SURFACE WATER COMPLIANCE REPORT

Former York Naval Ordnance Plant
1425 Eden Road, Springettsbury Township
York, Pennsylvania

Prepared for:

Former York Naval Ordnance Plant Remediation Team

January 21, 2022

Prepared by:

Groundwater Sciences Corporation
2550 Interstate Drive, Suite 303
Harrisburg, Pennsylvania 17110

SURFACE WATER COMPLIANCE REPORT

Former York Naval Ordnance Plant
1425 Eden Road, Springettsbury Township
York, Pennsylvania

Prepared for:

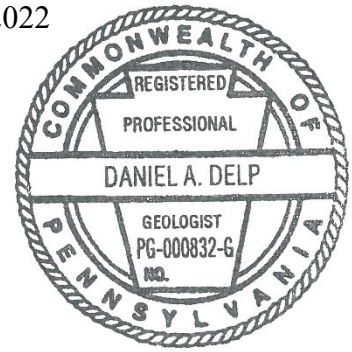
Former York Naval Ordnance Plant Remediation Team

January 21, 2022

Prepared by:

Groundwater Sciences Corporation

Daniel A. Delp, P.E., P.G.
Senior Associate
Groundwater Sciences Corporation
January 21, 2022



Christopher D. O'Neil, P.G.
Senior Hydrogeologist
Groundwater Sciences Corporation
January 21, 2022

Table of Contents

Tables

Figures

Appendices

** - in portable document format (PDF) on the USB Drive attached to this report.*

LIST OF ACRONYMS AND ABBREVIATIONS

%D	percent difference
%R	percent recoveries
%RSD	percent relative standard deviation
ARAR	applicable or relevant appropriate requirement
CCV	continuing calibration verification
cfs	cubic feet per second
cis12DCE	cis-1,2-dichloroethene
COC	constituent of concern
DQA	data quality assessment
DQI	data quality indicators
DQO	data quality objective
EDD	electronic data deliverables
FSP	Field Sampling Plan
fYNOP	former York Naval Ordnance Plant
gpm	gallons per minute
GSC	Groundwater Sciences Corporation
LCL	lower control limit
LCS/LCSD	laboratory control sample/laboratory control sample duplicate
MDL	method detection limit
MS/MSD	matrix spike/matrix spike duplicate
PADEP	Pennsylvania Department of Environmental Protection
PCE	tetrachloroethene
QA/QC	quality assurance/quality control
QAPP	Quality Assurance Project Plan
QC	quality control
Qh	harmonic mean flow
QL	quantitation limit
RA	risk assessment
RL	reporting limits
RPD	relative percent difference
RRFs	relative response factors

SDG	sample delivery groups
TCE	trichloroethene
UCL	upper control limit
µg/L	micrograms per liter
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VC	vinyl chloride
VOC	volatile organic compound
WPL	West Parking Lot
WQC	water quality criteria

EXECUTIVE SUMMARY

This report documents results of surface water monitoring conducted in Codorus Creek according to the former York Naval Ordnance Plant (fYNOP or Site) Site-Wide Cleanup Plan (Cleanup Plan). The results of surface water quality sampling were used with published precipitation and stream flow data to determine that applicable surface water criteria were met in Codorus Creek with fYNOP's West Parking Lot (WPL) groundwater extraction system operating.

The Cleanup Plan presented the scope, frequency, objectives, methods, and points of application within Codorus Creek where compliance of surface water quality criteria is evaluated. These points of application were determined using a Pennsylvania Department of Environmental Protection (PADEP) surface water discharge model and calculated stream velocities at specified design stream flows as detailed in the Cleanup Plan.

Twenty-four monthly surface water sampling events (September 2019 through August 2021) were performed. The monitoring events included sampling from three discharge locations (COD-SW-15, COD-SW-17, and COD-SW-26) and nine surface water locations downstream of discharge locations (COD-SW-6, COD-SW-7, COD-SW-8, COD-SW-9, COD-SW-13, COD-SW-16, COD-SW-27, COD-SW-28, and COD-SW-29).

Over a two-year period, water quality and stream flow data were collected during varying precipitation and stream flows that represent typical seasonal variations in Codorus Creek. Applicable surface water quality criteria (WQC) for Codorus Creek are the published PADEP Chapter 93 standards and the laboratory reporting limit (RL) for vinyl chloride (VC). During each monthly sampling event, detected concentrations of surface water constituents of concern (COCs) were below the applicable WQC at each sampling location. The COCs for fYNOP at Codorus Creek are tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cis12DCE), and VC.

Using the process described in the Cleanup Plan, surface water monitoring in Codorus Creek verifies that the fYNOP Site complies with WQC during operation of the WPL extraction system under stream flow and precipitation conditions that represent typical seasonal variations in the creek.

On September 1, 2021, a shutdown test of the WPL groundwater extraction system was initiated in accordance with the Cleanup Plan. Monthly surface water sampling of the Codorus Creek is

continuing during this test. The results of the shutdown test monitoring will be documented in a Final Report addressing requirements of the Pennsylvania Land Recycling and Environmental Remediation Standards Act (Act 2).

1 INTRODUCTION

This report documents results of surface water monitoring conducted in Codorus Creek at the former York Naval Ordnance Plant (fYNOP or Site). The fYNOP is located north of the City of York, in Springettsbury Township, York County, Pennsylvania, as shown on **Figure 1.0-1**. Site features and area designations at the fYNOP are illustrated on **Figure 1.0-2**.

Surface water monitoring was conducted according to the fYNOP Site-Wide Cleanup Plan (Cleanup Plan) (Groundwater Sciences Corporation [GSC], 2019) approved by the Pennsylvania Department of Environmental Protection (PADEP) in February 2020. The monitoring objectives are to verify continued compliance with applicable surface water quality criteria (WQC) in Codorus Creek with the West Parking Lot (WPL) groundwater extraction system operating.

Surface water quality sampling occurred monthly over a two-year period (September 2019 through August 2021). Samples were collected monthly from 12 locations in Codorus Creek identified in the Cleanup Plan and analyzed for fYNOP constituents of concern (COCs).

This report is organized into seven sections. A summary of Cleanup Plan requirements is presented in Section 2. Section 3 provides a description of surface water sampling. Data evaluation and interpretation from surface water sampling and analyses are presented in Section 4. A summary and conclusions are provided in Section 5. Section 6 contains the laboratory data quality assessment and Section 7 is a list of references.

2 SUMMARY OF CLEANUP PLAN REQUIREMENTS FOR SURFACE WATER

The objective of WPL groundwater extraction is to reduce mass flux of COCs from the Site to Codorus Creek. The human health risk assessment (RA) for groundwater (Groundwater RA, NewFields, 2018) identified recreational wading as the only complete exposure pathway to Site groundwater entering Codorus Creek. The Groundwater RA concluded that no unacceptable risk to humans exists by wading in the creek under pumping and non-pumping conditions. However, the Cleanup Plan determined that an applicable or relevant appropriate requirement (ARAR) for the Site was compliance with Chapter 93 WQC. Therefore, the Cleanup Plan provided a monitoring plan to determine the impact on Codorus Creek water quality from COC migration from the Site as follows:

- Operate the WPL groundwater extraction system in its current configuration for two years during monthly surface water quality sampling of Codorus Creek—Data will be used to demonstrate continued compliance with Chapter 93 WQC in Codorus Creek over two complete hydrologic cycles.

- After the two-year WPL system operation and Codorus Creek monitoring, perform a shutdown test of the WPL extraction system—WPL extraction wells will be deactivated while surface water monitoring of Codorus Creek continues through one complete hydrologic cycle.

The Cleanup Plan presented the scope, frequency, objectives, and methods to evaluate data to determine compliance with Chapter 93 WQC at specific points of application in Codorus Creek. To determine sampling locations and application of WQCs at these locations, the Cleanup Plan considered in-stream mixing, stream geometry, and sensitivity analyses of variables used in the evaluation. Sampling locations and WQC assigned to each sampling location determined by the evaluation are shown on **Figure 2.0-1** and **Table 2.0-1**, respectively.

This Report addresses the first bullet, above, and evaluates the results of monthly sample analytical data from September 2019 to August 2021 to determine compliance with applicable WQC in Codorus Creek. The report shows that stream flow variability during sampling is consistent with historical fluctuations in Codorus Creek and that analytical results demonstrate compliance with WQC over wide variations of stream flow. The second bullet, above, will be addressed in the Final Report

addressing requirements of the Pennsylvania Land Recycling and Environmental Remediation Standards Act (Act 2).

Site-related COCs for the creek are tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cis12DCE), and vinyl chloride (VC). **Table 2.0-2** provides the applicable WQC for each surface water COC. The published human health criteria for PCE, TCE, and VC changed in July 2020 from 0.69 micrograms per liter (µg/L) to 10 µg/L, from 2.5 µg/L to 0.6 µg/L, and from 0.025 µg/L to 0.02 µg/L, respectively, after publication of the Cleanup Plan. The criteria for cis12DCE did not change. The PADEP Chapter 93 standard for VC is lower than can be reliably achieved using Pennsylvania-certified analytical methods. In these situations, the analytical method quantitation limit (QL) and applicable reporting limit (RL) are used to determine compliance (i.e., 1.0 µg/L for samples collected prior to May 2020 and 0.5 µg/L for samples collected on and after May 2020).

3 SURFACE WATER SAMPLING

This Section describes monitoring activities and results of monthly surface water sampling conducted in September 2019 through August 2021. These activities meet the requirements defined in the Cleanup Plan.

Surface water monitoring procedures used to collect and analyze data are described in the Field Sampling Plan (FSP) (GSC, 2012) and the Quality Assurance Project Plan (QAPP) (GSC, 2020a). Copies of the FSP and the QAPP are available on the public website, https://yorksiteremedy.com.

3.1 Scope of Sampling and Analysis

Twenty-four monthly surface water samples (September 2019 through August 2021) were collected and analyzed from 12 locations in Codorus Creek shown on **Figure 2.0-1**. Three groundwater discharge locations (COD-SW-15, COD-SW-17, and COD-SW-26) and nine surface water sampling locations downstream of discharge locations (COD-SW-6, COD-SW-7, COD-SW-8, COD-SW-9, COD-SW-13, COD-SW-16, COD-SW-27, COD-SW-28, and COD-SW-29) were sampled.

Two hundred eighty-eight surface water samples were analyzed for the project analyte list volatile organic compounds (VOCs) in the QAPP using SW-846 Method 8260C or 8260D. As identified in the Cleanup Plan, surface water COCs in Codorus Creek are PCE, TCE, cis12DCE, and VC. Sample collection and field measurement documentation are in **Appendix A**.

Laboratory analytical reports for the samples are in **Appendix B**. During surface water sampling and analysis, the laboratory RL for the COCs changed from 1 µg/L to 0.5 µg/L. In addition, the method detection limit (MDL) changed from 0.5 µg/L to 0.06 µg/L for PCE, 0.7 µg/L to 0.06 µg/L for TCE, 0.7 µg/L to 0.05 µg/L for cis12DCE, and 0.4 µg/L to 0.1 µg/L for VC. The laboratory data quality assessment (DQA) is described in Section 6.

3.2 WPL System Operations

Table 3.2-1 provides the average monthly pumping rate for the WPL groundwater extraction system from September 2019 to August 2021. The extraction system removed and treated groundwater during that period at an average pumping rate of 237 gallons per minute (gpm). The average monthly

pumping rate ranged from 220 gpm in June 2021 to 272 gpm in October 2019. During the 24-month period of surface water sampling, groundwater was extracted at rates typical of those since 2015 when the WPL extraction system was reconfigured. In the four years prior to surface water sampling, the average WPL extraction system pumping rate was 220 gpm.

