg/L	75-27-4	---	---	---	0.00013	NA	0.00013	RSL
Same for all zones	VOCs	Bromoform	mg/L	75-25-2	---	---	---	0.0033	NA	0.0033	RSL
Same for all zones	VOCs	Bromomethane	mg/L	74-83-9	---	---	---	0.00075	NA	0.00075	RSL
Same for all zones	VOCs	Carbon disulfide	mg/L	75-15-0	---	---	---	0.081	NA	0.081	RSL
Same for all zones	VOCs	Carbon tetrachloride	mg/L	56-23-5	0.0022	0.000204	0.005	0.00046	NA	0.005	MCL
Same for all zones	VOCs	Chlorobenzene	mg/L	108-90-7	---	---	0.1	0.0078	NA	0.1	MCL
Same for all zones	VOCs	Chloroethane	mg/L	75-00-3	---	---	---	2.1	NA	2.1	RSL
Same for all zones	VOCs	Chloroform	mg/L	67-66-3	0.00223	0.000207	0.08	0.00022	NA	0.08	MCL

Table 6-1. Groundwater Screening Levels (Continued)

Aquifer Zone	Analysis Type	Chemical	Units	CAS No	NGT CUG	Resident CUG	MCL	Tapwater RSL	Background	GW Screening Level	GW Screening Level Source
Same for all zones	VOCs	Chloromethane	mg/L	74-87-3	---	---	---	0.019	NA	0.019	RSL
Same for all zones	VOCs	Dibromochloromethane	mg/L	124-48-1	---	---	---	0.00087	NA	0.00087	RSL
Same for all zones	VOCs	Ethylbenzene	mg/L	100-41-4	---	---	0.7	0.0015	NA	0.7	MCL
Same for all zones	VOCs	Methylene chloride	mg/L	75-09-2	0.0575	0.00534	0.005	0.011	NA	0.005	MCL
Same for all zones	VOCs	Styrene	mg/L	100-42-5	---	---	0.1	0.12	NA	0.1	MCL
Same for all zones	VOCs	Tetrachloroethene	mg/L	127-18-4	0.00105	0.000098	0.005	0.0041	NA	0.005	MCL
Same for all zones	VOCs	Toluene	mg/L	108-88-3	---	---	1	0.11	NA	1	MCL
Same for all zones	VOCs	Trichloroethene	mg/L	79-01-6	0.000336	0.000031	0.005	0.00028	NA	0.005	MCL
Same for all zones	VOCs	Vinyl chloride	mg/L	75-01-4	---	---	0.002	0.000019	NA	0.002	MCL
Same for all zones	VOCs	Xylenes, total	mg/L	1330-20-7	---	---	10	0.019	NA	10	MCL
Same for all zones	VOCs	cis-1,3-Dichloropropene	mg/L	10061-01-5	---	---	---	0.00047	NA	0.00047	RSL
Same for all zones	VOCs	trans-1,3-Dichloropropene	mg/L	10061-02-6	---	---	---	0.00047	NA	0.00047	RSL
Basal Sharon Conglomerate	Metals, Total/Filtered	Aluminum	mg/L	7429-90-5	31.981	1.028	---	2	0.049	2	RSL
Basal Sharon Conglomerate	Metals, Total/Filtered	Antimony	mg/L	7440-36-0	0.0117	0.000389	0.006	0.00078	0.0006	0.006	MCL
Basal Sharon Conglomerate	Metals, Total/Filtered	Arsenic	mg/L	7440-38-2	0.000608	0.000056	0.01	0.000052	0.048	0.048	BKG
Basal Sharon Conglomerate	Metals, Total/Filtered	Barium	mg/L	7440-39-3	6.332	0.204	2	0.38	0.145	2	MCL
Basal Sharon Conglomerate	Metals, Total/Filtered	Beryllium	mg/L	7440-41-7	---	---	0.004	0.0025	0.00023	0.004	MCL
Basal Sharon Conglomerate	Metals, Total/Filtered	Cadmium	mg/L	7440-43-9	0.0132	0.000456	0.005	0.00092	0	0.005	MCL
Basal Sharon Conglomerate	Metals, Total/Filtered	Calcium	mg/L	7440-70-2	---	---	---	---	93	None	NA
Basal Sharon Conglomerate	Metals, Total/Filtered	Chromium	mg/L	7440-47-3	33.087	1.214	0.1	2.2	0.00074	0.1	MCL
Basal Sharon Conglomerate	Metals, Total/Filtered	Cobalt	mg/L	7440-48-4	0.654	0.0208	---	0.0006	0.005	0.0208	RC
Basal Sharon Conglomerate	Metals, Total/Filtered	Copper	mg/L	7440-50-8	---	---	1.3	0.08	0.00069	1.3	MCL
Basal Sharon Conglomerate	Metals, Total/Filtered	Iron	mg/L	7439-89-6	9.671	0.31	---	1.4	2.56	2.56	BKG
Basal Sharon Conglomerate	Metals, Total/Filtered	Lead	mg/L	7439-92-1	---	---	0.015	0.015	0.00022	0.015	MCL
Basal Sharon Conglomerate	Metals, Total/Filtered	Magnesium	mg/L	7439-95-4	---	---	---	---	30	None	NA
Basal Sharon Conglomerate	Metals, Total/Filtered	Manganese	mg/L	7439-96-5	1.421	0.0463	---	0.043	1.03	1.03	BKG
Basal Sharon Conglomerate	Metals, Total/Filtered	Mercury	mg/L	7439-97-6	---	---	0.002	0.000063	0	0.002	MCL
Basal Sharon Conglomerate	Metals, Total/Filtered	Nickel	mg/L	7440-02-0	0.654	0.0208	---	0.039	0.014	0.039	RSL
Basal Sharon Conglomerate	Metals, Total/Filtered	Potassium	mg/L	7440-09-7	---	---	---	---	2.9	None	NA
Basal Sharon Conglomerate	Metals, Total/Filtered	Selenium	mg/L	7782-49-2	---	---	0.05	0.01	0	0.05	MCL
Basal Sharon Conglomerate	Metals, Total/Filtered	Silver	mg/L	7440-22-4	---	---	---	0.0094	0	0.0094	RSL
Basal Sharon Conglomerate	Metals, Total/Filtered	Sodium	mg/L	7440-23-5	---	---	---	---	15.3	None	NA
Basal Sharon Conglomerate	Metals, Total/Filtered	Thallium	mg/L	7440-28-0	0.00261	0.000083	0.002	0.00002	0.000097	0.002	MCL
Basal Sharon Conglomerate	Metals, Total/Filtered	Vanadium	mg/L	7440-62-2	0.185	0.00638	---	0.0086	0	0.0086	RSL
Basal Sharon Conglomerate	Metals, Total/Filtered	Zinc	mg/L	7440-66-6	9.756	0.312	---	0.6	0.003	0.6	RSL
Homewood Sandstone	Metals, Total/Filtered	Aluminum	mg/L	7429-90-5	31.981	1.028	---	2	0.43	2	RSL
Homewood Sandstone	Metals, Total/Filtered	Antimony	mg/L	7440-36-0	0.0117	0.000389	0.006	0.00078	0	0.006	MCL
Homewood Sandstone	Metals, Total/Filtered	Arsenic	mg/L	7440-38-2	0.000608	0.000056	0.01	0.000052	0.008	0.01	MCL
Homewood Sandstone	Metals, Total/Filtered	Barium	mg/L	7440-39-3	6.332	0.204	2	0.38	0.177	2	MCL
Homewood Sandstone	Metals, Total/Filtered	Beryllium	mg/L	7440-41-7	---	---	0.004	0.0025	0	0.004	MCL
Homewood Sandstone	Metals, Total/Filtered	Cadmium	mg/L	7440-43-9	0.0132	0.000456	0.005	0.00092	0	0.005	MCL
Homewood Sandstone	Metals, Total/Filtered	Calcium	mg/L	7440-70-2	---	---	---	---	143	None	NA
Homewood Sandstone	Metals, Total/Filtered	Chromium	mg/L	7440-47-3	33.087	1.214	0.1	2.2	0.007	0.1	MCL
Homewood Sandstone	Metals, Total/Filtered	Chromium, hexavalent	mg/L	18540-29-9	---	---	---	0.000035	0	0.000035	RSL
Homewood Sandstone	Metals, Total/Filtered	Cobalt	mg/L	7440-48-4	0.654	0.0208	---	0.0006	0.003	0.0208	RC
Homewood Sandstone	Metals, Total/Filtered	Copper	mg/L	7440-50-8	---	---	1.3	0.08	0.002	1.3	MCL
Homewood Sandstone	Metals, Total/Filtered	Iron	mg/L	7439-89-6	9.671	0.31	---	1.4	22.3	22.3	BKG
Homewood Sandstone	Metals, Total/Filtered	Lead	mg/L	7439-92-1	---	---	0.015	0.015	0.00032	0.015	MCL
Homewood Sandstone	Metals, Total/Filtered	Magnesium	mg/L	7439-95-4	---	---	---	---	37.5	None	NA

Table 6-1. Groundwater Screening Levels (Continued)

Aquifer Zone	Analysis Type	Chemical	Units	CAS No	NGT CUG	Resident CUG	MCL	Tapwater RSL	Background	GW Screening Level	GW Screening Level Source
Homewood Sandstone	Metals, Total/Filtered	Manganese	mg/L	7439-96-5	1.421	0.0463	---	0.043	0.56	0.56	BKG
Homewood Sandstone	Metals, Total/Filtered	Mercury	mg/L	7439-97-6	---	---	0.002	0.000063	0	0.002	MCL
Homewood Sandstone	Metals, Total/Filtered	Nickel	mg/L	7440-02-0	0.654	0.0208	---	0.039	0.005	0.039	RSL
Homewood Sandstone	Metals, Total/Filtered	Potassium	mg/L	7440-09-7	---	---	---	---	2.01	None	NA
Homewood Sandstone	Metals, Total/Filtered	Selenium	mg/L	7782-49-2	---	---	0.05	0.01	0	0.05	MCL
Homewood Sandstone	Metals, Total/Filtered	Silver	mg/L	7440-22-4	---	---	---	0.0094	0	0.0094	RSL
Homewood Sandstone	Metals, Total/Filtered	Sodium	mg/L	7440-23-5	---	---	---	---	21	None	NA
Homewood Sandstone	Metals, Total/Filtered	Thallium	mg/L	7440-28-0	0.00261	0.000083	0.002	0.00002	0	0.002	MCL
Homewood Sandstone	Metals, Total/Filtered	Vanadium	mg/L	7440-62-2	0.185	0.00638	---	0.0086	0.0007	0.0086	RSL
Homewood Sandstone	Metals, Total/Filtered	Zinc	mg/L	7440-66-6	9.756	0.312	---	0.6	0.011	0.6	RSL
Unconsolidated	Metals, Total/Filtered	Aluminum	mg/L	7429-90-5	31.981	1.028	---	2	0.386	2	RSL
Unconsolidated	Metals, Total/Filtered	Antimony	mg/L	7440-36-0	0.0117	0.000389	0.006	0.00078	0	0.006	MCL
Unconsolidated	Metals, Total/Filtered	Arsenic	mg/L	7440-38-2	0.000608	0.000056	0.01	0.000052	0.003	0.01	MCL
Unconsolidated	Metals, Total/Filtered	Barium	mg/L	7440-39-3	6.332	0.204	2	0.38	0.034	2	MCL
Unconsolidated	Metals, Total/Filtered	Beryllium	mg/L	7440-41-7	---	---	0.004	0.0025	0	0.004	MCL
Unconsolidated	Metals, Total/Filtered	Cadmium	mg/L	7440-43-9	0.0132	0.000456	0.005	0.00092	0	0.005	MCL
Unconsolidated	Metals, Total/Filtered	Calcium	mg/L	7440-70-2	---	---	---	---	107	None	NA
Unconsolidated	Metals, Total/Filtered	Chromium	mg/L	7440-47-3	33.087	1.214	0.1	2.2	0.002	0.1	MCL
Unconsolidated	Metals, Total/Filtered	Chromium, hexavalent	mg/L	18540-29-9	---	---	---	0.000035	0	0.000035	RSL
Unconsolidated	Metals, Total/Filtered	Cobalt	mg/L	7440-48-4	0.654	0.0208	---	0.0006	0.00083	0.0208	RC
Unconsolidated	Metals, Total/Filtered	Copper	mg/L	7440-50-8	---	---	1.3	0.08	0.005	1.3	MCL
Unconsolidated	Metals, Total/Filtered	Iron	mg/L	7439-89-6	9.671	0.31	---	1.4	1.91	1.91	BKG
Unconsolidated	Metals, Total/Filtered	Lead	mg/L	7439-92-1	---	---	0.015	0.015	0.00099	0.015	MCL
Unconsolidated	Metals, Total/Filtered	Magnesium	mg/L	7439-95-4	---	---	---	---	55.3	None	NA
Unconsolidated	Metals, Total/Filtered	Manganese	mg/L	7439-96-5	1.421	0.0463	---	0.043	0.075	0.075	BKG
Unconsolidated	Metals, Total/Filtered	Mercury	mg/L	7439-97-6	---	---	0.002	0.000063	0	0.002	MCL
Unconsolidated	Metals, Total/Filtered	Nickel	mg/L	7440-02-0	0.654	0.0208	---	0.039	0.002	0.039	RSL
Unconsolidated	Metals, Total/Filtered	Potassium	mg/L	7440-09-7	---	---	---	---	4.84	None	NA
Unconsolidated	Metals, Total/Filtered	Selenium	mg/L	7782-49-2	---	---	0.05	0.01	0.00099	0.05	MCL
Unconsolidated	Metals, Total/Filtered	Silver	mg/L	7440-22-4	---	---	---	0.0094	0	0.0094	RSL
Unconsolidated	Metals, Total/Filtered	Sodium	mg/L	7440-23-5	---	---	---	---	18.2	None	NA
Unconsolidated	Metals, Total/Filtered	Thallium	mg/L	7440-28-0	0.00261	0.000083	0.002	0.00002	0	0.002	MCL
Unconsolidated	Metals, Total/Filtered	Vanadium	mg/L	7440-62-2	0.185	0.00638	---	0.0086	0.0005	0.0086	RSL
Unconsolidated	Metals, Total/Filtered	Zinc	mg/L	7440-66-6	9.756	0.312	---	0.6	0.005	0.6	RSL
Upper Sharon	Metals, Total/Filtered	Aluminum	mg/L	7429-90-5	31.981	1.028	---	2	0.038	2	RSL
Upper Sharon	Metals, Total/Filtered	Antimony	mg/L	7440-36-0	0.0117	0.000389	0.006	0.00078	0	0.006	MCL
Upper Sharon	Metals, Total/Filtered	Arsenic	mg/L	7440-38-2	0.000608	0.000056	0.01	0.000052	0.003	0.01	MCL
Upper Sharon	Metals, Total/Filtered	Barium	mg/L	7440-39-3	6.332	0.204	2	0.38	0.035	2	MCL
Upper Sharon	Metals, Total/Filtered	Beryllium	mg/L	7440-41-7	---	---	0.004	0.0025	0	0.004	MCL
Upper Sharon	Metals, Total/Filtered	Cadmium	mg/L	7440-43-9	0.0132	0.000456	0.005	0.00092	0	0.005	MCL
Upper Sharon	Metals, Total/Filtered	Calcium	mg/L	7440-70-2	---	---	---	---	118	None	NA
Upper Sharon	Metals, Total/Filtered	Chromium	mg/L	7440-47-3	33.087	1.214	0.1	2.2	0	0.1	MCL
Upper Sharon	Metals, Total/Filtered	Cobalt	mg/L	7440-48-4	0.654	0.0208	---	0.0006	0.001	0.0208	RC
Upper Sharon	Metals, Total/Filtered	Copper	mg/L	7440-50-8	---	---	1.3	0.08	0.001	1.3	MCL
Upper Sharon	Metals, Total/Filtered	Iron	mg/L	7439-89-6	9.671	0.31	---	1.4	2.08	2.08	BKG
Upper Sharon	Metals, Total/Filtered	Lead	mg/L	7439-92-1	---	---	0.015	0.015	0.002	0.015	MCL
Upper Sharon	Metals, Total/Filtered	Magnesium	mg/L	7439-95-4	---	---	---	---	38.9	None	NA
Upper Sharon	Metals, Total/Filtered	Manganese	mg/L	7439-96-5	1.421	0.0463	---	0.043	0.198	0.198	BKG
Upper Sharon	Metals, Total/Filtered	Mercury	mg/L	7439-97-6	---	---	0.002	0.000063	0	0.002	MCL

Table 6-1. Groundwater Screening Levels (Continued)

Aquifer Zone	Analysis Type	Chemical	Units	CAS No	NGT CUG	Resident CUG	MCL	Tapwater RSL	Background	GW Screening Level	GW Screening Level Source
Upper Sharon	Metals, Total/Filtered	Nickel	mg/L	7440-02-0	0.654	0.0208	---	0.039	0.002	0.039	RSL
Upper Sharon	Metals, Total/Filtered	Potassium	mg/L	7440-09-7	---	---	---	---	3.38	None	NA
Upper Sharon	Metals, Total/Filtered	Selenium	mg/L	7782-49-2	---	---	0.05	0.01	0.001	0.05	MCL
Upper Sharon	Metals, Total/Filtered	Silver	mg/L	7440-22-4	---	---	---	0.0094	0	0.0094	RSL
Upper Sharon	Metals, Total/Filtered	Sodium	mg/L	7440-23-5	---	---	---	---	129	None	NA
Upper Sharon	Metals, Total/Filtered	Thallium	mg/L	7440-28-0	0.00261	0.000083	0.002	0.00002	0	0.002	MCL
Upper Sharon	Metals, Total/Filtered	Vanadium	mg/L	7440-62-2	0.185	0.00638	---	0.0086	0.00085	0.0086	RSL
Upper Sharon	Metals, Total/Filtered	Zinc	mg/L	7440-66-6	9.756	0.312	---	0.6	0.009	0.6	RSL

BHC = Hexachlorocyclohexane.
BKG = Background.
CAS = Chemical Abstract Service.
CUG = Cleanup goal.
DDD = Dichlorodiphenyldichloroethane.
DDE = Dichlorodiphenyldichloroethylene.
DDT = Dichlorodiphenyltrichloroethane.
GW = Groundwater.
HMX = Octahydro-1,3,5,7- tetranitro-1,3,5,7-tetrazocine.
MCL = Maximum contaminant level.
mg/L = Milligrams per liter.
NA = Not applicable.
NGT = National Guard Trainee.
PCB = Polychlorinated biphenyl.
PETN = Pentaerythritol tetranitrate.
RA = Resident Adult Facility-wide Cleanup Goal.
RC = Resident Child Facility-wide Cleanup Goal.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
RSL = Regional screening level.
SVOC = Semi-volatile organic compound.
VOC = Volatile organic compound.
--- = Screening level does not exist for specified chemical.

Table 6-2. Screening Level Exceedances – Spring 2019 Sample Event

Aquifer Zone	Well	Date Collected	Sample ID	Sample Type	Analysis Type	Chemical	Result	Units	Validation Qualifier	GW Screening Level	GW Screening Level Source
Basal Sharon Conglomerate	FWGmw-018	5/9/2019	FWGmw-018-190401-GW	Grab	Metals, Total	Calcium	82	mg/L		None	NA
Basal Sharon Conglomerate	FWGmw-018	5/9/2019	FWGmw-018-190401-GW	Grab	Metals, Total	Magnesium	25	mg/L		None	NA
Basal Sharon Conglomerate	FWGmw-018	5/9/2019	FWGmw-018-190401-GW	Grab	Metals, Total	Potassium	1.9	mg/L	J	None	NA
Basal Sharon Conglomerate	FWGmw-018	5/9/2019	FWGmw-018-190401-GW	Grab	Metals, Total	Sodium	15	mg/L		None	NA
Basal Sharon Conglomerate	SCFmw-004	5/2/2019	SCFmw-004-190401-GW	Grab	Metals, Total	Calcium	150	mg/L		None	NA
Basal Sharon Conglomerate	SCFmw-004	5/2/2019	SCFmw-004-190401-GW	Grab	Metals, Total	Magnesium	58	mg/L		None	NA
Basal Sharon Conglomerate	SCFmw-004	5/2/2019	SCFmw-004-190401-GW	Grab	Metals, Total	Potassium	2.9	mg/L	J	None	NA
Basal Sharon Conglomerate	SCFmw-004	5/2/2019	SCFmw-004-190401-GW	Grab	Metals, Total	Sodium	13	mg/L	J	None	NA
Homewood Sandstone	FBQmw-171	4/30/2019	FBQmw-171-190401-GW	Grab	Anions	Sulfate	24	mg/L		None	NA
Homewood Sandstone	FBQmw-174	4/30/2019	FBQmw-174-190401-GW	Grab	Anions	Sulfate	15	mg/L		None	NA
Homewood Sandstone	FBQmw-174	4/30/2019	FBQmw-174-190401-GW	Grab	Explosives/Propellants	2,4,6-Trinitrotoluene	10	µg/L		0.98	RSL
Homewood Sandstone	FBQmw-174	4/30/2019	FBQmw-174-190401-GW	Grab	Explosives/Propellants	2,4-Dinitrotoluene	0.67	µg/L		0.24	RSL
Homewood Sandstone	FBQmw-174	4/30/2019	FBQmw-174-190401-GW	Grab	Explosives/Propellants	2-Amino-4,6-Dinitrotoluene	15	µg/L		3.9	RSL
Homewood Sandstone	FBQmw-174	4/30/2019	FBQmw-174-190401-GW	Grab	Explosives/Propellants	4-Amino-2,6-Dinitrotoluene	14	µg/L		3.9	RSL
Homewood Sandstone	FBQmw-174	4/30/2019	FBQmw-174-190401-GW	Grab	Explosives/Propellants	RDX	1.2	µg/L	J	0.97	RSL
Homewood Sandstone	FBQmw-175	5/7/2019	FBQmw-175-190401-GW	Grab	Anions	Sulfate	20	mg/L		None	NA
Homewood Sandstone	FBQmw-175	5/7/2019	FBQmw-175-190402-GW	Field Duplicate	Anions	Sulfate	18	mg/L		None	NA
Homewood Sandstone	LL7mw-001	5/1/2019	LL7mw-001-190401-GW	Grab	Metals, Total	Calcium	38	mg/L		None	NA
Homewood Sandstone	LL7mw-001	5/1/2019	LL7mw-001-190401-GW	Grab	Metals, Total	Magnesium	12	mg/L		None	NA
Homewood Sandstone	LL7mw-001	5/1/2019	LL7mw-001-190401-GW	Grab	Metals, Total	Potassium	1.1	mg/L	J	None	NA
Homewood Sandstone	LL7mw-001	5/1/2019	LL7mw-001-190401-GW	Grab	Metals, Total	Sodium	5.4	mg/L		None	NA
Homewood Sandstone	LL10mw-005	5/1/2019	LL10mw-005-190401-GW	Grab	Metals, Total	Calcium	59	mg/L		None	NA
Homewood Sandstone	LL10mw-005	5/1/2019	LL10mw-005-190401-GW	Grab	Metals, Total	Magnesium	14	mg/L		None	NA
Homewood Sandstone	LL10mw-005	5/1/2019	LL10mw-005-190401-GW	Grab	Metals, Total	Sodium	3.5	mg/L	J	None	NA
Unconsolidated	DETmw-003	4/29/2019	DET-003-190401-GW	Grab	Metals, Total	Calcium	90	mg/L		None	NA
Unconsolidated	DETmw-003	4/29/2019	DET-003-190402-GW	Field Duplicate	Metals, Total	Calcium	91	mg/L		None	NA
Unconsolidated	DETmw-003	4/29/2019	DET-003-190401-GW	Grab	Metals, Total	Magnesium	33	mg/L		None	NA
Unconsolidated	DETmw-003	4/29/2019	DET-003-190402-GW	Field Duplicate	Metals, Total	Magnesium	33	mg/L		None	NA
Unconsolidated	DETmw-003	4/29/2019	DET-003-190402-GW	Field Duplicate	Metals, Total	Manganese	0.24	mg/L		0.075	BKG
Unconsolidated	DETmw-003	4/29/2019	DET-003-190401-GW	Grab	Metals, Total	Manganese	0.24	mg/L		0.075	BKG
Unconsolidated	DETmw-003	4/29/2019	DET-003-190401-GW	Grab	Metals, Total	Potassium	1.9	mg/L	J	None	NA
Unconsolidated	DETmw-003	4/29/2019	DET-003-190402-GW	Field Duplicate	Metals, Total	Potassium	1.9	mg/L	J	None	NA
Unconsolidated	DETmw-003	4/29/2019	DET-003-190402-GW	Field Duplicate	Metals, Total	Sodium	12	mg/L		None	NA
Unconsolidated	DETmw-003	4/29/2019	DET-003-190401-GW	Grab	Metals, Total	Sodium	12	mg/L		None	NA
Unconsolidated	DETmw-004	4/29/2019	DET-004-190401-GW	Grab	Explosives/Propellants	RDX	1.4	µg/L		0.97	RSL
Unconsolidated	DETmw-004	4/29/2019	DET-004-190401-GW	Grab	Metals, Total	Calcium	120	mg/L		None	NA
Unconsolidated	DETmw-004	4/29/2019	DET-004-190401-GW	Grab	Metals, Total	Magnesium	24	mg/L		None	NA
Unconsolidated	DETmw-004	4/29/2019	DET-004-190401-GW	Grab	Metals, Total	Potassium	1.2	mg/L	J	None	NA
Unconsolidated	DETmw-004	4/29/2019	DET-004-190401-GW	Grab	Metals, Total	Sodium	2.2	mg/L	J	None	NA
Unconsolidated	WBGmw-006	4/30/2019	WBGmw-006-190401-GW	Grab	Explosives/Propellants	RDX	11	µg/L		0.97	RSL
Unconsolidated	WBGmw-006	4/30/2019	WBGmw-006-190401-GW	Grab	Metals, Total	Calcium	79	mg/L		None	NA
Unconsolidated	WBGmw-006	4/30/2019	WBGmw-006-190401-GW	Grab	Metals, Total	Magnesium	26	mg/L		None	NA
Unconsolidated	WBGmw-006	4/30/2019	WBGmw-006-190401-GW	Grab	Metals, Total	Manganese	0.099	mg/L		0.075	BKG
Unconsolidated	WBGmw-006	4/30/2019	WBGmw-006-190401-GW	Grab	Metals, Total	Potassium	0.86	mg/L	J	None	NA
Unconsolidated	WBGmw-006	4/30/2019	WBGmw-006-190401-GW	Grab	Metals, Total	Sodium	5.5	mg/L		None	NA
Unconsolidated	WBGmw-009	4/30/2019	WBGmw-009-190401-GW	Grab	Explosives/Propellants	RDX	1.6	µg/L		0.97	RSL

