Department of Energy

Portsmouth/Paducah Project Office
1017 Majestic Drive, Suite 200
Lexington, Kentucky 40513
(859) 219-4000

June 9, 2025

Ms. April Webb
Interim Federal Facility Agreement Manager
Division of Waste Management
Kentucky Department for Environmental Protection
300 Sower Boulevard, 2nd Floor
Frankfort, Kentucky 40601

PPPO-02-10033020-25B

Mr. Brian Begley
Federal Facility Agreement Manager
U.S. Environmental Protection Agency, Region 4
61 Forsyth Street
Atlanta, Georgia 30303

Dear Ms. Webb and Mr. Begley:

TRANSMITTAL OF THE TRICHLOROETHENE AND TECHNETIUM-99 GROUNDWATER CONTAMINATION IN THE REGIONAL GRAVEL AQUIFER FOR CALENDAR YEAR 2024 AT THE PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY, FRNP-RPT-0380

Please find enclosed a courtesy copy of the subject document, *Trichloroethene and Technetium-99 Groundwater Contamination in the Regional Gravel Aquifer for Calendar Year 2024 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, FRNP-RPT-0380. Appendix A is enclosed as a separate file. This report presents the methodology used to develop the trichloroethene and technetium-99 groundwater plume maps from groundwater sampling data from wells completed in the Regional Gravel Aquifer and collected through the end of calendar year 2024. The plume maps reports are used to depict and better understand the progress of groundwater cleanup and to optimize planning of groundwater cleanup at the Paducah Gaseous Diffusion Plant.

If you have any questions or require additional information, please contact me at (270) 217-2029.

Sincerely,

APRIL LADD Digitally signed by APRIL LADD
Date: 2025.06.09 16:49:31 -05'00'

April Ladd
Federal Facility Agreement Manager
Portsmouth/Paducah Project Office

Enclosures:
1. *Trichloroethene and Technetium-99 Groundwater Contamination in the Regional Gravel Aquifer for Calendar Year 2024 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, FRNP-RPT-0380
2. Appendix A—Groundwater Plume Map for Calendar Year 2024, FRNP-RPT-0380

Administrative Record File—ARF ARR

cc w/enclosures:
abigail.parish@pppo.gov, PPPO
april.ladd@pppo.gov, PPPO
april.webb@ky.gov, KDEP
arcorrespondence@pad.pppo.gov
begley.brian@epa.gov, EPA
bruce.ford@pad.pppo.gov, FRNP
bwhatton@tva.gov, TVA
dcnorman0@tva.gov, TVA
eric@pgdpcab.org, CAB
frnpcorrespondence@pad.pppo.gov
joel.bradburne@pppo.gov, PPPO
jrsewell@tva.gov, TVA
kelly.layne@pppo.gov, ETAS
kentuckyES@fws.gov, FWS
leo.williamson@ky.gov, KDEP
mac.mcrae@TechLawInc.com, EPA
maphillips0@tva.gov, TVA
megan.mulry@pad.pppo.gov, FRNP
mwaplin@tva.gov, TVA
myrna.redfield@pad.pppo.gov, FRNP
nathan.garner@ky.gov, KYRHB
nrepcdep-dwm-hwb-pgdp@ky.gov
pad.rmc@pad.pppo.gov
rebeccaw.goodman@ky.gov, KEEC
reinhard.knerr@pppo.gov, PPPO
sebenton@tva.gov, TVA
stefanie.fountain@pad.pppo.gov, FRNP
stephaniec.brock@ky.gov, KYRHB
testher@tva.gov, TVA
timothy.kreher@ky.gov, KDFWR
todd.powers@pad.pppo.gov, FRNP
tom.reed@pad.pppo.gov, FRNP

FRNP-RPT-0380

Trichloroethene and Technetium-99 Groundwater Contamination in the Regional Gravel Aquifer for Calendar Year 2024 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

FOUR RIVERS NUCLEAR PARTNERSHIP, LLC

CLEARED FOR PUBLIC RELEASE

FRNP-RPT-0380

Trichloroethene and Technetium-99 Groundwater Contamination in the Regional Gravel Aquifer for Calendar Year 2024 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

Date Issued—May 2025

Prepared for the
U.S. DEPARTMENT OF ENERGY
Office of Environmental Management

Prepared by
FOUR RIVERS NUCLEAR PARTNERSHIP, LLC,
managing the
Deactivation and Remediation Project at the
Paducah Gaseous Diffusion Plant
under Contract DE-EM0004895

CLEARED FOR PUBLIC RELEASE

THIS PAGE INTENTIONALLY LEFT BLANK

CONTENTS

THIS PAGE INTENTIONALLY LEFT BLANK

TABLES

FIGURES

THIS PAGE INTENTIONALLY LEFT BLANK

ACRONYMS

AIP	agreement in principle
CSM	conceptual site model
CY	calendar year
DOE	U.S. Department of Energy
EMP	environmental monitoring plan
EPA	U.S. Environmental Protection Agency
EW	extraction well
FR	*Federal Register*
FRNP	Four Rivers Nuclear Partnership, LLC
KDEP	Kentucky Department for Environmental Protection
MCL	maximum contaminant level
MW	monitoring well
N/A	not applicable
NEPCS	Northeast Plume Containment System
OREIS	Oak Ridge Environmental Information System
OU	operable unit
PEGASIS	PPPO Environmental Geographic Analytical Spatial Information System
PPPO	Portsmouth/Paducah Project Office
PGDP	Paducah Gaseous Diffusion Plant
RGA	Regional Gravel Aquifer
SWMU	solid waste management unit

THIS PAGE INTENTIONALLY LEFT BLANK

1. INTRODUCTION

Four Rivers Nuclear Partnership, LLC, (FRNP) has evaluated groundwater analytical data as of the end of calendar year (CY) 2024 to produce revised groundwater plume maps for both trichloroethene (TCE) and technetium-99 (Tc-99) within the Regional Gravel Aquifer (RGA) associated with the U.S. Department of Energy (DOE) Paducah Gaseous Diffusion Plant (PGDP) in Paducah, Kentucky. The two primary groundwater plume constituents are TCE and Tc-99. This report presents the analytical data sets taken from the Paducah Oak Ridge Environmental Information System (OREIS) data system, methods used to develop these maps, and changes to the contaminant plumes over time. These plume maps are intended to show the most recent sample results from each location as of the end of CY 2024. For wells that were not sampled in 2024, the most recent sample results from 2023 have been used. Because these plume maps are based on the most recent values for 2023 or 2024, they may not reflect the maximum or minimum value observed during the reporting period for all locations. An alternate interpretation showing the maximum values observed during 2023 to 2024 is available in Appendix A.

The plume maps depict the general footprint of the TCE and Tc-99 contamination in the RGA and convey the general magnitude and distribution of contamination at or above the TCE and Tc-99 maximum contaminant levels (MCLs) within the plumes.[1] These maps show plots of isoconcentration lines and measured contaminant concentrations. Maps of TCE degradation products are not included because their detection often is masked by higher TCE concentrations in groundwater samples and the plumes of TCE degradation products are overlain by the TCE plumes. In the 2023–2024 dataset, no TCE degradation product was detected at a concentration above its MCL outside the area overlain by the TCE plumes. Any calculation of human health risk estimates based upon mapped contaminant concentrations should be performed by a qualified risk assessor because of the uncertainties in the concentrations of TCE breakdown products, some of which are unknown due to the inability to measure these concentrations in areas where TCE concentrations are very high.

The PGDP groundwater plume maps are revised every two years to: (1) provide a basis for timely incorporation of routine groundwater monitoring and characterization data, (2) demonstrate the progress of groundwater cleanup to date, and (3) facilitate planning to optimize the site groundwater cleanup. The plume maps also complement the reporting of environmental monitoring plan (EMP) results and activities in the Paducah Site Annual Site Environmental Report. These plume maps are used, along with additional information, to further evaluate specific areas of groundwater contamination at PGDP in more detail for decision-making purposes based on individual project needs. More specific project evaluations are discussed in applicable documents, which are available through the DOE Environmental Information Center (https://eic.pad.pppo.gov).

The data tables (including charts of TCE and Tc-99 sampling results collected for the last 10 years) used to generate maps presented in this document are included in the appendices. TCE and Tc-99 analyses of

[1] For Tc-99, 900 picocuries per liter (pCi/L) defines the lower plume limit. The value derived by the U.S. Environmental Protection Agency (EPA) from the 4 millirem per year (mrem/year) MCL for Tc-99 is 900 pCi/L (see https://www.epa.gov/system/files/documents/2021-08/compliance-radionuclidesindw.pdf) (EPA 2002). An alternate value derived by EPA from the 4 mrem/year MCL is 3,790 pCi/L and was proposed in the July 18, 1991, *Federal Register (FR)*, http://nepis.epa.gov (document number 570-Z-91-049). Table A.9 of the *Methods for Conducting Risk Assessments and Risk Evaluations at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, Volume 1, Human Health* includes the Tc-99 dose-based groundwater screening level (1,930 pCi/L for an adult receptor) resulting in a 4 mrem/year dose based upon more recent dosimetry (DOE 2022).

groundwater samples collected by DOE that were rejected during data validation, verification, or assessment were not used in development of this report. The monitoring well and residential well analyses used in this report are generated following the quality assurance project plan in the applicable EMP (FRNP 2022, FRNP 2023a). Analyses for EWs are governed by the quality assurance project plan found in the Northeast Plume Remedial Action Work Plan (DOE 2018) and the sampling and analysis, quality assurance and quality control section of the Northwest Plume Operations and Maintenance Plan (DOE 2020). Appendix A contains tables and trend charts of TCE and Tc-99 sampling results collected for the last 10 years and plume maps showing the maximum values observed during 2023 and 2024. Appendix B contains the most recent TCE and Tc-99 values from 2023 and 2024 from PGDP RGA monitoring wells (MWs). These concentrations were used to develop Figure 1 through Figure 10 as well as the large-scale maps of the 2024 plume maps showing most recent concentrations in 2023 and 2024 provided in Appendix C.

The isoconcentration contours of contaminant concentrations depicted on the maps presented in Section 4 and the large-scale plume maps in Appendix C are based on the distribution of contaminant concentrations most recently observed in 2023 and 2024 and knowledge of the conceptual site model (CSM). The magnitude and distribution of contamination within the plumes will vary slightly over time based on contaminant trends and variations in hydrologic influences.

To support interpretation of plume geometries, potentiometric surface maps for the RGA were developed using synoptic water level measurements collected in August 2023 and August 2024 to evaluate groundwater flow direction. These potentiometric maps are presented in Section 5.

2. DATA ANALYSIS METHODOLOGY

The TCE and Tc-99 data used in these maps were extracted from the Paducah OREIS database. Paducah OREIS is the centralized, standardized, quality assured, and configuration-controlled data management system that is the long-term repository of environmental data (i.e., measurements, geographic) for Paducah projects. See Table B.1 in Appendix B for the 2023 to 2024 TCE and Tc-99 results in RGA wells used to create the 2024 TCE and Tc-99 plume maps. Data collected by DOE contractors, following consistent quality assurance and sampling protocols, are used so that the data are comparable to previous reports. Data are made available to the public through the DOE PPPO Environmental Geographic Analytical Spatial Information System (PEGASIS) (https://pegasis.pad.pppo.gov/). The maps for CY 2024 are based on analytical results from the most recent sampling event (primarily January 2024–December 2024). For collocated MWs (i.e., clustered wells, multiport wells), where analytical results for the CY are available from screened intervals at multiple elevations within the RGA (e.g., upper, middle, lower RGA), these data are displayed and used for contouring as follows.

- For well clusters completed at multiple depths, all wells are labeled with their most recent sampling results. The maximum TCE and Tc-99 values for the well clusters were used for contouring.

- For multiport wells with multiple sampling depths within the same well, the most recent result from each of the sampled ports was compared (even if the most recent port samples were collected on different days) and the maximum TCE and Tc-99 result from the comparison was used for contouring and labeling. This selection criterion may result in different ports selected for TCE or Tc-99.

For wells that were not sampled in 2024, the most recent data from 2023 were used.

Mapping involved first plotting the selected data on geographic information system (ArcMap 10.8.2)-generated maps and then comparing those data to the contouring performed for the 2022 TCE and Tc-99

plume maps. Plume contours were adjusted to accommodate more recent data. The changes from 2022 to 2024 are discussed in Section 4. On the 2024 plume maps shown in Section 4 of the main text, dashed lines show the contour lines from the 2022 plume maps for comparison.

For TCE, the Safe Drinking Water Act MCL of 5 micrograms per liter (µg/L) is the isoconcentration contour that defines the limit of the plume. Subsequent isoconcentration contours of 100 µg/L, 1,000 µg/L, and 10,000 µg/L are provided based on concentration data for the period and consideration of the CSM. For Tc-99, 900 picocuries per liter (pCi/L) defines the plume limit.[2] Subsequent isoconcentration contours of 1,930 pCi/L and 3,790 pCi/L are provided based on concentration data for the period and consideration of the CSM.

3. 2024 PLUME MAPS

As identified in the "Screened Zone" column of Appendix B, Well Program Inventory, in the 2024 EMP, there are 253 active wells including MWs, piezometers, and 33 residential wells that can be used to monitor the RGA (FRNP 2023a). The dataset considered in this document also includes results for Little Bayou Creek Seep 5 and the four operating extraction wells (EWs). The PGDP deactivation and remediation prime contractor monitored a subset of this well network in 2023 and 2024, as discussed below, in accordance with the associated EMPs (FRNP 2022, FRNP 2023a).

Figures C.1 and C.2 of Appendix C provide the 2024 TCE and Tc-99 plume maps, respectively. Section 4 includes an explanation for the interpretation of these maps. Table 1 presents a summary of some characteristics of these plumes in areas outside the PGDP boundary and off DOE property.[3] Because these plumes are based on interpretation, plume lengths outside the DOE property and plume areas are approximate.

Table 1. PGDP Groundwater Plumes, Based on Most Recent Concentrations in CY 2024

Plume	Approximate Maximum Contaminant Concentrations Outside PGDP Boundary	Approximate Maximum Contaminant Concentrations Off DOE Property	Off DOE Property Plume Length	Approximate Total Area[a]
		TCE		
Northwest	501 µg/L	41.1 µg/L	1.1 miles	214 acres
C-746-S&T area	4.89 µg/L	not applicable (N/A)	N/A[b]	0 acres
Northeast	172 µg/L	26.4 µg/L	0.2 miles	372 acres
Southwest	3.58 µg/L	< 1 µg/L	N/A	85 acres
		Tc-99		
Northwest	< 900 pCi/L	< 900 pCi/L	N/A	25 acres

[a] The approximate total areas are the areas of the respective plumes inside and outside the PGDP boundary and off DOE property.
[b] The C-746-S&T plume does not leave DOE property as currently interpreted.

[2] See Note 1.
[3] For purposes of this report, the "PGDP boundary" is defined as the revised 229 Boundary per *FR* notices, Vol. 83, No. 213, dated November 2, 2018.

3.1 TRICHLOROETHENE

During the reporting period of 2023 to 2024, 253 RGA MWs, 4 EWs, and 32 residential wells were sampled by DOE, analyzed for TCE, and included in the development of the revised groundwater TCE plume map.[4] Of the 253 RGA MWs included in the development of the TCE plume map, 225 were sampled most recently in 2024. These results are supplemented by 28 RGA MWs sampled and analyzed for TCE in 2023 but were not sampled in 2024. The four EWs also were sampled in 2024. Of the 32 residential wells used for monitoring the RGA, 25 residential wells were sampled in 2024 for TCE, and the results were included in the development of the TCE plume map. These results are supplemented by seven residential wells sampled and analyzed for TCE in 2023 but were not sampled in 2024. A summary of the approximate maximum concentrations of TCE outside the PGDP boundary and off DOE property in RGA wells is shown in Table 1. Appendix B lists the most recent sample data that was used to develop the 2024 plume maps.

Appendix C contains the 2024 TCE plume map (Figure C.1). Generally, the plume interpretation is based on the following:

- In 2023 and 2024, 1,596 groundwater samples were collected by DOE from RGA MWs, EWs, and residential wells and analyzed for TCE.

- TCE results from 2023 to 2024 used to develop the plume maps, along with the date sampled, are posted adjacent to the well label. The basis for data posting is as follows.

  — If the well was sampled only once in 2024, the sample result is posted.

  — If the well was sampled multiple times, the most recent result was posted. If the most recent data are from duplicate samples or include more than one sample per day, then the result was selected using the following:

    – If there was a detection in both samples, the higher concentration was selected;

    – If there was a detection in one sample but not the other, the detected concentration was selected; or

    – If there was not a detection in either sample, the reported value from the lowest detection limit was selected.

  — For well clusters completed at multiple depths, all wells are labeled with their most recent sampling results. The maximum TCE value for the well cluster was used for contouring.

  — For multiport wells with multiple sampling depths within the same well, the most recent result from each of the sampled ports was compared (even if the most recent port samples were collected on different days), and the maximum TCE result from the comparison was used for contouring and labeling. This selection criterion may result in different ports selected for TCE or Tc-99.

[4] Of these RGA MWs, some have multiple sampling ports.

- The results are posted as reported by the laboratory, with "UJ," "U," and "J" laboratory, assessment, or validation qualifiers, if applicable.[5]

- Groundwater EW locations are labeled on the map, and the concentrations from the EWs are posted.

- For some wells that were not sampled in 2024 but sampled in 2023, TCE results from 2023 were used to develop the plume map using the same rules as for the 2024 TCE results. These results and the date sampled are posted on the map.

- The contour intervals selected were 5 µg/L, 100 µg/L, 1,000 µg/L, and 10,000 µg/L. This order of magnitude interval approach for contour interval selection is consistent with the contour interval selection used in the prior mapping for the site. Because none of the TCE concentrations in 2024 exceed 100,000 µg/L, a contour map for 100,000 µg/L was not drawn.

- Contouring was produced by hand, using interpolation between observed concentrations. The contouring also incorporated historical source information, previous plume interpretations, and general groundwater flow directions.

- Residential wells R10 and R40 located along Ogden Landing Road were sampled in 2023 and 2024. The TCE results from these wells were below 5 µg/L. Because these wells are located outside the extent of the map, the results from these wells are not shown on the plume maps. TCE concentrations are provided in Appendix A.

3.2 TECHNETIUM-99

During the reporting period of 2023 to 2024, 215 RGA MWs, four EWs, and nine residential wells were sampled by DOE, analyzed for Tc-99, and included in the development of the revised groundwater Tc-99 plume map.[6] Of the 215 RGA MWs included in the development of the Tc-99 plume map, 193 were sampled most recently in 2024. These results are supplemented by 22 RGA MWs sampled and analyzed for Tc-99 in 2023 but were not sampled in 2024. The four EWs were sampled in 2024 for Tc-99. Of the residential wells used for monitoring the RGA, nine residential wells were sampled in 2024 for Tc-99 and the results were included in the development of the Tc-99 plume map. The highest Tc-99 concentration in RGA wells outside the industrialized section of PGDP was 504 pCi/L at EW233. Appendix B lists the most recent sample data that were used to develop the 2024 plume maps.

Appendix C contains the 2024 Tc-99 plume map (i.e., Figure C.2). Generally, the plume interpretation is based upon the following:

- A total of 1,400 groundwater samples was collected by DOE from RGA MWs and residential wells and analyzed for Tc-99 from 2023 to 2024.

---

[5] For presentation of data in figures and tables included herein, any qualifier (i.e., laboratory, assessment, validation) that contains both "U" and "J" is simplified as "UJ," any qualifier that contains "U" is simplified as "U," and any qualifier that contains "J" is simplified as "J." A "U" qualifier indicates a compound was analyzed for, but not detected at or below, the lowest concentration reported. A "J" qualifier indicates an estimated value. Full details on qualifiers for posted results are available in PEGASIS.
[6] See Note 4.

- Tc-99 results from 2024 used to develop the plume map, along with the date sampled, are posted adjacent to the well. The logic for data posting was the same as described for TCE in Section 3.1.

- The results are posted as reported by the laboratory, with "U" laboratory qualifiers, if applicable.[7]

- For some wells that were not sampled in 2024, but were sampled in 2023, the Tc-99 results from 2023 used to develop the plume map were selected using the same rules as for the 2024 Tc-99 results. These results and the date sampled are posted on the map.

- The contour intervals selected were 900 pCi/L, 1,930 pCi/L, and 3,790 pCi/L.[8] The interval selection is based on EPA's 1976 and 1991 derived MCL activities of 900 pCi/L and 3,790 pCi/L, respectively, and the dose-based groundwater screening level of 1,930 pCi/L (DOE 2022). This contour interval selection is consistent with the contour interval selection used in recent mapping for the site.

- Contouring was produced by hand, using interpolation between observed concentrations. The contouring also incorporated historical source information and previous plume interpretations.

4. CHANGES FROM 2022 PLUME MAPS

PGDP groundwater plume maps for 2018 to 2024 are presented in Figures 1 and 2 for TCE and Tc-99, respectively. The previous comprehensive plume maps summarized the TCE and Tc-99 data collected through 2022 (FRNP 2023b). In an effort to understand the changes in the plume areas and contaminant concentrations at PGDP, the 2024 plume maps were compared to the 2022 plume maps for both TCE and Tc-99. For discussion purposes, the plumes have been divided into northwest, northeast, and central portions, including the Southwest Plume. Figures in this section show the 2024 TCE plume overlaid with the 2022 plume isoconcentration lines. Similarly, a figure showing the 2024 Tc-99 Plume overlaid with the 2022 plume isoconcentration lines is included in this report. The Tc-99 plume, as defined by the 900 pCi/L activity level[9], is limited to the central part of the site, and is discussed in that subsection. A comparison of isoconcentration contours for the 2022 and 2024 TCE plumes indicates that the footprint of the plumes in 2024 are generally smaller than in 2022 and TCE concentrations in 2024 are generally lower than in 2022. The reduction in the footprint of the TCE plumes indicate the effectiveness of the pump-and-treat remediation system to: (1) contain the plumes from migration; and (2) remove TCE from the aquifer. The footprint of the Tc-99 plume in 2022 and 2024 are generally similar. General observations are discussed in the following sections.

[7] For presentation of data in figures and tables included herein, any qualifier (i.e., laboratory, assessment, validation) "U" is simplified as "U." A "U" qualifier indicates a result is reported less than the minimum detectable activity and/or total propagated uncertainty. Negative results may be reported due to a statistical determination of the counts seen by a detector, minus a background count.

[8] See Note 1.

[9] The target level for treatment of Tc-99 is 900 pCi/L as documented in the *Record of Decision for Interim Remedial Action of the Northwest Plume at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE 1993).