3.3 Precipitation and Hydrology

Figures 3.3-1 and **3.3-2** provide published United States Geologic Survey (USGS) average daily stream flow rates (referenced to by USGS as discharge rates) of Codorus Creek for the York and Pleasureville gaging stations for the 24-month period of sampling. The two stations bracket the Site with the York Station located 4.3 miles upstream of the fYNOP Site and the Pleasureville Station located 4.1 miles downstream (**Figure 3.3-3**).

As shown on **Figures 3.3-1** and **3.3-2**, sampling occurred over varying creek flows and both gaging stations show similar magnitudes and ranges of flow over the 24-month sampling period. Average daily flows in Codorus Creek at the Pleasureville station on the sampling dates ranged from 83 to 617 cubic feet per second (cfs) (**Table 3.2-1**). This range of stream flows encompasses the calculated harmonic mean flow (Qh) of 117 cfs. The flow rates are above the calculated lowest seven-day average flow that occurs once every ten years (Q7-10) of 36 cfs for the Pleasureville station. **Table 3.3-1** provides published stream discharge statistics for the gaging stations and Qh and Q7-10 flows shown on **Figures 3.3-1** and **3.3-2**, calculated using the United States Geological Survey (USGS) StreamStats software.

Table 3.3-2 presents precipitation data for the York Airport Weather Station between January 2017 and September 2021. Based on a comparison of precipitation amounts during the 24-month period of surface water sampling with published normal monthly precipitation, seven months were greater than normal, 16 months were less than normal, and one month was equal to normal precipitation amounts. Both annual (September to August) precipitation amounts during surface water sampling (37.2 and 34.7 inches) are less than the published normal annual precipitation value (42.1 inches).

3.4 Data Representativeness

As shown on **Figure 3.3-2** (Pleasureville station), surface water samples were collected over a representative range of flows (from 83 cfs [September 2019] to 617 cfs [December 2019]). Due to

the sample collection schedule and short duration of peak flows, samples were not collected during some higher creek flows. A representative sample from COD-SW-17 could not be collected in September 2019 due to minimal discharge and this location was sampled instead on October 9, 2019.

Over a two-year period, surface water quality data was collected during varying precipitation and stream flows that represent typical seasonal variations in Codorus Creek. Therefore, the monthly samples were collected during conditions that represent typical flow variability in Codorus Creek and normal precipitation amounts.

4 DATA EVALUATION AND INTERPRETATION

4.1 Analytical Results

Table 4.1-1 contains the COC surface water analytical results for 24 monthly sampling events in Codorus Creek. COCs were detected at all sampling locations at low concentrations. Out of the 288 samples analyzed, PCE was detected in 134 samples, TCE was detected in 135 samples, cis12DCE was detected in 154 samples, and VC was detected in two samples (both from COD-SW-17). The highest PCE, TCE, cis12DCE, and VC concentrations were detected at sampling location COD-SW-17. The following describes the concentration range of detected COCs at the sampling locations:

- Detected PCE concentrations range from 0.06 J µg/L to 8.4 µg/L,
- Detected TCE concentrations range from 0.063 J µg/L to 3.4 µg/L,
- Detected cis12DCE concentrations range from 0.05 J µg/L to 1.8 µg/L, and
- Detected VC concentrations range from 0.11 J µg/L to 0.25 J µg/L.

From the nine surface water sampling locations downstream of discharge locations (COD-SW-6, COD-SW-7, COD-SW-8, COD-SW-9, COD-SW-13, COD-SW-16, COD-SW-27, COD-SW-28, and COD-SW-29), COC detections comprise only 59 percent of the total COCs detected while comprising 75 percent of the total samples analyzed. In addition, the maximum detected PCE, TCE, and cis12DCE concentrations at these downstream locations are low at less than 0.30 µg/L.

4.2 Compliance Determination

Table 4.1-1 presents a comparison of applicable WQC with the COC analytical results at points of application in Codorus Creek. Reported COC concentrations were below the applicable WQC at each sampling location during the 24 monthly sampling events. The result of this comparison indicates that compliance was attained for all surface water COCs at all sample locations using the process described in the Cleanup Plan.

5 SUMMARY AND CONCLUSIONS

Using the process described in the Cleanup Plan, 288 surface water samples were collected from 12 locations in Codorus Creek for analysis of project analyte list VOCs. Sampling was conducted monthly from September 2019 through August 2021 during varying stream flows and precipitation amounts representative of normal conditions. Detected concentrations of surface water COCs in Codorus Creek were below applicable WQC. These results verify continued compliance with WQC in Codorus Creek during WPL groundwater extraction system operation.

Site groundwater data indicate that natural processes coupled with almost 30 years of WPL extraction system operations have reduced the mass of COCs in the aquifer and mass flux of COCs to Codorus Creek to a point where future WPL pumping may not be necessary. A shutdown test of the WPL groundwater extraction system was initiated on September 1, 2021, in accordance with the Cleanup Plan. Surface water quality in Codorus Creek is currently being monitored monthly with WPL extraction well pumps off. The results of monitoring will be documented in a Final Report addressing requirements of Act 2.

6 LABORATORY DATA QUALITY ASSESSMENT

Electronic data deliverables (EDDs) from the laboratory (Eurofins Lancaster Laboratories Env, LLC) are entered into the fYNOP database during the process of managing environmental chemistry data at the fYNOP. The data packages provided by the laboratory for surface water samples were reviewed in accordance with the QAPP and qualified individual sample results, as necessary, in the fYNOP database.

The DQA was performed on eight rounds of monthly surface water data from January through August 2021. The DQA for monthly surface water data from September 2019 through December 2020 was completed previously and included in the Groundwater and Surface Water Monitoring Reports for 2019 and 2020 (GSC, 2020b and 2021). The laboratory DQA was performed in accordance with the quality assurance/quality control (QA/QC) program described in this section. Eight sample delivery groups (SDGs) were generated for these surface water samples. Data packages for the SDGs were reviewed for holding time exceedances of VOCs, surrogate recoveries, and blank detections of VOCs as part of the general review of data packages. The laboratory case narratives for the SDGs were also reviewed.

The surface water and associated quality control (QC) trip blank samples were analyzed for VOCs using approved methods specified in the QAPP (GSC, 2020a). The data validator conducted a complete validation of the VOC analytical data in the SDGs for compliance with QC criteria in accordance with Section B.2.8 of the QAPP using the United States Environmental Protection Agency's (USEPA) National Functional Guidelines for Organic Superfund Methods Data Review (USEPA-540-R-2017-002, USEPA, 2017) and the validation and verification methods described in Section D.2 of the QAPP. USEPA-540-R-2017-002 uses the following categories to address the data quality indicators (DQIs) of precision, bias, representativeness, comparability, completeness, and sensitivity described in Section A.7.2 of the QAPP as follows:

1. Review and verification of the laboratory case narrative.

2. Verification of sample reanalysis and secondary dilutions were used to assess the DQIs for comparability and sensitivity.

3. Holding time limits were used to assess the DQIs for representativeness and low bias.

4. Surrogate (System Monitoring Compound) percent recoveries (%R) for organic methods were used to assess the DQIs for low/high bias.

5. Blank contamination (in method, field, equipment rinse, and trip blanks) was used to assess the DQIs for high bias.

6. Relative Response Factors (RRFs) in initial calibration and continuing calibrations, Percent Relative Standard Deviation (%RSD) in initial calibrations, and Percent Difference (%D) in continuing calibrations were used to assess the DQIs for low/high bias.

7. Matrix Spike and Matrix Spike Duplicate (MS/MSD), %R, and Relative Percent Difference (RPD) were used to assess the DQI for low/high bias.

8. Laboratory Control Sample and Laboratory Control Sample Duplicate (LCS/LCSD), %R, and RPD were used to assess the DQIs for precision and low/high bias.

9. Field duplicate samples were used to assess the DQIs for precision and representativeness at the frequency of one field duplicate per 20 environmental samples being analyzed for VOCs.

Surface water chemistry data and associated QC data were evaluated based on these DQIs and qualified according to the outcome of the review. During verification, individual sample results were qualified as necessary to designate usability of the data toward meeting project objectives. Data qualifiers were applied based on deviations from the measurement performance criteria identified in USEPA-540-R-2017-002 and Table A-2 of the QAPP. The qualifiers used are defined as follows:

- U – The analyte was analyzed but was not detected above the reported sample quantitation limit. These results are qualitatively acceptable.

- J – The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample. Although estimated, these results are qualitatively acceptable.

- UJ – The analyte was not detected above the reported sample quantitation limit. The reported quantitation limit is approximate and may or may not represent the actual limit of quantitation

necessary to measure the analyte accurately and precisely in the sample. Although estimated, these results are qualitatively acceptable.

- R – The analyte result was rejected due to serious deficiencies in the ability to analyze the sample and/or meet QC criteria. The presence or absence of the analyte cannot be verified.

In accordance with USEPA-540-R-2017-002, the contents of the data packages and QA/QC results were compared to the requirements of the analytical method. QC data reported by the laboratory was evaluated against required precision and accuracy limits established in Table A-2 of the QAPP. A validation report generated for the SDGs is presented on the table in **Appendix C**. This table lists only the analytical results qualified by the data validator that show the original laboratory qualifiers and reported values together with the final qualifiers (U, J, UJ, or R) and values applied by the validator. A detailed data validation narrative on precision, bias, representativeness, comparability, completeness, and sensitivity is provided in **Appendix D**.

In summary, the analytical results were acceptable as reported by the analytical laboratory with exceptions as follows:

- The %R for two reported analytes was outside LCS/LCSD control limits, and the results for 10 samples were qualified "UJ" based on LCS/LCSD %R acceptance criteria.

- MS/MSD results outside the QC limits for VOCs resulted in the qualification "UJ" (not detected and estimated) of seven analytes in one surface water sample due to the potential for high bias where the MS/MSD results were greater than the upper control limit (UCL), or the potential for low bias where the MS/MSD results were less than the lower control limit (LCL).

- Results for acetone in 12 surface water samples were qualified "U" (not detected) due to method blank contamination with the potential for high bias.

- Results for acetone in nine surface water samples and for methylene chloride in two surface water samples were qualified "U" (not detected) due to trip blank contamination with the potential for high bias.

- Three analytes (ketones) in 13 samples from the March 2021 sampling event were qualified as not detected and estimated ("UJ") based on continuing calibration verification (CCV) criteria with the potential for high or low bias. One analyte (2-butanone) detected in one surface water sample from the same event was qualified as estimated ("J") based on CCV criteria.

- Three of the calculated RPDs for the field duplicate surface water samples collected in May 2021 exceeded the data quality objective (DQO) for precision (<50 RPD). The analytical results for three VOCs in both samples from COD-SW-17 were qualified as estimated ("J").

7 REFERENCES

GSC, 2012. Field Sampling Plan for Part 2 of the Supplemental Groundwater Remedial Investigation at the former York Naval Ordnance Plant in York, Pennsylvania, April.

GSC, 2019. Site-Wide Cleanup Plan, Former York Naval Ordnance Plant, 1425 Eden Road, Springettsbury Township, York, Pennsylvania, November.

GSC, 2020a. Quality Assurance Project Plan, Former York Naval Ordnance Plant, 1425 Eden Road, Springettsbury Township, York, Pennsylvania, November.

GSC, 2020b. Groundwater and Surface Water Monitoring Report for 2019, Former York Naval Ordnance Plant, 1425 Eden Road, Springettsbury Township, York, Pennsylvania, July.

GSC, 2021. Groundwater and Surface Water Monitoring Report for 2020, Former York Naval Ordnance Plant, 1425 Eden Road, Springettsbury Township, York, Pennsylvania, June.

NewFields, 2018. Revised Groundwater Human Health Risk Assessment, Former York Naval Ordnance Plant, March.