Table 6-2. Screening Level Exceedances – Spring 2019 Sample Event (Continued)

Aquifer Zone	Well	Date Collected	Sample ID	Sample Type	Analysis Type	Chemical	Result	Units	Validation Qualifier	GW Screening Level	GW Screening Level Source
Unconsolidated	WBGmw-009	4/30/2019	WBGmw-009-190401-GW	Grab	Metals, Total	Calcium	49	mg/L		None	NA
Unconsolidated	WBGmw-009	4/30/2019	WBGmw-009-190401-GW	Grab	Metals, Total	Magnesium	12	mg/L		None	NA
Unconsolidated	WBGmw-009	4/30/2019	WBGmw-009-190401-GW	Grab	Metals, Total	Manganese	0.18	mg/L		0.075	BKG
Unconsolidated	WBGmw-009	4/30/2019	WBGmw-009-190401-GW	Grab	Metals, Total	Potassium	0.61	mg/L	J	None	NA
Unconsolidated	WBGmw-009	4/30/2019	WBGmw-009-190401-GW	Grab	Metals, Total	Sodium	3.3	mg/L	J	None	NA
Unconsolidated	LL1mw-064	5/7/2019	LL1mw-064-190401-GW	Grab	Metals, Total	Calcium	63	mg/L		None	NA
Unconsolidated	LL1mw-064	5/7/2019	LL1mw-064-190401-GW	Grab	Metals, Total	Magnesium	11	mg/L		None	NA
Unconsolidated	LL1mw-064	5/7/2019	LL1mw-064-190401-GW	Grab	Metals, Total	Manganese	0.12	mg/L		0.075	BKG
Unconsolidated	LL1mw-064	5/7/2019	LL1mw-064-190401-GW	Grab	Metals, Total	Potassium	0.92	mg/L	J	None	NA
Unconsolidated	LL1mw-064	5/7/2019	LL1mw-064-190401-GW	Grab	Metals, Total	Sodium	5.5	mg/L	J	None	NA
Unconsolidated	LL1mw-065	5/7/2019	LL1mw-065-190401-GW	Grab	Metals, Total	Calcium	86	mg/L		None	NA
Unconsolidated	LL1mw-065	5/7/2019	LL1mw-065-190401-GW	Grab	Metals, Total	Magnesium	29	mg/L		None	NA
Unconsolidated	LL1mw-065	5/7/2019	LL1mw-065-190401-GW	Grab	Metals, Total	Potassium	1.4	mg/L	J	None	NA
Unconsolidated	LL1mw-065	5/7/2019	LL1mw-065-190401-GW	Grab	Metals, Total	Sodium	15	mg/L	J	None	NA
Unconsolidated	LL1mw-086	5/7/2019	LL1mw-086-190401-GF	Grab	Metals, Filtered	Calcium	32	mg/L		None	NA
Unconsolidated	LL1mw-086	5/7/2019	LL1mw-086-190401-GF	Grab	Metals, Filtered	Magnesium	28	mg/L		None	NA
Unconsolidated	LL1mw-086	5/7/2019	LL1mw-086-190401-GF	Grab	Metals, Filtered	Potassium	21	mg/L	J	None	NA
Unconsolidated	LL1mw-086	5/7/2019	LL1mw-086-190401-GF	Grab	Metals, Filtered	Sodium	13	mg/L		None	NA
Unconsolidated	LL1mw-086	5/7/2019	LL1mw-086-190401-GW	Grab	Metals, Total	Aluminum	3.1	mg/L		2	RSL
Unconsolidated	LL1mw-086	5/7/2019	LL1mw-086-190401-GW	Grab	Metals, Total	Calcium	71	mg/L		None	NA
Unconsolidated	LL1mw-086	5/7/2019	LL1mw-086-190401-GW	Grab	Metals, Total	Iron	7.1	mg/L		1.91	BKG
Unconsolidated	LL1mw-086	5/7/2019	LL1mw-086-190401-GW	Grab	Metals, Total	Magnesium	39	mg/L		None	NA
Unconsolidated	LL1mw-086	5/7/2019	LL1mw-086-190401-GW	Grab	Metals, Total	Manganese	0.36	mg/L		0.075	BKG
Unconsolidated	LL1mw-086	5/7/2019	LL1mw-086-190401-GW	Grab	Metals, Total	Potassium	26	mg/L		None	NA
Unconsolidated	LL1mw-086	5/7/2019	LL1mw-086-190401-GW	Grab	Metals, Total	Sodium	16	mg/L	J	None	NA
Unconsolidated	LL1mw-087	5/2/2019	LL1mw-087-190401-GW	Grab	Metals, Total	Calcium	79	mg/L		None	NA
Unconsolidated	LL1mw-087	5/2/2019	LL1mw-087-190401-GW	Grab	Metals, Total	Magnesium	19	mg/L		None	NA
Unconsolidated	LL1mw-087	5/2/2019	LL1mw-087-190401-GW	Grab	Metals, Total	Potassium	0.9	mg/L	J	None	NA
Unconsolidated	LL1mw-087	5/2/2019	LL1mw-087-190401-GW	Grab	Metals, Total	Sodium	10	mg/L	J	None	NA
Unconsolidated	LL1mw-088	5/8/2019	LL1mw-088-190401-GW	Grab	Metals, Total	Arsenic	0.028	mg/L		0.01	MCL
Unconsolidated	LL1mw-088	5/8/2019	LL1mw-088-190401-GW	Grab	Metals, Total	Calcium	75	mg/L		None	NA
Unconsolidated	LL1mw-088	5/8/2019	LL1mw-088-190401-GW	Grab	Metals, Total	Magnesium	33	mg/L		None	NA
Unconsolidated	LL1mw-088	5/8/2019	LL1mw-088-190401-GW	Grab	Metals, Total	Potassium	2.4	mg/L	J	None	NA
Unconsolidated	LL1mw-088	5/8/2019	LL1mw-088-190401-GW	Grab	Metals, Total	Sodium	23	mg/L	J	None	NA
Unconsolidated	LL12mw-185	5/1/2019	LL12mw-185-190401-GW	Grab	Anions	Nitrate	92	mg/L		10	MCL
Unconsolidated	LL12mw-187	5/2/2019	LL12mw-187-190401-GW	Grab	Anions	Nitrate	1600	mg/L		10	MCL
Unconsolidated	LL12mw-187	5/2/2019	LL12mw-187-190401-GW	Grab	Metals, Total	Calcium	1000	mg/L		None	NA
Unconsolidated	LL12mw-187	5/2/2019	LL12mw-187-190401-GW	Grab	Metals, Total	Magnesium	320	mg/L	J	None	NA
Unconsolidated	LL12mw-187	5/2/2019	LL12mw-187-190401-GW	Grab	Metals, Total	Manganese	2.9	mg/L		0.075	BKG
Unconsolidated	LL12mw-187	5/2/2019	LL12mw-187-190401-GW	Grab	Metals, Total	Potassium	58	mg/L		None	NA
Unconsolidated	LL12mw-187	5/2/2019	LL12mw-187-190401-GW	Grab	Metals, Total	Sodium	44	mg/L	J	None	NA
Unconsolidated	LL12mw-242	5/1/2019	LL12mw-242-190401-GF	Grab	Metals, Filtered	Arsenic	0.013	mg/L	J	0.01	MCL
Unconsolidated	LL12mw-242	5/1/2019	LL12mw-242-190401-GF	Grab	Metals, Filtered	Calcium	66	mg/L		None	NA
Unconsolidated	LL12mw-242	5/1/2019	LL12mw-242-190401-GF	Grab	Metals, Filtered	Iron	2	mg/L		1.91	BKG
Unconsolidated	LL12mw-242	5/1/2019	LL12mw-242-190401-GF	Grab	Metals, Filtered	Magnesium	41	mg/L		None	NA
Unconsolidated	LL12mw-242	5/1/2019	LL12mw-242-190401-GF	Grab	Metals, Filtered	Potassium	3.1	mg/L		None	NA
Unconsolidated	LL12mw-242	5/1/2019	LL12mw-242-190401-GF	Grab	Metals, Filtered	Sodium	26	mg/L		None	NA

Table 6-2. Screening Level Exceedances – Spring 2019 Sample Event (Continued)

Aquifer Zone	Well	Date Collected	Sample ID	Sample Type	Analysis Type	Chemical	Result	Units	Validation Qualifier	GW Screening Level	GW Screening Level Source
Unconsolidated	LL12mw-242	5/1/2019	LL12mw-242-190401-GW	Grab	Metals, Total	Arsenic	0.022	mg/L		0.01	MCL
Unconsolidated	LL12mw-242	5/1/2019	LL12mw-242-190401-GW	Grab	Metals, Total	Calcium	66	mg/L		None	NA
Unconsolidated	LL12mw-242	5/1/2019	LL12mw-242-190401-GW	Grab	Metals, Total	Iron	3.8	mg/L		1.91	BKG
Unconsolidated	LL12mw-242	5/1/2019	LL12mw-242-190401-GW	Grab	Metals, Total	Magnesium	40	mg/L		None	NA
Unconsolidated	LL12mw-242	5/1/2019	LL12mw-242-190401-GW	Grab	Metals, Total	Sodium	29	mg/L	J	None	NA
Unconsolidated	LL12mw-245	5/2/2019	LL12mw-245-190401-GW	Grab	Metals, Total	Arsenic	0.012	mg/L		0.01	MCL
Unconsolidated	LL12mw-245	5/2/2019	LL12mw-245-190401-GW	Grab	Metals, Total	Calcium	140	mg/L		None	NA
Unconsolidated	LL12mw-245	5/2/2019	LL12mw-245-190401-GW	Grab	Metals, Total	Magnesium	67	mg/L		None	NA
Unconsolidated	LL12mw-245	5/2/2019	LL12mw-245-190401-GW	Grab	Metals, Total	Sodium	25	mg/L	J	None	NA
Unconsolidated	LL12mw-247	5/1/2019	LL12mw-247-190401-GW	Grab	Metals, Total	Calcium	99	mg/L		None	NA
Unconsolidated	LL12mw-247	5/1/2019	LL12mw-247-190401-GW	Grab	Metals, Total	Magnesium	52	mg/L		None	NA
Unconsolidated	LL12mw-247	5/1/2019	LL12mw-247-190401-GW	Grab	Metals, Total	Manganese	0.16	mg/L		0.075	BKG
Unconsolidated	LL12mw-247	5/1/2019	LL12mw-247-190401-GW	Grab	Metals, Total	Potassium	2.6	mg/L	J	None	NA
Unconsolidated	LL12mw-247	5/1/2019	LL12mw-247-190401-GW	Grab	Metals, Total	Sodium	22	mg/L		None	NA
Unconsolidated	SCLmw-001	5/8/2019	SCLmw-001-190401-GW	Grab	Anions	Sulfate	160	mg/L		None	NA
Unconsolidated	SCLmw-001	5/8/2019	SCLmw-001-190401-GW	Grab	Metals, Total	Calcium	130	mg/L		None	NA
Unconsolidated	SCLmw-001	5/8/2019	SCLmw-001-190401-GW	Grab	Metals, Total	Magnesium	42	mg/L		None	NA
Unconsolidated	SCLmw-001	5/8/2019	SCLmw-001-190401-GW	Grab	Metals, Total	Manganese	0.31	mg/L		0.075	BKG
Unconsolidated	SCLmw-001	5/8/2019	SCLmw-001-190401-GW	Grab	Metals, Total	Potassium	3.8	mg/L		None	NA
Unconsolidated	SCLmw-001	5/8/2019	SCLmw-001-190401-GW	Grab	Metals, Total	Sodium	19	mg/L		None	NA
Unconsolidated	SCLmw-001	5/8/2019	SCLmw-001-190401-GW	Grab	Miscellaneous	Total Phosphorus as P	0.018	mg/L	J	None	NA
Unconsolidated	SCLmw-001	5/8/2019	SCLmw-001-190401-GW	Grab	Miscellaneous	Total Phosphorus as P	0.018	mg/L	J	None	NA
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190401-GW	Grab	Anions	Sulfate	190	mg/L		None	NA
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190402-GW	Field Duplicate	Metals, Total	Calcium	190	mg/L		None	NA
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190401-GW	Grab	Metals, Total	Calcium	190	mg/L		None	NA
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190401-GW	Grab	Metals, Total	Iron	10	mg/L		1.91	BKG
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190402-GW	Field Duplicate	Metals, Total	Iron	10	mg/L		1.91	BKG
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190402-GW	Field Duplicate	Metals, Total	Magnesium	16	mg/L		None	NA
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190401-GW	Grab	Metals, Total	Magnesium	16	mg/L		None	NA
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190401-GW	Grab	Metals, Total	Manganese	1.1	mg/L		0.075	BKG
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190402-GW	Field Duplicate	Metals, Total	Manganese	1	mg/L		0.075	BKG
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190401-GW	Grab	Metals, Total	Potassium	4	mg/L		None	NA
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190402-GW	Field Duplicate	Metals, Total	Potassium	4	mg/L		None	NA
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190402-GW	Field Duplicate	Metals, Total	Sodium	3.3	mg/L	J	None	NA
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190401-GW	Grab	Metals, Total	Sodium	3.3	mg/L	J	None	NA
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190402-GW	Field Duplicate	Miscellaneous	Total Phosphorus as P	0.11	mg/L	J	None	NA
Unconsolidated	SCLmw-002	5/8/2019	SCLmw-002-190401-GW	Grab	Miscellaneous	Total Phosphorus as P	0.1	mg/L	J	None	NA
Unconsolidated	SCLmw-003	5/8/2019	SCLmw-003-190401-GW	Grab	Anions	Sulfate	240	mg/L		None	NA
Unconsolidated	SCLmw-003	5/8/2019	SCLmw-003-190401-GW	Grab	Metals, Total	Calcium	160	mg/L		None	NA
Unconsolidated	SCLmw-003	5/8/2019	SCLmw-003-190401-GW	Grab	Metals, Total	Magnesium	67	mg/L		None	NA
Unconsolidated	SCLmw-003	5/8/2019	SCLmw-003-190401-GW	Grab	Metals, Total	Manganese	0.23	mg/L		0.075	BKG
Unconsolidated	SCLmw-003	5/8/2019	SCLmw-003-190401-GW	Grab	Metals, Total	Potassium	6	mg/L		None	NA
Unconsolidated	SCLmw-003	5/8/2019	SCLmw-003-190401-GW	Grab	Metals, Total	Sodium	38	mg/L	J	None	NA
Unconsolidated	NTAmw-119	4/30/2019	NTAmw-119-190401-GW	Grab	Metals, Total	Calcium	85	mg/L		None	NA
Unconsolidated	NTAmw-119	4/30/2019	NTAmw-119-190401-GW	Grab	Metals, Total	Magnesium	21	mg/L		None	NA
Unconsolidated	NTAmw-119	4/30/2019	NTAmw-119-190401-GW	Grab	Metals, Total	Manganese	0.33	mg/L		0.075	BKG
Unconsolidated	NTAmw-119	4/30/2019	NTAmw-119-190401-GW	Grab	Metals, Total	Potassium	1.4	mg/L	J	None	NA
Unconsolidated	NTAmw-119	4/30/2019	NTAmw-119-190401-GW	Grab	Metals, Total	Sodium	6.4	mg/L		None	NA
Unconsolidated	FWGmw-004	5/8/2019	FWGmw-004-190401-GW	Grab	Metals, Total	Calcium	96	mg/L		None	NA

Table 6-2. Screening Level Exceedances – Spring 2019 Sample Event (Continued)

Aquifer Zone	Well	Date Collected	Sample ID	Sample Type	Analysis Type	Chemical	Result	Units	Validation Qualifier	GW Screening Level	GW Screening Level Source
Unconsolidated	FWGmw-004	5/8/2019	FWGmw-004-190401-GW	Grab	Metals, Total	Magnesium	50	mg/L		None	NA
Unconsolidated	FWGmw-004	5/8/2019	FWGmw-004-190401-GW	Grab	Metals, Total	Potassium	0.7	mg/L	J	None	NA
Unconsolidated	FWGmw-004	5/8/2019	FWGmw-004-190401-GW	Grab	Metals, Total	Sodium	4.6	mg/L	J	None	NA
Unconsolidated	FWGmw-007	4/30/2019	FWGmw-007-190401-GW	Grab	Metals, Total	Calcium	130	mg/L		None	NA
Unconsolidated	FWGmw-007	4/30/2019	FWGmw-007-190401-GW	Grab	Metals, Total	Magnesium	66	mg/L		None	NA
Unconsolidated	FWGmw-007	4/30/2019	FWGmw-007-190401-GW	Grab	Metals, Total	Manganese	0.13	mg/L		0.075	BKG
Unconsolidated	FWGmw-007	4/30/2019	FWGmw-007-190401-GW	Grab	Metals, Total	Potassium	2.5	mg/L	J	None	NA
Unconsolidated	FWGmw-007	4/30/2019	FWGmw-007-190401-GW	Grab	Metals, Total	Sodium	11	mg/L		None	NA
Unconsolidated	FWGmw-011	5/7/2019	FWGmw-011-190401-GW	Grab	Metals, Total	Calcium	50	mg/L		None	NA
Unconsolidated	FWGmw-011	5/7/2019	FWGmw-011-190401-GW	Grab	Metals, Total	Iron	8.2	mg/L		1.91	BKG
Unconsolidated	FWGmw-011	5/7/2019	FWGmw-011-190401-GW	Grab	Metals, Total	Magnesium	12	mg/L		None	NA
Unconsolidated	FWGmw-011	5/7/2019	FWGmw-011-190401-GW	Grab	Metals, Total	Manganese	0.29	mg/L		0.075	BKG
Unconsolidated	FWGmw-011	5/7/2019	FWGmw-011-190401-GW	Grab	Metals, Total	Potassium	1.2	mg/L	J	None	NA
Unconsolidated	FWGmw-011	5/7/2019	FWGmw-011-190401-GW	Grab	Metals, Total	Sodium	5.7	mg/L	J	None	NA
Unconsolidated	FWGmw-015	5/8/2019	FWGmw-015-190401-GW	Grab	Metals, Total	Calcium	280	mg/L		None	NA
Unconsolidated	FWGmw-015	5/8/2019	FWGmw-015-190401-GW	Grab	Metals, Total	Magnesium	290	mg/L		None	NA
Unconsolidated	FWGmw-015	5/8/2019	FWGmw-015-190401-GW	Grab	Metals, Total	Potassium	3.5	mg/L		None	NA
Unconsolidated	FWGmw-015	5/8/2019	FWGmw-015-190401-GW	Grab	Metals, Total	Sodium	44	mg/L	J	None	NA
Upper Sharon	RQLmw-007	5/9/2019	RQLmw-007-190401-GW	Grab	Metals, Total	Calcium	58	mg/L		None	NA
Upper Sharon	RQLmw-007	5/9/2019	RQLmw-007-190401-GW	Grab	Metals, Total	Magnesium	38	mg/L		None	NA
Upper Sharon	RQLmw-007	5/9/2019	RQLmw-007-190401-GW	Grab	Metals, Total	Manganese	0.49	mg/L		0.198	BKG
Upper Sharon	RQLmw-007	5/9/2019	RQLmw-007-190401-GW	Grab	Metals, Total	Potassium	2.9	mg/L	J	None	NA
Upper Sharon	RQLmw-008	5/9/2019	RQLmw-008-190401-GW	Grab	Metals, Total	Arsenic	0.011	mg/L		0.01	MCL
Upper Sharon	RQLmw-008	5/9/2019	RQLmw-008-190401-GW	Grab	Metals, Total	Calcium	41	mg/L		None	NA
Upper Sharon	RQLmw-008	5/9/2019	RQLmw-008-190401-GW	Grab	Metals, Total	Iron	28	mg/L		2.08	BKG
Upper Sharon	RQLmw-008	5/9/2019	RQLmw-008-190401-GW	Grab	Metals, Total	Magnesium	74	mg/L		None	NA
Upper Sharon	RQLmw-008	5/9/2019	RQLmw-008-190401-GW	Grab	Metals, Total	Manganese	0.46	mg/L		0.198	BKG
Upper Sharon	RQLmw-008	5/9/2019	RQLmw-008-190401-GW	Grab	Metals, Total	Potassium	2.1	mg/L	J	None	NA
Upper Sharon	RQLmw-009	5/9/2019	RQLmw-009-190401-GW	Grab	Metals, Total	Calcium	18	mg/L		None	NA
Upper Sharon	RQLmw-009	5/9/2019	RQLmw-009-190401-GW	Grab	Metals, Total	Magnesium	10	mg/L		None	NA
Upper Sharon	RQLmw-009	5/9/2019	RQLmw-009-190401-GW	Grab	Metals, Total	Manganese	0.3	mg/L		0.198	BKG
Upper Sharon	RQLmw-009	5/9/2019	RQLmw-009-190401-GW	Grab	Metals, Total	Potassium	2.8	mg/L	J	None	NA
Upper Sharon	RQLmw-011	5/9/2019	RQLmw-011-190402-GW	Field Duplicate	Anions	Sulfate	130	mg/L	J	None	NA
Upper Sharon	RQLmw-011	5/9/2019	RQLmw-011-190401-GW	Grab	Anions	Sulfate	130	mg/L	J	None	NA
Upper Sharon	RQLmw-012	5/9/2019	RQLmw-012-190401-GW	Grab	Anions	Sulfate	110	mg/L	J	None	NA
Upper Sharon	RQLmw-013	5/9/2019	RQLmw-013-190401-GW	Grab	Anions	Sulfate	160	mg/L	J	None	NA
Upper Sharon	DA2mw-115	4/29/2019	DA2mw-115-190402-GW	Field Duplicate	Metals, Total	Calcium	100	mg/L		None	NA
Upper Sharon	DA2mw-115	4/29/2019	DA2mw-115-190401-GW	Grab	Metals, Total	Calcium	100	mg/L		None	NA
Upper Sharon	DA2mw-115	4/29/2019	DA2mw-115-190402-GW	Field Duplicate	Metals, Total	Magnesium	28	mg/L		None	NA
Upper Sharon	DA2mw-115	4/29/2019	DA2mw-115-190401-GW	Grab	Metals, Total	Magnesium	28	mg/L		None	NA
Upper Sharon	DA2mw-115	4/29/2019	DA2mw-115-190401-GW	Grab	Metals, Total	Potassium	3.3	mg/L		None	NA
Upper Sharon	DA2mw-115	4/29/2019	DA2mw-115-190402-GW	Field Duplicate	Metals, Total	Potassium	3.4	mg/L		None	NA
Upper Sharon	DA2mw-115	4/29/2019	DA2mw-115-190402-GW	Field Duplicate	Metals, Total	Sodium	12	mg/L		None	NA
Upper Sharon	DA2mw-115	4/29/2019	DA2mw-115-190401-GW	Grab	Metals, Total	Sodium	12	mg/L		None	NA
Upper Sharon	WBGmw-020	4/30/2019	WBGmw-020-190401-GW	Grab	Metals, Total	Calcium	31	mg/L		None	NA
Upper Sharon	WBGmw-020	4/30/2019	WBGmw-020-190401-GW	Grab	Metals, Total	Iron	3.4	mg/L		2.08	BKG
Upper Sharon	WBGmw-020	4/30/2019	WBGmw-020-190401-GW	Grab	Metals, Total	Magnesium	10	mg/L		None	NA
Upper Sharon	WBGmw-020	4/30/2019	WBGmw-020-190401-GW	Grab	Metals, Total	Manganese	0.22	mg/L		0.198	BKG

Table 6-2. Screening Level Exceedances – Spring 2019 Sample Event (Continued)

