ECF-HANFORD-20-0018
Revision 0

CALCULATION AND DEPICTION OF GROUNDWATER CONTAMINATION FOR THE CALENDAR YEAR 2019 HANFORD SITE GROUNDWATER MONITORING REPORT

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract DE-AC06-08RL14788

CH2MHILL
Plateau Remediation Company

P.O. Box 1600
Richland, Washington 99352

Approved for Public Release;
Further Dissemination Unlimited

ECF-HANFORD-20-0018
Revision 0

CALCULATION AND DEPICTION OF GROUNDWATER CONTAMINATION FOR THE CALENDAR YEAR 2019 HANFORD SITE GROUNDWATER MONITORING REPORT

Date Published
September 2020

Prepared for the U.S. Department of Energy
Assistant Secretary for Environmental Management

Contractor for the U.S. Department of Energy
under Contract DE-AC06-08RL14788

CH2MHILL
Plateau Remediation Company
P.O. Box 1600
Richland, Washington 99352

APPROVED
By Sarah Harrison at 9:14 am, Sep 08, 2020

Release Approval | Date

Approved for Public Release;
Further Dissemination Unlimited

TRADEMARK DISCLAIMER

Reference herein to any specific commercial product, process, or service by tradename, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors.

This report has been reproduced from the best available copy.

Printed in the United States of America

ENVIRONMENTAL CALCULATION COVER PAGE

SECTION 1 - Completed by the Responsible Manager

Project:
Hanford Site Groundwater Monitoring for 2019

Date: 08/17/2020

Calculation Title and Description:
Calculation and Depiction of Groundwater Contamination for the Calendar Year 2019 Hanford Site Groundwater Monitoring Report

RELEASE / ISSUE

DATE:
Sep 08, 2020
HANFORD RELEASE

Qualifications Summary

Preparer(s):

Name: Alex Spiliotopoulos

Degree, Major, Institution, Year: PhD, Civil and Environmental Engineering, University of Vermont, 1999
BS, Civil Engineering, University of Patras, Greece, 1994

Professional Licenses:

Brief Narrative of Experience: Dr. Spiliotopoulos' expertise is analysis to support water resources management. He has developed and applied analytical and numerical models for groundwater flow and contaminant transport, focusing on pump-and-treat system operations, reactive-transport modeling, and optimization applications for least-cost remediation designs. He has extensive experience in assessing water-resources management in support of inter- and intra-state water-resource allocation and conflict resolution, assessment of water quantity and quality data, development and application of statistical tools and numerical interpolation techniques for mapping water-level and water-quality data, and the application of advanced parameter estimation techniques for model calibration. At Hanford, he has designed RPO and RI/FS remedial alternatives, including large-scale pump-and-treat networks and/or MNA and other in-situ treatment technologies for the River Corridor OUs, conducted sitewide multi-constituent plume delineation, and co-authored Remedial Design and Remedial Action Work Plans. He has provided technical support on system performance evaluations and modifications, characterization of plume migration patterns, aquifer test data interpretations as well as practical and theoretical aspects of aquifer hydraulics and their applications. He developed and contributed to numerous presentations to stakeholders, illustrating elements of the proposed remedies, and their impacts on containment and recovery performance.

ENVIRONMENTAL CALCULATION COVER PAGE (Continued)

Checker(s):

Name: Zdravka Karanovic

Degree, Major, Institution, Year: MS, Hydrogeology, Ohio State University, 2005
BS, Hydrogeology, University of Belgrade, 1999

Professional Licenses:

Brief Narrative of Experience: Ms. Karanovic specializes in groundwater assessment, evaluation and modeling of hydrological and hydrogeological processes, as well as data evaluation and interpretation. She is proficient in map production, supervision of drilling, and installation and development of groundwater monitoring wells. She has also applied advanced research using fallout radionuclides in watersheds as tracers in sediment budget investigations. Her experience includes Microsoft Access and SQL Server database development, integration and management, obtaining and interpreting geochemical data, chemical fingerprinting, investigating the sources of contaminants for litigation, data visualization, statistical analysis, water-level mapping, and capture zone analysis.

Name: Clark Griffith

Degree, Major, Institution, Year: MS, Engineering Science (Hydrology Emphasis), University of Mississippi, 2008
BS, Geological Engineering, University of Mississippi, 2003

Professional Licenses: Professional Geoscientist (Texas)
Geologist-In-Training (Mississippi)

Brief Narrative of Experience: Clark Griffith's professional experience includes research and applied experience in the areas of contaminant transport, groundwater mechanics, geochemistry, statistics, numerical modeling, and hydrogeologic data acquisition and analysis. He has gained this experience on projects involving the protection of human health and the environment from contamination resulting from past industrial operations, the disposal of hazardous and radioactive wastes, and the management and use of groundwater resources. In support of geologic and hydrogeologic characterization efforts, Clark has conducted and analyzed hydraulic tests, performed groundwater sampling for water quality and age-dating analyses, installed vadose zone monitoring systems, and completed geologic mapping of fractures and subsurface testing of fracture connectivity. For a variety of federal, state, and municipal agencies, as well as commercial industry clients, Clark has contributed to projects aimed at investigating and determining the nature and extent of subsurface contamination as part of environmental restoration efforts, the permitting and licensing of hazardous and radioactive waste disposal facilities, the reclamation and closure of former mining operations, and the remediation and re-development of Brownfield and other decommissioned industrial properties. He has assisted in the development and application of flow and transport models, conducted sensitivity analyses of model parameters and results, and produced visualizations of model simulations. He has used a number of data analysis, management, and modeling tools and codes including ArcGIS, Groundwater Vistas, Groundwater Modeling System, AQTESOLV, ERDAS Imagine, HydroGeoAnalyst, SATOOL, and Subsurface Transport over Multiple Phases (STOMP).

ENVIRONMENTAL CALCULATION COVER PAGE (Continued)

Senior Reviewer(s):

Name: Kim Gordon

Degree, Major, Institution, Year: BS, Geosystems Engineering and Hydrogeology, The University of Texas at Austin, 1999

Professional Licenses: Professional Engineer (Texas)

Brief Narrative of Experience: Kimberly 'Kim' Gordon's professional experience encompasses modeling, environmental assessments, water resource evaluations, site and reservoir characterization, geologic modeling, numerical modeling, regulatory filings, and litigation support for environmental, oil and gas, and government clients. She has specific experience in site characterization design and conceptual model development, numerical model simulation to assess multi-phase flow characteristics and to optimize production systems, and evaluation and remediation of chlorinated solvents and hydrocarbons. She has designed and executed field studies for site and reservoir characterization with dynamic workflows that update in real time. Kim has used a wide variety of data types including both geologic and petrophysical to develop multiple-scale geologic models ranging from site-wide to regional models. She has developed and implemented a wide variety of numerical simulations for the assessment of reservoir potential and the evaluation and optimization of remedial strategies. She has assisted clients with regulatory filings and provided detailed reports for regulatory hearings. She also provides other litigation support services and expert opinions for environmental and oil and gas clients. Kim has managed projects for environmental, government, and oil and gas clients ranging in budgets from several thousand dollars to several million dollars. Her unique qualifications as both a licensed professional engineer and professional geoscientist allow her to serve as a project liaison for multidisciplinary teams of scientists, engineers, managers, and government officials.

SECTION 2 - Completed by Preparer

Calculation Number: ECF-HANFORD-20-0018 | Revision Number: 0

Revision History

Revision No.	Description	Date	Affected Pages
0	Initial Issue	08/17/2019	All

SECTION 3 - Completed by the Responsible Manager

Document Control:

Is the document intended to be controlled within the Document Management Control System (DMCS)? ◉ Yes ○ No

Does document contain scientific and technical information intended for public use? ◉ Yes ○ No

Does document contain controlled-use information? ○ Yes ◉ No

SECTION 4 - Document Review and Approval

Preparer(s):

Alex Spiliotopoulos	Senior Hydrogeologist	A Spiliotopoulos	08/17/2020
Print First and Last Name	*Position*	*Signature*	*Date*

ENVIRONMENTAL CALCULATION COVER PAGE (Continued)

Checker(s):

Print First and Last Name	Position	Signature	Date
Zdravka Karanovic	Hydrogeologist	ZKaranovic	08/17/2019
Clark Griffith	Hydrogeologist	Clark Griffith	8/18/2020

Senior Reviewer(s):

Print First and Last Name	Position	Signature	Date
Kimberly Gordon	Principal Engineer	Kimberly Gordon	8/18/2020

Responsible Manager(s):

Print First and Last Name	Position	Signature	Date
Bill Faught	Manager	Approved by Faught, William R on	8/26/2020

SECTION 5 - Applicable if Calculation is a Risk Assessment or Uses an Environmental Model

Prior to Initiating Modeling:

Required training for modelers completed:
Integration Lead:

Print First and Last Name	Signature	Date
William Nichols	WILLIAM NICHOLS (Affiliate)	Digitally signed by WILLIAM NICHOLS (Affiliate) Date: 2020.08.18 12:16:13 -07'00'

Safety Software Approved:
Integration Lead:

Print First and Last Name	Signature	Date
William Nichols	WILLIAM NICHOLS (Affiliate)	Digitally signed by WILLIAM NICHOLS (Affiliate) Date: 2020.08.18 12:16:41 -07'00'

Calculation Approved:
Risk/Modeling Integration Manager:

Print First and Last Name	Signature	Date
Alaa Aly	ALAA ALY (Affiliate)	Digitally signed by ALAA ALY (Affiliate) Date: 2020.08.18 12:20:48 -07'00'

Contents

1 Purpose 1-1

2 Background 2-1

3 Methodology 3-1

3.1 Data Acquisition and Overview 3-3

3.1.1 Data Types 3-3

3.1.2 Data Compilation and Reduction 3-7

3.2 Data Selection Rules 3-7

3.2.1 General Data Selection Rules 3-8

3.2.2 Special Data Selection Rules 3-9

3.2.3 Data Selection Parameters 3-10

3.3 Development of the Interpolation Input Datasets 3-11

3.4 Data Transformations 3-12

3.5 Numerical Interpolation 3-13

3.5.1 Variogram Parameters 3-13

4 Assumptions and Inputs 4-1

4.1 Assumptions and Limitations 4-1

4.2 Inputs 4-2

5 Software Applications 5-1

5.1 QUANTILE 5-1

5.2 R 5-1

5.3 GroundWater Desktop 5-1

5.4 Statement of Valid Software Application 5-1

6 Calculation 6-1

6.1 Development of Interpolation Datasets 6-1

6.2 Plume Mapping by Interest Area 6-2

6.2.1 100-BC-5 6-2

6.2.2 100-FR-3 6-7

6.2.3 100-HR-3 6-11

6.2.4 100-KR-4 6-17

6.2.5 100-NR-2 6-25

6.2.6 200-BP-5 6-29

6.2.7 200-PO-1 6-34

6.2.8 200-UP-1 6-36

6.2.9 200-ZP-1 6-41

6.2.10 300-FF-5 (618-11 Burial Ground) 6-55

6.2.11 Main 300 Area 6-56
6.2.12 1100-EM-1 6-60
6.3 Plume Area Calculations 6-60
7 Results/Conclusions 7-1
8 References 8-1

Appendices

A Data Used for the Development of Interpolation Input Files ..... A-i
B Kriging Interpolation Input Files per Contaminant of Interest and Groundwater Interest Area ..... Available electronically
C Contaminant of Interest Plume Maps ..... C-i

Figures

Figure 3-1. Groundwater Interest Area and Operable Unit Boundaries 3-2
Figure 3-2. Data Selection and Aggregation Procedure for Constructing Interpolation Input Datasets 3-5
Figure 3-3. Schematic of a Modeled Semi-variogram 3-14
Figure 6-1. Groundwater Interest Area Boundaries for Plume Area Calculations 6-62

Tables

Table 6-1. COIs and Data Selection Parameters for 100-BC-5 6-3
Table 6-2. COIs and Interpolation Parameters for 100-BC-5 6-4
Table 6-3. COIs and Data Selection Parameters for 100-FR-3 6-8
Table 6-4. COIs and Interpolation Parameters for 100-FR-3 6-9
Table 6-5. COIs and Data Selection Parameters for 100-HR-3 6-12
Table 6-6. COIs and Interpolation Parameters for 100-HR-3 6-13
Table 6-7. COIs and Data Selection Parameters for 100-KR-4 6-18
Table 6-8. COIs and Interpolation Parameters for 100-KR-4 6-19
Table 6-9. Historic High Carbon-14 Samples 6-21
Table 6-10. Parameters Used in Interpolation-Migration Calculations 6-21
Table 6-11. Summary of Migrated Data used in the 100-KR-4 Mapping Analysis 6-22
Table 6-12. COIs and Data Selection Parameters for 100-NR-2 6-26
Table 6-13. COIs and Interpolation Parameters for 100-NR-2 6-27
Table 6-14. COIs and Data Selection Parameters for 200-BP-5 6-30

Table 6-15. COIs and Interpolation Parameters for 200-BP-5 6-31
Table 6-16. COIs and Data Selection Parameters for 200-PO-1 6-34
Table 6-17. COIs and Interpolation Parameters for 200-PO-1 6-35
Table 6-18. COIs and Data Selection Parameters for 200-UP-1 6-37
Table 6-19. COIs and Interpolation Parameters for 200-UP-1 6-38
Table 6-20. COIs and Data Selection Parameters for 200-ZP-1 6-42
Table 6-21. COIs and Interpolation Parameters for 200-ZP-1 6-43
Table 6-22. Interpolation Dataset for the 200-ZP-1 Carbon Tetrachloride 6-48
Table 6-23. COIs and Data Selection Parameters for 300-FF-5 (618-11 Burial Ground) 6-55
Table 6-24. COIs and Interpolation Parameters for 300-FF-5 (618-11 Burial Ground) 6-55
Table 6-25. COIs and Data Selection Parameters for 1100-EM-1/Main 300 Area 6-57
Table 6-26. COIs and Interpolation Parameters for 1100-EM-1/Main 300 Area 6-58
Table 6-27. COIs and Data Selection Parameters for 1100-EM-1 Area 6-60
Table 6-28. COIs and Interpolation Parameters for 1100-EM-1/Main 300-FF-5 Area 6-60
Table 7-1. Calculated Plume Area per GIA for Carbon-14 7-1
Table 7-2. Calculated Plume Area per GIA for Chromium 7-1
Table 7-3. Calculated Plume Area per GIA for Cyanide 7-4
Table 7-4. Calculated Plume Area per GIA for Iodine-129 7-5
Table 7-5. Calculated Plume Area per GIA for Nitrate 7-5
Table 7-6. Calculated Plume Area per GIA for Strontium-90 7-7
Table 7-7. Calculated Plume Area per GIA for Trichloroethene 7-8
Table 7-8. Calculated Plume Area per GIA for Technetium-99 7-9
Table 7-9. Calculated Plume Area per GIA for TPH-D (Annual Average) 7-10
Table 7-10. Calculated Plume Area per GIA for Tritium 7-10
Table 7-11. Calculated Plume Area per GIA for Uranium 7-10
Table 7-12. Calculated Plume Area per GIA for Carbon Tetrachloride 7-11
Table 7-13. Calculated Plume Area per GIA for Chloroform 7-12

This page intentionally left blank.

Terms

2D	two-dimensional
3D	three-dimensional
CDF	cumulative distribution function
CHPRC	CH2M HILL Plateau Remediation Company
COI	contaminant of interest
CPGWM	Central Plateau groundwater model
CSM	Conceptual Site Model
CY	calendar year
ECF	environmental calculation file
F&T	fate and transport
GIA	Groundwater Interest Area
GSLIB	geostatistical library
GWD	GroundWater Desktop
HEIS	Hanford Environmental Information System
MDA	minimum detectable activity
MIK	multiple indicator kriging
OK	ordinary kriging
OU	operable unit
P&T	pump-and-treat
P2RGWM	Plateau to River Groundwater Model
PRB	permeable reactive barrier
QK	quantile kriging
RUM	Ringold upper mud
SRL	standard reporting limit
SSP&A	S.S. Papadopulos & Associates, Inc.
UK	universal kriging
WMA	Waste Management Area

This page intentionally left blank.

1 Purpose

The purpose of this environmental calculation file (ECF) is to describe the methodology, input data and calculations used to delineate contaminant plumes and the corresponding concentration distributions for the contaminants of interest (COIs) in each Groundwater Interest Area (GIA) of the Hanford Site in support of the DOE/RL-2019-66, *Hanford Site Groundwater Monitoring Report for 201*9.

The overarching objective of the plume delineations described in this ECF is to construct piecewise-continuous (gridded) maps of the estimated extents of contamination that balance objectivity with qualitative input from project scientists and can be used to calculate simple summary statistics, such as plume area.

This page intentionally left blank.

2 Background

A systematic approach to develop contaminant plume maps using an integrated numerical interpolation methodology was first applied for the DOE/RL-2011-118, *Hanford Site Groundwater Monitoring for 2011*, and it has been implemented since then for the purposes of all subsequent annual Sitewide monitoring reports.

The approach implemented an integrated procedure of compiling and aggregating datasets in a comprehensive database; developing input files; and executing batch processes using the open-source statistical computing/programming language R (R Development Core Team, 2012, *R: A language and environment for statistical computing*). Details on the development and implementation of this procedure are provided in the following chapters.

This integrated approach ensures flexibility, traceability and reproducibility of data selection and plume interpolation, while at the same time honoring the conceptual site model and historical plume migration patterns in each GIA.

This page intentionally left bank.

3 Methodology

Maps of the extent of contamination, referred to as contaminant plume maps, are developed by interpolating point sample data obtained from wells and aquifer tubes to a grid using two-dimensional (2D) ordinary kriging (OK). Sample data obtained within the monitoring period are in some instances supplemented with data obtained prior to the monitoring period or other types of data, as discussed below.

Since concentration data often do not follow a normal distribution, being more often skewed or tailed, the sample data values are typically subject to a parametric or nonparametric transformation before employing the OK interpolation technique to produce a piecewise-continuous estimate of the extent of contamination. Three data transformations used in the plume mapping process are detailed below. Upon completion of the interpolation of the transformed dataset, back-transformation of the results provides contaminant distributions corresponding to the units and actual range of values for each COI in each GIA. A map of the GIA and operable unit (OU) boundaries is shown in Figure 3-1.

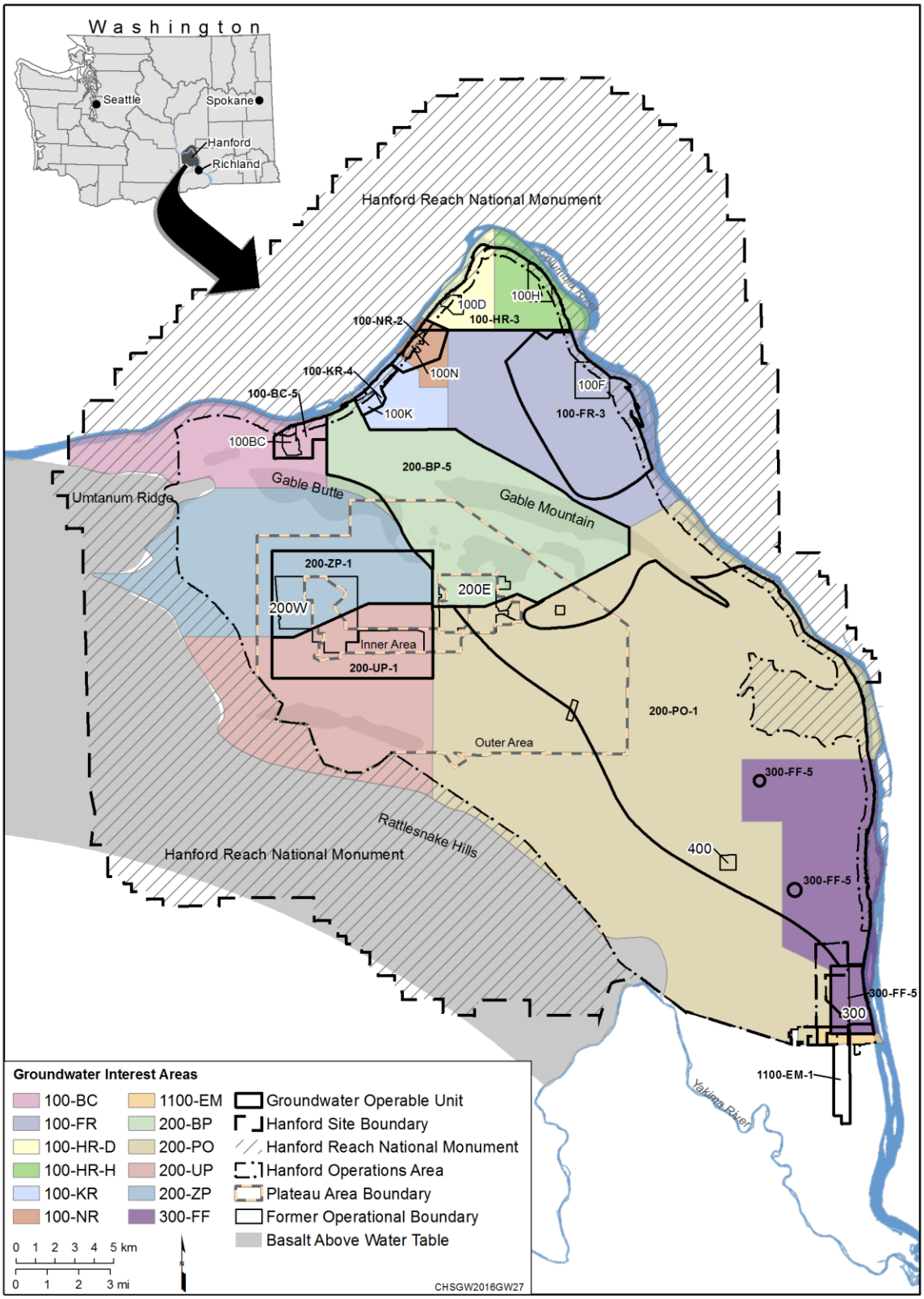


Figure 3-1. Groundwater Interest Area and Operable Unit Boundaries

The plume mapping procedure involves the following steps (Figure 3-2):

1. Data acquisition, overview, compilation and reduction.
2. Data selection per GIA/COI; mapping value for each measurement location is determined systematically using a standard set of data selection rules.
3. Development of interpolation datasets by applying data selection rules. Data transformation, depending on the data values and their distribution for each COI in each GIA.
4. Application of OK to interpolate the transformed data set.
5. Back-transformation of the OK interpolation results.
6. Visualization of interpolation results; i.e., generation of contaminant plume maps.
7. Calculations of plume areas corresponding to defined concentration intervals for each COI in each GIA.

These steps of the plume mapping procedure are detailed below.

3.1 Data Acquisition and Overview

The Hanford Environmental Information System (HEIS) was queried for data through the end of 2019. This dataset includes concentrations of chemical constituents and physical parameters in groundwater, measured across the Hanford Site, in wells and aquifer tubes.

In addition to the data pull from HEIS, complementary data were provided by CH2M HILL Plateau Remediation Company (CHPRC) and used in the interpolation. Details about these datasets are provided in Section 4.2.

The available data were reviewed to determine those measurements representative of contaminant distribution in the aquifer during calendar year (CY) 2019. The dataset was complemented by additional data including measured values outside CY2019 and/or values determined by the project scientists based on inferred plume extents. The various data types are discussed below.

3.1.1 Data Types

Mapping was based primarily on data collected at each measurement location during CY2019. Where data were unavailable during CY2019, the dataset was expanded to include all data collected during the three-year period between January 1, 2017, through December 31, 2019, and extending further in the historical dataset where necessary, as explained in detail in the following sections. The three-year period was selected by CHPRC and the regulators as an appropriate temporal window that provides sufficient data to develop distributions that reflect the most recent conditions in the aquifer and prevent data shortage due to incidental lack of current-year sampling data at critical monitoring locations. General and special data selection rules developed per COI and GIA are based on data available during this expanded timeframe and are described in detail in Section 3.2

In cases where such recent direct measurements were unavailable, additional data points were included to represent known conditions at the site. These points are discussed in detail in the GIA specific sections of Chapter 6 and are categorized by type as discussed below.

Type 1: Point values, which are based on COI concentration measurements but were not determined based on the general or special data selection rules described in detail in Section 3.2. For example, effluent concentrations from the corresponding treatment plant may be used to reflect conditions near an injection

well; or a historical measurement outside the 2017-2019 timeframe may be used where more recent data are not available.

Type 2: Points determined by geologic constraints. For example, a COI concentration value of zero (0.0) may be included in areas where basalt is thought to provide a barrier to COI migration.

Type 3: Points determined based on knowledge of plume sources, previous remediation activities, historical plume configuration, etc., including migrated and interpolated data.

Migrated data points are used where historically high concentrations are thought to have moved into areas with no current monitoring points (e.g., wells have been decommissioned). The migrated points provide first-order estimates of the likely transport of the corresponding contaminant from the historically sampled location. The following analytical steps are used to migrate the historic groundwater conditions through to the present day:

1. The location and sample data for the historical groundwater sample value are identified from the available sample records.
2. The typical groundwater flow direction and rate are estimated from historical water-level data.
3. The approximate movement of the contamination from the historical high-valued location, from the time of sampling to the date of interest, is calculated assuming advection and retardation (sorption) as the dominant transport processes, using appropriate parameter values. The resulting location downgradient of the measured location is identified as the “migrated location.”
4. The approximate concentration at the migrated location is adjusted to account for radioactive decay, if applicable. This concentration is referred to as the “migrated concentration.”

Migrated data were used only for 100-KR plumes. The complete set of parameters and data, as well as any migration calculations are provided in Section 6.2.4.

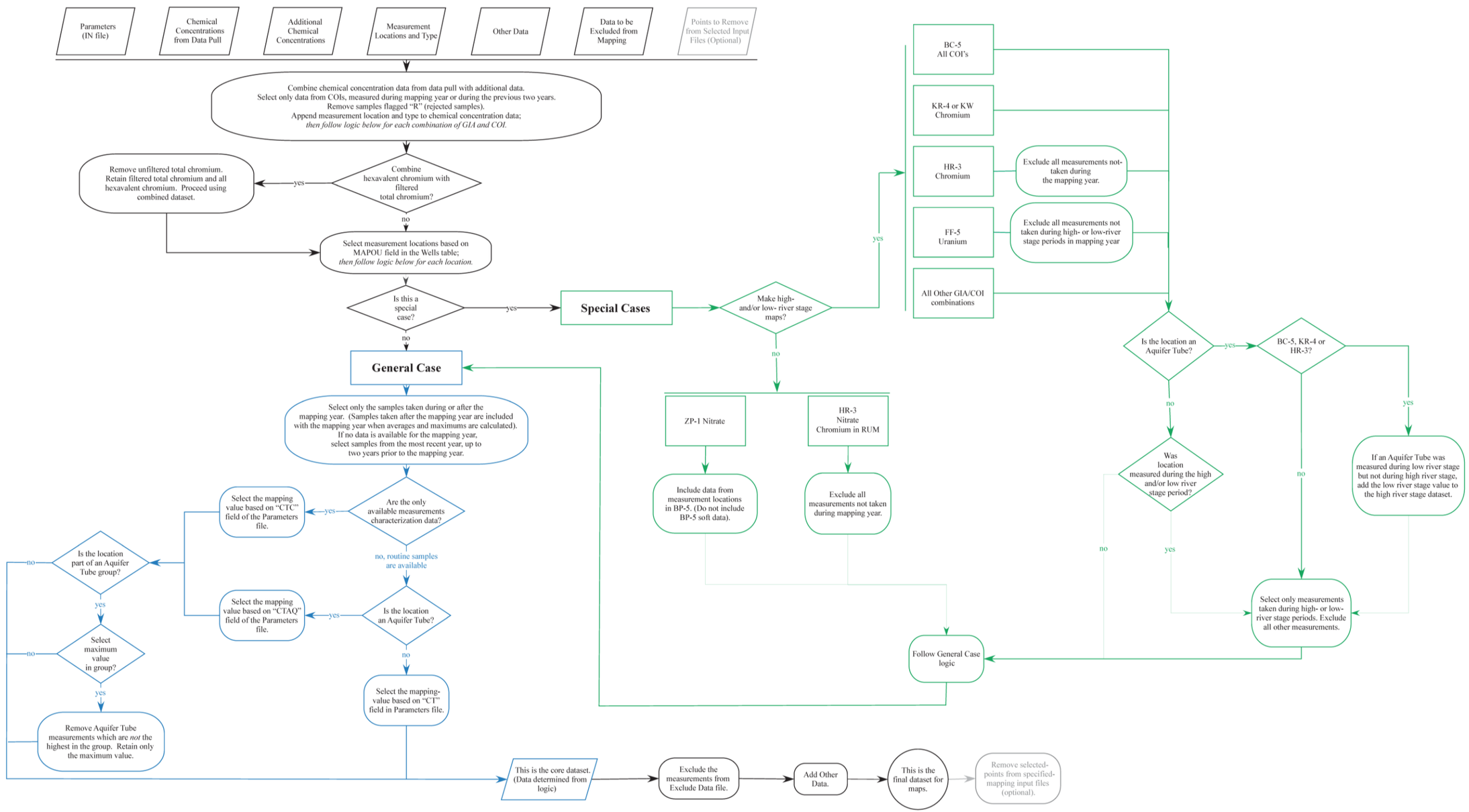


Figure 3-2. Data Selection and Aggregation Procedure for Constructing Interpolation Input Datasets

This page is intentionally left blank.

3.1.2 Data Compilation and Reduction

Spatial coordinates, location type, GIA assignments, and well construction information for all measurement locations were queried from HEIS database. GIA assignments were further refined using a set of polygons to define the appropriate interpolation dataset for each GIA. This information, together with the concentration data and additional information described above, were reduced and compiled into separate files comprising a comprehensive database of all information required for the plume mapping procedure described at the beginning of Chapter 3. The database is managed using the open-source statistical computing/programming language R. Details of data compilation and reduction are provided in Chapter 6.

3.2 Data Selection Rules

Data selection rules consist of the following criteria to determine the appropriate interpolation dataset for each COI and GIA:

- Monitoring locations are removed from the master chemical concentration table if the screened interval is outside the aquifer zone of interest (e.g., basalt confined aquifer).
- Rejected data (measurements flagged with qualifiers “R”) are removed from the dataset.
- Some samples are excluded from the dataset based on the professional judgment of the project scientist. For example:
  - Data from some extraction wells that do not represent ambient conditions due to concentrations averaging (dilution effects due to extraction-well screened interval)
  - Data from wells with lower contaminant concentrations than nearby wells (to ensure development of conservative, 2D distributions)
  - Selected individual data points that are suspected errors (flagged “Y” or “F” in HEIS)
- For measurements flagged with the “U” laboratory qualifier (non-detects) or any combination including the “U” qualifier, the reported value represents (or is replaced by) the associated minimum detectable activity (MDA) for radionuclides, or the standard reporting limit (SRL) for all other COIs. If the SRL field is blank, the standard value reported (“STD_VALUE_RPTD”) is used. However, for hexavalent chromium samples flagged as non-detects with a negative standard value reported, a standard value reported is replaced by 1 μg/L.
- For each measurement location, a single representative concentration was determined depending on:
  - Available data (CY 2019 only, 2017-2018, earlier data)
  - Type of monitoring location (monitoring/extraction well, injection well, aquifer tube)
  - COI/GIA combination and period of interest (annual average, high/low river stage)
  - COI type (e.g., total chromium vs. hexavalent chromium)
  - Sampling result (filtered vs. unfiltered)
  - Collection purpose (e.g., routine sample vs. characterization sample)

Two sets of data selection rules are implemented for each COI/GIA combination: *general* and *special* data selection rules. Interpolation datasets for most COI/GIA combinations are developed based on the general data selection rules. Special data selection rules are implemented in selected COI/GIA combinations where additional considerations are required for contaminant plume depiction (for example,

in cases where high/low river stage plume depictions are required, or a subset of the entire dataset is considered). Special data selection rules are implemented to pre-process the available data before the general data selection procedure is implemented. The general and special data selection rules are described in detail below and are depicted in the schematic flowchart in Figure 3-2.

3.2.1 General Data Selection Rules

Under the general data selection rules datasets are generated for each GIA/COI using a multi-step process:

1. If the selected COI is chromium, then all unfiltered total chromium measurements are removed from the chemical concentration dataset. All hexavalent chromium measurements, and all filtered total chromium measurements are retained, and the data selection process proceeds to step 2 using the combined dataset. For all other COIs this step is skipped, and the process immediately advances to Step 2.
2. Measurement locations for the selected GIA are determined from the GIA assignments.
3. A subset of the master chemical concentration table is generated, which contains concentration measurements for the selected COI taken at the locations determined in Step 2. The selection process advances to Step 4 using this subset.
4. The concentration data are further reduced: for each measurement location, all COI concentrations measured during the most recent year available for the period 2017-2019 are selected. That is, for each measurement location:
    a. If any COI concentration measurements were taken in 2019, then 2019 data are retained.
    b. If no COI concentration measurements were taken in 2019, then 2018 data are retained.
    c. If no COI concentration measurements were taken in 2019 or 2018, then 2017 data are retained, if available.

At the end of this step, the concentration dataset consists of concentrations of the specified COI, measured only at locations specified for the selected GIA, and measured only during the most recent year that data are available.