Tables

Table 2.0-1
Water Quality Criteria Application - Surface Water Sampling Locations
Former York Naval Ordnance Plant - York, Pennsylvania

Surface Water Sampling Location	Fish and Aquatic Life		Human Health
	AFC	CFC	CRL
COD-SW-26	X		
COD-SW-6	X	X	X
COD-SW-7	X	X	X
COD-SW-17	X		
COD-SW-16	X	X	
COD-SW-27	X	X	
COD-SW-15	X		
COD-SW-13	X	X	
COD-SW-28	X	X	
COD-SW-8	X	X	
COD-SW-9	X	X	
COD-SW-29	X	X	X

Notes:
AFC - Acute Fish Criteria or Criteria Maximum Concentration from Chapter 93
CFC - Chronic Fish Criteria or Criteria Continuous Concentration from Chapter 93
CRL - Cancer Risk Level Human Health Criteria from Chapter 93
X - Applicable surface water quality criteria

Table 2.0-2
PADEP Surface Water Quality Criteria
Former York Naval Ordnance Plant - York, Pennsylvania

	Fish and Aquatic Life		Human Health
	AFC	CFC	CRL
Constituent of Concern (COC)	**(µg/L)**	**(µg/L)**	**(µg/L)**
cis-1,2-Dichloroethene (cis12DCE)	N/A	N/A	12
Tetrachloroethene (PCE)	700	140	10
Trichloroethene (TCE)	2,300	450	0.6
Vinyl Chloride (VC)	N/A	N/A	0.02

Notes:
Surface water quality criteria from 25 Pa. Code § Chapter 93 - Water Quality Standards (Table 5 - Water Quality Criteria for Toxic Substances), effective July 11, 2020. The CRL values for PCE, TCE, and VC were amended on July 10, 2020 and are different than the CRL values in the Cleanup Plan.
CFC - Chronic Fish Criteria or Criteria Continuous Concentration from Chapter 93
AFC - Acute Fish Criteria or Criteria Maximum Concentration from Chapter 93
CRL - Cancer Risk Level or Human Health Criteria from Chapter 93
Criteria are reviewed periodically and are subject to change
N/A - Criterion not developed
µg/L - micrograms per liter

Table 3.2-1
Surface Water Monitoring Information
Former York Naval Ordnance Plant - York, Pennsylvania

Sample Collection Date	Sample Description[1]	Average Monthly West Parking Lot (WPL) Groundwater Extraction System Pumping Rate (gpm)[2]	Average Daily Stream Gage Discharge (cfs)[3]
09/23/19	Month 1	270	83
10/24/19	Month 2	272	128
11/21/19	Month 3	244	106
12/18/19	Month 4	240	617
01/23/20	Month 5	240	223
02/24/20	Month 6	231	268
03/25/20	Month 7	241	287
04/28/20	Month 8	240	346
05/26/20	Month 9	241	249
06/24/20	Month 10	240	271
07/28/20	Month 11	229	157
08/25/20	Month 12	232	133
09/25/20	Month 13	229	96
10/29/20	Month 14	232	284
11/30/20	Month 15	225	366
12/23/20	Month 16	232	309
01/26/21	Month 17	233	147
02/25/21	Month 18	230	487
03/24/21	Month 19	226	400
04/26/21	Month 20	239	197
05/25/21	Month 21	232	129
06/24/21	Month 22	220	109
07/29/21	Month 23	232	115
08/26/21	Month 24	231	176

Notes:

gpm - gallons per minute

cfs - cubic feet per second

(1) Month since sampling was initiated in September 2019.

(2) Data provided by HTG.

(3) Stream Gage Location - USGS 01575585 Codorus Creek at Pleasureville, PA (https://waterdata.usgs.gov/).

Table 3.3-1
Stream Discharge Statistics for Codorus Creek
Former York Naval Ordnance Plant - York, Pennsylvania

USGS Gaging Station Location	Data Source											
	Stucky 2011 (Published)[1]				StreamStats Collection Station Report (Published)[2]				StreamStats Basin Delineation Report (Calculated)[3]			
	Controlled Harmonic Mean	Harmonic Mean	Controlled 7D10Y Low	7D10Y Low	Controlled Harmonic Mean	Harmonic Mean	Controlled 7D10Y Low	7D10Y Low	Controlled Harmonic Mean	Harmonic Mean	Controlled 7D10Y Low	7D10Y Low
01575500 - Codorus Creek Near York (Upstream of fYNOP)	N/A	88	N/A	19	88	89	19	N/A	N/A	81	N/A	24
01575585 - Codorus Creek at Pleasureville (Downstream of fYNOP)	N/A	N/A	N/A	N/A	N/A	189	N/A	N/A	N/A	117	N/A	36

Notes:
N/A - Discharge data not available
7D10Y Low - 7 day 10 year low flow
Discharge data reported in cubic feet per second (cfs)
(1) Values are published in Stuckey, M.H., and Roland, M.A., 2011, Selected streamflow statistics for stream gage locations in and near Pennsylvania: U.S. Geological Survey Scientific Investigations Report 2011–1070, 88 p.
(2) Values are published on USGS StreamStats Data-Collection Station Reports for gaging stations 01575500 and 01575585 (https://streamstats.usgs.gov/ss/)
(3) Values were calculated using USGS StreamStats software (https://streamstats.usgs.gov/ss/)
(4) Yellow highlighted cells represent calculated discharge values used in the Surface Water Compliance Report

Table 3.3-2
Precipitation Data for York Airport Weather Station
Former York Naval Ordnance Plant - York, Pennsylvania

Month	Total Monthly Precipitation (inches)[1]					Normal Monthly Precipitation (inches)[2]
	2017	2018	2019	2020	2021	
Jan	2.6	2.1	1.4	3.0	1.5	2.6
Feb	1.8	4.8	1.5	2.3	3.4	2.5
Mar	3.0	1.1	5.1	3.1	2.4	3.7
Apr	1.4	3.9	3.0	4.1	1.9	3.4
May	3.6	4.6	6.3	2.5	3.4	4.2
Jun	2.1	5.4	3.9	4.2	0.5	3.2
Jul	5.0	11.7	5.0	3.0	3.9	4.3
Aug	4.0	5.7	0.9	2.7	8.1	3.8
Sep	2.3	7.2	0.7	0.9	11.2	4.8
Oct	3.7	2.0	6.1	2.9	--	3.6
Nov	2.3	7.9	1.5	3.1	--	3.1
Dec	0.8	4.2	4.0	2.7	--	3.1
Year	**Calculated Total Annual Monthly Precipitation (inches)**					**Normal Annual Precipitation (inches)[2]**
	2017	**2018**	**2019**	**2020**	**2021**	
	32.5	60.6	39.2	34.6	--	42.1

Year 1 (Sept 2019 - Aug 2020) Calculated Total Annual Precipitation = 37.2 inches
Year 2 (Sept 2020 - Aug 2021) Calculated Total Annual Precipitation = 34.7 inches

Notes:

(1) Monthly precipitation data were obtained from the PA State Climatologist website: http://www.climate.psu.edu/data/ (York, PA airport weather station).

(2) Normal monthly and annual precipitation values are from the National Oceanic and Atmospheric Administration precipitation normals from the latest 30-year period (1991-2020) for the York, PA airport weather station. https://www.ncei.noaa.gov/access/us-climate-normals/

(3) Yellow highlighted cells represent the 24-month period of fYNOP surface water monitoring.

Table 4.4-1
Monthly Surface Water Sampling Results
Former York Naval Ordnance Plant - York, Pennsylvania

Sample Location	Sample Date	Constituent of Concern (COC) Result (1)				PADEP Surface Water Quality Criteria											
						Fish and Aquatic Life								Human Health			
						AFC	AFC	AFC	AFC	CFC	CFC	CFC	CFC	CRL	CRL	CRL	CRL
		TCE	PCE	cis12DCE	VC	TCE=2,300	PCE=700	cis12DCE=NE	VC=NE	TCE=450	PCE=140	cis12DCE=NE	VC=NE	TCE=0.60	PCE=10	cis12DCE=12	VC=0.02
COD-SW-26	09/23/19	1U	**5.1**	1U	1U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	10/24/19	1U	**4.2**	1U	1U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	11/21/19	1U	**4.7**	1U	1U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	12/18/19	1U	**1.0**	1U	1U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	01/23/20	1U	**4.0**	1U	1U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	02/24/20	1U	**0.55J**	1U	1UJ	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	03/25/20	1U	1U	1U	1U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	04/28/20	1U	**1.6**	1U	1UJ	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	05/26/20	0.5U	**3.1**	**0.072J**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	06/24/20	0.5U	**1.5**	**0.077J**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	07/28/20	**0.19J**	**3.6**	**0.091J**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	08/25/20	**0.19J**	**3.9**	**0.075J**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	09/25/20	**0.20J**	**3.7**	**0.083J**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	10/29/20	0.5U	0.5U	**0.064J**	0.5UJ	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	11/30/20	**0.063J**	0.5U	0.5U	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	12/23/20	0.5U	**0.72**	**0.06J**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	01/26/21	**0.13J**	**2.0**	0.5U	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	02/25/21	0.5U	**0.42J**	0.5U	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	03/24/21	**0.14J**	**2.1**	**0.069J**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	04/26/21	**0.18J**	**4.5**	**0.067J**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	05/25/21	**0.17J**	**4.0**	0.5U	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	06/24/21	**0.16J**	**3.2**	**0.08J**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	07/29/21	**0.12J**	**1.3**	**0.12J**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	08/26/21	**0.17J**	**3.4**	**0.1J**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 4.4-1
Monthly Surface Water Sampling Results
Former York Naval Ordnance Plant - York, Pennsylvania

Sample Location	Sample Date	Constituent of Concern (COC) Result (1)				PADEP Surface Water Quality Criteria											
						Fish and Aquatic Life								Human Health			
						AFC	AFC	AFC	AFC	CFC	CFC	CFC	CFC	CRL	CRL	CRL	CRL
		TCE	PCE	cis12DCE	VC	TCE=2,300	PCE=700	cis12DCE=NE	VC=NE	TCE=450	PCE=140	cis12DCE=NE	VC=NE	TCE=0.60	PCE=10	cis12DCE=12	VC=0.02
COD-SW-6	09/23/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	X	X	X	X
	10/24/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	X	X	X	X
	11/21/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	X	X	X	X
	12/18/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	X	X	X	X
	01/23/20	1U	1U	1U	1U	X	X	X	X	X	X	X	X	X	X	X	X
	02/24/20	1U	1U	1U	1U	X	X	X	X	X	X	X	X	X	X	X	X
	03/25/20	1U	1U	1U	1U	X	X	X	X	X	X	X	X	X	X	X	X
	04/28/20	1U	1U	1U	1UJ	X	X	X	X	X	X	X	X	X	X	X	X
	05/26/20	0.5U	0.5U	**0.057J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	06/24/20	0.5U	0.5U	0.5U	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	07/28/20	**0.065J**	0.5U	**0.067J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	08/25/20	**0.063J**	0.5U	0.5U	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	09/25/20	**0.098J**	0.5U	**0.099J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	10/29/20	0.5U	0.5U	0.5U	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	11/30/20	0.5U	0.5U	0.5U	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	12/23/20	0.5U	0.5U	0.5U	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	01/26/21	0.5U	0.5U	0.5U	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	02/25/21	0.5U	0.5U	0.5U	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	03/24/21	0.5U	0.5U	0.5U	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	04/26/21	0.5U	0.5U	**0.059J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	05/25/21	**0.087J**	0.5U	0.5U	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	06/24/21	0.5U	0.5U	**0.088J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	07/29/21	**0.072J**	0.5U	**0.11J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	08/26/21	**0.12J**	0.5U	**0.14J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
COD-SW-7	09/23/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	X	X	X	X
	10/24/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	X	X	X	X
	11/21/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	X	X	X	X
	12/18/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	X	X	X	X
	01/23/20	1U	1U	1U	1U	X	X	X	X	X	X	X	X	X	X	X	X
	02/24/20	1U	1U	1U	1U	X	X	X	X	X	X	X	X	X	X	X	X
	03/25/20	1U	1U	1U	1U	X	X	X	X	X	X	X	X	X	X	X	X
	04/28/20	1U	1U	1U	1UJ	X	X	X	X	X	X	X	X	X	X	X	X
	05/26/20	**0.098J**	0.5U	0.5U	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	06/24/20	0.5U	0.5U	**0.084J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	07/28/20	**0.081J**	0.5U	**0.080J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	08/25/20	**0.10J**	**0.065J**	**0.097J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	09/25/20	**0.15J**	0.5U	0.5U	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	10/29/20	**0.10J**	0.5U	**0.078J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	11/30/20	**0.082J**	0.5U	**0.067J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	12/23/20	0.5U	**0.074J**	**0.063J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	01/26/21	0.5U	**0.066J**	0.5U	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	02/25/21	0.5U	0.5U	0.5U	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	03/24/21	**0.096J**	0.5U	**0.069J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	04/26/21	**0.089J**	**0.075J**	**0.065J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	05/25/21	**0.082J**	**0.085J**	**0.085J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	06/24/21	**0.094J**	**0.076J**	**0.11J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	07/29/21	**0.13J**	**0.085J**	**0.19J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	08/26/21	**0.19J**	**0.17J**	**0.19J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X