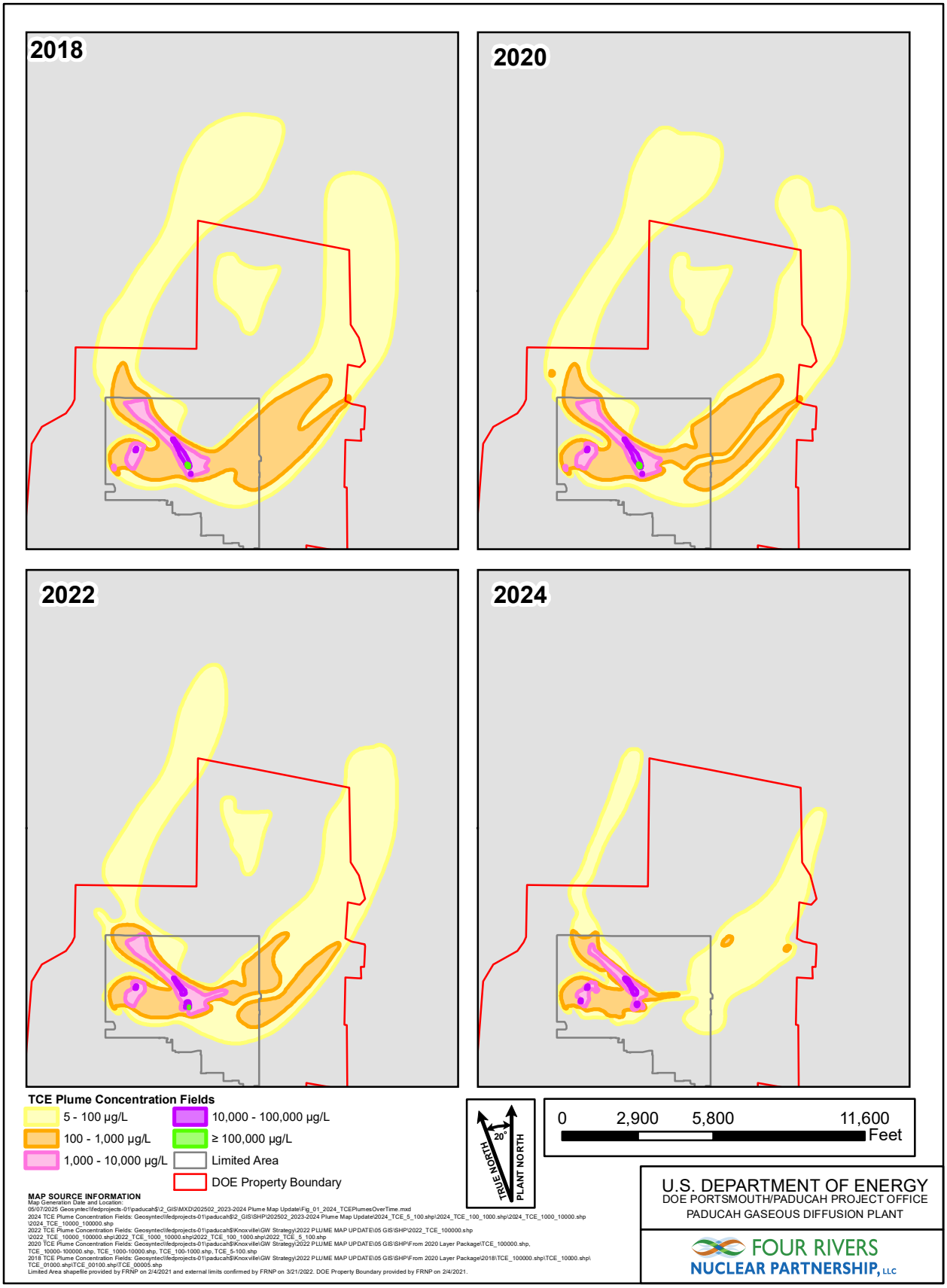


Figure 1. TCE Plumes as Interpreted for 2018, 2020, 2022, and 2024

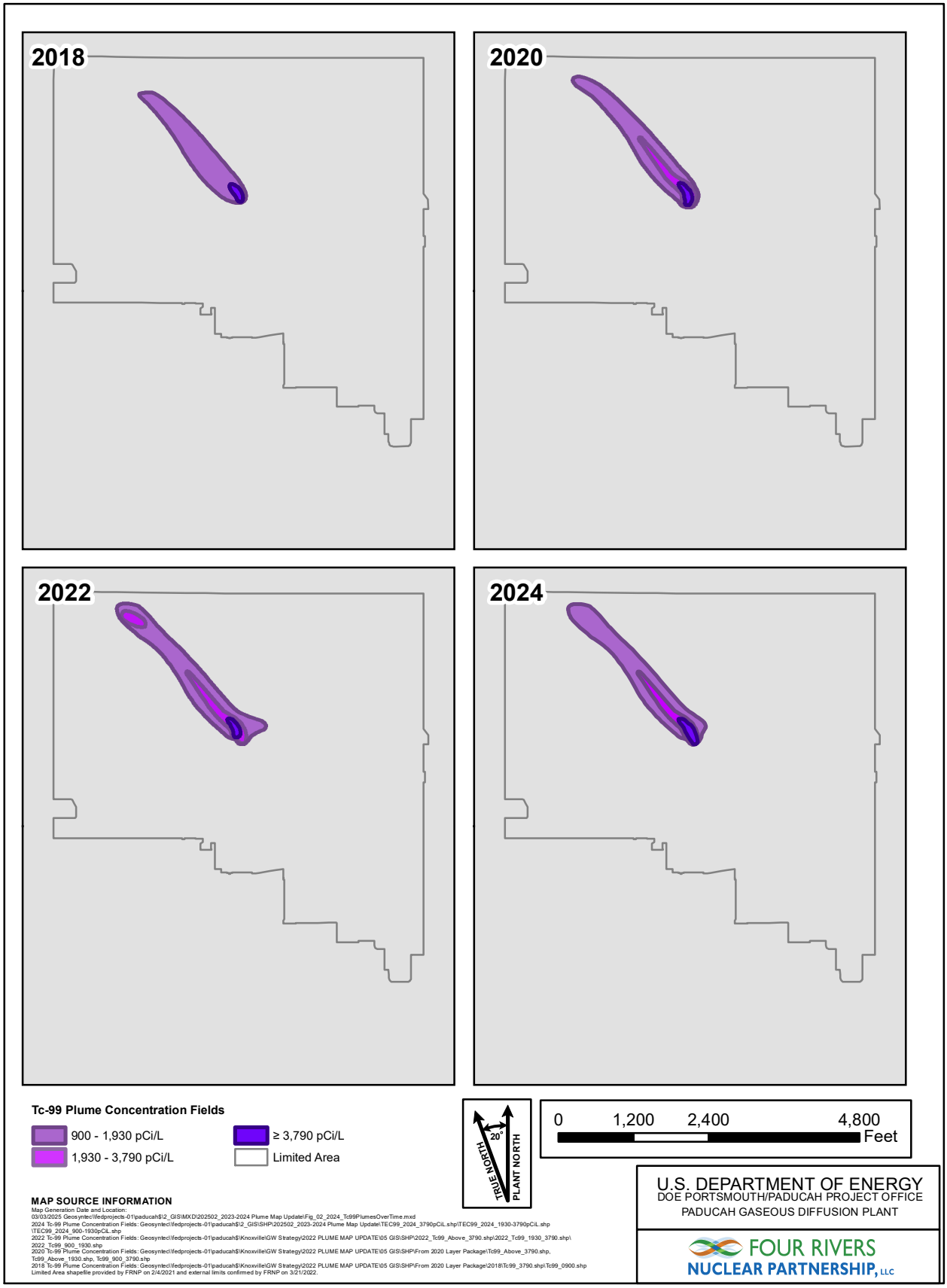


Figure 2. Tc-99 Plumes as Interpreted for 2018, 2020, 2022, and 2024

4.1 NORTHWEST PLUME

Figure 3 provides an enlargement of the north portion of the Northwest Plume. Three areas are described in this subsection: the northern distal margin (Area A), the area in the vicinity of EWs of the Northwest Plume Pump-and-Treat System (Area B), and the vicinity of the C-746-S&T landfills (Area C). In addition, Figure 3 includes temporal TCE concentration plots for selected wells illustrating the observations made in this subsection.

Area A

- The northern extent of the 5 µg/L TCE isoconcentration contour is defined by well clusters MW445/MW447 and MW448/MW450, in which TCE was not detected above 5 µg/L during this reporting period. These wells are the new most downgradient wells with TCE concentrations of < 1 µg/L in May 2024. The northern extent of TCE contamination during this reporting period retracted to the south compared to the TCE extent in previous years.

- Also of note is the seep that is sampled in Little Bayou Creek. LBCSP5 has declined from 47.5 µg/L of TCE in June 2014 to < 1 µg/L during the most recent sampling event in November 2024. The plume contours have not been defined based on seep data because they are not as representative as MW data; however, the declining TCE trend at the seeps support the interpretation of the shrinking plume length.

- TCE concentrations in MW135 declined from 24 µg/L in March 2023 to below 5 µg/L during the four subsequent monitoring events in 2023 and 2024. As such, the northeastern boundary of the Northwest Plume was defined based on results for MW135.

- TCE concentrations in MW491 declined from the maximum TCE concentration of 85.9 µg/L in May 2019 to 0.63J µg/L in May 2024. Similarly, TCE concentrations in MW492 declined from 93.2 µg/L in May 2019 to 0.48J µg/L in May 2024. These wells define the eastern extent of the Northwest Plume in this area and the eastern boundary of the Northwest Plume was adjusted based on these results.

- MW236 and MW240, which are along the western boundary of the Northwest Plume, have remained below 5 µg/L during this reporting period. Similarly, TCE concentrations in MW125 and MW20 were below 5 µg/L during the most recent sampling events; therefore, the plume was retracted to the west near these wells.

Area B

In August 2010, EW232 and EW233 began operations. Because EW232 and EW233 are located slightly upgradient and crossgradient of the former EW230 and EW231, changes in TCE concentrations at some downgradient locations continue to reflect trends associated with changes in pumping stress in the area. Observations related to changes in TCE distribution within the plume and plume configuration for this area are as follows:

- MW455 through MW462, MW501, and MW502 were installed, and sampling began in 2009. These wells form a transect perpendicular to the direction of groundwater flow, downgradient of the current EW field for the Northwest Plume pump-and-treat system, and provide data to evaluate the efficacy of the pump-and-treat system. Figure 4 provides a cross section showing the interpretation of TCE

THIS PAGE INTENTIONALLY LEFT BLANK

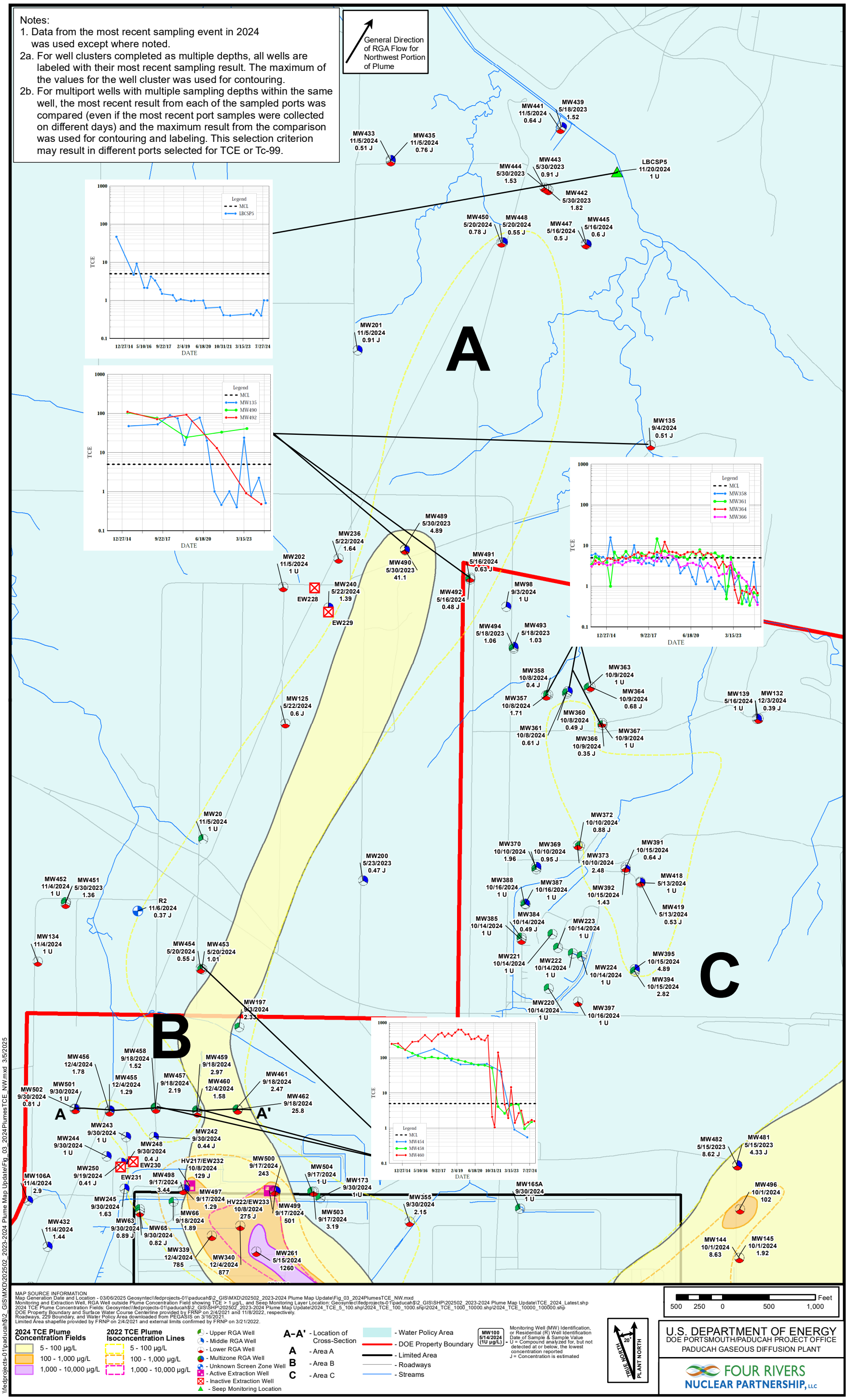
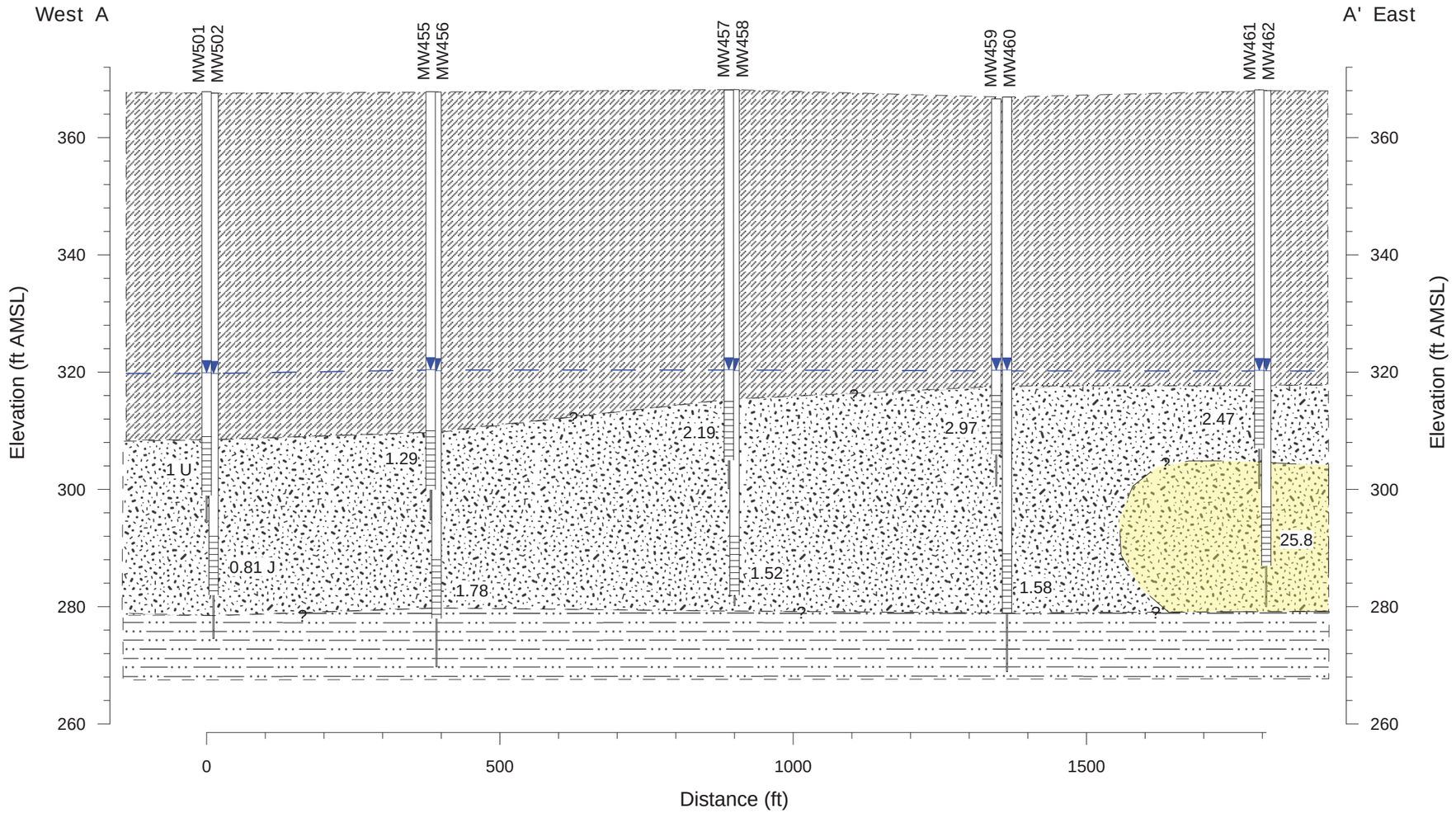
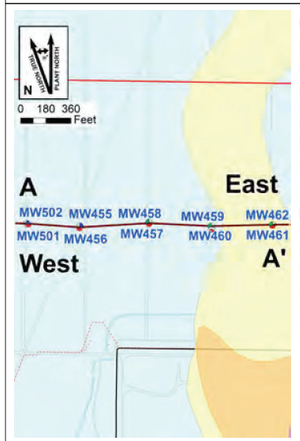


Figure 3. 2024 Northwest Portion of the TCE Plume Regional Gravel Aquifer





Key Map

Legend

- Upper RGA Well
- Middle RGA Well
- Lower RGA Well
- Hydrogeologic Cross-Section Line
- DOE Property Boundary
- Surface Water Course Centerline
- Roadways
- 229 Boundary
- Limited Area
- Water Policy Area

2024 TCE Plume Concentration Fields

- 5 - 100 µg/L
- 100 - 1,000 µg/L

2024 TCE Plume Concentration Fields
5 - 100 µg/L

Hydrogeologic Unit
UCRS RGA McNairy

Monitoring Well Location
- Casing
- Water Level (November 2024)
- Screen Interval
- Most recent TCE concentration (in µg/L)
- Boring

— - November 2024 Potentiometric Surface
Vertical Exaggeration = 10X.
U = Compound analyzed for but not detected at or below the lowest concentration reported.
For monitoring wells not sampled in calendar year 2024, results from the 2023 monitoring have been used.

? indicates extrapolated contact - and therefore should be considered approximate.

MAP SOURCE INFORMATION

Map Generation Date and Location - 03/05/2025; Geosyntec\\fedprojects-01\paducah$\3_Projects\Plume Map Document_2024 Update\01 Working Files\02 FIGURES\Cross Sections\Strater
Map Layer Location: Geosyntec\\fedprojects-01\paducah$\3_Projects\Plume Map Document_2024 Update\01 Working Files\07 CROSS SECTIONS\Strater\Figure 4. 2023–2024 TCE Plume Regional Gravel Aquifer Cross Section A-A'.sdg
Shapefile for Geologic Cross-Sections: Geosyntec\\fedprojects-01\paducah$\Knoxville\GW Strategy\2022 PLUME MAP UPDATE\05 GIS\SHP\Cross_Section_Lines.shp
Monitoring Well Layer Location: Geosyntec\\fedprojects-01\paducah$\2_GIS\SHP\202502_2023-2024 Plume Map Update\TCE_2024_Latest.shp
2024 TCE Plume Concentration Fields: Geosyntec\\fedprojects-01\paducah$\2_GIS\SHP\202502_2023-2024 Plume Map Update\2024_TCE_5_100.shp\2024_TCE_100_1000.shp\2024_TCE_1000_10000.shp\2024_TCE_10000_100000.shp
DOE Property Boundary and Surface Water Course Centerline provided by FRNP on 2/4/2021 and 11/8/2022, respectively.
Roadways, 229 Boundary, and Water Policy Area downloaded from PEGASIS on 3/16/2021.
Limited Area shapefile provided by FRNP on 2/4/2021 and external limits confirmed by FRNP on 3/21/2022.
Northing and easting of wells obtained from Pegasis, downloaded on 6/14/2022.
Groundwater elevation was based on the 11/18/2024 - 11/21/2024 measurements.
Hydrogeologic boundary and screen intervals are approximate, and were based on boring logs obtained from Pegasis, downloaded on 1/31/2023. Subsurface lithologic elevations between borings were interpreted based on available information and should be considered approximate.
Trichloroethene concentration data was provided by FRNP.

U.S. DEPARTMENT OF ENERGY
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

FOUR RIVERS NUCLEAR PARTNERSHIP, LLC

Figure 4. 2023–2024 TCE Plume Regional Gravel Aquifer Cross Section A-A'

concentrations within the RGA along this transect, which is denoted as A-A' on Figure 3. Based on the most recent result from each of these wells, TCE concentrations varied from 0.81J µg/L to 25.8 µg/L along this transect.

- The western boundary of the Northwest Plume was adjusted to the northwest of the EW field as TCE concentrations in MW459 and MW460 declined to below 5 µg/L during all the 2024 monitoring events from these wells. TCE concentrations in MW455 and MW456, defining the northern extent of a west lobe of the Northwest Plume in the 2022 TCE plume map, have been below the 5 µg/L during the 2023 and 2024 monitoring period; therefore, the TCE plume was adjusted to exclude MW455 and MW456.

- The highest TCE concentrations along this transect continue to shift to the east from well MW458 (a lower RGA well in which TCE has declined from 250 µg/L in 2014 to 1.52 µg/L in September 2024) to well MW462 (a lower RGA well, in which TCE has declined from 52 µg/L in 2014 to 25.8 µg/L in September 2024).

Area C

Area C is located in the vicinity of the C-746-S&T and C-746-U landfills and is not a part of the Northwest Plume. These locations are monitored frequently to support the solid waste permit for the C-746-S&T and C-764-U landfills.

The most recent TCE concentrations in monitoring wells in this area have been below 5 µg/L. As such, no TCE plume was drawn in this area. MW360, MW361, MW366, and MW364 that were historically used to delineate the north boundary of the plume continued to remain below 5 µg/L. MW391, MW392, MW418, and MW419 were located inside the extent of the TCE plume in 2022. TCE concentrations in these wells declined to below 5 µg/L during the most recent sampling in 2024. Along the western edge of the historical plume, TCE concentrations in MW372 and MW473 have remained below 5 µg/L during four sampling events in 2024. TCE concentrations in MW394/MW395, located at the southern end of the historical plume, are also below the 5 µg/L during the most recent sampling event.

4.2 NORTHEAST PLUME

Figure 5 provides an enlargement of the Northeast Plume. Three areas are described in this subsection: the northern distal margin (Area D); the area in the vicinity of the former Northeast Plume Pump-and-Treat EWs (Area E); and the vicinity of the industrial site (Area F). Figure 5 also includes temporal TCE concentration plots for selected wells to illustrate the observations made in this subsection.

Area D

The northern extent of the 2024 Northeast Plume has decreased compared to the 2022 plume. Wells MW463 through MW472 provide definition of the northern extent of the 5 µg/L TCE isoconcentration contour. In 2023 and 2024, TCE concentrations in MW467/MW468 declined to below 5 µg/L. Consequently, the contour defining the northern extent of the 5 µg/L TCE isoconcentration contour from 2022 was retracted. Wells MW148 and MW487, with the most recent groundwater TCE concentrations below 5 µg/L, defines the eastern edge of the plume. Well cluster MW483 and MW484 define the western extent of the plume. Due to below 5 µg/L TCE concentrations in MW148, MW487, MW483, and MW484, the 2024 plume was adjusted to exclude these wells. MW486A, screened in the lower RGA, is the northernmost well within the plume with TCE concentration of 26.4 µg/L. TCE concentrations in adjacent well MW485, screened in the middle RGA, declined to below 1 µg/L in May 2023.