5. For each measurement location, either the maximum value or the average (mean) value of the concentration data is determined, according to the rule for that measurement and location type specified in for the particular COI/GIA combination. Aggregation methods are specified as described below:
    a. Except aquifer tubes, for samples that are not characterization data: the value is determined based on all COI measurements taken during the year. If samples are available, then characterization measurements are excluded from the calculation.
    b. If no other than characterization samples are available, characterization samples (COLLECTION_PURPOSE = “C”) are selected. The value is calculated based on the maximum of all measurements taken during the year.
    c. For aquifer tubes: the value is determined based on all measurements taken during the year. Subsequently:

- If the aquifer tube is part of a group of aquifer tubes in close proximity to each other, then only the aquifer tube with the highest maximum concentration in each group is used in the interpolation input dataset. The other aquifer tubes in the group are excluded.
- Otherwise, the maximum concentration is used in the interpolation dataset.

d. Data selected for each measurement location using steps 1-5 comprise the core interpolation dataset for the selected COI/GIA. The selection process proceeds to step 6 using the core dataset.

6. Measurements marked for exclusion for the selected COI/GIA combination are removed from the core dataset.

7. Type 1, 2 and 3 data not included in data pull, as defined earlier, for the selected COI/GIA combination are added to the core dataset.

Data selected in steps 1-7 above comprise the final interpolation dataset for each GIA/COI combination under the general data selection rules. The general data selection rules are depicted in the schematic flowchart in Figure 3-2.

3.2.2 Special Data Selection Rules

For selected COI/GIA combinations, additional data selection/aggregation rules are used to pre-process the core dataset, before the general data selection rules were applied.

Special cases include:

- high/low river-stage conditions
- data from aquifer tubes
- other site-specific conditions

A brief description of each special case is provided below, and each case is described in detail in the GIA specific sections of Chapter 6. The general data selection rules are depicted in the schematic flowchart in Figure 3-2.

Special data selection rules are applied in the following cases:

- Nitrate in 200-ZP-1: Nitrate in the 200 Area occurs as a large, contiguous plume extending across multiple GIAs. In order to better represent nitrate distribution in both 200-ZP-1 and 200-BP-5 GIAs and across their shared boundary area, the 200-BP-5 measurements are added to the 200-ZP-1 dataset.

- Nitrate and chromium in 100-HR-3: Only measurements taken during the current calendar year are used to generate the interpolation input datasets. Measurements taken during the current calendar year provide adequate spatial coverage across the GIA and are considered sufficient to generate plume depictions for these COIs in 100-HR-3 that are representative of current conditions. In addition, data from previous years may not be representative of current conditions due to the continuous operation of the expansive DX/HX pump and treat (P&T) system in the 100-HR-3 throughout the current calendar year. However, Type 1 and Type 3 data are used where necessary to ensure that the resulting plume depiction reflects historical data and plume migration.

- Chromium in 100-HR-3, 100-KR-4 (east and north), and 100-KW: Two chromium plume maps were generated, one representing conditions during the high river-stage period (4/1/2019-7/15/2019) and another representing conditions during the low river-stage period (8/1/2019-12/31/2019). If an aquifer tube was not measured during the high river-stage period, but was measured during the low river-

stage period, then the low river-stage concentration was included in the high river-stage dataset. This rule is applied to ensure the plume is bounded along the shoreline during high river-stage conditions, as low river-stage concentrations are generally greater than high river-stage concentrations, and therefore utilization of low river-stage values provides a conservative estimate of high river-stage conditions along the shoreline. If an aquifer tube was not measured during either the high or low river-stage periods, it was excluded.

- All COIs in 100-BC-5 and 100-FR-3: Data were limited to low river-stage measurements only. If a location was not sampled during the low river-stage period (8/1/2019-12/31/2019), then the annual average from the most recent measurement year was used. The data selection process continued according to the general selection rules outlined in Section 3.2.1 and Figure 3-2.
- Uranium in 300-FF-5: Two plume maps were generated, one representing conditions during the month of June (6/1/2019 – 6/30/2019) and another one representing conditions during the month of December (12/1/2019 – 12/31/2019). All measurements taken outside these timeframes were excluded.

3.2.3 Data Selection Parameters

For each combination of GIA and COI, a set of parameters are specified in the data selection parameters table. These parameters define how concentration data at each measurement location are selected and processed (Table A-6). Discussion of the parameters for each GIA/COI is provided in the GIA specific sections of Chapter 6. Parameters include:

1. DORS: lists all COIs for which high and/or low river-stage period maps are made. If no river-stage specific maps are made, this field is left blank.
2. HIGHRIVSTAGE/LOWRIVSTAGE: date ranges which specify high and low river-stage periods, respectively. If no river-stage specific maps are made, this field is left blank. If river stages are specified, then aggregation is done using data measured only within the specified date ranges (if available), rather than the whole calendar year. The generation of river-stage specific datasets is described in Section 3.2.2, and in the relevant GIA specific sections of Chapter 6.
3. COMBCHROM: parameter applicable only to chromium datasets. If the entry in this field is “yes,” then both hexavalent chromium and filtered total chromium measurements are used when calculating average or maximum concentration. Unfiltered total chromium is excluded. If this field is “no” or blank, hexavalent chromium and total chromium are treated as separate COIs. This latter case is not evaluated in this ECF, but the capability is implemented in the code to provide flexibility should such evaluation be required.
4. MAXAQ: parameter applicable to all COIs with a value “yes/no.” If the entry in this field is “yes” then average (under high/low river-stage conditions) or maximum (under annual average conditions) concentration values for each individual aquifer tube are calculated according to the value in the “CTAQ” field (described below), but only the maximum calculated value for each aquifer tube group is used for the interpolation input datasets. If the entry in this field is “no” or blank, then each aquifer tube is considered separately instead of being part of a group, in the interpolation input dataset.
5. CT: parameter specifying which aggregation method to use for routine measurements at most locations. Methods used for aquifer tubes and characterization data are specified separately, in the CTAQ and CTC fields, respectively, as described below. Aggregation methods for routine measurements for the datasets presented in this ECF are:

a. For chemical COIs:

- MEAN_ VALOR_ND_SRL: the average (mean) of all COI concentration values listed in the "STD_VALUE_RPTD" field of the HEIS database, taken during the period of interest and based on the data selection rules described earlier. Before proceeding with averaging, if the sample is flagged "non-detect," the value in the "STD_VALUE_RPTD" field is replaced with the value in the "STD_REPORTING_LIMIT" field, if it is not blank; otherwise, the value in the "STD_VALUE_RPTD" field is used.
- MAX_VALOR_ND_SRL: the maximum of all COI concentration values listed in the "STD_VALUE_RPTD" field of the HEIS database taken during the period of interest and based on the data selection rules described earlier. Before determining the maximum, if the sample is flagged "non-detect," the value in the "STD_VALUE_RPTD" field is replaced with the value in the "STD_ REPORTING_LIMIT," if it is not blank; otherwise the value in the "STD_VALUE_RPTD" field is used.

b. For radionuclides:

- MEAN_VALOR_ND_MDA: the average (mean) of all COI concentration values listed in the "STD_VALUE_RPTD" field of the HEIS database, taken during the period of interest and based on the data selection rules described earlier. If the sample is flagged "non-detect," the value in the "STD_VALUE_RPTD" field is replaced with the value in the "STD_MDA" field before averaging.
- MAX_ VALOR_ND_MDA: the maximum of all COI concentration values listed in the "STD_VALUE_RPTD" field of the HEIS database taken during the period of interest and based on the data selection rules described earlier. If the sample is flagged "non-detect," the value in the "STD_VALUE_RPTD" field is replaced with the value in the "STD_MDA" before determining the maximum.

6. CTAQ: parameter specifying which aggregation method to use for aquifer tube measurements. Available aggregation methods are the same as listed in the "CT" field as described above. If MAXAQ is "yes," then the aggregation method specified in CTAQ is applied to each aquifer tube, but only the maximum of the resulting values for each group is included in the interpolation input dataset.

3.3 Development of the Interpolation Input Datasets

The set of input files described in Section 3.1.2 were imported into an R workspace and saved as data tables in a R data file. All subsequent data processing was done automatically in the R workspace, using the systematic selection/aggregation procedure described below. The schematic flowchart in Figure 3-2 depicts the entire data selection process and input dataset development.

First, concentration data from the original query of the HEIS database were combined with the additional data described earlier to develop a master table including all COI concentration measurements taken at any measurement location for the three-year period between January 1, 2017, and December 31, 2019. Samples with the "R" qualifier in any HEIS qualifier field were removed from the concentrations table before further processing. Additional samples were also removed that were considered unrepresentative of the site groundwater conditions. These removed samples are described in detail in corresponding GIA specific sections of Chapter 6. After the appropriate samples were removed, the X-Y coordinates, measurement location type, and GIA assignments were appended to the concentration data by joining the

concentration data table to a *measurement locations and type* table using an SQL query within the R workspace.

An R script was then used to automatically generate one or more interpolation input data sets for each combination of GIA and COI. The mapping value at each location was determined based on the general and special data selection rules described earlier.

3.4 Data Transformations

Geostatistical interpolation (kriging) is described as a best linear unbiased estimator for spatially dependent variables: best in the sense that it is a minimum variance estimator; linear in the sense that the estimator is a linear combination of independent variables; and unbiased in the sense that the average error of the estimator is zero. However, for tailed or skewed data distributions and/or for nonstationary data (data for which the mean value is dependent on the location) – such as contaminant concentrations in groundwater – the contaminant distribution, the irregularity of the monitoring network and the skewedness of the dataset can result in extrapolation and unrealistic plume depictions when using OK interpolation of the raw sample data. To mitigate this common difficulty, the interpolation of parametric or nonparametric transformations of the raw sample data is commonplace (Journel and Deutsch, 1997, "Rank Order Geostatistics: A Proposal for a Unique Coding and Common Processing of Diverse Data"; Reed et al., 2004, "Spatial Interpolation Methods for Nonstationary Plume Data"). The most common categories of these methods are:

- Logarithmic transformation
- Rank transformation
- Indicator transformation

Data transformations were used for developing the COI distributions described in this ECF.
The appropriate transformation for each COI/GIA interpolation was selected collaboratively between CHPRC and S.S. Papadopulos and Associates, Inc. (SSP&A), such that the resulting interpolated plume reflected the origin, shape, and/or extent as defined on the basis of previous investigations. A description of each transformation is provided below:

- Log-transform kriging: A common form of kriging for environmental sampling data. The raw sample data are log-transformed, OK is undertaken on the log-transformed values, and the resulting interpolated grid is back-transformed to the original concentration units (Deutsch and Journel, 1992, *GSLIB: Geostatistical Software Library and User's Guide*; Journel and Deutsch, 1997; Reed et al., 2004).

- Quantile kriging (QK): A uniform-score rank transform is applied to the raw sample data, wherein the data are ranked in ascending order to define a cumulative distribution between zero and one. The values that are ascribed to each sampled location from the cumulative distribution are then interpolated to the grid using the OK technique, and subsequently back-transformed to the original concentration units (Deutsch and Journel, 1992; Journel and Deutsch, 1997; Reed et al., 2004). Journel and Deutsch (1997) first proposed rank-order geostatistics. Transforming the actual measured data values into standardized ranks - that is, sorting and ranking the data and then kriging the ranks - mitigates the requirement that the transformed data exhibit a Gaussian distribution. There are no specific requirements regarding the distribution of the transformed data: the standardized ranks actually follow a uniform distribution. QK is denoted as "RNK" in the list of interpolation inputs for each GIA/COI combination presented in Chapter 6.

- Multiple indicator kriging (MIK): The MIK approach used here can also be described as prescribed rank or prescribed category kriging for reasons described below (Cressie, 1993, *Statistics for Spatial Data*; Hohn, 1988, *Geostatistics and Petroleum Geology*). The sample data are evaluated and assigned indicators that correspond with concentration levels of interest, such as cleanup standards. For example, concentrations of interest when depicting chromium contamination include 10 µg/L, 20 µg/L, 48 µg/L and 100 µg/L. In this case, sample concentrations within each interval are transformed using a cumulative distribution function (CDF) to assign to each sample concentration a probability the given concentration will be exceeded. The sample data are transformed into cumulative probabilities using the CDF and interpolating using kriging, after which, the CDF is used to back-transform the result into concentration units.

Reed et al., (2004) provide a comparison of various interpolation methods, illustrating the advantages of geostatistical methods, as well as the relative benefit of transform kriging, and especially QK, over ordinary kriging, for less biased interpolation of nonstationary data characterized by preferential sampling and high skewness, such as concentration data.

The output of a single sample data interpolation exercise is a smoothly-varying, piecewise-continuous, grid of estimated concentration values that can be depicted using contours and/or color-flooding using appropriate concentration intervals. Review of the mapped contamination plumes by GIA scientists ensures that the resulting contaminant depictions comport with the conceptual model of historical plume migration and do not violate conditions or constraints imposed by the site operations or natural conditions. In some cases, observations and comments based on initial kriging estimates were used to alter inputs for subsequent kriging estimates. The final product provides an estimate of the concentration for each COI that utilizes a robust estimation technique and the input from CHPRC GIA project scientists.

3.5 Numerical Interpolation

Log-transform kriging, QK, and the variant of MIK used here are accomplished using the program QUANTILE (Attachment A-User Documentation [Documentation and Verification Package for QUANTILE, Version 1.20], which is based upon the U.S. Geological Survey kriging routines of Skrivan and Karlinger, 1980, *Semi-Variogram Estimation and Universal Kriging Program*. QUANTILE is programmed in Fortran 90/95 using a modular program structure. It has been developed to be independent of any specific computer platform, requiring simple ASCII input files and producing ASCII output files. QUANTILE incorporates routines to conduct the logarithmic, quantile, and categorical indicator data transforms, undertake OK of the transformed values, and complete the necessary back-transformations. QUANTILE undertakes spatial interpolation in 2D.

A detailed description of the input file structure and data required by QUANTILE is provided in the program documentation (SSP&A, 2014, *Quantile program*).

3.5.1 Variogram Parameters

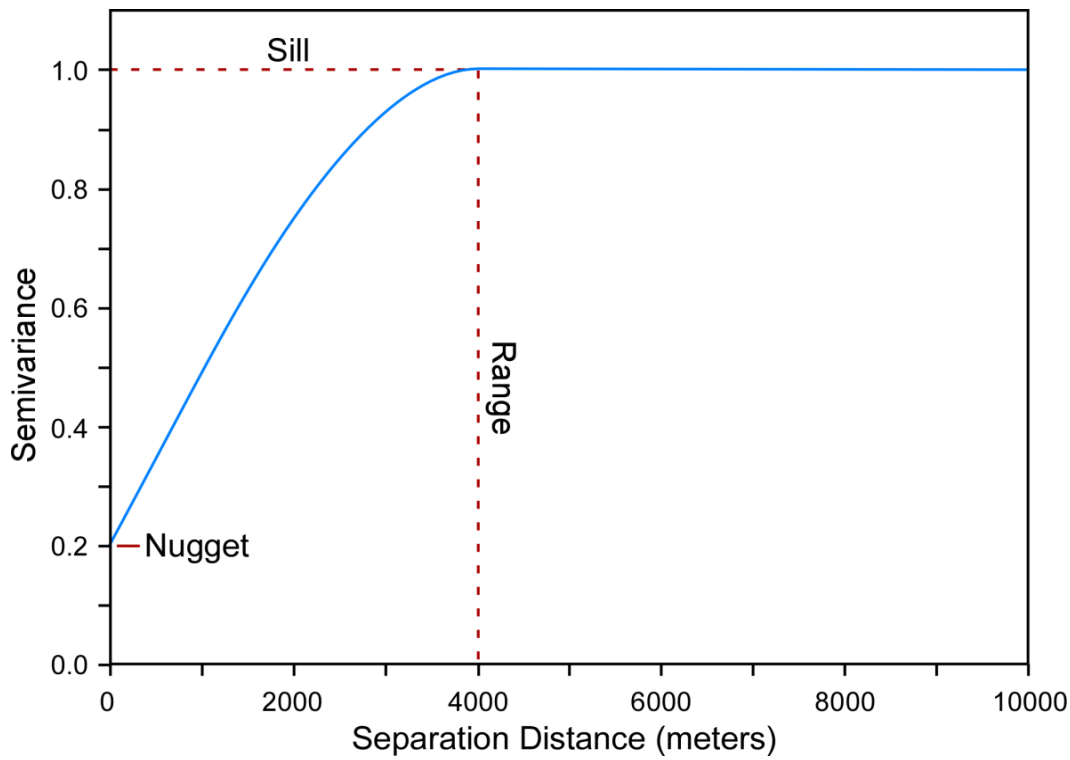
Qualitatively, the variogram (or, semi-variogram) is a descriptor of how the relationship between two values sampled from a random field changes with increasing separation distance of their sampled locations. Quantitatively, if the random field exhibits a constant mean, then the spatial relationship is described in terms of the variance of the difference between the sampled values at the two locations. Chilès and Delfiner, 1999, *Geostatistics: Modeling Spatial Uncertainty*, among others, provides detailed descriptions and examples of the types, construction and application of variograms.

The interpolation program used to create the plume maps in this ECF uses the variogram subroutines provided as part of the geostatistical library (GSLIB) (Deutsch and Journel, 1992). As a result, definition of the variogram structures used by the program follows the protocols detailed in the GSLIB user's guide.

Variograms are generally presented as one-dimensional curves that depict the theoretical (semi-) variance versus separation distance (h). Although nested variogram structures can be defined using the GSLIB protocols and subroutines, for purposes of the interpolation described in this ECF only single-structure variograms were used. A single-structure variogram used for purposes of 2D (i.e., single-layer) interpolation can be defined in terms of the following parameters (Figure 3-3):

- Sill – the value of the (semi-)variance at which the variogram levels off (i.e., in a single-structure variogram, this is equivalent to the total [semi-]variance).
- Range – the distance at which the semi-variogram reaches the sill value.
- Nugget – small scale variability that occurs within separate distances smaller than the typical sample spacing. The nugget typically incorporates measurement and/or sample support error(s).

The most common variogram structures – and those which are implemented within the GSLIB routines – are the (a) spherical (use actual range); (b) exponential (use practical range); (c) Gaussian (use practical range); (d) power law; and (e) hole effect variogram structures.



Source: Bohling, 2005, *Introduction to Geostatistics and Variogram Analysis*.

Figure 3-3. Schematic of a Modeled Semi-variogram

In the case that the relationship between the (semi-)variance and separation distance is the same in all directions, the variogram is isotropic. Often, however, the relationship is not isotropic. For example, when mapping groundwater contamination it is often the case that sampled values are more similar in the direction of groundwater flow (and, presumably, contaminant transport) than in the direction orthogonal to groundwater flow. In such cases, an anisotropic variogram can be defined by specifying a principal direction (angle; defined clockwise from north) and a range in that direction; and specifying a range in the secondary direction which is in most cases orthogonal to the principal direction. The ratio of the ranges in

the principal (maximum) and secondary (minimum) directions is referred to as the (horizontal) anisotropy.

For the purposes of developing plume depictions for CY2019, no experimental variograms were developed during that process. Instead, variogram models were developed in collaboration with the GIA project scientists to ensure that plume depictions comport with the conceptual model of historical plume migration.

This page intentionally left blank.

4 Assumptions and Inputs

The following sub-sections define the assumptions and inputs that were used for this work.

4.1 Assumptions and Limitations

Assumptions and limitations of the sample and supporting data that are used to form the inputs to the contaminant plume mapping are summarized below:

- The dataset used as input to the mapping procedure is representative of the extent of contamination in the aquifer for the corresponding COI and GIA. Other points were incorporated in the form of either (a) previous sampling results or (b) values that are considered as representative given the scale of the contaminant plume(s) and the rate(s) of migration of contamination over time.

Assumptions and limitations of the contaminant plume interpolation approaches that are used to prepare the plume maps are summarized below:

- With regard to the depicted lateral extents of contamination, the distribution of contaminants in groundwater is reasonably well represented by the qualified data used as inputs.
- In the absence of replicates (i.e., multiple values at one location) or small-scale variance, such as measurement errors, represented using a nugget, OK honors the sample data values at the sampled locations. However:
  - When interpolating to a grid for mapping purposes, this is not guaranteed.
  - Because the interpolation data set can include data over a period of up to three years, the resulting map does not necessarily represent an actual “instantaneous” condition within the aquifer, but rather provides a representative composite depiction.
- Studies by other investigators (e.g., Reed et al., 2004) suggest that use of OK together with data transformations, such as QK, produces robust interpolation results, which mitigate bias due to highly skewed data and/or variations in the spacing of measured data (i.e., data support). However, each of the logarithmic, uniform-score, and indicator transforms generally lead to median-unbiased estimators that may, depending on the true distribution of the data, underestimate the contaminant mass.
- Interpolation for different COIs within the same OU may be conducted using different variogram parameters. As mentioned earlier, no experimental variograms were developed during that process. Instead, variogram models were developed in collaboration with the project scientists to ensure that plume depictions comport with the conceptual model of historical plume migration. The interpolation procedure guarantees that development of plume depictions is traceable and repeatable, provided that input data and parameters remain unchanged.
- Plume area calculations are based on selection of grid cells exceeding concentration thresholds using spatial selection polygons and R-language scripts for cell aggregation. Reported plume areas reflect the accuracy and precision of this methodology, although other methods of calculating areas are available (e.g., ESRI’s area calculator in ArcMap) which may produce slightly different values. In all cases, calculated plume areas represent the estimated plume extents and interpolated distributions and should not be considered as absolute metrics of the actual contaminant distribution in the aquifer.

4.2 Inputs

On February 10, 2020, HEIS was queried for all groundwater constituent concentration measurements collected between October 7, 1951, and December 31, 2019, and the table of the database snapshot was saved in HEIS as GW_REPORT_CY2019_GWSR. This dataset included concentrations of chemical constituents and physical parameters in groundwater, measured across the Hanford Site in monitoring wells, injection wells, extraction wells, and aquifer tubes (4,482,640 records). These data were downloaded by SSP&A on February 10, 2020 in a Microsoft® Access® database.

In addition to the data pull from HEIS, the following complementary data were provided by CHPRC and used in the interpolation (some 2019 data were not yet available when the maps were created):

- U.S. Ecology wells in the 200 Area:
  - Calculated 2019 annual average values, used for the chromium, nitrate, tritium and trichloroethene plume depictions (S. Gowen, personal communication, December 9, 2019)
  - Calculated 2014 annual average values for selected wells, used for the iodine-129 depiction (M. Hartman, personal communication, February 7, 2017)
- Data collected by Energy Northwest: 2018 average tritium concentrations, as reported in Table B-11.1 of Energy Northwest, 2019, *2018 Annual Radiological Environmental Operating Report for the Columbia Generating Station.*
- Groundwater data from Framatome for 2018, used in 300-FF-5 for uranium and nitrate (Table 3 of Framatome, 2019, *2018 Annual Groundwater Report*).

Spatial coordinates, location type, and construction information for all chemical concentration measurement locations were queried from the HEIS database on February 10, 2020.

® Microsoft and Access are trademarks of the Microsoft Corporation in the United States and other countries.

5 Software Applications

Software for this calculation was used in accordance with applicable controlled software management requirements. The following programs are classified as “Support Software.”

5.1 QUANTILE

The QUANTILE program (SSP&A, 2014) was used to perform the spatial interpolation of sampled contaminant concentration data that is detailed in this calculation. QUANTILE is a Fortran program based upon the United States Geological Survey kriging routines of Skrivan and Karlinger (1980). QUANTILE incorporates routines to conduct the logarithmic, quantile and categorical data transforms, undertake OK of the transformed values, and complete the necessary back-transformations. Quantile also supports simple kriging of untransformed data values. QUANTILE is a program for spatial interpolation in 2D programmed in Fortran 90/95 using a modular program structure. It has been developed to be independent of any specific model platform, requiring simple ASCII input files and producing ASCII output files.

QUANTILE is identified as level D developed software, with the assigned Hanford Information Systems Inventory (HISI) Identification Number 3500, and has passed applicable acceptance tests.

The workstation type and property number from which software is run is SSP&A, FE407.

5.2 R

The R programming environment version 2.14.0 (The R Development Core Team, 2012; Ihaka and Gentleman, 1996, “R: A Language for Data Analysis and Graphics”) was used to perform a variety of data processing tasks including the tabulation and formatting of data in preparation for analysis using the software program QUANTILE.

The checker of this ECF tested the implementation of the scripts developed for the purposes of the calculations described herein and confirmed that all inputs and outputs are consistent with those presented in this document and associated electronic files.

5.3 GroundWater Desktop

The QUANTILE program was updated to support interpolations in three-dimensional (3D), and it was incorporated in commercially available software (SSP&A, 2017, *GroundWater Desktop: User Manual, Version 3.00*), hereafter called GroundWater Desktop (GWD). GWD allows for visualization of input data, variograms and interpolated plumes in 3D. GWD also supports 3D interpolation on regular or irregular grids and generates outputs in formats that can be directly used for numerical transport simulations. GWD was used for 3D kriging of carbon tetrachloride and chloroform in the 200 West area.

5.4 Statement of Valid Software Application

QUANTILE and R were used in a manner consistent with their intended use and are valid uses of these software for the problems addressed in this calculation.

This page intentionally left blank.

6 Calculation

Calculations were performed following the procedures described in Chapter 3. Calculations included the following steps:

- Data compilation and reduction.
- Assignment of data selection parameters.
- Execution of R workspace scripts to:
  - develop interpolation datasets in corresponding structured folders per COI
  - run batch processes to (a) interpolate datasets for each COI/GIA combination; and (b) aggregate resulting COI distributions to Sitewide mosaics (one per COI)
- Plume area calculations per COI

Details on the calculations under the first two steps and plume area calculations are provided below.

6.1 Development of Interpolation Datasets

Data were compiled and reduced as follows:

1. Chemical concentrations in groundwater:
   a. A subset was extracted from the original HEIS query, containing only COI concentration measurements for the 3-year period between January 1, 2017, and December 31, 2019 (87,9943 records). This subset was saved as the database text file “tbl_GW_Data.csv” (Table A-1). This table is available in electronic format only and a hard copy is not included in this ECF, due to size restrictions. Two additional fields were added to the table, titled “sspaQUAL” and “sspaQUAL_NOTE,” to indicate samples removed from the concentration dataset prior to processing that were not considered representative of 2019 plume conditions based on input from the GIA project scientist, and the reason for removal was recorded. These samples are discussed in detail in the GIA specific section(s) later in this chapter.
   b. COI concentrations (individual data points) excluded from the original HEIS query per input from the project scientist (14 records, Table A-2). This information is included in Table A-1 and it is extracted in a separate table, Table A-2, to facilitate easier review of the excluded data.
2. Measurement locations and type: The tabulated spatial coordinates, location type, and construction information for the measurement locations were saved as the database text file “tbl_WellInfo_ForMaps.csv” (Table A-3). Two additional fields were added to this table: the aquifer tube group, and the list of GIAs for which each measurement location should be considered in the interpolation. These fields are described below:
   a. AQT_GROUPID: Aquifer tube groups were assigned using a geographic information systems analysis. The aquifer tube locations were plotted on a map, and groups were assigned based on the location and relative proximity of the tubes. If a location was not an aquifer tube, or if an aquifer tube was not determined to be part of a group, then this field was left blank.

b. sspaMAPOU: A geographic information systems analysis was performed again in 2020 for the purposes of plume mapping for CY2019, to determine the set of locations to be used for interpolation input dataset(s) for each GIA. The set of locations selected for a GIA included locations within and, in many cases, outside the GIA boundary, ensuring continuity in the depiction of plumes extending in multiple GIAs. This field lists one or more GIAs for each measurement location used in any interpolation input dataset.

   Note: Table A-3 is available in electronic format only and a hard copy is not included in this ECF due to size restrictions.

3. List of monitoring locations to exclude: selected measurement locations were excluded from the mapping datasets based on input from the GIA project scientist(s), reflecting erroneous measurements or measurements not representative of site conditions. Excluded data points are saved in the database table "tbl_RemoveData.csv" (Table A-4). Excluded data points are discussed in detail in the GIA specific sections of this chapter. In addition, a few data exclusions based on decisions made in the 2018 plume-mapping interpolation, were maintained in the 2019 excluded data-point list. Details on these excluded data are also provided in Table A-4.

4. Other data: supplemental measured data points and/or other data were included to reflect known conditions at the site as discussed in Section 3.1.1. These points are included in the interpolation input datasets based on input from the GIA project scientists and are saved as the database table "tbl_SoftData.csv" (Table A-5). These data points are discussed in detail in the GIA specific sections of Chapter 6.

5. Data selection parameters: data selection and aggregation parameters vary by GIA/COI, as discussed in the presentation of the general and special data selection rules earlier in this ECF. These parameters are listed by GIA and COI in the database table "IN_OUCOC_list.csv" (Table A-6). The data selection parameters file is introduced in Section 3.2.3 and the specific parameters selected for each GIA/COI are described in detail in the GIA specific subsections of Section 6.2.

6.2 Plume Mapping by Interest Area

The data selection process and interpolation details for each COI/GIA combination are provided in the following sections.

6.2.1 100-BC-5

The list of COIs and data selection parameters is provided in Table 6-1. All wells are sampled in the fall, and only a few are sampled at other times. Limiting sampling to a specific season provides a more consistent data set.

Kriging interpolation parameters, along with the name of the corresponding QUANTILE input file(s) and figures, are provided in Table 6-2. The QUANTILE input datasets are provided in Appendix B.

Table 6-1. COIs and Data Selection Parameters for 100-BC-5

Operable Unit	Contaminant of Interest	DORS	High River Stage	Low River Stage	COMB CHROM	MAX AQ	CT	CTAQ	CTC
100-BC-5	Hexavalent chromium; Chromium	Hexavalent chromium; Chromium	N/A	8/1/2019 - 12/31/2019	y	y	MEAN VALOR ND SRL	MEAN VALOR ND SRL	MAX VALOR ND SRL
100-BC-5	Nitrate	Nitrate	N/A	8/1/2019 - 12/31/2019	--	y	MEAN VALOR ND SRL	MEAN VALOR ND SRL	MAX VALOR ND SRL
100-BC-5	Strontium-90	Strontium-90	N/A	8/1/2019 - 12/31/2019	--	y	MEAN VALOR ND MDA	MEAN VALOR ND MDA	MAX VALOR ND MDA
100-BC-5	Trichloroethene	Trichloroethene	N/A	8/1/2019 - 12/31/2019	--	y	MEAN VALOR ND SRL	MEAN VALOR ND SRL	MAX VALOR ND SRL
100-BC-5	Tritium	Tritium	N/A	8/1/2019 - 12/31/2019	--	y	MEAN VALOR ND MDA	MEAN VALOR ND MDA	MAX VALOR ND MDA

N/A = not applicable

Table 6-2. COIs and Interpolation Parameters for 100-BC-5

Contaminant of Interest	Kriging Type	Minimum Range (m)	Maximum Range (m)	Angle (degrees from north)	File Name	Figure
Chromium Low river stage	MIK	700	900	40	100-BC-5_ChromComb_LO.dat	Figure C-1
Nitrate Low river stage	RNK	1,200	1,500	0	100-BC-5_Nitrate_LO.dat	Map not developed as interpolation of the corresponding datasets did not result in concentration distributions above the applicable standards
Strontium-90 Low river stage	RNK	1,200	1,500	0	100-BC-5_Strontium-90_LO.dat	Figure C-2
Trichloroethene Low river stage	RNK	350	700	300	100-BC-5_Trichloroethene_LO.dat	Map not developed as interpolation of the corresponding datasets did not result in concentration distributions above the applicable standards
Tritium Low river stage	MIK	1,200	1,600	15	100-BC-5_Tritium_LO.dat	Map not developed as interpolation of the corresponding datasets did not result in concentration distributions above the applicable standards

MIK = multiple indicator kriging

RNK = quantile kriging

Nitrate and tritium maps were not developed as interpolation of the corresponding datasets did not result in concentration distributions above the applicable standards (45 mg/L for nitrate and 20,000 pCi/L for tritium). A trichloroethene map was not developed because only one well had a concentration above the applicable standard of 5 μg/L.

Two wells were excluded from all 100-BC-5 interpolation input files because their screened intervals were outside the aquifer zone of interest. All excluded wells are listed in Appendix A, Table A-4.

Four Type 2 data points were added to all 100-BC-5 interpolation input files as a geologic control points to represent boundary where basalt is present above the water table. All added data are listed in Appendix A, Table A-5.

For all COIs, concentration data were pre-processed according to the special data selection procedure outlined for 100-BC-5 in Section 3.2.2 and Figure 3-2. Special data selection rules were used because the majority of the data were collected during the low river-stage period, 8/1/2019 to 12/31/2019.

6.2.1.1 Chromium

Chromium was mapped using a single kriging grid covering the entire GIA (Figure C-1). The map represents conditions during the low river-stage period, 8/1/2019 to 12/31/2019.

For aquifer tubes and wells, the mean concentration measured during the low river-stage period was used for the interpolation input files. If a well was not sampled during the low river-stage period, then the annual average for CY2019 was used. If an aquifer tube was not measured during the low river-stage period, it was excluded. The data selection process continued according to the general logic outlined in Section 3.2.1 and Figure 3-2. The final interpolation input dataset is provided in Appendix B.

Two Type 2 data points were added based on input from the GIA project scientist, to represent expected concentrations in an inferred paleochannel and boundary where basalt is present above the water table. Another two Type 3 data points were added (Appendix A, Table A-5).

Ten additional wells were excluded from the chromium 100-BC-5 interpolation input files. Eight were excluded because their screened intervals were in the lower unconfined aquifer, and two wells were excluded because their concentrations were lower than surrounding wells. All excluded data are listed in Appendix A, Table A-4.

6.2.1.2 Nitrate

Nitrate datasets were prepared, and interpolation was set up using a single kriging grid covering the entire GIA. The dataset represents conditions during the low river-stage period, 8/1/2019 to 12/31/2019. The special data selection procedure detailed in Section 3.2.2 and Figure 3-2 was followed.