Table 4.4-1
Monthly Surface Water Sampling Results
Former York Naval Ordnance Plant - York, Pennsylvania

Sample Location	Sample Date	Constituent of Concern (COC) Result (1)				PADEP Surface Water Quality Criteria											
						Fish and Aquatic Life								Human Health			
						AFC	AFC	AFC	AFC	CFC	CFC	CFC	CFC	CRL	CRL	CRL	CRL
		TCE	PCE	cis12DCE	VC	TCE=2,300	PCE=700	cis12DCE=NE	VC=NE	TCE=450	PCE=140	cis12DCE=NE	VC=NE	TCE=0.60	PCE=10	cis12DCE=12	VC=0.02
COD-SW-17	10/9/2019 (2)	**1.2**	**3.0**	**0.99J**	1U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	10/24/19	**1.6**	**3.1**	**1.3**	1U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	11/21/19	**1.5**	**3.8**	**1.0**	1U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	12/18/19	1U	**2.0**	1U	1U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	01/23/20	**1.2**	**3.1**	**0.995**	1U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	02/24/20	**2.5**	**6.6**	**1.8**	1U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	03/25/20	1U	1U	1U	1U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	04/28/20	1U	**1.2**	1U	1UJ	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	05/26/20	**0.68**	**1.3**	**0.52**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	06/24/20	**2.0**	**3.4**	**1.8**	**0.25J**	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	07/28/20	**1.4**	**3.0**	**1.1**	**0.11J**	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	08/25/20	**2.8**	**7.1**	**1.6**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	09/25/20	**1.0**	**2.3**	**0.78**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	10/29/20	**0.28J**	**0.44J**	**0.14J**	0.5UJ	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	11/30/20	0.5U	0.5U	0.5U	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	12/23/20	**0.9**	**2.3**	**0.65**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	01/26/21	**1.2**	**3.3**	**0.81**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	02/25/21	0.5U	0.5U	**0.051J**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	03/24/21	**0.9**	**2.1**	**0.57**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	04/26/21	**1.0**	**2.4**	**0.80**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	05/25/21	**0.35J**	**0.54J**	**0.36J**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	06/24/21	**1.1**	**3.5**	**0.81**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	07/29/21	**0.2J**	**0.23J**	**0.2J**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	08/26/21	**3.4**	**8.4**	**1.7**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 4.4-1
Monthly Surface Water Sampling Results
Former York Naval Ordnance Plant - York, Pennsylvania

Sample Location	Sample Date	Constituent of Concern (COC) Result (1)				PADEP Surface Water Quality Criteria											
						Fish and Aquatic Life								Human Health			
						AFC	AFC	AFC	AFC	CFC	CFC	CFC	CFC	CRL	CRL	CRL	CRL
		TCE	PCE	cis12DCE	VC	TCE=2,300	PCE=700	cis12DCE=NE	VC=NE	TCE=450	PCE=140	cis12DCE=NE	VC=NE	TCE=0.60	PCE=10	cis12DCE=12	VC=0.02
COD-SW-16	09/23/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	10/24/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	11/21/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	12/18/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	01/23/20	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	02/24/20	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	03/25/20	1U	1U	1U	1UJ	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	04/28/20	1U	1U	1U	1UJ	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	05/26/20	**0.16J**	**0.075J**	**0.090J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	06/24/20	**0.078J**	0.5U	**0.082J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	07/28/20	**0.078J**	0.5U	**0.087J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	08/25/20	**0.13J**	**0.072J**	**0.12J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	09/25/20	**0.11J**	**0.068J**	**0.11J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	10/29/20	**0.087J**	0.5U	0.5U	0.5UJ	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	11/30/20	0.5U	0.5U	**0.5U**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	12/23/20	0.5U	0.5U	**0.068J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	01/26/21	**0.1J**	0.5U	**0.092J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	02/25/21	0.5U	0.5U	0.5U	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	03/24/21	**0.09J**	0.5U	**0.082J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	04/26/21	**0.081J**	**0.065J**	**0.076J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	05/25/21	**0.087J**	**0.062J**	**0.11J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	06/24/21	0.5U	0.5U	0.5U	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	07/29/21	**0.11J**	**0.062J**	**0.18J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	08/26/21	**0.19J**	**0.12J**	**0.23J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
COD-SW-27	09/23/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	10/24/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	11/21/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	12/18/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	01/23/20	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	02/24/20	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	03/25/20	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	04/28/20	1U	1U	1U	1UJ	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	05/26/20	0.5U	**0.079J**	**0.079J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	06/24/20	**0.097J**	**0.12J**	**0.087J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	07/28/20	0.5U	0.5U	**0.069J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	08/25/20	**0.089J**	0.5U	**0.090J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	09/25/20	**0.11J**	0.5U	**0.11J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	10/29/20	**0.094J**	**0.061J**	**0.068J**	0.5UJ	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	11/30/20	**0.072J**	0.5U	0.5U	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	12/23/20	0.5U	**0.068J**	**0.062J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	01/26/21	**0.15J**	**0.13J**	**0.11J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	02/25/21	0.5U	**0.063J**	0.5U	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	03/24/21	**0.096J**	0.5U	**0.079J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	04/26/21	**0.072J**	**0.064J**	**0.066J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	05/25/21	**0.084J**	**0.079J**	**0.094J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	06/24/21	0.5U	0.5U	**0.11J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	07/29/21	**0.24J**	**0.29J**	**0.20J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	08/26/21	**0.17J**	**0.14J**	**0.19J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A

Table 4.4-1
Monthly Surface Water Sampling Results
Former York Naval Ordnance Plant - York, Pennsylvania

Sample Location	Sample Date	Constituent of Concern (COC) Result (1)				PADEP Surface Water Quality Criteria											
						Fish and Aquatic Life								Human Health			
						AFC	AFC	AFC	AFC	CFC	CFC	CFC	CFC	CRL	CRL	CRL	CRL
		TCE	PCE	cis12DCE	VC	TCE=2,300	PCE=700	cis12DCE=NE	VC=NE	TCE=450	PCE=140	cis12DCE=NE	VC=NE	TCE=0.60	PCE=10	cis12DCE=12	VC=0.02
COD-SW-15	09/23/19	**0.96J**	**2.9**	**0.79J**	1U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	10/24/19	**1.3**	**2.6**	**0.97J**	1U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	11/21/19	**0.99J**	**2.7**	**0.86J**	1U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	12/18/19	**0.86J**	**3.0**	**0.83J**	1U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	01/23/20	**0.86J**	**2.4**	**0.87J**	1UJ	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	02/24/20	**1.4**	**3.1**	**1.4**	1U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	03/25/20	1U	**2.2**	1U	1UJ	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	04/28/20	**1.5**	**2.8**	**1.2**	1UJ	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	05/26/20	**1.0**	**3.1**	**0.83**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	06/24/20	**0.89**	**2.5**	**0.77**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	07/28/20	**0.89**	**2.5**	**0.75**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	08/25/20	**1.1**	**3.0**	**0.85**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	09/25/20	**0.86**	**2.2**	**0.70**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	10/29/20	**0.79**	**2.0**	**0.66**	0.5UJ	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	11/30/20	**0.29J**	**0.64**	**0.23J**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	12/23/20	**0.97**	**2.8**	**0.84**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	01/26/21	**0.78**	**2.1**	**0.66**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	02/25/21	**0.53**	**1.5**	**0.43J**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	03/24/21	**0.98**	**2.9**	**0.78**	0.5UJ	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	04/26/21	**0.86**	**2.4**	**0.69**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	05/25/21	**0.75**	**2.2**	**0.63**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	06/24/21	**0.80**	**2.2**	**0.66**	0.5UJ	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	07/29/21	**0.83**	**2.2**	**0.67**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	08/26/21	**1.1**	**3.3J**	**0.89**	0.5U	X	X	X	X	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
COD-SW-13	09/23/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	10/24/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	11/21/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	12/18/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	01/23/20	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	02/24/20	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	03/25/20	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	04/28/20	1U	1U	1U	1UJ	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	05/26/20	0.5U	0.5U	**0.08J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	06/24/20	**0.074J**	0.5U	**0.083J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	07/28/20	**0.073J**	0.5U	**0.086J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	08/25/20	**0.13J**	**0.064J**	**0.12J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	09/25/20	**0.13J**	0.5U	**0.12J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	10/29/20	0.5U	**0.074J**	**0.051J**	0.5UJ	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	11/30/20	0.5U	0.5U	**0.056J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	12/23/20	**0.069J**	0.5U	**0.078J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	01/26/21	0.5U	**0.064J**	**0.092J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	02/25/21	0.5U	0.5U	**0.051J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	03/24/21	**0.097J**	**0.06J**	**0.085J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	04/26/21	**0.071J**	0.5U	**0.075J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	05/25/21	**0.092J**	0.5U	**0.11J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	06/24/21	**0.10J**	0.5U	**0.13J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	07/29/21	**0.12J**	0.5U	**0.14J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	08/26/21	**0.22J**	**0.14J**	**0.24J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A

Table 4.4-1
Monthly Surface Water Sampling Results
Former York Naval Ordnance Plant - York, Pennsylvania