Aquifer Zone	Well	Date Collected	Sample ID	Sample Type	Analysis Type	Chemical	Result	Units	Validation Qualifier	GW Screening Level	GW Screening Level Source
Upper Sharon	WBGmw-020	4/30/2019	WBGmw-020-190401-GW	Grab	Metals, Total	Potassium	0.8	mg/L	J	None	NA
Upper Sharon	WBGmw-020	4/30/2019	WBGmw-020-190401-GW	Grab	Metals, Total	Sodium	3.9	mg/L	J	None	NA
Upper Sharon	WBGmw-021	4/30/2019	WBGmw-021-190401-GW	Grab	Metals, Total	Calcium	77	mg/L		None	NA
Upper Sharon	WBGmw-021	4/30/2019	WBGmw-021-190401-GW	Grab	Metals, Total	Magnesium	19	mg/L		None	NA
Upper Sharon	WBGmw-021	4/30/2019	WBGmw-021-190401-GW	Grab	Metals, Total	Manganese	0.37	mg/L		0.198	BKG
Upper Sharon	WBGmw-021	4/30/2019	WBGmw-021-190401-GW	Grab	Metals, Total	Potassium	1.4	mg/L	J	None	NA
Upper Sharon	WBGmw-021	4/30/2019	WBGmw-021-190401-GW	Grab	Metals, Total	Sodium	4.8	mg/L	J	None	NA
Upper Sharon	LL1mw-080	5/7/2019	LL1mw-080-190401-GW	Grab	Explosives/Propellants	RDX	13	µg/L		0.97	RSL
Upper Sharon	LL1mw-083	5/6/2019	LL1mw-083-190401-GW	Grab	Anions	Sulfate	120	mg/L	J	None	NA
Upper Sharon	LL1mw-083	5/6/2019	LL1mw-083-190401-GW	Grab	Explosives/Propellants	1,3-Dinitrobenzene	2	µg/L		0.2	RSL
Upper Sharon	LL1mw-083	5/6/2019	LL1mw-083-190401-GW	Grab	Explosives/Propellants	2,4,6-Trinitrotoluene	1.9	µg/L		0.98	RSL
Upper Sharon	LL1mw-083	5/6/2019	LL1mw-083-190401-GW	Grab	Explosives/Propellants	2,4-Dinitrotoluene	2.8	µg/L		0.24	RSL
Upper Sharon	LL1mw-083	5/6/2019	LL1mw-083-190401-GW	Grab	Explosives/Propellants	2-Amino-4,6-Dinitrotoluene	11	µg/L		3.9	RSL
Upper Sharon	LL1mw-083	5/6/2019	LL1mw-083-190401-GW	Grab	Explosives/Propellants	4-Amino-2,6-Dinitrotoluene	14	µg/L		3.9	RSL
Upper Sharon	LL1mw-084	5/6/2019	LL1mw-084-190401-GW	Grab	Anions	Sulfate	140	mg/L	J	None	NA
Upper Sharon	LL1mw-084	5/6/2019	LL1mw-084-190401-GW	Grab	Anions	Sulfide	0.8	mg/L	J	None	NA
Upper Sharon	LL1mw-084	5/6/2019	LL1mw-084-190401-GW	Grab	Explosives/Propellants	1,3-Dinitrobenzene	2.4	µg/L		0.2	RSL
Upper Sharon	LL1mw-084	5/6/2019	LL1mw-084-190401-GW	Grab	Explosives/Propellants	2,4,6-Trinitrotoluene	3.3	µg/L		0.98	RSL
Upper Sharon	LL1mw-084	5/6/2019	LL1mw-084-190401-GW	Grab	Explosives/Propellants	2,4-Dinitrotoluene	0.87	µg/L		0.24	RSL
Upper Sharon	LL1mw-084	5/6/2019	LL1mw-084-190401-GW	Grab	Explosives/Propellants	2-Amino-4,6-Dinitrotoluene	7.9	µg/L		3.9	RSL
Upper Sharon	LL1mw-084	5/6/2019	LL1mw-084-190401-GW	Grab	Explosives/Propellants	4-Amino-2,6-Dinitrotoluene	18	µg/L		3.9	RSL
Upper Sharon	LL1mw-084	5/6/2019	LL1mw-084-190401-GW	Grab	Explosives/Propellants	RDX	2	µg/L		0.97	RSL
Upper Sharon	LL1mw-084	5/6/2019	LL1mw-084-190401-GW	Grab	Metals, Total	Calcium	29	mg/L		None	NA
Upper Sharon	LL1mw-084	5/6/2019	LL1mw-084-190401-GW	Grab	Metals, Total	Magnesium	13	mg/L		None	NA
Upper Sharon	LL1mw-084	5/6/2019	LL1mw-084-190401-GW	Grab	Metals, Total	Potassium	0.88	mg/L	J	None	NA
Upper Sharon	LL1mw-084	5/6/2019	LL1mw-084-190401-GW	Grab	Metals, Total	Sodium	3.4	mg/L	J	None	NA
Upper Sharon	LL2mw-059	5/6/2019	LL2mw-059-190401-GW	Grab	Explosives/Propellants	1,3-Dinitrobenzene	0.27	µg/L	J	0.2	RSL
Upper Sharon	LL2mw-059	5/6/2019	LL2mw-059-190401-GW	Grab	Explosives/Propellants	2,4-Dinitrotoluene	0.52	µg/L		0.24	RSL
Upper Sharon	LL2mw-059	5/6/2019	LL2mw-059-190401-GW	Grab	Metals, Total	Calcium	24	mg/L		None	NA
Upper Sharon	LL2mw-059	5/6/2019	LL2mw-059-190401-GW	Grab	Metals, Total	Magnesium	7.9	mg/L		None	NA
Upper Sharon	LL2mw-059	5/6/2019	LL2mw-059-190401-GW	Grab	Metals, Total	Potassium	1.4	mg/L	J	None	NA
Upper Sharon	LL2mw-059	5/6/2019	LL2mw-059-190401-GW	Grab	Metals, Total	Sodium	3.3	mg/L	J	None	NA
Upper Sharon	LL2mw-267	5/2/2019	LL2mw-267-190401-GW	Grab	Metals, Total	Calcium	28	mg/L		None	NA
Upper Sharon	LL2mw-267	5/2/2019	LL2mw-267-190401-GW	Grab	Metals, Total	Iron	2.5	mg/L		2.08	BKG
Upper Sharon	LL2mw-267	5/2/2019	LL2mw-267-190401-GW	Grab	Metals, Total	Magnesium	12	mg/L		None	NA
Upper Sharon	LL2mw-267	5/2/2019	LL2mw-267-190401-GW	Grab	Metals, Total	Potassium	0.79	mg/L	J	None	NA
Upper Sharon	LL2mw-267	5/2/2019	LL2mw-267-190401-GW	Grab	Metals, Total	Sodium	8.1	mg/L	J	None	NA
Upper Sharon	LL3mw-237	5/6/2019	LL3mw-237-190401-GW	Grab	Explosives/Propellants	4-Amino-2,6-Dinitrotoluene	4	µg/L		3.9	RSL
Upper Sharon	LL3mw-244	5/6/2019	LL3mw-244-190401-GW	Grab	Metals, Total	Calcium	60	mg/L		None	NA
Upper Sharon	LL3mw-244	5/6/2019	LL3mw-244-190401-GW	Grab	Metals, Total	Magnesium	3.1	mg/L		None	NA
Upper Sharon	LL3mw-244	5/6/2019	LL3mw-244-190401-GW	Grab	Metals, Total	Potassium	3.1	mg/L		None	NA
Upper Sharon	LL3mw-246	5/9/2019	LL3mw-246-190402-GW	Field Duplicate	Metals, Total	Calcium	20	mg/L		None	NA
Upper Sharon	LL3mw-246	5/9/2019	LL3mw-246-190401-GW	Grab	Metals, Total	Calcium	20	mg/L		None	NA
Upper Sharon	LL3mw-246	5/9/2019	LL3mw-246-190402-GW	Field Duplicate	Metals, Total	Magnesium	6.6	mg/L		None	NA
Upper Sharon	LL3mw-246	5/9/2019	LL3mw-246-190401-GW	Grab	Metals, Total	Magnesium	6.7	mg/L		None	NA
Upper Sharon	LL3mw-246	5/9/2019	LL3mw-246-190402-GW	Field Duplicate	Metals, Total	Potassium	1.1	mg/L	J	None	NA
Upper Sharon	LL3mw-246	5/9/2019	LL3mw-246-190401-GW	Grab	Metals, Total	Potassium	1.2	mg/L	J	None	NA
Upper Sharon	LL3mw-246	5/9/2019	LL3mw-246-190402-GW	Field Duplicate	Metals, Total	Sodium	2.7	mg/L	J	None	NA

Table 6-2. Screening Level Exceedances – Spring 2019 Sample Event (Continued)

Aquifer Zone	Well	Date Collected	Sample ID	Sample Type	Analysis Type	Chemical	Result	Units	Validation Qualifier	GW Screening Level	GW Screening Level Source
Upper Sharon	LL3mw-246	5/9/2019	LL3mw-246-190401-GW	Grab	Metals, Total	Sodium	2.8	mg/L	J	None	NA
Upper Sharon	FWGmw-012	5/7/2019	FWGmw-012-190401-GW	Grab	Metals, Total	Calcium	25	mg/L		None	NA
Upper Sharon	FWGmw-012	5/7/2019	FWGmw-012-190401-GW	Grab	Metals, Total	Iron	2.4	mg/L		2.08	BKG
Upper Sharon	FWGmw-012	5/7/2019	FWGmw-012-190401-GW	Grab	Metals, Total	Magnesium	5.8	mg/L		None	NA
Upper Sharon	FWGmw-012	5/7/2019	FWGmw-012-190401-GW	Grab	Metals, Total	Potassium	3.6	mg/L		None	NA
Upper Sharon	FWGmw-012	5/7/2019	FWGmw-012-190401-GW	Grab	Metals, Total	Sodium	6.7	mg/L	J	None	NA
Upper Sharon	FWGmw-016	4/29/2019	FWGmw-016-190401-GW	Grab	Metals, Total	Calcium	110	mg/L		None	NA
Upper Sharon	FWGmw-016	4/29/2019	FWGmw-016-190401-GW	Grab	Metals, Total	Magnesium	28	mg/L		None	NA
Upper Sharon	FWGmw-016	4/29/2019	FWGmw-016-190401-GW	Grab	Metals, Total	Manganese	0.22	mg/L		0.198	BKG
Upper Sharon	FWGmw-016	4/29/2019	FWGmw-016-190401-GW	Grab	Metals, Total	Potassium	2.4	mg/L	J	None	NA
Upper Sharon	FWGmw-016	4/29/2019	FWGmw-016-190401-GW	Grab	Metals, Total	Sodium	11	mg/L		None	NA
Upper Sharon	FWGmw-020	5/13/2019	FWGmw-020-190401-GW	Grab	Metals, Total	Arsenic	0.023	mg/L		0.01	MCL
Upper Sharon	FWGmw-020	5/13/2019	FWGmw-020-190401-GW	Grab	Metals, Total	Calcium	110	mg/L		None	NA
Upper Sharon	FWGmw-020	5/13/2019	FWGmw-020-190401-GW	Grab	Metals, Total	Magnesium	36	mg/L		None	NA
Upper Sharon	FWGmw-020	5/13/2019	FWGmw-020-190401-GW	Grab	Metals, Total	Potassium	4.6	mg/L		None	NA
Upper Sharon	FWGmw-020	5/13/2019	FWGmw-020-190401-GW	Grab	Metals, Total	Sodium	16	mg/L	J	None	NA
Upper Sharon	FWGmw-021	5/9/2019	FWGmw-021-190402-GW	Field Duplicate	Metals, Total	Calcium	20	mg/L		None	NA
Upper Sharon	FWGmw-021	5/9/2019	FWGmw-021-190401-GW	Grab	Metals, Total	Calcium	21	mg/L		None	NA
Upper Sharon	FWGmw-021	5/9/2019	FWGmw-021-190402-GW	Field Duplicate	Metals, Total	Magnesium	6.8	mg/L		None	NA
Upper Sharon	FWGmw-021	5/9/2019	FWGmw-021-190401-GW	Grab	Metals, Total	Magnesium	6.9	mg/L		None	NA
Upper Sharon	FWGmw-021	5/9/2019	FWGmw-021-190402-GW	Field Duplicate	Metals, Total	Potassium	1.2	mg/L	J	None	NA
Upper Sharon	FWGmw-021	5/9/2019	FWGmw-021-190401-GW	Grab	Metals, Total	Magnesium	6.9	mg/L		None	NA
Upper Sharon	FWGmw-021	5/9/2019	FWGmw-021-190402-GW	Field Duplicate	Metals, Total	Potassium	1.2	mg/L	J	None	NA
Upper Sharon	FWGmw-021	5/9/2019	FWGmw-021-190401-GW	Grab	Metals, Total	Potassium	1.2	mg/L	J	None	NA
Upper Sharon	FWGmw-021	5/9/2019	FWGmw-021-190402-GW	Field Duplicate	Metals, Total	Sodium	2.9	mg/L	J	None	NA
Upper Sharon	FWGmw-021	5/9/2019	FWGmw-021-190401-GW	Grab	Metals, Total	Sodium	3	mg/L	J	None	NA
Upper Sharon	FWGmw-024	5/9/2019	FWGmw-024-190401-GW	Grab	Metals, Total	Calcium	59	mg/L		None	NA
Upper Sharon	FWGmw-024	5/9/2019	FWGmw-024-190401-GW	Grab	Metals, Total	Magnesium	18	mg/L		None	NA
Upper Sharon	FWGmw-024	5/9/2019	FWGmw-024-190401-GW	Grab	Metals, Total	Manganese	0.33	mg/L		0.198	BKG
Upper Sharon	FWGmw-024	5/9/2019	FWGmw-024-190401-GW	Grab	Metals, Total	Potassium	0.81	mg/L	J	None	NA
Upper Sharon	FWGmw-024	5/9/2019	FWGmw-024-190401-GW	Grab	Metals, Total	Sodium	4.9	mg/L	J	None	NA

µg/L = Micrograms per liter.
BKG = Background.
GW = Groundwater.
ID = Identifier.
J = Result is estimated
MCL = Maximum contaminant level.
mg/L = Milligrams per liter.
NA = Not applicable.
RA = Resident Adult Facility-wide Cleanup Goal.
RC = Resident Child Facility-wide Cleanup Goal.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
RSL = Regional screening level.
VOC = Volatile organic compound.

Table 6-3. Screening Level Exceedances – Fall 2019 Sample Event

Zone	Well	Date Collected	Sample ID	Sample Type	Analysis Type	Chemical	Result	Units	Validation Qualifier	GW Screening Level	GW Screening Level Source
Basal Sharon Conglomerate	FWGmw-018	10/3/2019	FWGmw-018-191001-GW	Grab	Metals, Total	Calcium	82	mg/L		None	NA
Basal Sharon Conglomerate	FWGmw-018	10/3/2019	FWGmw-018-191001-GW	Grab	Metals, Total	Magnesium	26	mg/L		None	NA
Basal Sharon Conglomerate	FWGmw-018	10/3/2019	FWGmw-018-191001-GW	Grab	Metals, Total	Potassium	2	mg/L	J	None	NA
Basal Sharon Conglomerate	FWGmw-018	10/3/2019	FWGmw-018-191001-GW	Grab	Metals, Total	Sodium	15	mg/L		None	NA
Basal Sharon Conglomerate	SCFmw-004	10/3/2019	SCFmw-004-191001-GW	Grab	Metals, Total	Calcium	160	mg/L		None	NA
Homewood Sandstone	SCFmw-004	10/3/2019	SCFmw-004-191001-GW	Grab	Metals, Total	Magnesium	64	mg/L		None	NA
Basal Sharon Conglomerate	SCFmw-004	10/3/2019	SCFmw-004-191001-GW	Grab	Metals, Total	Potassium	2.8	mg/L	J	None	NA
Basal Sharon Conglomerate	SCFmw-004	10/3/2019	SCFmw-004-191001-GW	Grab	Metals, Total	Sodium	11	mg/L		None	NA
Homewood Sandstone	FBQmw-171	10/2/2019	FBQmw-171-191001-GW	Grab	Anions	Sulfate	22	mg/L	J	None	NA
Homewood Sandstone	FBQmw-174	10/2/2019	FBQmw-174-191001-GW	Grab	Anions	Sulfate	12	mg/L	J	None	NA
Homewood Sandstone	FBQmw-175	10/1/2019	FBQmw-175-191001-GW	Grab	Anions	Sulfate	19	mg/L		None	NA
Homewood Sandstone	FBQmw-175	10/1/2019	FBQmw-175-191001-GW	Grab	Anions	Sulfide	0.8	mg/L	J	None	NA
Homewood Sandstone	LL10mw-005	10/2/2019	LL10mw-005-191001-GW	Grab	Metals, Total	Calcium	60	mg/L		None	NA
Homewood Sandstone	LL10mw-005	10/2/2019	LL10mw-005-191001-GW	Grab	Metals, Total	Magnesium	14	mg/L		None	NA
Homewood Sandstone	LL10mw-005	10/2/2019	LL10mw-005-191001-GW	Grab	Metals, Total	Manganese	2.2	mg/L	J	0.56	BKG
Homewood Sandstone	LL10mw-005	10/2/2019	LL10mw-005-191001-GW	Grab	Metals, Total	Potassium	0.73	mg/L	J	None	NA
Homewood Sandstone	LL10mw-005	10/2/2019	LL10mw-005-191001-GW	Grab	Metals, Total	Sodium	3.4	mg/L	J	None	NA
Homewood Sandstone	LL7mw-001	10/2/2019	LL7mw-001-191001-GW	Grab	Metals, Total	Calcium	39	mg/L		None	NA
Homewood Sandstone	LL7mw-001	10/2/2019	LL7mw-001-191001-GW	Grab	Metals, Total	Magnesium	13	mg/L		None	NA
Homewood Sandstone	LL7mw-001	10/2/2019	LL7mw-001-191001-GW	Grab	Metals, Total	Potassium	1.1	mg/L	J	None	NA
Homewood Sandstone	LL7mw-001	10/2/2019	LL7mw-001-191001-GW	Grab	Metals, Total	Sodium	5.9	mg/L	J	None	NA
Unconsolidated	BKGmw-021	10/2/2019	BKGmw-021-191001-GW	Grab	Metals, Total	Calcium	78	mg/L	J	None	NA
Unconsolidated	BKGmw-021	10/2/2019	BKGmw-021-191001-GW	Grab	Metals, Total	Magnesium	35	mg/L	J	None	NA
Unconsolidated	BKGmw-021	10/2/2019	BKGmw-021-191001-GW	Grab	Metals, Total	Potassium	0.94	mg/L	J	None	NA
Unconsolidated	BKGmw-021	10/2/2019	BKGmw-021-191001-GW	Grab	Metals, Total	Sodium	8.2	mg/L	J	None	NA
Unconsolidated	BKGmw-021	10/2/2019	BKGmw-021-191002-GW	Field Duplicate	Metals, Total	Calcium	75	mg/L		None	NA
Unconsolidated	BKGmw-021	10/2/2019	BKGmw-021-191002-GW	Field Duplicate	Metals, Total	Magnesium	34	mg/L		None	NA
Unconsolidated	BKGmw-021	10/2/2019	BKGmw-021-191002-GW	Field Duplicate	Metals, Total	Potassium	0.92	mg/L	J	None	NA
Unconsolidated	BKGmw-021	10/2/2019	BKGmw-021-191002-GW	Field Duplicate	Metals, Total	Sodium	7.9	mg/L	J	None	NA
Unconsolidated	DETmw-003	10/1/2019	DET-003-191001-GW	Grab	Metals, Total	Arsenic	0.011	mg/L		0.01	MCL
Unconsolidated	DETmw-003	10/1/2019	DET-003-191001-GW	Grab	Metals, Total	Calcium	89	mg/L		None	NA
Unconsolidated	DETmw-003	10/1/2019	DET-003-191001-GW	Grab	Metals, Total	Iron	2.2	mg/L	J	1.91	BKG
Unconsolidated	DETmw-003	10/1/2019	DET-003-191001-GW	Grab	Metals, Total	Magnesium	32	mg/L		None	NA
Unconsolidated	DETmw-003	10/1/2019	DET-003-191001-GW	Grab	Metals, Total	Manganese	0.23	mg/L		0.075	BKG
Unconsolidated	DETmw-003	10/1/2019	DET-003-191001-GW	Grab	Metals, Total	Potassium	2.1	mg/L	J	None	NA
Unconsolidated	DETmw-003	10/1/2019	DET-003-191001-GW	Grab	Metals, Total	Sodium	12	mg/L		None	NA
Unconsolidated	DETmw-004	10/1/2019	DET-004-191001-GW	Grab	Metals, Total	Calcium	150	mg/L		None	NA
Unconsolidated	DETmw-004	10/1/2019	DET-004-191001-GW	Grab	Metals, Total	Magnesium	29	mg/L		None	NA
Unconsolidated	DETmw-004	10/1/2019	DET-004-191001-GW	Grab	Metals, Total	Manganese	0.42	mg/L		0.075	BKG
Unconsolidated	DETmw-004	10/1/2019	DET-004-191001-GW	Grab	Metals, Total	Potassium	1.7	mg/L	J	None	NA
Unconsolidated	DETmw-004	10/1/2019	DET-004-191001-GW	Grab	Metals, Total	Sodium	2.6	mg/L	J	None	NA
Unconsolidated	EBGmw-125	10/7/2019	EBGmw-125-191001-GW	Grab	Metals, Total	Calcium	73	mg/L	J	None	NA
Unconsolidated	EBGmw-125	10/7/2019	EBGmw-125-191001-GW	Grab	Metals, Total	Iron	7.6	mg/L		1.91	BKG
Unconsolidated	EBGmw-125	10/7/2019	EBGmw-125-191001-GW	Grab	Metals, Total	Magnesium	35	mg/L		None	NA
Unconsolidated	EBGmw-125	10/7/2019	EBGmw-125-191001-GW	Grab	Metals, Total	Manganese	0.56	mg/L	J	0.075	BKG
Unconsolidated	EBGmw-125	10/7/2019	EBGmw-125-191001-GW	Grab	Metals, Total	Potassium	3	mg/L		None	NA

Table 6-3. Screening Level Exceedances – Fall 2019 Sample Event (Continued)

Zone	Well	Date Collected	Sample ID	Sample Type	Analysis Type	Chemical	Result	Units	Validation Qualifier	GW Screening Level	GW Screening Level Source
Unconsolidated	EBGmw-125	10/7/2019	EBGmw-125-191001-GW	Grab	Metals, Total	Sodium	5.7	mg/L		None	NA
Unconsolidated	FWGmw-002	10/2/2019	FWGmw-002-191001-GF	Grab	Metals, Filtered	Calcium	50	mg/L		None	NA
Unconsolidated	FWGmw-002	10/2/2019	FWGmw-002-191001-GF	Grab	Metals, Filtered	Iron	2.4	mg/L		1.91	BKG
Unconsolidated	FWGmw-002	10/2/2019	FWGmw-002-191001-GF	Grab	Metals, Filtered	Magnesium	14	mg/L		None	NA
Unconsolidated	FWGmw-002	10/2/2019	FWGmw-002-191001-GF	Grab	Metals, Filtered	Manganese	0.12	mg/L		0.075	BKG
Unconsolidated	FWGmw-002	10/2/2019	FWGmw-002-191001-GF	Grab	Metals, Filtered	Potassium	2.9	mg/L	J	None	NA
Unconsolidated	FWGmw-002	10/2/2019	FWGmw-002-191001-GF	Grab	Metals, Filtered	Sodium	21	mg/L		None	NA
Unconsolidated	FWGmw-002	10/2/2019	FWGmw-002-191001-GW	Grab	Metals, Total	Aluminum	2.2	mg/L		2	RSL
Unconsolidated	FWGmw-002	10/2/2019	FWGmw-002-191001-GW	Grab	Metals, Total	Calcium	48	mg/L		None	NA
Unconsolidated	FWGmw-002	10/2/2019	FWGmw-002-191001-GW	Grab	Metals, Total	Iron	6.5	mg/L		1.91	BKG
Unconsolidated	FWGmw-002	10/2/2019	FWGmw-002-191001-GW	Grab	Metals, Total	Magnesium	15	mg/L		None	NA
Unconsolidated	FWGmw-002	10/2/2019	FWGmw-002-191001-GW	Grab	Metals, Total	Manganese	0.16	mg/L	J	0.075	BKG
Unconsolidated	FWGmw-002	10/2/2019	FWGmw-002-191001-GW	Grab	Metals, Total	Potassium	3.1	mg/L		None	NA
Unconsolidated	FWGmw-002	10/2/2019	FWGmw-002-191001-GW	Grab	Metals, Total	Sodium	20	mg/L		None	NA
Unconsolidated	FWGmw-004	10/1/2019	FWGmw-004-191001-GW	Grab	Metals, Total	Calcium	90	mg/L		None	NA
Unconsolidated	FWGmw-004	10/1/2019	FWGmw-004-191001-GW	Grab	Metals, Total	Magnesium	40	mg/L		None	NA
Unconsolidated	FWGmw-004	10/1/2019	FWGmw-004-191001-GW	Grab	Metals, Total	Potassium	0.84	mg/L	J	None	NA
Unconsolidated	FWGmw-004	10/1/2019	FWGmw-004-191001-GW	Grab	Metals, Total	Sodium	3.9	mg/L	J	None	NA
Unconsolidated	FWGmw-007	10/2/2019	FWGmw-007-191001-GW	Grab	Metals, Total	Calcium	110	mg/L		None	NA
Unconsolidated	FWGmw-007	10/2/2019	FWGmw-007-191001-GW	Grab	Metals, Total	Magnesium	57	mg/L		None	NA
Unconsolidated	FWGmw-007	10/2/2019	FWGmw-007-191001-GW	Grab	Metals, Total	Manganese	0.088	mg/L	J	0.075	BKG
Unconsolidated	FWGmw-007	10/2/2019	FWGmw-007-191001-GW	Grab	Metals, Total	Potassium	2.1	mg/L	J	None	NA
Unconsolidated	FWGmw-007	10/2/2019	FWGmw-007-191001-GW	Grab	Metals, Total	Sodium	8.8	mg/L	J	None	NA
Unconsolidated	FWGmw-011	10/3/2019	FWGmw-011-191001-GW	Grab	Metals, Total	Calcium	42	mg/L		None	NA
Unconsolidated	FWGmw-011	10/3/2019	FWGmw-011-191001-GW	Grab	Metals, Total	Iron	6.2	mg/L		1.91	BKG
Unconsolidated	FWGmw-011	10/3/2019	FWGmw-011-191001-GW	Grab	Metals, Total	Magnesium	9.8	mg/L		None	NA
Unconsolidated	FWGmw-011	10/3/2019	FWGmw-011-191001-GW	Grab	Metals, Total	Manganese	0.24	mg/L	J	0.075	BKG
Unconsolidated	FWGmw-011	10/3/2019	FWGmw-011-191001-GW	Grab	Metals, Total	Potassium	2.9	mg/L	J	None	NA
Unconsolidated	FWGmw-011	10/3/2019	FWGmw-011-191001-GW	Grab	Metals, Total	Sodium	5.9	mg/L		None	NA
Unconsolidated	FWGmw-015	9/30/2019	FWGmw-015-191001-GW	Grab	Metals, Total	Calcium	250	mg/L		None	NA
Unconsolidated	FWGmw-015	9/30/2019	FWGmw-015-191001-GW	Grab	Metals, Total	Magnesium	220	mg/L		None	NA
Unconsolidated	FWGmw-015	9/30/2019	FWGmw-015-191001-GW	Grab	Metals, Total	Manganese	0.34	mg/L		0.075	BKG
Unconsolidated	FWGmw-015	9/30/2019	FWGmw-015-191001-GW	Grab	Metals, Total	Potassium	3.1	mg/L		None	NA
Unconsolidated	FWGmw-015	9/30/2019	FWGmw-015-191001-GW	Grab	Metals, Total	Sodium	38	mg/L		None	NA
Unconsolidated	LL12mw-185	10/8/2019	LL12mw-185-191001-GW	Grab	Anions	Nitrate	89	mg/L		10	MCL
Unconsolidated	LL12mw-187	10/8/2019	LL12mw-187-191001-GW	Grab	Metals, Total	Calcium	1100	mg/L	J	None	NA
Unconsolidated	LL12mw-187	10/8/2019	LL12mw-187-191001-GW	Grab	Metals, Total	Magnesium	330	mg/L		None	NA
Unconsolidated	LL12mw-187	10/8/2019	LL12mw-187-191001-GW	Grab	Metals, Total	Manganese	2.6	mg/L		0.075	BKG
Unconsolidated	LL12mw-187	10/8/2019	LL12mw-187-191001-GW	Grab	Metals, Total	Potassium	55	mg/L		None	NA
Unconsolidated	LL12mw-187	10/8/2019	LL12mw-187-191001-GW	Grab	Metals, Total	Sodium	39	mg/L		None	NA
Unconsolidated	LL12mw-242	10/8/2019	LL12mw-242-191001-GF	Grab	Metals, Filtered	Arsenic	0.018	mg/L		0.01	MCL
Unconsolidated	LL12mw-242	10/8/2019	LL12mw-242-191001-GF	Grab	Metals, Filtered	Calcium	75	mg/L		None	NA
Unconsolidated	LL12mw-242	10/8/2019	LL12mw-242-191001-GF	Grab	Metals, Filtered	Iron	2.1	mg/L		1.91	BKG
Unconsolidated	LL12mw-242	10/8/2019	LL12mw-242-191001-GF	Grab	Metals, Filtered	Magnesium	46	mg/L		None	NA
Unconsolidated	LL12mw-242	10/8/2019	LL12mw-242-191001-GF	Grab	Metals, Filtered	Manganese	0.11	mg/L		0.075	BKG
Unconsolidated	LL12mw-242	10/8/2019	LL12mw-242-191001-GF	Grab	Metals, Filtered	Potassium	1.9	mg/L	J	None	NA
Unconsolidated	LL12mw-242	10/8/2019	LL12mw-242-191001-GF	Grab	Metals, Filtered	Sodium	20	mg/L		None	NA