THIS PAGE INTENTIONALLY LEFT BLANK

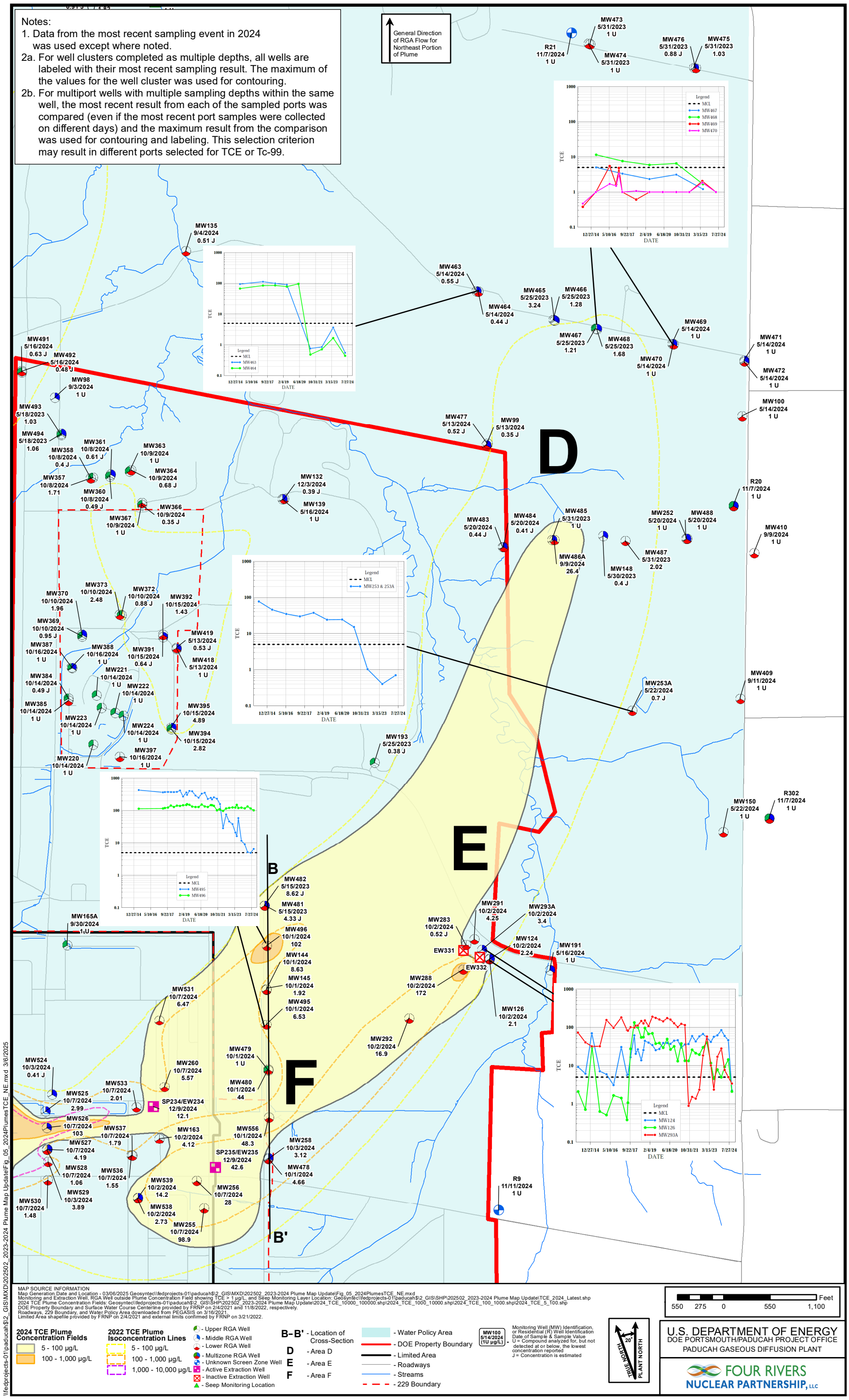


Figure 5. 2024 Northeast Portion of the TCE Plume Regional Gravel Aquifer

THIS PAGE INTENTIONALLY LEFT BLANK

Area E

- With cessation of pumping in EW331 and EW332 in 2017 as part of the Northeast Plume optimization project, the western lobe of > 100 µg/L TCE has contracted to near the PGDP boundary.[10] Only one MW in the area of EW331 and EW332, MW288, had TCE concentrations > 100 µg/L during the most recent sampling.

- Results of the 2024 monitoring continue to show an overall decline in TCE concentrations since 2014 at MW253 and its replacement well MW253A, which are located north of the old EWs that currently are in standby. The TCE concentration in MW253A declined to below 5 µg/L in 2022 and remained below 5 µg/L in 2023 and 2024. As such, the extent of the plume retracted westward.

- TCE concentrations in the east side of the former EW field, EW331 and EW332, were stable or decreased during the monitoring period. TCE concentrations in MW124, MW126, MW283, MW291, and MW293A have declined to below 5 µg/L during the recent monitoring event; therefore, the extent of the plume is retracted westward in this area. In MW126, TCE concentrations have fluctuated above and below 5 µg/L during the monitoring period but was measured at 2.1 µg/L in October 2024. Similarly, TCE concentrations in MW124 significantly decreased from 46.2 µg/L in July 2024 to 2.24 µg/L in October 2024. MW283 have consistently been below 5 µg/L, with a maximum concentration of 4.14 µg/L during the monitoring period. TCE concentrations in MW291 increased from below 5 µg/L to 12.9 µg/L in July 2024 but decreased to 4.25 µg/L in October 2024. Similarly, TCE concentrations in MW293A declined to 3.4 µg/L during the recent monitoring event.

Area F

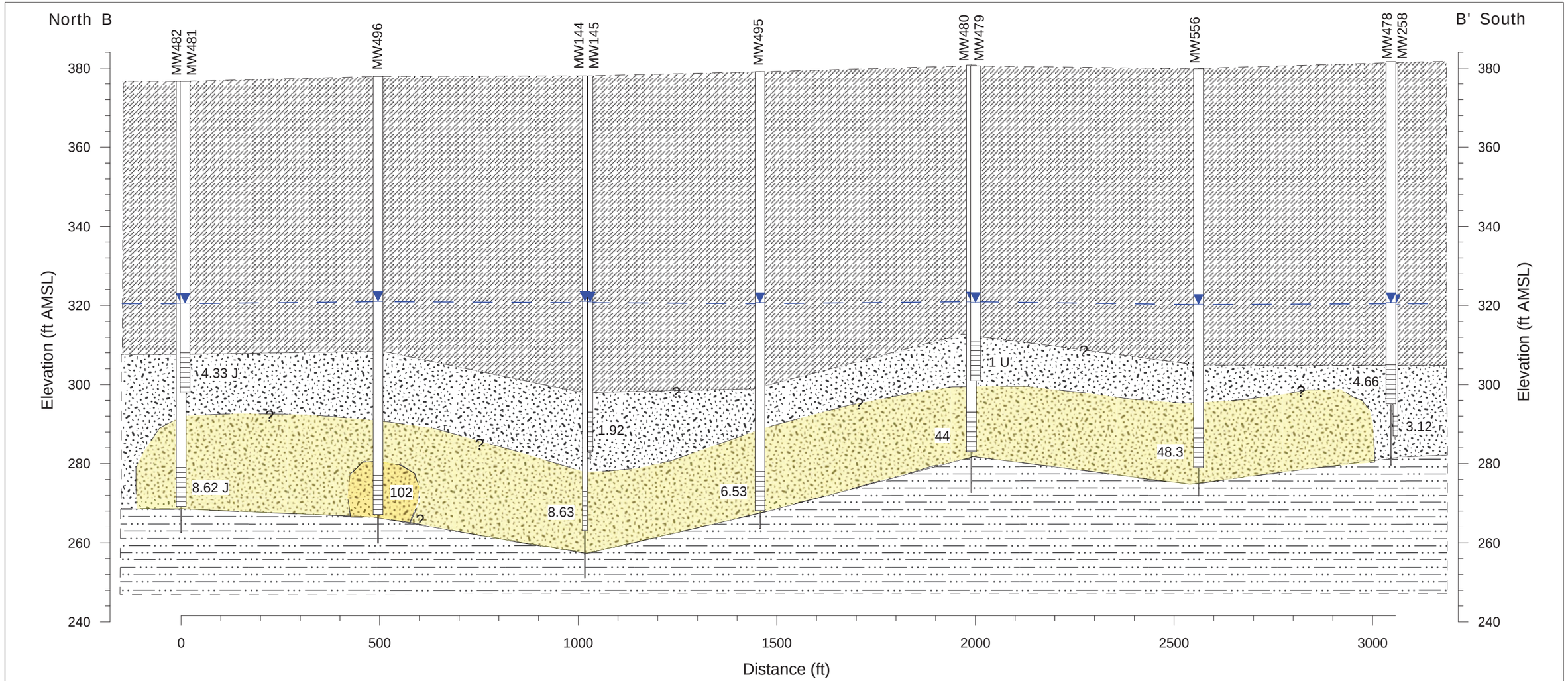
- Only one MW near the east side of the plant, MW496, had TCE concentrations >100 µg/L in 2024 (shown in the B-B' transect on Figure 5). TCE concentrations in the remaining wells along the B-B' transect were well below 100 µg/L during the recent monitoring. A cross section showing the interpretation of TCE concentrations within the RGA along this transect is provided in Figure 6.

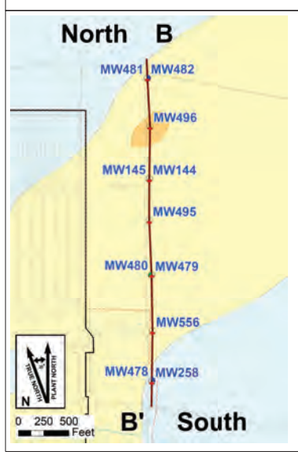
- Along the north end of the B-B' transect, TCE concentrations in MW481 have been below 5 µg/L during the last 10 years of monitoring. In MW482, TCE concentrations decreased from 66.5 µg/L in May 2021 to 8.62J µg/L in May 2023. TCE concentrations in MW144 decreased from 123 µg/L in January 2023 to < 100 µg/L during seven monitoring events in 2023 and 2024, with the most recent TCE concentration of 8.63 µg/L in October 2024. Similarly, TCE concentrations in MW495 declined to < 100 µg/L in April 2022 and remained below 10 µg/L during the past four monitoring events.

- Near the middle of B-B' transect, TCE concentrations in MW479 decreased from 21.5 µg/L in July 2023 to < 5 µg/L during five monitoring events in 2023 and 2024, with the most recent TCE concentration of < 1 µg/L in October 2024. TCE concentrations in MW480 also decreased from 106 µg/L in April 2024 to below 100 µg/L in July 2024 and October 2024 (44 µg/L in October 2024); therefore, the 100 µg/L contour was retracted from these wells.

[10] EW331 and EW332 are currently inactive but are being kept in good working condition until the Federal Facility Agreement parties agree that maintenance no longer is necessary, and final disposition (including well abandonment) has been determined.

THIS PAGE INTENTIONALLY LEFT BLANK





Key Map

Legend

- Upper RGA Well
- Middle RGA Well
- Lower RGA Well
- Hydrogeologic Cross-Section Line
- Surface Water Course Centerline
- Roadways
- 229 Boundary
- Limited Area
- Water Policy Area

2024 TCE Plume Concentration Fields

- 5 - 100 µg/L
- 100 - 1,000 µg/L

2024 TCE Plume Concentration Fields
- 5 - 100 µg/L
- 100 - 1,000 µg/L

Hydrogeologic Unit
UCRS RGA McNairy

Monitoring Well Location
- Casing
- Water Level (November 2024)
- Screen Interval
- Most recent TCE concentration (in µg/L)
- Boring

- November 2024 Potentiometric Surface

Vertical Exaggeration = 10X.

U = Compound analyzed for but not detected at or below the lowest concentration reported. For monitoring wells not sampled in calendar year 2024, results from the 2023 monitoring have been used.

? - indicates extrapolated contact and therefore should be considered approximate.

MAP SOURCE INFORMATION

Map Generation Date and Location - 02/28/2025; Geosyntec\\fedprojects-01\paducah$\3_Projects\Plume Map Document_2024 Update\01 Working Files\02 FIGURES\Cross Sections\Strater
Map Layer Location: Geosyntec\\fedprojects-01\paducah$\3_Projects\Plume Map Document_2024 Update\01 Working Files\07 CROSS SECTIONS\Strater\Figure 6. 2023–2024 TCE Plume Regional Gravel Aquifer Cross Section B-B'.sdg
Shapefile for Geologic Cross-Sections: \\fedprojects-01\paducah$\Knoxville\GW Strategy\2022 PLUME MAP UPDATE\05 GIS\SHP\Cross_Section_Lines.shp
Monitoring Well Layer Location: Geosyntec\\fedprojects-01\paducah$\2_GIS\SHP\202502_2023-2024 Plume Map Update\TCE_2024_Latest.shp
2024 TCE Plume Concentration Fields: Geosyntec\\fedprojects-01\paducah$\2_GIS\SHP\202502_2023-2024 Plume Map Update\2024_TCE_5_100.shp\2024_TCE_100_1000.shp\2024_TCE_1000_10000.shp\2024_TCE_10000_100000.shp
Surface Water Course Centerline provided by FRNP on 11/8/2022.
Roadways, 229 Boundary, and Water Policy Area downloaded from PEGASIS on 3/16/2021.
Limited Area shapefile provided by FRNP on 2/4/2021 and external limits confirmed by FRNP on 3/21/2022.
Northing and easting of wells obtained from Pegasis, downloaded on 6/14/2022.
Groundwater elevation was based on the 11/18/2024 - 11/21/2024 measurements.
Hydrogeologic boundary and screen intervals are approximate, and were based on boring logs obtained from Pegasis, downloaded on 1/31/2023. Subsurface lithologic elevations between borings were interpreted based on available information and should be considered approximate.
Trichloroethene concentration data was provided by FRNP.

U.S. DEPARTMENT OF ENERGY
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

FOUR RIVERS NUCLEAR PARTNERSHIP, LLC

Figure 6. 2023–2024 TCE Plume Regional Gravel Aquifer Cross Section B-B'

THIS PAGE INTENTIONALLY LEFT BLANK

- TCE concentrations also declined along the south end of the B-B' transect. In MW258, TCE concentration declined from 220 µg/L in January 2023 to 3.12 µg/L in October 2024. Similarly, in MW478, TCE concentrations declined from 157 µg/L in January 2023 to 4.66 µg/L in October 2024; therefore, the extent of the 5 µg/L contour retracted to the west of these wells.

4.3 CENTRAL SITE AREA INCLUDING SOUTHWEST PLUME

TCE

The TCE plume in the industrialized section of PGDP is presented in Figure 7. The overall footprint of the TCE plume in the central site area in 2024 is similar to previous years; differences are noted below. Figure 7 includes temporal TCE concentration plots for selected wells, illustrating the observations made in this subsection.

- The extent of the Southwest Plume north of Solid Waste Management Unit (SWMU) 4 included a small, isolated 10,000 µg/L contour indicated by TCE values in MW333 that were > 10,000 µg/L in January 2015, June 2015, and January 2016. The most recent value for MW333 (i.e., 1,130J µg/L in July 2024) is shown on the map (designated as Area G on Figure 7). An isolated 10,000 µg/L contour was drawn south of SWMU 4 due to the detection of 13,200 µg/L TCE in MW550. TCE concentrations have been consistently increasing in MW550 from 1,500 µg/L in 2016 to 13,200 µg/L in September 2024 due to a suspected TCE source zone in the south SWMU 4 area.

- TCE concentrations in MW416 and MW551, located adjacent to MW550, have declined over time. In MW416, TCE concentrations decreased from a maximum of 1,010 µg/L in May 2019 to 151 µg/L in May 2023. In MW551, TCE concentrations also decreased from 1,600 µg/L in March 2023 to 636 µg/L in September 2024; therefore, the 1,000 µg/L contour was adjusted to exclude MW551.

- TCE concentrations in MW337 declined from 1,780 µg/L in 2022 to 836 µg/L in 2024. Similarly TCE concentrations in MW67 decreased from 1,030 µg/L in July 2022 to 696J µg/L in July 2024; therefore, the 1,000 µg/L contour was retracted from these wells.

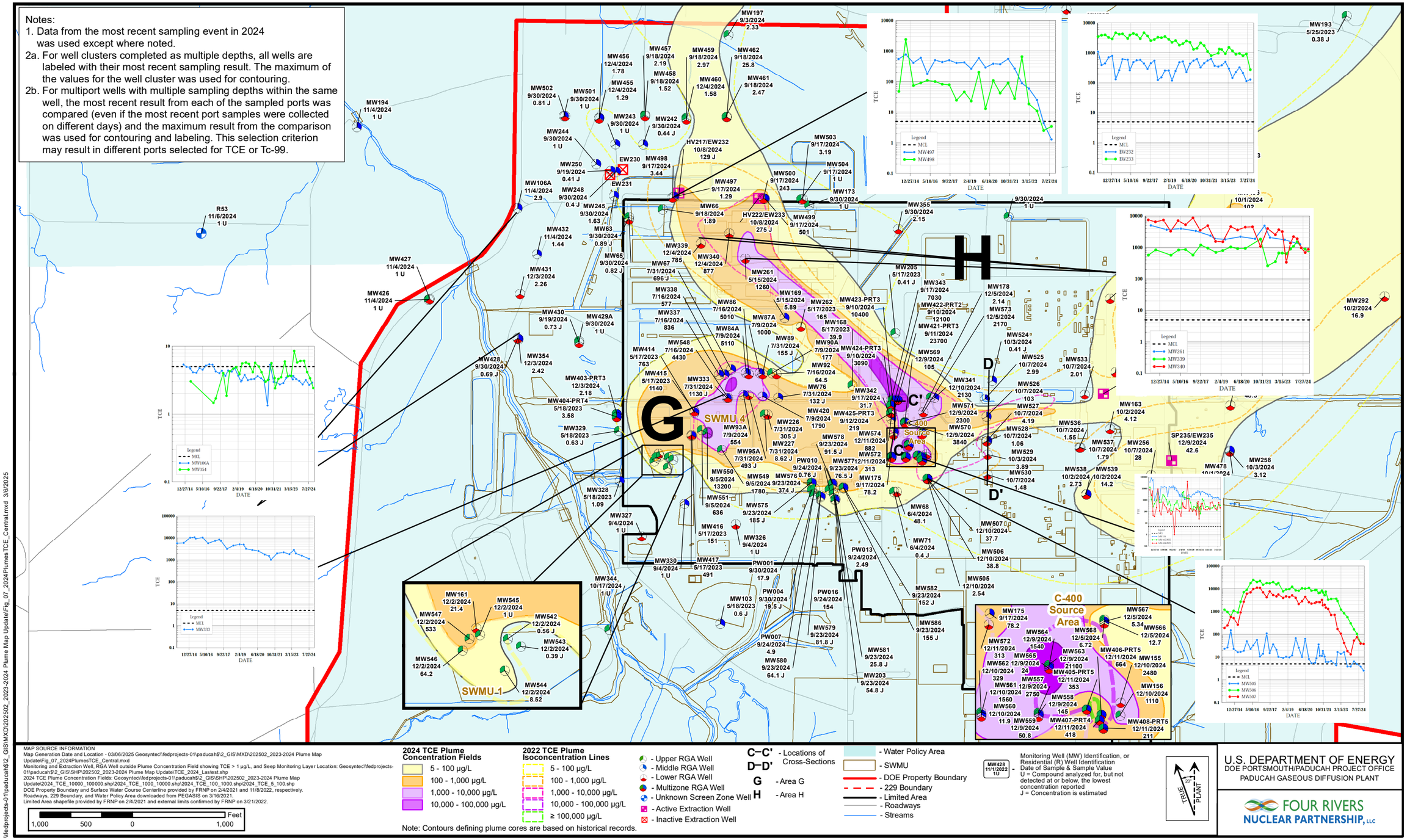
- At SWMU 1, TCE concentrations in MW547 have declined from 1,190 µg/L in December 2020 to < 1,000 µg/L during eight measurements in 2021 through 2024; therefore, the 1,000 µg/L contour has been removed from SWMU 1 (see inset at lower left of Figure 7). In MW161 (i.e., lower RGA), TCE concentrations have continued to decline from a high of 12,200 µg/L in May 2016 to 21.4 µg/L in December 2024 (designated as Area G on Figure 7). TCE concentration reductions in this area are likely reflective of the source area remediation performed at SWMU 1 in 2015.

- In MW403 and MW404, located near the west side of the plant, TCE concentrations declined to below 5 µg/L during the recent monitoring; therefore, the 5 µg/L contour was retracted to the east (designated as Area G on Figure 7).

- The second area (designated as Area H on Figure 7) is on the northern margin of the industrial footprint. The highest concentrations of TCE extend from C-400 Cleaning Building toward the Northwest Plume groundwater EWs. Overall, TCE concentrations in this area have remained stable since 2018. In MW173 and MW504, TCE concentrations remained below the 5 µg/L while concentrations in MW355 and MW503 decreased to below 5 µg/L during the reporting period; therefore, the eastern extent of the TCE plume in this area was retracted to the west.

THIS PAGE INTENTIONALLY LEFT BLANK

Notes:
1. Data from the most recent sampling event in 2024 was used except where noted.
2a. For well clusters completed as multiple depths, all wells are labeled with their most recent sampling result. The maximum of the values for the well cluster was used for contouring.
2b. For multiport wells with multiple sampling depths within the same well, the most recent result from each of the sampled ports was compared (even if the most recent port samples were collected on different days) and the maximum result from the comparison was used for contouring and labeling. This selection criterion may result in different ports selected for TCE or Tc-99.



MAP SOURCE INFORMATION
Map Generation Date and Location - 03/06/2025 Geosyntec\\fedprojects-01\paducah$\2_GIS\MXD\202502_2023-2024 Plume Map Update\Fig_07_2024PlumesTCE_Central.mxd
Monitoring and Extraction Well, RGA Well outside Plume Concentration Field showing TCE > 1 µg/L, and Seep Monitoring Layer Location: Geosyntec\\fedprojects-01\paducah$\2_GIS\SHP\202502_2023-2024 Plume Map Update\TCE_2024_Lastest.shp
2024 TCE Plume Concentration Fields: Geosyntec\\fedprojects-01\paducah$\2_GIS\SHP\202502_2023-2024 Plume Map Update\2024_TCE_10000_100000.shp\2024_TCE_1000_10000.shp\2024_TCE_100_1000.shp\2024_TCE_5_100.shp
DOE Property Boundary and Surface Water Course Centerline provided by FRNP on 2/4/2021 and 11/8/2022, respectively.
Roadways, 229 Boundary, and Water Policy Area downloaded from PEGASIS on 3/16/2021.
Limited Area shapefile provided by FRNP on 2/4/2021 and external limits confirmed by FRNP on 3/21/2022.

Feet
1,000 500 0 1,000

2024 TCE Plume Concentration Fields
- 5 - 100 µg/L
- 100 - 1,000 µg/L
- 1,000 - 10,000 µg/L
- 10,000 - 100,000 µg/L

2022 TCE Plume Isoconcentration Lines
- 5 - 100 µg/L
- 100 - 1,000 µg/L
- 1,000 - 10,000 µg/L
- 10,000 - 100,000 µg/L
- ≥ 100,000 µg/L

Note: Contours defining plume cores are based on historical records.

- Upper RGA Well
- Middle RGA Well
- Lower RGA Well
- Multizone RGA Well
- Unknown Screen Zone Well
- Active Extraction Well
- Inactive Extraction Well

C–C' - Locations of Cross-Sections
D–D'
G - Area G
H - Area H

- Water Policy Area
- SWMU
- DOE Property Boundary
- 229 Boundary
- Limited Area
- Roadways
- Streams

MW428 11/1/2022 1U - Monitoring Well (MW) Identification, or Residential (R) Well Identification
Date of Sample & Sample Value
U = Compound analyzed for, but not detected at or below, the lowest concentration reported
J = Concentration is estimated

TRUE NORTH
PLANT

U.S. DEPARTMENT OF ENERGY
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

FOUR RIVERS NUCLEAR PARTNERSHIP, LLC

\\fedprojects-01\paducah$\2_GIS\MXD\202502_2023-2024 Plume Map Update\Fig_07_2024PlumesTCE_Central.mxd 3/6/2025

Figure 7. 2024 Central Portion of the TCE Plume Regional Gravel Aquifer

THIS PAGE INTENTIONALLY LEFT BLANK

- The 100,000 µg/L contour previously was drawn around the C-400 Cleaning Building source area based on historical data [e.g., MW156, which recorded up to 360,000 µg/L in 1991 (CH2M HILL 1992); Waste Area Grouping 6 angled boring, which recorded over 100,000 µg/L beneath C-400 in 1997 (DOE 1999)] and consideration of the CSM. Groundwater MWs installed during the C-400 investigation in 2020 and 2021 provided additional information on the extent of the 100,000 µg/L contour. A TCE concentration exceeding 100,000 µg/L was measured in MW407-PRT2 at 272,000 µg/L in April 2021; however, none of the MWs in the C-400 area have TCE concentrations exceeding 100,000 µg/L during the 2024 monitoring period, therefore, the 100,000 µg/L contour was removed.