Sample Location	Sample Date	Constituent of Concern (COC) Result (1)				PADEP Surface Water Quality Criteria											
						Fish and Aquatic Life								Human Health			
						AFC	AFC	AFC	AFC	CFC	CFC	CFC	CFC	CRL	CRL	CRL	CRL
		TCE	PCE	cis12DCE	VC	TCE=2,300	PCE=700	cis12DCE=NE	VC=NE	TCE=450	PCE=140	cis12DCE=NE	VC=NE	TCE=0.60	PCE=10	cis12DCE=12	VC=0.02
COD-SW-28	09/23/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	10/24/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	11/21/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	12/18/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	01/23/20	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	02/24/20	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	03/25/20	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	04/28/20	1U	1U	1U	1UJ	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	05/26/20	**0.098J**	**0.13J**	**0.085J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	06/24/20	0.5U	**0.87J**	0.5U	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	07/28/20	0.5U	**0.080J**	0.5U	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	08/25/20	**0.097J**	**0.11J**	**0.098J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	09/25/20	0.5U	**0.078J**	0.5U	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	10/29/20	0.5U	**0.088J**	0.5U	0.5UJ	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	11/30/20	0.5U	0.5U	0.5U	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	12/23/20	0.5U	**0.14J**	0.5U	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	01/26/21	**0.091J**	**0.08J**	**0.059J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	02/25/21	0.5U	**0.11J**	0.5U	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	03/24/21	0.5U	**0.068J**	0.5U	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	04/26/21	**0.07J**	**0.11J**	**0.059J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	05/25/21	0.5U	**0.087J**	0.5U	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	06/24/21	0.5U	**0.096J**	**0.073J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	07/29/21	**0.10J**	**0.10J**	**0.14J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	08/26/21	0.5U	**0.081J**	0.5U	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
COD-SW-8	09/23/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	10/24/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	11/21/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	12/18/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	01/23/20	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	02/24/20	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	03/25/20	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	04/28/20	1U	1U	1U	1UJ	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	05/26/20	0.5U	0.5U	0.5U	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	06/24/20	**0.075J**	0.5U	**0.077J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	07/28/20	**0.068J**	0.5U	**0.076J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	08/25/20	**0.12J**	**0.064J**	**0.12J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	09/25/20	**0.11J**	0.5U	**0.11J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	10/29/20	0.5U	0.5U	**0.086J**	0.5UJ	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	11/30/20	0.5U	0.5U	0.5U	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	12/23/20	0.5U	0.5U	0.5U	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	01/26/21	**0.12J**	**0.062J**	**0.092J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	02/25/21	0.5U	0.5U	0.5U	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	03/24/21	**0.097J**	0.5U	**0.088J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	04/26/21	**0.075J**	0.5U	**0.069J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	05/25/21	**0.095J**	0.5U	**0.11J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	06/24/21	0.5U	0.5U	**0.12J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	07/29/21	**0.099J**	0.5U	**0.13J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	08/26/21	**0.2J**	**0.099J**	**0.24J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A

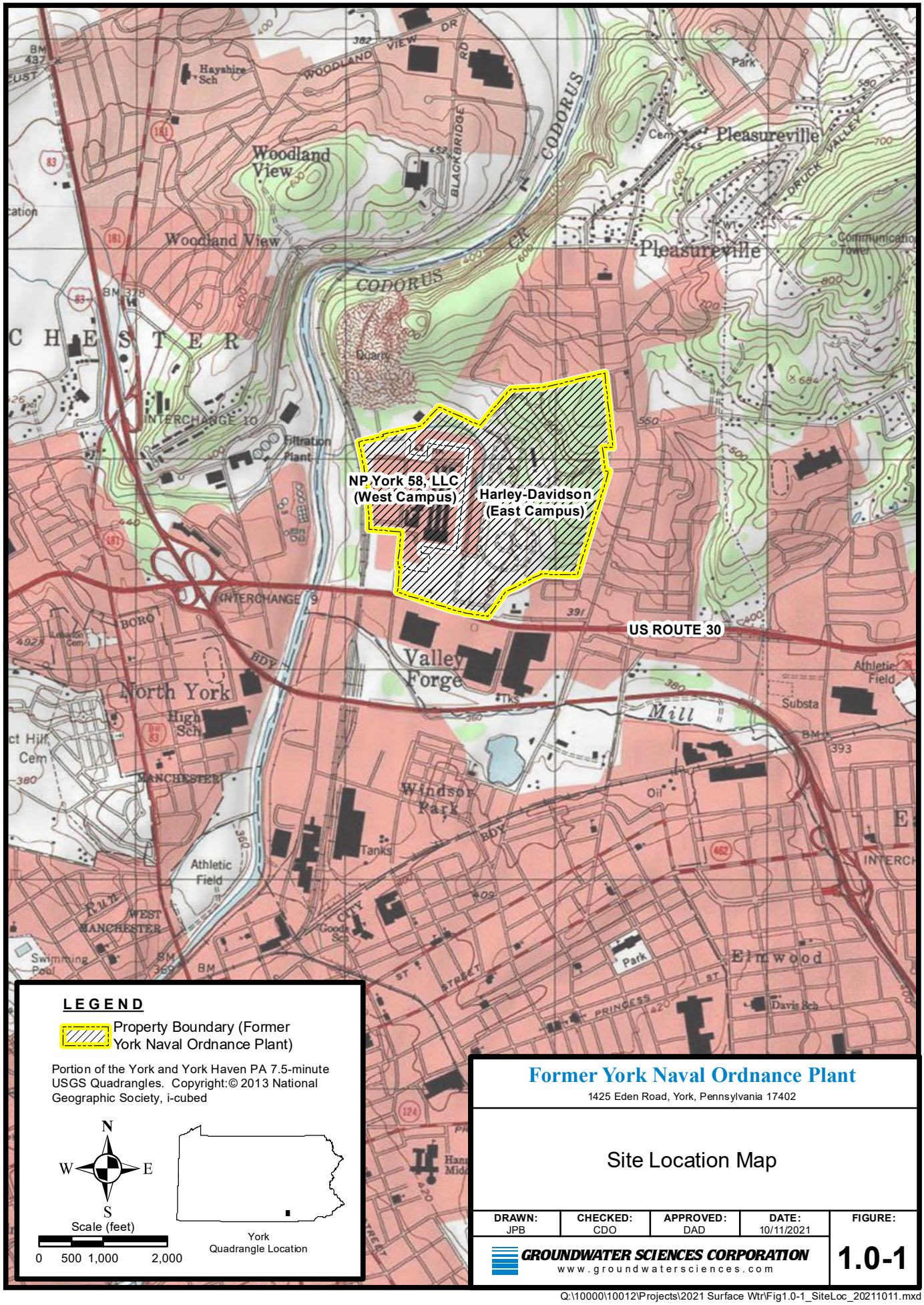
Table 4.4-1
Monthly Surface Water Sampling Results
Former York Naval Ordnance Plant - York, Pennsylvania

Sample Location	Sample Date	Constituent of Concern (COC) Result (1)				PADEP Surface Water Quality Criteria											
						Fish and Aquatic Life								Human Health			
						AFC	AFC	AFC	AFC	CFC	CFC	CFC	CFC	CRL	CRL	CRL	CRL
		TCE	PCE	cis12DCE	VC	TCE=2,300	PCE=700	cis12DCE=NE	VC=NE	TCE=450	PCE=140	cis12DCE=NE	VC=NE	TCE=0.60	PCE=10	cis12DCE=12	VC=0.02
COD-SW-9	09/23/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	10/24/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	11/21/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	12/18/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	01/23/20	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	02/24/20	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	03/25/20	1U	1U	1U	1U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	04/28/20	1U	1U	1U	1UJ	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	05/26/20	**0.073J**	**0.094J**	**0.059J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	06/24/20	0.5U	**0.088J**	0.5U	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	07/28/20	0.5U	**0.076J**	0.5U	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	08/25/20	**0.074J**	**0.076J**	0.5U	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	09/25/20	0.5U	**0.084J**	**0.061J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	10/29/20	0.5U	**0.088J**	0.5U	0.5UJ	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	11/30/20	0.5U	0.5U	0.5U	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	12/23/20	0.5U	**0.11J**	0.5U	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	01/26/21	0.5U	**0.082J**	0.5U	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	02/25/21	0.5U	**0.076J**	0.5U	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	03/24/21	0.5U	**0.078J**	0.5U	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	04/26/21	**0.063J**	**0.09J**	0.5U	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	05/25/21	0.5U	**0.073J**	0.5U	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	06/24/21	0.5U	**0.085J**	**0.11J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	07/29/21	0.5U	**0.081J**	**0.078J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
	08/26/21	**0.072J**	**0.094J**	**0.072J**	0.5U	X	X	X	X	X	X	X	X	N/A	N/A	N/A	N/A
COD-SW-29	09/23/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	X	X	X	X
	10/24/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	X	X	X	X
	11/21/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	X	X	X	X
	12/18/19	1U	1U	1U	1U	X	X	X	X	X	X	X	X	X	X	X	X
	01/23/20	1U	1U	1U	1U	X	X	X	X	X	X	X	X	X	X	X	X
	02/24/20	1U	1U	1U	1U	X	X	X	X	X	X	X	X	X	X	X	X
	03/25/20	1U	1U	1U	1U	X	X	X	X	X	X	X	X	X	X	X	X
	04/28/20	1U	1U	1U	1UJ	X	X	X	X	X	X	X	X	X	X	X	X
	05/26/20	0.5U	0.5U	**0.067J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	06/24/20	**0.065J**	0.5U	**0.076J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	07/28/20	0.5U	0.5U	**0.080J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	08/25/20	**0.12J**	**0.074J**	0.5U	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	09/25/20	**0.11J**	0.5U	**0.11J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	10/29/20	**0.092J**	**0.065J**	**0.10J**	0.5UJ	X	X	X	X	X	X	X	X	X	X	X	X
	11/30/20	0.5U	0.5U	0.5U	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	12/23/20	**0.075J**	0.5U	**0.076J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	01/26/21	0.5U	**0.061J**	**0.084J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	02/25/21	0.5U	0.5U	0.5U	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	03/24/21	**0.10J**	0.5U	**0.083J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	04/26/21	**0.075J**	0.5U	**0.076J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	05/25/21	**0.10J**	0.5U	**0.11J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	06/24/21	**0.11J**	0.5U	**0.13J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	07/29/21	**0.11J**	**0.064J**	**0.13J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X
	08/26/21	**0.2J**	**0.12J**	**0.21J**	0.5U	X	X	X	X	X	X	X	X	X	X	X	X

Table 4.4-1
Monthly Surface Water Sampling Results
Former York Naval Ordnance Plant - York, Pennsylvania

Sample Location	Sample Date	Constituent of Concern (COC) Result (1)				PADEP Surface Water Quality Criteria											
						Fish and Aquatic Life								Human Health			
						AFC	AFC	AFC	AFC	CFC	CFC	CFC	CFC	CRL	CRL	CRL	CRL
		TCE	PCE	cis12DCE	VC	TCE=2,300	PCE=700	cis12DCE=NE	VC=NE	TCE=450	PCE=140	cis12DCE=NE	VC=NE	TCE=0.60	PCE=10	cis12DCE=12	VC=0.02
Notes:	Results and criteria are reported in micrograms per liter (µg/L)																
	cis12DCE - cis-1,2-Dichloroethene																
	PCE - Tetrachloroethene																
	TCE - Trichloroethene																
	VC - Vinyl Chloride																
	(1) Non-detect results for COCs are shown as the laboratory Reporting Limit (RL) followed by "U". COC results that were detected between the laboratory RL and the Method Detection Limit (MDL) are shown as the approximate concentration reported by the laboratory followed by "J". These "J" concentrations were positively identified in the sample and are qualitatively acceptable. MDLs for cis12DCE , PCE, and TCE are less than the lowest PADEP surface water quality criteria (i.e., Human Health CRLs) of 12 µg/L, 10 µg/L, and 0.60 µg/L, respectively (see laboratory reports for MDLs). The RL and MDL for VC are greater than the lowest PADEP surface water quality criteria of 0.02 µg/L (see laboratory reports for RLs and MDLs); however, the laboratory method is NELAC-certified and the RL for VC is acceptable for criteria comparison.															
	(2) - Sample from location COD-SW-17 was collected on 10/09/19 because it was dry (no flow from spring) on 09/23/19.																
	Bold font indicates analyte detected in sample																
	Surface water quality criteria from 25 Pa. Code Chapter 93 - Water Quality Standards (Table 5 - Water Quality Criteria for Toxic Substances). Criteria are reviewed periodically and are subject to change.																
	CFC - Chronic Fish Criteria or Criteria Continuous Concentration from Chapter 93																
	AFC - Acute Fish Criteria or Criteria Maximum Concentration from Chapter 93																
	CRL - Cancer Risk Level or Human Health Criteria from Chapter 93																
	NE - Criterion not established																
	N/A - Criterion does not apply to samples from this location																
	X - Criterion applies to samples collected from this location																
	Blue highlight indicates sample result is less than criterion																