For aquifer tubes and wells, the mean concentration measured during the low river-stage period was used for the interpolation input files. If a well was not sampled during the low river-stage period, then the annual average for CY2019 was used. If an aquifer tube was not measured during the low river-stage period, it was excluded. The data selection process then continued according to the general data selection rules outlined in Section 3.2.1 and Figure 3-2. The final interpolation input dataset is provided in Appendix B.

A nitrate map in 100-BC-5 was not developed as interpolation of the corresponding dataset did not result in a concentration distribution above the applicable standard.

6.2.1.3 Strontium-90

Strontium-90 was mapped using a single kriging grid covering the entire GIA (Figure C-2). The map represents conditions during the low river-stage period, 8/1/2019 to 12/31/2019. The special data selection procedure detailed in Section 3.2.2 and Figure 3-2 was followed.

For aquifer tubes and wells, the mean concentration measured during the low river-stage period was used for the interpolation input files. If a well was not sampled during the low river-stage period, then the annual average for CY2019 was used. If an aquifer tube was not measured during the low river-stage period, it was excluded. The data selection process then continued according to the general data selection rules outlined in Section 3.2.1 and Figure 3-2. The final interpolation input dataset is provided in Appendix B.

Two Type 3 data points were added to constrain western and eastern extents of the plume. Aquifer tube C6235 was not sampled and the value from CY2016 plume mapping for aquifer tube group 130 was used, comprising data from aquifer tubes C6233, C6234, C6235, and C8856. Well 199-B3-50 has not been sampled after 2015 and the MDA value from the most recent sample was used (Appendix A, Table A-5).

Four wells were excluded from strontium-90 interpolation input files because their screened intervals were in the lower unconfined aquifer. Additionally, one well was excluded because concentrations were higher in surrounding wells (Appendix A, Table A-4).

The August 2019 sample from well C7725 was excluded by the GIA project scientist as suspect (Appendix A, Table A-2)

6.2.1.4 Trichloroethene

Trichloroethene datasets were prepared and interpolation was set up using a single kriging grid covering the entire GIA. The dataset represents conditions during the low river-stage period, 8/1/2019 to 12/31/2019. The special data selection procedure detailed in Section 3.2.2 and Figure 3-2 was followed.

For aquifer tubes and wells, the mean concentration measured during the low river-stage period was used for the interpolation input files. If a well was not sampled during the low river-stage period, then the annual average for CY2019 was used. If an aquifer tube was not measured during the low river-stage period, it was excluded. The data selection process then continued according to the general data selection rules outlined in Section 3.2.1 and Figure 3-2. The final interpolation input dataset is provided in Appendix B.

Only one well (199-B5-11) had a concentration above the applicable standard, so a trichloroethene map for 100-BC-5 was not developed.

6.2.1.5 Tritium

Tritium datasets were prepared, and interpolation was set up using a single kriging grid covering the entire GIA. The dataset represents conditions during the low river-stage period, 8/1/2019 to 12/31/2019. The special data selection procedure detailed in Section 3.2.2 and Figure 3-2 was followed.

For aquifer tubes and wells, the mean concentration measured during the low river-stage period was used for the interpolation input files. If a well was not sampled during the low river-stage period, then the annual average for CY2019 was used. If an aquifer tube was not measured during the low river-stage period, it was excluded. The data selection process then continued according to the general data selection rules outlined in Section 3.2.1 and Figure 3-2. The final interpolation input dataset is provided in Appendix B.

Three wells were excluded from the tritium interpolation input files because their screened intervals were in the lower unconfined aquifer and tritium concentrations were higher in adjacent shallow wells (Appendix A, Table A-4).

A tritium map for 100-BC-5 was not developed as interpolation of the dataset did not result in a distribution above the applicable standard.

6.2.2 100-FR-3

The list of COIs and data selection parameters is provided in Table 6-3. All wells are sampled in the fall, and only a few are sampled at other times. Limiting sampling to a specific season provides a more consistent data set.

Kriging interpolation parameters, along with the name of the corresponding QUANTILE input file(s) and figures, are provided in Table 6-4. The QUANTILE input datasets are provided in Appendix B.

Table 6-3. COIs and Data Selection Parameters for 100-FR-3

Operable Unit	Contaminant of Interest	DORS	High River Stage	Low River Stage	COMB CHROM	MAX AQ	CT	CTAQ	CTC
100-FR-3	Hexavalent chromium; Chromium	Hexavalent chromium; Chromium	N/A	8/1/2019 - 12/31/2019	y	y	MEAN VALOR ND SRL	MEAN VALOR ND SRL	MAX VALOR ND SRL
100-FR-699-71-34 (Separate plume in vicinity of 699-71-34)	Hexavalent chromium; Chromium	Hexavalent chromium; Chromium	N/A	8/1/2019 - 12/31/2019	y	y	MEAN VALOR ND SRL	MEAN VALOR ND SRL	MAX VALOR ND SRL
100-FR-3	Nitrate	Nitrate	N/A	8/1/2019 - 12/31/2019	--	y	MEAN VALOR ND SRL	MEAN VALOR ND SRL	MAX VALOR ND SRL
100-FR-3	Strontium-90	Strontium-90	N/A	8/1/2019 - 12/31/2019	--	y	MEAN VALOR ND MDA	MEAN VALOR ND MDA	MAX VALOR ND MDA
100-FR-3	Trichloroethene	Trichloroethene	N/A	8/1/2019 - 12/31/2019	--	y	MEAN VALOR ND SRL	MEAN VALOR ND SRL	MAX VALOR ND SRL

N/A = not applicable

Table 6-4. COIs and Interpolation Parameters for 100-FR-3

Contaminant of Interest	Kriging Type	Minimum Range	Maximum Range	Angle	File Name	Figure
Chromium (Main Area) Low river stage	MIK	500	1,000	45	100-FR-3_ChromComb_LO.dat	Figure C-3
Chromium (around 699-71-34) Low river stage	RNK	200	300	135	100-FR-699-71-34_ChromComb_LO.dat	Figure C-3
Nitrate Low river stage	MIK	2,000	3,500	-50	100-FR-3_Nitrate_LO.dat	Figure C-4
Strontium-90 Low river stage	MIK	400	400	45	100-FR-3_Strontium-90_LO.dat	Figure C-5
Trichloroethene Low river stage	MIK	1,000	1,000	70	100-FR-3_Trichloroethene_LO.dat	Figure C-6

MIK = multiple indicator kriging
RNK = quantile kriging

Five wells were excluded from all 100-FR-3 interpolation input files because their screened intervals were outside the aquifer zone of interest. (Appendix A, Table A-4).

6.2.2.1 Chromium

Chromium was mapped using two kriging grids: a separate grid to map chromium in the vicinity of well 699-71-34, inland of the mud outcrop, and a grid for the remaining GIA (Figure C-3). The map represents conditions during the low river-stage period, 8/1/2019 to 12/31/2019. The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed.

For aquifer tubes and wells, the mean concentration measured during the low river-stage period was used in the interpolation input files. If a monitoring location was not sampled during the low river-stage period, then the annual average from the most recent measurement year was used. The data selection process continued according to the general logic outlined in Section 3.2.1 and Figure 3-2. The final interpolation input dataset is provided in Appendix B.

6.2.2.2 Nitrate

Nitrate was mapped using a single kriging grid covering the entire GIA (Figure C-4). The map represents conditions during the low river-stage period, 8/1/2019 to 12/31/2019. The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed.

For aquifer tubes and wells, the mean concentration measured during the low river-stage period was used in the interpolation input files. If a monitoring location was not sampled during the low river-stage period, then the annual average from the most recent measurement year was used. The data selection process continued according to the general logic outlined in Section 3.2.1 and Figure 3-2. The final interpolation input dataset is provided in Appendix B.

Three Type 2 data points were added based on input from the GIA project scientist, to constrain plume extents in the mud and three Type 3 data points to assist in smoother plume delineation (Appendix A, Table A-5).

6.2.2.3 Strontium-90

Strontium-90 was mapped using a single kriging grid covering the entire GIA (Figure C-5). The map represents conditions during the low river-stage period, 8/1/2019 to 12/31/2019. The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed.

For aquifer tubes and wells, the mean concentration measured during the low river-stage period was used in the interpolation input files. If a monitoring location was not sampled during the low river-stage period, then the annual average from the most recent measurement year was used. The data selection process continued according to the general logic outlined in Section 3.2.1 and Figure 3-2. The final interpolation input dataset is provided in Appendix B.

One Type 3 data point was added to control plume extent based on input from the GIA project scientist (Appendix A, Table A-5).

6.2.2.4 Trichloroethene

Trichloroethene was mapped using a single kriging grid covering the entire GIA (Figure C-6). The map represents conditions during the low river-stage period, 8/1/2019 to 12/31/2019. The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed.

For aquifer tubes and wells, the mean concentration measured during the low river-stage period was used in the interpolation input files. If a monitoring location was not sampled during the low river-stage period,

then the annual average from the most recent measurement year was used. The data selection process continued according to the general logic outlined in Section 3.2.1 and Figure 3-2. The final interpolation input dataset is provided in Appendix B.

Two Type 3 data point were added to control plume extent based on input from the GIA project scientist (Appendix A, Table A-5).

One well was excluded because concentrations were higher in adjacent well (Appendix A, Table A-4). One additional well was excluded because concentrations were higher in adjacent well (Appendix A, Table A-2).

6.2.3 100-HR-3

The list of COIs and data selection parameters is provided in Table 6-5.

Kriging interpolation parameters, along with the name of the corresponding QUANTILE input file(s) and figures, are provided in Table 6-6. The QUANTILE input datasets are provided in Appendix B.

Table 6-5. COIs and Data Selection Parameters for 100-HR-3

Operable Unit	Contaminant of Interest	DORS	High River Stage	Low River Stage	COMB CHROM	MAX AQ	CT	CTAQ	CTC
100-HR-3	Hexavalent chromium; Chromium	Hexavalent chromium; Chromium	4/1/2019 - 7/15/2019	8/1/2019 - 12/31/2019	y	y	MEAN VALOR ND SRL	MEAN VALOR ND SRL	MAX VALOR ND SRL
100-HR-3	Hexavalent chromium; Chromium In RUM	Hexavalent chromium; Chromium			y	y	MAX VALOR ND SRL	MAX VALOR ND SRL	MAX VALOR ND SRL
100-HR-3	Nitrate	--	--	--	--	y	MEAN VALOR ND SRL	MAX VALOR ND SRL	MAX VALOR ND SRL
100-HR-3	Strontium-90	--	--	--	--	y	MEAN VALOR ND MDA	MAX VALOR ND MDA	MAX VALOR ND MDA
100-HR-3	Tritium	--	--	--	--	y	MEAN VALOR ND MDA	MAX VALOR ND MDA	MAX VALOR ND MDA
100-HR-3	Uranium	--	--	--	--	y	MEAN VALOR ND SRL	MAX VALOR ND SRL	MAX VALOR ND SRL

RUM = Ringold upper mud

Table 6-6. COIs and Interpolation Parameters for 100-HR-3

Contaminant of Interest	Kriging Type	Minimum Range	Maximum Range	Angle	File Name	Figure
Chromium High river stage 100-D area	MIK	2,000	2,000	0	100-HR-3-D_ChromComb_HI.dat	Figure C-7
Chromium High river stage 100-H area	MIK	1,000	1,300	90	100-HR-3-H_ChromComb_HI.dat	Figure C-8
Chromium Low river stage 100-D area	MIK	2,150	2,150	-40	100-HR-3-D_ChromComb_LO.dat	Figure C-9
Chromium Low river stage 100-H area	MIK	1,000	1,300	80	100-HR-3-H_ChromComb_LO.dat	Figure C-10
Chromium in RUM Western Plume	MIK	1,200	1,500	-120	100-HR-3_ChromComb_WEST.dat	Figure C-11
Chromium in RUM Eastern Plume	MIK	2,500	3,000	-40	100-HR-3_ChromComb_EAST.dat	Figure C-11
Groundwater levels in RUM						Figure C-12
Nitrate	MIK	800	1,000	310	100-HR-3_Nitrate.dat	Figure C-13 and C-14
Strontium-90	MIK	600	800	100	100-HR-3_Strontium-90.dat	Figure C-15 and C-16
Tritium	MIK	1,000	1,000	0	100-HR-3_Tritium.dat	Map not developed as interpolation of the dataset did not result in a distribution above the applicable standard
Uranium 100-D area	MIK	2,000	2,000	-40	100-HR-3-D_Uranium.dat	Map not developed as interpolation of the dataset did not result in a distribution above the applicable standard

Table 6-6. COIs and Interpolation Parameters for 100-HR-3

Contaminant of Interest	Kriging Type	Minimum Range	Maximum Range	Angle	File Name	Figure
Uranium 100-H area	MIK	1,000	1,300	80	100-HR-3-H_Uranium.dat	Map not developed as interpolation of the dataset did not result in a distribution above the applicable standard

MIK = multiple indicator kriging

RUM = Ringold upper mud

Tritium and uranium maps were not developed as interpolation of the dataset did not result in a distribution above the applicable standard, except for uranium in well 199-H4-84.

Several wells were excluded from all 100-HR-3 interpolation input files because their screened intervals were outside the aquifer zone of interest (Appendix A, Table A-4).

6.2.3.1 Chromium

Chromium maps were developed considering two separate areas, roughly corresponding to 100-D (Figure C-7 for high river stage and Figure C-9 for low river stage) and Horn/100-H (Figure C-8 for high river stage and Figure C-10 for low river stage), respectively, using a fine interpolation grid in each area.

The 100-HR-3 chromium concentration data were pre-processed according to the special data selection procedure outlined in Section 3.2.2 and Figure 3-2. Special data selection rules were used given that measurements taken in 2019 provided adequate spatial coverage across the GIA. Review of specific conductance data also suggested that variations in chromium concentration occur in response to annual fluctuations in the Columbia River stage. Therefore, two chromium plume maps were generated, one representing conditions during the high river-stage period (4/1/2019 to 7/15/2019) and another representing conditions during the low river-stage period (8/1/2019 to 12/31/2019).

First, all measurements taken prior to CY2019 were excluded. Then, two datasets were generated, representing the high river-stage period, from 4/1/2019 to 7/15/2019, and the low river-stage period, from 8/1/2019 to 12/31/2019, respectively.

For the high river-stage period (4/1/2019 to 7/15/2019): For aquifer tubes and wells, the mean concentration measured during the high river-stage period was used for the interpolation input files. If a well was not sampled during the high river-stage period, then the annual average for CY2019 was used. If an aquifer tube was not measured during the high river-stage period, but was measured during the low river-stage period, then the low river-stage mean concentration was included in the high river-stage input files. If an aquifer tube was not measured during either the high or low river-stage periods, it was excluded. The data selection process then continued according to the general data selection rules outlined in Section 3.2.1 and Figure 3-2.

For the low river-stage period (8/1/2019-12/31/2019): For aquifer tubes and wells, the mean concentration measured during the low river-stage period was used for the interpolation input files. If a well was not sampled during the low river-stage period, then the annual average for CY2019 was used. If an aquifer tube was not measured during the low river-stage period, it was excluded. The data selection process then continued according to the general data selection rules outlined in Section 3.2.1 and Figure 3-2. The final interpolation input dataset is provided in Appendix B.

For both the high and low river-stage maps, Type 1 data points representing average P&T system effluent concentrations were added at the locations of the 100-HR-3 area injection. One Type 1 data point was added for high river stage at well 199-H4-74, using the 2018 value. One Type 3 data point for high and low river-stage conditions was added based on input from the GIA project scientist (Appendix A, Table A-5). For chromium samples flagged as non-detects with a negative standard value reported, the reported value was replaced with 1 μg/L and the mean value for high and low river-stage periods was calculated and added to the dataset (Appendix A, Table A-5).

In addition to the plumes for the unconfined aquifer, a chromium map was developed for the Ringold upper mud (RUM). Two separate grids were used to develop corresponding plumes in the Horn and around 100-H, respectively. Special data selection rules were applied to provide an interpretation of chromium distribution in the RUM based on the most recent data available, including newly installed

wells. All measurements taken before CY2019 were excluded. Then, the data selection progressed according to the general data selection rules outlined in Section 3.2.1 and Figure 3-2, using only maximum CY2019 data. One Type 3 datapoint was used in the interpolation to bound plume extents southeast of 100-H, without impacting the conceptual model for chromium distribution in that area. The final interpolation input dataset is provided in Appendix B and the plume map is shown in Figure C-11. As shown on this map, dashed lines are used to indicate areas where there is uncertainty in the conceptual site model (CSM) of the RUM aquifer, as the number of monitoring locations is not sufficient for definitive plume delineation and therefore plume extents are uncertain. Planned installation of new monitoring wells will enhance understanding of the spatial distribution of Cr(VI) in the RUM and the CSM of the RUM aquifer will be further updated.

A map of groundwater elevations in the RUM (Figure C-12) was also developed, based on monitoring data in RUM wells in May 2019. Calculations are documented in a separate ECF.

6.2.3.2 Nitrate

Nitrate was mapped using a single kriging grid covering the entire GIA (Figure C-13 for 100-HR-3-D and C-14 for 100-HR-3-H). Nitrate concentrations in 100-HR-3-D are well below the standard and, therefore, the depiction in Figure C-13 illustrates only the location of the datapoints. The 100-HR-3 data were pre-processed according to the special data selection procedure outlined in Section 3.2.2 and Figure 3-2. Special data selection rules were applied because measurements taken in 2019 provided adequate spatial coverage across the GIA. All measurements taken before CY2019 were excluded. Then, the data selection progressed according to the general data selection rules outlined in Section 3.2.1 and Figure 3-2, using only CY2019 data. The final interpolation input dataset is provided in Appendix B.

Type 1 data points representing average P&T system effluent concentrations were added at the locations of the 100-HR-3 area injection wells. (Appendix A, Table A-5).

6.2.3.3 Strontium-90

Strontium-90 was mapped using a single kriging grid covering the entire GIA (Figure C-15 for 100-HR-3-D and C-16 for 100-HR-3-H). The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. The final interpolation input dataset is provided in Appendix B.

Type 1 data points representing average P&T system effluent concentrations were added at the locations of the 100-HR-3 area injection wells (Appendix A, Table A-5).

6.2.3.4 Tritium

Tritium datasets were prepared, and interpolation was set up using a single kriging grid covering the entire GIA. The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. The final interpolation input dataset is provided in Appendix B.

Type 1 data points representing average P&T system effluent concentrations were added at the locations of the 100-HR-3 area injection wells (Appendix A, Table A-5).

A tritium map in 100-HR-3 was not developed, as interpolation of the dataset did not result in a distribution above the applicable standard.

6.2.3.5 Uranium

Uranium datasets were prepared, and interpolation was set up using two kriging grids covering two separate areas, roughly corresponding to 100-D and the Horn/100-H, respectively, using a fine interpolation grid in each area.

The 100-HR-3 uranium concentration data were pre-processed according to the general data selection process detailed in Section 3.2.1 and Figure 3-2. Datasets were generated for annual average concentrations.

Type 1 data points representing average P&T system effluent concentrations were added at the locations of the 100-HR-3 area injection wells (Appendix A, Table A-5).

Uranium maps in 100-HR-3 were not developed, as interpolation of the dataset did not result in a distribution above the applicable standard except for well 199-H4-84.

6.2.4 100-KR-4

The list of COIs and data selection parameters is provided in Table 6-7.

Kriging interpolation parameters, along with the name of the corresponding QUANTILE input file(s) and figures, are provided in Table 6-8. The QUANTILE input datasets are provided in Appendix B.

Table 6-7. COIs and Data Selection Parameters for 100-KR-4

Operable Unit	Contaminant of Interest	DORS	High River Stage	Low River Stage	COMB CHROM	MAX AQ	CT	CTAQ	CTC
100-KR-4	Carbon-14	--	--	--	--	y	MEAN VALOR ND MDA	MAX VALOR ND MDA	MAX VALOR ND MDA
100-KR-4	Hexavalent chromium; Chromium	Hexavalent chromium; Chromium	4/1/2019 - 7/15/2019	8/1/2019 - 12/31/2019	y	y	MEAN VALOR ND SRL	MEAN VALOR ND SRL	MAX VALOR ND SRL
100-KR-4	Nitrate	--	--	--	--	y	MEAN VALOR ND SRL	MAX VALOR ND SRL	MAX VALOR ND SRL
100-KR-4	Strontium-90	--	--	--	--	y	MEAN VALOR ND MDA	MAX VALOR ND MDA	MAX VALOR ND MDA
100-KR-4	Tritium	--	--	--	--	y	MEAN VALOR ND MDA	MAX VALOR ND MDA	MAX VALOR ND MDA
100-MAX-KR-4	Trichloroethene	--	--	--	--	y	MAX VALOR ND SRL	MAX VALOR ND SRL	MAX VALOR ND SRL
100-KW	Carbon-14	--	--	--	--	y	MEAN VALOR ND MDA	MAX VALOR ND MDA	MAX VALOR ND MDA
100-KW	Hexavalent chromium; Chromium	Hexavalent chromium; Chromium	4/1/2019- 7/15/2019	8/1/2019 - 12/31/2019	y	y	MEAN VALOR ND SRL	MEAN VALOR ND SRL	MAX VALOR ND SRL
100-KW	Strontium-90	--	--	--	--	y	MEAN VALOR ND MDA	MAX VALOR ND MDA	MAX VALOR ND MDA

Table 6-7. COIs and Data Selection Parameters for 100-KR-4

Operable Unit	Contaminant of Interest	DORS	High River Stage	Low River Stage	COMB CHROM	MAX AQ	CT	CTAQ	CTC
100-KW	Tritium	--	--	--	--	y	MEAN VALOR ND MDA	MAX VALOR ND MDA	MAX VALOR ND MDA
100-NR-2	Hexavalent chromium; Chromium				y	y	MEAN VAL OR ND SRL	MAX VAL OR ND SRL	MAX VAL OR ND SRL

Table 6-8. COIs and Interpolation Parameters for 100-KR-4

Contaminant of Interest	Kriging Type	Minimum Range (m)	Maximum Range (m)	Angle (degrees)	File Name	Figure
Carbon-14	MIK	180	200	300	100-KR-4_Carbon_14.dat	Figure C-17
Chromium High river stage K-North Area	MIK	650	1,170	345	100_KR-4_KN_ChromComb_HI.dat	Figure C-18
Chromium High river stage K-East Area	MIK	650	1,000	300	100_KR-4_KE_ChromComb_HI.dat	Figure C-18
Chromium Low river stage K-North Area	MIK	650	1,170	-16	100_KR-4_KN_ChromComb_LO.dat	Figure C-19
Chromium Low river stage K-East Area	MIK	670	1,000	-55	100_KR-4_KE_ChromComb_LO.dat	Figure C-19

Table 6-8. COIs and Interpolation Parameters for 100-KR-4

Contaminant of Interest	Kriging Type	Minimum Range (m)	Maximum Range (m)	Angle (degrees)	File Name	Figure
Nitrate	MIK	350	700	310	100-KR-4_Nitrate.dat	Figure C-21
Strontium-90 K-North Area	MIK	400	600	335	100_KR-4_KN_Strontium-90.dat	Figure C-22
Strontium-90 K-East Area	MIK	350	700	300	100_KR-4_KE_Strontium-90.dat	Figure C-22
Trichloroethene Annual Maximum	MIK	350	700	330	100-MAX-KR-4_Trichloroethene.dat	Figure C-23
Tritium	MIK	350	700	300	100-KR-4_Tritium.dat	Figure C-24
Chromium NR-2	MIK	650	1170	-16	100-NR-2_ChromComb.dat	Figure C-20

MIK = multiple indicator kriging

Four wells were excluded from all 100-KR-4 interpolation input files because their screened intervals were outside the aquifer zone of interest (Appendix A, Table A-4).

6.2.4.1 Migrated Data Points in the 100-KR-4 Area

A migrated data point was used in 2019 for mapping the carbon-14 plume. The historical location of measured high concentration carbon-14 is immediately downgradient of the reactor gas dryer condensate cribs, known release points for carbon-14 contaminated wastewater. The historical high-valued sample of carbon-14 that was included in the migration calculations is provided in Table 6-9.

Table 6-9. Historic High Carbon-14 Samples

Well Name	Northing (m)	Easting (m)	Concentration (pCi/L)	Contaminant of Interest	Sample Date
199-K-30	146781	569238	23,000	Carbon-14	6/3/1993

Parameters used in past for the migration calculations are tabulated in Table 6-10.

Table 6-10. Parameters Used in Interpolation-Migration Calculations

Parameter[a]	Carbon-14	Unit(s)
Hydraulic conductivity	8	m/d
Hydraulic gradient (magnitude)	0.00292[b], 0.005[c]	--
Hydraulic gradient (azimuth)	350	--
Mobile porosity	0.18	--
Distribution coefficient	0.0018	m^3/kg
Bulk density	1900	kg/m^3
Retardation rate	20.0	--
Half life	5730	Years
Half life	2,092,883	Days
Rate of decay	3.31E-07	1/day

a. Parameters are based upon those presented in ECF-200P01-09-2352, *200-PO-1 Remedial Investigation Report – Near-Field Groundwater Contaminant Fate and Transport Modeling* (Rev. 0); ECF-100KR4-11-0113, *Modeling of RI/FS Design Alternatives for 100-KR-4* (Rev. 3); ECF-100KR2-12-0021, *Modeling Evaluation of Waste Sites Near 100-KE Reactor*; SGW-46279, *Conceptual Framework and Numerical Implementation of 100 Areas Groundwater Flow and Transport Model* (Rev. 3).

b. Prior to KW pump and treat remedy

c. Following commencement of KW pump and treat remedy

As detailed in ECF-Hanford-16-0061, *Calculation and Depiction of Groundwater Contamination for the Calendar Year 2015 Hanford Site Groundwater Monitoring Report*, the location over time and associated value of the migrated data that result from these calculations are presented in Table 6-11.

Table 6-11. Summary of Migrated Data used in the 100-KR-4 Mapping Analysis

Date	Gradient Magnitude	Gradient Direction (degrees)	Easting (m)	Northing (m)	Value (pCi/L)
Contaminant: Carbon-14 Well: 199-K-30					
6/3/1993	N/A	N/A	569238	146781	23,000
1/1/2007	0.00292	350	569233	146813	22,962
12/31/2011	0.005	350	569229	146833	22,948
12/31/2015 (CP_2016_4)	N/A	N/A	569197	146778	22,948

N/A = not applicable

For CY2019, the data point CP_2016_4 for carbon-14 corresponds to a previously migrated value for well 199-K-30. The migrated 199-K-30 value was not changed from that estimated for CY2011; however, its location was modified in 2015. The location and value used in CY2015 have remained the same in all annual plume depictions since then.

6.2.4.2 Carbon-14

Carbon-14 was mapped using a single kriging grid covering the entire GIA except for the K-West area (Figure C-17). A separate grid developed for K-West area is detailed at the end of this section. Measurement locations in the 100-NR-2 GIA were included in the K-Area datasets (except for K-West) to ensure plume continuity across the GIA boundary. The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. The final interpolation input dataset is provided in Appendix B.

Type 1 data points representing average effluent concentrations were added at the locations of the 100-KR-4 area injection wells. One migrated data point was included, corresponding to migration from the vicinity of well 199-K-30 with its calculated value for CY2015 (Appendix A, Table A-5).

In K-West, the carbon-14 map was developed considering only measurement locations in that area (i.e., data points east of K-West were not included in the interpolation dataset). The 100-KW carbon-14 concentration data were pre-processed according to the general data selection process outlined in Section 3.2.1 and Figure 3-2.

Type 1 data points representing average effluent concentrations were added at the locations of the 100-KW area injection wells. Two Type 3 points were added to constrain plume delineation upgradient (Appendix A, Table A-5).

6.2.4.3 Chromium

Chromium maps in the 100-KR-4 GIA were developed considering three separate areas, roughly corresponding to the K-West Reactor area, the K-East Reactor area, and the area east-northeast of the K-East Reactor (also referred to K-North), using a fine interpolation grid in each area. For all chromium maps (except for K-West), measurement locations in the 100-NR-2 GIA were included to ensure plume

continuity across the GIA boundary. The 100-KR-4 maps include the chromium plumes within 100-NR-2, depicting concentration distributions under high and low river-stage conditions.

A separate map was created for 100-NR-2 GIA to depict the annual average chromium plume in that area. Plume development included measurement locations from the 100-KR-4 GIA and it was based on the general data selection process detailed in Section 3.2.1 and Figure 3-2. Data selection parameters are listed in Table 6-8, and the final interpolation input dataset is provided in Appendix B.

The 100-KR-4 chromium concentration data were pre-processed according to the special data selection procedure outlined in Section 3.2.2 and Figure 3-2. Special data selection rules were used because data review suggested that significant variations in chromium concentration occur in response to annual fluctuations in the Columbia River stage.

Two chromium datasets were generated, representing the high river-stage period, from 4/1/2019 to 7/15/2019, and the low river-stage period, from 8/1/2019 to 12/31/2019, respectively.

For the high river-stage period (4/1/2019 to 7/15/2019): For aquifer tubes and wells, the mean concentration measured during the high river-stage period was used for the interpolation input files. If a well was not sampled during the high river-stage period, then the annual average for the most recent measurement year was used. If an aquifer tube was not measured during the high river-stage period, but was measured during the low river-stage period, then the low river-stage mean concentration was included in the high river-stage input files. The data selection process then continued according to the general data selection rules outlined in Section 3.2.1 and Figure 3-2.

For the low river-stage period (8/1/2019-12/31/2019): For aquifer tubes and wells, the mean concentration measured during the low river-stage period was used for the interpolation input files. If a well was not sampled during the low river-stage period, then the annual average for the most recent measurement year was used. If an aquifer tube was not measured during the low river-stage period, it was excluded. The data selection process then continued according to the general data selection rules outlined in Section 3.2.1 and Figure 3-2. The final interpolation input dataset is provided in Appendix B.

In both the high and low river-stage datasets, Type 1 data points representing average P&T system effluent concentrations were added at the locations of the K-East, K-North, and K-West area injection wells. Also, one injection well from K-West was included in K-East and K-North, to control plume extents to the west. Five Type 3 points were added to both the high and low river stage dataset, two Type 3 points to the low river stage and two to high river stage to constrain expansion of the chromium plume in the upgradient direction with concentrations consistent with nearby well measurements. The filtered total chromium sample for 199-N-51 was re-run after data pull and the new averages were added for high and low river stage. For new well 199-K-239, January 2020 maximum characterization data was added for KE (Appendix A, Table A-5). For chromium samples flagged as non-detects with a negative standard value reported, the reported value was replaced with 1 μg/L and the mean value for high and low river-stage periods was calculated and added to the dataset (Appendix A, Table A-5).

The September 2019 data point (sample number B3R6K1) from 199-N-50 was excluded at the request of the GIA project scientist (Appendix A, Table A-2).

Figure C-18 combines depictions for high river-stage conditions. Figure C-19 combines depictions for low river-stage conditions.

The annual average plume for NR-2 is shown in a separate map (Figure C-20). Type 1 data points representing average P&T system effluent concentrations were added at corresponding locations in K-East and K-North. Three Type 3 data points were added to constrain expansion of the chromium plume

in the upgradient direction with concentrations consistent with nearby well measurements. The filtered total chromium sample for 199-N-51 was re-analyzed after the original data pull from HEIS, and a new average value was calculated for that well and added to the dataset. For new well 199-K-239, January 2020 maximum characterization data was added to the dataset. For chromium samples flagged as non-detects with a negative standard value reported, the reported value was replaced with 1 µg/L and annual average was calculated and added to the dataset (Appendix A, Table A-5).

The September 2019 data point (sample number B3R6K1) from 199-N-50 was excluded from the dataset at the request of the GIA project scientist (Appendix A, Table A-2).

6.2.4.4 Nitrate

Nitrate was mapped using a single kriging grid covering the entire GIA (Figure C-21). Measurement locations in the 100-NR-2 GIA were included to ensure plume continuity across the GIA boundary. The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-7, and the final interpolation input dataset is provided in Appendix B.

Type 1 data points representing average P&T system effluent concentrations were added at the locations of the 100-KR-4, 100-KX and 100-KW area injection wells. For new well 199-K-239, January 2020 maximum characterization data was used in the interpolation. Also, one Type 3 data point was added to the interpolation dataset (Appendix A, Table A-5).

One point (199-N-77) was removed from the dataset at the request of the GIA project scientist (Appendix A, Table A-4).

6.2.4.5 Strontium-90

Strontium-90 maps were developed considering three separate areas, roughly corresponding to K-West, K-East and K-North, respectively, using a fine interpolation grid in each area (Figure C-22). Measurement locations in the 100-NR-2 GIA were included to the K-East and K-North interpolation datasets to ensure plume continuity across the GIA boundary. The separate grid for the K-West area was developed and it is detailed at the end of this section. The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-7, and the final interpolation input dataset is provided in Appendix B.

Type 1 data points representing average P&T system effluent concentrations were added at the locations of the K-East and K-North area injection wells. Another Type 1 data point was added to the interpolation dataset for 199-K-186 using its 2016 value as a Type 1 data point (Appendix A, Table A-5).

One well was excluded based on input from the GIA project scientist, because it was anomalously low (Appendix A, Table A-4).

Samples from 2019 for wells 199-N-184 and 199-N-2 were excluded at the request of the GIA project scientist, so that 2018 values were used instead (Appendix A, Table A-2).

In the K-West area, strontium-90 maps were developed considering only measurement locations in that area (Figure C-22). The 100-KW strontium-90 concentration data were pre-processed according to the general data selection process outlined in Section 3.2.1 and Figure 3-2. Data selection parameters are listed in Table 6-7, and the final interpolation input dataset is provided in Appendix B.