- Generally, the TCE concentrations indicate flow to the northwest from the north and west areas of the C-400 Complex Operable Unit (OU) and flow to the east from the north and central area of the C-400 Complex OU. A cross section showing the interpretation of TCE concentrations within the RGA on the west and north sides of C-400 is in Figure 8. The location of the cross section is denoted as C-C' on Figure 7.

- The 10,000 µg/L TCE concentration contour was previously interpreted to map one contiguous area under the C-400 Cleaning Building, but the recent results indicate two areas of higher TCE concentration. A distinct south area of > 10,000 µg/L TCE occurs around upper RGA MW563. A north area of > 10,000 µg/L TCE in the lower RGA occurs around MW421-PRT3, MW422-PRT2, MW422-PRT3, and MW423-PRT3. This appears to be the current residual source for the Northwest Plume.

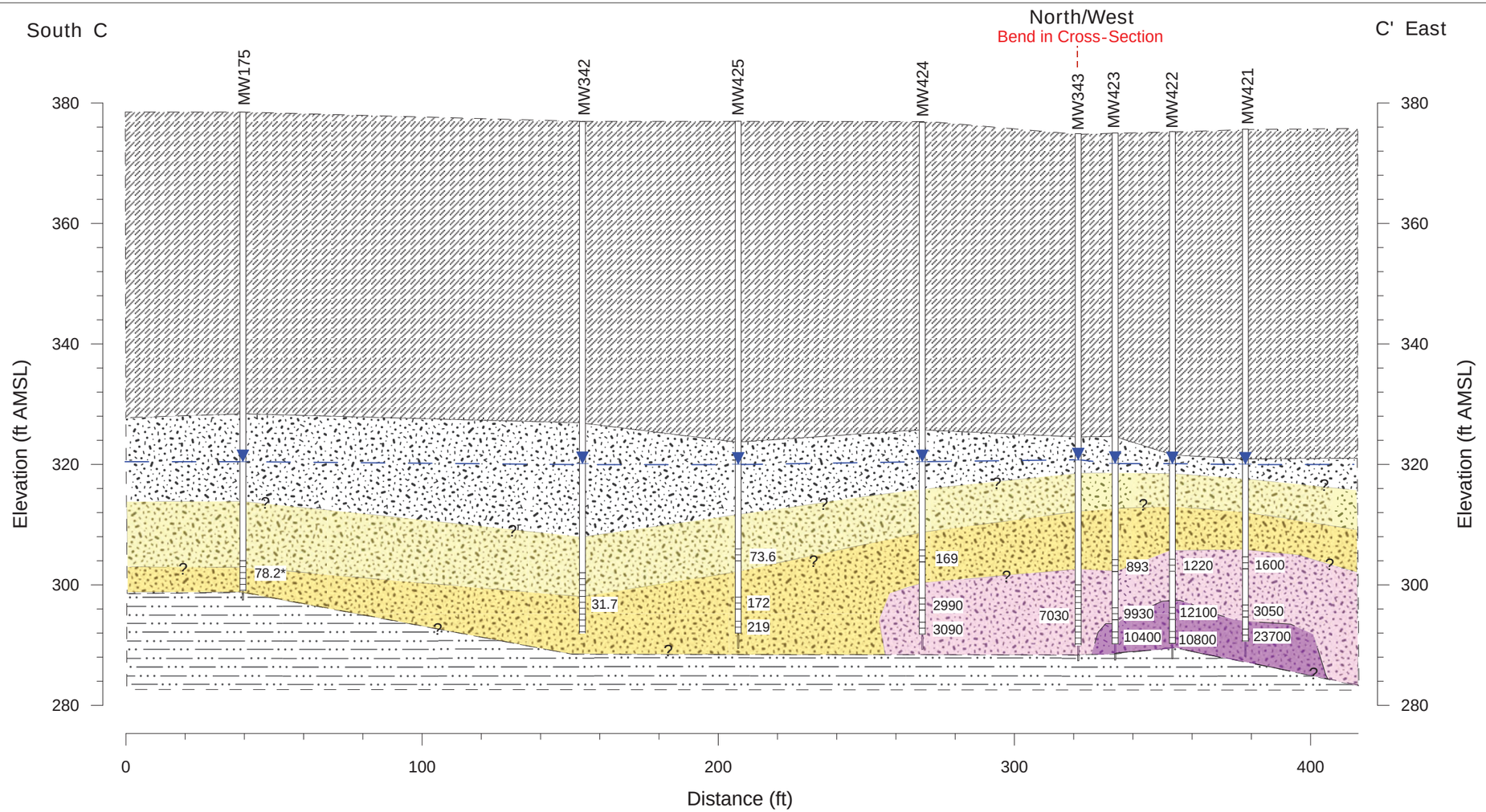
- The area near the southeast corner of C-400 has been subject to remedial action, using electrical resistance heating in the Upper Continental Recharge System and upper RGA (DOE 2011, DOE 2013) and a steam treatability study in the RGA (DOE 2016). MW156, MW408-PRT5, MW405-PRT5, MW406-PRT5, and MW407-PRT4, located near the southeast corner of C-400, have shown overall declines in TCE concentrations from 2014 to 2024. Most notably, TCE in MW408-PRT5 has decreased from its high of 1,400,000 µg/L in September 2012 to 211 µg/L in December 2024. Similarly, TCE concentrations in MW156 declined from a maximum concentration of 81,800 µg/L in June 2014 to 1,110 µg/L in December 2024. In MW405-PRT5, TCE concentrations declined from 13,000 µg/L in March 2014 to 353 µg/L in December 2024. Similarly, the TCE concentrations in MW406-PRT5 and MW407-PRT4 declined from 2,610 µg/L and 1,290 µg/L in December 2022 to 664 µg/L and 418 µg/L in December 2024, respectively.

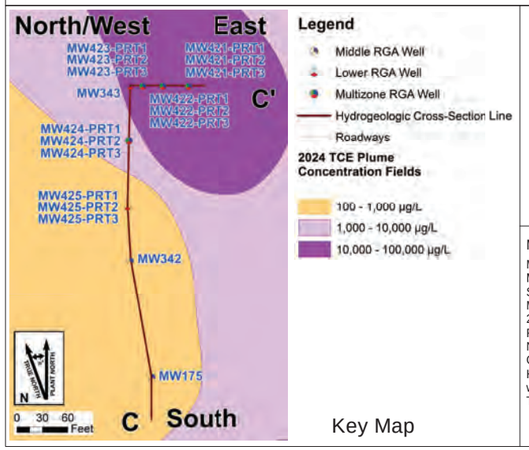
- To the south of the C-400 Cleaning Building source area, all of the most recent samples from the MW505/MW506/MW507 well nest contained TCE concentrations below 100 µg/L. The 1,000 µg/L and 100 µg/L TCE concentration contours were adjusted to the north at this location.

- A cross section in Figure 9 shows the 5 µg/L and 100 µg/L concentration fields only in well MW526 along the MW524–MW530 transect line of wells between the Northwest Plume and Northeast Plume, which are connected with similar concentration contours east of the C-400 Cleaning Building. The location of the cross section is denoted as D-D' on Figure 7. TCE concentration time-series graphs in monitoring wells MW524-MW530 are included in Appendix A. Based on evaluation of the time-series graphs, there is no migration of TCE source material from the C-400 Cleaning Building source area in the direction of the Northeast Plume Containment System (NEPCS) extraction field. The diminishing TCE plume is being captured by EW234.

- To the west of the industrialized section of PGDP, MW354 had four observed TCE concentrations above 5 µg/L during the monitoring period, although the three most recent results were below 5 µg/L. Well MW429A had only one TCE concentration above 5 µg/L during the monitoring period but the

THIS PAGE INTENTIONALLY LEFT BLANK





Key Map

2024 TCE Plume Concentration Fields

- 5 - 100 µg/L
- 100 - 1,000 µg/L
- 1,000 - 10,000 µg/L
- 10,000 - 100,000 µg/L

Hydrogeologic Unit

UCRS RGA McNairy

Monitoring Well Location

- Casing
- Water Level (November 2024)
- Screen Interval
- Most recent TCE concentration (in µg/L)
- Boring

- November 2024 Potentiometric Surface

Vertical Exaggeration = 2.5X.
For monitoring wells not sampled in calendar year 2024, results from the 2023 monitoring have been used.

? indicates extrapolated contact - and therefore should be considered approximate.

* Monitoring well MW572 located south of MW175 has TCE concentration of 313 µg/L, - therefore the 100 µg/L concentration contour is extended to include MW175 and MW342.

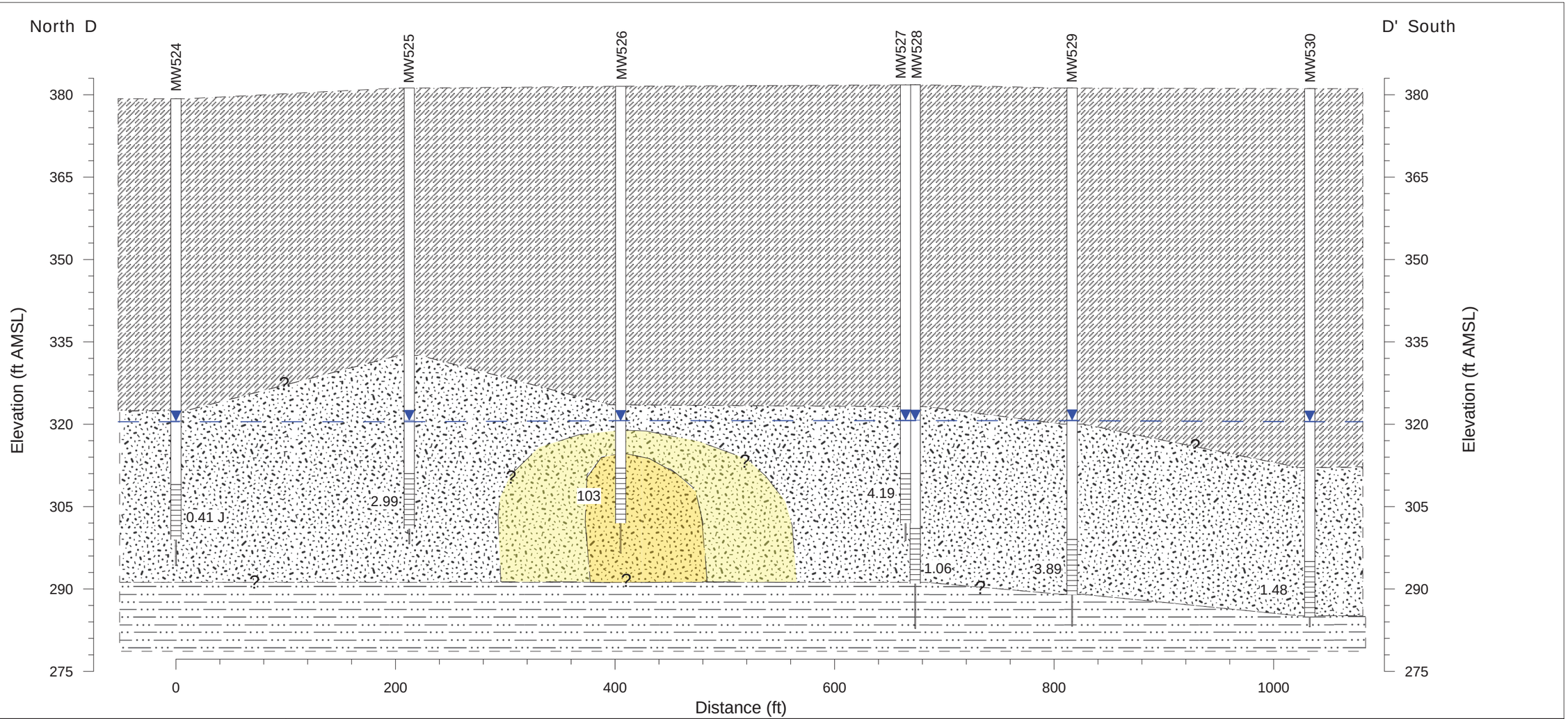
MAP SOURCE INFORMATION

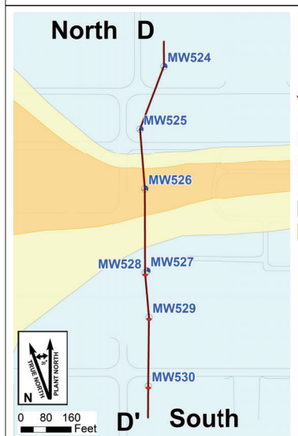
Map Generation Date and Location - 03/03/2025; Geosyntec\\fedprojects-01\paducah$\3_Projects\Plume Map Document_2024 Update\01 Working Files\02 FIGURES\Cross Sections\Strater
Map Layer Location: Geosyntec\\fedprojects-01\paducah$\3_Projects\Plume Map Document_2024 Update\01 Working Files\07 CROSS SECTIONS\Strater\Figure 8. 2023–2024 TCE Plume Regional Gravel Aquifer Cross Section C-C'.sdg
Shapefile for Geologic Cross-Sections: Geosyntec\\fedprojects-01\paducah$\Knoxville\GW Strategy\2022 PLUME MAP UPDATE\05 GIS\SHP\Cross_Section_Lines.shp
Monitoring Well Layer Location: Geosyntec\\fedprojects-01\paducah$\2_GIS\SHP\202502_2023-2024 Plume Map Update\TCE_2024_Latest.shp
2024 TCE Plume Concentration Fields: Geosyntec\\fedprojects-01\paducah$\2_GIS\SHP\202502_2023-2024 Plume Map Update\2024_TCE_5_100.shp\2024_TCE_100_1000.shp\2024_TCE_1000_10000.shp\2024_TCE_10000_100000.shp
Roadways, 229 Boundary, and Water Policy Area downloaded from PEGASIS on 3/16/2021.
Northing and easting of wells obtained from Pegasis, downloaded on 6/14/2022.
Groundwater elevation was based on the 11/18/2024 - 11/21/2024 measurements.
Hydrogeologic boundary and screen intervals are approximate, and were based on boring logs obtained from Pegasis, downloaded on 1/31/2023. Subsurface lithologic elevations between borings were interpreted based on available information and should be considered approximate.
Trichloroethene concentration data was provided by FRNP.

U.S. DEPARTMENT OF ENERGY
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

FOUR RIVERS NUCLEAR PARTNERSHIP, LLC

Figure 8. 2023–2024 TCE Plume Regional Gravel Aquifer Cross Section C-C'





Key Map

Legend

- Middle RGA Well
- Lower RGA Well
- Hydrogeologic Cross-Section Line
- Roadways
- Water Policy Area

2024 TCE Plume Concentration Fields

- 5 - 100 µg/L
- 100 - 1,000 µg/L

2024 TCE Plume Concentration Fields

- 5 - 100 µg/L
- 100 - 1,000 µg/L

Hydrogeologic Unit: UCRS, RGA, McNairy

Monitoring Well Location

- Casing
- Water Level (November 2024)
- Screen Interval
- Most recent TCE concentration (in µg/L)
- Boring

- November 2024 Potentiometric Surface

Vertical Exaggeration = 5X.
For monitoring wells not sampled in calendar year 2024, results from the 2023 monitoring have been used.

? indicates extrapolated contact and therefore should be considered approximate.

MAP SOURCE INFORMATION

Map Generation Date and Location - 03/05/2025; Geosyntec\\fedprojects-01\paducah$\3_Projects\Plume Map Document_2024 Update\01 Working Files\02 FIGURES\Cross Sections\Strater
Map Layer Location: Geosyntec\\fedprojects-01\paducah$\3_Projects\Plume Map Document_2024 Update\01 Working Files\07 CROSS SECTIONS\Strater\Figure 9. 2023–2024 TCE Plume Regional Gravel Aquifer Cross Section D-D'.sdg
Shapefile for Geologic Cross-Sections: \\fedprojects-01\paducah$\Knoxville\GW Strategy\2022 PLUME MAP UPDATE\05 GIS\SHP\Cross_Section_Lines.shp
Monitoring Well Layer Location: Geosyntec\\fedprojects-01\paducah$\2_GIS\SHP\202502_2023-2024 Plume Map Update\TCE_2024_Latest.shp
2024 TCE Plume Concentration Fields: Geosyntec\\fedprojects-01\paducah$\2_GIS\SHP\202502_2023-2024 Plume Map Update\2024_TCE_5_100.shp\2024_TCE_100_1000.shp\2024_TCE_1000_10000.shp\2024_TCE_10000_100000.shp
Roadways, 229 Boundary, and Water Policy Area downloaded from PEGASIS on 3/16/2021.
Northing and easting of wells obtained from Pegasis, downloaded on 6/14/2022.
Groundwater elevation was based on the 11/18/2024 - 11/21/2024 measurements.
Hydrogeologic boundary and screen intervals are approximate, and were based on boring logs obtained from Pegasis, downloaded on 1/31/2023. Subsurface lithologic elevations between borings were interpreted based on available information and should be considered approximate.
Trichloroethene concentration data was provided by FRNP.

U.S. DEPARTMENT OF ENERGY
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

FOUR RIVERS NUCLEAR PARTNERSHIP, LLC

Figure 9. 2023–2024 TCE Plume Regional Gravel Aquifer Cross Section D-D'

most recent TCE concentration is below 5 µg/L. The wells delineate the western extent of the Southwest Plume. MW354 and MW429A are not directly downgradient of the Southwest Plume source area. (designated as G on Figure 7) based on the potentiometric surface in the RGA, shown in Figures 11 and 12 (see Section 5). The location of the source responsible for the detections of TCE in MW354 and MW429A is uncertain.

Tc-99

There were 1,416 analyses for Tc-99 in RGA groundwater at PGDP in 2023 and 2024, representing 240 sample locations. Of the 240 locations, 20 locations had Tc-99 analyses > 900 pCi/L and 16 locations had Tc-99 analyses > 1,930 pCi/L. Figure 10 presents the results of Tc-99 analyses near the central area of the plant, where the groundwater samples collected in 2024 (supplemented with samples collected in 2023) contained Tc-99 at activities > 900 pCi/L and 1,930 pCi/L. Figure 10 also presents temporal concentration plots for selected wells illustrating the observations made in this subsection.

The area exceeding 900 pCi/L for Tc-99 lies within the TCE footprint on Figure 7 (i.e., the area encompassed by the 100–1,000 µg/L isocontour). From the 2022 interpreted contour, the 900 pCi/L contour was retracted to the west to exclude MW341, which decreased from 1,540 pCi/L in December 2022 (i.e., the last sampling event of the 2022 plume map update) to 348 pCi/L in December 2024 (Figure 10). Contours of 1,930 pCi/L and 3,790 pCi/L, which were added at the northwest extent of the 2022 Tc-99 plume, have been removed because of a decline in Tc-99 concentrations in MW340. The 900 pCi/L contour in this area remained the same to accommodate MW340 and MW261. Tc-99 activities in nearby MW339 remained below 900 pCi/L. The northwestern extent of the area exceeding 900 pCi/L is delineated by downgradient wells MW497/MW498/EW232 and MW499/MW500/EW233, where the activity was below 900 pCi/L in all samples collected in 2024.

The highest concentration level of Tc-99 during the 2023 and 2024 monitoring period occurred in the area of MW421 through MW425 (which are located downgradient of the Tc-99 source area at the C-400 Cleaning Building). This is consistent with historical releases at the C-400 Cleaning Building. The southern extent of the 3,790 pCi/L isoconcentration contour was adjusted to the southeast to include MW570 and MW571, where the Tc-99 activity increased from 2,440 pCi/L and 1,190 pCi/L in December 2022 to 30,100 pCi/L and 16,900 pCi/L in December 2024, respectively. MW421-PRT1, PRT2, and PRT3 showed overall increases in Tc-99 activity since 2022, therefore, the 3,790 pCi/L isoconcentration contour expanded to include MW421. The Tc-99 activity in MW425-PRT1, PRT2, and PRT3 declined from September 2022 measurement to the September 2024 measurement (Figure 10); therefore, the 3,790 pCi/L isoconcentration contour was adjusted to the north to exclude MW425.

The southern extent of the Tc-99 plume is delineated by MW175, MW572, and MW566/MW567/MW568, with reported Tc-99 activity for all samples collected in 2024 of < 900 pCi/L.

- Northeast Plume transect wells, MW524 to MW530, installed as part of the Northeast Plume optimization project, all contain < 900 pCi/L of Tc-99 (ranging from nondetect to 230 pCi/L during the most recent monitoring event in October 2024). Time-series graphs of Tc-99 concentration in monitoring wells MW524 to MW530 is included in the Appendix A Data. Based on evaluation of the time-series graphs, the Tc-99 activity that is migrating into the NEPCS extraction field remains below 900 pCi/L, and thus, below a concentration which would require Tc-99 treatment.

THIS PAGE INTENTIONALLY LEFT BLANK

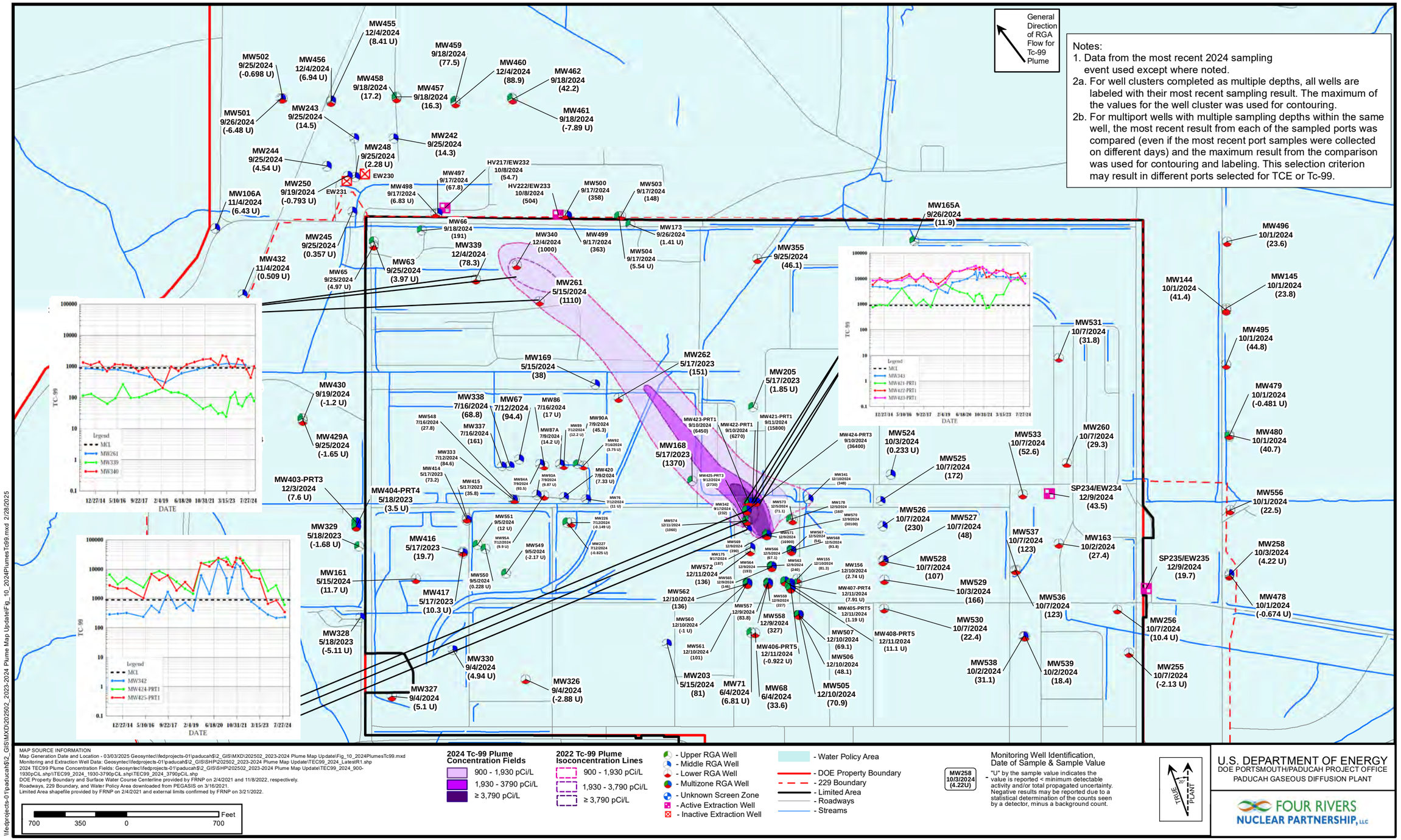


Figure 10. 2024 Tc-99 Plume—Regional Gravel Aquifer

THIS PAGE INTENTIONALLY LEFT BLANK

5. POTENTIOMETRIC MAPS

Synoptic water level measurements were collected in August 2023 and August 2024 to evaluate groundwater flow direction. In 2023, water level measurements in wells screened in the RGA were made in 303 EWs, MWs, and piezometers during a 4-day period between August 21, 2023, and August 24, 2023. Similarly, in 2024, groundwater level measurements were conducted in 313 EWs, MWs and piezometers during a 4-day period between August 19, 2024, and August 22, 2024. These water level measurements (Table 2) are the basis for the August 2023 and August 2024 potentiometric surface maps of the RGA, presented as Figures 11 and 12, respectively. The contours of the potentiometric surface map define lines of equal hydraulic potential. The regional direction of hydraulic gradient is perpendicular to the hydraulic potential lines. These potentiometric surface contours help explain the plume geometries. In addition to groundwater flow direction, other factors affecting the plume geometries include temporal changes to the RGA hydraulic potential field; source zone characteristics, anisotropy of the hydraulic conductivity within the RGA; near-field recharge effects; recharge sources not associated with PGDP; and advection, dispersion, and natural attenuation of the contaminants.