Figures



Former York Naval Ordnance Plant

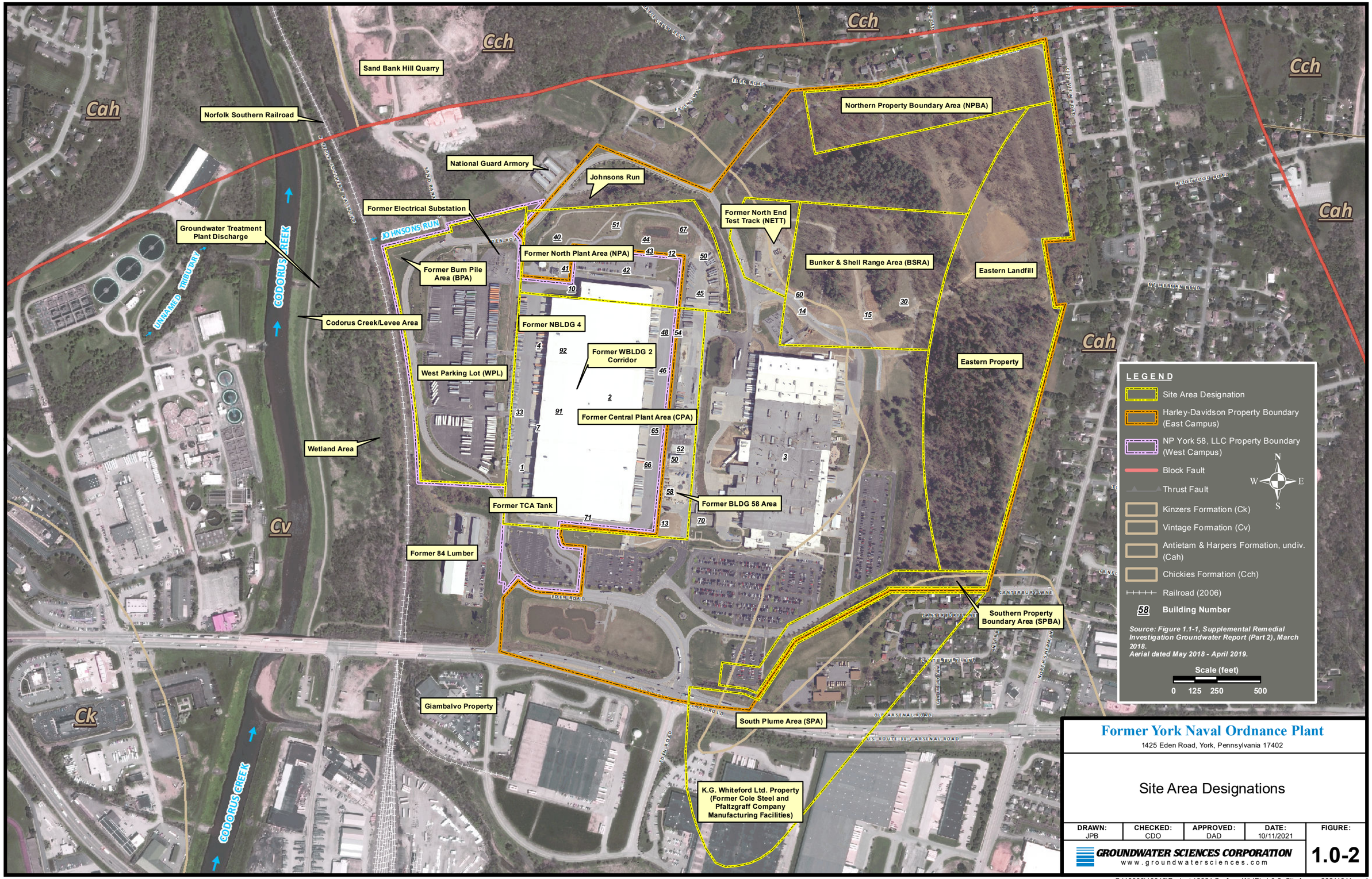
1425 Eden Road, York, Pennsylvania 17402

Site Location Map

DRAWN:	CHECKED:	APPROVED:	DATE:	FIGURE:
JPB	CDO	DAD	10/11/2021	1.0-1

GROUNDWATER SCIENCES CORPORATION
www.groundwatersciences.com

Q:\10000\10012\Projects\2021 Surface Wtr\Fig1.0-1_SiteLoc_20211011.mxd



Former York Naval Ordnance Plant

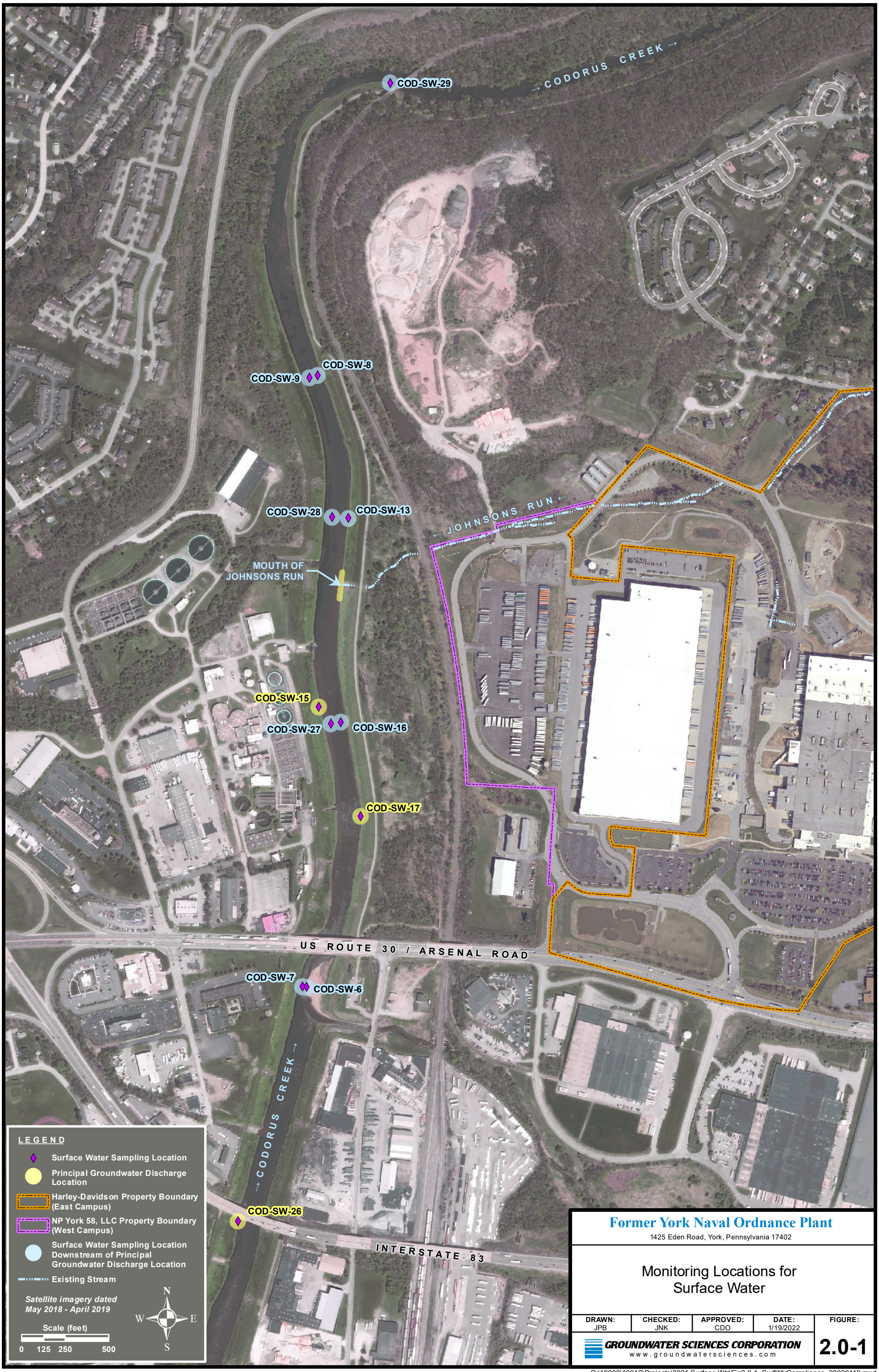
1425 Eden Road, York, Pennsylvania 17402

Site Area Designations

DRAWN:	CHECKED:	APPROVED:	DATE:	FIGURE:
JPB	CDO	DAD	10/11/2021	1.0-2

GROUNDWATER SCIENCES CORPORATION
www.groundwatersciences.com

Q:\10000\10012\Projects\2021 Surface Wtr\Fig1.0-2_SiteAreas_20211011.mxd



Former York Naval Ordnance Plant

1425 Eden Road, York, Pennsylvania 17402

Monitoring Locations for Surface Water

DRAWN:	CHECKED:	APPROVED:	DATE:	FIGURE:
JPB	JNK	CDO	1/19/2022	2.0-1

GROUNDWATER SCIENCES CORPORATION
www.groundwatersciences.com

Q:\10000\10012\Projects\2021 Surface Wtr\Fig2.0-1_SurfWtrCompliance_20220119.mxd

Figure 3.3-1
Codorus Creek Discharge - USGS Gaging Station No. 01575500 - Codorus Creek Near York, PA (Upstream of fYNOP)
Former York Naval Ordnance Plant - York, PA