Table 6-3. Screening Level Exceedances – Fall 2019 Sample Event (Continued)

Zone	Well	Date Collected	Sample ID	Sample Type	Analysis Type	Chemical	Result	Units	Validation Qualifier	GW Screening Level	GW Screening Level Source
Unconsolidated	LL12mw-242	10/8/2019	LL12mw-242-191001-GW	Grab	Metals, Total	Arsenic	0.02	mg/L		0.01	MCL
Unconsolidated	LL12mw-242	10/8/2019	LL12mw-242-191001-GW	Grab	Metals, Total	Calcium	75	mg/L	J	None	NA
Unconsolidated	LL12mw-242	10/8/2019	LL12mw-242-191001-GW	Grab	Metals, Total	Iron	4.2	mg/L		1.91	BKG
Unconsolidated	LL12mw-242	10/8/2019	LL12mw-242-191001-GW	Grab	Metals, Total	Magnesium	47	mg/L		None	NA
Unconsolidated	LL12mw-242	10/8/2019	LL12mw-242-191001-GW	Grab	Metals, Total	Manganese	0.15	mg/L		0.075	BKG
Unconsolidated	LL12mw-242	10/8/2019	LL12mw-242-191001-GW	Grab	Metals, Total	Potassium	2.1	mg/L	J	None	NA
Unconsolidated	LL12mw-242	10/8/2019	LL12mw-242-191001-GW	Grab	Metals, Total	Sodium	21	mg/L		None	NA
Unconsolidated	LL12mw-245	10/8/2019	LL12mw-245-191001-GW	Grab	Metals, Total	Calcium	150	mg/L	J	None	NA
Unconsolidated	LL12mw-245	10/8/2019	LL12mw-245-191001-GW	Grab	Metals, Total	Magnesium	72	mg/L		None	NA
Unconsolidated	LL12mw-245	10/8/2019	LL12mw-245-191001-GW	Grab	Metals, Total	Manganese	0.12	mg/L		0.075	BKG
Unconsolidated	LL12mw-245	10/8/2019	LL12mw-245-191001-GW	Grab	Metals, Total	Potassium	3.4	mg/L		None	NA
Unconsolidated	LL12mw-245	10/8/2019	LL12mw-245-191001-GW	Grab	Metals, Total	Sodium	25	mg/L		None	NA
Unconsolidated	LL12mw-247	10/3/2019	LL12mw-247-191001-GW	Grab	Metals, Total	Calcium	90	mg/L		None	NA
Unconsolidated	LL12mw-247	10/3/2019	LL12mw-247-191001-GW	Grab	Metals, Total	Magnesium	48	mg/L		None	NA
Unconsolidated	LL12mw-247	10/3/2019	LL12mw-247-191001-GW	Grab	Metals, Total	Manganese	0.15	mg/L	J	0.075	BKG
Unconsolidated	LL12mw-247	10/3/2019	LL12mw-247-191001-GW	Grab	Metals, Total	Potassium	2.5	mg/L	J	None	NA
Unconsolidated	LL12mw-247	10/3/2019	LL12mw-247-191001-GW	Grab	Metals, Total	Sodium	21	mg/L		None	NA
Unconsolidated	LL1mw-063	10/9/2019	LL1mw-063-191001-GW	Grab	Explosives/Propellants	1,3-Dinitrobenzene	0.41	µg/L	J	0.2	RSL
Unconsolidated	LL1mw-063	10/9/2019	LL1mw-063-191001-GW	Grab	Explosives/Propellants	4-Amino-2,6-Dinitrotoluene	5.9	µg/L		3.9	RSL
Unconsolidated	LL1mw-064	10/3/2019	LL1mw-064-191001-GW	Grab	Metals, Total	Calcium	56	mg/L		None	NA
Unconsolidated	LL1mw-064	10/3/2019	LL1mw-064-191001-GW	Grab	Metals, Total	Magnesium	9.7	mg/L		None	NA
Unconsolidated	LL1mw-064	10/3/2019	LL1mw-064-191001-GW	Grab	Metals, Total	Manganese	0.12	mg/L	J	0.075	BKG
Unconsolidated	LL1mw-064	10/3/2019	LL1mw-064-191001-GW	Grab	Metals, Total	Potassium	0.84	mg/L	J	None	NA
Unconsolidated	LL1mw-064	10/3/2019	LL1mw-064-191001-GW	Grab	Metals, Total	Sodium	4.9	mg/L	J	None	NA
Unconsolidated	LL1mw-065	10/8/2019	LL1mw-065-191001-GW	Grab	Metals, Total	Calcium	77	mg/L	J	None	NA
Unconsolidated	LL1mw-065	10/8/2019	LL1mw-065-191001-GW	Grab	Metals, Total	Magnesium	24	mg/L		None	NA
Unconsolidated	LL1mw-065	10/8/2019	LL1mw-065-191001-GW	Grab	Metals, Total	Potassium	1.4	mg/L	J	None	NA
Unconsolidated	LL1mw-065	10/8/2019	LL1mw-065-191001-GW	Grab	Metals, Total	Sodium	14	mg/L		None	NA
Unconsolidated	LL1mw-086	10/8/2019	LL1mw-086-191001-GF	Grab	Metals, Filtered	Calcium	53	mg/L		None	NA
Unconsolidated	LL1mw-086	10/8/2019	LL1mw-086-191001-GF	Grab	Metals, Filtered	Magnesium	28	mg/L		None	NA
Unconsolidated	LL1mw-086	10/8/2019	LL1mw-086-191001-GF	Grab	Metals, Filtered	Manganese	0.35	mg/L		0.075	BKG
Unconsolidated	LL1mw-086	10/8/2019	LL1mw-086-191001-GF	Grab	Metals, Filtered	Potassium	8.4	mg/L		None	NA
Unconsolidated	LL1mw-086	10/8/2019	LL1mw-086-191001-GF	Grab	Metals, Filtered	Sodium	7.7	mg/L		None	NA
Unconsolidated	LL1mw-086	10/8/2019	LL1mw-086-191001-GW	Grab	Metals, Total	Calcium	63	mg/L	J	None	NA
Unconsolidated	LL1mw-086	10/8/2019	LL1mw-086-191001-GW	Grab	Metals, Total	Iron	5.9	mg/L		1.91	BKG
Unconsolidated	LL1mw-086	10/8/2019	LL1mw-086-191001-GW	Grab	Metals, Total	Magnesium	30	mg/L		None	NA
Unconsolidated	LL1mw-086	10/8/2019	LL1mw-086-191001-GW	Grab	Metals, Total	Manganese	0.51	mg/L		0.075	BKG
Unconsolidated	LL1mw-086	10/8/2019	LL1mw-086-191001-GW	Grab	Metals, Total	Potassium	7.9	mg/L		None	NA
Unconsolidated	LL1mw-086	10/8/2019	LL1mw-086-191001-GW	Grab	Metals, Total	Sodium	7.6	mg/L		None	NA
Unconsolidated	LL1mw-087	10/3/2019	LL1mw-087-191001-GW	Grab	Metals, Total	Calcium	93	mg/L		None	NA
Unconsolidated	LL1mw-087	10/3/2019	LL1mw-087-191001-GW	Grab	Metals, Total	Magnesium	34	mg/L		None	NA
Unconsolidated	LL1mw-087	10/3/2019	LL1mw-087-191001-GW	Grab	Metals, Total	Manganese	0.28	mg/L	J	0.075	BKG
Unconsolidated	LL1mw-087	10/3/2019	LL1mw-087-191001-GW	Grab	Metals, Total	Potassium	0.95	mg/L	J	None	NA
Unconsolidated	LL1mw-087	10/3/2019	LL1mw-087-191001-GW	Grab	Metals, Total	Sodium	15	mg/L		None	NA
Unconsolidated	LL1mw-088	10/3/2019	LL1mw-088-191001-GW	Grab	Metals, Total	Arsenic	0.028	mg/L	J	0.01	MCL
Unconsolidated	LL1mw-088	10/3/2019	LL1mw-088-191001-GW	Grab	Metals, Total	Calcium	80	mg/L		None	NA
Unconsolidated	LL1mw-088	10/3/2019	LL1mw-088-191001-GW	Grab	Metals, Total	Magnesium	37	mg/L		None	NA
Unconsolidated	LL1mw-088	10/3/2019	LL1mw-088-191001-GW	Grab	Metals, Total	Potassium	2.6	mg/L	J	None	NA

Table 6-3. Screening Level Exceedances – Fall 2019 Sample Event (Continued)

Zone	Well	Date Collected	Sample ID	Sample Type	Analysis Type	Chemical	Result	Units	Validation Qualifier	GW Screening Level	GW Screening Level Source
Unconsolidated	LL1mw-088	10/3/2019	LL1mw-088-191001-GW	Grab	Metals, Total	Sodium	25	mg/L		None	NA
Unconsolidated	NTAmw-119	10/2/2019	NTAmw-119-191001-GW	Grab	Metals, Total	Calcium	78	mg/L		None	NA
Unconsolidated	NTAmw-119	10/2/2019	NTAmw-119-191001-GW	Grab	Metals, Total	Magnesium	21	mg/L		None	NA
Unconsolidated	NTAmw-119	10/2/2019	NTAmw-119-191001-GW	Grab	Metals, Total	Manganese	0.29	mg/L	J	0.075	BKG
Unconsolidated	NTAmw-119	10/2/2019	NTAmw-119-191001-GW	Grab	Metals, Total	Potassium	1.3	mg/L	J	None	NA
Unconsolidated	NTAmw-119	10/2/2019	NTAmw-119-191001-GW	Grab	Metals, Total	Sodium	6.8	mg/L	J	None	NA
Unconsolidated	WBGmw-006	9/30/2019	WBGmw-006-191001-GW	Grab	Explosives/Propellants	RDX	8.2	µg/L		0.97	RSL
Unconsolidated	WBGmw-006	9/30/2019	WBGmw-006-191001-GW	Grab	Metals, Total	Calcium	71	mg/L		None	NA
Unconsolidated	WBGmw-006	9/30/2019	WBGmw-006-191001-GW	Grab	Metals, Total	Magnesium	24	mg/L		None	NA
Unconsolidated	WBGmw-006	9/30/2019	WBGmw-006-191001-GW	Grab	Metals, Total	Potassium	0.93	mg/L	J	None	NA
Unconsolidated	WBGmw-006	9/30/2019	WBGmw-006-191001-GW	Grab	Metals, Total	Sodium	5.5	mg/L		None	NA
Unconsolidated	WBGmw-009	9/30/2019	WBGmw-009-191001-GW	Grab	Explosives/Propellants	RDX	3.5	µg/L		0.97	RSL
Unconsolidated	WBGmw-009	9/30/2019	WBGmw-009-191001-GW	Grab	Metals, Total	Calcium	68	mg/L		None	NA
Unconsolidated	WBGmw-009	9/30/2019	WBGmw-009-191001-GW	Grab	Metals, Total	Magnesium	20	mg/L		None	NA
Unconsolidated	WBGmw-009	9/30/2019	WBGmw-009-191001-GW	Grab	Metals, Total	Manganese	0.33	mg/L		0.075	BKG
Unconsolidated	WBGmw-009	9/30/2019	WBGmw-009-191001-GW	Grab	Metals, Total	Potassium	0.8	mg/L	J	None	NA
Unconsolidated	WBGmw-009	9/30/2019	WBGmw-009-191001-GW	Grab	Metals, Total	Sodium	3.6	mg/L	J	None	NA
Upper Sharon	B12mw-012	10/3/2019	B12mw-012-191001-GW	Grab	Metals, Total	Calcium	31	mg/L		None	NA
Upper Sharon	B12mw-012	10/3/2019	B12mw-012-191001-GW	Grab	Metals, Total	Magnesium	23	mg/L		None	NA
Upper Sharon	B12mw-012	10/3/2019	B12mw-012-191001-GW	Grab	Metals, Total	Manganese	0.55	mg/L	J	0.198	BKG
Upper Sharon	B12mw-012	10/3/2019	B12mw-012-191001-GW	Grab	Metals, Total	Potassium	2.2	mg/L	J	None	NA
Upper Sharon	B12mw-012	10/3/2019	B12mw-012-191001-GW	Grab	Metals, Total	Sodium	17	mg/L		None	NA
Upper Sharon	DA2mw-115	9/30/2019	DA2mw-115-191001-GW	Grab	Metals, Total	Calcium	94	mg/L		None	NA
Upper Sharon	DA2mw-115	9/30/2019	DA2mw-115-191001-GW	Grab	Metals, Total	Magnesium	26	mg/L		None	NA
Upper Sharon	DA2mw-115	9/30/2019	DA2mw-115-191001-GW	Grab	Metals, Total	Potassium	3.1	mg/L		None	NA
Upper Sharon	DA2mw-115	9/30/2019	DA2mw-115-191001-GW	Grab	Metals, Total	Sodium	10	mg/L		None	NA
Upper Sharon	DA2mw-115	9/30/2019	DA2mw-115-191002-GW	Field Duplicate	Metals, Total	Calcium	100	mg/L		None	NA
Upper Sharon	DA2mw-115	9/30/2019	DA2mw-115-191002-GW	Field Duplicate	Metals, Total	Magnesium	28	mg/L		None	NA
Upper Sharon	DA2mw-115	9/30/2019	DA2mw-115-191002-GW	Field Duplicate	Metals, Total	Potassium	3.4	mg/L		None	NA
Upper Sharon	DA2mw-115	9/30/2019	DA2mw-115-191002-GW	Field Duplicate	Metals, Total	Sodium	11	mg/L		None	NA
Upper Sharon	FWGmw-012	10/3/2019	FWGmw-012-191001-GW	Grab	Metals, Total	Calcium	20	mg/L		None	NA
Upper Sharon	FWGmw-012	10/3/2019	FWGmw-012-191001-GW	Grab	Metals, Total	Iron	2.8	mg/L		2.08	BKG
Upper Sharon	FWGmw-012	10/3/2019	FWGmw-012-191001-GW	Grab	Metals, Total	Magnesium	4.9	mg/L		None	NA
Upper Sharon	FWGmw-012	10/3/2019	FWGmw-012-191001-GW	Grab	Metals, Total	Potassium	0.91	mg/L	J	None	NA
Upper Sharon	FWGmw-012	10/3/2019	FWGmw-012-191001-GW	Grab	Metals, Total	Sodium	5.7	mg/L		None	NA
Upper Sharon	FWGmw-016	9/30/2019	FWGmw-016-191001-GW	Grab	Metals, Total	Calcium	98	mg/L		None	NA
Upper Sharon	FWGmw-016	9/30/2019	FWGmw-016-191001-GW	Grab	Metals, Total	Magnesium	26	mg/L		None	NA
Upper Sharon	FWGmw-016	9/30/2019	FWGmw-016-191001-GW	Grab	Metals, Total	Potassium	2.1	mg/L	J	None	NA
Upper Sharon	FWGmw-016	9/30/2019	FWGmw-016-191001-GW	Grab	Metals, Total	Sodium	11	mg/L		None	NA
Upper Sharon	FWGmw-020	10/3/2019	FWGmw-020-191001-GW	Grab	Metals, Total	Arsenic	0.031	mg/L	J	0.01	MCL
Upper Sharon	FWGmw-020	10/3/2019	FWGmw-020-191001-GW	Grab	Metals, Total	Calcium	94	mg/L		None	NA
Upper Sharon	FWGmw-020	10/3/2019	FWGmw-020-191001-GW	Grab	Metals, Total	Magnesium	34	mg/L		None	NA
Upper Sharon	FWGmw-020	10/3/2019	FWGmw-020-191001-GW	Grab	Metals, Total	Potassium	4.1	mg/L		None	NA
Upper Sharon	FWGmw-020	10/3/2019	FWGmw-020-191001-GW	Grab	Metals, Total	Sodium	15	mg/L		None	NA
Upper Sharon	FWGmw-021	10/3/2019	FWGmw-021-191001-GW	Grab	Metals, Total	Calcium	18	mg/L		None	NA
Upper Sharon	FWGmw-021	10/3/2019	FWGmw-021-191001-GW	Grab	Metals, Total	Iron	2.7	mg/L		2.08	BKG
Upper Sharon	FWGmw-021	10/3/2019	FWGmw-021-191001-GW	Grab	Metals, Total	Magnesium	6.8	mg/L		None	NA
Upper Sharon	FWGmw-021	10/3/2019	FWGmw-021-191001-GW	Grab	Metals, Total	Manganese	0.36	mg/L	J	0.198	BKG

Table 6-3. Screening Level Exceedances – Fall 2019 Sample Event (Continued)

Zone	Well	Date Collected	Sample ID	Sample Type	Analysis Type	Chemical	Result	Units	Validation Qualifier	GW Screening Level	GW Screening Level Source
Upper Sharon	FWGmw-021	10/3/2019	FWGmw-021-191001-GW	Grab	Metals, Total	Potassium	1.4	mg/L	J	None	NA
Upper Sharon	FWGmw-021	10/3/2019	FWGmw-021-191001-GW	Grab	Metals, Total	Sodium	3.5	mg/L	J	None	NA
Upper Sharon	FWGmw-021	10/3/2019	FWGmw-021-191002-GW	Field Duplicate	Metals, Total	Calcium	19	mg/L		None	NA
Upper Sharon	FWGmw-021	10/3/2019	FWGmw-021-191002-GW	Field Duplicate	Metals, Total	Iron	2.8	mg/L		2.08	BKG
Upper Sharon	FWGmw-021	10/3/2019	FWGmw-021-191002-GW	Field Duplicate	Metals, Total	Magnesium	6.9	mg/L		None	NA
Upper Sharon	FWGmw-021	10/3/2019	FWGmw-021-191002-GW	Field Duplicate	Metals, Total	Manganese	0.39	mg/L	J	0.198	BKG
Upper Sharon	FWGmw-021	10/3/2019	FWGmw-021-191002-GW	Field Duplicate	Metals, Total	Potassium	1.5	mg/L	J	None	NA
Upper Sharon	FWGmw-021	10/3/2019	FWGmw-021-191002-GW	Field Duplicate	Metals, Total	Sodium	3.6	mg/L	J	None	NA
Upper Sharon	FWGmw-024	10/3/2019	FWGmw-024-191001-GW	Grab	Metals, Total	Calcium	64	mg/L		None	NA
Upper Sharon	FWGmw-024	10/3/2019	FWGmw-024-191001-GW	Grab	Metals, Total	Iron	2.8	mg/L		2.08	BKG
Upper Sharon	FWGmw-024	10/3/2019	FWGmw-024-191001-GW	Grab	Metals, Total	Magnesium	19	mg/L		None	NA
Upper Sharon	FWGmw-024	10/3/2019	FWGmw-024-191001-GW	Grab	Metals, Total	Manganese	0.26	mg/L	J	0.198	BKG
Upper Sharon	FWGmw-024	10/3/2019	FWGmw-024-191001-GW	Grab	Metals, Total	Potassium	1.1	mg/L	J	None	NA
Upper Sharon	FWGmw-024	10/3/2019	FWGmw-024-191001-GW	Grab	Metals, Total	Sodium	5.4	mg/L		None	NA
Upper Sharon	LL1mw-080	10/9/2019	LL1mw-080-191001-GW	Grab	Explosives/Propellants	1,3-Dinitrobenzene	0.62	µg/L		0.2	RSL
Upper Sharon	LL1mw-080	10/9/2019	LL1mw-080-191001-GW	Grab	Explosives/Propellants	RDX	24	µg/L		0.97	RSL
Upper Sharon	LL1mw-080	10/9/2019	LL1mw-080-191001-GW	Grab	Metals, Total	Calcium	150	mg/L		None	NA
Upper Sharon	LL1mw-080	10/9/2019	LL1mw-080-191001-GW	Grab	Metals, Total	Magnesium	9	mg/L		None	NA
Upper Sharon	LL1mw-080	10/9/2019	LL1mw-080-191001-GW	Grab	Metals, Total	Potassium	3.7	mg/L		None	NA
Upper Sharon	LL1mw-080	10/9/2019	LL1mw-080-191001-GW	Grab	Metals, Total	Sodium	1.3	mg/L	J	None	NA
Upper Sharon	LL1mw-083	10/9/2019	LL1mw-083-191001-GW	Grab	Anions	Sulfate	130	mg/L		None	NA
Upper Sharon	LL1mw-083	10/9/2019	LL1mw-083-191001-GW	Grab	Anions	Sulfate	130	mg/L		None	NA
Upper Sharon	LL1mw-083	10/9/2019	LL1mw-083-191001-GW	Grab	Explosives/Propellants	1,3-Dinitrobenzene	1.7	µg/L	J	0.2	RSL
Upper Sharon	LL1mw-083	10/9/2019	LL1mw-083-191001-GW	Grab	Explosives/Propellants	2,4,6-Trinitrotoluene	2.3	µg/L		0.98	RSL
Upper Sharon	LL1mw-083	10/9/2019	LL1mw-083-191001-GW	Grab	Explosives/Propellants	2,4-Dinitrotoluene	2.8	µg/L		0.24	RSL
Upper Sharon	LL1mw-083	10/9/2019	LL1mw-083-191001-GW	Grab	Explosives/Propellants	2-Amino-4,6-Dinitrotoluene	12	µg/L		3.9	RSL
Upper Sharon	LL1mw-083	10/9/2019	LL1mw-083-191001-GW	Grab	Explosives/Propellants	4-Amino-2,6-Dinitrotoluene	20	µg/L		3.9	RSL
Upper Sharon	LL1mw-084	10/9/2019	LL1mw-084-191001-GW	Grab	Anions	Sulfate	130	mg/L		None	NA
Upper Sharon	LL1mw-084	10/9/2019	LL1mw-084-191001-GW	Grab	Explosives/Propellants	1,3-Dinitrobenzene	2.5	µg/L	J	0.2	RSL
Upper Sharon	LL1mw-084	10/9/2019	LL1mw-084-191001-GW	Grab	Explosives/Propellants	2,4,6-Trinitrotoluene	3.6	µg/L		0.98	RSL
Upper Sharon	LL1mw-084	10/9/2019	LL1mw-084-191001-GW	Grab	Explosives/Propellants	2,4-Dinitrotoluene	1.4	µg/L	J	0.24	RSL
Upper Sharon	LL1mw-084	10/9/2019	LL1mw-084-191001-GW	Grab	Explosives/Propellants	2-Amino-4,6-Dinitrotoluene	8.9	µg/L		3.9	RSL
Upper Sharon	LL1mw-084	10/9/2019	LL1mw-084-191001-GW	Grab	Explosives/Propellants	4-Amino-2,6-Dinitrotoluene	20	µg/L		3.9	RSL
Upper Sharon	LL1mw-084	10/9/2019	LL1mw-084-191001-GW	Grab	Metals, Total	Calcium	51	mg/L		None	NA
Upper Sharon	LL1mw-084	10/9/2019	LL1mw-084-191001-GW	Grab	Metals, Total	Magnesium	3.2	mg/L		None	NA
Upper Sharon	LL1mw-084	10/9/2019	LL1mw-084-191001-GW	Grab	Metals, Total	Potassium	3.4	mg/L		None	NA
Upper Sharon	LL1mw-084	10/9/2019	LL1mw-084-191001-GW	Grab	Metals, Total	Sodium	3.1	mg/L	J	None	NA
Upper Sharon	LL2mw-059	10/2/2019	LL2mw-059-191001-GW	Grab	Explosives/Propellants	1,3-Dinitrobenzene	0.31	µg/L	J	0.2	RSL
Upper Sharon	LL2mw-059	10/2/2019	LL2mw-059-191001-GW	Grab	Metals, Total	Calcium	26	mg/L		None	NA
Upper Sharon	LL2mw-059	10/2/2019	LL2mw-059-191001-GW	Grab	Metals, Total	Magnesium	11	mg/L		None	NA
Upper Sharon	LL2mw-059	10/2/2019	LL2mw-059-191001-GW	Grab	Metals, Total	Potassium	0.74	mg/L	J	None	NA
Upper Sharon	LL2mw-059	10/2/2019	LL2mw-059-191001-GW	Grab	Metals, Total	Sodium	2.9	mg/L	J	None	NA
Upper Sharon	LL2mw-267	10/7/2019	LL2mw-267-191001-GW	Grab	Metals, Total	Calcium	40	mg/L	J	None	NA
Upper Sharon	LL2mw-267	10/7/2019	LL2mw-267-191001-GW	Grab	Metals, Total	Iron	4.1	mg/L		2.08	BKG
Upper Sharon	LL2mw-267	10/7/2019	LL2mw-267-191001-GW	Grab	Metals, Total	Magnesium	17	mg/L		None	NA
Upper Sharon	LL2mw-267	10/7/2019	LL2mw-267-191001-GW	Grab	Metals, Total	Manganese	0.69	mg/L		0.198	BKG
Upper Sharon	LL2mw-267	10/7/2019	LL2mw-267-191001-GW	Grab	Metals, Total	Potassium	1	mg/L	J	None	NA
Upper Sharon	LL2mw-267	10/7/2019	LL2mw-267-191001-GW	Grab	Metals, Total	Sodium	7.7	mg/L		None	NA
Upper Sharon	LL3mw-244	10/2/2019	LL3mw-244-191001-GW	Grab	Metals, Total	Calcium	22	mg/L		None	NA