Type 1 data points representing average P&T system effluent concentrations were added at the locations of the K-West area injection wells (Appendix A, Table A-5).

Well 199-K-168 was removed at the request of the GIA project scientist. This well was screened in the middle of the aquifer and while operating as an extraction well the pump was set at 155 ft below ground surface (bgs) (Appendix A, Table A-4).

6.2.4.6 Trichloroethene

Trichloroethene was mapped using a single kriging grid covering the entire GIA and considering annual maximum values at each monitoring location (Figure C-23), rather than the annual average, to depict a conservatively large plume. Measurement locations in the 100-NR-2 GIA were included to ensure plume continuity across the GIA boundary. The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-7, and the final interpolation input dataset is provided in Appendix B.

Type 1 data points representing average P&T system effluent concentrations were added at the locations of the 100-KR-4 area injection wells. For new well 199-K-239, January 2020 maximum characterization data was used. (Appendix A, Table A-5).

6.2.4.7 Tritium

Tritium was mapped using a single kriging grid covering the entire GIA except for the K-West area (Figure C-24). Another grid was developed for the K-West area and is detailed at the end of this section. Measurement locations in the 100-NR-2 GIA were included (except for the K-West area interpolation dataset) to ensure plume continuity across the GIA boundary. The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-7, and the final interpolation input dataset is provided in Appendix B.

Type 1 data points representing average P&T system effluent concentrations were added at the locations of the 100-KR-4 area injection wells (Appendix A, Table A-5).

In the K-West area, tritium maps were developed considering only measurement locations in that area (Figure C-24). The 100-KW tritium concentration data were pre-processed according to the general data selection process detailed in Section 3.2.1 and Figure 3-2. Data selection parameters are listed in Table 6-7, and the final interpolation input dataset is provided in Appendix B.

Type 1 data points representing average P&T system effluent concentrations were added at the locations of the 100-KW area injection wells (Appendix A, Table A-5).

6.2.5 100-NR-2

The list of COIs and data selection parameters is provided in Table 6-12.

Kriging interpolation parameters, along with the name of the corresponding QUANTILE input files and figures, are provided in Table 6-13. The QUANTILE input datasets are provided in Appendix B.

Table 6-12. COIs and Data Selection Parameters for 100-NR-2

Operable Unit	Contaminant of Interest	DORS	High River Stage	Low River Stage	COMB CHROM	MAX AQ	CT	CTAQ	CTC
100-NR-2	Nitrate	--	--	--	--	y	MEAN VALOR ND SRL	MAX VALOR ND SRL	MAX VALOR ND SRL
100-NR-2	Strontium-90	--	--	--	--	y	MEAN VALOR ND MDA	MAX VALOR ND MDA	MAX VALOR ND MDA
100-NR-2 C7934 Area	Strontium-90	--	--	--	--	y	MEAN VALOR ND MDA	MAX VALOR ND MDA	MAX VALOR ND MDA
100-NR-2	Total petroleum hydrocarbons - diesel range	--	--	--	--	y	MEAN VALOR ND SRL	MAX VALOR ND SRL	MAX VALOR ND SRL
100-NR-2	Total petroleum hydrocarbons - diesel range	Total petroleum hydrocarbons - diesel range	6/1/2019 - 7/31/2019	11/1/2019 - 12/31/2019	--	y	MEAN VALOR ND SRL	MEAN VALOR ND SRL	MAX VALOR ND SRL
100-NR-2	Tritium	--	--	--	--	y	MEAN VALOR ND MDA	MAX VALOR ND MDA	MAX VALOR ND MDA
100-NR-2 C7934 Area	Tritium	--	--	--	--	y	MEAN VALOR ND MDA	MAX VALOR ND MDA	MAX VALOR ND MDA

Table 6-13. COIs and Interpolation Parameters for 100-NR-2

Contaminant of Interest	Kriging Type	Minimum Range (m)	Maximum Range (m)	Angle (degrees)	File Name	Figure
Nitrate	MIK	850	1700	330	100-NR-2_Nitrate.dat	Figure C-25
Strontium-90 100-NR-2 (Main GIA)	MIK	400	800	10	100-NR-2_Strontium-90.dat	Figure C-26
Strontium-90 100-NR-2 C7934 Area	MIK	80	160	305	100-NR_C7934_Strontium-90.dat	Figure C-26
Total petroleum hydrocarbons-diesel range	MIK	2000	4000	290	100-NR-2_Total petroleum hydrocarbons - diesel range.dat	Figure C-27
Total petroleum hydrocarbons-diesel range High river stage	MIK	2000	4000	290	100-NR-2_Total petroleum hydrocarbons - diesel range_HI.dat	Figure C-28
Total petroleum hydrocarbons-diesel range Low river stage	MIK	2000	4000	290	100-NR-2_Total petroleum hydrocarbons - diesel range_LO.dat	Figure C-29
Tritium 100-NR-2 C7934 Area	LOG	50	90	305	100-NR-C7934_Tritium.dat	Figure C-30
Tritium 100-NR-2 (Main GIA)	RNK	350	400	-50	100-NR-2_Tritium.dat	Figure C-30

GIA = groundwater interest area
LOG = logarithmic transformation
MIK = multiple indicator kriging
RNK = quantile kriging

Four wells were excluded from all 100-NR-2 interpolation input files because their screened intervals were outside the aquifer zone of interest (Appendix A, Table A-4).

6.2.5.1 Nitrate

Nitrate was mapped using a single kriging grid covering the entire GIA (Figure C-25). Measurement locations in the 100-KR-4 GIA were included to ensure plume continuity across the GIA boundary. The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-12, and the final interpolation input dataset is provided in Appendix B.

Type 1 data points representing average P&T system effluent concentrations were added at the locations of the 100-KR-4, 100-KX and 100-KW area injection wells. Also, January 2020 maximum characterization data was added at new well 199-K-239 (Appendix A, Table A-5).

One well was excluded at the request of the GIA project scientist, because it was not representative of the aquifer (Appendix A, Table A-4).

6.2.5.2 Strontium-90

Strontium-90 maps were developed using two different interpolation grids (Figure C-26). The first grid encompasses most of the main 100-NR-2 GIA. The second, finer-resolution grid encompasses only the immediate vicinity of aquifer tube C7934. Points used for the fine-resolution, small scale map near aquifer tube C7934, were excluded from the dataset used for the interpolation main GIA. Locations from the 100-KR-4 GIA were included with the main 100-NR-2 dataset to ensure plume continuity across the GIA boundary (except for the C7934 area interpolation dataset). The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed for both datasets. Data selection parameters are listed in Table 6-12, and the final interpolation input dataset is provided in Appendix B.

Type 1 data points representing average P&T system effluent concentrations were added at the locations of the 100-KR-4 area injection wells. One Type 1 data point was added, using the 2016 value for 199-K-186 (Appendix A, Table A-5).

Sixty-four Type 3 data points are added based on decay pre-injection concentrations at the injection wells 20 meters inland from each apatite treated injection wells to better reflect the plume to the permeable reactive barrier (PRB). This is because the PRB is only ~30 ft thick to sequester strontium that flows through the barrier before reaching the river. Since there are limited wells upgradient of the PRB line, the plume interpretations using the PRB monitoring well concentrations would lead to lower concentrations upgradient of the PRB. The list of these data points is provided in Appendix A, Table A-5.

One point was removed based on input from the GIA project scientist, because it was anomalously low (Appendix A, Table A-4).

The September 2019 samples for 199-N-184 and 199-N-2 were excluded at the request of the GIA project scientist (Appendix A, Table A-2).

6.2.5.3 Total Petroleum Hydrocarbons

Total petroleum hydrocarbons - diesel range (TPH-D) was mapped using a single kriging grid covering the entire GIA (Figure C-27). Locations from the 100-KR-4 GIA were included with the 100-NR-2 dataset to ensure plume continuity across the GIA boundary. The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-12, and the final interpolation input dataset is provided in Appendix B.

Well 199-N-210 was removed based on input from the GIA project scientist (Appendix A, Table A-4).

Separate TPH-d plume maps (Figure C-28 and C-29) were generated using a single kriging grid covering the entire GIA, one representing conditions during the high river-stage period (6/1/2019 - 7/31/2019) and another representing conditions during the low river-stage period (11/1/2019-12/31/2019). Locations from the 100-KR-4 GIA were included with the 100-NR-2 dataset to ensure plume continuity across the GIA boundary. The 100-NR-2 TPH-D concentration data were pre-processed according to the special data selection procedure outlined in Section 3.2.2 and Figure 3-2. Data selection parameters are listed in Table 6-12, and the final interpolation input dataset is provided in Appendix B.

For aquifer tubes and wells, the mean concentration measured during the high/low river-stage period was used for the interpolation input files. If a location was not sampled during the high/low river-stage period, then the annual average from the most recent measurement year was used. The data selection process then continued according to the general data selection rules outlined in Section 3.2.1 and Figure 3-2.

6.2.5.4 Tritium

Tritium maps were developed using two different interpolation grids (Figure C-30). The first grid encompasses most of the main 100-NR-2 GIA. The second, finer-resolution grid encompasses only the immediate vicinity of aquifer tube C7934. Points used for the fine-resolution, small scale map near aquifer tube C7934 were excluded from the dataset used for the main GIA. Locations from the 100-KR-4 GIA were included with the 100-NR-2 dataset to ensure plume continuity across the GIA boundary. The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-12, and the final interpolation input dataset is provided in Appendix B.

Type 1 data points representing average P&T effluent concentrations were added at the locations of the 100-KR-4 area injection wells. One Type 3 data point (CP_2019_101) was added, based on input from the GIA project scientist, to constrain plume around aquifer tube C7934 (Appendix A, Table A-5).

6.2.6 200-BP-5

The list of COIs and data selection parameters is provided in Table 6-14.

Kriging interpolation parameters, along with the name of the corresponding QUANTILE input file(s) and figures, are provided in Table 6-15. The QUANTILE input datasets are provided in Appendix B.

Table 6-14. COIs and Data Selection Parameters for 200-BP-5

Operable Unit	Contaminant of Interest	DORS	High River Stage	Low River Stage	COMB CHROM	MAX AQ	CT	CTAQ	CTC
200-BP-5	Cyanide	--	--	--	--	y	MEAN VALOR ND SRL	MAX VALOR ND SRL	MAX VALOR ND SRL
200-BP-5	Iodine-129	--	--	--	--	y	MEAN VALOR ND MDA	MAX VALOR ND MDA	MAX VALOR ND MDA
200-BP-5	Nitrate	--	--	--	--	y	MEAN VALOR ND SRL	MAX VALOR ND SRL	MAX VALOR ND SRL
200-BP-E25-32P (Separate plume in vicinity of 299-E25-32P/Q)	Nitrate	--	--	--	--	y	MEAN VALOR ND SRL	MAX VALOR ND SRL	MAX VALOR ND SRL
200-BP-5	Strontium-90	--	--	--	--	y	MEAN VALOR ND MDA	MAX VALOR ND MDA	MAX VALOR ND MDA
200-BP-5	Technetium-99	--	--	--	--	y	MEAN VALOR ND MDA	MAX VALOR ND MDA	MAX VALOR ND MDA
200-BP-5	Tritium	--	--	--	--	y	MEAN VALOR ND MDA	MAX VALOR ND MDA	MAX VALOR ND MDA
200-BP-5	Uranium	--	--	--	--	y	MEAN VALOR ND SRL	MAX VALOR ND SRL	MAX VALOR ND SRL

Table 6-15. COIs and Interpolation Parameters for 200-BP-5

Contaminant of Interest	Kriging Type	Minimum Range (m)	Maximum Range (m)	Angle (degrees)	File Name	Figure
Cyanide 200-BP-5 North	RNK	950	1050	145	200-BP-5_Cyanide_N.dat	Figure C-31
Cyanide 200-BP-5 South	LOG	400	600	130	200-BP-5_Cyanide_S.dat	Figure C-31
Iodine-129	MIK	2300	4750	340	200-BP-5_Iodine-129.dat	Figure C-32
Nitrate 200-BP-5 (Main Area)	MIK	2400	5050	145	200-BP-5_Nitrate.dat	Figure C-33
Nitrate 200-BP-5 Near WMA C	RNK	650	1000	305	200-BP-5_Nitrate_z.dat	Figure C-33
Nitrate 200-BP-5 (Around 299-E25-32P/Q)	RNK	650	1000	305	200-BP-E25-32P_Nitrate.dat	Figure C-33
Strontium-90	LOG	500	1300	335	200-BP-5_Strontium-90.dat	Figure C-34
Technetium-99 200-BP-5 North	MIK	1500	4000	145	200-BP-5_Technetium-99_N.dat	Figure C-35

Table 6-15. COIs and Interpolation Parameters for 200-BP-5

Contaminant of Interest	Kriging Type	Minimum Range (m)	Maximum Range (m)	Angle (degrees)	File Name	Figure
Technetium-99 200-BP-5 South	MIK	950	3050	130	200-BP-5_Technetium-99_S.dat	Figure C-35
Technetium-99 200-BP-5 SS	MIK	850	950	-75	200-BP-5_Technetium-99_SS.dat	Figure C-35
Tritium 200-BP-5 North	MIK	800	1500	355	200-BP-5_Tritium_N.dat	Figure C-36
Uranium 200-BP-5 North	MIK	900	4000	305	200-BP-5_Uranium_N.dat	Figure C-37
Uranium 200-BP-5 South	MIK	300	700	135	200-BP-5_Uranium_S.dat	Figure C-37

SS = a pseudo-geographic distinction of the subset of data points used for developing the plume in the very southern part of BP-5 (not exclusively related to a particular waste site)

LOG = logarithmic transformation

MIK = multiple indicator kriging

RNK = quantile kriging

WMA C = Waste Management Area C

Wells with screened intervals outside the aquifer zone of interest were excluded from all 200-BP-5 interpolation input files (Appendix A, Table A-4).

Type 2 data points were added to all datasets to represent the geologic boundary where basalt is present above the water table (Appendix A, Table A-5).

6.2.6.1 Cyanide

Cyanide was mapped using two grids, which encompass the northern and southern portions of the GIA, respectively (Figure C-31). The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-14, and the final interpolation input dataset is provided in Appendix B.

Several Type 3 data points were added based on input from the GIA project scientist (Appendix A, Table A-5).

6.2.6.2 Iodine-129

Iodine-129 was mapped using a single kriging grid covering the entire GIA (Figure C-32). The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-14, and the final interpolation input dataset is provided in Appendix B.

Type 3 data points were added based on the conceptual model of historic plume migration, and one Type 2 data point was added at the inferred location of a high hydraulic conductivity channel. Two Type 1 data points, representing annual average iodine-129 concentrations measured by U.S. Ecology in CY2014, were added at the location of wells 699-35-58D and 699-35-59, respectively. For wells 299-E17-12 and 299-E24-18, the reported values for 2018 (non-detects) were used instead of the MDAs, which were close to 1 pCi/L. Characterization data for 2019 were used for 699-47-53B and 699-47-55, using the average instead of maximum MDA value (Appendix A, Table A-5).

Five 2019 samples were excluded based on input from the GIA project scientist (Appendix A, Table A-2).

6.2.6.3 Nitrate

Nitrate grids were developed for the main GIA, for the area in the immediate vicinity of Waste Management Area (WMA) C, and around 299-E25-32P/Q well separately. The nitrate plumes, including the portion extending across the 200-PO-1 boundary, are depicted in Figure C-33. The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-14, and the final interpolation input datasets are provided in Appendix B.

Several Type 1 data points were included, representing annual average nitrate concentrations measured by U.S. Ecology in 2019. The annual average for well 299-E27-10 was revised in order to exclude an anomalously low result, and the new average appears as a Type 1 data point. Three Type 2 geologic control points were added to control plume delineation where basalt is present above water table. Type 3 data points were included based on input from the GIA project scientist and are described in Appendix A, Table A-5.

One data point was removed based on input from the GIA project scientist (Appendix A, Table A-4).

6.2.6.4 Strontium-90

Strontium-90 was mapped using a single kriging grid covering the entire GIA (Figure C-34). The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-14, and the final interpolation input dataset is provided in Appendix B.

6.2.6.5 Technetium-99

Technetium-99 was mapped using three separate grids, each representing different sources and/or aquifer conditions which have historically occurred or currently/recently occur within the GIA (Figure C-35). For all maps, input data were determined using the general data selection process detailed in Section 3.2.1 and Figure 3-2. Data selection parameters are listed in Table 6-14, and the final interpolation input dataset is provided in Appendix B.

Several Type 3 points were added based on input from the GIA project scientist to represent prior knowledge of site conditions (Appendix A, Table A-5).

The October 2019 sample for well 699-47-55 was excluded based on input from the GIA project scientist (Appendix A, Table A-2).

6.2.6.6 Tritium

Tritium was mapped using a single grid (Figure C-36). The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-14, and the final interpolation input dataset is provided in Appendix B.

Several Type 1 data points were included, representing annual average tritium concentrations measured by U.S. Ecology in 2019. Two Type 3 data point was also added based on input from the GIA project scientist as described in Appendix A, Table A-5.

6.2.6.7 Uranium

Uranium was mapped using two grids, which encompass the northern and southern portions of the GIA, respectively (Figure C-37). The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-14, and the final interpolation input dataset is provided in Appendix B.

Two Type 3 data point were added to uranium north plume based on input from the GIA project scientist as described in Appendix A, Table A-5.

One well was removed based on input from the GIA project scientist, because it has a deeper screened interval (Appendix A, Table A-4).

6.2.7 200-PO-1

The list of COIs and data selection parameters is provided in Table 6-16.

Table 6-16. COIs and Data Selection Parameters for 200-PO-1

Operable Unit	Contaminant of Interest	DORS	High River Stage	Low River Stage	COMB CHROM	MAX AQ	CT	CTAQ	CTC
200-PO-1	Iodine-129	--	--	--	--	y	MEAN VALOR ND MDA	MAX VALOR ND MDA	MAX VALOR ND MDA
200-PO-1	Tritium	--	--	--	--	y	MEAN VALOR ND MDA	MAX VALOR ND MDA	MAX VALOR ND MDA

Table 6-16. COIs and Data Selection Parameters for 200-PO-1

Operable Unit	Contaminant of Interest	DORS	High River Stage	Low River Stage	COMB CHROM	MAX AQ	CT	CTAQ	CTC
200-PO-1	Uranium	--	--	--	--	y	MEAN VALOR ND SRL	MAX VALOR ND SRL	MAX VALOR ND SRL

Kriging interpolation parameters, along with the name of the corresponding QUANTILE input file(s) and figures, are provided in Table 6-17. The QUANTILE input datasets are provided in Appendix B.

Table 6-17. COIs and Interpolation Parameters for 200-PO-1

Contaminant of Interest	Kriging Type	Minimum Range (m)	Maximum Range (m)	Angle (degrees)	File Name	Figure
Iodine-129	MIK	3200	7800	115	200-PO-1_Iodine-129.dat	Figure C-38
Tritium North/South	MIK	4000	7400	140	200-PO-1_Tritium_NS.dat	Figure C-39
Uranium	RNK	3610	4800	90	200-PO-1_Uranium.dat	Figure C-37

MIK = multiple indicator kriging
RNK = quantile kriging

Nitrate and technetium-99 in 200-PO-1 are found at levels above their applicable standards only near the northern boundary of the GIA with 200-BP-5. Therefore, their interpolated distributions are included in the corresponding plume depictions for 200-BP-5 (Figures C-33 and C-35, respectively).

Wells with screened intervals outside the aquifer zone of interest were excluded from all 200-PO-1 interpolation input files (Appendix A, Table A-4). Several Type 2 data points were added to all datasets based on input from the GIA project scientist, to represent the geologic boundary where basalt is present above the water table (Appendix A, Table A-5).

6.2.7.1 Iodine-129

Iodine-129 was mapped using a single kriging grid covering the entire GIA (Figure C-38. The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-16, and the final interpolation input dataset is provided in Appendix B.

Several Type 2 data points were added to represent the boundary where basalt is present above the water table, and one data point was added at the inferred location of a high hydraulic conductivity channel. Two Type 1 data points, representing annual average iodine-129 concentrations measured by U.S. Ecology in CY2014, were added at the location of wells 699-35-58D and 699-35-59, respectively. For wells 299-E17-12 and 299-E24-18 reported values were used instead of MDAs as Type 1 data points.

Characterization data from 2019 were used for 699-47-53B and 699-47-55, using the average instead of maximum MDA value. For 699-29-4 and 699-31-11 the 2019 samples were excluded (Appendix A,

Table A-2) and the 2016 values were used as Type 1 data points. Several Type 3 data points were added to the dataset based on input from the GIA project scientist (Appendix A, Table A-5).

Ten 2019 samples, including samples mentioned above, were excluded based on input from the GIA project scientist (Appendix A, Table A-2).

6.2.7.2 Tritium

Tritium was mapped using a single kriging grid covering the north-south portion of the GIA (Figure C-39). The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-16, and the final interpolation input dataset is provided in Appendix B.

Four Type 3 data points were added based on input from the GIA project scientist, to maintain main-plume continuity and for plume separation near the Plutonium-Uranium Extraction Facility. In addition, several Type 1 data points were included, representing annual average tritium measured by U.S. Ecology in 2019. Well 699-15-15B was last sampled in 2010 and was maintained as a control point to provide plume boundary for known areas of tritium attenuation (Appendix A, Table A-5).

6.2.7.3 Uranium

Uranium was interpolated using a single kriging grid covering the entire GIA. The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-16, and the final interpolation input dataset is provided in Appendix B. One well was removed based on input from the GIA project scientist, because it has a deeper screened interval (Appendix A, Table A-4).

As mentioned earlier, uranium in 200-PO-1 is found at levels above its applicable standards only near the northern boundary of the GIA with 200-BP-5. The interpolated distribution is included in the corresponding plume depiction for 200-BP-5 (Figure C-37).

6.2.8 200-UP-1

The list of COIs and data selection parameters is provided in Table 6-18.

Kriging interpolation parameters, along with the name of the corresponding QUANTILE input file(s) and figures, are provided in Table 6-19. The QUANTILE input datasets are provided in Appendix B.

Table 6-18. COIs and Data Selection Parameters for 200-UP-1

Operable Unit	Contaminant of Interest	DORS	High River Stage	Low River Stage	COMB CHROM	MAX AQ	CT	CTAQ	CTC
200-UP-1 near 299-W26-13	Hexavalent chromium; Chromium	--	--	--	y	y	MEAN VALOR ND SRL	MAX VALOR ND SRL	MAX VALOR ND SRL
200-UP-1	Hexavalent chromium; Chromium	--	--	--	y	y	MEAN VALOR ND SRL	MAX VALOR ND SRL	MAX VALOR ND SRL
200-UP-1	Iodine-129	--	--	--	--	y	MEAN VALOR ND MDA	MAX VALOR ND MDA	MAX VALOR ND MDA
200-UP-1 near 699-38-70C	Technetium-99	--	--	--	--	y	MEAN VALOR ND MDA	MAX VALOR ND MDA	MAX VALOR ND MDA
200-UP-1	Technetium-99	--	--	--	--	y	MEAN VALOR ND MDA	MAX VALOR ND MDA	MAX VALOR ND MDA
200-UP-1	Tritium	--	--	--	--	y	MEAN VALOR ND MDA	MAX VALOR ND MDA	MAX VALOR ND MDA
200-UP-1 near 299-W23-4	Uranium	--	--	--	--	y	MEAN VALOR ND SRL	MAX VALOR ND SRL	MAX VALOR ND SRL
200-UP-1	Uranium	--	--	--	--	y	MEAN VALOR ND SRL	MAX VALOR ND SRL	MAX VALOR ND SRL

Table 6-19. COIs and Interpolation Parameters for 200-UP-1

Contaminant of Interest	Kriging Type	Minimum Range (m)	Maximum Range (m)	Angle (degrees)	File Name	Figure
Chromium Main GIA	MIK	3000	8000	90	200-UP-1_ChromComb.dat	Figure C-40
Chromium Crib S20	MIK	100	300	75	200-UP-1_ChromComb_CribS20.dat	Figure C-40
Chromium SSX	MIK	180	500	105	200-UP-1_ChromComb_SSX.dat	Figure C-40
Chromium near 299-W26-13	MIK	300	400	75	200-UP-W26-13_ChromComb.dat	Figure C-40
Iodine-129	MIK	2300	3300	81	200-UP-1_Iodine-129.dat	Figure C-41
Technetium-99 Middle	MIK	300	850	100	200-UP-1_Technetium-99_Middle.dat	Figure C-43
Technetium-99 North	RNK	300	480	70	200-UP-1_Technetium-99_North.dat	Figure C-43
Technetium-99 South	MIK	750	1550	120	200-UP-1_Technetium-99_South.dat	Figure C-43
Technetium-99 near 699-38-70C	MIK	1000	1200	70	200-UP-38-70C_Technetium-99_South.dat	Figure C-43
Tritium	MIK	1500	3200	75	200-UP-1_Tritium.dat	Figure C-44
Uranium near 299-W23-4	MIK	80	80	75	200-UP-W23-4_Uranium.dat	Figure C-45
Uranium	MIK	650	1500	75	200-UP-1_Uranium.dat	Figure C-45

GIA = groundwater interest area
MIK = multiple indicator kriging
RNK = quantile kriging

Nitrate is also present in 200-UP-1, but it is mapped as part of the 200-ZP-1 plume. Details on the nitrate plume mapping and the associated interpolation parameters are provided in Section 6.2.9. A map of the nitrate plume in 200-UP-1 is provided in Figure C-42.

Selected wells were excluded from all 200-UP-1 interpolation input files because their screened intervals were outside the aquifer zone of interest. Other wells were excluded based on input from the GIA project scientist because measured concentrations were not considered to be representative of the aquifer. All excluded wells are listed in Appendix A, Table A-4.

6.2.8.1 Chromium

Chromium maps were developed using four separate grids, for the main GIA, the WMA S-SX area, the 216-S-20 Crib, and the vicinity of well 299-W26-13 separately (Figure C-40). A finer-resolution grid encompasses only the immediate vicinity of 299-W26-13. Measurement locations in the 200-ZP-1 GIA were included to ensure plume continuity across the GIA boundary, 6+3 except for the 299-W26-13 plume. The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-18, and the final interpolation input dataset is provided in Appendix B.

Points representing average P&T system effluent concentrations were added at the locations of the unconfined injection wells. Several Type 1 data points were included, representing (a) annual average chromium concentrations measured by U.S. Ecology in 2019, (b) historical measurements at locations where more recent were unavailable, and (c) new well characterization data. January 2020 data was included as Type 1 data point for well 699-31-53B. In addition, Type 3 data points were included based on input from the GIA project scientist, and are described in Appendix A, Table A-5.

Two wells, 299-W11-45 and 299-W14-13, were excluded from the interpolation, because nearby wells have higher concentration (Appendix A, Table A-4).

Two November 2019 data points from well 299-W26-13 were excluded from the average calculations as erroneous (Appendix A, Table A-2).

6.2.8.2 Iodine-129

Iodine-129 was mapped using a single kriging grid covering the entire GIA (Figure C-41). Measurement locations in the 200-ZP-1 GIA were included to ensure plume continuity across the GIA boundary. The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-18, and the final interpolation input dataset is provided in Appendix B.

Points representing average P&T system effluent concentrations were added at the locations of the unconfined injection wells. Two Type 1 data points, representing annual average iodine-129 concentrations measured by U.S. Ecology in 2014, were added at the location of wells 699-35-58D and 699-35-59. A complete list of these data points is provided in Appendix A, Table A-5.

Three Type 1 data points were included, for which no recent data are available. At those locations, data in 2015 included reported values flagged as “U” with MDA values above the 1 pCi/L iodine-129 drinking water standard. In those cases, input values were determined in 2015 based on historical data and associated trends. These data points have been used in annual plume maps with their 2015 calculated values since then. Also, for two wells, 299-E17-12 and 299-E24-18, the reported values for 2018 (non-detects) were used instead of the MDAs, which were close to 1 pCi/L based on input from the GIA project scientist. For well 299-W22-86, the 2019 sample was excluded (Appendix A, Table A-2) and the 2016 MDA was used as Type 1 data point (Appendix A, Table A-5).

Three wells were excluded from all iodine-129 input files based on input from the GIA project scientist and are described in Appendix A, Table A-4.

Four 2019 samples (including the sample for 299-W22-86 mentioned above) were excluded based on input from the GIA project scientist (Appendix A, Table A-2).

6.2.8.3 Technetium-99

Technetium-99 was mapped using four separate grids, each representing different sources and/or aquifer conditions which occur within the GIA (Figure C-43). One of the grids encompasses only the immediate vicinity of 699-38-70C. Measurement locations in the 200-ZP-1 GIA were included to ensure plume continuity across the GIA boundary, except for the 699-38-70C plume. For all maps, input data were determined using the general data selection process detailed in Section 3.2.1 and Figure 3-2. Data selection parameters are listed in Table 6-18, and the final interpolation input dataset is provided in Appendix B.

Points representing average P&T system effluent concentrations were added at the locations of the 200-ZP-1 area unconfined injection wells. In addition, Type 3 data points were included based on input from the GIA project scientist and are described in Appendix A, Table A-5.

Three wells were excluded from all technetium-99 input files based on input from the GIA project scientist and are described in Appendix A, Table A-4.

6.2.8.4 Tritium

Tritium was mapped using a single kriging grid covering the entire GIA (Figure C-44). Measurement locations in the 200-ZP-1 GIA were included to ensure plume continuity across the GIA boundary. The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-18, and the final interpolation input dataset is provided in Appendix B.

Several points representing annual average tritium concentrations measured by U.S. Ecology in 2019 were included as Type 1 data points. Type 1 data points representing average P&T system effluent concentrations were added at the locations of the unconfined injection wells. In addition, two Type 3 data points were included based on input from the GIA project scientist, and are described in Appendix A, Table A-5.

One well was excluded from all tritium input files based on input from the GIA project scientist, because they were not representative of the aquifer (Appendix A, Table A-4).

6.2.8.5 Uranium

Uranium was mapped using two separate kriging grids: one covering the entire GIA and a finer-resolution grid encompassing only the immediate vicinity of 299-W23-4 (Figure C-45). Measurement locations in the 200-ZP-1 GIA were included to ensure plume continuity across the GIA boundary, except for the 299-W23-4 plume. The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-18, and the final interpolation input dataset is provided in Appendix B.

Type 1 data points representing average P&T system effluent concentrations were added at the locations of the unconfined injection wells. In addition, four Type 3 data points were based on input from the GIA project scientist, and are described in Appendix A, Table A-5.

Three wells were excluded from all uranium input files based on input from the GIA project scientist, and are described in Appendix A, Table A-4.

6.2.9 200-ZP-1

The list of COIs and data selection parameters is provided in Table 6-20. The carbon tetrachloride plume and chloroform maps were developed based on a procedure detailed at the end of this section.

Kriging interpolation parameters, along with the name of the corresponding QUANTILE input file(s) and figures, are provided in Table 6-21. The QUANTILE input datasets are provided in Appendix B.

Table 6-20. COIs and Data Selection Parameters for 200-ZP-1

Operable Unit	Contaminant of Interest	DORS	High River Stage	Low River Stage	COMB CHROM	MAX AQ	CT	CTAQ	CTC
200-ZP-1	Cyanide	--	--	--	--	y	MEAN VALOR ND SRL	MAX VALOR ND SRL	MAX VALOR ND SRL
200-ZP-1	Chloroform	--	--	--	--	y	MEAN VALOR ND SRL	MAX VALOR ND SRL	MAX VALOR ND SRL
200-ZP-1	Hexavalent chromium; Chromium	--	--	--	y	y	MEAN VALOR ND SRL	MAX VALOR ND SRL	MAX VALOR ND SRL
200-ZP-1	Iodine-129	--	--	--	--	y	MEAN VALOR ND MDA	MAX VALOR ND MDA	MAX VALOR ND MDA
200-ZP-1	Nitrate	--	--	--	--	y	MEAN VALOR ND SRL	MAX VALOR ND SRL	MAX VALOR ND SRL
200-ZP-1	Technetium-99	--	--	--	--	y	MEAN VALOR ND MDA	MAX VALOR ND MDA	MAX VALOR ND MDA
200-ZP-1	Tritium	--	--	--	--	y	MEAN VALOR ND MDA	MAX VALOR ND MDA	MAX VALOR ND MDA
200-ZP-1	Trichloroethene	--	--	--	--	y	MEAN VALOR ND SRL	MAX VALOR ND SRL	MAX VALOR ND SRL

Table 6-21. COIs and Interpolation Parameters for 200-ZP-1

Contaminant of Interest	Kriging Type	Minimum Range (m)	Maximum Range (m)	Angle (degrees)	File Name	Figure
Cyanide	RNK	900	1250	90	200-ZP-1_Cyanide.dat	Figure C-46
Chloroform	RNK	1500	1500	0	200-ZP-1_Chloroform.dat	Figure C-47
Chromium	RNK	900	1250	90	200-ZP-1_ChromComb.dat	Figure C-48
Iodine-129	MIK	800	1050	40	200-ZP-1_Iodine-129.dat	Figure C-49
Nitrate (Main GIA)	MIK	2900	3600	66	200-ZP-1_Nitrate_ZP.dat	Figure C-50
Nitrate SSX	MIK	150	280	90	200-ZP-1_Nitrate_SSX.dat	Figure C-42
Technetium-99	MIK	750	900	95	200-ZP-1_Technetium-99.dat	Figure C-51
Trichloroethene	MIK	900	900	85	200-ZP-1_Trichloroethene.dat	Figure C-53
Tritium	MIK	500	800	60	200-ZP-1_Tritium.dat	Figure C-52

GIA = groundwater interest area
MIK = multiple indicator kriging
RNK = quantile kriging

Selected wells were excluded from all 200-ZP-1 interpolation input files because their screened intervals were outside the aquifer zone of interest. Other wells were excluded based on input from the GIA project scientist because measured concentrations were not considered to be representative of the unconfined aquifer. All excluded data are listed in Appendix A, Table A-4 and are also excluded from chloroform.