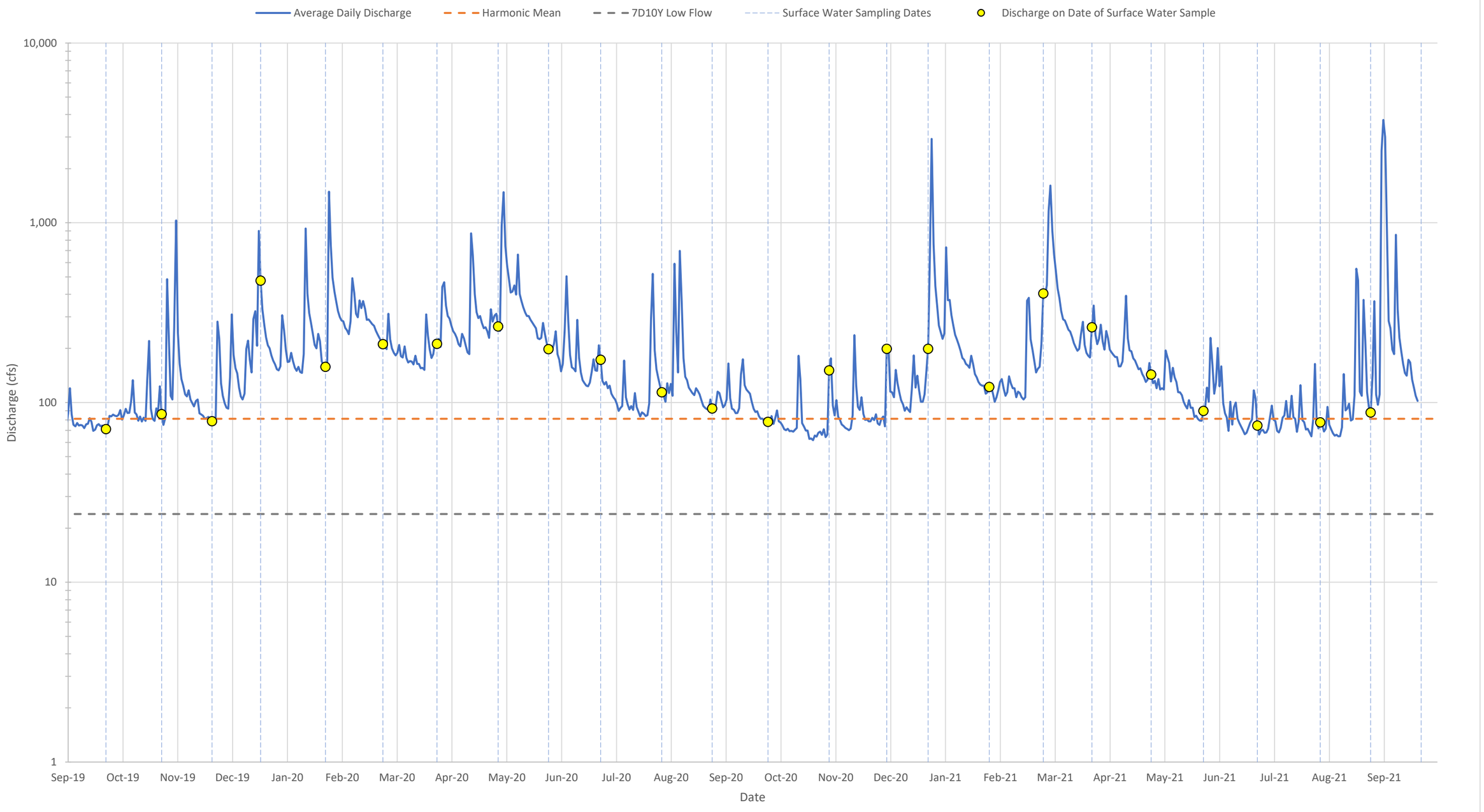
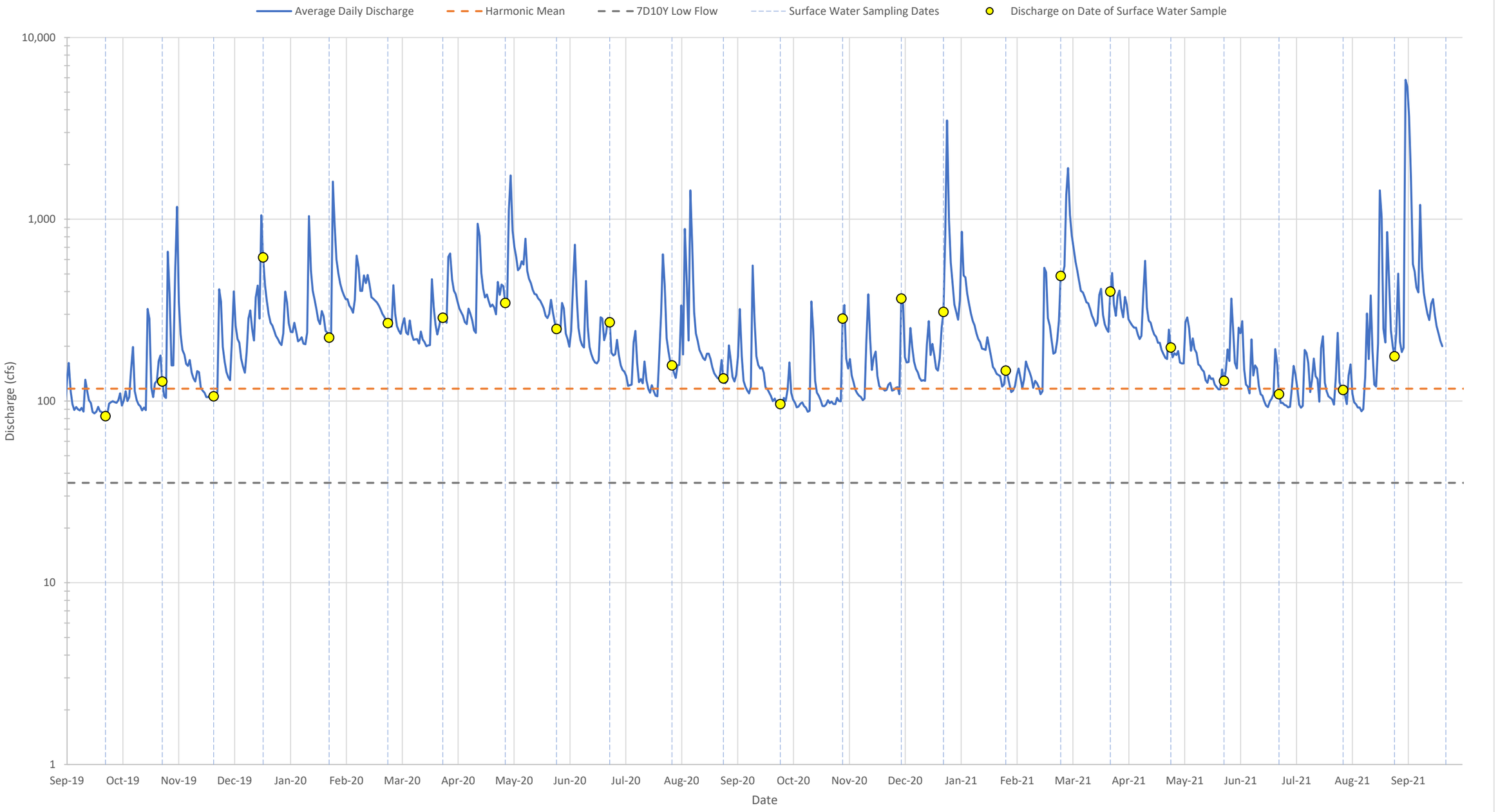
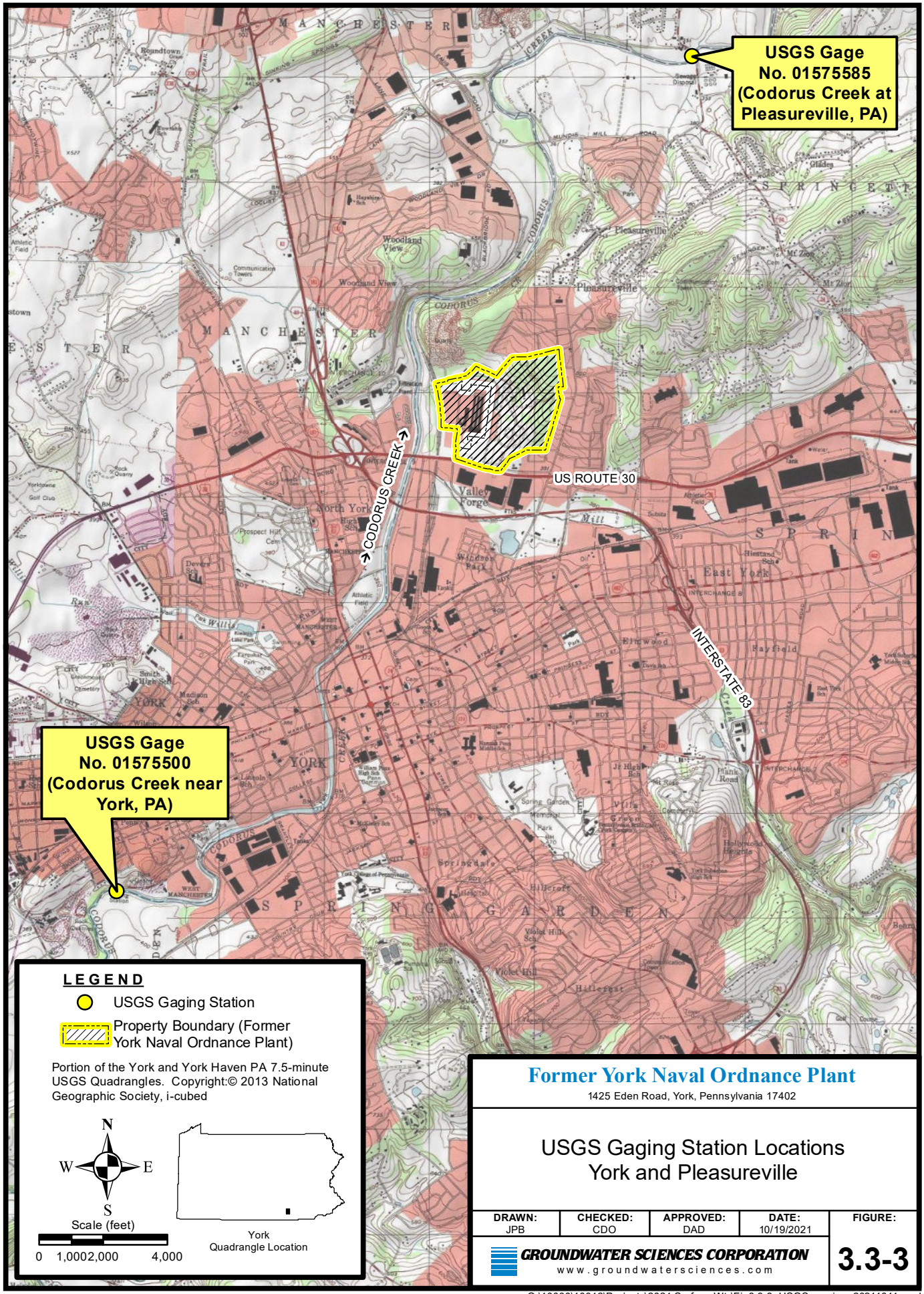


Figure 3.3-2
Codorus Creek Discharge - USGS Gaging Station No. 01575585 - Codorus Creek at Pleasureville, PA (Downstream of fYNOP)
Former York Naval Ordnance Plant - York PA





Former York Naval Ordnance Plant

1425 Eden Road, York, Pennsylvania 17402

USGS Gaging Station Locations York and Pleasureville

DRAWN:	CHECKED:	APPROVED:	DATE:	FIGURE:
JPB	CDO	DAD	10/19/2021	3.3-3

GROUNDWATER SCIENCES CORPORATION
www.groundwatersciences.com

Q:\10000\10012\Projects\2021 Surface Wtr\Fig3.3-3_USGSgauging_20211011.mxd

Appendix A

Surface Water Sampling Field Measurement Data*

** - in portable document format (PDF) on the USB Drive attached to this report.*

Appendix B

Laboratory Analysis Reports for Samples*

** - in portable document format (PDF) on the USB Drive attached to this report.*

Appendix C

Data Validation Report*

** - in portable document format (PDF) on the USB Drive attached to this report.*

Appendix D

Data Validation Narrative

Laboratory Data Validation Narrative

Surface water samples were collected in 2021 in accordance with a comprehensive quality assurance/quality control (QA/QC) program. Eight (8) sample delivery groups (SDGs) were generated for 112 samples that were collected monthly from January 26, 2021, through August 26, 2021. The total includes eight quality control (QC) trip blank samples and eight duplicate samples. All samples were analyzed for volatile organic compounds (VOCs) by SW-846 Method 8260D.

Groundwater Sciences Corporation (GSC) systematically reviewed the eight SDGs for compliance with QC criteria in accordance with Section B.2.8 of the Quality Assurance Project Plan (QAPP). The GSC data validators conducted a complete data validation on these SDGs using United States Environmental Protection Agency's (USEPA's) National Functional Guidelines for Organic Superfund Methods Data Review (USEPA-540-R-2017-002) and the validation and verification methods described in Section D.2 of the QAPP. The following criteria were reviewed:

1. Review and verification of the laboratory case narrative;
2. Verification of sample reanalysis and secondary dilutions;
3. Holding time limits;
4. Surrogate (System Monitoring Compound) percent recoveries (%R) for organic methods;
5. Internal Standard (IS) area counts and retention times for organic methods;
6. Blank contamination (in method, field, equipment rinse and trip blanks);
7. Relative Response Factors (RRFs) in initial calibration and continuing calibrations, Percent Relative Standard Deviation (%RSD) in initial calibrations, and Percent Difference (%D) in continuing calibrations;
8. Matrix Spike and Matrix Spike Duplicate (MS/MSD), %R, and Relative Percent Difference (RPD);
9. Laboratory Control Sample and Laboratory Control Sample Duplicate (LCS/LCSD), %R, and RPD.