Table 2. RGA Water Levels Measurement Events during CY 2023 and 2024

Event Dates	Number of Wells/Piezometers	Ohio River Stage [ft above mean sea level (amsl)]	Barometric Pressure [inches of mercury (in/Hg)]	Rainfall During the Event (inches)
August 21–24, 2023	303	301.27	30.09	0.0
August 19–22, 2024	313	301.17	30.11	0.0

Notes: Ohio River elevation was estimated as the average of elevations measured by the U.S. Geological Survey at Paducah Station USGS 0361100 and Olmsted, Illinois, Station USGS 03612600. Rainfall data was obtained from the Paducah, Barkley Regional Airport office of the National Weather Service (i.e., https://w1.weather.gov/data/obhistory/KPAH.html).

A dominant control on the hydraulic potential field of the RGA is the stage of the Ohio River, which is the primary discharge zone of the RGA. The Ohio River stage controls the base hydraulic potential in the RGA (e.g., water levels rise in the RGA when the river stage is high). During August 2023, the Ohio River stage near the Paducah Site was approximately 301.27 ft amsl; in August 2024, the stage of the Ohio River was approximately 301.17 ft amsl. Both are examples of the current base-level river stage. In addition, the Northeast Plume and Northwest Plume pump-and-treat systems form local cones of depression in the RGA potentiometric surface.

Operation of the Olmsted Locks and Dam on the Ohio River, located approximately 19 miles downstream of the Paducah Site, began in September 2018. The dam maintains a higher base-level stage on the Ohio River and will impact the river stage during the operational life of the dam. As such, the August 2023 and August 2024 maps documented RGA hydraulic potential contours during a higher river stage (301.27 ft amsl and 301.17 ft amsl, respectively) compared with the August 2017 and August 2018 maps (290 ft amsl and 298 ft amsl, respectively).

RGA water level measurements were converted to elevation and corrected to a standard barometric pressure that was common during the period of the water level measurements: 30.09 in/Hg for the August 2023 measurements and 30.11 inches of mercury for the August 2024 measurements. Rainfall was minimal during both periods of water level measurements: 0.0 inches of precipitation during the periods of both the August 2023 and August 2024 water level measurements.

A data quality review of the RGA water level measurements identified a few measurements that were rejected for mapping the RGA potentiometric surface (Table 3).[11] In the August 2023 data set, seven out of 310 measurements were rejected. In the August 2024 data set, three out of 316 measurements were rejected.

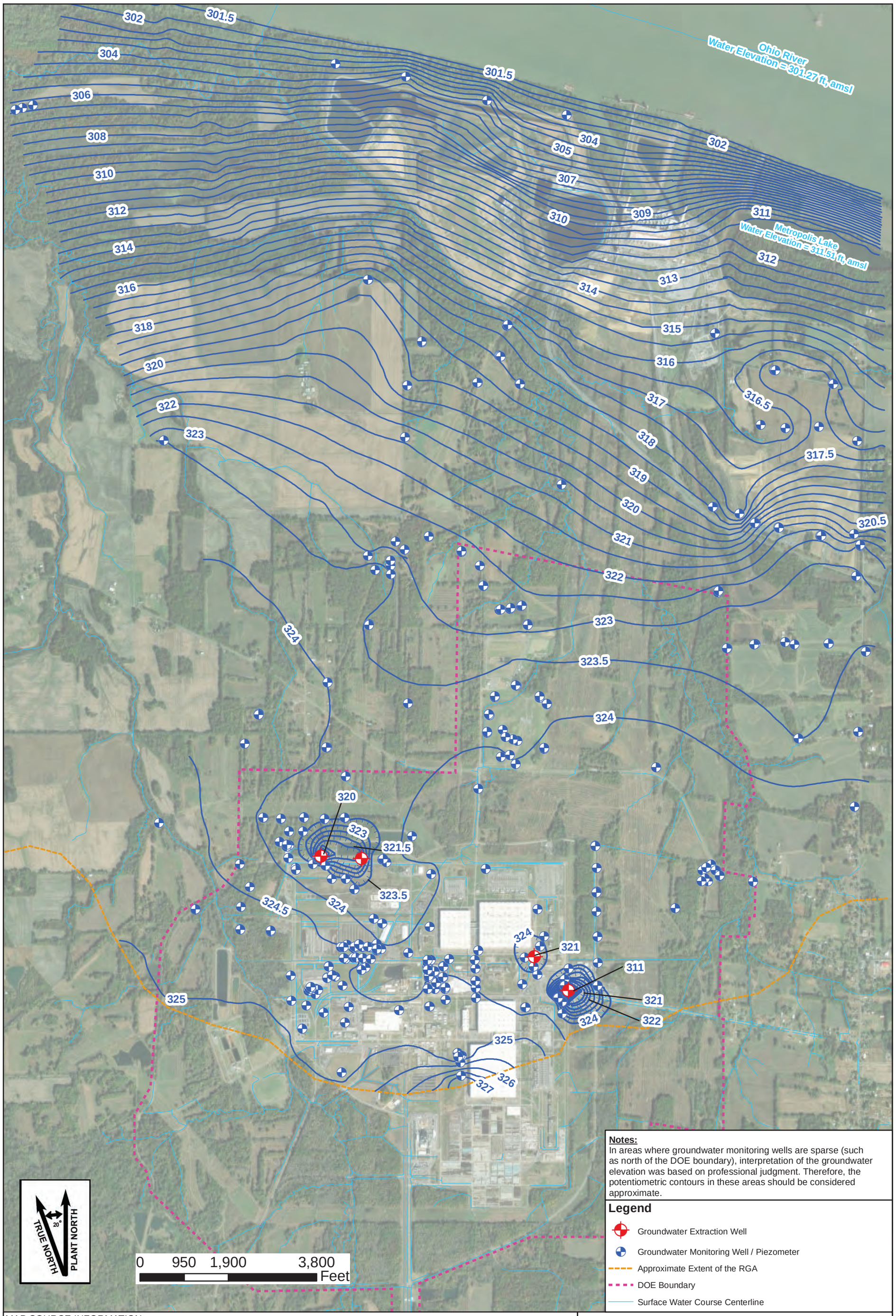
Table 3. RGA Water Levels Measurements (Total and Useable) from Events during CY 2023 and 2024

Event	Total Number of Measurements	Number of Acceptable Measurements
August 21–24, 2023	310	303
August 19–22, 2024	316	313

The RGA hydraulic potential contours first were generated by computer using a Surfer® software (version 23.4.238, 2022) and ArcGIS Pro (version 3.1.0). The Surfer® software created contours using kriging, based on the well coordinates and water level elevations of the August 2023 and August 2024 synoptic water measurements events. The resulting contours were exported into ArcGIS Pro for the presentation of the contours together, with relevant site features and smoothed manually in ArcGIS Pro where site knowledge provided bias to understanding the hydraulic potential field.

The available wells and piezometers for both the August 2023 and August 2024 data sets provide a robust monitoring network for defining the RGA hydraulic potential within the DOE property. For the region included in Figures 11 and 12, the primary areas of uncertainty are (1) the northwest corner, where no monitoring point is present; (2) the western edge of the contoured expanse, where few wells and piezometers are available to refine the contour spacing; and (3) the zone parallel to the Ohio River, which includes the Tennessee Valley Authority Shawnee Fossil Plant. The slope of the RGA hydraulic potential in the area adjacent to the Ohio River varies spatially and temporally, dependent upon season and Ohio River stage consistent with Figures 11 and 12 and the conclusions of the white paper, *Comparison of Regional Groundwater Flow Pre- and Post-Construction and Operation of Olmsted Locks and Dam* (FRNP 2023c).

[11] A measurement was rejected when the derived elevation was inconsistent with other measurements in the area; no explanation for the discrepancy was apparent.



MAP SOURCE INFORMATION

Map Generation Date and Location - 10/08/2023 Geosyntec\\fedprojects-01\paducah$\Knoxville\GW Strategy\GIS\MXDs\2022-2023 Potentiometric Surface Maps
Map Layer Location: Geosyntec\\fedprojects-01\paducah$\Knoxville\GW Strategy\GIS\MXDs\2022-2023 Potentiometric Surface Maps\August 2023 Potentiometric Surface Map_10082023.mxd
Image Source: Aerial 2021: http://pegasis.pad.pppo.gov:6080/arcgis/services; and
Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community.
Shapefile for Surface Water Course Centerline provided by FRNP on 11/8/2022.
DOE Property Boundary provided by FRNP on 2/4/2021.
Northing and easting of wells obtained from Pegasis, downloaded on 6/14/2022.
Groundwater elevation was based on the 8/21/2023 - 8/24/2023 measurements. Groundwater elevation of extraction wells was measured on 08/28/2023 and was provided by FRNP on 9/14/2023.
Ohio River elevation was estimated as the average of elevations measured by the USGS at Paducah Station
USGS 0361100 and Olmsted, IL Station (USGS 03612600) between 5/22/2023 - 5/26/2023.
Groundwater elevation for the TVA wells were provided by the Kentucky Division of Waste Management letter to DOE (#KY8-890-008-982) dated 08/30/2023. Water elevation at Metropolis Lake was provided by FRNP on 8/24/2023.
amsl = above mean sea level

U.S. DEPARTMENT OF ENERGY
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

FOUR RIVERS NUCLEAR PARTNERSHIP, LLC

Figure 11. August 2023 RGA Potentiometric Surface Map

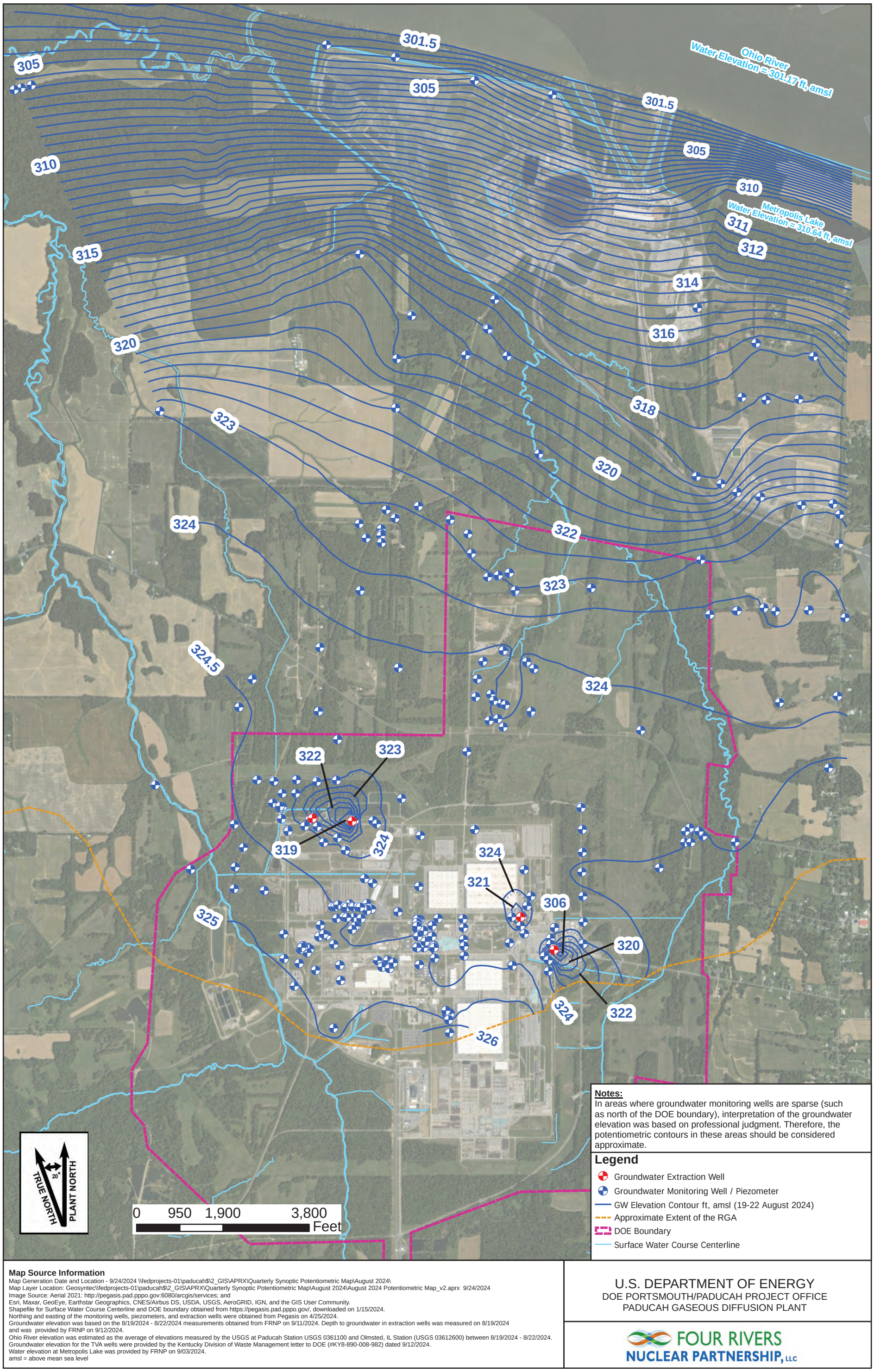


Figure 12. August 2024 RGA Potentiometric Surface Map

6. SUMMARY

This plume map document has been prepared based on the most recent TCE and Tc-99 concentrations measured in RGA MWs, EWs, and residential wells in 2023 and 2024. Appendix A provides a compendium of analyses and trends for the period 2014 through 2024.

The off-site extent and width of the TCE plumes in 2024 are markedly smaller than in 2022 (with similar reductions on-site) and TCE concentrations in 2024 are generally lower than in 2022. In 2024, TCE levels in the Northeast Plume were near-uniformly below 100 µg/L and, in the Northwest and Southwest Plumes, TCE levels greater than 100 µg/L are largely contained within the Paducah Site boundary. The reduction in the footprint of the TCE plumes indicates the effectiveness of the pump-and-treat remediation system to: (1) contain the plumes from migration; and (2) remove TCE from the aquifer.

The footprint of the Tc-99 plume in 2022 and 2024 is generally similar. Tc-99 levels > 900 pCi/L are restricted to the Northwest Plume. The C-400 Complex continued to be the primary source of Tc-99 groundwater contamination during 2024. EWs of the Northwest Plume pump-and-treat remediation system contained the plume centroid at the plant boundary.

7. REFERENCES

CH2M HILL 1992. *Results of the Site Investigation, Phase II at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky,* KY/SUB/13B-97777C P-03/1991/1, U.S. Department of Energy, Paducah, KY, April.

DOE (U.S. Department of Energy) 1993. *Record of Decision for Interim Remedial Action of the Northwest Plume at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/06-1143&D4, U.S. Department of Energy, Paducah, KY, July.

DOE 1999. *Remedial Investigation Report for Waste Area Grouping 6 at the Paducah Gaseous Diffusion Plant*, *Paducah, Kentucky*, DOE/OR/07-1727&D2, Volumes 1–6, U.S. Department of Energy, Paducah, KY, May.

DOE 2011. *Technical Performance Evaluation for Phase I of the C-400 Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-1260&D1, U.S. Department of Energy, Paducah, KY, August.

DOE 2013. *Remedial Action Work Plan for Phase IIa of the Interim Remedial Action for the Volatile Organic Compound Contamination at the C-400 Cleaning Building at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-1271&D2/R3, U.S. Department of Energy, Paducah, KY, October.

DOE 2016. *Treatability Study Report for the C-400 Interim Remedial Action Phase IIb Steam Injection Treatability Study at Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-2202&D2, U.S. Department of Energy, Paducah, KY, May.

DOE 2018. *Remedial Action Work Plan for Optimization of the Northeast Plume Interim Remedial Actoin at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-1280&D2/R3/A1, U.S. Department of Energy, Paducah, KY, August.

DOE 2020. *Operation and Maintenance Plan for the Northwest Plume Groundwater System Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-1253&D4/R7, U.S. Department of Energy, Paducah, KY, November.

DOE 2022. *Methods for Conducting Risk Assessments and Risk Evaluations at the Paducah Gaseous Diffusion Plant Paducah, Kentucky Volume 1. Human Health*, DOE/LX/07-0107&D2/R13/V1, U.S. Department of Energy, Paducah, KY, June.

EPA (U.S. Environmental Protection Agency) 2002. *Radionuclides in Drinking Water: A Small Entity Compliance Guide*, EPA 815-R-02-001, Office of Ground Water and Drinking Water, U.S. Environmental Protection Agency, Washington, DC, February.

FRNP (Four Rivers Nuclear Partnership, LLC) 2022. *Environmental Monitoring Plan Fiscal Year 2023 Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, CP2-ES-0006/FR8, Four Rivers Nuclear Partnership, LLC, Paducah, KY, October.

FRNP 2023a. *Environmental Monitoring Plan Fiscal Year 2024 Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, CP2-ES-0006/FR10, Four Rivers Nuclear Partnership, LLC, Paducah, KY, November.

FRNP 2023b. *Trichloroethene and Technetium-99 Groundwater Contamination in the Regional Gravel Aquifer for Calendar Year 2022 at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, FRNP-RPT-0273, Four Rivers Nuclear Partnership, LLC, Paducah, KY, June.

FRNP 2023c. *Comparison of Regional Groundwater Flow Pre- and Post-Construction and Operation of Olmsted Locks and Dam*, FRNP-RPT-0260, Four Rivers Nuclear Partnership, LLC, Paducah, KY, February.

APPENDIX A

ELECTRONIC COPIES OF TABLES AND GRAPHS AND ALTERNATE INTERPRETATION OF PLUMES WITH MAXIMUM RESULTS (DATA)

THIS PAGE INTENTIONALLY LEFT BLANK

APPENDIX A

ELECTRONIC COPIES OF TABLES AND GRAPHS (DATA)

FIGURES

Notes:
1. Data from the maximum result sampled 2023-2024.
2a. For well clusters completed as multiple depths, all wells are labeled with the maximum sampling result. The maximum of the values for the well cluster was used for contouring.
2b. For multiport wells with multiple sampling depths within the same well, the maximum result was used for contouring and labeling.

MW146 (1.64)
MW433 (1.26)
MW435 (9.46)
MW439 (1.52)
MW441 (1.23)
LBCSP5 (1U)
MW443 (0.91J)
MW444 (1.53)
MW442 (1.82)
MW450 (1.03)
MW448 (2.1)
MW445 (0.67J)
MW447 (1.14)
R245 (1U)
R83 (1U)
R21 (1U)
MW474 (1U)
MW473 (1U)
MW475 (1.03)
MW476 (0.88J)
MW199 (1U)
MW201 (1.2)
MW135 (24)
MW463 (3.65J)
MW464 (1.66J)
MW465 (3.24)
MW466 (1.28)
MW467 (1.21)
MW468 (1.68)
MW469 (2.05J)
MW470 (1.85J)
MW472 (1U)
MW471 (1.35)
R14 (1U)
MW236 (3.53)
MW490 (41.1)
MW489 (4.89)
MW492 (0.91J)
MW491 (2.52)
MW202 (1U)
MW240 (1.44)
MW98 (1.3)
MW493 (1.03)
MW494 (1.06)
MW360 (7.54)
MW361 (5.18)
MW364 (3.36)
MW357 (6.13)
MW363 (3.96)
MW358 (3.89J)
MW367 (1.61)
MW366 (3.87)
MW132 (0.39J)
MW139 (1U)
MW477 (0.59J)
MW99 (0.4J)
MW100 (1U)
R13 (1U)
MW125 (0.6J)
MW485 (1U)
MW486A (110)
MW148 (0.4J)
R20 (1U)
MW483 (0.5J)
MW484 (1U)
MW487 (2.02)
MW488 (1U)
MW252 (1U)
MW410 (6.95)
MW372 (6.01)
MW370 (5.48)
MW373 (5.76)
MW369 (5.84)
MW392 (9.43)
MW391 (2.87)
MW419 (4.02)
MW418 (2.32)
MW388 (1.52)
MW387 (1.61)
MW221 (2.69)
MW384 (6.03)
MW222 (1U)
MW385 (2.92)
MW223 (2.42)
MW224 (1.41)
MW395 (7.11)
MW394 (6.47)
MW220 (1.26)
MW397 (1U)
MW20 (1U)
MW200 (0.47J)
MW451 (1.36)
MW452 (1.1)
R2 (5.03)
MW134 (1U)
MW454 (0.91J)
MW453 (1.18)
MW253A (0.7J)
MW409 (3.17)
MW193 (0.38J)
MW197 (11.2)
MW456 (6.87)
MW455 (2.23)
MW457 (17.1)
MW458 (4.73)
MW459 (12.4)
MW460 (14.6)
MW461 (5.07)
MW462 (31)
MW501 (1U)
MW502 (27.1)
MW242 (3.2)
MW194 (1.35)
MW243 (31.5)
MW244 (5.39)
MW248 (3.44)
MW250 (5.94)
MW500 (320)
MW499 (865)
HV217/EW232 (502)
MW504 (31.5)
MW503 (25.1)
MW173 (22.5)
HV222/EW233 (1540)
MW497 (59.6)
MW498 (18.6)
MW245 (11.7)
MW63 (7.62)
MW65 (4.29)
MW66 (221)
MW339 (1550)
MW340 (3190)
MW261 (1750J)
MW106A (3.7)
MW432 (2.61)
MW431 (7.18)
MW427 (1.62)
MW426 (6.71)
MW429A (6.88)
MW430 (4.45)
MW428 (2.41)
MW354 (8.52)
MW355 (4.36)
MW165A (1.64)
MW496 (150)
MW481 (4.33J)
MW482 (8.62J)
MW291 (16.8)
MW283 (4.14)
MW293A (57.7)
MW124 (84.5)
MW126 (40.1)
MW191 (1U)
MW288 (190)
MW145 (15.5)
MW144 (123)
MW531 (160)
MW495 (58.6)
MW292 (104)
MW169 (32.6J)
MW262 (165)
MW205 (0.41J)
MW524 (32.2)
MW260 (42.4)
MW480 (221)
MW479 (21.5)
MW525 (484)
SP234/EW234 (319)
MW556 (93.3)
MW526 (1540)
MW533 (937)
MW163 (73.8)
MW527 (26.5)
MW528 (27)
MW536 (10.6)
MW537 (19.3)
SP235/EW235 (118)
MW478 (157)
MW258 (220)
MW529 (2000)
MW538 (66)
MW539 (46.9)
MW256 (120)
MW255 (164)
MW530 (88.3)
MW403-PRT3 (10.9)
MW404-PRT4 (3.58)
MW329 (0.63J)
MW161 (79.1J)
MW545 (2.41)
MW547 (881)
MW328 (1.09)
MW542 (1.7)
MW543 (1.89)
MW546 (128)
MW544 (44)
MW549 (7280)
MW330 (1.93)
MW326 (1U)
MW327 (1.48)
PW010 (11.8)
PW004 (339)
PW016 (162)
MW575 (368)
MW576 (1730)
PW001 (71.4)
PW007 (16.4J)
MW582 (152J)
MW68 (66.7)
MW71 (2.83)
MW581 (25.8J)
MW579 (81.8J)
MW580 (64.1J)
MW577 (76.5J)
MW578 (122)
PW013 (16.8)
MW586 (460)
MW203 (66.6)
MW150 (1U)
R302 (1U)
R53 (3.78)
MW344 (1U)
MW103 (0.6J)
R9 (1U)
MW423-PRT1/PRT2/PRT3 (13300)
MW422-PRT1/PRT2/PRT3 (18100)
MW343 (8120)
MW421-PRT1/PRT2/PRT3 (35800)
MW341 (4110)
MW424-PRT1/PRT2/PRT3 (4110)
MW425-PRT1/PRT2/PRT3 (2520)
MW178 (44.7)
MW574 (1500)
MW569 (339)
MW573 (6380)
MW342 (1500)
MW570 (5660)
MW571 (4140)
MW566 (322)
MW567 (2800)
MW568 (5080)
MW175 (2800)
MW572 (1100)
MW563 (29600)
MW564 (5430)
MW565 (1470)
MW405-PRT5 (413)
MW406-PRT5 (2100)
MW560 (221)
MW155 (11100)
MW156 (3250)
MW561 (2670J)
MW562 (1200)
MW407-PRT4 (889)
MW557 (10200)
MW408-PRT5 (676)
MW558 (3490)
MW506 (1210)
MW507 (106)
MW559 (1650)
MW505 (16.3)

Inset A
MW67 (790)
MW338 (577)
MW86 (6200)
MW87A (2160)
MW84A (7000)
MW337 (1440)
MW89 (241)
MW90A (313)
MW92 (64.5)
MW420 (2600)
MW333 (2850J)
MW548 (6610J)
MW93A (1960)
MW95A (1710J)
MW76 (248J)
MW415 (1140)
MW414 (763)
MW227 (69.3J)
MW226 (305J)
MW551 (1600)
MW550 (13200)
MW417 (491)
MW416 (151)

See Inset A
See Inset B
Inset B

TRUE
20°
PLANT

600 300 0 600 1,200 1,800 Feet

2024 TCE Plume Concentration Fields for Alternate Interpretation Using Maximum Concentrations
- 5 - 100 µg/L
- 100 - 1,000 µg/L
- 1,000 - 10,000 µg/L
- 10,000 - 100,000 µg/L

2024 TCE Plume Concentration Fields (Figure C.1)
- 5 - 100 µg/L
- 100 - 1,000 µg/L
- 1,000 - 10,000 µg/L
- 10,000 - 100,000 µg/L

- Upper RGA Well
- Middle RGA Well
- Lower RGA Well
- Multizone RGA Well
- Unknown Screen Zone Well
- Extraction Well
- Seep Monitoring Location
- Surface Water Course Centerline
- DOE Property Boundary
- Roadways
- 229 Boundary
- Limited Area
- Water Policy

MW100 (1U) — Monitoring Well Identification
Sample Value (TCE Concentration in µg/L)
J = Concentration is estimated
U = Compound analyzed for but not detected at or below, the lowest concentration reported

Note: Contours defining >10,000 µg/L used historical records in addition to recent groundwater monitoring results.