Three Type 2 data points were added to all datasets (including chloroform) to represent the geologic boundary where the basalt is present above the water table (Appendix A, Table A-5).

Details on the mapping of carbon tetrachloride and chloroform are provided at the end of this section.

6.2.9.1 Cyanide

Cyanide was mapped using a single kriging grid covering the entire GIA (Figure C-46). Measurement locations in the 200-UP-1 GIA were included to ensure plume continuity across the GIA boundary. The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-20, and the final interpolation input dataset is provided in Appendix B.

6.2.9.2 Chloroform

Chloroform was mapped using a single kriging grid covering the entire GIA (Figure C-47). Measurement locations in the 200-UP-1 GIA were included to ensure plume continuity across the GIA boundary. The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-20, and the final interpolation input dataset is provided in Appendix B.

6.2.9.3 Chromium

Chromium was mapped using a single kriging grid covering the entire GIA (Figure C-48). Measurement locations in the 200-UP-1 GIA were included to ensure plume continuity across the GIA boundary. The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-20, and the final interpolation input dataset is provided in Appendix B.

Points representing average P&T system effluent concentrations were added at the locations of the 200-ZP-1 area unconfined injection wells. Several Type 1 data points were included, representing (a) annual average chromium measured by U.S. Ecology in 2019, (b) historical measurements at locations where more recent were unavailable, and (c) well characterization result. January 2020 data was included as Type 1 for well 699-31-53B. In addition, five Type 3 data points were included based on input from the GIA project scientist, and are described in Appendix A, Table A-5.

Two wells, 299-W11-45 and 299-W14-13, were excluded from interpolation, because nearby wells have higher concentration (Appendix A, Table A-4).

Two November data points from well 299-W26-13 were excluded from the average calculations as erroneous (Appendix A, Table A-2).

6.2.9.4 Iodine-129

Iodine-129 was mapped using a single kriging grid covering the entire GIA (Figure C-49). Measurement locations in the 200-UP-1 GIA were included to ensure plume continuity across the GIA boundary. The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-20, and the final interpolation input dataset is provided in Appendix B.

Points representing average P&T system effluent concentrations were added at the locations of the 200-ZP-1 area unconfined injection wells. Two Type 1 data points, representing annual average iodine-129 concentrations measured by U.S. Ecology in 2014, were added at the location of wells 699-35-58D and 699-35-59 (Appendix A, Table A-5).

Three Type 1 data points were included, for which no recent data are available. At those locations, data in 2015 included reported values flagged as "U" with MDA values above the 1 pCi/L iodine-129 drinking water standard. In those cases, input values were determined in 2015 based on historical data and associated trends. These data points have been used in annual plume maps with their 2015 calculated values since then. For well 299-W22-86 the 2019 sample was excluded (Appendix A, Table A-2) and the 2016 MDA was used as Type 1 data point. The list of these data points is provided in Appendix A, Table A-5.

Three wells were excluded from all iodine-129 input files based on input from the GIA project scientist (Appendix A, Table A-4).

Four 2019 samples (including the sample from 299-W22-86 mentioned above) were excluded based on input from the GIA project scientist (Appendix A, Table A-2).

6.2.9.5 Nitrate

Nitrate maps were developed for the main GIA and for the WMA S-SX area separately (Figure C-50 and C-42. Measurement locations in the 200-UP-1 and 200-BP-5 GIA were included to ensure plume continuity across the GIA boundaries. The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-20, and the final interpolation input datasets are provided in Appendix B.

Points representing average P&T system effluent concentrations were added at the locations of unconfined injection wells. Several Type 1 data points were included, representing (a) annual average nitrate measured by U.S. Ecology in 2019, and (b) historical measurements at locations where more recent data were unavailable. The 2018 annual average for well 299-E27-10 was revised in order to exclude an anomalously low result, and the new average appears as a Type 1 data point. One Type 2 point was included to represent a geologic boundary where the basalt is present above water table. In addition, Type 3 data points were included based on input from the GIA project scientist, and are described in Appendix A, Table A-5.

Nine wells were excluded from all nitrate input files based on input from the GIA project scientist (Appendix A, Table A-4).

6.2.9.6 Technetium-99

Technetium-99 was mapped using a single kriging grid covering the entire GIA (Figure C-51). Measurement locations in the 200-UP-1 GIA were included to ensure plume continuity across the GIA boundary. Input data were determined using the general data selection process detailed in Section 3.2.1 and Figure 3-2. Data selection parameters are listed in Table 6-20, and the final interpolation input dataset is provided in Appendix B.

Points representing average P&T system effluent concentrations were added at the locations of the unconfined injection wells. In addition, Type 3 data points were included based on input from the GIA project scientist, and are described in Appendix A, Table A-5.

Three wells were excluded from all technetium-99 input files based on input from the GIA project scientist (Appendix A, Table A-4).

6.2.9.7 Tritium

Tritium was mapped using a single kriging grid covering the entire GIA (Figure C-52). Measurement locations in the 200-UP-1 GIA were included to ensure plume continuity across the GIA boundary.

The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-20, and the final interpolation input dataset is provided in Appendix B.

Several data points representing annual average tritium concentrations measured by U.S. Ecology in 2019 were included as Type 1 data points. Points representing average P&T system effluent concentrations were added as Type 1 data points at the locations of the unconfined injection wells (Appendix A, Table A-5).

One well was excluded from all tritium input files based in input from the GIA project scientist (Appendix A, Table A-4).

6.2.9.8 Trichloroethene

Trichloroethene was mapped using a single kriging grid covering the entire GIA (Figure C-53). Measurement locations in the 200-UP-1 GIA were included to ensure plume continuity across the GIA boundary. The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-20, and the final interpolation input dataset is provided in Appendix B.

Points representing average P&T system effluent concentrations were added at the locations of the unconfined injection wells. In addition, several Type 1 data points were included, representing annual average trichloroethene concentrations measured by U.S. Ecology in 2019. Two Type 1 data points were included corresponding to non-detects with a standard reporting limit much higher than their corresponding detection limit; for those data points, the detection limit was used instead. One Type 3 data point was included based on input from the GIA project scientist (Appendix A, Table A-5).

One well was excluded from all trichloroethene input files based on input from the GIA project scientist, because nearby well has higher concentrations (Appendix A, Table A-4).

Three 2019 samples associated with field blank contamination were excluded from input files (Appendix A, Table A-2).

6.2.9.9 Carbon Tetrachloride

During CY2012 the approximate extent of carbon tetrachloride (CTET) in groundwater within 200 West was mapped in three dimensions using a 3D kriging technique as detailed in the calculation brief ECF-200ZP1-13-0006, *Description of Groundwater Modeling Calculations for the Calendar Year 2012 (CY2012) 200 Areas Pump-and-Treat Report*. At that time, groundwater quality results obtained from sampling of wells in addition to characterization data obtained between CY2002 and CY2011 were used as inputs into the mapping. Doing so provided a combination of recent information on CTET concentrations (recent well samples) together with less current but highly informative data on the vertical distribution of CTET at the time of drilling (characterization data). Since that time, this 3D depiction has been used as the initial condition for groundwater contaminant fate and transport (F&T) modeling using the Central Plateau groundwater model (CPGWM) to evaluate the performance of the 200 West groundwater P&T as detailed in several annual groundwater P&T reports. During that time, 2D kriging has been used on an annual basis to provide approximate depictions of the extent of CTET within 200 West, in a manner consistent with the mapping approach used for other contaminants throughout Hanford Site groundwater as described for CY2014 in DOE/RL-2015-07, *Hanford Site Groundwater Monitoring Report for 2014*, and ECF-Hanford-15-0003, *Calculation and Depiction of Groundwater Contamination for the Calendar Year 2014 Hanford Site Groundwater Monitoring Report*. For CY2015, for purposes of performance evaluation of the 200 West P&T system, it was necessary to update the approximate extent of CTET in 3D, providing a more current initial condition for predictive F&T modeling and maps were

prepared for purposes of the CY2015 Sitewide monitoring report. The approximate current extent of CTET in groundwater was mapped in 3D using a hybrid of 3D kriging and groundwater F&T transport modeling. The sequential and iterative steps are described in detail in ECF-200W-16-0092, *Calculation of Three-Dimensional Groundwater Concentration Plumes for 200-West for Calendar Year (CY) 2015*.

In fiscal year (FY) 2019 the CPGWM, which was originally developed to support the 200-ZP-1 OU for Rev. 0 of the Remedial Design/Remedial Action Work Plan (DOE/RL-2008-78, *200 West Area 200-ZP-1 Pump-and-Treat Remedial Design/Remedial Action Work Plan*) and focused on near-term plume behavior was retired in favor of the Plateau to River Groundwater Model (P2RGWM) (CP-57037, *Model Package Report: Plateau to River Groundwater Model Version 8.3*) to provide far-field simulation capability integrated between 200-West and 200-East. 3D plume depictions and initial conditions could not be easily translated from CPGWM to P2RGWM because of their differences regarding layer discretization. A separate ECF describes methods and calculations used to generate initial conditions for P2RGWM model to make predictions for the future F&T of the COIs in the 200 ZP-1 and UP-1 OUs.

For CY2019, CTET was mapped in 3D, implementing a hybrid approach of 3D kriging of the processed CY2019 data, with groundwater F&T transport modeling providing additional information for improving the interpolation results. This mapping process is described below:

1. Migration simulation – first, the migration of the 3D CTET plume that was mapped in CY2015 and used as an initial condition for F&T modeling, was simulated using the P2RGWM. The purpose of this step was to migrate the depiction of CTET that was prepared for CY2015 to provide an approximate distribution of CTET in CY2019.

2. Average sample results – next, the average sampled value of CTET obtained from monitoring and extraction wells data between January and December 2019 was calculated, to represent the best-estimate of CTET concentrations during CY2019. Because of monitoring wells lack of spatial coverage in 200 West central area, concentration data from several extraction wells were included in the interpolation data set with exception of extraction wells with CTET concentration values less than neighboring monitoring wells. Data used for the interpolation and the list of wells excluded from interpolation are listed in Table 6-22.

3. The data set from Step 2 was then interpolated using universal kriging (UK) to provide a continuous 3D depiction of CTET throughout 200 West. UK is a variant of the ordinary kriging with a local trend or external drift. Advantages of using UK are:

    a. Enables inclusion of an underlying trend

    b. Trend coefficients estimated through mapping

    c. Resulting map reproduces measured data and includes underlying deterministic “pattern(s)”

3D spatial interpolation was performed using GWD which supports the updated version of QUANTILE program that allows interpolations in 3D. GWD was used to import simulated CTET plume from step 1 and execute 3D interpolation using the simulated plume as an external drift and providing a 3D depiction of the extent of CTET that generally honors the recently-sampled CTET values, while reflecting patterns in the distribution of CTET that were impacted by 200W P&T system simulated using P2RGWM. For the 3D interpolation a log-transformation of the data was implemented and a spherical variogram was used, with a range of 1,500 m, a vertical anisotropy of 0.2 and a sill of 4.

For the purposes of this sitewide groundwater monitoring report, three depictions of CTET are prepared:

- The first represents the maximum mapped values of CTET above the Ringold Formation member of Wooded Island – lower mud unit (Figure C-54).
- The second represents CTET depiction below the Ringold Formation member of Wooded Island – lower mud unit (Figure C-55).
- The third represents the maximum 2D footprint of CTET (Figure C-56).

Table 6-22. Interpolation Dataset for the 200-ZP-1 Carbon Tetrachloride

Name	Easting	Northing	Elevation* (m)	Concentration (µg/L)	Well Type	Excluded
299-W10-1	566,663.1	136,734.6	132.52	130.00	Monitoring	-
299-W10-14	566,017.2	136,608.9	80.37	0.18	Monitoring	-
299-W10-27	566,844.0	136,441.8	129.99	106.00	Monitoring	-
299-W10-30	566,082.8	136,739.3	131.66	26.40	Monitoring	-
299-W10-31	566,266.4	136,968.3	131.19	9.40	Monitoring	-
299-W11-13	567,099.4	136,424.0	106.78	150.00	Monitoring	-
299-W11-18	567,181.9	137,161.5	130.45	26.50	Monitoring	-
299-W11-43	567,269.7	136,971.0	85.00	96.80	Monitoring	-
299-W11-45	566,992.8	136,775.6	124.93	640.00	Monitoring	-
299-W11-47	566,933.8	136,680.7	121.41	487.00	Monitoring	-
299-W11-48	566,882.0	136,846.2	110.61	879.00	Monitoring	-
299-W11-49	567,361.5	135,924.7	112.38	630.00	Extraction	-
299-W11-50	566,966.3	136,756.6	107.00	558.50	Extraction	-
299-W11-87	568,150.0	136,650.0	110.00	1,830.00	Monitoring	-
299-W11-88	567,874.7	137,113.1	79.35	159.00	Monitoring	-
299-W11-90	567,306.8	136,519.7	100.19	921.50	Extraction	-
299-W11-92	566,692.9	136,351.8	106.28	77.10	Extraction	-
299-W11-96	567,774.8	136,772.2	105.04	966.17	Extraction	-
299-W11-97	568,317.6	135,875.9	94.62	251.50	Monitoring	-
299-W12-2	568,312.7	136,610.3	101.70	824.75	Extraction	-
299-W12-3	568,321.5	136,998.1	103.05	460.00	Extraction	-
299-W12-4	568,327.4	136,363.7	92.79	599.75	Extraction	-
299-W13-1	568,148.7	136,048.6	98.32	1,550.00	Monitoring	-
299-W13-2P	568,832.6	135,819.2	125.52	70.00	Monitoring	-

Table 6-22. Interpolation Dataset for the 200-ZP-1 Carbon Tetrachloride

Name	Easting	Northing	Elevation* (m)	Concentration (µg/L)	Well Type	Excluded
299-W13-2Q	568,832.6	135,819.2	107.23	39.00	Monitoring	-
299-W14-11	566,901.7	136,287.6	123.09	380.00	Monitoring	-
299-W14-13	566,901.7	136,282.4	129.20	270.00	Monitoring	-
299-W14-14	566,898.4	136,181.0	129.45	128.00	Monitoring	-
299-W14-20	566,909.2	136,284.5	105.40	416.25	Extraction	-
299-W14-21	567,721.5	135,890.0	93.58	573.25	Extraction	-
299-W14-22	568,324.7	136,117.3	97.48	406.83	Extraction	-
299-W14-71	567,733.4	135,567.8	91.18	408.00	Monitoring	-
299-W14-72	567,328.4	135,941.3	87.19	1,030.00	Monitoring	-
299-W14-73	567,359.0	136,204.6	97.59	832.00	Extraction	-
299-W14-74	567,781.5	136,381.3	98.82	953.25	Extraction	-
299-W15-11	566,412.3	136,000.7	134.21	40.20	Monitoring	-
299-W15-152	566,309.4	135,550.0	132.14	4.73	Monitoring	-
299-W15-17	566,306.9	135,719.0	78.93	3.79	Monitoring	-
299-W15-225	566,657.4	136,108.9	105.79	59.23	Extraction	-
299-W15-7	566,675.9	135,920.2	122.32	29.00	Monitoring	-
299-W15-763	566,809.2	136,028.8	130.86	45.00	Monitoring	-
299-W15-765	566,697.0	136,373.1	131.05	28.00	Monitoring	-
299-W15-83	566,304.5	135,826.2	131.99	16.00	Monitoring	-
299-W15-94	566,307.6	135,640.3	132.11	5.10	Monitoring	-
299-W17-2	566,951.6	135,806.2	109.97	387.00	Extraction	-
299-W17-3	566,925.9	135,325.0	106.32	153.50	Extraction	-
299-W18-21	566,097.7	134,978.7	136.51	0.30	Monitoring	-
299-W18-22	566,088.6	134,990.2	72.58	3.20	Monitoring	-
299-W18-40	566,723.3	134,996.4	130.87	34.00	Monitoring	-
299-W19-105	567,565.2	134,745.4	129.82	40.60	Monitoring	-
299-W19-107	567,997.9	135,205.7	119.73	127.00	Monitoring	-
299-W19-111	567,313.0	135,547.0	107.67	316.67	Monitoring	-
299-W19-113	567,689.6	135,008.2	115.93	73.63	Monitoring	-

Table 6-22. Interpolation Dataset for the 200-ZP-1 Carbon Tetrachloride

Name	Easting	Northing	Elevation* (m)	Concentration (µg/L)	Well Type	Excluded
299-W19-114	567,901.9	135,013.2	116.66	54.48	Monitoring	-
299-W19-115	567,372.0	135,012.0	124.15	98.00	Monitoring	-
299-W19-116	568,510.2	135,090.2	124.74	15.00	Monitoring	-
299-W19-123	567,511.7	134,988.1	105.81	165.00	Monitoring	-
299-W19-125	567,720.1	135,090.9	108.19	111.93	Monitoring	-
299-W19-126	567,397.3	135,101.2	83.74	81.50	Characterization	-
299-W19-126	567,397.3	135,101.2	89.85	171.00	Characterization	-
299-W19-126	567,397.3	135,101.2	95.92	200.00	Characterization	-
299-W19-126	567,397.3	135,101.2	102.11	147.00	Characterization	-
299-W19-126	567,397.3	135,101.2	108.19	68.70	Characterization	-
299-W19-126	567,397.3	135,101.2	114.32	104.00	Characterization	-
299-W19-126	567,397.3	135,101.2	115.10	136.00	Characterization	-
299-W19-126	567,397.3	135,101.2	120.27	116.00	Characterization	-
299-W19-126	567,397.3	135,101.2	126.46	106.00	Characterization	-
299-W19-131	568,060.1	135,008.1	90.59	33.60	Characterization	-
299-W19-131	568,060.1	135,008.1	96.75	44.90	Characterization	-
299-W19-131	568,060.1	135,008.1	102.80	0.61	Characterization	-
299-W19-131	568,060.1	135,008.1	108.73	76.70	Characterization	-
299-W19-131	568,060.1	135,008.1	115.30	94.90	Characterization	-
299-W19-131	568,060.1	135,008.1	122.17	87.20	Characterization	-
299-W19-131	568,060.1	135,008.1	125.89	46.80	Characterization	-
299-W19-131	568,060.1	135,008.1	126.36	25.10	Characterization	-
299-W19-131	568,060.1	135,008.1	128.84	23.20	Characterization	-
299-W19-34A	567,673.6	135,012.2	113.34	54.80	Monitoring	-
299-W19-34B	567,662.9	135,010.7	87.57	44.30	Monitoring	-
299-W19-36	567,634.7	135,017.1	128.68	66.50	Monitoring	-
299-W19-4	567,949.9	135,350.8	98.29	150.00	Monitoring	-
299-W19-41	566,896.5	135,004.5	132.09	92.60	Monitoring	-
299-W19-47	566,895.3	135,161.9	131.01	76.10	Monitoring	-

Table 6-22. Interpolation Dataset for the 200-ZP-1 Carbon Tetrachloride

Name	Easting	Northing	Elevation* (m)	Concentration (µg/L)	Well Type	Excluded
299-W19-48	567,822.9	134,926.0	126.91	6.10	Monitoring	-
299-W19-49	567,568.0	134,894.4	129.01	67.30	Monitoring	-
299-W19-6	567,133.3	134,693.8	89.79	35.70	Monitoring	-
299-W20-1	568,220.0	135,054.0	89.54	32.60	Characterization	-
299-W20-1	568,220.0	135,054.0	95.66	48.80	Characterization	-
299-W20-1	568,220.0	135,054.0	101.58	63.90	Characterization	-
299-W20-1	568,220.0	135,054.0	108.81	89.00	Characterization	-
299-W20-1	568,220.0	135,054.0	115.23	34.30	Characterization	-
299-W20-1	568,220.0	135,054.0	120.29	37.20	Characterization	-
299-W20-1	568,220.0	135,054.0	124.53	149.00	Characterization	-
299-W20-1	568,220.0	135,054.0	124.62	96.30	Characterization	-
299-W20-1	568,220.0	135,054.0	126.36	151.00	Characterization	-
299-W21-2	568,124.4	134,573.8	129.51	11.20	Monitoring	-
299-W22-47	566,908.7	134,076.3	130.50	49.00	Monitoring	-
299-W22-72	567,237.4	134,207.1	129.77	38.45	Monitoring	-
299-W22-86	567,186.7	134,041.3	129.81	26.30	Monitoring	-
299-W22-87	567,541.8	134,539.9	129.66	10.00	Monitoring	-
299-W22-88	568,046.5	134,390.5	128.25	3.60	Monitoring	-
299-W22-90	566,961.4	134,483.2	125.49	82.15	Extraction	-
299-W22-91	566,911.8	134,134.5	123.59	55.08	Extraction	-
299-W22-92	567,167.8	134,029.8	125.57	70.63	Extraction	-
299-W23-19	566,759.1	134,166.7	132.62	54.50	Monitoring	-
299-W23-4	566,628.2	134,391.9	129.85	37.45	Monitoring	-
299-W26-13	566,424.4	133,293.6	132.06	0.30	Monitoring	-
299-W26-14	566,682.7	133,539.2	131.26	2.60	Monitoring	-
299-W27-2	566,908.3	133,670.4	81.15	1.91	Monitoring	-
299-W5-1	568,329.7	137,321.2	105.90	190.67	Extraction	-
299-W5-2P	568,175.4	137,621.1	108.91	195.00	Monitoring	-
299-W5-2Q	568,175.4	137,621.1	90.61	310.00	Monitoring	-

Table 6-22. Interpolation Dataset for the 200-ZP-1 Carbon Tetrachloride

Name	Easting	Northing	Elevation* (m)	Concentration (µg/L)	Well Type	Excluded
299-W6-15	567,781.7	137,076.4	102.09	870.75	Monitoring	-
299-W6-17	567,750.0	137,450.0	74.56	1,120.00	Characterization	-
299-W6-17	567,750.0	137,450.0	78.40	1,000.00	Characterization	-
299-W6-17	567,750.0	137,450.0	83.00	903.00	Characterization	-
299-W6-17	567,750.0	137,450.0	87.30	1,050.00	Characterization	-
299-W6-17	567,750.0	137,450.0	89.10	1,340.00	Characterization	-
299-W6-17	567,750.0	137,450.0	95.17	929.00	Characterization	-
299-W6-17	567,750.0	137,450.0	101.32	166.00	Characterization	-
299-W6-17	567,750.0	137,450.0	107.39	56.80	Characterization	-
299-W6-17	567,750.0	137,450.0	113.61	67.90	Characterization	-
299-W6-17	567,750.0	137,450.0	119.55	46.80	Characterization	-
299-W6-17	567,750.0	137,450.0	125.68	42.00	Characterization	-
299-W6-3	567,118.2	137,299.1	86.96	1.40	Monitoring	-
299-W6-6	567,318.7	137,638.7	87.28	0.30	Monitoring	-
299-W7-3	566,292.0	137,638.6	65.37	0.58	Monitoring	-
699-30-66	569,991.0	132,739.2	90.83	0.52	Monitoring	-
699-32-62	571,009.6	133,215.9	122.84	0.35	Monitoring	-
699-32-72A	567,942.7	133,362.6	110.17	0.79	Monitoring	-
699-32-76	566,683.9	133,137.7	129.45	0.19	Monitoring	-
699-33-75	566,907.8	133,662.5	129.64	3.97	Monitoring	-
699-33-76	566,621.2	133,600.4	130.20	1.90	Monitoring	-
699-34-61	571,395.9	133,809.9	125.43	0.49	Monitoring	-
699-35-66A	569,857.9	134,099.2	128.71	0.99	Monitoring	-
699-35-78A	566,063.6	134,271.3	134.36	21.20	Monitoring	-
699-36-61A	571,395.5	134,557.1	123.42	0.00	Monitoring	-
699-36-63B	570,683.5	134,228.7	121.42	0.88	Monitoring	-
699-36-66B	569,731.3	134,469.0	125.53	2.59	Monitoring	-
699-36-70A	568,466.7	134,308.8	129.95	1.65	Monitoring	-
699-36-70B	568,427.8	134,626.0	128.65	12.00	Monitoring	-

Table 6-22. Interpolation Dataset for the 200-ZP-1 Carbon Tetrachloride

Name	Easting	Northing	Elevation* (m)	Concentration (µg/L)	Well Type	Excluded
699-37-66	569,730.3	134,797.2	125.16	1.90	Monitoring	-
699-38-61	571,219.1	134,997.3	122.38	0.30	Monitoring	-
699-38-64B	569,900.2	135,319.9	123.81	3.00	Monitoring	-
699-38-65	570,090.2	135,039.8	128.68	1.00	Monitoring	-
699-38-70B	568,469.1	135,331.0	95.57	62.60	Monitoring	-
699-38-70C	569,084.1	135,325.6	103.04	16.00	Monitoring	-
699-39-68	569,077.9	135,332.8	111.95	12.20	Monitoring	-
699-40-62	571,164.3	135,764.4	123.43	0.18	Monitoring	-
699-40-65	570,057.5	135,881.2	124.13	5.41	Monitoring	-
699-43-69	568,967.0	136,488.5	99.22	250.00	Monitoring	-
699-44-70B	568,670.1	136,810.4	73.43	142.00	Characterization	-
699-44-70B	568,670.1	136,810.4	79.49	153.00	Characterization	-
699-44-70B	568,670.1	136,810.4	85.46	171.00	Characterization	-
699-44-70B	568,670.1	136,810.4	91.68	200.50	Characterization	-
699-44-70B	568,670.1	136,810.4	97.81	247.00	Characterization	-
699-44-70B	568,670.1	136,810.4	98.79	203.00	Characterization	-
699-44-70B	568,670.1	136,810.4	99.72	250.00	Monitoring	-
699-44-70B	568,670.1	136,810.4	103.91	225.00	Characterization	-
699-44-70B	568,670.1	136,810.4	121.07	17.70	Characterization	-
699-45-69A	568,729.3	137,182.7	125.69	0.19	Monitoring	-
699-45-69C	568,947.1	137,233.8	107.53	20.00	Monitoring	-
699-46-61	571,431.2	137,442.4	107.27	0.30	Characterization	-
699-46-61	571,431.2	137,442.4	113.02	0.30	Characterization	-
699-46-61	571,431.2	137,442.4	118.90	0.30	Characterization	-
699-46-61	571,431.2	137,442.4	119.30	0.30	Characterization	-
699-47-60	571,474.4	137,968.7	120.78	0.23	Monitoring	-
699-47-78	566,045.5	137,800.7	69.71	0.30	Characterization	-
699-47-78	566,045.5	137,800.7	76.18	0.58	Characterization	-
699-47-78	566,045.5	137,800.7	82.24	1.15	Characterization	-

Table 6-22. Interpolation Dataset for the 200-ZP-1 Carbon Tetrachloride

Name	Easting	Northing	Elevation* (m)	Concentration (µg/L)	Well Type	Excluded
699-47-78	566,045.5	137,800.7	106.57	3.55	Characterization	-
699-47-78	566,045.5	137,800.7	119.12	2.00	Characterization	-
699-47-78	566,045.5	137,800.7	131.34	0.30	Characterization	-
699-47-78	566,045.5	137,800.7	135.09	0.60	Characterization	-
699-47-78B	566,046.3	137,926.7	68.91	0.30	Characterization	-
699-47-78B	566,046.3	137,926.7	86.97	0.70	Characterization	-
699-47-78B	566,046.3	137,926.7	93.07	34.30	Characterization	-
699-47-78B	566,046.3	137,926.7	105.26	44.70	Characterization	-
699-47-78B	566,046.3	137,926.7	110.38	15.40	Characterization	-
699-47-78B	566,046.3	137,926.7	117.60	10.07	Characterization	-
699-47-78B	566,046.3	137,926.7	123.67	6.38	Characterization	-
699-47-78B	566,046.3	137,926.7	129.73	1.99	Characterization	-
699-47-78C	566,046.2	138,045.8	69.12	4.14	Characterization	-
699-47-78C	566,046.2	138,045.8	75.13	6.34	Characterization	-
699-47-78C	566,046.2	138,045.8	81.16	4.27	Characterization	-
699-47-78C	566,046.2	138,045.8	105.70	17.30	Characterization	-
699-47-78C	566,046.2	138,045.8	117.90	20.30	Characterization	-
699-47-78C	566,046.2	138,045.8	124.14	3.58	Characterization	-
699-47-78C	566,046.2	138,045.8	130.09	1.87	Characterization	-
699-48-70	568,501.6	138,200.9	93.77	2.41	Characterization	-
699-48-70	568,501.6	138,200.9	99.89	5.92	Characterization	-
699-48-70	568,501.6	138,200.9	104.28	80.50	Characterization	-
699-48-70	568,501.6	138,200.9	106.02	40.40	Characterization	-
699-48-70	568,501.6	138,200.9	112.11	33.90	Characterization	-
699-48-70	568,501.6	138,200.9	113.62	87.50	Monitoring	-
699-48-70	568,501.6	138,200.9	118.27	149.00	Characterization	-
699-48-70	568,501.6	138,200.9	124.31	90.50	Characterization	-
699-48-71	568,387.9	138,056.9	128.42	163.00	Monitoring	-
699-49-100C	559,303.7	138,503.2	135.34	0.24	Monitoring	-

Table 6-22. Interpolation Dataset for the 200-ZP-1 Carbon Tetrachloride

Name	Easting	Northing	Elevation* (m)	Concentration (µg/L)	Well Type	Excluded
699-50-74	567,359.5	138,646.7	127.24	0.19	Monitoring	-
699-51-63	570,664.4	139,148.4	121.82	0.15	Monitoring	-
CP	569,750.0	134,350.0	120.00	1.00	Monitoring	-

*Elevation represents elevation of the middle of the screen for monitoring and pumping wells and reported sampling elevation for characterization samples.

6.2.10 300-FF-5 (618-11 Burial Ground)

The list of COIs and data selection parameters is provided in Table 6-23.

Table 6-23. COIs and Data Selection Parameters for 300-FF-5 (618-11 Burial Ground)

Operable Unit	Contaminant of Interest	DORS	High River Stage	Low River Stage	COMB CHROM	MAX AQ	CT	CTAQ	CTC
300-F-BG	Nitrate	--	--	--	--	y	MEAN VALOR ND SRL	MAX VALOR ND SRL	MAX VALOR ND SRL
300-F-BG	Tritium	--	--	--	--	y	MEAN VALOR ND MDA	MAX VALOR ND MDA	MAX VALOR ND MDA

Kriging interpolation parameters, along with the name of the corresponding QUANTILE input file(s) and figures, are provided in Table 6-24. The QUANTILE input datasets are provided in Appendix B.

Table 6-24. COIs and Interpolation Parameters for 300-FF-5 (618-11 Burial Ground)

Contaminant of Interest	Kriging Type	Minimum Range (m)	Maximum Range (m)	Angle (degrees)	File Name	Figure
Nitrate	RNK	350	1100	75	300-F-BG_Nitrate.dat	Figure C-57
Tritium	RNK	180	750	80	300-F-BG_Tritium.dat	Figure C-58

RNK = quantile kriging

One well was excluded from all 300-FF-5 interpolation input files because its screened interval was outside the aquifer zone of interest. All excluded data are listed in Appendix A, Table A-4.

6.2.10.1 Nitrate

Nitrate was mapped using a single kriging grid covering the 618-11 area (Figure C-57). The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-23, and the final interpolation input datasets are provided in Appendix B.

One Type 3 data point was included based on input from the GIA project scientist (Appendix A, Table A-5).

6.2.10.2 Tritium

Tritium was mapped using a single kriging grid covering the 618-11 area (Figure C-58). The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-23, and the final interpolation input dataset is provided in Appendix B.

Several data points were included, representing annual average tritium concentrations measured by Energy Northwest in 2018 (Energy Northwest, 2019). In addition, one Type 3 data point was included based on input from the GIA project scientist, and is described in Appendix A, Table A-4.

6.2.11 Main 300 Area

The list of COIs and data selection parameters is provided in Table 6-25.

Kriging interpolation parameters, along with the name of the corresponding QUANTILE input file(s) and figures, are provided in Table 6-26. The QUANTILE input datasets are provided in Appendix B.

Table 6-25. COIs and Data Selection Parameters for 1100-EM-1/Main 300 Area

Operable Unit	Contaminant of Interest	DORS	High River Stage	Low River Stage	COMB CHROM	MAX AQ	CT	CTAQ	CTC
300-FF-5	Nitrate	--	--	--	--	y	MEAN VALOR ND SRL	MAX VALOR ND SRL	MAX VALOR ND SRL
300-FF-5	Trichloroethene	--	--	--	--	y	MEAN VALOR ND SRL	MAX VALOR ND SRL	MAX VALOR ND SRL
300-FF-5	Tritium	--	--	--	--	y	MEAN VALOR ND MDA	MAX VALOR ND MDA	MAX VALOR ND MDA
300-FF-5	Uranium	Uranium	6/1/2019-6/30/2019	12/1/2019-12/31/2019	--	y	MEAN VALOR ND SRL	MEANV ALOR ND SRL	MAX VALOR ND SRL
300-FF-5-399-8-5A (Separate plume in vicinity of 399-8-5A)	Uranium	Uranium	6/1/2019-6/30/2019	12/1/2019-12/31/2019	--	y	MEAN VALOR ND SRL	MEANV ALOR ND SRL	MAX VALOR ND SRL

Table 6-26. COIs and Interpolation Parameters for 1100-EM-1/Main 300 Area

Contaminant of Interest	Kriging Type	Minimum Range (m)	Maximum Range (m)	Angle (degrees)	File Name	Figure
Nitrate	MIK	3,000	5,000	40	300-FF-5_Nitrate.dat	Figure C-59
Trichloroethene	RNK	1,052	1,400	90	300-FF-5_Trichloroethene.dat	Map not developed as interpolation of the corresponding datasets did not result in concentration distributions above the applicable standards
Tritium	RNK	1,200	1,400	110	300-FF-5_Tritium.dat	Map not developed as interpolation of the dataset did not result in a distribution above the applicable standard
Uranium June Dataset	MIK	500	900	165	300-FF-5_Uranium_HI.dat	Figure C-60
Uranium in vicinity of 399-8-5A	LOG	300	450	130	300-FF-5-399-8-5A_Uranium_HI.dat	Figure C-60
Uranium December Dataset	LOG	600	900	130	300-FF-5_Uranium_LO.dat	Figure C-61

LOG = logarithmic transformation
MIK = multiple indicator kriging
RNK = quantile kriging

A map for trichloroethene and tritium were not developed as interpolation of the dataset did not result in a distribution above the applicable standard.