The laboratory case narratives were also reviewed for all SDGs. The contents of the data packages and QA/QC results were compared to the requirements of SW-846 Method 8260D. GSC evaluated QC data reported by the laboratory against required precision and accuracy limits established in Table A-2 of the QAPP. The validation reports that were generated are presented in **Appendix C** and include qualifiers added by the data validator.

Consistent with the data quality requirements as defined by the data quality indicators (DQIs) described in Section A.7.2 of the QAPP, project data and associated QC data were evaluated on these categories and qualified according to the outcome of the review. During the review, laboratory-applied data qualifiers were evaluated and explained. During verification, individual sample results were qualified as necessary to designate usability of the data toward meeting project objectives. The qualifiers that were used are defined as follows:

U – The analyte was analyzed for but was not detected above the reported sample quantitation limit. These results are qualitatively acceptable.

J – The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample. Although estimated, these results are qualitatively acceptable.

UJ – The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to measure accurately and precisely the analyte in the sample. Although estimated, these results are qualitatively acceptable.

R – The analyte result was rejected due to serious deficiencies in the ability to analyze the sample and/or meet QC criteria. The presence or absence of the analyte cannot be verified.

Data qualifiers were applied based on deviations from the measurement performance criteria identified in USEPA-540-R-2017-002 and Table A-2 of the QAPP.

A secondary stage of validation occurred following completion of the initial validation for a discrete sampling event. Trip blanks were associated with the corresponding surface water samples and were evaluated and qualified using the same criteria as method blanks.

The following sections address the laboratory chemical analysis program implemented for the 2021 surface water sampling events. The project DQIs are summarized in the following sections and include a review of precision, bias, representativeness, comparability, completeness, and sensitivity.

Precision

Precision was assessed using the analysis of LCS/LCSDs and duplicate samples. MS/MSDs were also evaluated but data was not qualified based solely on MS/MSD results, except for the specific environmental sample that was spiked for the MS/MSD analysis.

LCS/LCSDs were evaluated based on %R results. The %R for two reported analytes was outside LCS/LCSD control limits, and the results for 10 samples were qualified "UJ" based on LCS/LCSD %R acceptance criteria.

MS/MSD results greater than the upper control limit (UCL) or less than the lower control limit (LCL) affected seven analytes in one surface water sample. The results were qualified as estimated ("UJ"); however, as noted above, data for this project was not qualified based solely on MS/MSD results.

Field duplicate samples were used to assess intralaboratory precision and were collected by filling multiple sample containers from the same sampling device during sampling events at a frequency of at least one duplicate sample per 20 media samples, effectively one duplicate sample per sampling event. Eight duplicate surface water samples from location COD-SW-17 were collected, which is approximately eight percent of the 96 unique surface water samples that were collected from January through August 2021. The duplicate samples were assigned blind field identification numbers by the sampler and were analyzed by SW-846 Method 8260D.

Comparative results for tetrachloroethene (PCE) and trichloroethene (TCE) in the eight duplicate samples are shown on the following table. In accordance with Section A.7.2.1 of the QAPP, RPDs between the results for the primary sample and duplicate sample were calculated. Three of the calculated RPDs for the surface water sample collected in May 2021 from COD-SW-17 exceeded the data quality objective (DQO) for precision (<50 RPD) in the volatile organics analysis of a field duplicate sample. This DQO is specified on Table A-2 of the QAPP. Two of these results – 60% RPD for PCE and 110% RPD for TCE – are shown on the comparison table. Not shown on the table is the 53% RPD for cis-1,2-dichloroethene (cis12DCE) in the same samples, which also exceeds the DQO for precision.

In evaluating the effect of these RPD exceedances on data quality, it is important to note that the concentrations of all three VOCs with duplicate sample RPD exceedances are very low. All three primary sample results are close to or less than the reporting limit (0.5 micrograms per liter [µg/L]). The duplicate sample results are approximately twice the reporting limit in the case of PCE and TCE, and slightly above the reporting limit in the case of cis12DCE. For all three VOCs, one must consider that an absolute difference (|S – D|) of less than one microgram per liter at concentrations

near the reporting limit can generate a high RPD that is not statistically significant. For example, intuitively, the difference between a concentration of 0.37 µg/L and 0.63 µg/L is not significant when the reporting limit is 0.5 µg/L (i.e., these two concentrations are essentially the same measurement, subject to mechanical variability inherent in all analytical instruments and possible matrix interference effects). However, the calculated RPD between these two concentrations is 52% which would suggest analytical problems in samples with concentrations 10 or 100 times the reporting limit. As explained above, professional judgment suggests that the difference in concentrations at levels near the reporting limit is acceptable and, therefore, the analytical results for the three VOCs in both samples from May 2021 were qualified as estimated ("J") in accordance with standard data validation procedures.

Comparison of Intralaboratory Duplicate Sample Results (for PCE and TCE only)

Location	Date	Parameter	Primary Result, S (µg/L)	Duplicate Result, D (µg/L)	Absolute Difference (µg/L)	Relative Percent Difference
COD-SW-17	01/26/21	PCE	3.3	3.2	0.1	3%
		TCE	1.2	1.2	0	0%
COD-SW-17	02/25/21	PCE	0.5 U	0.5 U	NA	NA
		TCE	0.5 U	0.5 U	NA	NA
COD-SW-17	03/24/21	PCE	2.1	3.0	0.9	35%
		TCE	0.88	1.2	0.32	31%
COD-SW-17	04/26/21	PCE	2.4	2.4	0	0%
		TCE	0.98	0.97	0.01	1%
COD-SW-17	05/25/21	PCE	0.54	1.0	0.46	60%
		TCE	0.35	1.2	0.85	110%
COD-SW-17	06/24/21	PCE	3.5	3.5	0	0%
		TCE	1.1	1.3	0.2	17%
COD-SW-17	07/29/21	PCE	0.23	0.28	0.05	20%
		TCE	0.20	0.20	0	0%
COD-SW-17	08/26/21	PCE	8.4	9.2	0.8	9%
		TCE	3.4	3.7	0.3	8%

Absolute Difference = |S - D|

Relative Percent Difference = (|S - D| / (S + D)/2) x 100

NA = Not applicable; cannot be calculated due to one result being a non-detect ("U" or "UJ").

Based on criteria including the results of the calculations, the parameters analyzed and reported, the absolute differences given sample dilutions, concentration levels, and professional judgment, the duplicate results do not show variations that indicate a serious lack of precision in the analytical results.

Based on an evaluation of %R for LCS/LCSDs and RPDs for duplicate samples, the overall precision of samples collected for the project appears to be acceptable. As a result, the laboratory DQO for precision was met.

Bias

Bias is the systematic or persistent distortion of a measurement process causing errors in one direction. Data conditions that imply a potential for high bias in the sample result include:

1. Detection of a target compound in an associated method blank, trip blank, field blank, or equipment rinse blank,
2. A surrogate recovery (%R) greater than the acceptable range for a specific compound's analytical analogue,
3. A continuing calibration verification (CCV) sample recovery greater than the acceptable range for a specific compound, and
4. A LCS/LCSD or MS/MSD recovery greater than the acceptable range for a specific compound.

Similarly, data conditions that imply a potential for low bias in the sample result include:

1. Analysis of the sample outside the holding time (i.e., 14 days for preserved VOCs),
2. A CCV sample recovery less than the acceptable range for a specific compound, and
3. A LCS/LCSD or MS/MSD recovery less than the acceptable range for a specific compound.

High analytical bias was evaluated by reviewing blank detections, low analytical bias was evaluated by reviewing holding times, and both high and low analytical biases were evaluated by analysis of LCS/LCSD and MS/MSD samples, CCV sample recoveries, and surrogate recoveries. The laboratory analyzed LCS/LCSD samples for each SDG and analyzed MS/MSD samples at a frequency of at least one per 20 unique surface water samples (QAPP, Section B.1.5). Acceptance criteria for LCS/LCSD and MS/MSD measurements are expressed as a %R and are specified in Table A-2 of the QAPP.

Results for acetone in 12 surface water samples were qualified "U" (not detected) due to method blank contamination with the potential for high bias. Results for acetone in nine surface water samples and for methylene chloride in two surface water samples were qualified "U" (not detected) due to trip blank contamination with the potential for high bias.

As noted in the discussion of precision, the LCS/LCSD results were within the QC limits except for two analytes in 10 samples that were qualified as estimated. MS/MSD results outside the QC limits for VOCs resulted in the qualification of seven analytes in one surface water sample due to the potential for high bias where the MS/MSD results were greater than the UCL, and the potential for low bias where the MS/MSD results were less than the LCL.

Three analytes (ketones) in 13 samples from the March 2021 sampling event were qualified as not detected and estimated ("UJ") based on CCV criteria with the potential for high or low bias. One analyte (2-butanone) detected in one surface water sample from the same event was qualified as estimated ("J") based on CCV criteria.

Based on a review of the results, the data conditions implying a potential for low or high bias in a sample have been addressed by validation and resulting qualification of the analytical data using the following flags: "U", "J", and "UJ". Note: "UJ" is a unique validation qualifier whereas "U" and "J" can be either laboratory qualifiers or validation qualifiers.

Representativeness

Representativeness was satisfied by verifying that the QAPP was properly followed, that proper sampling techniques were used, that proper analytical procedures were followed, and that analytical holding times of the samples were not exceeded. If holding times are greater than two times the method-required holding time, then the sample results are rejected ("R") for non-detects and are qualified as estimated ("J") for detects. No VOC results were qualified due to holding time exceedances and no sample results were rejected due to missed holding times. Based on an evaluation of sample precision and accuracy, the surface water samples collected in 2021 are representative of the environmental conditions at the time of sampling.

Comparability

Comparability expresses the confidence with which one data set can be compared to another data set measuring the same property. Comparability is achieved using established and approved sample collection techniques and analytical methods, consistency in the basis of analysis (wet weight vs.

dry weight, volume vs. mass, etc.), consistency in reporting units, and analysis of standard reference materials.

Data comparability is achieved by using standard units of measure. The use of USEPA-approved methods to collect and analyze samples, along with instruments calibrated against Standard Analytical Reference Materials (SARM), which are National Institute for Standards and Technology (NIST)-traceable standards, also aids comparability.

Based on the precision and accuracy assessment presented above and the use of USEPA-approved methods, the data collected during the 2021 surface water sampling events are comparable to data collected using similar USEPA-approved methods.

Completeness

Completeness measures the quantity of valid data generated from the laboratory analysis and sampling processes. For data to be valid, all acceptance criteria must be fulfilled, including accuracy and precision, analytical methods must be followed, and each data point must be validated satisfactorily. None of the results from the 2021 surface water sampling events have been qualified for reasons of completeness. The DQOs (Table A-2 of the QAPP) were set at 90 percent for analytical laboratory completeness. Based on the evaluation of the laboratory QC results, the data exceeded 90 percent completeness and are deemed useful for assessing results and developing recommendations.

Results that have been flagged or qualified “U”, “UJ”, or “J” for various reasons encountered minor analytical problems and have limited impact on the data quality.

Sensitivity

Sensitivity requirements were specified as the minimum required reporting levels for VOCs listed in Table A-4 of the QAPP. None of the samples required serial dilution due to matrix interferences or elevated concentrations of target compounds. Accordingly, a review of non-detect reporting limit data for surface water constituents of concern (PCE, TCE, cis12DCE, and vinyl chloride) indicates applicable surface water quality criteria was not exceeded. Therefore, the reporting limit criteria and the analytical DQI for sensitivity were met.