Table 6-3. Screening Level Exceedances – Fall 2019 Sample Event (Continued)

Zone	Well	Date Collected	Sample ID	Sample Type	Analysis Type	Chemical	Result	Units	Validation Qualifier	GW Screening Level	GW Screening Level Source
Upper Sharon	LL3mw-244	10/2/2019	LL3mw-244-191001-GW	Grab	Metals, Total	Magnesium	7.5	mg/L		None	NA
Upper Sharon	LL3mw-244	10/2/2019	LL3mw-244-191001-GW	Grab	Metals, Total	Potassium	1.4	mg/L	J	None	NA
Upper Sharon	LL3mw-244	10/2/2019	LL3mw-244-191001-GW	Grab	Metals, Total	Sodium	3.3	mg/L	J	None	NA
Upper Sharon	LL3mw-246	10/3/2019	LL3mw-246-191001-GW	Grab	Metals, Total	Calcium	22	mg/L		None	NA
Upper Sharon	LL3mw-246	10/3/2019	LL3mw-246-191001-GW	Grab	Metals, Total	Magnesium	7.4	mg/L		None	NA
Upper Sharon	LL3mw-246	10/3/2019	LL3mw-246-191001-GW	Grab	Metals, Total	Potassium	1.3	mg/L	J	None	NA
Upper Sharon	LL3mw-246	10/3/2019	LL3mw-246-191001-GW	Grab	Metals, Total	Sodium	3	mg/L	J	None	NA
Upper Sharon	LL3mw-246	10/3/2019	LL3mw-246-191002-GW	Field Duplicate	Metals, Total	Calcium	22	mg/L		None	NA
Upper Sharon	LL3mw-246	10/3/2019	LL3mw-246-191002-GW	Field Duplicate	Metals, Total	Magnesium	7.5	mg/L		None	NA
Upper Sharon	LL3mw-246	10/3/2019	LL3mw-246-191002-GW	Field Duplicate	Metals, Total	Potassium	1.4	mg/L	J	None	NA
Upper Sharon	LL3mw-246	10/3/2019	LL3mw-246-191002-GW	Field Duplicate	Metals, Total	Sodium	3	mg/L	J	None	NA
Upper Sharon	RQLmw-007	10/7/2019	RQLmw-007-191001-GW	Grab	Metals, Total	Calcium	22	mg/L	J	None	NA
Upper Sharon	RQLmw-007	10/7/2019	RQLmw-007-191001-GW	Grab	Metals, Total	Iron	2.8	mg/L		2.08	BKG
Upper Sharon	RQLmw-007	10/7/2019	RQLmw-007-191001-GW	Grab	Metals, Total	Magnesium	27	mg/L		None	NA
Upper Sharon	RQLmw-007	10/7/2019	RQLmw-007-191001-GW	Grab	Metals, Total	Manganese	1.7	mg/L	J	0.198	BKG
Upper Sharon	RQLmw-007	10/7/2019	RQLmw-007-191001-GW	Grab	Metals, Total	Nickel	0.039	mg/L		0.039	RSL
Upper Sharon	RQLmw-007	10/7/2019	RQLmw-007-191001-GW	Grab	Metals, Total	Potassium	3.1	mg/L		None	NA
Upper Sharon	RQLmw-007	10/7/2019	RQLmw-007-191001-GW	Grab	Metals, Total	Sodium	3.6	mg/L	J	None	NA
Upper Sharon	RQLmw-007	10/7/2019	RQLmw-007-191002-GW	Field Duplicate	Metals, Total	Calcium	92	mg/L	J	None	NA
Upper Sharon	RQLmw-007	10/7/2019	RQLmw-007-191002-GW	Field Duplicate	Metals, Total	Iron	2.8	mg/L		2.08	BKG
Upper Sharon	RQLmw-007	10/7/2019	RQLmw-007-191002-GW	Field Duplicate	Metals, Total	Magnesium	49	mg/L		None	NA
Upper Sharon	RQLmw-007	10/7/2019	RQLmw-007-191002-GW	Field Duplicate	Metals, Total	Manganese	1.7	mg/L	J	0.198	BKG
Upper Sharon	RQLmw-007	10/7/2019	RQLmw-007-191002-GW	Field Duplicate	Metals, Total	Nickel	0.039	mg/L		0.039	RSL
Upper Sharon	RQLmw-007	10/7/2019	RQLmw-007-191002-GW	Field Duplicate	Metals, Total	Potassium	4.7	mg/L		None	NA
Upper Sharon	RQLmw-007	10/7/2019	RQLmw-007-191002-GW	Field Duplicate	Metals, Total	Sodium	3.4	mg/L	J	None	NA
Upper Sharon	RQLmw-008	10/7/2019	RQLmw-008-191001-GW	Grab	Metals, Total	Arsenic	0.031	mg/L		0.01	MCL
Upper Sharon	RQLmw-008	10/7/2019	RQLmw-008-191001-GW	Grab	Metals, Total	Calcium	59	mg/L	J	None	NA
Upper Sharon	RQLmw-008	10/7/2019	RQLmw-008-191001-GW	Grab	Metals, Total	Iron	53	mg/L		2.08	BKG
Upper Sharon	RQLmw-008	10/7/2019	RQLmw-008-191001-GW	Grab	Metals, Total	Magnesium	79	mg/L		None	NA
Upper Sharon	RQLmw-008	10/7/2019	RQLmw-008-191001-GW	Grab	Metals, Total	Manganese	0.54	mg/L	J	0.198	BKG
Upper Sharon	RQLmw-008	10/7/2019	RQLmw-008-191001-GW	Grab	Metals, Total	Potassium	3.8	mg/L		None	NA
Upper Sharon	RQLmw-008	10/7/2019	RQLmw-008-191001-GW	Grab	Metals, Total	Sodium	3.3	mg/L	J	None	NA
Upper Sharon	RQLmw-009	10/7/2019	RQLmw-009-191001-GW	Grab	Metals, Total	Calcium	62	mg/L	J	None	NA
Upper Sharon	RQLmw-009	10/7/2019	RQLmw-009-191001-GW	Grab	Metals, Total	Iron	4.1	mg/L		2.08	BKG
Upper Sharon	RQLmw-009	10/7/2019	RQLmw-009-191001-GW	Grab	Metals, Total	Magnesium	9.5	mg/L		None	NA
Upper Sharon	RQLmw-009	10/7/2019	RQLmw-009-191001-GW	Grab	Metals, Total	Manganese	0.65	mg/L	J	0.198	BKG
Upper Sharon	RQLmw-009	10/7/2019	RQLmw-009-191001-GW	Grab	Metals, Total	Potassium	1.5	mg/L	J	None	NA
Upper Sharon	RQLmw-009	10/7/2019	RQLmw-009-191001-GW	Grab	Metals, Total	Sodium	1.2	mg/L	J	None	NA
Upper Sharon	RQLmw-011	10/7/2019	RQLmw-011-191001-GW	Grab	Anions	Sulfate	180	mg/L	J	None	NA
Upper Sharon	RQLmw-011	10/7/2019	RQLmw-011-191002-GW	Field Duplicate	Anions	Sulfate	170	mg/L	J	None	NA
Upper Sharon	RQLmw-012	10/7/2019	RQLmw-012-191001-GW	Grab	Anions	Sulfate	190	mg/L		None	NA
Upper Sharon	RQLmw-013	10/7/2019	RQLmw-013-191001-GW	Grab	Anions	Sulfate	170	mg/L	J	None	NA
Upper Sharon	WBGmw-020	9/30/2019	WBGmw-020-191001-GW	Grab	Metals, Total	Calcium	28	mg/L		None	NA
Upper Sharon	WBGmw-020	9/30/2019	WBGmw-020-191001-GW	Grab	Metals, Total	Iron	4.2	mg/L	J	2.08	BKG
Upper Sharon	WBGmw-020	9/30/2019	WBGmw-020-191001-GW	Grab	Metals, Total	Magnesium	9.2	mg/L		None	NA
Upper Sharon	WBGmw-020	9/30/2019	WBGmw-020-191001-GW	Grab	Metals, Total	Manganese	0.3	mg/L		0.198	BKG
Upper Sharon	WBGmw-020	9/30/2019	WBGmw-020-191001-GW	Grab	Metals, Total	Potassium	0.71	mg/L	J	None	NA
Upper Sharon	WBGmw-020	9/30/2019	WBGmw-020-191001-GW	Grab	Metals, Total	Sodium	3.5	mg/L	J	None	NA

Table 6-3. Screening Level Exceedances – Fall 2019 Sample Event (Continued)

Zone	Well	Date Collected	Sample ID	Sample Type	Analysis Type	Chemical	Result	Units	Validation Qualifier	GW Screening Level	GW Screening Level Source
Upper Sharon	WBGmw-021	9/30/2019	WBGmw-021-191001-GW	Grab	Metals, Total	Calcium	71	mg/L		None	NA
Upper Sharon	WBGmw-021	9/30/2019	WBGmw-021-191001-GW	Grab	Metals, Total	Magnesium	18	mg/L		None	NA
Upper Sharon	WBGmw-021	9/30/2019	WBGmw-021-191001-GW	Grab	Metals, Total	Manganese	0.38	mg/L		0.198	BKG
Upper Sharon	WBGmw-021	9/30/2019	WBGmw-021-191001-GW	Grab	Metals, Total	Potassium	1.3	mg/L	J	None	NA
Upper Sharon	WBGmw-021	9/30/2019	WBGmw-021-191001-GW	Grab	Metals, Total	Sodium	5.1	mg/L		None	NA

ID = Identifier.
GW = Groundwater.
J = Result is estimated.
MCL = Maximum contaminant level.
mg/L = Milligrams per liter.
NA = Not applicable.
BKG = Background.
RA = Resident Adult Facility-wide Cleanup Goal.
RC = Resident Child Facility-wide Cleanup Goal.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
RSL = Regional screening level.

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Table 6-4. pH Readings Outside of Normal Range in 2019

Aquifer	Well ID	Date Sampled	pH	Date Sampled	pH
Unconsolidated	LL1mw-089	5/7/2019	4.75	10/9/2019	4.99
Unconsolidated	LL1mw-063	NS	NS	10/9/2019	4.35
Unconsolidated	LL1mw-086	5/7/2019	10.44	10/8/2019	8.17
Homewood	CBLmw-001	NS	NS	NS	NS
Homewood	CBLmw-002	NS	NS	NS	NS
Homewood	CBLmw-002	NS	NS	NS	NS
Upper Sharon	LL1mw-083	5/6/2019	4.44	10/9/2019	4.4
Upper Sharon	RQLmw-011	5/9/2019	4.07	10/7/2019	5.6
Upper Sharon	RQLmw-012	5/9/2019	5.14	10/7/2019	5.13
Upper Sharon	RQLmw-013	5/9/2019	3.98	10/7/2019	4.37

ID = Identifier.
NS= Not sampled.

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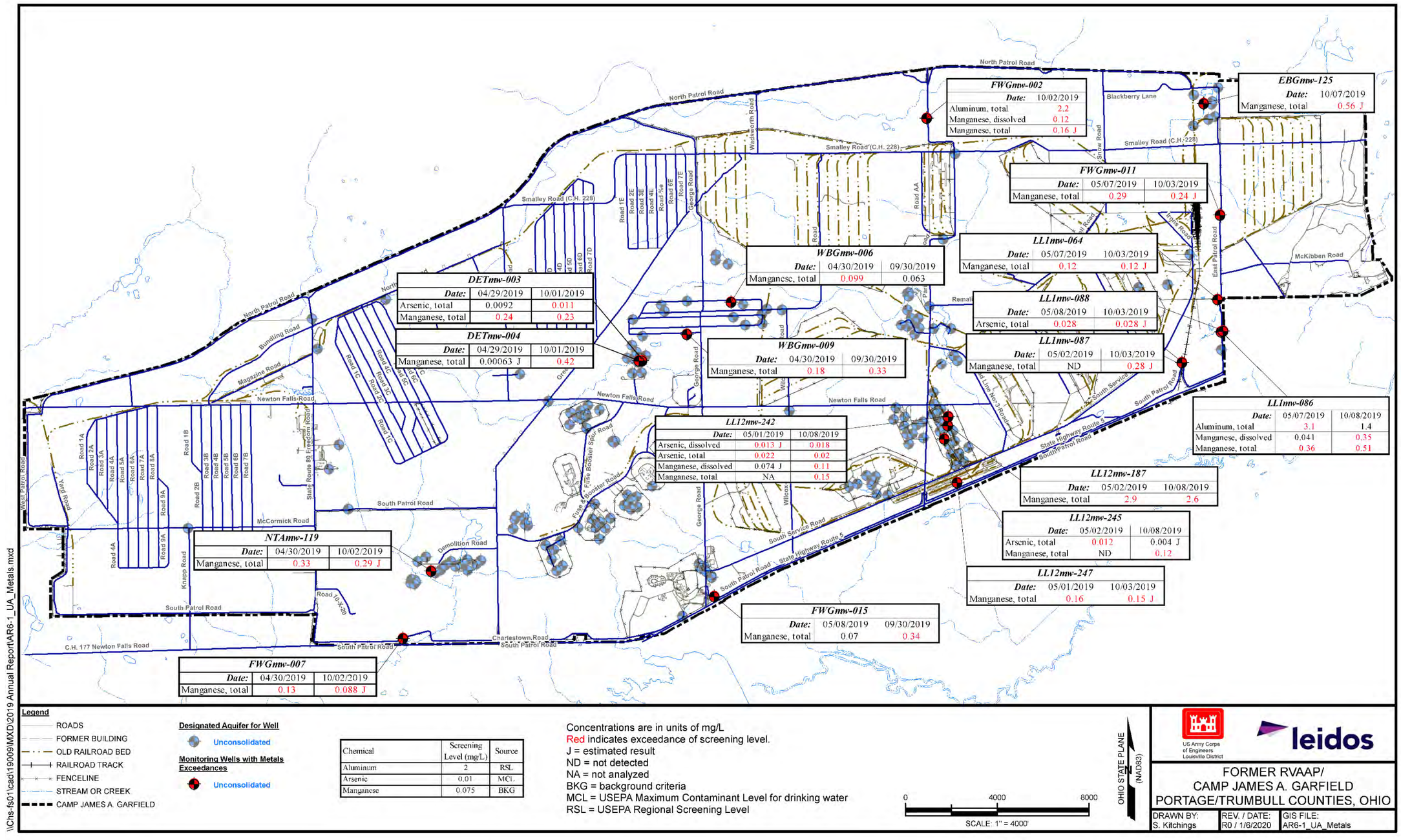


Figure 6-1. Inorganic Exceedances in the Unconsolidated Aquifer

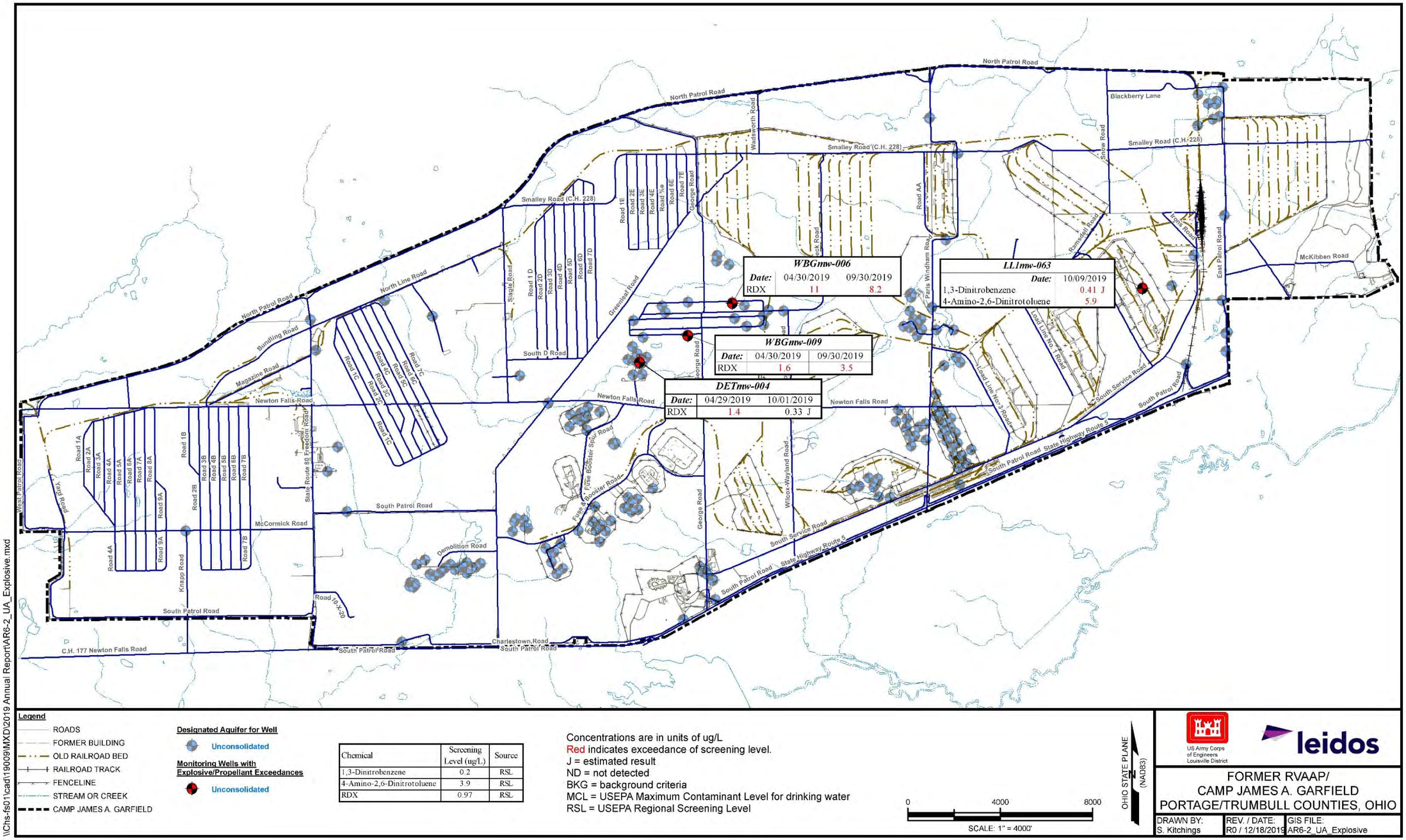


Figure 6-2. Explosive/Propellant Exceedances in the Unconsolidated Aquifer

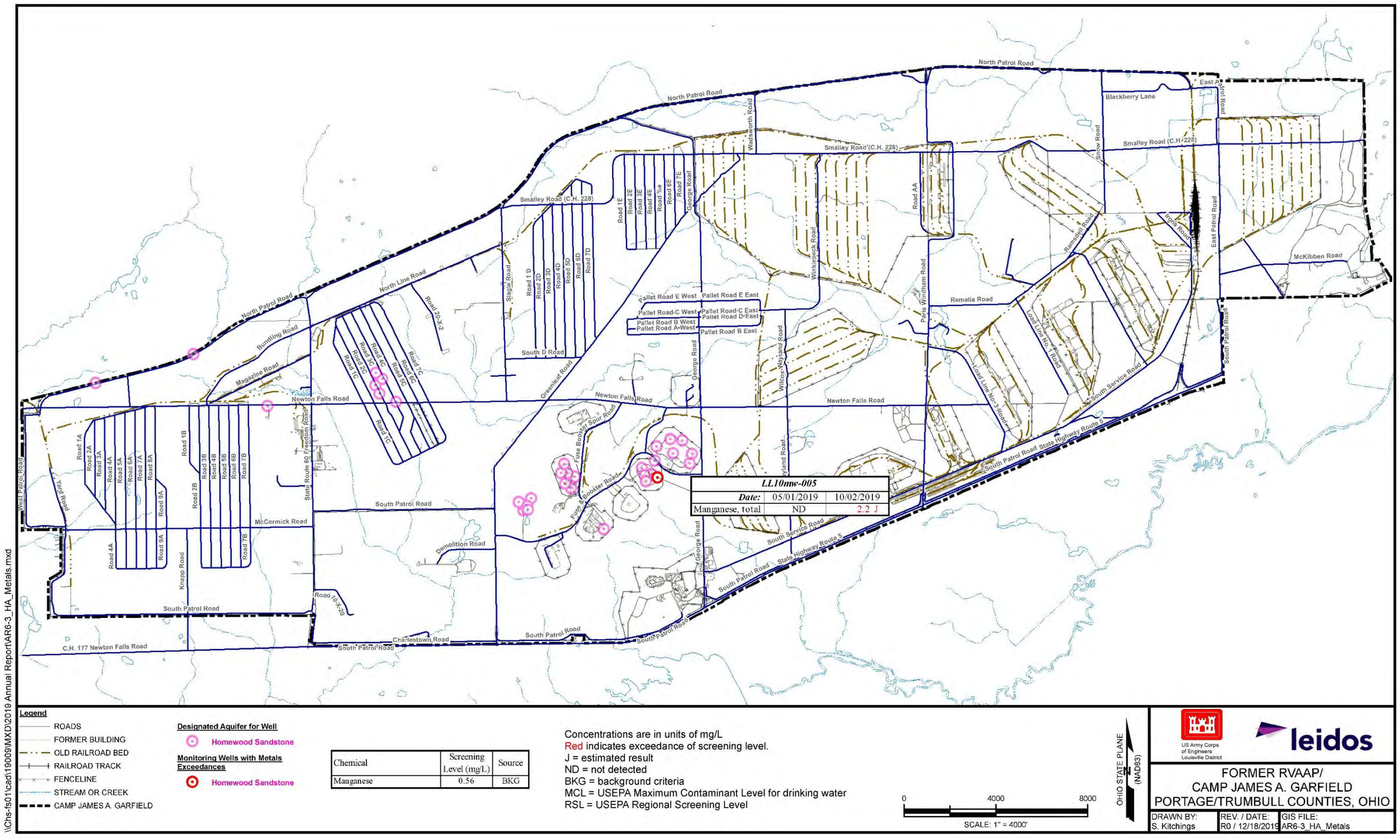
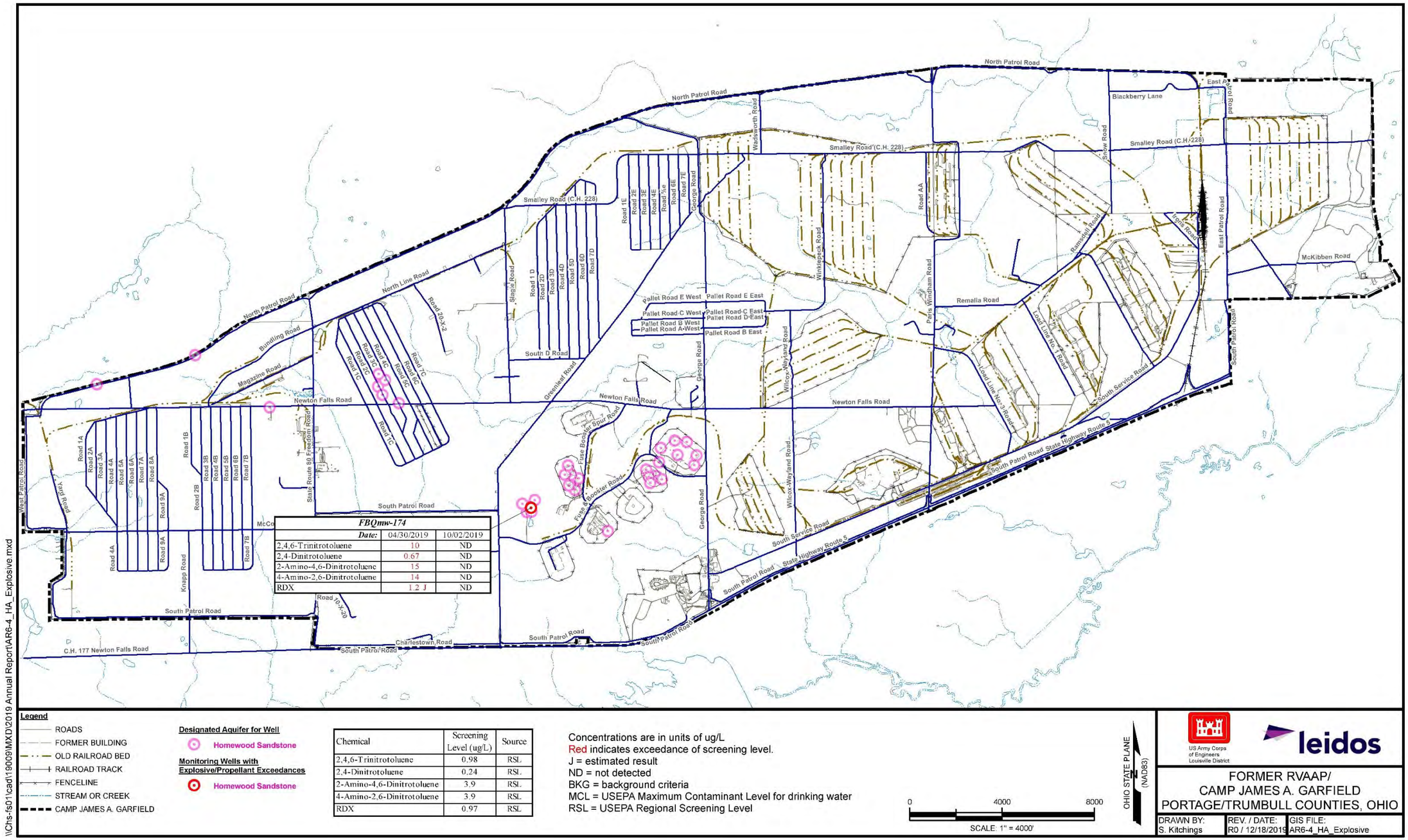