MAP SOURCE INFORMATION
Map Generation Date and Location - 03/06/2025 Geosyntec\\fedprojects-01\paducah$\2_GIS\MXD\202502_2023-2024 Plume Map Update\Fig_A1_2024PlumesTCE_MAXR1.mxd
Monitoring and Extraction Well, and Seep Monitoring Layer Location: Geosyntec\\fedprojects-01\paducah$\2_GIS\SHP\202502_2023-2024 Plume Map Update\tce_2024_max.shp
2024 Maximum TCE Plume Concentration Fields: Geosyntec\\fedprojects-01\paducah$\2_GIS\SHP\202502_2023-2024 Plume Map Update\2024_TCE_10000_100000_MAX.shp\\2024_TCE_1000_10000_MAX.shp\\2024_TCE_100_1000_MAX.shp\\2024_TCE_5_100_MAX.shp
2024 TCE Plume Concentration Fields: Geosyntec\\fedprojects-01\paducah$\2_GIS\SHP\202502_2023-2024 Plume Map Update\2024_TCE_5_100.shp\2024_TCE_100_1000.shp\2024_TCE_1000_10000.shp\2024_TCE_10000_100000.shp
DOE Property Boundary and Surface Water Course Centerline provided by FRNP on 2/4/2021 and 11/8/2022, respectively.
Roadways, 229 Boundary, and Water Policy Area downloaded from PEGASIS on 3/16/2021.
Roadways, 229 Boundary, and Water Policy Area downloaded from PEGASIS on 3/16/2021
Limited Area shapefile provided by FRNP on 2/4/2021 and external limits confirmed by FRNP on 3/21/2022.

U.S. DEPARTMENT OF ENERGY
PORTSMOUTH / PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

FOUR RIVERS NUCLEAR PARTNERSHIP, LLC

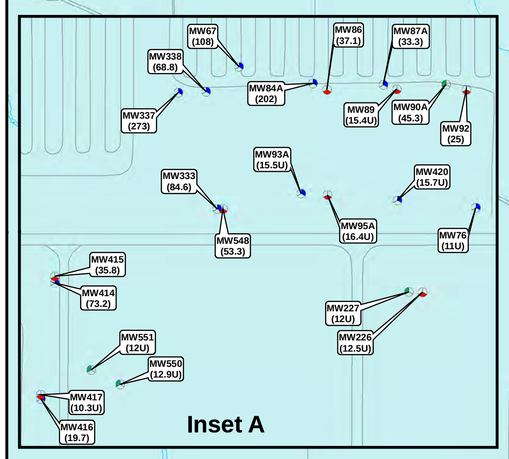
Figure A.1. 2024 TCE Plume–Regional Gravel Aquifer Alternate Interpretation Using Maximum Values

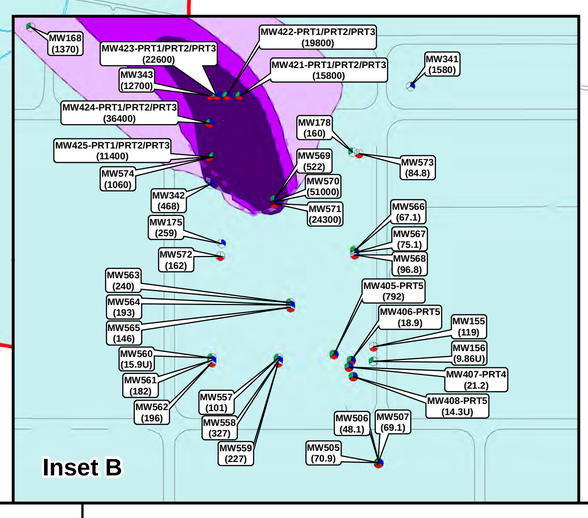
Notes:
1. Data from the maximum result sampled 2023-2024.
2a. For well clusters completed as multiple depths, all wells are labeled with the maximum sampling result. The maximum of the values for the well cluster was used for contouring.
2b. For multiport wells with multiple sampling depths within the same well, the maximum result was used for contouring and labeling.

Ohio River

MW146 (8.6U)
MW441 (9.4U)
MW435 (7.21U)
MW433 (8.89U)
MW442 (3.09U)
MW443 (5.91U)
MW444 (4.68U)
MW450 (4.28U)
MW445 (1.42U)
MW448 (7.05U)
MW447 (3.36U)
R245 (13.8U)
MW201 (15.3U)
MW199 (7.24U)
MW135 (66.2)
R14 (5.04U)
MW236 (3.35U)
MW490 (27.6)
MW202 (8.29U)
MW489 (13.2U)
MW492 (73.6)
MW491 (61.2)
MW240 (5.96U)
MW98 (53.4)
R13 (14U)
MW493 (45.1)
MW494 (67)
MW361 (54.3)
MW360 (9.74U)
MW363 (12.1U)
MW357 (46.1)
MW364 (63.9)
MW139 (13U)
MW132 (-6.13U)
MW358 (47)
MW367 (17.8U)
MW366 (87.8)
MW125 (48.6)
MW488 (9.81U)
MW67 (108)
MW86 (37.1)
MW87A (33.3)
MW338 (68.8)
MW84A (202)
MW89 (15.4U)
MW90A (45.3)
MW92 (25)
MW337 (273)
MW93A (15.5U)
MW420 (15.7U)
MW333 (84.6)
MW95A (16.4U)
MW76 (11U)
MW548 (53.3)
MW415 (35.8)
MW414 (73.2)
MW20 (9.35U)
MW227 (12U)
MW226 (12.5U)
MW200 (38)
MW370 (30.7)
MW372 (92)
MW369 (83.8)
MW373 (14.7U)
MW392 (11.5U)
MW419 (3.92U)
MW388 (26.3)
MW391 (14.4U)
MW418 (-3.29U)
MW387 (154)
MW551 (12U)
MW550 (12.9U)
MW451 (0.0727U)
R2 (8.59U)
MW221 (19.5U)
MW384 (79.6)
MW222 (14.3U)
MW452 (7.01U)
MW417 (10.3U)
MW416 (19.7)
MW385 (52.6)
MW224 (11.5U)
MW223 (15.5U)
MW395 (16.4U)
MW134 (7.98U)
MW454 (23)
MW394 (16.3U)
MW453 (21.1)
MW220 (20U)
MW397 (27.7)
MW197 (105)
MW150 (10.4U)
MW194 (8.87U)
MW455 (14.3)
MW456 (12.6)
MW457 (21)
MW458 (19)
MW459 (90.7)
MW460 (131)
MW501 (4.47U)
MW461 (2.05U)
MW502 (1.82U)
MW462 (50.8)
MW243 (22)
MW242 (26.7)
MW244 (4.54U)
MW248 (4.26U)
MW482 (21.2U)
MW291 (4.43U)
MW106A (11.9U)
MW250 (6.47U)
HV217 (142)
HV222 (559)
MW500 (358)
MW503 (199)
MW504 (5.69U)
MW497 (146)
MW481 (11.5U)
MW283 (4.1U)
MW293A (10.9U)
R53 (12.9U)
MW245 (7.03U)
MW165A (33.6)
MW355 (46.1)
MW496 (25.9)
MW498 (33.4)
MW499 (368)
MW288 (33.4)
MW126 (6.36U)
MW65 (13.6U)
MW63 (20)
MW66 (432)
MW173 (8.66U)
MW145 (29.6)
MW432 (19.3U)
MW124 (10.6U)
MW339 (147)
MW340 (2080)
MW261 (1250)
MW144 (59)
MW292 (9.34U)
MW531 (71.8)
MW169 (60.3)
MW205 (1.85U)
MW495 (54.5)
MW427 (6.07U)
MW426 (3.75U)
MW262 (151)
MW480 (42.7)
MW429A (3.93U)
MW260 (29.3)
MW428 (3.4U)
MW430 (4.69U)
MW354 (18.1U)
MW524 (14.6)
MW168 (1370)
MW533 (52.6)
MW479 (7.18U)
MW525 (172)
SP234/EW234 (79.1)
MW556 (26.2)
MW403-PRT3 (16.8U)
MW526 (314)
MW163 (64.7)
MW404-PRT4 (3.5U)
MW527 (48.9)
MW536 (148)
MW478 (8.71U)
MW161 (11.7U)
MW329 (-1.68U)
MW528 (132)
MW537 (152)
MW258 (10.2U)
MW549 (2.97U)
MW529 (214)
MW256 (20.9)
SP235/EW235 (43.7)
MW328 (-5.11U)
MW530 (40.1)
MW538 (31.1)
MW330 (7.35U)
MW203 (101)
MW255 (2.04U)
MW326 (12.7U)
MW71 (13.4U)
MW68 (33.6)
MW539 (36.3)
MW327 (10.9U)
MW344 (10.1U)
MW103 (8.6U)

See Inset A
See Inset B





TRUE
20°
PLANT

600 300 0 600 1,200 1,800 Feet

2024 Tc-99 Plume Concentration Fields Interpretation Using Maximum Concentrations
- 900 - 1,930 pCi/L
- 1,930 - 3790 pCi/L
- ≥ 3790 pCi/L

2024 Tc-99 Plume Concentration Fields (Figure C.2)
- 900 - 1,930 pCi/L
- 1,930 - 3790 pCi/L
- ≥ 3790 pCi/L

- Upper RGA Well
- Middle RGA Well
- Lower RGA Well
- Multiport RGA Well
- Unknown Screen Zone Well
- Extration Well
- Surface Water Course Centerline
- DOE Property Boundary
- Roadways
- 229 Boundary
- Limited Area
- Water Policy Area

MW242 (26.7) - Monitoring Well Identification
Sample Value (TCE Concentration in µg/L)
U = Compound analyzed for but not detected at or below the lowest concentration reported
UJ = Not detected and result estimated

MAP SOURCE INFORMATION
Map Generation Date and Location - 03/03/2025 Geosyntec\\fedprojects-01\paducah$\2_GIS\MXD\202502_2023-2024 Plume Map Update\Fig_A2_2024PlumesTc99_MAXR1.mxd
Monitoring and Extraction Well Layer Location: Geosyntec\\fedprojects-01\paducah$\2_GIS\SHP\202502_2023-2024 Plume Map Update\tec-992024__MAX.shp
2024 Maximum Tc-99 Plume Concentration Fields: Geosyntec\\fedprojects-01\paducah$\2_GIS\SHP\202502_2023-2024 Plume Map Update\2024_Tc-99Plume_MAX_Greaterthan3790.shp\2024_Tc-99Plume_MAX_1930_3790.shp\2024_Tc-99Plume_MAX_900-1930.shp
2024 Tc-99 Plume Concentration Fields : Geosyntec\\fedprojects-01\paducah$\2_GIS\SHP\202502_2023-2024 Plume Map Update\TEC99_2024_3790pCiL.shp\TEC99_2024_1930-3790pCiL.shp\TEC99_2024_900-1930pCiL.shp
DOE Property Boundary and Surface Water Course Centerline provided by FRNP on 2/4/2021 and 11/8/2022, respectively.
Roadways, 229 Boundary, and Water Policy Area downloaded from PEGASIS on 3/16/2021.
Limited Area shapefile provided by FRNP on 2/4/2021 and external limits confirmed by FRNP on 3/21/2022.

U.S. DEPARTMENT OF ENERGY
PORTSMOUTH / PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

FOUR RIVERS NUCLEAR PARTNERSHIP, LLC

\\fedprojects-01\paducah$\2_GIS\MXD\202502_2023-2024 Plume Map Update\Fig_A2_2024PlumesTc99_MAXR1.mxd 3/3/2025

Figure A.2. 2024 Tc-99 Plume–Regional Gravel Aquifer Alternate Interpretation Using Maximum Values

APPENDIX B

TABLE OF DATA USED TO PREPARE THE 2024 PLUME MAPS

THIS PAGE INTENTIONALLY LEFT BLANK

Table B.1. 2023 and 2024 TCE and Tc-99 Data Used to Create Plume Maps

Station	RGA Monitored Zone	Screened Interval (ft amsl)[a]	Most Recent Date TCE Sample Collected[b]	TCE (µg/L)[c]	Most Recent Date Tc-99 Sample Collected[b]	Tc-99 (pCi/L)[d]	Notes
MW100	Lower	283–293	05/14/2024	1 U	Not Sampled		
MW103	Middle	293–303	05/18/2023	0.6 J	05/18/2023	8.6 U	
MW106A	Middle	295–305	11/04/2024	2.9	11/04/2024	6.43 U	
MW124	Lower	270–280	10/02/2024	2.24	10/02/2024	4.04 U	
MW125	Lower	285–295	05/22/2024	0.6 J	05/22/2024	48.6	
MW126	Middle	298–308	10/02/2024	2.1	10/02/2024	3.56 U	
MW132	Lower	79-84	12/03/2024	0.39 J	12/03/2024	-6.13 U	
MW134	Lower	272–282	11/04/2024	1 U	11/04/2024	1.44 U	
MW135	Lower	283–293	09/04/2024	0.51 J	09/04/2024	55.2	
MW139	Middle	294–304	05/16/2024	1 U	05/16/2024	4.47 U	
MW144	Lower	263–273	10/01/2024	8.63	10/01/2024	41.4	
MW145	Lower	283–293	10/01/2024	1.92	10/01/2024	23.8	
MW146	Lower	283–293	11/05/2024	1 U	11/05/2024	8.6 U	
MW148[e]	Middle	281–311	05/30/2023	0.4 J	Not Sampled		
MW150[e]	Lower	278–308	05/22/2024	1 U	05/22/2024	10.4 U	
MW155	Lower	287–292	12/10/2024	2480	12/10/2024	81.3	
MW156	Upper	310–317	12/10/2024	1110	12/10/2024	2.74 U	
MW161	Lower	289–294	12/02/2024	21.4	05/15/2024	11.7 U	
MW163	Lower	285–290	10/02/2024	4.12	10/02/2024	27.4	
MW165A	Upper	310–315	09/30/2024	1 U	09/26/2024	11.9	
MW168	Upper	307–312	05/17/2023	39.9	05/17/2023	1370	
MW169	Middle	301–306	05/15/2024	5.89	05/15/2024	38	
MW173	Upper	314–319	09/30/2024	1 U	09/26/2024	1.41 U	
MW175	Middle	299–304	09/17/2024	78.2	09/17/2024	187	
MW178	Upper	309–314	12/05/2024	2.14	12/05/2024	160	
MW191	Middle	297–302	05/16/2024	1 U	Not Sampled		
MW193	Upper	298–303	05/25/2023	0.38 J	Not Sampled		
MW194	Middle	302–307	11/04/2024	1 U	11/04/2024	-2.22 U	
MW197	Upper	303–308	09/03/2024	2.33	09/03/2024	105	
MW199[e]	Lower	292–297	11/04/2024	1 U	11/04/2024	6.22 U	
MW20	Upper		11/05/2024	1 U	11/05/2024	9.35 U	
MW200	Middle	298–303	05/23/2023	0.47 J	05/23/2023	38	
MW201	Middle	297–302	11/05/2024	0.91 J	11/05/2024	7.45 U	
MW202	Lower	289–294	11/05/2024	1 U	11/05/2024	8.29 U	
MW203	Middle	299–304	09/23/2024	54.8 J	05/15/2024	81	
MW205	Upper	307–312	05/17/2023	0.41 J	05/17/2023	1.85 U	
MW220	Upper	310–320	10/14/2024	1 U	10/14/2024	14.8 UJ	
MW221	Upper	304–314	10/14/2024	1 U	10/14/2024	2.74 UJ	
MW222	Upper	314–324	10/14/2024	1 U	10/14/2024	-2.88 UJ	
MW223	Upper	309–319	10/14/2024	1 U	10/14/2024	6.45 UJ	
MW224	Upper	310–320	10/14/2024	1 U	10/14/2024	6.41 UJ	
MW226	Lower	287–297	07/31/2024	305 J	07/12/2024	-0.149 U	
MW227	Upper	301–311	07/31/2024	8.62 J	07/12/2024	-0.825 U	
MW236	Lower	290–300	05/22/2024	1.64	05/22/2024	-1.75 U	
MW240	Middle	290–300	05/22/2024	1.39	05/22/2024	1.96 U	
MW242	Middle	295–305	09/30/2024	0.44 J	09/25/2024	14.3	
MW243	Middle	293–303	09/30/2024	1 U	09/25/2024	14.5	
MW244	Middle	291–301	09/30/2024	1 U	09/25/2024	4.54 U	
MW245	Middle	294–304	09/30/2024	1.63	09/25/2024	0.357 U	
MW248	Middle	289–299	09/30/2024	0.4 J	09/25/2024	2.28 U	
MW250	Middle	293–303	09/19/2024	0.41 J	09/19/2024	-0.793 U	
MW252[e]	Lower	283–288	05/20/2024	1 U	Not Sampled		
MW253A[e,f]	Lower	268–273	05/22/2024	0.7 J	Not Sampled		
MW255	Lower	286–291	10/07/2024	98.9	10/07/2024	-2.13 U	
MW256	Lower	279–284	10/07/2024	28	10/07/2024	10.4 U	
MW258	Lower	287–292	10/03/2024	3.12	10/03/2024	4.22 U	
MW260	Lower	284–289	10/07/2024	5.57	10/07/2024	29.3	
MW261	Lower	276–281	05/15/2024	1260	05/15/2024	1110	
MW262	Lower	278–283	05/17/2023	165	05/17/2023	151	
MW283	Lower	288–298	10/02/2024	0.52 J	10/02/2024	2.78 U	
MW288	Lower	280–290	10/02/2024	172	10/02/2024	28.7	
MW291	Lower	288–298	10/02/2024	4.25	10/02/2024	-0.465 U	
MW292	Lower	276–286	10/02/2024	16.9	10/02/2024	7.6 U	
MW293A	Middle	289–299	10/02/2024	3.4	10/02/2024	9.32 U	
MW326	Lower	83-88	09/04/2024	1 U	09/04/2024	-2.88 U	
MW327	Lower	81-86	09/04/2024	1 U	09/04/2024	5.1 U	
MW328	Middle	301–306	05/18/2023	1.09	05/18/2023	-5.11 U	
MW329	Upper	303–308	05/18/2023	0.63 J	05/18/2023	-1.68 U	
MW330	Middle	72-77	09/04/2024	1 U	09/04/2024	4.94 U	
MW333	Middle	296–305	07/31/2024	1130 J	07/12/2024	84.6	
MW337	Middle	297–307	07/16/2024	836	07/16/2024	161	
MW338	Middle	298–308	07/16/2024	577	07/16/2024	68.8	
MW339	Lower	277–286	12/04/2024	785	12/04/2024	78.3	
MW340	Lower	277–286	12/04/2024	877	12/04/2024	1000	
MW341	Middle	293–303	12/10/2024	2130	12/10/2024	348	
MW342	Middle	292–302	09/17/2024	31.7	09/17/2024	232	
MW343	Lower	290–300	09/17/2024	7030	09/17/2024	12700	
MW344	Upper	55-64	10/17/2024	1 U	10/17/2024	1.27 U	
MW354	Middle	301–306	12/03/2024	2.42	12/03/2024	4.58 U	
MW355	Lower	285–290	09/30/2024	2.15	09/25/2024	46.1	
MW357	Upper	304–314	10/08/2024	1.71	10/08/2024	29.4	
MW358	Lower	285–295	10/08/2024	0.4 J	10/08/2024	15.1 U	
MW360	Upper	310–320	10/08/2024	0.49 J	10/08/2024	-4.76 U	
MW361	Middle	294–304	10/08/2024	0.61 J	10/08/2024	45.2	
MW363	Upper	301–311	10/09/2024	1 U	10/09/2024	11.5 U	
MW364	Lower	283–293	10/09/2024	0.68 J	10/09/2024	47.4	
MW366	Upper	304–314	10/09/2024	0.35 J	10/09/2024	67.4	
MW367	Lower	284–294	10/09/2024	1 U	10/09/2024	-1.17 U	
MW369	Upper	311–321	10/10/2024	0.95 J	10/10/2024	83.8	
MW370	Middle	292–302	10/10/2024	1.96	10/10/2024	20.6	
MW372	Upper	301–311	10/10/2024	0.88 J	10/10/2024	92	
MW373	Lower	288–298	10/10/2024	2.48	10/10/2024	12.8 U	
MW384	Upper	287–297	10/14/2024	0.49 J	10/14/2024	35.1 J	
MW385	Lower	303–313	10/14/2024	1 U	10/14/2024	40.9 J	
MW387	Upper	304–314	10/16/2024	1 U	10/16/2024	154	
MW388	Middle	291–301	10/16/2024	1 U	10/16/2024	4.56 U	
MW391	Middle	297–307	10/15/2024	0.64 J	10/15/2024	6.22 U	
MW392	Lower	273–283	10/15/2024	1.43	10/15/2024	-1.01 U	
MW394	Upper	302–312	10/15/2024	2.82	10/15/2024	0.147 U	
MW395	Middle	295–305	10/15/2024	4.89	10/15/2024	10.7 U	
MW397	Lower	290–300	10/16/2024	1 U	10/16/2024	15.5 U	

Table B.1. 2023 and 2024 TCE and Tc-99 Data Used to Create Plume Map (Continued)