Several wells were excluded from all 1100-EM-1/Main 300 Area interpolation input files because their screened interval was outside the aquifer zone of interest. All excluded data are listed in Appendix A, Table A-4.

6.2.11.1 Nitrate

Nitrate was mapped using a single kriging grid covering the 1100-EM GIA and main 300 Area (Figure C-59). The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-25, and the final interpolation input datasets are provided in Appendix B.

Several Type 1 data points representing late 2018 Framatome groundwater data (Framatome, 2019) were added based on input from the GIA project scientist, and are described in Appendix A, Table A-5.

6.2.11.2 Trichloroethene

The trichloroethene dataset was prepared and interpolation was set up using a single kriging grid covering the main 300 Area. The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-25, and the final interpolation input dataset is provided in Appendix B.

A trichloroethene map in this GIA was not developed as interpolation of the dataset did not result in a distribution above the applicable standard.

6.2.11.3 Tritium

The tritium dataset was prepared, and interpolation was set up using a single kriging grid covering the main 300 Area. The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-25, and the final interpolation input dataset is provided in Appendix B.

A tritium map in the main 300 Area was not developed as interpolation of the dataset did not result in a distribution above the applicable standard.

6.2.11.4 Uranium

Uranium was mapped using a single kriging grid covering the main 300 Area (Figure C-60 and C-61). Measurement locations in the 1100-EM-1 GIA were not included (see Section 6.2.12). The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Data selection parameters are listed in Table 6-25, and the final interpolation input datasets are provided in Appendix B. Two uranium plume maps were generated, one representing conditions in June (6/1/2019 to 6/30/2019) and another representing conditions in December (12/1/2019 to 12/31/2019). Data were limited only to June and December 2019.

Some of the data from June 2019 were classified with a media type “Miscellaneous Materials” instead of “Groundwater” when the groundwater data were pulled from HEIS. These data were added to the June dataset because they were considered representative of aquifer conditions. Three additional Type 1 points from December were included in the June dataset for the separate plume around 399-8-5A to provide spatial definition to that plume. October 2019 data for four wells were added to the December dataset as Type 1 data points. Three Type 3 data points were added to December and one to June dataset based on input from the GIA project scientist to connect segments of plume for more realistic representation (Appendix A, Table A-5).

6.2.12 1100-EM-1

The list of COIs and data selection parameters is provided in Table 6-27.

Table 6-27. COIs and Data Selection Parameters for 1100-EM-1 Area

Operable Unit	Contaminant of Interest	DORS	High River Stage	Low River Stage	COMB CHROM	MAX AQ	CT	CTAQ	CTC
1100-EM	Uranium	--	--	--	--	y	MEAN VALOR ND SRL	MAX VALOR ND SRL	MAX VALOR ND SRL

Kriging interpolation parameters, along with the name of the corresponding QUANTILE input file(s) and figures, are provided in Table 6-28. The QUANTILE input datasets are provided in Appendix B.

Table 6-28. COIs and Interpolation Parameters for 1100-EM-1/Main 300-FF-5 Area

Contaminant of Interest	Kriging Type	Minimum Range (m)	Maximum Range (m)	Angle (degrees)	File Name	Figure
Uranium	LOG	900	1400	45	1100-EM_Uranium.dat	Figure C-62

LOG = logarithmic transformation

6.2.12.1 Uranium

Uranium was mapped using a single kriging grid covering the entire GIA (Figure C-62). The general data selection process detailed in Section 3.2.1 and Figure 3-2 was followed. Measurement locations in the 1100-EM-1 GIA and data from Framatome for 2018 (Framatome, 2019) were included in the interpolation. Data selection parameters are listed in Table 6-27, and the final interpolation input datasets are provided in Appendix B.

Several Type 1 data points representing late 2018 Framatome groundwater data (Framatome, 2019) were added based on input from the GIA project scientist, and are described in Appendix A, Table A-5.

6.3 Plume Area Calculations

Plume area calculations were performed using an automated method developed in the open-source programming language R by identifying the grid cells with concentrations above predefined levels and calculating the corresponding plume areal extent. Figure 6-1 shows the set of polygons used for defining the plume area calculation boundaries for each GIA. Tables 7-1 to 7-13 list the plume areas in each GIA corresponding to concentration levels defined for each COI. All areas are reported in units of m^2. A subset of the plume area calculations was verified using the ArcGIS software (ESRI, 2010, *ESRI ArcGIS*), and found to be consistent with the reported level of precision with the computed areas.

Plume areas are presented based on the portion of the plume that is encompassed by each GIA polygon, as depicted in Figure 6-1. Therefore, for plumes extending beyond the boundaries of a GIA, calculated plume areas will be reported for the neighboring GIA where the plume extends into, even though a separate plume map for that neighboring GIA is not provided. One exception to this convention is that for

100-KR-4 the polygon used for calculating the associated plume area for chromium did not coincide with the GIA boundary. Instead, it was extended east to ensure that the portion of the plume across the 100-KR-4/100-NR-2 boundary is properly considered as part of the 100-KR-4 plume. The plume area of all other COIs in 100-KR-4 was calculated using a polygon defining the GIA boundary.

Plume area calculations do not exclude parts of the plume that may be overlapping or partially extending into areas where the basalt or the mud is above the water table, unless noted otherwise in the summary tables provided in Chapter 7.

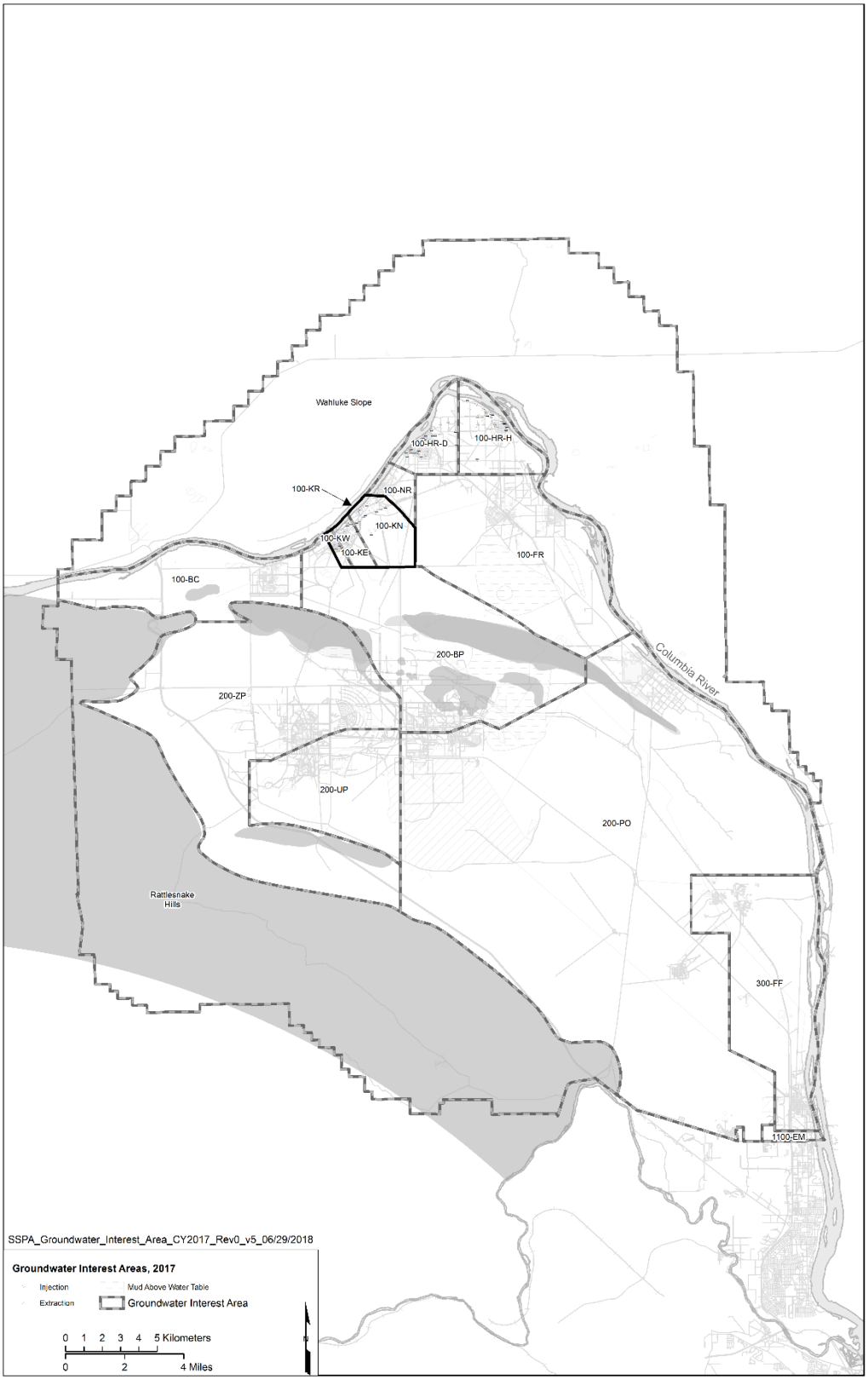


Figure 6-1. Groundwater Interest Area Boundaries for Plume Area Calculations

7 Results/Conclusions

Calculated plume maps for each combination of GIA and COI are provided in Appendix C. Also provided in Appendix C is a composite COI plume mosaic illustrating the calculated extent of contamination across the entire Hanford Site, based on the COI plume depictions developed for CY2019 (Figure C-63).

Calculated plume areas per COI and GIA are tabulated in Tables 7-1 through 7-13 below. Concentration levels for plume area calculations were selected by the project scientists to illustrate areal extents for the historically known concentration levels at the Hanford Site. These concentration levels are generally different from the intervals selected for the plume depictions presented in Appendix C, which reflect regulatory and other mapping requirements.

Table 7-1. Calculated Plume Area per GIA for Carbon-14

Groundwater Interest Area	Concentration (pCi/L)	Plume Area (m^2)
100-KR-4	1,000	112,175
	2,000	64,375
	5,000	37,575
	10,000	11,350

Table 7-2. Calculated Plume Area per GIA for Chromium

Groundwater Interest Area	Concentration (µg/L)	Plume Area (m^2)
100-BC-5	10	1,135,150
	20	120,225
	48	46,375
	100	-
	480	-
	4,800	-
100-KR-4: High river stage	10	1,006,075
	20	277,400
	48	57,550
	100	20,775
	480	325
	4,800	-

Table 7-2. Calculated Plume Area per GIA for Chromium

Groundwater Interest Area	Concentration (µg/L)	Plume Area (m^2)
100-KR-4: Low river stage	10	1,045,005
	20	187,000
	48	74,675
	100	34,475
	480	2,325
	4,800	-
100-NR-2: High river stage	10	602,450
	20	57,650
	48	-
	100	-
	480	-
	4,800	-
100-NR-2: Low river stage	10	607,825
	20	77,250
	48	-
	100	-
	480	-
	4,800	-
100-NR-2: Annual Average	10	642,900
	20	68,275
	48	-
	100	-
	480	-
	4,800	-
100-HR-3: High river stage	10	3,161,725
	20	1,026,350
	48	5,800
	100	450
	480	-

Table 7-2. Calculated Plume Area per GIA for Chromium

Groundwater Interest Area	Concentration (µg/L)	Plume Area (m^2)
	4,800	-
100-HR-3: Low river stage	10	2,863,925
	20	915,525
	48	13,125
	100	1,450
	480	-
	4,800	-
100-HR-3: RUM	10	3,460,725
	20	1,888,700
	48	980,500
	100	171,900
	480	100
	4,800	-
100-FR-3: Low river stage	10	136,014*
	20	130,061*
	48	12,775
	100	-
	480	-
	4,800	-
200-BP-5	10	N/A
	20	N/A
	48	-
	100	-
	480	-
	4,800	-
200-ZP-1	10	N/A
	20	N/A
	48	1,137,075
	100	272,850

Table 7-2. Calculated Plume Area per GIA for Chromium

Groundwater Interest Area	Concentration (µg/L)	Plume Area (m^2)
	480	-
	4,800	-
200-UP-1	10	N/A
	20	N/A
	48	8,392,525
	100	3,000,750
	480	-
	4,800	-
200-PO-1	10	N/A
	20	N/A
	48	3,280,925
	100	867,875
	480	-
	4,800	-

*Plume area excludes single-well plumes at 699-77-54, 699-83-47, and 699-87-42A, totaling 765,586 m^2 above 10 µg/L and 2,089 m^2 above 20 µg/L.

N/A = not applicable

RUM = Ringold upper mud

Table 7-3. Calculated Plume Area per GIA for Cyanide

Groundwater Interest Area	Concentration (µg/L)	Plume Area (m^2)
200-BP-5	200	177,500
	500	65,975
	1000	9,125
200-ZP-1	200	8,825
	500	7,125
	1000	2,325

Table 7-4. Calculated Plume Area per GIA for Iodine-129

Total	Concentration (pCi/L)	Plume Area (m^2)
200-ZP-1	1	133,050
	5	-
	10	-
	14	-
	16	-
	20	-
200-UP-1	1	4,059,175
	5	1,598,050
	10	459,925
	14	221,200
	16	134,825
	20	23,200
200-BP-5	1	5,333,825
	5	290,350
	10	1,775
	14	-
	16	-
	20	-
200-PO-1	1	54,819,450
	5	650,800
	10	11,825
	14	-
	16	-
	20	-

Table 7-5. Calculated Plume Area per GIA for Nitrate

Groundwater Interest Area	Concentration (mg/L)	Plume Area (m^2)
100-BC-5	45	-

Table 7-5. Calculated Plume Area per GIA for Nitrate

Groundwater Interest Area	Concentration (mg/L)	Plume Area (m^2)
	200	-
	450	-
100-KR-4	45	86,150
	200	-
	450	-
100-NR-2	45	715,100
	200	9,550
	450	-
100-HR-3	45	9,375
	200	-
	450	-
100-FR-3	45	6,056,228[a]
	200	47,525
	450	-
300-FF-5	45	308,950[b]
	200	2,050
	450	-
200-ZP-1	45	10,220,850
	200	2,002,200
	450	149,825
200-UP-1	45	6,889,225
	200	-
	450	-
200-BP-5	45	7,693,225
	200	325,375
	450	128,350
200-PO-1	45	3,900,400[c]
	200	-
	450	-

Table 7-5. Calculated Plume Area per GIA for Nitrate

Groundwater Interest Area	Concentration (mg/L)	Plume Area (m^2)
1100-EM	45	1,776,925[d]
	200	-
	450	-

a. Approximate calculated area excludes portion of interpolated plume overlaid by mud above water table (~ 1,760,000 m^2).

b. Plume area does not include portion of 1100-EM nitrate plume in 300-FF-5 Groundwater Interest Area (2,347,325 m^2).

c. Plume area does not include portion of 1100-EM nitrate plume in 200-PO-1 Groundwater Interest Area (125,250 m^2).

d. Plume footprint not included in the total area encompassed by the composite plume.

Table 7-6. Calculated Plume Area per GIA for Strontium-90

Groundwater Interest Area	Concentration (pCi/L)	Plume Area (m^2)
100-BC-5	8	506,075
	20	101,525
	80	-
100-KR-4	8	20,375
	20	14,050
	80	2,500
100-NR-2	8	614,725
	20	574,100
	80	419,700
	800	120,725
	8,000	8,200
100-HR-3	8	17,025
	20	1,950
	80	-
100-FR-3	8	120,500
	20	33,150
	80	1,400

Table 7-6. Calculated Plume Area per GIA for Strontium-90

Groundwater Interest Area	Concentration (pCi/L)	Plume Area (m^2)
200-BP-5	8	413,100
	20	265,175
	80	79,450
200-PO-1	8	925
	20	-
	80	-

Table 7-7. Calculated Plume Area per GIA for Trichloroethene

Groundwater Interest Area	Concentration (µg/L)	Plume Area (m^2)
100-KR-4	4	135,175
	5	68,250
	8	-
	10	-
100-FR-3	4	2,517,472*
	5	1,847,790*
	8	908,425
	10	496,875
300-FF-5	5	-
	8	-
	10	-
200-ZP-1	1	3,359,825
	4	1,705,825
	5	1,423,550
	8	362,650
	10	216,675
200-UP-1	1	2,402,425
	4	675,250
	5	516,675

Table 7-7. Calculated Plume Area per GIA for Trichloroethene

Groundwater Interest Area	Concentration (µg/L)	Plume Area (m^2)
	8	173,775
	10	99,800
200-PO-1	1	727,200.00
	4	469,200.00
	5	423,175
	8	301,550
	10	231,425

*Plume area excludes single-well plumes at 699-77-54, with 24,253 m^2 above 4 µg/L and 62,685 m^2 above 5 µg/L.

Table 7-8. Calculated Plume Area per GIA for Technetium-99

Groundwater Interest Area	Concentration (pCi/L)	Plume Area (m^2)
200-ZP-1	900	132,225
	3,000	31,875
	9,000	13,025
	20,000	100
200-UP-1	900	132,675
	3,000	34,400
	9,000	5,975
	20,000	-
200-BP-5	900	1,114,725
	3,000	354,150
	9,000	182,850
	20,000	6,050
200-PO-1	900	142,975
	3,000	39,750
	9,000	4,450
	20,000	-

Table 7-9. Calculated Plume Area per GIA for TPH-D (Annual Average)

Groundwater Interest Area	Concentration (µg/L)	Plume Area (m^2)
100-NR-2	500	21,050
	1,000	16,725
	2,000	12,550
	5,000	7,225
	10,000	5,350

Table 7-10. Calculated Plume Area per GIA for Tritium

Groundwater Interest Area	Concentration (pCi/L)	Plume Area (m^2)
100-KR-4	20,000	86,750
	45,000	17,725
100-NR-2	20,000	2,800
	45,000	1,150
300-FF-5	20,000	141,075
	45,000	42,200
200-ZP-1	20,000	140,550
	45,000	13,400
200-UP-1	20,000	3,728,200
	45,000	1,536,325
200-BP-5	20,000	29,625
	45,000	250
200-PO-1	20,000	56,838,675
	45,000	5,507,725

Table 7-11. Calculated Plume Area per GIA for Uranium

Groundwater Interest Area	Concentration (µg/L)	Plume Area (m^2)
300-FF-5: June	30	317,875
	300	750

Table 7-11. Calculated Plume Area per GIA for Uranium

Groundwater Interest Area	Concentration (µg/L)	Plume Area (m^2)
300-FF-5: December	30	204,225
	300	1,275
200-BP-5	30	190,325
	300	250
200-UP-1	30	108,700
	300	6,900
200-PO-1	30	61,275
	300	-

Table 7-12. Calculated Plume Area per GIA for Carbon Tetrachloride

Groundwater Interest Area	Concentration (µg/L)	Plume Area (m^2)
200-ZP-1	3.4	12,060,000
	4	11,107,500
	5	10,060,000
	50	4,347,500
	100	3,647,500
	500	1,672,500
	1,000	475,000
	2,000	-
200-UP-1	3.4	8,050,000
	4	7,572,500
	5	6,960,000
	50	2,240,000
	100	1,205,000
	500	110,000
	1,000	-
	2,000	-

Table 7-13. Calculated Plume Area per GIA for Chloroform

Groundwater Interest Area	Concentration (µg/L)	Plume Area (m^2)
200-ZP-1	1	7,478,875
	5	2,368,500
	10	72,350
	20	8,900
200-UP-1	1	6,437,625
	5	742,800
	10	56,625
	20	-

The composite plume, as shown in Figure C-63, has a total area of 160,214,075 square meters, when the nitrate plume in 1100-EM is excluded from the calculation.

8 References

Bohling, G., 2005, *Introduction to Geostatistics and Variogram Analysis*, Kansas Geological Survey, 1, 1-20.

Chilès, J-P, and P Delfiner, 1999, *Geostatistics: Modeling Spatial Uncertainty*, John Wiley & Sons, Inc., New York, New York.

CP-57037, 2020, *Model Package Report: Plateau to River Groundwater Model (Version 8.3)*, Rev. 2, CH2M HILL Plateau Remediation Company, Richland Washington. Available at: https://pdw.hanford.gov/document/AR-03674.

Cressie, N.A.C., 1993, *Statistics for Spatial Data*, John Wiley & Sons, New York, New York.

Deutsch, C.V. and A.G. Journel, 1992, *GSLIB: Geostatistical Software Library and User's Guide*, Oxford University Press, Inc., New York, New York.

DOE/RL-2008-78, 2009, *200 West Area 200-ZP-1 Pump-and-Treat Remedial Design/Remedial Action Work Plan*, Rev. 0 REISSUE, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: https://pdw.hanford.gov/document/0096137.

DOE/RL-2011-118, 2012, *Hanford Site Groundwater Monitoring for 2011*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0091795.

DOE/RL-2015-07, 2015, *Hanford Site Groundwater Monitoring Report for 2014*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: https://pdw.hanford.gov/arpir/pdf.cfm?accession=0080600H.

DOE/RL-2019-66, 2020, *Hanford Site Groundwater Monitoring Report for 2019*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: https://pdw.hanford.gov/document/AR-04023.

ECF-100KR2-12-0021, 2012, *Modeling Evaluation of Waste Sites Near 100-KE Reactor*, Rev. 0, CH2M HILL Plateau Remediation Company, Richland, Washington. Available at: https://pdw.hanford.gov/document/0079496H.

ECF-100KR4-11-0113, 2012, *Modeling of RI/FS Design Alternatives for 100-KR-4*, Rev. 3, CH2M HILL Plateau Remediation Company, Richland, Washington. Available at: https://pdw.hanford.gov/document/0064666H.

ECF-200P01-09-2352, 2010, *200-PO-1 Remedial Investigation Report – Near-Field Groundwater Contaminant Fate and Transport Modeling*, Rev. 0, CH2M HILL Plateau Remediation Company, Richland, Washington. Available at: https://pdw.hanford.gov/document/0084348.

ECF-200W-16-0092, 2018, *Calculation of Three-Dimensional Groundwater Concentration Plumes for 200-West for Calendar Year (CY) 2015*, Rev. 1, CH2M HILL Plateau Remediation Company, Richland, Washington. Available at: https://pdw.hanford.gov/document/AR-01148.

ECF-200ZP1-13-0006, 2013, *Description of Groundwater Modeling Calculations for the Calendar Year 2012 (CY2012) 200 Areas Pump-and-Treat Report*, Rev. 0, CH2M HILL Plateau Remediation Company, Richland, Washington. Available at: https://pdw.hanford.gov/document/0078751H.

ECF-Hanford-15-0003, 2015, *Calculation and Depiction of Groundwater Contamination for the Calendar Year 2014 Hanford Site Groundwater Monitoring Report*, Rev. 0, CH2M HILL Plateau Remediation Company, Richland, Washington. Available at: https://pdw.hanford.gov/document/0079509H.

ECF-Hanford-16-0061, 2016, *Calculation and Depiction of Groundwater Contamination for the Calendar Year 2015 Hanford Site Groundwater Monitoring Report*, Rev. 0, CH2M HILL Plateau Remediation Company, Richland, Washington. Available at: https://pdw.hanford.gov/document/0075373H.

Energy Northwest, 2019, *2018 Annual Radiological Environmental Operating Report for the Columbia Generating Station*, Energy Northwest, Richland, Washington. Available at: https://www.nrc.gov/docs/ML1912/ML19129A419.pdf.

ESRI, 2010, *ESRI ArcGIS*, Environmental Systems Research Institute, Inc., Redlands, California.

Framatome, 2019, *2018 Annual Groundwater Report*, E06-09-011, Version 1.0, Framatome, Inc., Richland, Washington.

Gowen, Steven, 2019, "U.S. Ecology Groundwater Data," (e-mail communication to M.J. Hartman), CH2M HILL Plateau Remediation Company, Richland, Washington, December 9.

Hartman, Mary, 2017, "Sitewide Report Datasets," (email communication to Alex Spiliotopoulos), CH2M HILL Plateau Remediation Company, Richland, Washington, February.

Hohn, M.E., 1998, *Geostatistics and Petroleum Geology*, Van Nostrond Reinhold, New York, 264 pp.

Ihaka, R., and R. Gentleman, 1996, "R: A Language for Data Analysis and Graphics," *Journal of Computational and Graphical Statistics* 5(3): 299-314. Available at: https://www.stat.auckland.ac.nz/~ihaka/downloads/R-paper.pdf.

Journel, A.G., and C.V. Deutsch, 1997, "Rank Order Geostatistics: A Proposal for a Unique Coding and Common Processing of Diverse Data," *Geostatistics Wollongong '96* 1:174-187, Kluwer Academic Publishers, Norwell, Massachusetts.

R Development Core Team, 2012, *R: A language and environment for statistical computing. R Foundation for Statistical Computing, Version 2.14.2*, R Foundation for Statistical Computing, Vienna, Austria.

Reed, P.M., T.R. Ellsworth, and B.S. Minsker, 2004, "Spatial Interpolation Methods for Nonstationary Plume Data," *Ground Water* 42(2):190-202.

SGW-46279, 2016, *Conceptual Framework and Numerical Implementation of 100 Areas Groundwater Flow and Transport Model*, Rev. 3, CH2M HILL Plateau Remediation Company, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=0076173H.

S.S. Papadopulos & Associates, Inc. (SSP&A), 2014, *Quantile program*. S.S. Papadopulos & Associates, Inc., Bethesda, Maryland.

S.S. Papadopulos & Associates, Inc. (SSP&A), 2017, *GroundWater Desktop: User Manual*, Version 3.00. S.S. Papadopulos & Associates, Inc., Bethesda, Maryland.

Skrivan, J.A,. and M.R. Karlinger, 1980, *Semi-Variogram Estimation and Universal Kriging Program*, U.S. Geological Survey Computer Contribution, Tacoma, Washington.

This page intentionally left blank.

Appendix A

Data Used for the Development of Interpolation Input Files

This page intentionally left blank.

Contents

A1 Introduction **A-1**

A2 Reference **A-150**

Tables

Table A-1. COI Concentrations Measured Since January 1, 2017 from the HEIS Database A-1

Table A-2. COI Concentrations Excluded from the HEIS Database Query per Input from the Project Scientist A-3

Table A-3. Measurement Locations and Type A-7

Table A-4. Data Removed from Interpolation Datasets A-7

Table A-5. Other Data Used in the Interpolation A-40

Table A-6. Data Selection Parameters A-143

This page intentionally left blank.

Terms

COI	contaminant of interest
GIA	Groundwater Interest Area
HEIS	Hanford Environmental Information System

This page intentionally left blank.

A1 Introduction

A hard copy of Table A-1 (concentrations of contaminants of interest since 2017) is not included in this environmental calculation file due to size restriction (87,994 records). Table A-1 is available in electronic format.

Table A-2 lists concentration data excluded from the original Hanford Environmental Information System (HEIS) query per input from the project scientist.

A hard copy of Table A-3 (spatial coordinates, location type, and construction information for the measurement locations used in the interpolations) is not included due to file size restriction. Table A-3 is available in electronic format.

Table A-4 lists selected data or measurement locations excluded from the mapping datasets based on input from the Groundwater Interest Area (GIA) project scientist(s), reflecting measurements that are valid but inconsistent with data from other wells nearby, or wells completed deeper in the same aquifer of other hydrogeologic units and, therefore, not representative of site conditions.

Table A-5 lists supplemental measured data points and/or other data included to reflect known conditions at the site as discussed in Section 3.1.1, based on input from the GIA project scientists.

Table A-6 lists the set of data selection parameters for each combination of GIA and contaminant of interest (COI), defining how concentration data at each measurement location are selected and processed.

Table A-1. COI Concentrations Measured Since January 1, 2017 from the HEIS Database

Available in electronic format.

This page intentionally left blank.

Table A-2. COI Concentrations Excluded from the HEIS Database Query per Input from the Project Scientist

WELL NAME	SAMP DATE TIME	FILTERED FLAG	STD CON LONG NAME	STD VALUE RPTD	STD ANAL UNITS RPTD	LAB QUALIFIER	REVIEW QUALIFIER	VALIDATION QUALIFIER	STD MDA	STD REPORTING LIMIT	DILUT FACTOR	MEDIA	COLLECTION PURPOSE	OWNER ID	SAMP NUM	METHOD NAME	METHOD CATEGORY	LOAD DATE TIME	sspaQUAL	sspaQUAL Note	sspaMAPOU
199-N-184	9/16/2019 9:56	N	Strontium-90	454	pCi/L				1.06	2	1	GW	R	PNLGW	B3R4F3	SRISO_SEP_PRECIP_GPC	RAD	10/16/2019 4:31	R	Lower than surrounding concentrations	100-KR-4;100-NR-2;100-MAX-KR-4
199-N-2	9/4/2019 14:28	N	Strontium-90	274	pCi/L				0.684	0.684	1	GW	R	PNLGW	B3R4H5	SR90_SEP_LSC	RAD	10/4/2019 6:00	R	Lower than surrounding concentrations	100-KR-4;100-NR-2;100-MAX-KR-4
199-N-50	9/6/2019 10:25	Y	Hexavalent Chromium	2.5	µg/L	BZ	HY			2	1	GW	R	PNLGW	B3R6K1	7196_CR6	INORGANIC	10/14/2019 6:55	R	Cr(VI) flagged Y; lower than trend and lower than total Cr	100-KR-4;100-NR-2;100-MAX-KR-4
299-E17-25	1/10/2019 10:09	N	Iodine-129	1.89	pCi/L				0.635	1	1	GW	R	PNLGW	B3MFM9	I129_SEP_LSC	RAD	2/4/2019 11:43	R	Suspected error; Previous and subsequent results near or below MDA. Submitted RDR	200-BP-5;200-PO-1;200-UP-1;200-ZP-1
299-E17-26	1/10/2019 8:30	N	Iodine-129	0.415	pCi/L	U			0.998	1	1	GW	R	PNLGW	B3MFN0	I129LL_SEP_LEPS_GS	RAD	2/5/2019 6:01	R	Non-detect value with high MDA	200-BP-5;200-PO-1;200-UP-1;200-ZP-1
299-E17-26	7/2/2019 9:37	N	Iodine-129	0.467	pCi/L	U			0.955	1	1	GW	R	PNLGW	B3PLV0	I129LL_SEP_LEPS_GS	RAD	7/31/2019 6:00	R	Non-detect value with high MDA	200-BP-5;200-PO-1;200-UP-1;200-ZP-1
299-W19-107	3/31/2019 7:55	N	Trichloroethene	45.3	µg/L		QY			0.3	1	GW	R	PNLGW	B3N0X6	8260_VOA_GCMS	ORGANIC	4/30/2019 6:01	R	Associated w/ field blank contamination and not consistent w/ other TCE results	200-UP-1;200-ZP-1
299-W22-86	6/6/2019 10:46	N	Iodine-129	-0.0516	pCi/L	U			0.982	1	1	GW	R	PNLGW	B3P714	I129LL_SEP_LEPS_GS	RAD	7/6/2019 6:00	R	Non-detect value with high MDA	200-UP-1;200-ZP-1
299-W26-13	11/8/2019 10:02	Y	Chromium	2.4	µg/L	B	FQ			2.4	1	GW	R	PNLGW	B3T8Y5	6010_METALS_ICP	INORGANIC	12/12/2019 6:00	R	Result was erroneous and subsequently corrected in HEIS	200-UP-W26-13;200-UP-1;200-ZP-1

Table A-2. COI Concentrations Excluded from the HEIS Database Query per Input from the Project Scientist

WELL NAME	SAMP DATE TIME	FILTERED FLAG	STD CON LONG NAME	STD VALUE RPTD	STD ANAL UNITS RPTD	LAB QUALIFIER	REVIEW QUALIFIER	VALIDATION QUALIFIER	STD MDA	STD REPORTING LIMIT	DILUT FACTOR	MEDIA	COLLECTION PURPOSE	OWNER ID	SAMP NUM	METHOD NAME	METHOD CATEGORY	LOAD DATE TIME	sspaQUAL	sspaQUAL Note	sspaMAPOU
299-W26-13	11/8/2019 10:02	Y	Chromium	3.2	µg/L	B	FQ			0.46	10	GW	R	PNLGW	B3T8Y5	6020_METALS_ICPMS	INORGANIC	12/12/2019 6:00	R	Result was erroneous and subsequently corrected in HEIS	200-UP-W26-13;200-UP-1;200-ZP-1
699-29-4	1/21/2019 13:26	N	Iodine-129	1.55	pCi/L		Y		0.495	1	1	GW	R	PNLGW	B3MNF2	I129LL_SEP_LEPS_GS	RAD	4/18/2019 12:20	R	Flagged Y; much higher than previous data and associated with known lab problem	200-PO-1
699-31-11	1/21/2019 11:25	N	Iodine-129	3.29	pCi/L		Y		0.608	1	1	GW	R	PNLGW	B3MNF3	I129LL_SEP_LEPS_GS	RAD	4/18/2019 12:20	R	Flagged Y; much higher than previous data and associated with known lab problem	200-PO-1
699-34-61	4/2/2019 10:52	N	Trichloroethene	1.91	µg/L	J	Q			0.3	1	GW	R	PNLGW	B3NCB8	8260_VOA_GCMS	ORGANIC	5/1/2019 4:37	R	Associated with field blank contamination at 1.18 µg/L	200-PO-1;200-UP-1;200-ZP-1
699-35-78A	3/31/2019 7:35	N	Trichloroethene	3.3	µg/L	J	Q			0.3	1	GW	R	PNLGW	B3NB83	8260_VOA_GCMS	ORGANIC	4/30/2019 6:01	R	Associated with field blank contamination at 4.21 µg/L	200-UP-1;200-ZP-1;200-UP-W23-4
699-47-55	10/30/2019 12:20	Y	Technetium-99	4180	pCi/L				37.2	50	1	GW	C	CENTPLAT	B3TBL8	TC99_EIE_LSC	RAD	11/9/2019 6:00	R	Characterization sample does not represent unconfined aquifer	200-BP-5;200-PO-1
699-52-55	4/23/2019 10:32	N	Iodine-129	0.176	pCi/L	U			1.16	1	1	GW	R	PNLGW	B3NJD9	I129_SEP_LSC	RAD	6/25/2019 9:45	R	Non-detect value with high MDA	200-BP-5;200-PO-1
699-53-55C	4/17/2019 10:20	N	Iodine-129	-0.226	pCi/L	U			0.921	1	1	GW	R	PNLGW	B3NK66	I129LL_SEP_LEPS_GS	RAD	5/16/2019 6:00	R	Non-detect value with high MDA	200-BP-5;200-PO-1
699-71-30B	7/31/2019 11:30	N	Trichloroethene	4.24	µg/L	J				0.3	1	GW	C	CENTPLAT	B3R458	8260_VOA_GCMS	ORGANIC	8/29/2019 6:00	R	Concentrations higher in adjacent well	100-FR-3;100-FR-3_LO

Table A-2. COI Concentrations Excluded from the HEIS Database Query per Input from the Project Scientist

WELL NAME	SAMP DATE TIME	FILTERED FLAG	STD CON LONG NAME	STD VALUE RPTD	STD ANAL UNITS RPTD	LAB QUALIFIER	REVIEW QUALIFIER	VALIDATION QUALIFIER	STD MDA	STD REPORTING LIMIT	DILUT FACTOR	MEDIA	COLLECTION PURPOSE	OWNER ID	SAMP NUM	METHOD NAME	METHOD CATEGORY	LOAD DATE TIME	sspaQUAL	sspaQUAL Note	sspaMAPOU
C6359	10/3/2019 10:12	N	Iodine-129	0.32	pCi/L	U			0.965	1	1	GW	R	PNLGW	B3RRD8	I129LL_SEP_LEPS_GS	RAD	11/2/2019 6:01	R	Non-detect value with high MDA	200-PO-1
C6384	10/2/2019 9:38	N	Iodine-129	0.363	pCi/L	U			0.894	1	1	GW	R	PNLGW	B3RRJ7	I129LL_SEP_LEPS_GS	RAD	11/1/2019 6:01	R	Non-detect value with high MDA	200-PO-1
C6384	10/2/2019 9:38	N	Iodine-129	0.0262	pCi/L	U			0.895	1	1	GW	R	PNLGW	B3RRJ6	I129LL_SEP_LEPS_GS	RAD	11/1/2019 6:01	R	Non-detect value with high MDA	200-PO-1
C7725	8/26/2019 10:26	N	Strontium-90	0.199	pCi/L	U	Y		0.821	0.821	1	GW	R	PNLGW	B3RB19	SR90_SEP_LSC	RAD	9/28/2019 12:00	R	Suspected error (low); flagged Y	100-BC-5;100-BC-5_LO

MDA = minimum detectable activity

This page intentionally left blank.