Figure 6-3. Inorganic Exceedances in the Homewood Aquifer



FBQmw-174		
Date:	04/30/2019	10/02/2019
2,4,6-Trinitrotoluene	10	ND
2,4-Dinitrotoluene	0.67	ND
2-Amino-4,6-Dinitrotoluene	15	ND
4-Amino-2,6-Dinitrotoluene	14	ND
RDX	1.2 J	ND

Legend

- ROADS
- FORMER BUILDING
- OLD RAILROAD BED
- RAILROAD TRACK
- FENCELINE
- STREAM OR CREEK
- CAMP JAMES A. GARFIELD

Designated Aquifer for Well

- Homewood Sandstone

Monitoring Wells with Explosive/Propellant Exceedances

- Homewood Sandstone

Chemical	Screening Level (ug/L)	Source
2,4,6-Trinitrotoluene	0.98	RSL
2,4-Dinitrotoluene	0.24	RSL
2-Amino-4,6-Dinitrotoluene	3.9	RSL
4-Amino-2,6-Dinitrotoluene	3.9	RSL
RDX	0.97	RSL

Concentrations are in units of ug/L
Red indicates exceedance of screening level.
J = estimated result
ND = not detected
BKG = background criteria
MCL = USEPA Maximum Contaminant Level for drinking water
RSL = USEPA Regional Screening Level

0 4000 8000
SCALE: 1" = 4000'

OHIO STATE PLANE (NAD83)

US Army Corps of Engineers Louisville District

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FORMER RVAAP/
CAMP JAMES A. GARFIELD
PORTAGE/TRUMBULL COUNTIES, OHIO

DRAWN BY:	REV. / DATE:	GIS FILE:
S. Kitchings	R0 / 12/18/2019	AR6-4_HA_Explosive

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Figure 6-4. Explosive/Propellant Exceedances in the Homewood Aquifer

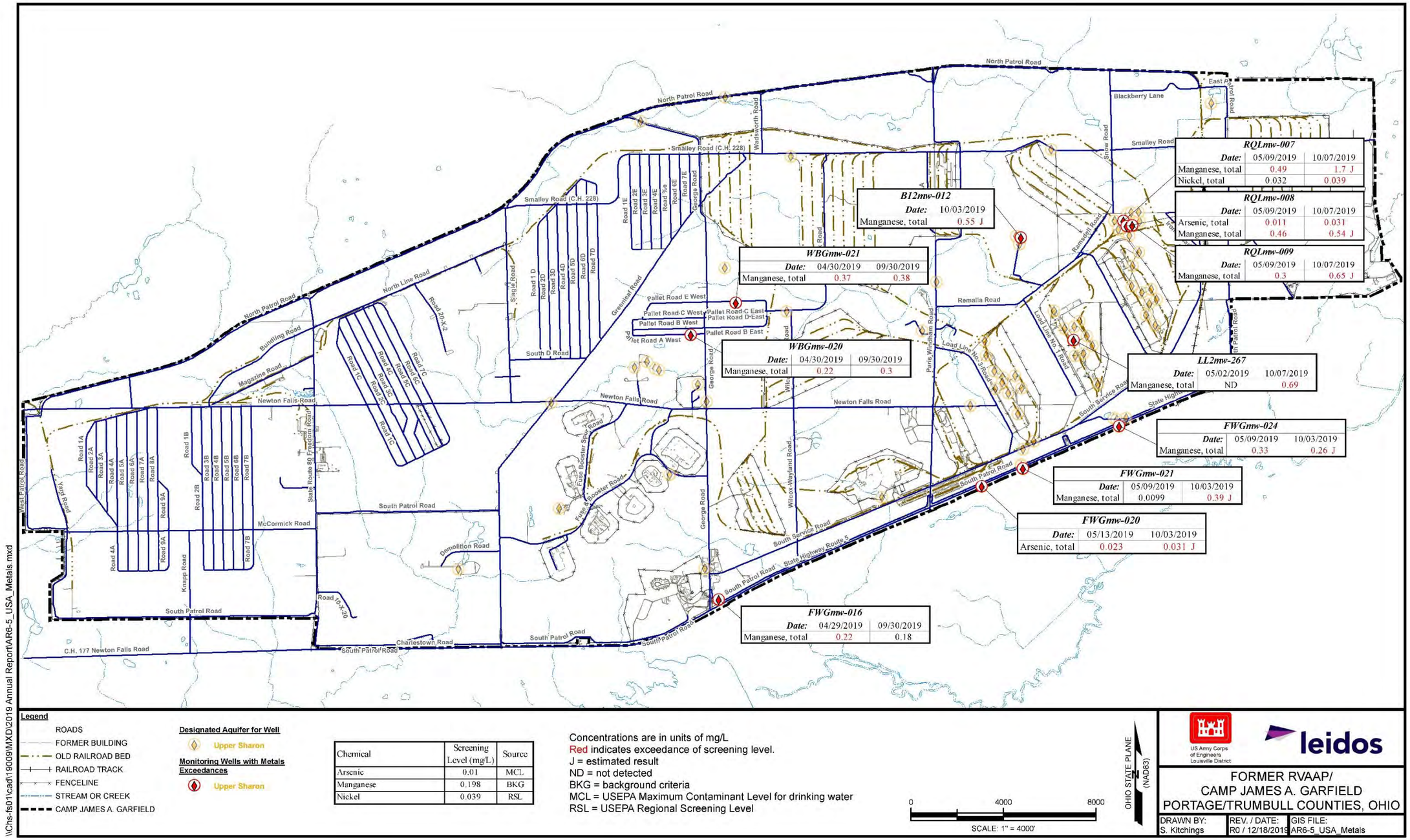
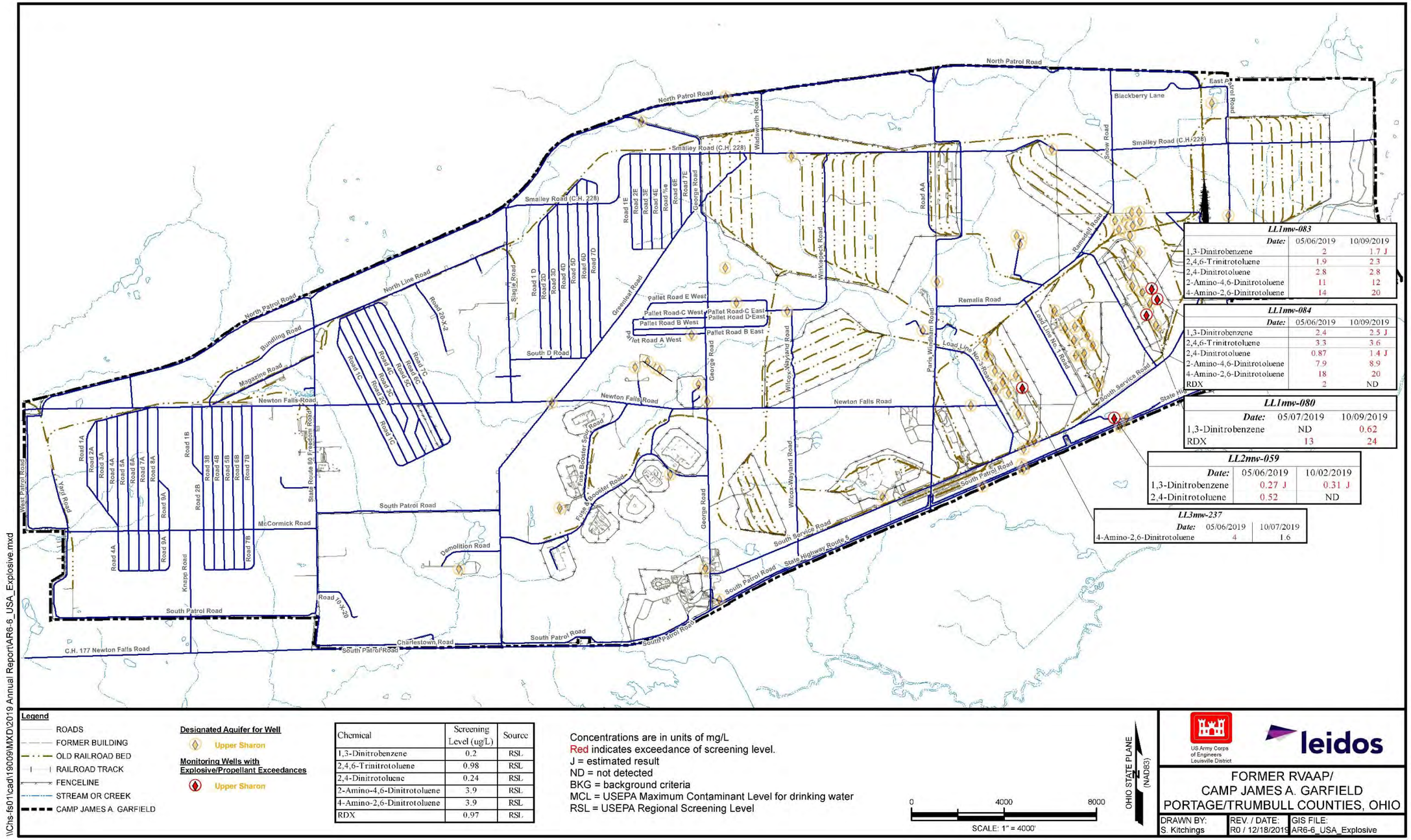


Figure 6-5. Inorganic Exceedances in the Upper Sharon Aquifer



LL1mw-083		
Date:	05/06/2019	10/09/2019
1,3-Dinitrobenzene	2	1.7 J
2,4,6-Trinitrotoluene	1.9	2.3
2,4-Dinitrotoluene	2.8	2.8
2-Amino-4,6-Dinitrotoluene	11	12
4-Amino-2,6-Dinitrotoluene	14	20

LL1mw-084		
Date:	05/06/2019	10/09/2019
1,3-Dinitrobenzene	2.4	2.5 J
2,4,6-Trinitrotoluene	3.3	3.6
2,4-Dinitrotoluene	0.87	1.4 J
2-Amino-4,6-Dinitrotoluene	7.9	8.9
4-Amino-2,6-Dinitrotoluene	18	20
RDX	2	ND

LL1mw-080		
Date:	05/07/2019	10/09/2019
1,3-Dinitrobenzene	ND	0.62
RDX	13	24

LL2mw-059		
Date:	05/06/2019	10/02/2019
1,3-Dinitrobenzene	0.27 J	0.31 J
2,4-Dinitrotoluene	0.52	ND

LL3mw-237		
Date:	05/06/2019	10/07/2019
4-Amino-2,6-Dinitrotoluene	4	1.6

Legend

- ROADS
- FORMER BUILDING
- OLD RAILROAD BED
- RAILROAD TRACK
- FENCELINE
- STREAM OR CREEK
- CAMP JAMES A. GARFIELD

Designated Aquifer for Well

Upper Sharon

Monitoring Wells with Explosive/Propellant Exceedances

Upper Sharon

Chemical	Screening Level (ug/L)	Source
1,3-Dinitrobenzene	0.2	RSL
2,4,6-Trinitrotoluene	0.98	RSL
2,4-Dinitrotoluene	0.24	RSL
2-Amino-4,6-Dinitrotoluene	3.9	RSL
4-Amino-2,6-Dinitrotoluene	3.9	RSL
RDX	0.97	RSL

Concentrations are in units of mg/L
Red indicates exceedance of screening level.
J = estimated result
ND = not detected
BKG = background criteria
MCL = USEPA Maximum Contaminant Level for drinking water
RSL = USEPA Regional Screening Level

0 4000 8000
SCALE: 1" = 4000'

OHIO STATE PLANE N (NAD83)

US Army Corps of Engineers Louisville District

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FORMER RVAAP/
CAMP JAMES A. GARFIELD
PORTAGE/TRUMBULL COUNTIES, OHIO

DRAWN BY:	REV. / DATE:	GIS FILE:
S. Kitchings	R0 / 12/18/2019	AR6-6_USA_Explosive

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Figure 6-6. Explosive/Propellant Exceedances in the Upper Sharon Aquifer

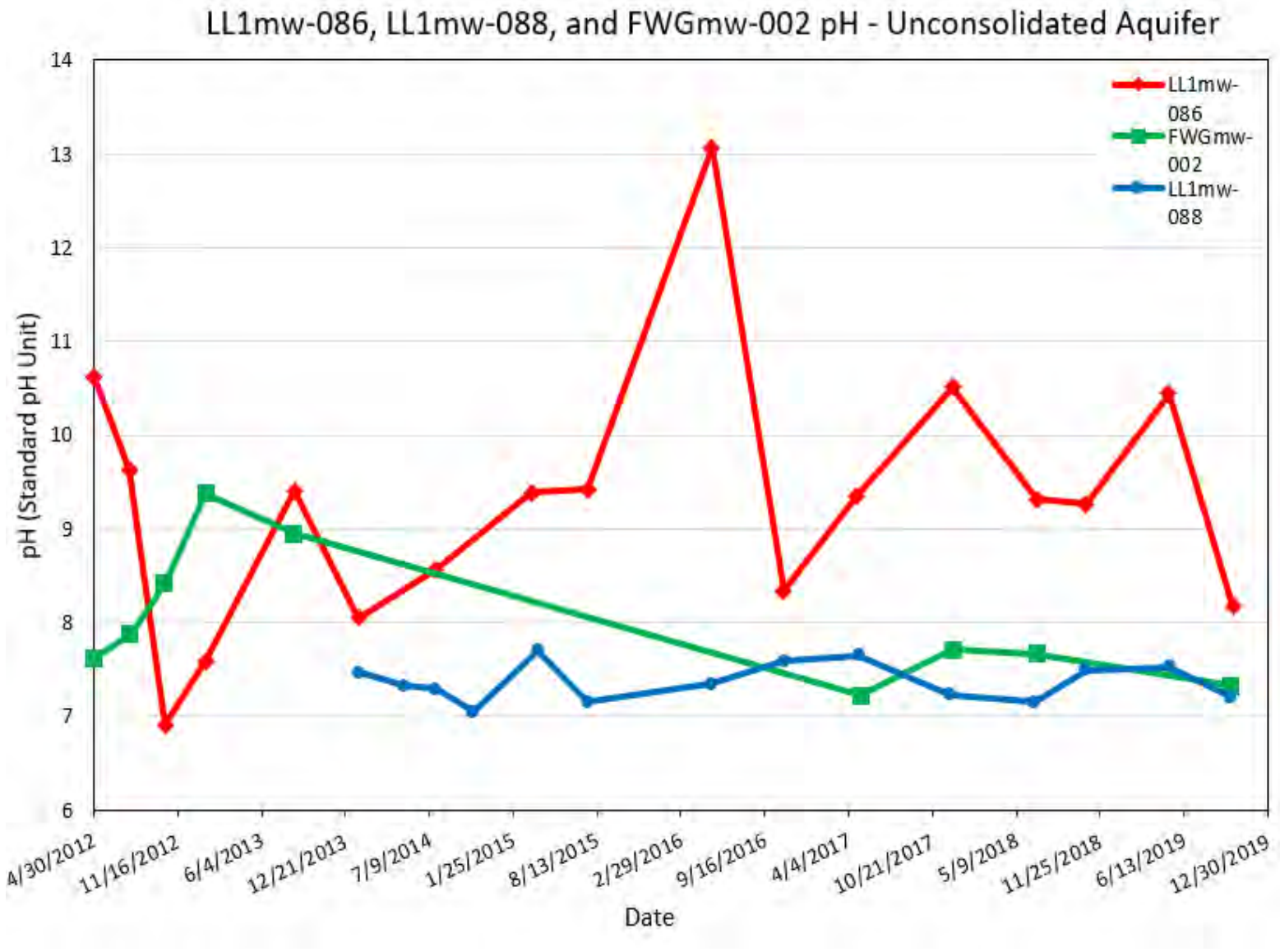

Figure 6-7. LL1mw-086, LL1mw-088, and FWGmw-002 pH – Unconsolidated Aquifer

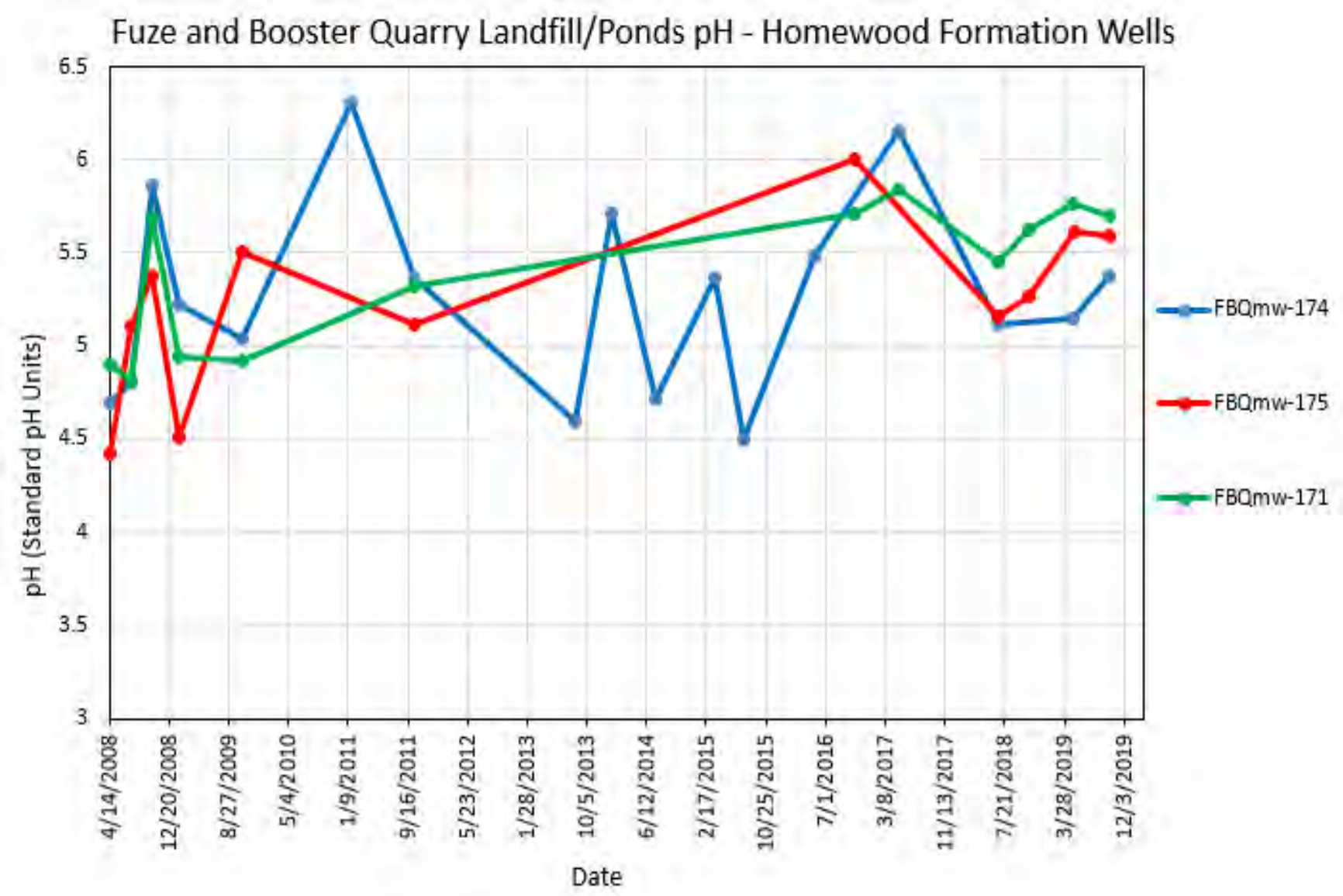

Figure 6-8. Fuze and Booster Quarry Landfill/Ponds pH – Homewood Aquifer

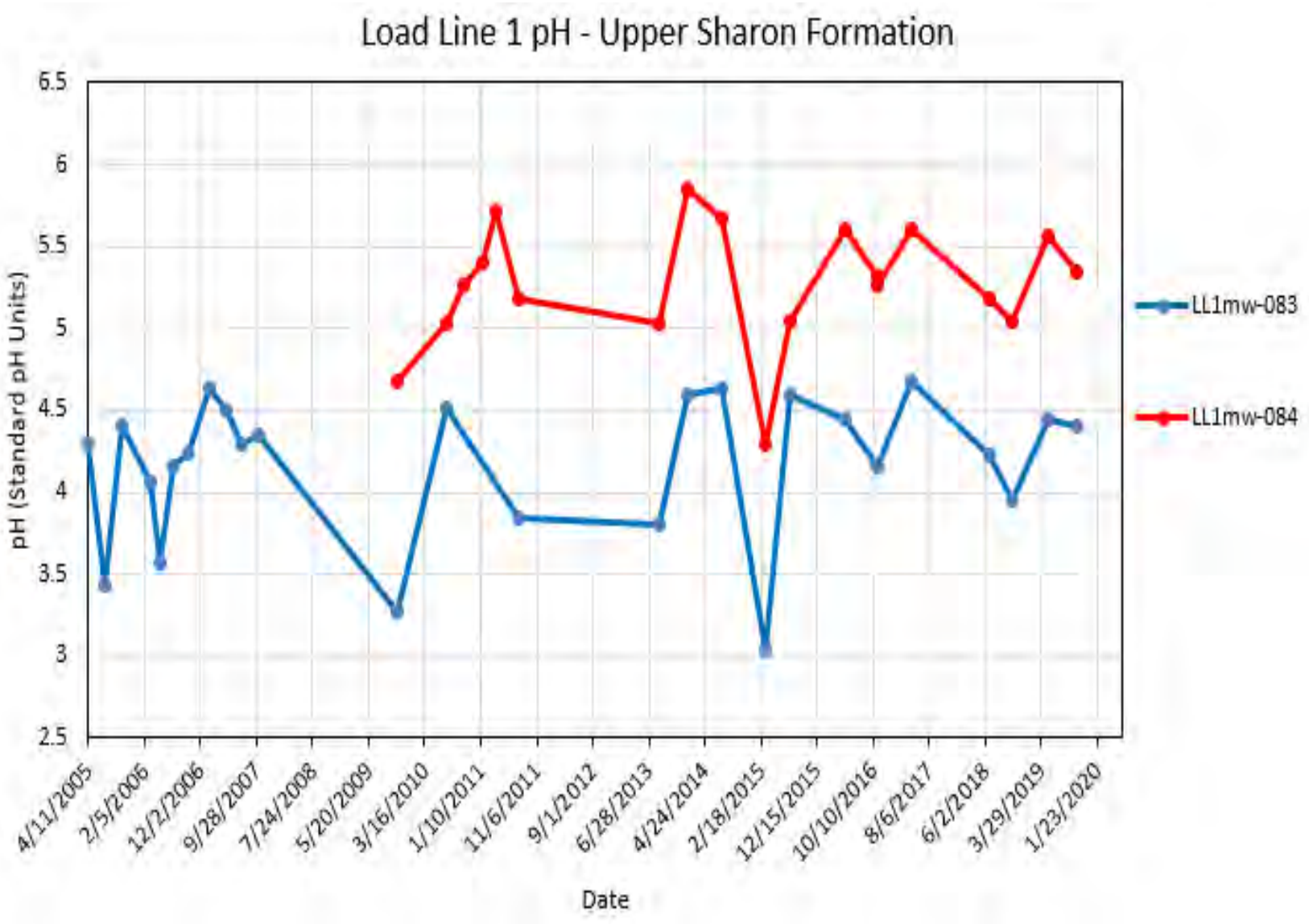

Figure 6-9. Load Line 1 pH – Upper Sharon Aquifer

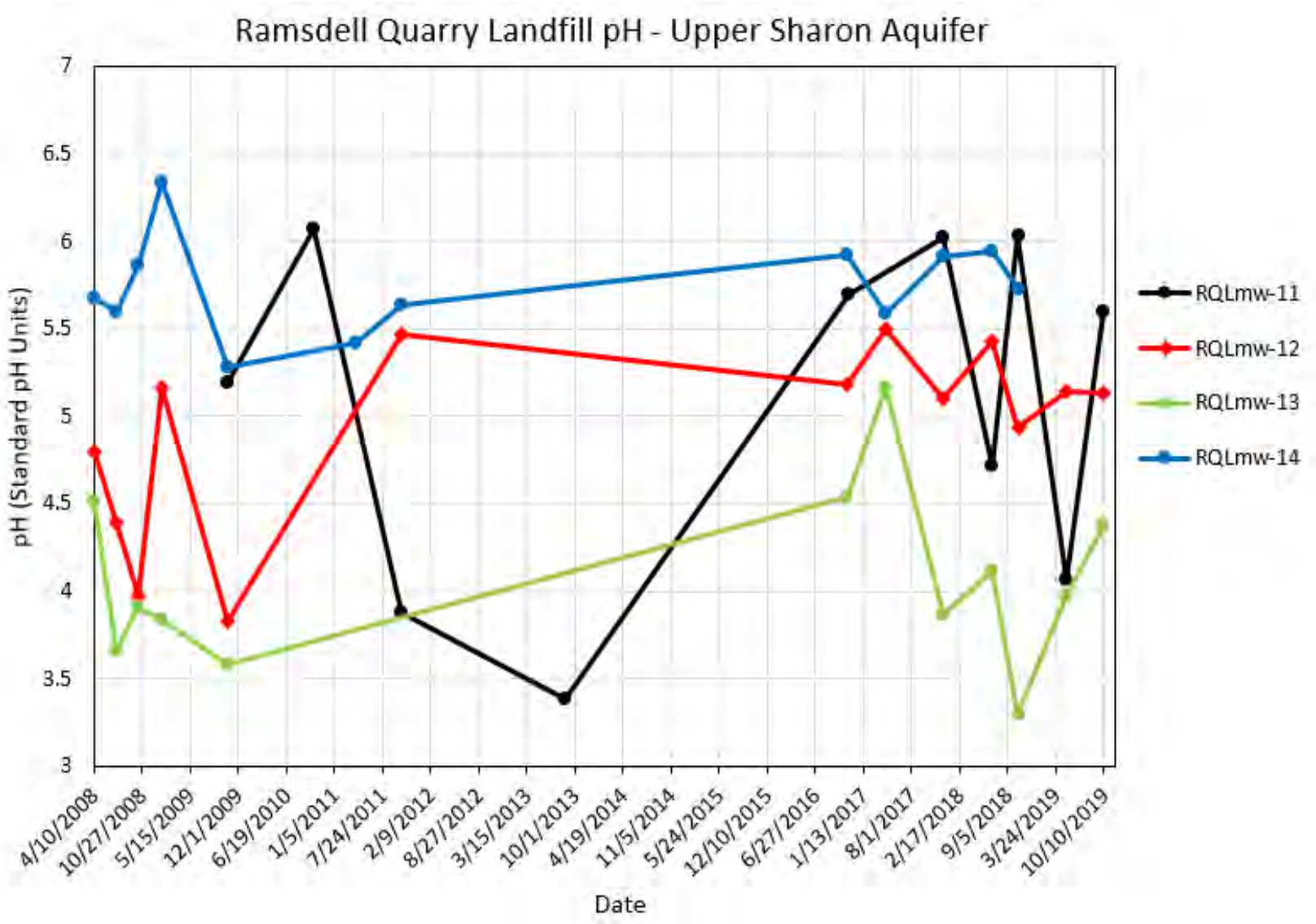

Figure 6-10. Ramsdell Quarry Landfill pH – Upper Sharon Aquifer

7.0 TIME-TREND GRAPHS

Graphs were prepared for select wells representing a mix of organic constituents regularly included in the semi-annual program, generally with at least one constituent that exceeded the screening level in at least one of the 2019 sampling events (some constituents without 2019 exceedances were graphed to provide comparison to 2016, 2017, and 2018 results over screening levels).