MW403	RGA-Multiport[g]	272–274	12/03/2024	2.18 (PRT3)	12/03/2024	7.6 U (PRT3)	MW403 was sampled at ports: PRT3
MW404	RGA-Multiport[h]	284–286	05/18/2023	3.58 (PRT4)	05/18/2023	3.5 U (PRT4)	MW404 was sampled at ports: PRT4
MW405	RGA-Multiport[i]	271-319	12/11/2024	353 (PRT5)	12/11/2024	1.19 U (PRT5)	MW405 was sampled at ports: PRT5
MW406	RGA-Multiport[j]	296-342	12/11/2024	664 (PRT5)	12/11/2024	-0.922 U (PRT5)	MW406 was sampled at ports: PRT5
MW407	RGA-Multiport[k]	296-342	12/11/2024	418 (PRT4)	12/11/2024	7.91 U (PRT4)	MW407 was sampled at ports: PRT4
MW408	RGA-Multiport[l]	298-320	12/11/2024	211 (PRT5)	12/11/2024	11.1 U (PRT5)	MW408 was sampled at ports: PRT5
MW409[e]	Lower	280–290	09/11/2024	1 U	Not Sampled		
MW410[e]	Lower	278–288	09/09/2024	1 U	Not Sampled		
MW414	Middle	297–307	05/17/2023	763	05/17/2023	73.2	
MW415	Lower	273–283	05/17/2023	1140	05/17/2023	35.8	
MW416	Middle	300–310	05/17/2023	151	05/17/2023	19.7	
MW417	Lower	272–282	05/17/2023	491	05/17/2023	10.3 U	
MW418	Middle	296–306	05/13/2024	1 U	05/13/2024	-3.29 U	
MW419	Lower	281–291	05/13/2024	0.53 J	05/13/2024	3.54 U	
MW420	Middle	299–309	07/09/2024	1790	07/09/2024	7.33 U	
MW421	Multiport[m]	291–305	09/11/2024	23700 (PRT3)	09/11/2024	15800 (PRT1)	MW421 was sampled at ports: PRT1, PRT2, PRT3
MW422	RGA-Multiport[m]	290–304	09/10/2024	12100 (PRT2)	09/10/2024	6270 (PRT1)	MW422 was sampled at ports: PRT1, PRT2, PRT3
MW423	RGA-Multiport[m]	290–305	09/10/2024	10400 (PRT3)	09/10/2024	6450 (PRT1)	MW423 was sampled at ports: PRT1, PRT2, PRT3
MW424	RGA-Multiport[m]	292–306	09/10/2024	3090 (PRT3)	09/10/2024	36400 (PRT3)	MW424 was sampled at ports: PRT1, PRT2, PRT3
MW425	RGA-Multiport[m]	292–306	09/12/2024	219 (PRT3)	09/12/2024	2730 (PRT3)	MW425 was sampled at ports: PRT1, PRT2, PRT3
MW426	Upper	304–314	11/04/2024	1 U	11/04/2024	3.54 U	
MW427	Lower	273–283	11/04/2024	1 U	11/04/2024	1.43 U	
MW428	Lower	277–287	09/30/2024	0.69 J	09/25/2024	3.4 U	
MW429A	Upper	302–312	09/30/2024	1 U	09/25/2024	-1.65 U	
MW430	Lower	281–291	09/19/2024	0.73 J	09/19/2024	-1.2 U	
MW431	Lower	285–295	12/03/2024	2.26	Not Sampled		
MW432	Middle	292–302	11/04/2024	1.44	11/04/2024	0.509 U	
MW433	Middle	302–305	11/05/2024	0.51 J	11/05/2024	8.89 U	
MW435	Lower	274–284	11/05/2024	0.76 J	11/05/2024	6.8 U	
MW439	Middle	295–297	05/18/2023	1.52	Not Sampled		
MW441	Lower	277–279	11/05/2024	0.64 J	11/05/2024	9.4 U	
MW442	Lower	288–291	05/30/2023	1.82	05/30/2023	3.09 U	
MW443	Lower	274–277	05/30/2023	0.91 J	05/30/2023	5.91 U	
MW444	Lower	259–264	05/30/2023	1.53	05/30/2023	4.68 U	
MW445	Middle	297–300	05/16/2024	0.6 J	05/16/2024	1.42 U	
MW447	Lower	261–266	05/16/2024	0.5 J	05/16/2024	3.36 U	
MW448	Middle	303–305	05/20/2024	0.55 J	05/20/2024	7.05 U	
MW450	Lower	276–286	05/20/2024	0.78 J	05/20/2024	4.28 U	
MW451	Upper	304–314	05/30/2023	1.36	05/30/2023	0.0727 U	
MW452	Lower	280–290	11/04/2024	1 U	11/04/2024	0.775 U	
MW453	Upper	306–316	05/20/2024	1.01	05/20/2024	21.1	
MW454	Lower	284–294	05/20/2024	0.55 J	05/20/2024	18.2	
MW455	Middle	300–310	12/04/2024	1.29	12/04/2024	8.41 U	
MW456	Lower	278–288	12/04/2024	1.78	12/04/2024	6.94 U	
MW457	Upper	305–315	09/18/2024	2.19	09/18/2024	16.3	
MW458	Lower	282–292	09/18/2024	1.52	09/18/2024	17.2	
MW459	Upper	306–316	09/18/2024	2.97	09/18/2024	77.5	
MW460	Lower	279–289	12/04/2024	1.58	12/04/2024	88.9	
MW461	Upper	307–317	09/18/2024	2.47	09/18/2024	-7.89 U	
MW462	Lower	287–297	09/18/2024	25.8	09/18/2024	42.2	
MW463	Middle	298–308	05/14/2024	0.55 J	Not Sampled		
MW464	Lower	267–277	05/14/2024	0.44 J	Not Sampled		
MW465	Middle	302–307	05/25/2023	3.24	Not Sampled		
MW466	Middle	295–300	05/25/2023	1.28	Not Sampled		
MW467	Upper	300–310	05/25/2023	1.21	Not Sampled		
MW468	Middle	294–299	05/25/2023	1.68	Not Sampled		
MW469	Middle	297–307	05/14/2024	1 U	Not Sampled		
MW470	Lower	292–297	05/14/2024	1 U	Not Sampled		
MW471	Middle	292–302	05/14/2024	1 U	Not Sampled		
MW472	Lower	286–291	05/14/2024	1 U	Not Sampled		
MW473[e]	Lower	289–299	05/31/2023	1 U	Not Sampled		
MW474[e]	Lower	275–285	05/31/2023	1 U	Not Sampled		
MW475[e]	Middle	293–303	05/31/2023	1.03	Not Sampled		
MW476[e]	Lower	267–277	05/31/2023	0.88 J	Not Sampled		
MW477	Lower	282–292	05/13/2024	0.52 J	Not Sampled		
MW478	Middle	295–305	10/01/2024	4.66	10/01/2024	-0.674 U	
MW479	Upper	301–311	10/01/2024	1 U	10/01/2024	-0.481 U	
MW480	Lower	283–293	10/01/2024	44	10/01/2024	40.7	
MW481	Middle	298–308	05/15/2023	4.33 J	05/15/2023	11.5 U	
MW482	Lower	269–279	05/15/2023	8.62 J	05/15/2023	21.2 U	
MW483[e]	Middle	294–304	05/20/2024	0.44 J	Not Sampled		
MW484[e]	Lower	278–288	05/20/2024	0.41 J	Not Sampled		
MW485[e]	Middle	295–305	05/31/2023	1 U	Not Sampled		
MW486A[e]	Lower	311-314	09/09/2024	26.4	Not Sampled		
MW487[e]	Lower	282–292	05/31/2023	2.02	Not Sampled		
MW488[e]	Middle	299–309	05/20/2024	1 U	05/20/2024	9.81 U	
MW489	Middle	300–310	05/30/2023	4.89	05/30/2023	13.2 U	
MW490	Lower	290–300	05/30/2023	41.1	05/30/2023	27.6	
MW491	Upper	301–311	05/16/2024	0.63 J	05/16/2024	61.2	
MW492	Lower	286–296	05/16/2024	0.48 J	05/16/2024	73.6	
MW493	Upper	302–312	05/18/2023	1.03	05/18/2023	45.1	
MW494	Middle	290–300	05/18/2023	1.06	05/18/2023	67	
MW495	Lower	268–278	10/01/2024	6.53	10/01/2024	44.8	
MW496	Lower	267–277	10/01/2024	102	10/01/2024	23.6	
MW497	Middle	300–310	09/17/2024	1.29	09/17/2024	67.8	
MW498	Lower	276–286	09/17/2024	3.44	09/17/2024	6.83 U	
MW499	Middle	297–307	09/17/2024	501	09/17/2024	363	
MW500	Lower	278–288	09/17/2024	243	09/17/2024	358	
MW501	Middle	299–309	09/30/2024	1 U	09/26/2024	-6.48 U	
MW502	Lower	282–292	09/30/2024	0.81 J	09/25/2024	-0.698 U	
MW503	Lower	282–287	09/17/2024	3.19	09/17/2024	148	
MW504	Upper	315–320	09/17/2024	1 U	09/17/2024	5.54 U	
MW505	Upper	312–317	12/10/2024	2.54	12/10/2024	70.9	
MW506	Middle	300–305	12/10/2024	38.8	12/10/2024	48.1	
MW507	Lower	287–292	12/10/2024	37.7	12/10/2024	69.1	
MW524	Middle	299–309	10/03/2024	0.41 J	10/03/2024	0.233 U	
MW525	Middle	301–311	10/07/2024	2.99	10/07/2024	172	
MW526	Middle	302–312	10/07/2024	103	10/07/2024	230	
MW527	Middle	302–311	10/07/2024	4.19	10/07/2024	48	
MW528	Lower	291–301	10/07/2024	1.06	10/07/2024	107	
MW529	Lower	289–299	10/03/2024	3.89	10/03/2024	166	

Table B.1. 2023 and 2024 TCE and Tc-99 Data Used to Create Plume Map (Continued)

MW530	Lower	285–295	10/07/2024	1.48	10/07/2024	22.4	
MW531	Lower	267–277	10/07/2024	6.47	10/07/2024	31.8	
MW533	Lower	282–292	10/07/2024	2.01	10/07/2024	52.6	
MW536	Lower	288–298	10/07/2024	1.55	10/07/2024	123	
MW537	Lower	277–287	10/07/2024	1.79	10/07/2024	123	
MW538	Middle	294–304	10/02/2024	2.73	10/02/2024	31.1	
MW539	Lower	281–291	10/02/2024	14.2	10/02/2024	18.4	
MW542	Upper	305–310	12/02/2024	0.56 J	Not Sampled		
MW543	Upper	304–309	12/02/2024	0.39 J	Not Sampled		
MW544	Upper	308–313	12/02/2024	8.52	Not Sampled		
MW545	Upper	309–314	12/02/2024	1 U	Not Sampled		
MW546	Upper	305–310	12/02/2024	64.2	Not Sampled		
MW547	Upper	305–310	12/02/2024	533	Not Sampled		
MW548	Lower	287–297	07/16/2024	4430	07/16/2024	27.8	
MW549	Upper	303–313	09/05/2024	1780	09/05/2024	-2.17 U	
MW550	Upper	297–307	09/05/2024	13200	09/05/2024	0.228 U	
MW551	Upper	298–308	09/05/2024	636	09/05/2024	12 U	
MW556	Lower	279–289	10/01/2024	48.3	10/01/2024	22.5	
MW557	Upper	314-310	12/09/2024	2750	12/09/2024	83.8	
MW558	Middle	303-298	12/09/2024	145	12/09/2024	327	
MW559	Lower	292-287	12/09/2024	50.8	12/09/2024	227	
MW560	Upper	312-307	12/10/2024	11.9	12/10/2024	-1 U	
MW561	Middle	301-297	12/10/2024	1560	12/10/2024	101	
MW562	Lower	290-285	12/10/2024	329	12/10/2024	136	
MW563	Upper	314-310	12/09/2024	21100	12/09/2024	240	
MW564	Middle	305-301	12/09/2024	1540	12/09/2024	193	
MW565	Lower	296-292	12/09/2024	24	12/09/2024	146	
MW566	Upper	319-314	12/05/2024	12.7	12/05/2024	67.1	
MW567	Middle	309-304	12/05/2024	5.34	12/05/2024	54	
MW568	Lower	299-294	12/05/2024	6.72	12/05/2024	93.8	
MW569	Upper	314-309	12/09/2024	105	12/09/2024	390	
MW570	Middle	306-302	12/09/2024	3840	12/09/2024	30100	
MW571	Lower	295-290	12/09/2024	2300	12/09/2024	16900	
MW572	Lower	296-291	12/11/2024	313	12/11/2024	136	
MW573	Lower	297-292	12/05/2024	2170	12/05/2024	71.1	
MW574	Upper	314-309	12/11/2024	882	12/11/2024	1060	
MW575	Upper	309-304	09/23/2024	185 J	Not Sampled		
MW576	Middle	304-299	09/23/2024	374 J	Not Sampled		
MW577	Upper	309-304	09/23/2024	76.5 J	Not Sampled		
MW578	Middle	304-299	09/23/2024	91.5 J	Not Sampled		
MW579	Upper	309-304	09/23/2024	81.8 J	Not Sampled		
MW580	Middle	304-299	09/23/2024	64.1 J	Not Sampled		
MW581	Upper	310-305	09/23/2024	25.8 J	Not Sampled		
MW582	Upper	310-305	09/23/2024	152 J	Not Sampled		
MW586	Middle	305-300	09/23/2024	155 J	Not Sampled		
MW63	Upper	307–312	09/30/2024	0.89 J	09/25/2024	3.97 U	
MW65	Lower	279–284	09/30/2024	0.82 J	09/25/2024	4.97 U	
MW66	Upper	308–313	09/18/2024	1.89	09/18/2024	191	
MW67	Middle	302–307	07/31/2024	696 J	07/12/2024	94.4	
MW68	Lower	275–280	06/04/2024	48.1	06/04/2024	33.6	
MW71	Upper	306-310	06/04/2024	0.4 J	06/04/2024	6.81 U	
MW76	Middle	295–305	07/31/2024	132 J	07/12/2024	11 U	
MW84A	Middle	297–307	07/09/2024	5110	07/09/2024	93.5	
MW86	Lower	287–298	07/16/2024	5010	07/16/2024	17 U	
MW87A	Middle	298–308	07/09/2024	1000	07/09/2024	14.2 U	
MW89	Lower	285–295	07/31/2024	155 J	07/12/2024	12.2 U	
MW90A	Upper	301–311	07/09/2024	177	07/09/2024	45.3	
MW92	Lower	282–293	07/16/2024	64.5	07/16/2024	3.75 U	
MW93A	Middle	296–306	07/09/2024	554	07/09/2024	9.87 U	
MW95A	Lower	288–298	07/31/2024	493 J	07/12/2024	9.9 U	
MW98	Middle	293–303	09/03/2024	1 U	09/03/2024	32.7	
MW99	Middle	295–305	05/13/2024	0.35 J	Not Sampled		
PW001	Upper	—	09/30/2024	17.9	Not Sampled		
PW004	Upper	—	09/30/2024	19.5 J	Not Sampled		
PW007	Upper	—	09/24/2024	4.9	Not Sampled		
PW010	Upper	—	09/24/2024	0.76 J	Not Sampled		
PW013	Upper	—	09/24/2024	2.49	Not Sampled		
PW016	Upper	—	09/24/2024	154	Not Sampled		
R10[c]	Unknown[o]	—	11/07/2024	1 U	Not Sampled		
R114[c]	Unknown[o]	—	11/11/2024	1 U	Not Sampled		
R13[c]	Unknown[o]	—	11/06/2024	1 U	11/06/2024	3.33 U	
R14	Unknown[o]	—	11/06/2024	1 U	11/06/2024	5.04 U	
R2[c]	Unknown[o]	—	11/06/2024	0.37 J	11/06/2024	8.59 U	
R20[c]	RGA[n]	—	11/07/2024	1 U	Not Sampled		
R21[c]	Unknown[n]	—	11/07/2024	1 U	Not Sampled		
R245[c]	Unknown[n]	—	11/06/2024	1 U	11/06/2024	13.8 U	
R26[c]	Unknown[n]	—	11/06/2024	1 U	11/06/2024	3.77 U	
R302[c]	RGA[n]	—	11/07/2024	1 U	Not Sampled		
R40	Unknown[n]	—	11/07/2024	1 U	Not Sampled		
R53[c]	Unknown[n]	—	11/06/2024	1 U	11/06/2024	10.3 U	
R83[c]	Unknown[n]	—	11/07/2024	1 U	Not Sampled		
R9[c]	Unknown[n]	—	11/11/2024	1 U	Not Sampled		
R90[c]	Unknown[n]	—	11/11/2024	1 U	Not Sampled		
SP234/EW234	Extraction Well[o]	286-301	12/09/2024	12.1	12/09/2024	43.5	
SP235/EW235	Extraction Well[o]	283-298	12/09/2024	42.6	12/09/2024	19.7	
HV217/EW232	Extraction Well[o]	283-303	10/08/2024	129 J	10/08/2024	54.7	
HV222/EW233	Extraction Well[o]	276-296	10/08/2024	275 J	10/08/2024	504	
LBCSP5[p]	Surface Water Seep	—	11/20/2024	1 U	Not Sampled		

Table B.1. 2023 and 2024 TCE and Tc-99 Data Used to Create Plume Map (Continued)

Notes

[a] Screened intervals are approximate.

[b] For multiport wells with multiple sampling depths within the same well, the most recent result from each of the sampled ports was compared (even if the most recent port samples were collected on different days) and the maximum result from the comparison is presented in this table. This selection criterion may result in different ports select for TCE or Tc-99.

[c] TCE results of "1U" indicate the compound analyzed for, but not detected at or below, the lowest concentration reported; J indicates the concentration is estimated.

[d] Tc-99 results with "U" indicate "U" the value is reported < minimum detectable activity and/or total propagated uncertainty. Negative results may be reported due to a statistical determination of the counts seen by a detector, minus a background count.

[e] Location designated as 'Private-Residential' or Residential Well in annual Environmental Monitoring Plans.

[f] MW253A RGA monitored zone and screened interval zone are assumed to be the same as the original well, MW253.

[g] MW403 was sampled from Port 3 during 2023–2024. Port 3 screen interval is shown.

[h] MW404 was sampled from Port 4 during 2023–2024. Port 4 screen interval is shown.

[i] MW405 was sampled from Ports 2 through 6 during 2023–2024. The screen interval shown encompasses Ports 2 through 6.

[j] MW406 was sampled from Ports 1 through 5 during 2023–2024. The screen interval shown encompasses all five ports.

[k] MW407 was sampled from Ports 1 through 5 during 2023–2024. The screen interval shown encompasses all five ports.

[l] MW408 was sampled from Ports 2 through 5 during 2023–2024. The screen interval shown encompasses Ports 2 through 5.

[m] MW421–MW425 were sampled from all three ports during 2023–2024. The screen interval shown encompasses all three ports.

[n] Residential wells are assumed to be completed in the Upper RGA unless known to be otherwise.

[o] Extraction wells are screened across the RGA.

[p] LBCSP5 = Little Bayou Creek Surface Water Seep

APPENDIX C

2024 PLUME MAPS

THIS PAGE INTENTIONALLY LEFT BLANK

FIGURES

THIS PAGE INTENTIONALLY LEFT BLANK

Notes:
1. Data from the most recent 2024 sampling event used except where noted.
2a. For well clusters completed as multiple depths, all wells are labeled with their most recent sampling result. The maximum of the values for the well cluster was used for contouring.
2b. For multiport wells with multiple sampling depths within the same well, the most recent result from each of the sampled ports was compared (even if the most recent port samples were collected on different days) and the maximum result from the comparison was used for contouring and labeling. This selection criterion may result in different ports selected for TCE or Tc-99.