Table A-3. Measurement Locations and Type

Available in electronic format.

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
199-B2-12	ALL	ALL	Well screened in water-bearing unit of RUM	100-BC-5;100-BC-5_LO
199-B2-15	ALL	ALL	Well screened in water-bearing unit of RUM	100-BC-5;100-BC-5_LO
199-B2-16	Hexavalent Chromium; Chromium	ALL	Lower unconfined; separate map for Cr(VI)	100-BC-5;100-BC-5_LO
199-B5-5	Hexavalent Chromium; Chromium	ALL	Lower unconfined; separate map for Cr(VI). Sr-90 and tritium higher in upper aquifer.	100-BC-5;100-BC-5_LO
199-B5-6	Hexavalent Chromium; Chromium	ALL	Lower unconfined; separate map for Cr(VI). Sr-90 and tritium higher in upper aquifer.	100-BC-5;100-BC-5_LO
199-B5-9	Hexavalent Chromium; Chromium	ALL	Lower unconfined; separate map for Cr(VI). Sr-90 and tritium higher in upper aquifer.	100-BC-5;100-BC-5_LO
AT-B-3-S	Hexavalent Chromium; Chromium	100-BC-5;100-BC-5_LO	Lower than surrounding concentrations	100-BC-5;100-BC-5_LO
C7781	Hexavalent Chromium; Chromium	100-BC-5;100-BC-5_LO	Lower than surrounding concentrations	100-BC-5;100-BC-5_LO
199-B5-13	Hexavalent Chromium; Chromium; Strontium-90	ALL	Lower unconfined; separate map for Cr(VI). Sr-90 higher in upper aquifer.	100-BC-5;100-BC-5_LO

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
199-B3-51	Hexavalent Chromium; Chromium; Strontium-90; Tritium	ALL	Lower unconfined; separate map for Cr(VI). Sr-90 and tritium higher in upper aquifer.	100-BC-5;100-BC-5_LO
199-B4-18	Hexavalent Chromium; Chromium; Strontium-90; Tritium	ALL	Lower unconfined; separate map for Cr(VI). Sr-90 and tritium higher in upper aquifer.	100-BC-5;100-BC-5_LO
199-B5-11	Hexavalent Chromium; Chromium; Strontium-90; Tritium	ALL	Lower unconfined; separate map for Cr(VI). Sr-90 and tritium higher in upper aquifer.	100-BC-5;100-BC-5_LO
C8851	Strontium-90	100-BC-5;100-BC-5_LO	Lower than surrounding concentrations	100-BC-5;100-BC-5_LO
199-F5-43B	ALL	ALL	Well screened in the RUM	100-FR-3;100-FR-3_LO
199-F5-53	ALL	ALL	Well screened in the RUM	100-FR-3;100-FR-3_LO
699-66-32	ALL	ALL	Well monitors a perched zone	100-FR-3;100-FR-3_LO
699-68-29	ALL	ALL	2019 characterization sample from RUM aquitard	100-FR-3;100-FR-3_LO
699-71-26	ALL	ALL	2016 characterization sample from RUM	100-FR-3;100-FR-3_LO
699-71-30	Trichloroethene	100-FR-3;100-FR-3_LO	Concentrations higher in adjacent well	100-FR-3;100-FR-3_LO
199-D5-134	ALL	ALL	Well screened in the RUM	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H
199-D5-141	ALL	ALL	Well screened in the RUM	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H
199-D8-54B	ALL	ALL	Well screened in the RUM	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
				MAX-HR-3-H
199-H1-50	ALL	ALL	Well screened in the RUM	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H
199-H2-1	ALL	ALL	Well screened in the RUM	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H
199-H3-10	ALL	ALL	Well screened in the RUM	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H
199-H3-12	ALL	ALL	Well screened in the RUM	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H
199-H3-13	ALL	ALL	Well screened in the RUM	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H
199-H3-22	ALL	ALL	Well screened in the RUM	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H
199-H3-28	ALL	ALL	Well screened in the RUM	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H
199-H3-29	ALL	ALL	Well screened in the RUM	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H
199-H3-2C	ALL	ALL	Well screened in the RUM	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
				MAX-HR-3-H
199-H3-30	ALL	ALL	Well screened in the RUM	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H
199-H3-32	ALL	ALL	Well screened in the RUM	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H
199-H3-9	ALL	ALL	Well screened in the RUM	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H
199-H4-12C	ALL	ALL	Well screened in the RUM	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H
199-H4-15CP	ALL	ALL	Basalt confined	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H
199-H4-15CQ	ALL	ALL	Well screened in Ringold Unit A	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H
199-H4-15CR	ALL	ALL	Well screened in Ringold Unit B	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H
199-H4-15CS	ALL	ALL	Well screened in the RUM	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H
199-H4-2	ALL	ALL	Basalt confined	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
				MAX-HR-3-H
199-H4-90	ALL	ALL	Well screened in the RUM	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H
199-H4-91	ALL	ALL	Well screened in the RUM	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H
199-H7-1	ALL	ALL	Well screened in the RUM	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H
699-95-45C	ALL	ALL	Well screened in the RUM	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H
699-97-43C	ALL	ALL	Well screened in the RUM	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H
699-97-45B	ALL	ALL	Well screened in the RUM	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H
699-97-48C	ALL	ALL	Well screened in the RUM	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H
699-97-60	ALL	ALL	Well screened in the RUM	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H
699-97-61	ALL	ALL	Well screened in the RUM	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
				MAX-HR-3-H
199-K-13	ALL	ALL	Unclear which part of the unconfined aquifer well is screened	100-KR-4;100-NR-2;100-MAX-KR-4
199-K-192	ALL	ALL	Well screened in the RUM	100-KR-4;100-NR-2;100-MAX-KR-4
199-K-32B	ALL	ALL	Well screened in the RUM	100-KR-4;100-NR-2;100-MAX-KR-4
199-N-80	ALL	ALL	Well screened in RUM.	100-KR-4;100-NR-2;100-MAX-KR-4
199-N-77	Nitrate	ALL	Deep unconfined. Nitrate higher in adjacent shallow well N-72	100-KR-4;100-NR-2;100-MAX-KR-4
199-N-32	Strontium-90	ALL	Anomalously low Sr-90. Post data on map but do not use the Sr-90 value in the mapping.	100-KR-4;100-NR-2;100-MAX-KR-4
199-N-210	Total petroleum hydrocarbons - diesel range	100-KR-4;100-NR-2;100-NR-2_HI;100-NR-2_LO	No 2019 data so need to continue to exclude 2018 out of trend value	100-KR-4;100-NR-2;100-MAX-KR-4
C6263	Strontium-90; Tritium	100-NR-2	Used only for plume around C7934	100-KR-4;100-NR-2;100-NR-C7934;100-MAX-KR-4
C6264	Strontium-90; Tritium	100-NR-2	Used only for plume around C7934	100-KR-4;100-NR-2;100-NR-C7934;100-MAX-KR-4
C6265	Strontium-90; Tritium	100-NR-2	Used only for plume around C7934	100-KR-4;100-NR-2;100-NR-C7934;100-MAX-KR-4

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
C6317	Strontium-90; Tritium	100-NR-2	Used only for plume around C7934	100-KR-4;100-NR-2;100-NR-C7934;100-MAX-KR-4
C6318	Strontium-90; Tritium	100-NR-2	Used only for plume around C7934	100-KR-4;100-NR-2;100-NR-C7934;100-MAX-KR-4
C6319	Strontium-90; Tritium	100-NR-2	Used only for plume around C7934	100-KR-4;100-NR-2;100-NR-C7934;100-MAX-KR-4
C6320	Strontium-90; Tritium	100-NR-2	Used only for plume around C7934	100-KR-4;100-NR-2;100-NR-C7934;100-MAX-KR-4
C6321	Strontium-90; Tritium	100-NR-2	Used only for plume around C7934	100-KR-4;100-NR-2;100-NR-C7934;100-MAX-KR-4
C6322	Strontium-90; Tritium	100-NR-2	Used only for plume around C7934	100-KR-4;100-NR-2;100-NR-C7934;100-MAX-KR-4
C6352	Strontium-90; Tritium	100-NR-2	Used only for plume around C7934	100-KR-4;100-NR-2;100-NR-C7934;100-MAX-KR-4
C7934	Strontium-90; Tritium	100-NR-2	Used only for plume around C7934	100-KR-4;100-NR-2;100-NR-C7934;100-MAX-KR-4
C7935	Strontium-90; Tritium	100-NR-2	Used only for plume around C7934	100-KR-4;100-NR-2;100-NR-C7934;100-MAX-KR-4
C7936	Strontium-90; Tritium	100-NR-2	Used only for plume around C7934	100-KR-4;100-NR-2;100-

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
				NR-C7934;100-MAX-KR-4
C7937	Strontium-90; Tritium	100-NR-2	Used only for plume around C7934	100-KR-4;100-NR-2;100-NR-C7934;100-MAX-KR-4
C7938	Strontium-90; Tritium	100-NR-2	Used only for plume around C7934	100-KR-4;100-NR-2;100-NR-C7934;100-MAX-KR-4
C7939	Strontium-90; Tritium	100-NR-2	Used only for plume around C7934	100-KR-4;100-NR-2;100-NR-C7934;100-MAX-KR-4
14-D	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
14-M	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
14-S	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
15-M	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
17-D	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
17-M	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
199-K-106A	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
199-K-107A	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
199-K-108A	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
199-K-132	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
199-K-137	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
199-K-138	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
199-K-139	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
199-K-140	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
199-K-158	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
199-K-165	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
199-K-166	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
199-K-168	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
199-K-173	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
199-K-175	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
199-K-183	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
199-K-184	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
199-K-185	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
199-K-196	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
199-K-204	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
199-K-205	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
199-K-206	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
199-K-223	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
199-K-224	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
199-K-229	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
199-K-235	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
199-K-236	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
199-K-31	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
199-K-34	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
199-K-38	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
AT-K-1-D	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
AT-K-1-M	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
AT-K-1-S	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
C6236	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
C6237	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
C6238	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
C6239	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
C6240	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
C6241	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
C7641	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
C7642	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
C7643	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
199-K-168	Strontium-90	100-KW;100-MAX-KW	Screened in the middle of the aquifer and while operating as an extraction well the pump was set at 155 ft bgs.	100-KW;100-MAX-KW;100-KR-4;100-NR-2;100-MAX-KR-4
CP_2017_12	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-MAX-KW;100-MAX-KW_LO;100-KR-4;100-NR-2;100-MAX-KR-4
CP_2017_13	Carbon-14; Hexavalent Chromium; Chromium; Strontium-90; Sulfate; Tritium; Total petroleum hydrocarbons - diesel range	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-KR-4-KE;100-KR-4-KE_HI;100-KR-4-KE_LO;100-KR-4-KN;100-KR-4-KN_HI;100-KR-4-KN_LO;100-NR-2;100-NR-2_HI;100-NR-2_LO;100-MAX-KR-4	Used only for 100-KW	100-MAX-KW;100-MAX-KW_LO;100-KR-4;100-NR-2;100-MAX-KR-4
299-E28-23	ALL	ALL	E28-23 is a longer screen with lower concentrations than well E28-24. Adjacent well 299-E28-24 has much higher concentrations	200-BP-5;200-BP-E28-24;200-PO-1
299-E26-8	ALL	ALL	Basalt confined	200-BP-5;200-PO-1
299-E28-25	ALL	ALL	E28-25 has a longer screen and lower concentrations than adjacent well E28-24	200-BP-5;200-PO-1

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
299-E28-7	ALL	ALL	Adjacent well 299-E28-24 has much higher concentrations	200-BP-5;200-PO-1
299-E33-12	ALL	ALL	Basalt confined	200-BP-5;200-PO-1
299-E33-340	ALL	ALL	Basalt confined	200-BP-5;200-PO-1
299-E33-344	ALL	ALL	Well monitors perched water	200-BP-5;200-PO-1
299-E33-350	ALL	ALL	Well monitors perched water	200-BP-5;200-PO-1
299-E33-351	ALL	ALL	Well monitors perched water	200-BP-5;200-PO-1
299-E33-40	ALL	ALL	Basalt confined	200-BP-5;200-PO-1
299-E33-50	ALL	ALL	Basalt confined	200-BP-5;200-PO-1
699-28-40P	ALL	ALL	Ringold confined piezo. Concentrations in the unconfined host well 699-28-40 are higher.	200-BP-5;200-PO-1
699-39-39	ALL	ALL	mud well	200-BP-5;200-PO-1
699-40-33A	ALL	ALL	mud well	200-BP-5;200-PO-1
699-40-36	ALL	ALL	Deep unconfined. Nitrate much higher in nearby water table well 699-39-39. Confined Ringold	200-BP-5;200-PO-1
699-40-39	ALL	ALL	mud well	200-BP-5;200-PO-1
699-40-40A	ALL	ALL	mud well	200-BP-5;200-PO-1
699-41-40	ALL	ALL	mud well	200-BP-5;200-PO-1
699-41-42	ALL	ALL	mud well	200-BP-5;200-PO-1
699-42-37	ALL	ALL	mud well	200-BP-5;200-PO-1

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
699-42-39A	ALL	ALL	mud well	200-BP-5;200-PO-1
699-42-39B	ALL	ALL	Confined Ringold	200-BP-5;200-PO-1
699-42-40A	ALL	ALL	mud well	200-BP-5;200-PO-1
699-42-40B	ALL	ALL	mud well	200-BP-5;200-PO-1
699-42-40C	ALL	ALL	Basalt confined	200-BP-5;200-PO-1
699-42-42A	ALL	ALL	mud well	200-BP-5;200-PO-1
699-42-42B	ALL	ALL	Confined Ringold	200-BP-5;200-PO-1
699-43-40	ALL	ALL	mud well	200-BP-5;200-PO-1
699-43-41F	ALL	ALL	mud well	200-BP-5;200-PO-1
699-43-41G	ALL	ALL	Basalt confined	200-BP-5;200-PO-1
699-44-39B	ALL	ALL	mud well	200-BP-5;200-PO-1
699-44-42	ALL	ALL	mud well	200-BP-5;200-PO-1
699-44-43B	ALL	ALL	mud well	200-BP-5;200-PO-1
699-45-42	ALL	ALL	mud well	200-BP-5;200-PO-1
699-49-55B	ALL	ALL	Basalt confined	200-BP-5;200-PO-1
699-49-57B	ALL	ALL	Basalt confined	200-BP-5;200-PO-1
699-50-45	ALL	ALL	Basalt confined	200-BP-5;200-PO-1
699-50-53B	ALL	ALL	Basalt confined	200-BP-5;200-PO-1
699-52-46A	ALL	ALL	Basalt confined	200-BP-5;200-PO-1
699-52-55B	ALL	ALL	Basalt confined	200-BP-5;200-PO-1

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
699-53-55A	ALL	ALL	Basalt confined	200-BP-5;200-PO-1
699-53-55AT	ALL	ALL	monitors the confined aquifer	200-BP-5;200-PO-1
699-54-34	ALL	ALL	Basalt confined	200-BP-5;200-PO-1
699-54-57	ALL	ALL	Basalt confined	200-BP-5;200-PO-1
699-56-43	ALL	ALL	Basalt confined	200-BP-5;200-PO-1
699-56-53	ALL	ALL	Basalt confined	200-BP-5;200-PO-1
299-E33-205	Nitrate	200-BP-5;200-PO-1;200-ZP-1	No 2019 data so need to continue to exclude 2018 out of trend value	200-BP-5;200-PO-1
299-E16-1	ALL	ALL	Basalt confined	200-BP-5;200-PO-1;200-UP-1
299-E28-32	Uranium	ALL	Deeper screened interval	200-BP-5;200-PO-1;200-ZP-1
699-11-E4F	ALL	ALL	Well completed in middle unconfined aquifer. Constituent results not considered representative to define plume extent.	200-PO-1
699-13-1C	ALL	ALL	Basalt confined	200-PO-1
699-15-E13	ALL	ALL	Basalt confined	200-PO-1
699-24-1P	ALL	ALL	Basalt confined	200-PO-1
699-25-33A	ALL	ALL	Screened at top of lower permeability unit within unconfined aquifer. Concentrations higher in adjacent shallow wells	200-PO-1
699-32-22B	ALL	ALL	Basalt confined	200-PO-1
699-S2-34B	ALL	ALL	Basalt confined	200-PO-1

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
499-S0-7	ALL	ALL	Deep water supply well. Concentrations less than nearby water table wells 699-2-3 and 699-2-6A	200-PO-1;300-FF-5
499-S0-8	ALL	ALL	Deep water supply well. Concentrations less than nearby water table wells 699-2-3 and 699-2-6A	200-PO-1;300-FF-5
499-S1-8J	ALL	ALL	Deep water supply well. Concentrations less than nearby water table wells 699-2-3 and 699-2-6A	200-PO-1;300-FF-5
699-S11-E12AP	ALL	ALL	Basalt confined	200-PO-1;300-FF-5
299-W14-20	ALL	ALL	Concentrations in this extraction well are lower than in adjacent monitoring wells; I-129 Adjacent well W14-11 has higher concentrations	200-UP-1;200-ZP-1
299-W19-34B	ALL	ALL	Top of screen 145 ft below water table. Concentrations higher in nearby well 299-W19-43 which is water screened at the top of the unconfined aquifer	200-UP-1;200-ZP-1
299-W22-24P	ALL	ALL	Confined Ringold	200-UP-1;200-ZP-1
299-W22-24S	ALL	ALL	Exclude piezometer; concentrations not representative of higher concentrations of upper unconfined aquifer in this area	200-UP-1;200-ZP-1
299-W27-2	ALL	ALL	Exclude; deep well; exclude for all constituents even carbon tetrachloride - adjacent shallower well 699-33-75 has higher carbon tetrachloride concentration; screen corrosion confirmed by camera	200-UP-1;200-ZP-1

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
			survey	
699-29-70AP	ALL	ALL	Basalt confined	200-UP-1;200-ZP-1
299-W11-45	Hexavalent Chromium; Chromium	200-UP-1;200-ZP-1	Nearby well 299-W11-50 has higher Cr and Cr(VI) concentrations	200-UP-1;200-ZP-1
299-W14-13	Hexavalent Chromium; Chromium	ALL	Adjacent well W14-11 has higher concentrations	200-UP-1;200-ZP-1
299-W18-44	Iodine-129	ALL	Most recent data point is 2017; MDA too high	200-UP-1;200-ZP-1
299-W6-15	Iodine-129	200-UP-1;200-ZP-1	Exclude extraction well W6-15	200-UP-1;200-ZP-1
299-W6-16	Iodine-129	ALL	Most recent data point is 2017; MDA too high	200-UP-1;200-ZP-1
299-W19-125	Nitrate	200-UP-1;200-ZP-1	Lower than nearby well	200-UP-1;200-ZP-1
299-W6-6	Nitrate	200-UP-1;200-ZP-1	Lower than surrounding concentrations	200-UP-1;200-ZP-1
699-45-69A	Nitrate	200-UP-1;200-ZP-1	shallow screened interval; well going dry	200-UP-1;200-ZP-1
699-47-78	Nitrate	200-UP-1;200-ZP-1	No 2019 data; 2018 data not representative of 2019 changes in nitrate injection	200-UP-1;200-ZP-1
699-47-78B	Nitrate	200-UP-1;200-ZP-1	No 2019 data; 2018 data not representative of 2019 changes in nitrate injection	200-UP-1;200-ZP-1
699-47-78C	Nitrate	200-UP-1;200-ZP-1	No 2019 data; 2018 data not representative of 2019 changes in nitrate injection	200-UP-1;200-ZP-1
299-W22-90	Nitrate; Technetium-99	ALL	Exclude extraction well; Tc-99 and NO3 concentrations higher in nearby monitoring	200-UP-1;200-ZP-1

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
			well 299-W22-93	
299-W22-91	Nitrate; Technetium-99	ALL	Exclude extraction well; Tc-99 and NO3 concentrations higher in nearby monitoring well 299-W22-116	200-UP-1;200-ZP-1
299-W19-34A	Nitrate; Tritium; Technetium-99; Uranium	ALL	Top of screen 40 ft below water table. Concentrations higher in nearby well 299-W19-43 which is water screened at the top of the unconfined aquifer	200-UP-1;200-ZP-1
299-W11-49	Trichloroethene	200-UP-1;200-ZP-1	Nearby well 299-W14-72 has higher TCE concentrations	200-UP-1;200-ZP-1
299-W19-113	Uranium	ALL	Exclude extraction well; uranium concentrations higher in nearby monitoring well 299-W19-36	200-UP-1;200-ZP-1
299-W19-114	Uranium	ALL	Exclude extraction well; uranium concentrations higher in nearby monitoring well 299-W19-101	200-UP-1;200-ZP-1
299-W26-13	Hexavalent Chromium; Chromium	200-UP-1;200-ZP-1	Use for local Cr plume at 216-S-10 pond only; do not connect this plume to larger SE Cr plume	200-UP-W26-13;200-UP-1;200-ZP-1
699-13-1A	ALL	ALL	Well completed in middle unconfined aquifer. Constituent results not considered representative to define plume extent	300-F-BG
1199-39-16D	ALL	ALL	Well construction uncertain. Water level at 27 ft well drilled to 66 ft	300-FF-5
399-1-105	ALL	ALL	Vadose Zone Injection Well	300-FF-5

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
399-1-10B	ALL	ALL	Well completed in lower unconfined aquifer. Constituent results less than adjacent upper unconfined well 399-1-10A	300-FF-5
399-1-118	ALL	ALL	Vadose Zone Injection Well	300-FF-5
399-1-129	ALL	ALL	Vadose Zone Injection Well	300-FF-5
399-1-139	ALL	ALL	Vadose Zone Injection Well	300-FF-5
399-1-13B	ALL	ALL	Well completed in middle unconfined aquifer. Constituent results less than adjacent upper unconfined well 399-1-13A	300-FF-5
399-1-14B	ALL	ALL	Well completed in lower unconfined aquifer. Constituent results less than adjacent upper unconfined well 399-1-14A	300-FF-5
399-1-16B	ALL	ALL	Well completed in lower unconfined aquifer. Constituent results less than adjacent upper unconfined well 399-1-16A	300-FF-5
399-1-16C	ALL	ALL	Well completed in uppermost confined aquifer (Ringold Lower Mud).	300-FF-5
399-1-17B	ALL	ALL	Well completed in middle unconfined aquifer. Constituent results less than adjacent upper unconfined well 399-1-17A	300-FF-5
399-1-17C	ALL	ALL	Well completed in uppermost confined aquifer (Ringold Lower Mud)	300-FF-5
399-1-18B	ALL	ALL	Well completed in middle unconfined aquifer. Constituent results less than adjacent upper unconfined well 399-1-18A	300-FF-5

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
399-1-18C	ALL	ALL	Well completed in lower unconfined aquifer. Constituent results less than adjacent upper unconfined well 399-1-18A	300-FF-5
399-1-21B	ALL	ALL	Well completed in lower unconfined aquifer. Constituent results less than adjacent upper unconfined well 399-1-21A	300-FF-5
399-1-57	ALL	ALL	Well completed in middle unconfined aquifer. Constituent results less than nearby unconfined water table wells	300-FF-5
399-1-8	ALL	ALL	Well completed in lower unconfined aquifer. Constituent results less than nearby unconfined water table well 399-1-7	300-FF-5
399-1-9	ALL	ALL	Well completed in uppermost confined aquifer (Ringold Lower Mud)	300-FF-5
399-3-21	ALL	ALL	Well completed in lower unconfined aquifer. Constituent results less than nearby unconfined water table well 399-3-20	300-FF-5
399-3-22	ALL	ALL	Well completed in lower unconfined aquifer. Constituent results less than nearby unconfined water table well 399-3-12	300-FF-5
399-5-2	ALL	ALL	Basalt confined	300-FF-5
399-8-5B	ALL	ALL	Well completed in lower unconfined aquifer. Constituent results less than nearby unconfined water table well 399-8-5A.	300-FF-5
399-8-5C	ALL	ALL	Well completed in uppermost confined aquifer (Ringold Lower Mud).	300-FF-5
699-S22-E9C	ALL	ALL	Basalt confined	300-FF-5

Table A-4. Data Removed from Interpolation Datasets

WELL NAME	COI	sspaMAPOU	Reason to Exclude	Mapping Area/Plume
699-S27-E9C	ALL	ALL	Basalt confined	300-FF-5
699-S29-E16C	ALL	ALL	Well completed in uppermost confined aquifer (Ringold Lower Mud)	300-FF-5
699-S31-1P	ALL	ALL	Screened in basalt per PNNL-13021. Well 699-S31-1 at same location screened within unconfined aquifer	300-FF-5
699-S24-10P	ALL	ALL	Basalt confined	
699-S24-19P	ALL	ALL	Basalt confined	

Reference: PNNL-13021, *Water Level Monitoring Plan for the Hanford Groundwater Monitoring Project*.

bgs = below ground surface
COI = contaminant of interest
MDA = minimum detectable activity
PRB = permeable reactive barrier
RUM = Ringold Formation upper mud

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
CP33	0	OTHER DATA	ALL	100-BC-5;100-BC-5_LO	2	Geologic Control to represent boundary where basalt is present above water table
CP34	0	OTHER DATA	ALL	100-BC-5;100-BC-5_LO	2	Geologic Control to represent boundary where basalt is present above water table
CP35	0	OTHER DATA	ALL	100-BC-5;100-BC-5_LO	2	Geologic Control to represent boundary where basalt is present above water table
CP36	0	OTHER DATA	ALL	100-BC-5;100-BC-5_LO	2	Geologic Control to represent boundary where basalt is present above water table
CP41	0	OTHER DATA	Hexavalent Chromium	100-BC-5;100-BC-5_LO	2	Geologic Control. Value selected to represent inferred paleochannel with expected low concentration.
CP42	0	OTHER DATA	Hexavalent Chromium	100-BC-5;100-BC-5_LO	2	Geologic Control. Value selected to represent inferred paleochannel with expected low concentration.
199-B3-50	1.2	2015	Strontium-90	100-BC-5;100-BC-5_LO	1	not sampled after 2015. Use 2015 MDA (most recent sample)

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
C6235	1.27	2015	Strontium-90	100-BC-5;100-BC-5_LO	1	AT cluster not sampled after 2015. Use 2015 result.
CP_2017_4	1.1111	OTHER DATA	Strontium-90	100-BC-5;100-BC-5_LO	3	Constrain western extent based on known source locations and flow directions
CP_2018_10	1.5	OTHER DATA	Strontium-90	100-BC-5;100-BC-5_LO	3	Constrain eastern extent based on known source locations and flow directions
CP_2020_7	10	OTHER DATA	Hexavalent Chromium	100-BC-5_LO	3	Add CP to smooth southeast boundary
CP_2020_8	11	OTHER DATA	Hexavalent Chromium	100-BC-5_LO	3	Add CP to smooth southeast boundary
CP_2017_5	45000	OTHER DATA	Nitrate	100-FR-3;100-FR-3_LO	2	Geologic control; RUM above water table
CP_2018_11	30000	OTHER DATA	Nitrate	100-FR-3;100-FR-3_LO	3	Constrain northern extent based on known flow directions
CP_2018_12	10000	OTHER DATA	Nitrate	100-FR-3;100-FR-3_LO	2	Geologic control RUM above water table
CP_2018_13	0	OTHER DATA	Nitrate	100-FR-3;100-FR-3_LO	2	Geologic control RUM above water table
CP_2018_24	2	OTHER DATA	Strontium-90	100-FR-3;100-FR-3_LO	3	Control extent of plume in upgradient direction