Concentrations of each of these constituents were graphed by monitoring well and class of analyte (i.e., explosives, VOCs, SVOCs, pesticides, hexavalent chromium, and cyanide) using analytical results from each well's first sampling event through 2019. The graphs include linear trend lines for each constituent with at least four detected results. Non-detect results are included in the graphs and are plotted as the reporting limit. A "first detection" threshold line is included for well locations that have been graphed with an extended initial period prior to a detection of the indicated constituent. Appendix G includes the graphs.

The following subsections summarize the findings of the graphs.

7.1 EXPLOSIVES AND PROPELLANTS

Explosives or propellants were detected in 20 of 41 wells sampled in 2019, and only exceeded the screening level in 10 of 41 wells. The time-trend graphs in Appendix G indicate that in most of the monitoring wells where exceedances were detected in 2019, the concentration is decreasing or remaining the same. Since the 2018 Annual Report, screening levels have been revised for RDX; 2,4-DNT; 2-Amino-4,6-DNT; 4-Amino-2,6-DNT; TNT; and 1,3-DNB to use the Tapwater RSLs instead of the Resident Receptor FWCUG.

The trend lines provided in Appendix G are summarized below:

- DETmw-004
  - RDX – RDX concentrations show a decreasing trend since the peak concentrations in April 2011 (5.4 µg/L) and January 2013 (6.1 µg/L). This could be a direct result from removal actions conducted at Open Demolition Area #2 in this timeframe. Two of the last three sample results were below the RSL of 0.97 µg/L. See Figure G-1, which depicts a decrease in RDX from 2008 to 2019.
- FBQmw-174
  - 2,4-DNT – The upward trendline for 2,4-DNT is a result of the May 2017 sample results considered not detected, but the reported concentration was 2.2 µg/L. Without this data point, the 2,4-DNT concentrations trend downwards. 2,4-DNT was not detected in the most recent sample in Fall 2019. See Figure G-2.
  - 2-Amino-4,6-DNT and 4-Amino-2,6-DNT – The trendlines show decreasing concentrations in groundwater over time in this well. 2-Amino-4,6-DNT and 4-amino-2,6-DNT were not detected in the most recent sample in Fall 2019. See Figures G-3 and G-4.
  - TNT – The trendline shows a decrease in groundwater concentrations over time in this well. TNT was not detected in the most recent sample in Fall 2019. See Figure G-5.

- LL1mw-080
  - All explosive and propellant trendlines for LL1mw-080 show an overall decrease in groundwater concentrations over time in this well. However, 2018/2019 detected concentrations in are generally higher than 2016/2017 detected concentrations for all explosives and propellants. However, the 2018/2019 detected concentrations did not exceed historically high concentrations at this well. See Figures G-6 through G-8.
  - Concentrations of 4-amino-4,6-DNT and 2-amino-2,6-DNT have been below the current screening level since Fall 2016. See Figures G-7 and G-8.
- LL1mw-081
  - Concentrations of 2-amino-4,6-DNT have been below the screening level in all sampling events (from 2000 to 2019) and display an overall decrease in concentration over time. See Figure G-9.
- LL1mw-083
  - 2-Amino-4,6-DNT and 4-amino-2,6-DNT – The trendlines show decreasing concentrations in groundwater over time in this well; however, 2018 and 2019 concentrations are above 2017 levels and above the screening level. See Figures G-10 and G-11.
  - 1,3-DNB – The trendline shows a slight increasing trend, due to the high concentration detected in Spring 2019 of 2 µg/L, above the screening level of 0.2 µg/L. However, since 2010, 12 of 14 samples have been below 0.3 µg/L. See Figure G-12.
  - All other explosive and propellant (TNT; 2,4-DNT; and 2,6-DNT) trendlines for LL1mw-083 show a decrease in groundwater concentrations over time in this well. See Figures G-13 to G-15.
- LL1mw-084
  - RDX – The overall trendline shows a slightly increasing trend. However, concentrations showed a decreasing trend until the October 2018 sampling event. RDX was detected at the highest concentration of 5.2 µg/L during this sampling event. Concentrations of RDX decreased below the screening level in 2019. RDX was not detected in the most recent sample in Fall 2019. See Figure G-16.
  - 1,3-DNB – The trendline shows an increase in groundwater concentrations over time in this well. 1,3-DNB was detected in 2019 at concentrations of 2.4 and 2.5 µg/L, above the screening level of 0.2 µg/L. See Figure G-17.
  - All other explosive and propellant trendlines for LL1mw-084 show a decrease in groundwater concentrations over time in this well. See Figures G-18 to G-22.
- LL2mw-059
  - 2,4-DNT – The trendline shows a slightly increasing trend over time in this well. The sample collected in Spring 2019 had a concentration of 0.52 µg/L 2,4-DNT, which is the second highest concentration detected in this well. 2,4-DNT was not detected in the Fall 2019 sample. See Figure G-23.
  - 4-Amino-2,6-DNT and 2-Amino-4,6-DNT – Concentrations have been below the screening levels since 2000 and show an overall decrease in concentration. See Figures G-24 and G-25.
  - 1,3-DNB – The trendline shows a slightly decreasing trend over the sampling period, with 26 of 33 reported concentrations below the screening level. See Figure G-26.

- LL2mw-267
  - All explosive and propellant trendlines for LL2mw-267 show a decrease in groundwater concentrations over time in this well.
  - RDX – Concentrations of RDX have been below the screening level since 2016. See Figure G-27.
  - TNT - All detections of TNT have been below the screening level, with exception of the August 2007 sample, which was plotted above the screening level due to an elevated laboratory limit of detection. This value is qualified as non-detect. See Figure G-28.
  - 2,4-DNT – Samples were below the screening level from Spring 2015 through Fall 2018. The 2019 concentrations that are presented as above the screening level had elevated laboratory detection limits and were considered non-detect. See Figure G-29.
  - 2-Amino-4,6-DNT and 4-Amino-2,6-DNT – Concentrations have been below the screening levels since 2001. See Figures G-30 and G-31.
- LL3mw-237
  - All explosive and propellant trendlines for LL3mw-237 show a decrease in groundwater concentrations over time in this well.
  - TNT – Concentrations have been below the screening level since 2017. See Figure G-32.
  - 2-Amino-4,6-DNT – Concentrations were below the screening level in four of the last five samples. See Figure G-33.
  - 4-Amino-2,6-DNT – Concentrations were below the screening level in Fall 2019. See Figure G-34.
- LL3mw-244
  - 2-Amino-4,6-DNT and 4-Amino-2,6-DNT – Samples have been below the screening levels since 2012. Trendlines show a decrease in concentration over time in this well. See Figures G-35 and G-36.
- LL3mw-246

  2-Amino-4,6-DNT and 4-Amino-2,6-DNT – Samples have been below the screening levels since 2014. Trendlines show a decrease in concentration over time in this well. See Figures G-37 and G-38.
- WBGmw-006
  - All explosive and propellant trendlines for WBGmw-006 show a decrease in groundwater concentrations over time in this well. See Figure G-39.
- WBGmw-009
  - All explosive and propellant trendlines for WBGmw-009 show a decrease in groundwater concentrations over time in this well. See Figure G-40.
- RQLmw-008
  - RDX – Concentrations of RDX above the screening level were detected during the 2018 sampling event. RDX was not detected in 2019. Trend analysis was not performed, as only 4 of 32 samples contained detectable concentrations.
  - 1,3-DNB – 1,3-DNB has been detected historically in RQLmw-008; however, 1,3-DNB was not detected in 2017, 2018, or 2019. Trend analysis was not performed due to the low number of overall detections.

- RQLmw-014
  - RDX – Concentrations of RDX above the screening level were detected during the 2018 sampling event. This was only the second time RDX was detected at RQLmw-014. Trend analysis was not performed due to the low number of detections. This well was not sampled in 2019.

7.2 SEMI-VOLATILE ORGANIC COMPOUNDS

SVOCs were detected in one (RQLmw-007) of the seven semi-annual wells that were sampled for SVOCs during the 2019 sampling events. SVOCs detected in RQLmw-007 exceeded the screening level in 2017 and were below the screening level in 2018 and 2019.

Two SVOCs (naphthalene and benzoic acid) were detected in the three Sand Creek Disposal Road Landfill Road wells in January 2019. The detected concentrations were estimated and below the screening level. No other SVOCs were detected in January 2019, and no SVOCs were detected in May or August 2019 in these wells.

7.3 VOLATILE ORGANIC COMPOUNDS

No VOCs exceeded the screening level in 2019. Detections of VOCs were reported in five of eight wells in 2019.

Carbon tetrachloride was detected in both 2019 samples from LL10mw-003; however, both samples were below the MCL of 5 µg/L. Chloroform was detected in LL10mw-003 from July 2012-October 2019. A trendline for chloroform was presented in the 2017 Annual Report (TEC-Weston 2018). This report does not include a similar figure, since chloroform concentrations have never exceeded the MCL of 80 µg/L.

7.4 PESTICIDES AND POLYCHLORINATED BIPHENYLS

No pesticides or PCBs were detected in any of the five groundwater samples collected in 2019. Consequently, trend analysis and graphs are not provided for pesticides or PCBs.

7.5 CYANIDE

A total of 30 monitoring wells were analyzed for cyanide in 2019. Cyanide was detected in 12 wells, but it never exceeded the MCL of 0.2 mg/L. Estimated concentrations were detected in three of the five RCRA monitoring wells (DETmw-003, RQLmw-008, and RQLmw-009), but not in RQLmw-007 or DETmw-004. Historical results of cyanide in the five RCRA wells have been below the MCL of 0.2 mg/L. Given the low frequency of detection of cyanide in these wells, trend analysis and graphs are not provided.

8.0 CONCLUSIONS AND RECOMMENDATIONS

This section summarizes the work completed and the pertinent findings from the 2019 FWGWMP monitoring events conducted at CJAG. The recommendations indicate future activities to be performed regarding groundwater monitoring.

8.1 CONCLUSIONS

FWGWMP sampling events were conducted in Spring and Fall 2019. These sampling events were conducted in accordance with the objectives specified in the 2019 Addendum (Leidos 2019a) and applicable FCRs. Table 8-1 presents the wells and rationale list, which is provided in Table 3-1 of the 2019 Addendum, and includes a column that presents the results and findings from the analyses conducted at each well.

In addition to the sampling specified in the 2019 Addendum, the three permanent wells at Sand Creek Disposal Road Landfill were sampled quarterly in January, May, and August 2019 to complete the required four quarters of sampling at these newly installed wells.

The annual water level measurements were collected in April 2019. Groundwater elevations from 295 monitoring wells were used to generate the potentiometric surfaces for the Unconsolidated, Homewood Sandstone, Upper Sharon Sandstone, and Basal Sharon Conglomerate aquifers.

In general, the groundwater elevations observed during the October 2018 gauging event were similar to those observed during the Spring 2019 event. The primary gradient for the Unconsolidated aquifer was toward the east, with localized variances toward the north and south, as well as localized radial flow. The primary gradient for the Homewood aquifer was toward the east/southeast, with a localized radial pattern near Load Line 9. The primary gradient of the Upper Sharon aquifer was toward the east/southeast/northeast, with a localized radial pattern near Load Line 2. The primary gradient for the Basal Sharon Conglomerate aquifer was directed toward the east, with a northeasterly trend in the northeastern portion of CJAG.

8.2 RECOMMENDATIONS

The following subsections present recommendations of activities to be performed in the FWGWMP.

8.2.1 Well Redevelopment

As part of the ongoing FWGW monitoring, wells will be selected for redevelopment to remove accumulated sediment and fines from the filter packs. Although wells FBQmw-175, LL12mw-242, LL1mw-081, and LL1mw-086 were recommended for redevelopment in 2019, no redevelopment occurred in 2019. Turbidity in wells LL1mw-081 and FBQmw-175 was below 10 NTUs during the Fall 2019 sampling event, and below 20 NTUs during the Spring 2019 sampling event. Turbidity values

at wells LL1mw-086 and LL12mw-242 remain elevated and are recommended for redevelopment in 2020.

FWGmw-002 was sampled only in Fall 2019 and had turbidity greater than 20 NTUs during that event. The two prior sampling events at FWGmw-002 also had turbidity greater than 20 NTUs; therefore, this well is also recommended for redevelopment.

8.2.2 Well Abandonments

The temporary well at Open Demolition Area #1 and three temporary wells at Electric Substation No. 3 were abandoned in 2019 in June.

8.2.3 2020 FWGWMP Sampling

The proposed FWGWMP groundwater sampling for 2020 to support the RI is provided in the 2020 Addendum.

Table 8-1. Summary of 2019 FWGWMP Wells, Rationale, and Results Recommended in 2019 Addendum

No.	RVAAP-66 Area	Well Name	Aquifer	2019 FWGWMP Sampling Recommendations	2019 Sampling Results
1	RVAAP-01 Ramsdell Quarry	RQLmw-007	Upper Sharon	In accordance with the DFFO, analytical parameters for this RCRA well include the same parameters as 2018: VOCs, phthalates, PAHs, phenols, PCBs, explosives, pesticides, cyanide, phosphorus, and metals.	• VOCs, PAHs, phenols, PCBs, explosives, pesticides, cyanide, and phosphorus were not detected. • Phthalates were detected at low, estimated concentrations during the Fall 2019 sampling event. • All metal concentrations were below the screening level or background concentration, with the exceptions of manganese and nickel. Manganese was detected at concentrations of 0.49 mg/L in Spring 2019 and at an estimated concentration of 1.7J mg/L in Fall 2019 exceeding the background concentration of 0.198 mg/L. Nickel was detected at a concentration of 0.039 mg/L in Fall 2019, meeting the RSL of 0.039 mg/L.
2	RVAAP-01 Ramsdell Quarry	RQLmw-008	Upper Sharon	In accordance with the DFFO, analytical parameters for this RCRA well include the same parameters as 2018: VOCs, phthalates, PAHs, phenols, PCBs, explosives, pesticides, cyanide, and metals.	• VOCs, phthalates, PAHs, phenols, PCBs, explosives, and pesticides were not detected. • Cyanide was detected at an estimated concentration of 0.0053J mg/L; below the MCL of 0.2 mg/L in Spring 2019. Cyanide was not detected in Fall 2019. • All metal concentrations were below the screening level or background concentration, with the exceptions of manganese and arsenic. Manganese was detected at concentrations of 0.46 mg/L in Spring 2019 and at an estimated concentration of 0.54J mg/L in Fall 2019 exceeding the background concentration of 0.198 mg/L. Arsenic was detected at concentrations of 0.011 mg/L in Spring 2019 and 0.031 mg/L in Fall 2019, exceeding the MCL of 0.01 mg/L.
3	RVAAP-01 Ramsdell Quarry	RQLmw-009	Upper Sharon	In accordance with the DFFO, analytical parameters for this RCRA well include the same parameters as 2018: VOCs, phthalates, PAHs, phenols, PCBs, explosives, pesticides, cyanide, and metals.	• VOCs, phthalates, PAHs, phenols, PCBs, explosives, and pesticides were not detected. • Cyanide was detected at an estimated concentration of 0.013J mg/L, below the MCL of 0.2 mg/L in Spring 2019. Cyanide was not detected in Fall 2019. • All metal concentrations were below the screening level or background concentration, with the exception of manganese. Manganese was detected at concentrations of 0.3 mg/L in Spring 2019 and at an estimated concentration of 0.65J mg/L in Fall 2019 exceeding the background concentration of 0.198 mg/L.
4	RVAAP-01 Ramsdell Quarry	RQLmw-011	Upper Sharon	In consideration of the pH anomalies, continue to monitor anions, pH, and alkalinity.	• pH remains low, ranging from 4.07 to 5.6, along with alkalinity ranging from nondetect to 22 mg/L in 2019. • Nitrate, nitrite, and sulfide were not detected.
5	RVAAP-01 Ramsdell Quarry	RQLmw-012	Upper Sharon	In consideration of the pH anomalies, continue to monitor anions, pH, alkalinity, and cyanide.	• pH remains low, ranging from 5.13 to 5.14, along with alkalinity ranging from nondetect to 9.9J to 31 mg/L in 2019. • Nitrate, nitrite, and sulfide were either not detected or detected at concentrations below the screening level. • Cyanide was detected at an estimated concentration of 0.04J mg/L, below the MCL of 0.2 mg/L in Spring 2019. Cyanide was not detected in Fall 2019.
6	RVAAP-01 Ramsdell Quarry	RQLmw-013	Upper Sharon	In consideration of the pH anomalies, continue to monitor anions, pH, and alkalinity.	• pH remains low, ranging from 3.98 to 4.37, in 2019. • Alkalinity, nitrate, and sulfide were not detected.
7	RVAAP-01 Ramsdell Quarry	RQLmw-016	Upper Sharon	Continue to monitor cyanide.	• Cyanide was not detected in Spring 2019. Cyanide was detected at an estimated concentration of 0.0069J mg/L in Fall 2019, below the MCL of 0.2 mg/L.
8	RVAAP-02 Erie Burning Grounds	EBGmw-125	Unconsolidated	Continue to monitor cyanide. Analyze for metals to further understand nature and extent of contamination (per FCR LEIDOS_FWGW_009).	• Cyanide was detected at a concentration of 0.011 mg/L in Spring 2019, below the MCL of 0.2 mg/L. Cyanide was not detected in Fall 2019. • Metals were analyzed in Fall 2019 only. All metal concentrations were below the screening level or background concentration, with the exception of manganese. Manganese was detected at an estimated concentration of 0.56J mg/L, exceeding the background concentration of 0.075 mg/L.
9	RVAAP-02 Erie Burning Grounds	EBGmw-131	Upper Sharon	Continue to monitor cyanide.	• Cyanide was not detected.
10	RVAAP-04 Open Demolition Area #2	DA2mw-115	Upper Sharon	Continue to monitor metals.	• All metal concentrations were below the screening level or background concentration.

Table 8-1. Summary of 2019 FWGWMP Wells, Rationale, and Results Recommended in 2019 Addendum (Continued)

No.	RVAAP-66 Area	Well Name	Aquifer	2019 FWGWMP Sampling Recommendations	2019 Sampling Results
11	RVAAP-04 Open Demolition Area #2	DETmw-003	Unconsolidated	In accordance with the DFFO, analytical parameters for this RCRA well include the same parameters as 2018: VOCs, phthalates, nitroaromatics, PAHs, phenols, PCBs, explosives, pesticides, cyanide, and metals.	• Phthalates, nitroaromatics, SVOCs, phenols, PCBs, PAHs, explosives, or pesticides were not detected. • Acetone was the only VOC detected. Acetone was detected at an estimated concentration of 2.8J µg/L in Spring 2019, below the Tapwater RSL of 1,400 µg/L. • Cyanide was detected at an estimated concentration of 0.005J mg/L in Fall 2019, below the MCL of 0.2 mg/L. • All metal concentrations were below the screening level or background concentration, with the exceptions of manganese and arsenic. Manganese was detected at concentrations of 0.24 mg/L in Spring 2019 and 0.23 mg/L in Fall 2019, exceeding the background concentration of 0.075 mg/L. Arsenic was detected at a concentration of 0.011 mg/L in Fall 2019, exceeding the MCL of 0.01 mg/L.
12	RVAAP-04 Open Demolition Area #2	DETmw-004	Unconsolidated	In accordance with the DFFO, analytical parameters for this RCRA well include the same parameters as 2018: VOCs, phthalates, nitroaromatics, PAHs, phenols, PCBs, explosives, pesticides, cyanide, and metals.	• SVOCs, pesticides, phthalates, nitroaromatics, PAHs, phenols, cyanide, and PCBs were not detected. • Acetone was the only VOC detected. Acetone was detected at an estimated concentration of 5.1 µg/L, below the Tapwater RSL in Spring 2019. • All metal concentrations were below the screening level or background concentration, with the exception of manganese. Manganese was detected at a concentration of 0.42 mg/L in Fall 2019, exceeding the background concentration of 0.075 mg/L. • No explosives exceeded the screening level with the exception of RDX. RDX was detected at a concentration of 1.4 µg/L in Spring 2019, exceeding the RSL of 0.97 µg/L.
13	RVAAP-05 Winklepeck Burning Grounds	WBGmw-006	Unconsolidated	Continue to monitor explosives and metals.	• No explosives exceeded the screening level with the exception of RDX. RDX was detected at concentrations of 11 µg/L in Spring 2019 and 8.2 µg/L in Fall 2019, exceeding the RSL of 0.97 µg/L. • All metal concentrations were below the screening level or background concentration with the exception of manganese. Manganese was detected at a concentration of 0.099 mg/L in Spring 2019, exceeding the background concentration of 0.075 mg/L.
14	RVAAP-05 Winklepeck Burning Grounds	WBGmw-009	Unconsolidated	Continue to monitor explosives and metals.	• No explosives exceeded the screening level with the exception of RDX. RDX was detected at concentrations of 1.6 µg/L in Spring 2019 and 3.5 µg/L in Fall 2019, exceeding the RSL of 0.97 µg/L. • All metal concentrations were below the screening level or background concentration with the exception of manganese. Manganese was detected at concentrations of 0.18 mg/L in Spring 2019 and 0.33 mg/L in Fall 2019, exceeding the background concentration of 0.075 mg/L.
15	RVAAP-05 Winklepeck Burning Grounds	WBGmw-020	Upper Sharon	Continue to monitor explosives and metals.	• Explosives were not detected. • All metal concentrations were below the screening level or background concentration with the exception of manganese. Manganese was detected at concentrations of 0.22 mg/L in Spring 2019 and 0.3 mg/L in Fall 2019, exceeding the background concentration of 0.198 mg/L.
16	RVAAP-05 Winklepeck Burning Grounds	WBGmw-021	Upper Sharon	Continue to monitor explosives and metals.	• Explosives were not detected. • All metal concentrations were below the screening level or background concentration with the exception of manganese. Manganese was detected at concentrations of 0.37 mg/L in Spring 2019 and 0.38 mg/L in Fall 2019, exceeding the background concentration of 0.198 mg/L.
17	RVAAP-08 Load Line 1	LL1mw-063	Unconsolidated	Analyze for explosives and cyanide to address potential data gap (per FCR LEIDOS_FWGW_009).	This well was sampled in Fall 2019 only. • Cyanide was not detected. • All explosive concentrations were below the screening level with the exceptions of 1,3-DNB and 4-Amino-2,6-DNT. 1,3-DNB was detected at an estimated concentration of 0.41J µg/L, exceeding the RSL of 0.2 µg/L. 4-Amino-2,6-DNT was detected at a concentration of 5.9 µg/L, exceeding the RSL of 3.9 µg/L.
18	RVAAP-08 Load Line 1 (east of Load Line 1 fence)	LL1mw-064	Unconsolidated	Continue to monitor metals in this sentinel well.	• All metal concentrations were below the screening level or background concentration with the exception of manganese. Manganese was detected at a concentration of 0.12 mg/L in Spring 2019 and at an estimated concentration of 0.012J mg/L in Fall 2019, above the background concentration of 0.075 mg/L.
19	RVAAP-08 Load Line 1 (southeast of Load Line 1 fence)	LL1mw-065	Unconsolidated	Continue to monitor explosives and metals for migration potential.	• Explosives were not detected. • All metal concentrations were below the screening level or background concentration.