Ohio River

MW146 11/5/2024 (1U)
MW441 11/5/2024 (0.64J)
MW439 5/18/2023 (1.52)
MW435 11/5/2024 (0.76J)
MW433 11/5/2024 (0.51J)
LBCSP5 11/20/2024 (1U)
MW443 5/30/2023 (0.91J)
MW442 5/30/2023 (1.82)
MW444 5/30/2023 (1.53)
R83 11/7/2024 (1U)
R21 11/7/2024 (1U)
MW473 5/31/2023 (1U)
MW474 5/31/2023 (1U)
MW476 5/31/2023 (0.88J)
MW475 5/31/2023 (1.03)
MW450 5/20/2024 (0.78J)
MW448 5/20/2024 (0.55J)
MW447 5/16/2024 (0.5J)
MW445 5/16/2024 (0.6J)
R245 11/6/2024 (1U)
MW199 11/4/2024 (1U)
MW201 11/5/2024 (0.91J)
MW135 9/4/2024 (0.51J)
MW464 5/14/2024 (0.44J)
MW463 5/14/2024 (0.55J)
MW465 5/25/2023 (3.24)
MW466 5/25/2023 (1.28)
MW467 5/25/2023 (1.21)
MW468 5/25/2023 (1.68)
MW471 5/14/2024 (1U)
MW470 5/14/2024 (1U)
MW472 5/14/2024 (1U)
MW469 5/14/2024 (1U)
R14 11/6/2024 (1U)
MW236 9/22/2024 (1.64)
MW490 5/30/2023 (41.1)
MW489 5/30/2023 (4.89)
MW202 11/5/2024 (1U)
MW491 5/16/2024 (0.63J)
MW492 5/16/2024 (0.48J)
MW98 9/3/2024 (1U)
MW240 5/22/2024 (1.39)
R13 11/6/2024 (1U)
MW493 5/18/2023 (1.03)
MW494 5/18/2023 (1.06)
MW100 5/14/2024 (1U)
MW477 5/13/2024 (0.52J)
MW99 5/13/2024 (0.35J)
MW361 10/8/2024 (0.61J)
MW363 10/9/2024 (1U)
MW364 10/9/2024 (0.68J)
MW358 10/8/2024 (0.4J)
MW360 10/8/2024 (0.49J)
MW357 10/8/2024 (1.71)
MW367 10/9/2024 (1U)
MW366 10/9/2024 (0.35J)
MW125 5/22/2024 (0.6J)
MW139 5/16/2024 (1U)
MW132 12/3/2024 (0.39J)
R20 11/7/2024 (1U)
MW483 5/20/2024 (0.44J)
MW484 5/20/2024 (0.41J)
MW148 5/30/2023 (0.4J)
MW486A 9/9/2024 (26.4)
MW485 5/31/2023 (1U)
MW488 5/20/2024 (1U)
MW487 5/31/2023 (2.02)
MW252 5/20/2024 (1U)
MW410 9/9/2024 (1U)
MW67 7/31/2024 (696J)
MW87A 7/9/2024 (1000)
MW90A 7/9/2024 (177)
MW337 7/16/2024 (836)
MW338 7/16/2024 (577)
MW84A 7/9/2024 (5110)
MW86 7/16/2024 (5010)
MW89 7/31/2024 (155J)
MW92 7/16/2024 (64.5)
MW93A 7/9/2024 (554)
MW420 7/9/2024 (1790)
MW76 7/31/2024 (132J)
MW548 7/16/2024 (4430)
MW333 7/31/2024 (1130J)
MW95A 7/31/2024 (493J)
MW415 5/17/2023 (1140)
MW414 5/17/2023 (763)
MW227 7/31/2024 (8.62J)
MW226 7/31/2024 (305J)
MW417 5/17/2023 (491)
MW551 9/5/2024 (636)
MW550 9/5/2024 (13200)
MW416 5/17/2023 (151)
Inset A
MW20 11/5/2024 (1U)
MW200 5/23/2023 (0.47J)
MW451 5/30/2023 (1.36)
R2 11/6/2024 (0.37J)
MW452 11/4/2024 (1U)
MW454 5/20/2024 (0.55J)
MW453 5/20/2024 (1.01)
MW134 11/4/2024 (1U)
MW135 9/4/2024 (0.51J)
MW464 5/14/2024 (0.44J)
MW463 5/14/2024 (0.55J)
MW465 5/25/2023 (3.24)
MW466 5/25/2023 (1.28)
MW467 5/25/2023 (1.21)
MW468 5/25/2023 (1.68)
MW471 5/14/2024 (1U)
MW470 5/14/2024 (1U)
MW472 5/14/2024 (1U)
MW469 5/14/2024 (1U)
R14 11/6/2024 (1U)
MW236 9/22/2024 (1.64)
MW490 5/30/2023 (41.1)
MW489 5/30/2023 (4.89)
MW202 11/5/2024 (1U)
MW491 5/16/2024 (0.63J)
MW492 5/16/2024 (0.48J)
MW98 9/3/2024 (1U)
MW240 5/22/2024 (1.39)
R13 11/6/2024 (1U)
MW493 5/18/2023 (1.03)
MW494 5/18/2023 (1.06)
MW100 5/14/2024 (1U)
MW477 5/13/2024 (0.52J)
MW99 5/13/2024 (0.35J)
MW361 10/8/2024 (0.61J)
MW363 10/9/2024 (1U)
MW364 10/9/2024 (0.68J)
MW358 10/8/2024 (0.4J)
MW360 10/8/2024 (0.49J)
MW357 10/8/2024 (1.71)
MW367 10/9/2024 (1U)
MW366 10/9/2024 (0.35J)
MW125 5/22/2024 (0.6J)
MW139 5/16/2024 (1U)
MW132 12/3/2024 (0.39J)
R20 11/7/2024 (1U)
MW483 5/20/2024 (0.44J)
MW484 5/20/2024 (0.41J)
MW148 5/30/2023 (0.4J)
MW486A 9/9/2024 (26.4)
MW485 5/31/2023 (1U)
MW488 5/20/2024 (1U)
MW487 5/31/2023 (2.02)
MW252 5/20/2024 (1U)
MW410 9/9/2024 (1U)
MW373 10/10/2024 (2.48)
MW372 10/10/2024 (0.88J)
MW370 10/10/2024 (1.96)
MW392 10/15/2024 (1.43)
MW391 10/15/2024 (0.64J)
MW387 10/16/2024 (1U)
MW369 10/10/2024 (0.95J)
MW418 5/13/2024 (1U)
MW388 10/16/2024 (1U)
MW419 5/13/2024 (0.53J)
MW221 10/14/2024 (1U)
MW385 10/14/2024 (1U)
MW222 10/14/2024 (1U)
MW384 10/14/2024 (0.49J)
MW223 10/14/2024 (1U)
MW394 10/15/2024 (2.82)
MW224 10/14/2024 (1U)
MW395 10/15/2024 (4.89)
MW220 10/14/2024 (1U)
MW397 10/16/2024 (1U)
MW409 9/11/2024 (1U)
MW253A 5/22/2024 (0.7J)
MW193 5/25/2023 (0.38J)
R302 11/7/2024 (1U)
MW150 5/22/2024 (1U)
MW197 9/3/2024 (2.33)
MW455 12/4/2024 (1.29)
MW458 9/18/2024 (1.52)
MW457 9/18/2024 (2.19)
MW459 9/18/2024 (2.97)
MW461 9/18/2024 (2.47)
MW501 9/30/2024 (1U)
MW502 9/30/2024 (0.81J)
MW456 12/4/2024 (1.78)
MW243 9/30/2024 (1U)
MW242 9/30/2024 (0.44J)
MW462 9/18/2024 (25.8)
MW460 12/4/2024 (1.58)
MW194 11/4/2024 (1U)
MW244 9/30/2024 (1U)
MW250 9/19/2024 (0.41J)
MW248 9/30/2024 (0.4J)
MW497 9/17/2024 (1.29)
HV217/EW232 10/8/2024 (129J)
HV222/EW233 10/8/2024 (275J)
MW503 9/17/2024 (3.19)
MW500 9/17/2024 (243)
MW173 9/30/2024 (1U)
MW106A 11/4/2024 (2.9)
MW245 9/30/2024 (1.63)
MW66 9/18/2024 (1.89)
MW498 9/17/2024 (3.44)
MW499 9/17/2024 (501)
MW504 9/17/2024 (1U)
MW165A 9/30/2024 (1U)
MW355 9/30/2024 (2.15)
MW496 10/1/2024 (102)
MW482 5/15/2023 (8.62J)
MW481 5/15/2023 (4.33J)
MW283 10/2/2024 (0.52J)
MW291 10/2/2024 (4.25)
MW293A 10/2/2024 (3.4)
MW124 10/2/2024 (2.24)
MW126 10/2/2024 (2.1)
MW191 5/16/2024 (1U)
MW288 10/2/2024 (172)
R53 11/6/2024 (1U)
MW65 9/30/2024 (0.82J)
MW63 9/30/2024 (0.89J)
MW432 11/4/2024 (1.44)
MW340 12/4/2024 (877)
MW339 12/4/2024 (785)
MW261 5/15/2024 (1260)
MW145 10/1/2024 (1.92)
MW144 10/1/2024 (8.63)
MW531 10/7/2024 (6.47)
MW292 10/2/2024 (16.9)
MW495 10/1/2024 (6.53)
MW427 11/4/2024 (1U)
MW426 11/4/2024 (1U)
MW431 12/3/2024 (2.26)
MW169 5/15/2024 (5.89)
MW262 5/17/2023 (165)
MW205 5/17/2023 (0.41J)
MW430 9/19/2024 (0.73J)
MW429A 9/30/2024 (1U)
MW428 9/30/2024 (0.69J)
MW354 12/3/2024 (2.42)
MW524 10/3/2024 (0.41J)
MW533 10/7/2024 (2.01)
MW260 10/7/2024 (5.57)
MW479 10/1/2024 (1U)
MW480 10/1/2024 (44)
See Inset B
See Inset A
MW403-PRT3 12/3/2024 (2.18)
MW542 12/2/2024 (0.56J)
MW525 10/7/2024 (2.99)
SP234/EW234 12/9/2024 (12.1)
MW556 10/1/2024 (48.3)
MW404-PRT4 5/18/2023 (3.58)
PW013 9/24/2024 (2.49)
MW577 9/23/2024 (76.5J)
MW526 10/7/2024 (103)
MW537 10/7/2024 (1.79)
MW183 10/2/2024 (4.12)
MW161 12/2/2024 (21.4)
PW010 9/24/2024 (0.76J)
MW578 9/23/2024 (91.5J)
MW528 10/7/2024 (1.06)
MW527 10/7/2024 (4.19)
MW536 10/7/2024 (1.55)
MW478 10/1/2024 (4.66)
MW258 10/3/2024 (3.12)
MW329 5/18/2023 (0.63J)
MW549 9/5/2024 (1780)
MW576 9/23/2024 (374J)
MW586 9/23/2024 (155J)
MW529 10/3/2024 (3.89)
SP235/EW235 12/9/2024 (42.6)
MW547 12/2/2024 (533)
MW575 9/23/2024 (185J)
MW538 10/2/2024 (2.73)
MW546 12/2/2024 (64.2)
MW543 12/2/2024 (0.39J)
PW004 9/30/2024 (19.5J)
MW530 10/7/2024 (1.48)
MW539 10/2/2024 (14.2)
MW256 10/7/2024 (28)
R9 11/11/2024 (1U)
MW328 5/18/2023 (1.09)
MW544 12/2/2024 (8.52)
PW001 9/30/2024 (17.9)
MW582 9/23/2024 (152J)
MW545 12/2/2024 (1U)
PW007 9/24/2024 (4.9)
PW016 9/24/2024 (154)
MW68 6/4/2024 (48.1)
MW355 10/7/2024 (98.9)
MW339 9/4/2024 (1U)
MW326 9/4/2024 (1U)
MW579 9/23/2024 (81.8J)
MW580 9/23/2024 (64.1J)
MW581 9/23/2024 (25.8J)
MW71 6/4/2024 (0.4J)
MW203 9/23/2024 (54.8J)
MW327 9/4/2024 (1U)
MW168 5/17/2023 (39.9)
Inset B
MW422-PRT1/PRT2/PRT3 9/10/2024 (12100)
MW341 12/10/2024 (2130)
MW343 9/17/2024 (7030)
MW421-PRT1/PRT2/PRT3 9/11/2024 (23700)
MW423-PRT1/PRT2/PRT3 9/10/2024 (10400)
MW424-PRT1/PRT2/PRT3 9/10/2024 (3090)
MW178 12/5/2024 (2.14)
MW425-PRT1/PRT2/PRT3 9/12/2024 (219)
MW574 12/11/2024 (882)
MW573 12/5/2024 (2170)
MW342 9/17/2024 (31.7)
MW569 12/9/2024 (105)
MW570 12/9/2024 (3840)
MW571 12/9/2024 (2300)
MW175 9/17/2024 (78.2)
MW567 12/5/2024 (5.34)
MW566 12/5/2024 (12.7)
MW568 12/5/2024 (6.72)
MW572 12/11/2024 (313)
MW563 12/9/2024 (21100)
MW564 12/9/2024 (1540)
MW406-PRT5 12/11/2024 (664)
MW155 12/10/2024 (2480)
MW561 12/10/2024 (1560)
MW559 12/9/2024 (50.8)
MW156 12/10/2024 (1110)
MW560 12/10/2024 (11.9)
MW557 12/9/2024 (2750)
MW407-PRT4 12/11/2024 (418)
MW562 12/10/2024 (329)
MW405-PRT5 12/11/2024 (353)
MW558 12/9/2024 (145)
MW408-PRT5 12/11/2024 (211)
MW505 12/10/2024 (2.54)
MW506 12/10/2024 (38.8)
MW507 12/10/2024 (37.7)
MW344 10/17/2024 (1U)
MW103 5/18/2023 (0.6J)

N
TRUE
20°
PLANT

Feet
600 300 0 600 1,200 1,800

2024 TCE Plume Concentration Fields
- 5 - 100 µg/L
- 100 - 1,000 µg/L
- 1,000 - 10,000 µg/L
- 10,000 - 100,000 µg/L

- Upper RGA Well
- Middle RGA Well
- Lower RGA Well
- Multizone RGA Well
- Unknown Screen Zone Well
- Extraction Well
- Seep Monitoring Location

- RGA Well outside Plume Concentration Field showing TCE > 1 µg/L
- Surface Water Course Centerline
- DOE Property Boundary
- Roadways
- 229 Boundary

- Limited Area
- Water Policy Area

MW100 5/14/2024 (1U) - Monitoring Well Identification
Date of Sample and Sample Value (TCE Concentration in µg/L)
U = Compound analyzed for, but not detected at or below, the lowest concentration reported
J = Concentration is estimated

Note: Contours defining >10,000 µg/L used historical records in addition to recent groundwater monitoring results.

MAP SOURCE INFORMATION
Map Generation Date and Location - 03/06/2025 Geosyntec\\fedprojects-01\paducah$\2_GIS\MXD\202502_2023-2024 Plume Map Update\Fig_C01_2024PlumesTCER1.mxd
Monitoring and Extraction Well, RGA Well outside Plume Concentration Field showing TCE > 1 µg/L, and Seep Monitoring Layer Location: Geosyntec\\fedprojects-01\paducah$\2_GIS\SHP\202502_2023-2024 Plume Map Update\TCE_2024_Latest.shp
2024 TCE Plume Concentration Fields: Geosyntec\\fedprojects-01\paducah$\2_GIS\SHP\202502_2023-2024 Plume Map Update\2024_TCE_5_100.shp\2024_TCE_100_1000.shp\2024_TCE_1000_10000.shp\2024_TCE_10000_100000.shp
DOE Property Boundary and Surface Water Course Centerline provided by FRNP on 2/4/2021 and 11/8/2022, respectively.
Roadways, 229 Boundary, and Water Policy Area downloaded from PEGASIS on 3/16/2021.
Limited Area shapefile provided by FRNP on 2/4/2021 and external limits confirmed by FRNP on 3/21/2022.

U.S. DEPARTMENT OF ENERGY
PORTSMOUTH / PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

FOUR RIVERS NUCLEAR PARTNERSHIP, LLC

Figure C.1. 2024 TCE Plume–Regional Gravel Aquifer

Notes:
1. Data from the most recent 2024 sampling event used except where noted.
2a. For well clusters completed as multiple depths, all wells are labeled with their most recent sampling result. The maximum of the values for the well cluster was used for contouring.
2b. For multiport wells with multiple sampling depths within the same well, the most recent result from each of the sampled ports was compared (even if the most recent port samples were collected on different days) and the maximum result from the comparison was used for contouring and labeling. This selection criterion may result in different ports selected for TCE or Tc-99.

Ohio River

MW146 11/5/2024 (8.6 U)
MW433 11/5/2024 (8.89 U)
MW435 11/5/2024 (6.8 U)
MW441 11/5/2024 (9.4 U)
MW444 5/30/2023 (4.68 U)
MW443 5/30/2023 (5.91 U)
MW442 5/30/2023 (3.09 U)
MW450 5/20/2024 (4.28 U)
MW448 5/20/2024 (7.05 U)
MW447 5/16/2024 (3.36 U)
MW445 5/16/2024 (1.42 U)
R245 11/6/2024 (13.8 U)
MW199 11/4/2024 (6.22 U)
MW201 11/5/2024 (7.45 U)
MW135 9/4/2024 (55.2)
R14 11/6/2024 (5.04 U)
MW489 5/30/2023 (13.2 U)
MW490 5/30/2023 (27.6)
MW236 5/22/2024 (-1.75 U)
MW492 5/16/2024 (73.6)
MW202 11/5/2024 (8.29 U)
MW491 5/16/2024 (61.2)
MW98 9/3/2024 (32.7)
MW240 5/22/2024 (1.96 U)
MW493 5/16/2023 (45.1)
MW494 5/18/2023 (67)
R13 11/6/2024 (3.33 U)
MW360 10/8/2024 (-4.76 U)
MW361 10/8/2024 (45.2)
MW364 10/9/2024 (47.4)
MW357 10/8/2024 (29.4)
MW363 10/9/2024 (11.5 U)
MW358 10/8/2024 (15.1 U)
MW132 12/3/2024 (-6.13 U)
MW125 5/22/2024 (48.6)
MW367 10/9/2024 (-1.17 U)
MW366 10/9/2024 (67.4)
MW139 5/16/2024 (4.47 U)
MW488 5/20/2024 (9.81 U)
MW20 11/5/2024 (9.35 U)
MW200 5/23/2023 (38)
MW373 10/10/2024 (12.8 U)
MW392 10/15/2024 (-1.01 U)
MW370 10/10/2024 (20.6)
MW372 10/10/2024 (92)
MW391 10/15/2024 (6.22 U)
MW369 10/10/2024 (83.8)
MW418 5/13/2024 (-3.29 U)
MW419 5/13/2024 (3.54 U)
MW388 10/16/2024 (4.56 U)
MW387 10/16/2024 (154)
MW451 5/30/2023 (0.0727 U)
MW452 11/4/2024 (0.775 U)
MW385 10/14/2024 (40.9 J)
MW221 10/14/2024 (2.74 UJ)
MW384 10/14/2024 (35.1 J)
R2 11/6/2024 (8.59 U)
MW222 10/14/2024 (-2.88 UJ)
MW223 10/14/2024 (6.45 UJ)
MW395 10/15/2024 (10.7 U)
MW134 11/4/2024 (1.44 U)
MW453 5/20/2024 (21.1)
MW454 5/20/2024 (18.2)
MW224 10/14/2024 (6.41 UJ)
MW394 10/15/2024 (0.147 U)
MW220 10/14/2024 (14.8 UJ)
MW397 10/16/2024 (15.5 U)
MW197 9/3/2024 (105)
MW150 5/22/2024 (10.4 U)
MW501 9/26/2024 (-6.48 U)
MW456 12/4/2024 (6.94 U)
MW458 9/18/2024 (17.2)
MW459 9/18/2024 (77.5)
MW462 9/18/2024 (42.2)
MW461 9/18/2024 (-7.89 U)
MW502 9/25/2024 (-0.698 U)
MW455 12/4/2024 (8.41 U)
MW457 9/18/2024 (16.3)
MW460 12/4/2024 (88.9)
MW243 9/25/2024 (14.5)
MW194 11/4/2024 (-2.22 U)
MW242 9/25/2024 (14.3)
MW244 9/25/2024 (4.54 U)
MW500 9/17/2024 (358)
MW248 9/25/2024 (2.28 U)
MW504 9/17/2024 (5.54 U)
MW250 9/19/2024 (-0.793 U)
HV217/EW232 10/8/2024 (54.7)
HV222/EW233 10/8/2024 (504)
MW498 9/17/2024 (6.83 U)
MW503 9/17/2024 (148)
MW497 9/17/2024 (67.8)
MW481 5/15/2023 (11.5 U)
MW482 5/15/2023 (21.2 U)
MW106A 11/4/2024 (6.43 U)
MW245 9/25/2024 (0.357 U)
MW499 9/17/2024 (363)
MW291 10/2/2024 (-0.465 U)
MW283 10/2/2024 (2.78 U)
MW293A 10/2/2024 (9.32 U)
MW340 12/4/2024 (1000)
MW173 9/26/2024 (1.41 U)
MW165A 9/26/2024 (11.9)
MW496 10/1/2024 (23.6)
MW126 10/2/2024 (3.56 U)
MW65 9/25/2024 (4.97 U)
MW66 9/18/2024 (191)
MW355 9/25/2024 (46.1)
MW288 10/2/2024 (28.7)
MW124 10/2/2024 (4.04 U)
MW63 9/25/2024 (3.97 U)
MW339 12/4/2024 (78.3)
MW261 5/15/2024 (1110)
MW144 10/1/2024 (41.4)
MW145 10/1/2024 (23.8)
R53 11/6/2024 (10.3 U)
MW432 11/4/2024 (0.509 U)
MW531 10/7/2024 (31.8)
MW292 10/2/2024 (7.6 U)
MW426 11/4/2024 (3.54 U)
MW495 10/1/2024 (44.8)
MW428 9/25/2024 (3.4 U)
MW169 5/15/2024 (38)
MW205 5/17/2023 (1.85 U)
MW427 11/4/2024 (1.43 U)
MW354 12/3/2024 (4.58 U)
MW430 9/19/2024 (-1.2 U)
MW262 5/17/2023 (151)
MW479 10/1/2024 (-0.481 U)
MW480 10/1/2024 (40.7)
MW429A 9/25/2024 (-1.65 U)
MW260 10/7/2024 (29.3)
MW524 10/3/2024 (0.233 U)
MW525 10/7/2024 (172)
SP234/EW234 12/9/2024 (43.5)
MW533 10/7/2024 (52.6)
MW403-PRT3 12/3/2024 (7.6 U)
MW404-PRT4 5/18/2023 (3.5 U)
MW526 10/7/2024 (230)
MW556 10/1/2024 (22.5)
MW527 10/7/2024 (48)
MW163 10/2/2024 (27.4)
MW329 5/18/2023 (-1.68 U)
MW528 10/7/2024 (107)
MW537 10/7/2024 (123)
MW536 10/7/2024 (123)
SP235/EW235 12/9/2024 (19.7)
MW258 10/3/2024 (4.22 U)
MW529 10/3/2024 (166)
MW478 10/1/2024 (-0.674 U)
MW549 9/5/2024 (-2.17 U)
MW161 5/15/2024 (11.7 U)
MW328 5/18/2023 (-5.11 U)
MW256 10/7/2024 (10.4 U)
MW530 10/7/2024 (22.4)
MW330 9/4/2024 (4.94 U)
MW203 5/15/2024 (81)
MW71 6/4/2024 (6.81 U)
MW68 6/4/2024 (33.6)
MW538 10/2/2024 (31.1)
MW539 10/2/2024 (18.4)
MW255 10/7/2024 (-2.13 U)
MW326 9/4/2024 (-2.88 U)
MW327 9/4/2024 (5.1 U)
MW103 5/18/2023 (8.6 U)
MW344 10/17/2024 (1.27 U)

See Inset A
See Inset B

Inset A
MW67 7/12/2024 (94.4)
MW84A 7/9/2024 (93.5)
MW87A 7/9/2024 (14.2 U)
MW90A 7/9/2024 (45.3)
MW337 7/16/2024 (161)
MW338 7/16/2024 (68.8)
MW89 7/12/2024 (12.2 U)
MW92 7/16/2024 (3.75 U)
MW86 7/16/2024 (17 U)
MW95A 7/12/2024 (9.9 U)
MW93A 7/9/2024 (9.87 U)
MW333 7/12/2024 (84.6)
MW548 7/16/2024 (27.8)
MW420 7/9/2024 (7.33 U)
MW76 7/12/2024 (11 U)
MW415 5/17/2023 (35.8)
MW227 7/12/2024 (-0.825 U)
MW414 5/17/2023 (73.2)
MW226 7/12/2024 (-0.149 U)
MW417 5/17/2023 (10.3 U)
MW551 9/5/2024 (12 U)
MW550 9/5/2024 (0.228 U)
MW416 5/17/2023 (19.7)

Inset B
MW168 5/17/2023 (1370)
MW423-PRT1/PRT2/PRT3 9/10/2024 (6450)
MW422-PRT1/PRT2/PRT3 9/10/2024 (6270)
MW343 9/17/2024 (12700)
MW421-PRT1/PRT2/PRT3 9/11/2024 (15800)
MW424-PRT1/PRT2/PRT3 9/10/2024 (36400)
MW341 12/10/2024 (348)
MW425-PRT1/PRT2/PRT3 9/12/2024 (2730)
MW574 12/11/2024 (1060)
MW178 12/5/2024 (160)
MW573 12/5/2024 (71.1)
MW342 9/17/2024 (232)
MW569 12/9/2024 (390)
MW571 12/9/2024 (16900)
MW570 12/9/2024 (30100)
MW175 9/17/2024 (187)
MW566 12/5/2024 (67.1)
MW572 12/11/2024 (136)
MW568 12/5/2024 (93.8)
MW567 12/5/2024 (54)
MW564 12/9/2024 (193)
MW563 12/9/2024 (240)
MW560 12/10/2024 (-1 U)
MW565 12/9/2024 (146)
MW155 12/10/2024 (81.3)
MW562 12/10/2024 (136)
MW559 12/9/2024 (227)
MW557 12/9/2024 (83.8)
MW156 12/10/2024 (2.74 U)
MW561 12/10/2024 (101)
MW406-PRT5 12/11/2024 (-0.922 U)
MW558 12/9/2024 (327)
MW405-PRT5 12/11/2024 (1.19 U)
MW407-PRT4 12/11/2024 (7.91 U)
MW408-PRT5 12/11/2024 (11.1 U)
MW507 12/10/2024 (69.1)
MW506 12/10/2024 (48.1)
MW505 12/10/2024 (70.9)

N
TRUE
20°
PLANT

600 300 0 600 1,200 1,800 Feet

2024 Tc-99 Plume Concentration Fields
- 900 - 1,930 pCi/L
- 1,930 - 3790 pCi/L
- ≥3790 pCi/L

- Upper RGA Well
- Middle RGA Well
- Lower RGA Well
- Multizone RGA Well
- Unknown Screen Zone Well
- Extraction Well

- Surface Water Course Centerline
- DOE Property Boundary
- Roadways
- 229 Boundary

- Limited Area
- Water Policy Area

MW242 9/5/2024 (14.3) - Monitoring Well Identification
Date of Sample and Sample Value (Tc-99 Concentration in pCi/L)
U = Compound analyzed for but not detected at or below the lowest concentration reported
UJ = Not detected and result estimated

MAP SOURCE INFORMATION
Map Generation Date and Location - 03/03/2025 Geosyntec\\fedprojects-01\paducah$\2_GIS\MXD\202502_2023-2024 Plume Map Update\Fig_C02_2024PlumesTc99R1.mxd
Monitoring and Extraction Well Layer Location: Geosyntec\\fedprojects-01\paducah$\2_GIS\SHP\202502_2023-2024 Plume Map Update\TEC99_2024_LatestR1.shp
2024 Tc-99 Plume Concentration Fields : Geosyntec\\fedprojects-01\paducah$\2_GIS\SHP\TEC99_2024_900-1930pCiL.shp\TEC99_2024_1930-3790pCiL.shp\TEC99_2024_3790pCiL.shp
DOE Property Boundary and Surface Water Course Centerline provided by FRNP on 2/4/2021 and 11/8/2022, respectively.
Roadways, 229 Boundary, and Water Policy Area downloaded from PEGASIS on 3/16/2021.
Limited Area shapefile provided by FRNP on 2/4/2021 and external limits confirmed by FRNP on 3/21/2022.

U.S. DEPARTMENT OF ENERGY
PORTSMOUTH / PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

FOUR RIVERS NUCLEAR PARTNERSHIP, LLC

Figure C.2. 2024 Tc-99 Plume–Regional Gravel Aquifer