Table 8-1. Summary of 2019 FWGWMP Wells, Rationale, and Results Recommended in 2019 Addendum (Continued)

No.	RVAAP-66 Area	Well Name	Aquifer	2019 FWGWMP Sampling Recommendations	2019 Sampling Results
20	RVAAP-08 Load Line 1	LL1mw-080	Upper Sharon	Continue to monitor explosives. Analyze for metals to further understand nature and extent of contamination (per FCR LEIDOS_FWGW_009).	• All explosive concentrations were below the screening level or background concentration with the exceptions of 1,3-DNB and RDX. 1,3-DNB was detected at a concentration of 0.62 µg/L in Fall 2019, above the RSL of 0.2 µg/L. RDX was detected at concentrations of 13 µg/L in Spring 2019 and 24 µg/L in Fall 2019, above the RSL of 0.97 µg/L. • Metals were only sampled in Fall 2019, and none exceeded the screening level or background concentration.
21	RVAAP-08 Load Line 1	LL1mw-081	Upper Sharon	Continue to monitor explosives and cyanide.	• All explosive concentrations were below the screening level. • Cyanide was not detected.
22	RVAAP-08 Load Line 1	LL1mw-083	Upper Sharon	Continue to monitor explosives, anions, and alkalinity.	• pH remains low, ranging from 4 to 4.44, along with alkalinity ranging from nondetect to 44 mg/L in 2019. • Nitrite and sulfide were not detected, and nitrate was detected at low, estimated concentrations of 0.44J mg/L in Spring and Fall 2019, below the MCL of 10 mg/L. • Many explosives exceeded their screening level. Concentrations of 1,3-DNB exceeded the RSL of 0.2 µg/L in Spring and Fall 2019 (2 and 1.7J µg/L, respectively). Concentrations of TNT exceeded the RSL of 0.98 µg/L in Spring and Fall 2019 (1.9 and 2.3 µg/L, respectively). Concentrations of 2,4-DNT exceeded the RSL of 0.24 µg/L in Spring and Fall 2019, both at concentrations of 2.8 µg/L. Concentrations of 2-amino-4,6-DNT exceeded the RSL of 3.9 µg/L in Spring and Fall 2019 (11 and 12 µg/L, respectively). Concentrations of 4-amino-2,6-DNT exceeded the RSL of 3.9 µg/L in Spring and Fall 2019 (14 and 20 µg/L, respectively).
23	RVAAP-08 Load Line 1	LL1mw-084	Upper Sharon	Continue to monitor explosives, anions, alkalinity, and metals.	• pH ranged from 5.34 to 5.57, along with alkalinity ranging from nondetect to 23 mg/L in 2019. • Nitrite was not detected, and nitrate was detected at concentrations below the MCL of 10 mg/L. • Many explosives exceeded their screening level. Concentrations of 1,3-DNB exceeded the RSL of 0.2 µg/L in Spring and Fall 2019 (2.4 and 2.5J µg/L, respectively). Concentrations of TNT exceeded the RSL of 0.98 µg/L in Spring and Fall 2019 (3.3 and 3.6 µg/L, respectively). Concentrations of 2,4-DNT exceeded the RSL of 0.24 µg/L in Spring and Fall 2019 (0.87 and 1.4J µg/L, respectively). Concentrations of 2-amino-4,6-DNT exceeded the RSL of 3.9 µg/L in Spring and Fall 2019 (7.9 and 8.9 µg/L, respectively). Concentrations of 4-amino-2,6-DNT exceeded the RSL of 3.9 µg/L in Spring and Fall 2019 (18 and 20 µg/L, respectively). RDX exceeded the RSL of 0.97 µg/L in Spring 2019 at a concentration of 2 µg/L. • Concentrations of all metal concentrations were below the screening level or background concentration.
24	RVAAP-08 Load Line 1 (southeast of Load Line 1 fence)	LL1mw-086	Unconsolidated	Continue to monitor metals, cyanide, and alkalinity in this sentinel well.	• pH ranged from 8.17 to 10.44, along with alkalinity ranging from 110 to 190 mg/L in 2019. • Cyanide was not detected. • All metal concentrations were below the screening level or background concentration with the exceptions of aluminum and manganese. Aluminum was detected at a concentration of 3.1 mg/L in Spring 2019, above the RSL of 2.0 mg/L. Manganese was detected at concentrations of 0.36 mg/L (unfiltered) in Spring 2019, and 0.35 mg/L (filtered) and 0.51 mg/L (unfiltered) in Fall 2019, above the background concentration of 0.075 mg/L.
25	RVAAP-08 Load Line 1 (southeast of Load Line 1 fence)	LL1mw-087	Unconsolidated	Continue to monitor explosives and metals to monitor migration potential.	• Explosives were not detected. • All metal concentrations were below the screening level or background concentration with the exception of manganese in Fall 2019. Manganese was detected at an estimated concentration of 0.28J mg/L, above the background concentration of 0.075 mg/L.
26	RVAAP-08 Load Line 1	LL1mw-088	Unconsolidated	Continue to monitor explosives, alkalinity, and metals in this sentinel well.	• pH ranged from 7.2 to 7.53, along with alkalinity ranging from 290 to 310 mg/L in 2019. • Explosives were not detected. • All metal concentrations were below the screening level or background concentration with the exception of arsenic. Arsenic was detected at a concentration of 0.028 mg/L in Spring 2019 and an estimated concentration of 0.028J mg/L in Fall 2019, exceeding the MCL of 0.01 mg/L.
27	RVAAP-08 Load Line 1	LL1mw-089	Unconsolidated	Continue to monitor explosives and re-collect rejected propellant results from 2018.	• All explosive and propellant concentrations were below their screening level.
28	RVAAP-09 Load Line 2 South	LL2mw-059	Upper Sharon	Continue to monitor explosives and metals.	• The explosive 1,3-DNB exceeded the RSL of 0.2 µg/L at an estimated concentration of 0.27J µg/L in Spring 2019 and an estimated concentration of 0.31J µg/L in Fall 2019. 2,4-DNT exceeded the RSL (0.24 µg/L) in Spring 2019 at a concentration of 0.52 µg/L. • All metal concentrations were below the screening level or background concentration.

Table 8-1. Summary of 2019 FWGWMP Wells, Rationale, and Results Recommended in 2019 Addendum (Continued)

No.	RVAAP-66 Area	Well Name	Aquifer	2019 FWGWMP Sampling Recommendations	2019 Sampling Results
29	RVAAP-09 Load Line 2	LL2mw-264	Upper Sharon	Continue to monitor cyanide.	• Cyanide was detected at an estimated concentration of 0.006J mg/L, below the MCL of 0.2 mg/L in Spring 2019. Cyanide was not detected in Fall 2019.
30	RVAAP-09 Load Line 2	LL2mw-267	Upper Sharon	Continue to monitor explosives and metals.	• All explosive concentrations were below the screening level. • All metal concentrations were below the screening level or background concentration with the exception of manganese. Manganese was detected at a concentration of 0.69 mg/L in Fall 2019, exceeding the background concentration of 0.198 mg/L.
31	RVAAP-09 Load Line 2	LL2mw-272	Upper Sharon	Continue to monitor cyanide.	• Cyanide was not detected.
32	RVAAP-10 Load Line 3	LL3mw-234	Upper Sharon	Continue to monitor cyanide.	• Cyanide was detected at an estimated concentration of 0.0087J mg/L, below the MCL of 0.2 mg/L in Spring 2019. Cyanide was not detected in Fall 2019.
33	RVAAP-10 Load Line 3	LL3mw-237	Upper Sharon	Continue to monitor explosives.	• The explosive 4-amino-2,6-DNT exceeded the RSL of 3.9 µg/L at a concentration of 4 µg/L in Spring 2019. 4-Amino-2,6-DNT did not exceed the screening level in Fall 2019.
34	RVAAP-10 Load Line 3	LL3mw-244	Upper Sharon	Continue to monitor explosives and metals.	• All explosive concentrations were below the screening level. • All metal concentrations were below the screening level or background concentration.
35	RVAAP-10 Load Line 3	LL3mw-246	Upper Sharon	Continue to monitor explosives, perchlorate, and metals	• All explosive concentrations were below the screening level. • All metal concentrations were below the screening level or background concentration. • Perchlorate was detected at concentrations below the screening level.
36	RVAAP-11 Load Line 4	LL4mw-200	Unconsolidated	Continue to monitor cyanide.	• Cyanide was not detected.
37	RVAAP-12 Load Line 12	LL12mw-183	Unconsolidated	Continue to monitor cyanide.	• Cyanide was not detected.
38	RVAAP-12 Load Line 12	LL12mw-185	Unconsolidated	Continue to monitor nitrate.	• Nitrate was detected at a concentrations of 92 mg/L in Spring 2019 and 89 mg/L in Fall 2019, exceeding the MCL of 10 mg/L.
39	RVAAP-12 Load Line 12	LL12mw-187	Unconsolidated	Continue to monitor nitrate and metals.	• Nitrate was detected at a concentration of 1,600 mg/L in Spring 2019, exceeding the MCL of 10 mg/L. Nitrate was not detected in Fall 2019. • All metal concentrations were below the screening level or background concentration with the exception of manganese. Manganese was detected at concentrations of 2.9 mg/L in Spring 2019 and 2.6 mg/L in Fall 2019, exceeding the background concentration of 0.075 mg/L.
40	RVAAP-12 Load Line 12	LL12mw-242	Unconsolidated	Continue to monitor nitrate and metals.	• Nitrate was not detected. • All metal concentrations were below the screening level or background concentration with the exceptions of arsenic and manganese. Arsenic was detected at concentrations of 0.022 mg/L (unfiltered) and 0.013J mg/L (filtered) in Spring 2019. Arsenic was detected at concentrations of 0.02 mg/L (unfiltered) and 0.018 mg/L (filtered) in Fall 2019, exceeding the MCL of 0.01 mg/L. Manganese was detected at concentrations of 0.15 mg/L (unfiltered) and 0.11 mg/L (filtered) in Fall 2019, exceeding the background concentration of 0.075 mg/L.
41	RVAAP-12 Load Line 12	LL12mw-245	Unconsolidated	Continue to monitor explosives, nitrate, and metals at this exit pathway well.	• Nitrate was detected at estimated concentrations of 0.12J mg/L in Spring 2019 and 0.23J mg/L in Fall 2019, below the MCL of 10 mg/L. • All explosive concentrations were below the screening level, and the only detected explosives were TNT and RDX in Spring 2019 at low, estimated concentrations. • All metal concentrations were below the screening level or background concentration, with the exceptions of arsenic and manganese. Arsenic was detected at a concentration of 0.012 mg/L in Spring 2019, exceeding the MCL of 0.01 mg/L. Manganese was detected at a concentration of 0.12 mg/L, exceeding the background concentration of 0.075 mg/L in Fall 2019.
42	RVAAP-12 Load Line 12 (south of Load Line 12 fence)	LL12mw-247	Unconsolidated	Continue to monitor metals and nitrate at this exit pathway well.	• Nitrate was not detected. • All metal concentrations were below the screening level or background concentration with the exception of manganese. Manganese was detected at a concentration of 0.16 mg/L in Spring 2019 and at an estimated concentration of 0.15J mg/L in Fall 2019, exceeding the background concentration of 0.075 mg/L.
43	RVAAP-13 Building 1200	B12mw-012	Upper Sharon	Analyze for metals to further understand nature and extent of contamination (per FCR LEIDOS_FWGW_009).	This well was sampled in Fall 2019 only. • All metal concentrations were below the screening level or background concentration with the exception of manganese. Manganese was detected at an estimated concentration of 0.55J mg/L, which exceeded the background concentration of 0.198 mg/L.

Table 8-1. Summary of 2019 FWGWMP Wells, Rationale, and Results Recommended in 2019 Addendum (Continued)

No.	RVAAP-66 Area	Well Name	Aquifer	2019 FWGWMP Sampling Recommendations	2019 Sampling Results
44	RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-171	Homewood	Continue to monitor cyanide, anions, and alkalinity.	• pH ranged from 5.7 to 5.76, along with alkalinity ranging from 41 to 45 mg/L in 2019. • Nitrite and sulfide were not detected, and nitrate was detected at concentrations below the MCL of 10 mg/L. • Cyanide was not detected.
45	RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-172	Homewood	Continue to monitor cyanide.	• Cyanide was not detected.
46	RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-174	Homewood	Continue to monitor explosives, anions, and alkalinity.	• pH ranged from 5.15 to 5.38, along with alkalinity ranging from 4.8J to 11 mg/L in 2019. • Nitrite and sulfide were not detected, and nitrate was detected below the MCL of 10 mg/L. • Many explosives exceeded screening criteria in Spring 2019. TNT at a concentration of 10 µg/L exceeded the RSL of 0.98 mg/L. 2,4-DNT at a concentration of 0.67 µg/L exceeded the RSL of 0.24 µg/L. 2-Amino-4,6-DNT at a concentration of 15 µg/L exceeded the RSL of 3.9 µg/L. 4-Amino-2,6-DNT at a concentration of 14 µg/L exceeded the RSL of 3.9 µg/L. RDX at a concentration of 1.2J µg/L exceeded the RSL of 0.97 µg/L.
47	RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-175	Homewood	Continue to monitor anions, alkalinity, and hexavalent chromium.	• pH ranged from 5.59 to 5.61, along with alkalinity ranging from 8.7J to 13 mg/L in 2019. • Nitrate and nitrite were detected at concentrations below their MCL. • Hexavalent chromium was not detected.
48	RVAAP-16 Fuze and Booster Quarry Landfill/Ponds	FBQmw-176	Unconsolidated	Continue to monitor cyanide.	• Cyanide was not detected.
49	RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-001	Unconsolidated	Continue quarterly monitoring for anions, perchlorate, phosphorus, explosives, PCBs, pesticides, VOCs, SVOCs, PAHs, cyanide, hexavalent chromium, and metals (January/May/August 2019).	• Explosives, PCBs, pesticides, VOCs, nitrate, nitrite, and sulfide were not detected during any sampling event. • The only SVOC detected was naphthalene. Naphthalene was detected in January 2019 at a low, estimated concentration of 0.017 J µg/L, below the RSL of 0.17 µg/L. • All metal concentrations were below the screening level or background concentration with the exception of manganese. Manganese exceeded the background concentration of 0.075 mg/L at concentrations of 0.39 mg/L (January 2019), 0.31 mg/L (May 2019), and 0.26 mg/L (August 2019). • Cyanide was detected at an estimated concentration of 0.015 mg/L in May 2019, below the MCL of 0.2 mg/L. • Perchlorate was detected at an estimated concentration of 0.012 µg/L in January 2019, below the RSL of 1.4 µg/L.
50	RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-002	Unconsolidated	Continue quarterly monitoring for anions, perchlorate, phosphorus, explosives, PCBs, pesticides, VOCs, SVOCs, PAHs, cyanide, hexavalent chromium, and metals (January/May/August 2019).	• PCBs, pesticides, nitrate, nitrite, and sulfide were not detected. • All metal concentrations were below the screening criteria or background concentration with the exception of manganese. Manganese exceeded the background concentration of 0.075 mg/L at concentrations of 1.2J mg/L (January 2019), 1.1 mg/L (May 2019), and 0.74 mg/L (August 2019). • Cyanide was detected at an estimated concentration of 0.0052J mg/L in the field duplicate sample from May 2019, which is below the MCL of 0.2 mg/L. • Perchlorate was detected at a low, estimated concentration of 0.014J µg/L in January 2019. • Benzoic acid was the only SVOC detected. It was detected at an estimated concentration of 9.8J µg/L in January 2019, below the RSL of 7,500 µg/L. • Acetone and methylene chloride were the only detected VOCs. Acetone was detected at an estimated concentration of 2.1J µg/L in May 2019, below the Tapwater RSL of 1,400 µg/L. Methylene chloride was detected in a field duplicate sample in January 2019 at an estimated concentration of 0.41J µg/L, below the RSL of 11 µg/L. • RDX was the only explosive detected. RDX was detected at a concentration of 0.54 µg/L, below the RSL of 0.97 µg/L in August 2019.

Table 8-1. Summary of 2019 FWGWMP Wells, Rationale, and Results Recommended in 2019 Addendum (Continued)

No.	RVAAP-66 Area	Well Name	Aquifer	2019 FWGWMP Sampling Recommendations	2019 Sampling Results
51	RVAAP-34 Sand Creek Disposal Road Landfill	SCLmw-003	Unconsolidated	Continue quarterly monitoring for anions, perchlorate, phosphorus, explosives, PCBs, pesticides, VOCs, SVOCs, PAHs, cyanide, hexavalent chromium, and metals (January/May/August 2019).	• Explosives, PCBs, pesticides, phosphorus, cyanide, nitrate, nitrite, and sulfide were not detected. • Perchlorate was detected at a low, estimated concentration of 0.0099J µg/L in January 2019. • All metal concentrations were below the screening level or background concentration with the exception of manganese. Manganese exceeded the background concentration of 0.075 mg/L at concentrations of 0.33 mg/L in January 2019, 0.23 mg/L in May 2019, and 0.26 mg/L in August 2019. • Benzoic acid was the only SVOC detected. It was detected at an estimated concentration of 11J µg/L in January 2019, below the screening level of 7,500 µg/L. • Acetone was the only VOC detected. Acetone was detected at an estimated concentration of 2.1J µg/L in May 2019, below the Tapwater RSL of 1,400 µg/L.
52	RVAAP-38 NACA Test Area	NTAmw-119	Unconsolidated	Continue to monitor PAHs, explosives, and metals.	• PAHs were not detected. • The only explosive detected was 4-nitrotoluene in Fall 2019 at an estimated concentration of 0.31J µg/L, below the screening level of 5.01 µg/L. • All metal concentrations were below the screening level or background concentration with the exception of manganese. Manganese was detected at a concentration of 0.33 mg/L in Spring 2019 and at an estimated concentration of 0.29J mg/L in Fall 2019, exceeding the background concentration of 0.075 mg/L.
53	RVAAP-38 NACA Test Area	NTAmw-120	Upper Sharon	Monitor hexachlorocyclopentadiene in spring due to rejected 2018 results.	• This well was sampled in Spring 2019 only. • Hexachlorocyclopentadiene was not detected.
54	RVAAP-40 Load Line 7	LL7mw-001	Homewood	Continue to sample for metals and cyanide.	• All metal concentrations were below the screening level or background concentration. • Cyanide was not detected.
55	RVAAP-40 Load Line 7	LL7mw-006	Homewood	Continue to monitor explosives.	• All explosives were below their screening level.
56	RVAAP-43 Load Line 10	LL10mw-003	Homewood	Continue to monitor VOCs.	• All VOCs were not detected except acetone, carbon tetrachloride, and chloroform, which were below their respective screening levels.
57	RVAAP-43 Load Line 10	LL10mw-005	Homewood	Continue to monitor metals.	• All metals were below the screening level or background concentration with the exception of manganese. Manganese was not detected in Spring 2019. Manganese was detected at an estimated concentration of 2.2J mg/L in Fall 2019, exceeding the background concentration of 0.56 mg/L.
58	RVAAP-44 Load Line 11	LL11mw-005	Unconsolidated	Continue to monitor cyanide	• Cyanide was not detected.
59	RVAAP-49 Central Burn Pits	CBPmw-008	Unconsolidated	Continue to monitor cyanide.	• Cyanide was not detected.
60	RVAAP-49 Central Burn Pits	CBPmw-009	Upper Sharon	Continue to monitor cyanide.	• Cyanide was not detected.
61	RVAAP-66 Facility-wide Groundwater (north of Smalley Road, Paris-Windham Road intersection)	FWGmw-002	Unconsolidated	Analyze for metals to further understand nature and extent of contamination (per FCR LEIDOS_FWGW_009).	This well was only sampled in Fall 2019. • All metal concentrations were below the screening level or background concentration with the exceptions of aluminum and manganese. Aluminum was detected at a concentration of 2.2 mg/L (unfiltered) in Fall 2019, exceeding the RSL of 2.0 mg/L. Manganese was detected at a concentration of 0.12 mg/L (filtered) and at an estimated concentration of 0.16J mg/L (unfiltered) in Fall 2019, exceeding the background concentration of 0.075 mg/L.
62	RVAAP-66 Facility-wide Groundwater (southern portion of Administration Area)	FWGmw-004	Unconsolidated	• Continue to monitor explosives and metals for migration potential. • Analyze for cyanide to address potential data gap (per FCR LEIDOS_FWGW_009).	• Explosives were not detected. • All metals were below the screening level or background concentration. • Cyanide was detected at an estimated concentration of 0.0095J mg/L in Fall 2019, below the MCL of 0.2 mg/L.
63	RVAAP-66 Facility-wide Groundwater (southwestern portion of facility, south of NACA Test Area)	FWGmw-007	Unconsolidated	Continue to monitor explosives and metals for migration potential.	• Explosives were not detected. • All metal concentrations were below the screening level or background concentration with the exception of manganese. Manganese was detected at a concentration of 0.13 mg/L in Spring 2019 and at an estimated concentration of 0.088J mg/L in Fall 2019, exceeding the background concentration of 0.075 mg/L.
64	RVAAP-66 Facility-wide Groundwater (near East Classification Yard)	FWGmw-011	Unconsolidated	Continue to monitor explosives and metals for migration potential.	• Explosives were not detected. • All metal concentrations were below the screening level or background concentration with the exception of manganese. Manganese was detected at a concentration of 0.29 mg/L in Spring 2019 and at an estimated concentration of 0.24J mg/L in Fall 2019, exceeding the background concentration of 0.075 mg/L.

Table 8-1. Summary of 2019 FWGWMP Wells, Rationale, and Results Recommended in 2019 Addendum (Continued)

No.	RVAAP-66 Area	Well Name	Aquifer	2019 FWGWMP Sampling Recommendations	2019 Sampling Results
65	RVAAP-66 Facility-wide Groundwater (near East Classification Yard)	FWGmw-012	Upper Sharon	Continue to monitor explosives and metals for migration potential.	• Explosives were not detected. • All metal concentrations were below the screening level or background concentration.
66	RVAAP-66 Facility-wide Groundwater (southeast of Administration Area)	FWGmw-015	Unconsolidated	Continue to monitor explosives and metals for migration potential.	• Explosives were not detected. • All metal concentrations were below the screening level or background concentration with the exception of manganese. Manganese was detected at a concentration of 0.34 mg/L, exceeding the background concentration of 0.075 mg/L in Fall 2019. Manganese did not exceed the screening level or background concentration in Spring 2019.
67	RVAAP-66 Facility-wide Groundwater (southeast of Administration Area)	FWGmw-016	Upper Sharon	Continue to monitor explosives and metals for migration potential.	• Explosives were not detected. • All metal concentrations were below the screening level or background concentration with the exception of manganese. Manganese was detected at a concentration of 0.22 mg/L, which exceeded the background concentration of 0.198 mg/L in Spring 2019. Manganese did not exceed the screening level or background concentration in Fall 2019.
68	RVAAP-66 Facility-wide Groundwater (off-facility, south of State Route 5, south of Load Line 12)	FWGmw-018	Basal Sharon	Continue to monitor VOCs, metals, and cyanide in this exit pathway well.	• VOCs were not detected. • All metal concentrations were below the screening level or background concentration. • Cyanide was detected at an estimated concentration of 0.0065J mg/L in Spring 2019, below the MCL of 0.2 mg/L. Cyanide was not detected in Fall 2019.
69	RVAAP-66 Facility-wide Groundwater (located between Load Line 10 and Load Line 9)	FWGmw-019	Basal Sharon	Resample for rejected propellant results from 2018.	This well was sampled in Spring 2019 as a re-collection of propellants. • The propellants nitrocellulose and nitroguanidine were not detected in Spring 2019.
70	RVAAP-66 Facility-wide Groundwater (off-facility, south of State Route 5, south of Load Line 12)	FWGmw-020	Upper Sharon	Continue to monitor VOCs, metals, and cyanide in this exit pathway well.	• VOCs were not detected. • All metal concentrations were below the screening level or background concentration with the exception of arsenic. Arsenic was detected at a concentration of 0.023 mg/L in Spring 2019 and at an estimated concentration of 0.031J mg/L in Fall 2019, exceeding the MCL of 0.01 mg/L. • Cyanide was detected at a concentration of 0.011 mg/L in Spring 2019, which is below the MCL of 0.2 mg/L. Cyanide was not detected in Fall 2019.
71	RVAAP-66 Facility-wide Groundwater (off-facility, south of State Route 5, south of Load Line 3)	FWGmw-021	Upper Sharon	Continue to monitor explosives and metals.	• All explosive concentrations were below the screening level. • All metal concentrations were below the screening level or background concentration with the exception of manganese. Manganese was detected at an estimated concentration of 0.39J mg/L in Fall 2019, exceeding the background concentration of 0.198 mg/L.
72	RVAAP-66 Facility-wide Groundwater (located between Load Line 10 and Load Line 9)	FWGmw-022	Upper Sharon	Resample for rejected propellant results from 2018.	This well was sampled in Spring 2019 as a re-collection of propellants. • The propellants nitrocellulose and nitroguanidine were not detected in Spring 2019.
73	RVAAP-66 Facility-wide Groundwater (located between Load Line 7 and Fuze and Booster Quarry Landfill/Ponds)	FWGmw-023	Upper Sharon	Resample for rejected propellant results from 2018.	This well was sampled in Spring 2019 as a re-collection of propellants. • The propellants nitrocellulose and nitroguanidine were not detected in Spring 2019.
74	RVAAP-66 Facility-wide Groundwater (off-facility, south of State Route 5, south of Load Line 2)	FWGmw-024	Upper Sharon	Continue to monitor explosives and metals.	• Explosives were not detected. • All metal concentrations were below the screening level or background concentration with the exception of manganese. Manganese was detected at a concentration of 0.33 mg/L in Spring 2019 and 0.26J mg/L in Fall 2019, exceeding the background concentration of 0.198 mg/L.
75	RVAAP-66 Facility-wide Groundwater (southeastern portion of facility)	SCFmw-004	Basal Sharon	Continue to monitor metals.	• All metal concentrations were below the screening level or background concentration.

Table 8-1. Summary of 2019 FWGWMP Wells, Rationale, and Results Recommended in 2019 Addendum (Continued)

No.	RVAAP-66 Area	Well Name	Aquifer	2019 FWGWMP Sampling Recommendations	2019 Sampling Results
76	RVAAP-66 Facility-wide Groundwater (north of Smalley Road, Paris-Windham Road intersection)	BKGmw-021	Unconsolidated	Analyze for metals to further understand nature and extent of contamination (per FCR LEIDOS_FWGW_009).	This well was sampled in Fall 2019 only. • All metal concentrations were below the screening level or background concentration.

Sampling recommendations are presented in Table 3-1 of the 2019 Addendum (Leidos 2019a) or applicable FCRs.
Table 3-1 does not include a discussion of essential nutrients (calcium, chloride, iodine, iron, magnesium, potassium, phosphorus, and sodium).
µg/L = Micrograms per liter
DFFO = Director's Final Findings and Orders.
DNB = Dinitrobenzene.
DNT = Dinitrotoluene.
FCR = Field Change Request.
FWGWMP = Facility-wide groundwater monitoring plan.
HMX = Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine.
MCL = Maximum contaminant level.
mg/L = milligrams per liter.
NACA = National Advisory Committee on Aeronautics.
PAH = Polycyclic aromatic hydrocarbon.
PCB = Polychlorinated biphenyl.
RCRA = Resource Conservation and Recovery Act.
RDX = Hexahydro-1,3,5-trinitro-1,3,5-triazine.
RSL = Regional screening level.
RVAAP = Ravenna Army Ammunition Plant.
S.U. = Standard unit.
SVOC = Semi-volatile organic compound.
TNT = 2,4,6-Trinitrotoluene.
VOC = Volatile organic compound.

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