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
CP_2020_10	65000	OTHER DATA	Nitrate	100-FR-3_LO	3	FR-3 Nitrate - add CP to connect the main plume with 699-64-27 and 699-62-31
CP_2020_11	65000	OTHER DATA	Nitrate	100-FR-3_LO	3	FR-3 Nitrate - add CP to connect the main plume with 699-64-27 and 699-62-31
CP_2020_12	11	OTHER DATA	Trichloroethene	100-FR-3_LO	3	FR-3 Nitrate - add CP to connect 71-30C to main plume
CP_2020_13	8	OTHER DATA	Trichloroethene	100-FR-3_LO	3	FR-3 Nitrate - add CP to connect 71-30C to main plume
CP_2020_9	5	OTHER DATA	Hexavalent Chromium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO	3	Add CP to delimit the 100-D south plume (by ISRM) to be more consistent with 2018 maps
199-D5-108	2	2019	Hexavalent Chromium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D5-111	2	2019	Hexavalent Chromium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-D5-128	2	2019	Hexavalent Chromium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D5-129	2	2019	Hexavalent Chromium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D5-148	2	2019	Hexavalent Chromium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D6-1	2	2019	Hexavalent Chromium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D6-2	2	2019	Hexavalent Chromium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D7-4	2	2019	Hexavalent Chromium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-D7-5	2	2019	Hexavalent Chromium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-H1-20	2	2019	Hexavalent Chromium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H1-21	2	2019	Hexavalent Chromium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H1-25	2	2019	Hexavalent Chromium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H1-27	2	2019	Hexavalent Chromium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H1-5	2	2019	Hexavalent Chromium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-H1-6	2	2019	Hexavalent Chromium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H3-27	2	2019	Hexavalent Chromium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H4-17	2	2019	Hexavalent Chromium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H4-78	2	2019	Hexavalent Chromium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H4-79	2	2019	Hexavalent Chromium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H4-82	2	2019	Hexavalent Chromium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-H6-7	2	2019	Hexavalent Chromium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H6-8	2	2019	Hexavalent Chromium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
699-90-45B	2	2019	Hexavalent Chromium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
699-90-47B	2	2019	Hexavalent Chromium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
699-93-48C	2	2019	Hexavalent Chromium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
699-95-45B	2	2019	Hexavalent Chromium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-D5-108	0.21	2019	Uranium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D5-111	0.21	2019	Uranium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D5-128	0.21	2019	Uranium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D5-129	0.21	2019	Uranium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D5-148	0.21	2019	Uranium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D6-1	0.21	2019	Uranium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-D6-2	0.21	2019	Uranium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D7-4	0.21	2019	Uranium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D7-5	0.21	2019	Uranium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-H1-20	0.28	2019	Uranium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H1-21	0.28	2019	Uranium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H1-25	0.28	2019	Uranium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-H1-27	0.28	2019	Uranium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H1-5	0.21	2019	Uranium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-H1-6	0.28	2019	Uranium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H3-27	0.28	2019	Uranium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H4-17	0.28	2019	Uranium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H4-78	0.28	2019	Uranium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-H4-79	0.28	2019	Uranium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H4-82	0.21	2019	Uranium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-H6-7	0.28	2019	Uranium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H6-8	0.28	2019	Uranium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
699-90-45B	0.28	2019	Uranium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
699-90-47B	0.21	2019	Uranium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
699-93-48C	0.21	2019	Uranium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
699-95-45B	0.28	2019	Uranium	100-HR-3-D;100-HR-3-H;100-HR-3-D_HI;100-HR-3-H_HI;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H1-12	2	2019	Hexavalent Chromium	100-HR-3-D;100-HR-3-H;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
699-97-47C	2	2019	Hexavalent Chromium	100-HR-3-D;100-HR-3-H;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H1-12	0.28	2019	Uranium	100-HR-3-D;100-HR-3-H;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
699-97-47C	0.28	2019	Uranium	100-HR-3-D;100-HR-3-H;100-HR-3-D_LO;100-HR-3-H_LO;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-D5-108	18775	2019	Nitrate	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-D5-111	18775	2019	Nitrate	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D5-128	18775	2019	Nitrate	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D5-129	18775	2019	Nitrate	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D5-148	18775	2019	Nitrate	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D6-1	18775	2019	Nitrate	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D6-2	18775	2019	Nitrate	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D7-4	18775	2019	Nitrate	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D7-5	18775	2019	Nitrate	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-H1-12	18870	2019	Nitrate	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-H1-20	18870	2019	Nitrate	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H1-21	18870	2019	Nitrate	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H1-25	18870	2019	Nitrate	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H1-27	18870	2019	Nitrate	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H1-5	18775	2019	Nitrate	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-H1-6	18870	2019	Nitrate	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H3-27	18870	2019	Nitrate	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H4-17	18870	2019	Nitrate	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H4-78	18870	2019	Nitrate	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-H4-79	18870	2019	Nitrate	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H4-82	18775	2019	Nitrate	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-H6-7	18870	2019	Nitrate	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H6-8	18870	2019	Nitrate	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
699-90-45B	18870	2019	Nitrate	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
699-90-47B	18775	2019	Nitrate	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
699-93-48C	18775	2019	Nitrate	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
699-95-45B	18870	2019	Nitrate	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
699-97-47C	18870	2019	Nitrate	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-D5-108	1.288	2019	Strontium-90	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D5-111	1.288	2019	Strontium-90	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D5-128	1.288	2019	Strontium-90	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D5-129	1.288	2019	Strontium-90	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D5-148	1.288	2019	Strontium-90	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D6-1	1.288	2019	Strontium-90	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D6-2	1.288	2019	Strontium-90	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D7-4	1.288	2019	Strontium-90	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D7-5	1.288	2019	Strontium-90	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-H1-12	1.306	2019	Strontium-90	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H1-20	1.306	2019	Strontium-90	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H1-21	1.306	2019	Strontium-90	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H1-25	1.306	2019	Strontium-90	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H1-27	1.306	2019	Strontium-90	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H1-5	1.288	2019	Strontium-90	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-H1-6	1.306	2019	Strontium-90	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H3-27	1.306	2019	Strontium-90	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H4-17	1.306	2019	Strontium-90	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-H4-78	1.306	2019	Strontium-90	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H4-79	1.306	2019	Strontium-90	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H4-82	1.288	2019	Strontium-90	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-H6-7	1.306	2019	Strontium-90	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H6-8	1.306	2019	Strontium-90	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
699-90-45B	1.306	2019	Strontium-90	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
699-90-47B	1.288	2019	Strontium-90	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
699-93-48C	1.288	2019	Strontium-90	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
699-95-45B	1.306	2019	Strontium-90	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
699-97-47C	1.306	2019	Strontium-90	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-D5-108	1299	2019	Tritium	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D5-111	1299	2019	Tritium	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D5-128	1299	2019	Tritium	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D5-129	1299	2019	Tritium	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D5-148	1299	2019	Tritium	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D6-1	1299	2019	Tritium	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D6-2	1299	2019	Tritium	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-D7-4	1299	2019	Tritium	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-D7-5	1299	2019	Tritium	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-H1-12	606	2019	Tritium	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H1-20	606	2019	Tritium	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H1-21	606	2019	Tritium	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H1-25	606	2019	Tritium	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H1-27	606	2019	Tritium	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H1-5	1299	2019	Tritium	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-H1-6	606	2019	Tritium	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H3-27	606	2019	Tritium	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-H4-17	606	2019	Tritium	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H4-78	606	2019	Tritium	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H4-79	606	2019	Tritium	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H4-82	1299	2019	Tritium	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
199-H6-7	606	2019	Tritium	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-H6-8	606	2019	Tritium	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
699-90-45B	606	2019	Tritium	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
699-90-47B	1299	2019	Tritium	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System
699-93-48C	1299	2019	Tritium	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-DX P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
699-95-45B	606	2019	Tritium	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
699-97-47C	606	2019	Tritium	100-HR-3-D;100-HR-3-H;100-MAX-HR-3-D;100-MAX-HR-3-H	1	Average 2019 P&T Effluent concentration for 100-HX P&T System
199-D4-38	3.988333333	HIGH	Hexavalent Chromium	100-HR-3-D_HI;100-HR-3-H_HI	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-D4-39	4.051666667	HIGH	Hexavalent Chromium	100-HR-3-D_HI;100-HR-3-H_HI	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-D4-98	3.106666667	HIGH	Hexavalent Chromium	100-HR-3-D_HI;100-HR-3-H_HI	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-D7-3	2.386	HIGH	Hexavalent Chromium	100-HR-3-D_HI;100-HR-3-H_HI	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-D8-69	2.0075	HIGH	Hexavalent Chromium	100-HR-3-D_HI;100-HR-3-H_HI	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-H4-74	22.7	2018	Hexavalent Chromium	100-HR-3-D_HI;100-HR-3-H_HI	1	HR-3 Cr HI - add H4-74 2018 value (not sampled

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
						2019)
199-D4-38	5.128888889	LOW	Hexavalent Chromium	100-HR-3-D_LO;100-HR-3-H_LO	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-D4-39	7.296666667	LOW	Hexavalent Chromium	100-HR-3-D_LO;100-HR-3-H_LO	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-D4-83	1.932	LOW	Hexavalent Chromium	100-HR-3-D_LO;100-HR-3-H_LO	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-D4-98	4.772222222	LOW	Hexavalent Chromium	100-HR-3-D_LO;100-HR-3-H_LO	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-D4-99	3.781111111	LOW	Hexavalent Chromium	100-HR-3-D_LO;100-HR-3-H_LO	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-D5-101	4.867142857	LOW	Hexavalent Chromium	100-HR-3-D_LO;100-HR-3-H_LO	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-D5-127	4.708571429	LOW	Hexavalent Chromium	100-HR-3-D_LO;100-HR-3-H_LO	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-D5-92	4.577142857	LOW	Hexavalent Chromium	100-HR-3-D_LO;100-HR-3-H_LO	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
CP_2020_4	56000	OTHER DATA	Nitrate	100-KR-4	3	Add CP at 56000 µg/L to connect plume
CP_2019_17	15	OTHER DATA	Hexavalent Chromium	100-KR-4;100-KR-4_HI;100-KR-4_LO	3	Connect shoreline plume to source plume; add to HI RS
199-K-239	16.1	2020	Hexavalent Chromium	100-KR-4;100-KR-4_HI;100-KR-4_LO;100-NR-2;100-MAX-KR-4	1	Use Jan. 2020 characterization data of 16.1 µg/L for new well 199-K-239 with temp coordinates of (569039; 146693)
199-K-121A	40.4	2019	Carbon-14	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System
199-K-122A	40.4	2019	Carbon-14	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System
199-K-123A	40.4	2019	Carbon-14	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-K-124A	40.4	2019	Carbon-14	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System
199-K-128	40.4	2019	Carbon-14	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System
199-K-143	54.35	2019	Carbon-14	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-149	54.35	2019	Carbon-14	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-151	54.35	2019	Carbon-14	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-156	54.35	2019	Carbon-14	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-164	54.35	2019	Carbon-14	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-169	54.35	2019	Carbon-14	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-170	54.35	2019	Carbon-14	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-K-172	54.35	2019	Carbon-14	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-179	54.35	2019	Carbon-14	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-180	54.35	2019	Carbon-14	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
CP_2016_4	22948	OTHER DATA	Carbon-14	100-KR-4;100-NR-2	3	Migrated Data for 199-K-30 from 2015 plume mapping
199-K-121A	12325	2019	Nitrate	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System
199-K-122A	12325	2019	Nitrate	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System
199-K-123A	12325	2019	Nitrate	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System
199-K-124A	12325	2019	Nitrate	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System
199-K-128	12325	2019	Nitrate	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-K-143	14300	2019	Nitrate	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-149	14300	2019	Nitrate	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-151	14300	2019	Nitrate	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-156	14300	2019	Nitrate	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-164	14300	2019	Nitrate	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-169	14300	2019	Nitrate	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-170	14300	2019	Nitrate	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-172	14300	2019	Nitrate	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-179	14300	2019	Nitrate	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-K-180	14300	2019	Nitrate	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-121A	1.435	2019	Strontium-90	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System
199-K-122A	1.435	2019	Strontium-90	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System
199-K-123A	1.435	2019	Strontium-90	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System
199-K-124A	1.435	2019	Strontium-90	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System
199-K-128	1.435	2019	Strontium-90	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System
199-K-143	1.405	2019	Strontium-90	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-149	1.405	2019	Strontium-90	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-151	1.405	2019	Strontium-90	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-K-156	1.405	2019	Strontium-90	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-164	1.405	2019	Strontium-90	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-169	1.405	2019	Strontium-90	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-170	1.405	2019	Strontium-90	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-172	1.405	2019	Strontium-90	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-179	1.405	2019	Strontium-90	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-180	1.405	2019	Strontium-90	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-121A	3230	2019	Tritium	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System
199-K-122A	3230	2019	Tritium	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-K-123A	3230	2019	Tritium	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System
199-K-124A	3230	2019	Tritium	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System
199-K-128	3230	2019	Tritium	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System
199-K-143	3905	2019	Tritium	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-149	3905	2019	Tritium	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-151	3905	2019	Tritium	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-156	3905	2019	Tritium	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-164	3905	2019	Tritium	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-169	3905	2019	Tritium	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-K-170	3905	2019	Tritium	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-172	3905	2019	Tritium	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-179	3905	2019	Tritium	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-180	3905	2019	Tritium	100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-239	43200	2020	Nitrate	100-KR-4;100-NR-2;100-MAX-KR-4	1	KR-4 NO3 add 199-K-239 at 43200 µg/L (max characterization sample)
199-K-186	1.2	2016	Strontium-90	100-KR-4;100-NR-2;100-MAX-KR-4	1	KE Sr-90 add K-186 as CP (2018 map value)
199-K-121A	0.3	2019	Trichloroethene	100-KR-4;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System
199-K-122A	0.3	2019	Trichloroethene	100-KR-4;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System
199-K-123A	0.3	2019	Trichloroethene	100-KR-4;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-K-124A	0.3	2019	Trichloroethene	100-KR-4;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System
199-K-128	0.3	2019	Trichloroethene	100-KR-4;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System
199-K-143	0.3	2019	Trichloroethene	100-KR-4;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-149	0.3	2019	Trichloroethene	100-KR-4;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-151	0.3	2019	Trichloroethene	100-KR-4;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-156	0.3	2019	Trichloroethene	100-KR-4;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-164	0.3	2019	Trichloroethene	100-KR-4;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-169	0.3	2019	Trichloroethene	100-KR-4;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-170	0.3	2019	Trichloroethene	100-KR-4;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KX P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-K-172	0.3	2019	Trichloroethene	100-KR-4;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-179	0.3	2019	Trichloroethene	100-KR-4;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-180	0.3	2019	Trichloroethene	100-KR-4;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-239	0.63	2020	Trichloroethene	100-KR-4;100-NR-2;100-MAX-KR-4	1	characterization data from January 2020
199-K-114A	5	HIGH	Hexavalent Chromium	100-KR-4_HI	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-K-115A	2.75	HIGH	Hexavalent Chromium	100-KR-4_HI	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-K-116A	4.126	HIGH	Hexavalent Chromium	100-KR-4_HI	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-K-120A	1.5	HIGH	Hexavalent Chromium	100-KR-4_HI	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-K-127	3.39	HIGH	Hexavalent Chromium	100-KR-4_HI	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-K-145	4.75	HIGH	Hexavalent Chromium	100-KR-4_HI	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-K-162	2.5	HIGH	Hexavalent Chromium	100-KR-4_HI	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-K-163	4	HIGH	Hexavalent Chromium	100-KR-4_HI	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-K-198	5.75	HIGH	Hexavalent Chromium	100-KR-4_HI	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
CP_2020_3	9.5	OTHER DATA	Hexavalent Chromium	100-KR-4_HI	3	Add CP to better deleate plumes
199-N-51	8.95	2019	Hexavalent Chromium	100-KR-4_HI;100-KR-4_LO;100-NR-2	1	the filtered total chromium sample (14.4) was rerun at the lab and the new value is 10.4. With that value the mean for low RS goes to 8.95. Use this value in the interpolation.

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-K-121A	2	2019	Hexavalent Chromium	100-KR-4_HI;100-KR-4_LO;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System
199-K-122A	2	2019	Hexavalent Chromium	100-KR-4_HI;100-KR-4_LO;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System
199-K-123A	2	2019	Hexavalent Chromium	100-KR-4_HI;100-KR-4_LO;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System
199-K-124A	2	2019	Hexavalent Chromium	100-KR-4_HI;100-KR-4_LO;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System
199-K-128	2	2019	Hexavalent Chromium	100-KR-4_HI;100-KR-4_LO;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KR-4 P&T System
199-K-143	2	2019	Hexavalent Chromium	100-KR-4_HI;100-KR-4_LO;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-149	2	2019	Hexavalent Chromium	100-KR-4_HI;100-KR-4_LO;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-151	2	2019	Hexavalent Chromium	100-KR-4_HI;100-KR-4_LO;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-156	2	2019	Hexavalent Chromium	100-KR-4_HI;100-KR-4_LO;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KX P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-K-164	2	2019	Hexavalent Chromium	100-KR-4_HI;100-KR-4_LO;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-169	2	2019	Hexavalent Chromium	100-KR-4_HI;100-KR-4_LO;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-170	2	2019	Hexavalent Chromium	100-KR-4_HI;100-KR-4_LO;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-172	2	2019	Hexavalent Chromium	100-KR-4_HI;100-KR-4_LO;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-179	2	2019	Hexavalent Chromium	100-KR-4_HI;100-KR-4_LO;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
199-K-180	2	2019	Hexavalent Chromium	100-KR-4_HI;100-KR-4_LO;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KX P&T System
CP_2017_10	2.5	OTHER DATA	Hexavalent Chromium	100-KR-4_HI;100-KR-4_LO;100-NR-2;100-MAX-KR-4	3	Constrain the Cr(VI) plume in the upgradient direction. Concentrations are consistent with nearby well measurements.
CP_2017_8	2.5	OTHER DATA	Hexavalent Chromium	100-KR-4_HI;100-KR-4_LO;100-NR-2;100-MAX-KR-4	3	Increase inland extent so plume does not shrink too much
CP_2017_9	2.5	OTHER DATA	Hexavalent Chromium	100-KR-4_HI;100-KR-4_LO;100-NR-2;100-MAX-	3	Increase inland extent so plume does not shrink too

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
				KR-4		much
199-K-114A	2.972857143	LOW	Hexavalent Chromium	100-KR-4_LO	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-K-115A	3.847142857	LOW	Hexavalent Chromium	100-KR-4_LO	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-K-116A	2.142857143	LOW	Hexavalent Chromium	100-KR-4_LO	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-K-120A	2.107142857	LOW	Hexavalent Chromium	100-KR-4_LO	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-K-127	1.947142857	LOW	Hexavalent Chromium	100-KR-4_LO	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-K-145	2.772857143	LOW	Hexavalent Chromium	100-KR-4_LO	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-K-162	1.832857143	LOW	Hexavalent Chromium	100-KR-4_LO	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-K-163	1.665714286	LOW	Hexavalent Chromium	100-KR-4_LO	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-K-198	4.18	LOW	Hexavalent Chromium	100-KR-4_LO	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-K-199	1.812857143	LOW	Hexavalent Chromium	100-KR-4_LO	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-K-212	3.595714286	LOW	Hexavalent Chromium	100-KR-4_LO	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
CP_2020_1	15	OTHER DATA	Hexavalent Chromium	100-KR-4_LO	3	Add CP to extend plume to originate from the trench
CP_2018_20	2.5	OTHER DATA	Hexavalent Chromium	100-KR-4-KE_LO	3	Constrain the Cr(VI) plume in the upgradient direction between 199-K-188 and 199-K-187.

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
CP_2018_19	2	OTHER DATA	Hexavalent Chromium	100-KR-4-KN_HI;100-KR-4-KN_LO	3	Constrain the Cr(VI) plume in the upgradient direction of well 199-K-193.
199-K-158	241.67	2019	Carbon-14	100-KW	1	Average 2019 P&T Effluent concentration for 100-KW P&T System
199-K-175	241.67	2019	Carbon-14	100-KW	1	Average 2019 P&T Effluent concentration for 100-KW P&T System
199-K-206	241.67	2019	Carbon-14	100-KW	1	Average 2019 P&T Effluent concentration for 100-KW P&T System
CP_2017_12	1500	OTHER DATA	Carbon-14	100-KW	3	Constrain the carbon-14 plume in the upgradient direction.
CP_2017_13	1500	OTHER DATA	Carbon-14	100-KW	3	Constrain the carbon-14 plume in the upgradient direction.
199-K-158	1.575	2019	Strontium-90	100-KW	1	Average 2019 P&T Effluent concentration for 100-KW P&T System
199-K-175	1.575	2019	Strontium-90	100-KW	1	Average 2019 P&T Effluent concentration for 100-KW P&T System
199-K-206	1.575	2019	Strontium-90	100-KW	1	Average 2019 P&T Effluent concentration for

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
						100-KW P&T System
199-K-158	1308	2019	Tritium	100-KW	1	Average 2019 P&T Effluent concentration for 100-KW P&T System
199-K-175	1308	2019	Tritium	100-KW	1	Average 2019 P&T Effluent concentration for 100-KW P&T System
199-K-206	1308	2019	Tritium	100-KW	1	Average 2019 P&T Effluent concentration for 100-KW P&T System
199-K-174	241.67	2019	Carbon-14	100-KW;100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KW P&T System
199-K-174	1.575	2019	Strontium-90	100-KW;100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KW P&T System
199-K-174	1308	2019	Tritium	100-KW;100-KR-4;100-NR-2	1	Average 2019 P&T Effluent concentration for 100-KW P&T System
199-K-158	22888	2019	Nitrate	100-KW;100-KR-4;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KW P&T System
199-K-174	22888	2019	Nitrate	100-KW;100-KR-4;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KW P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-K-175	22888	2019	Nitrate	100-KW;100-KR-4;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KW P&T System
199-K-206	22888	2019	Nitrate	100-KW;100-KR-4;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KW P&T System
199-K-158	3.01	2019	Trichloroethene	100-KW;100-KR-4;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KW P&T System
199-K-175	3.01	2019	Trichloroethene	100-KW;100-KR-4;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KW P&T System
199-K-206	3.01	2019	Trichloroethene	100-KW;100-KR-4;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KW P&T System
199-K-174	3.01	2019	Trichloroethene	100-KW;100-KR-4;100-NR-2;100-NR-2;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KW P&T System
CP_2020_2	2	OTHER DATA	Hexavalent Chromium	100-KW_HI	3	Add CP to delimite plume on east side
199-K-158	2	2019	Hexavalent Chromium	100-KW_HI;100-KW_LO	1	Average 2019 P&T Effluent concentration for 100-KW P&T System
199-K-175	2	2019	Hexavalent Chromium	100-KW_HI;100-KW_LO	1	Average 2019 P&T Effluent concentration for 100-KW P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-K-206	2	2019	Hexavalent Chromium	100-KW_HI;100-KW_LO	1	Average 2019 P&T Effluent concentration for 100-KW P&T System
199-K-174	2	2019	Hexavalent Chromium	100-KW_HI;100-KW_LO;100-KR-4_HI;100-KR-4_LO;100-MAX-KR-4	1	Average 2019 P&T Effluent concentration for 100-KW P&T System
199-K-114A	3.629285714	2019	Hexavalent Chromium	100-NR-2	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-K-115A	3.495	2019	Hexavalent Chromium	100-NR-2	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-K-116A	3.361875	2019	Hexavalent Chromium	100-NR-2	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-K-120A	2.339285714	2019	Hexavalent Chromium	100-NR-2	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-K-127	2.581666667	2019	Hexavalent Chromium	100-NR-2	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-K-130	4.12	2019	Hexavalent Chromium	100-NR-2	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-K-145	4.315	2019	Hexavalent Chromium	100-NR-2	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-K-148	2.513	2019	Hexavalent Chromium	100-NR-2	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-K-162	2.487857143	2019	Hexavalent Chromium	100-NR-2	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-K-163	2.19	2019	Hexavalent Chromium	100-NR-2	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-K-171	5.189285714	2019	Hexavalent Chromium	100-NR-2	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-K-198	5.09	2019	Hexavalent Chromium	100-NR-2	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
199-K-199	2.976153846	2019	Hexavalent Chromium	100-NR-2	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-K-208	3.277142857	2019	Hexavalent Chromium	100-NR-2	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
199-K-212	3.726428571	2019	Hexavalent Chromium	100-NR-2	1	concentrations less than or equal to zero are replaced with 1 µg/L and average was calculated
CP-PRB-1	107.4449394	OTHER DATA	Strontium-90	100-NR-2	3	control points to the 100-N Sr-90 plume interpretation (based on decayed pre-injection concentrations at the injection wells) 20 meters inland from each apatite treated injection well (64 control points). Better reflects the plume to the PRB which lines up with the 2007 and 2008 interpretation before the injections were completed.
CP-PRB-10	10.74449394	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-11	32.23348181	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
CP-PRB-12	115.7099347	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-13	512.4297109	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-14	90.91494871	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-15	272.7448461	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-16	190.0948927	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-17	380.1897855	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-18	396.7197762	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-19	909.1494871	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-2	223.1548741	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-20	743.8495803	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-21	123.9749301	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-22	10.74449394	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-23	46.28397389	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
CP-PRB-24	90.91494871	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-25	1487.699161	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-26	1727.384025	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-27	2674.810772	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-28	3471.298041	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-29	1570.349114	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-3	115.7099347	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-30	814.1020407	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-31	1818.298974	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-32	1694.324044	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-33	1281.074277	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-34	3677.922925	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-35	1574.481612	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
CP-PRB-36	1174.539471	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-37	1074.449394	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-38	3640.896805	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-39	909.1494871	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-4	99.17994404	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-40	1983.598881	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-41	3.967197762	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-42	22.31548741	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-43	33.88648088	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-44	90.91494871	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-45	355.3947995	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-46	140.5049207	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-47	132.2399254	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
CP-PRB-48	239.6848648	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-49	214.8898788	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-5	297.5398321	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-50	69.42596083	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-51	9.917994404	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-52	75.21145757	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-53	214.8898788	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-54	1.487699161	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-55	1.570349114	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-56	2.562148554	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-57	99.17994404	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-58	578.5496736	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-59	471.1047342	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
CP-PRB-6	446.3097482	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-60	528.9597016	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-61	752.1145757	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-62	1735.649021	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-63	1487.699161	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-64	1.652999067	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-7	1487.699161	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-8	487.6347249	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP-PRB-9	677.7296176	OTHER DATA	Strontium-90	100-NR-2	3	See CP-PRB -1
CP_2019_101	500	OTHER DATA	Tritium	100-NR-C7934	3	Constrain inland extent of plume based on low tritium concentrations in wells 199-N-371 and 199-N-372.
SPC-GM-1	5.45	2018	Uranium	1100-EM	1	Framatome groundwater data - average 2018 results as control points

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
SPC-GM-10	16.25	2018	Uranium	1100-EM	1	Framatome groundwater data - average 2018 results as control points
SPC-GM-12	29.7	2018	Uranium	1100-EM	1	Framatome groundwater data - average 2018 results as control points
SPC-GM-2	5.9	2018	Uranium	1100-EM	1	Framatome groundwater data - average 2018 results as control points
SPC-GM-5	14.55	2018	Uranium	1100-EM	1	Framatome groundwater data - average 2018 results as control points
SPC-GM-6	11.15	2018	Uranium	1100-EM	1	Framatome groundwater data - average 2018 results as control points
SPC-GM-7	18.15	2018	Uranium	1100-EM	1	Framatome groundwater data - average 2018 results as control points
SPC-GM-8	23.575	2018	Uranium	1100-EM	1	Framatome groundwater data - average 2018 results as control points
CP_2019_70	40000	OTHER DATA	Nitrate	200-BP-5	3	Connect <45 mg/L parts
CP_2019_84	90000	OTHER DATA	Nitrate	200-BP-5	3	CP for consistency with CSM
CP_2019_85	0	OTHER DATA	Nitrate	200-BP-5	2	CP for consistency with CSM

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
CP_2019_86	75000	OTHER DATA	Nitrate	200-BP-5	3	CP for consistency with CSM
CP_2019_87	250000	OTHER DATA	Nitrate	200-BP-5	3	CP for consistency with CSM
CP_2019_88	0	OTHER DATA	Nitrate	200-BP-5	2	CP for consistency with CSM
CP_2020_17	3500	OTHER DATA	Technetium-99	200-BP-5	3	Extend plume near 699-47-55
CP_2019_28	20	OTHER DATA	Uranium	200-BP-5	3	Control point used to extend the plume south of 299-E33-47. Used only in 200-BP-5_Uranium_N.dat
CP_2020_20	50	OTHER DATA	Uranium	200-BP-5	3	Control point to connect plume near B Plant
CP02	0	OTHER DATA	ALL	200-BP-5;200-BP-E28-24;200-PO-1	2	Geologic Control to represent boundary where basalt is present above water table
CP03	0	OTHER DATA	ALL	200-BP-5;200-BP-E28-24;200-PO-1	2	Geologic Control to represent boundary where basalt is present above water table
CP04	0	OTHER DATA	ALL	200-BP-5;200-BP-E28-24;200-PO-1	2	Geologic Control to represent boundary where basalt is present above water table

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
CP05	0	OTHER DATA	ALL	200-BP-5;200-BP-E28-24;200-PO-1	2	Geologic Control to represent boundary where basalt is present above water table
CP06	0	OTHER DATA	ALL	200-BP-5;200-BP-E28-24;200-PO-1	2	Geologic Control to represent boundary where basalt is present above water table
CP07	0	OTHER DATA	ALL	200-BP-5;200-BP-E28-24;200-PO-1	2	Geologic Control to represent boundary where basalt is present above water table
CP08	0	OTHER DATA	ALL	200-BP-5;200-BP-E28-24;200-PO-1	2	Geologic Control to represent boundary where basalt is present above water table
CP09	0	OTHER DATA	ALL	200-BP-5;200-BP-E28-24;200-PO-1	2	Geologic Control to represent boundary where basalt is present above water table
CP10	0	OTHER DATA	ALL	200-BP-5;200-BP-E28-24;200-PO-1	2	Geologic Control to represent boundary where basalt is present above water table
CP11	0	OTHER DATA	ALL	200-BP-5;200-BP-E28-24;200-PO-1	2	Geologic Control to represent boundary where basalt is present above water table

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
CP12	0	OTHER DATA	ALL	200-BP-5;200-BP-E28-24;200-PO-1	2	Geologic Control to represent boundary where basalt is present above water table
CP13	0	OTHER DATA	ALL	200-BP-5;200-BP-E28-24;200-PO-1	2	Geologic Control to represent boundary where basalt is present above water table
CP14	0	OTHER DATA	ALL	200-BP-5;200-BP-E28-24;200-PO-1	2	Geologic Control to represent boundary where basalt is present above water table
CP15	0	OTHER DATA	ALL	200-BP-5;200-BP-E28-24;200-PO-1	2	Geologic Control to represent boundary where basalt is present above water table
CP16	0	OTHER DATA	ALL	200-BP-5;200-BP-E28-24;200-PO-1	2	Geologic Control to represent boundary where basalt is present above water table
CP17	0	OTHER DATA	ALL	200-BP-5;200-BP-E28-24;200-PO-1	2	Geologic Control to represent boundary where basalt is present above water table
CP18	0	OTHER DATA	ALL	200-BP-5;200-BP-E28-24;200-PO-1	2	Geologic Control to represent boundary where basalt is present above water table

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
CP19	0	OTHER DATA	ALL	200-BP-5;200-BP-E28-24;200-PO-1	2	Geologic Control to represent boundary where basalt is present above water table
CP20	0	OTHER DATA	ALL	200-BP-5;200-BP-E28-24;200-PO-1	2	Geologic Control to represent boundary where basalt is present above water table
CP21	0	OTHER DATA	ALL	200-BP-5;200-BP-E28-24;200-PO-1	2	Geologic Control to represent boundary where basalt is present above water table
CP22	0	OTHER DATA	ALL	200-BP-5;200-BP-E28-24;200-PO-1	2	Geologic Control to represent boundary where basalt is present above water table
CP23	0	OTHER DATA	ALL	200-BP-5;200-BP-E28-24;200-PO-1	2	Geologic Control to represent boundary where basalt is present above water table
CP24	0	OTHER DATA	ALL	200-BP-5;200-BP-E28-24;200-PO-1	2	Geologic Control to represent boundary where basalt is present above water table
CP26	0	OTHER DATA	ALL	200-BP-5;200-BP-E28-24;200-PO-1	2	Geologic Control to represent boundary where basalt is present above water table

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
CP27	0	OTHER DATA	ALL	200-BP-5;200-BP-E28-24;200-PO-1	2	Geologic Control to represent boundary where basalt is present above water table
CP28	0	OTHER DATA	ALL	200-BP-5;200-BP-E28-24;200-PO-1	2	Geologic Control to represent boundary where basalt is present above water table
CP29	0	OTHER DATA	ALL	200-BP-5;200-BP-E28-24;200-PO-1	2	Geologic Control to represent boundary where basalt is present above water table
CP_2017_27	1200	OTHER DATA	Cyanide	200-BP-5;200-PO-1	3	Estimated Cyanide Loading Source Area from 241-B-105 and 241-B-106 UPR
CP_2017_30	5	OTHER DATA	Cyanide	200-BP-5;200-PO-1	3	Add CP to control plume extents
CP_2017_31	150	OTHER DATA	Cyanide	200-BP-5;200-PO-1	3	BP-5 Cyanide North Add CPs to extend 480 contour and Add CP to control plume extents
CP_2020_18	200	OTHER DATA	Cyanide	200-BP-5;200-PO-1	3	Based on past results at 699-50-53A and 699-53-55B&C; and modeled flow direction (DOE/RL-95-59).

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
CP_2020_19	200	OTHER DATA	Cyanide	200-BP-5;200-PO-1	3	Control point between 299-E33-33 and 299-E34-9 to better define leading edge of plume extending to the southeast
699-47-53B	0.776	2019	Iodine-129	200-BP-5;200-PO-1	1	BP-5 I-129 - all available data are characterization data; use AVERAGE instead of MAX MDA
699-47-55	0.8308	2019	Iodine-129	200-BP-5;200-PO-1	1	BP-5 I-129 - all available data are characterization data; use AVERAGE instead of MAX MDA
CP_2014_52	0.8	OTHER DATA	Iodine-129	200-BP-5;200-PO-1	3	Control extent of plume adjacent to mud
CP_2014_53	0.8	OTHER DATA	Iodine-129	200-BP-5;200-PO-1	3	Location based on 2014 interpretation of plume extent based on groundwater flow direction.
CP_2016_10	0	OTHER DATA	Iodine-129	200-BP-5;200-PO-1	2	Add geology control point: (579220;138890): 0 µg/L
CP_2016_74	1.1	OTHER DATA	Iodine-129	200-BP-5;200-PO-1	3	Inferred location of high hydraulic conductivity channel. Concentration based on nearby wells within channel area.

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
CP_2017_16	0.8	OTHER DATA	Iodine-129	200-BP-5;200-PO-1	3	Control extent of plume adjacent to mud
CP_2017_17	0.8	OTHER DATA	Iodine-129	200-BP-5;200-PO-1	3	Control extent of plume adjacent to mud
CP_2017_60	1.1	OTHER DATA	Iodine-129	200-BP-5;200-PO-1	3	PO-1 Iodine-129: add control point to connect north-south parts of plume along Cold Creek
CP_2019_5	1	OTHER DATA	Iodine-129	200-BP-5;200-PO-1	3	Added control point between 299-E28-4 and 299-E28-6 to expand the boundary towards 299-E28-6
CP_2019_6	1	OTHER DATA	Iodine-129	200-BP-5;200-PO-1	3	Added control point between 299-E28-6 and 299-E23-1 to expand the boundary towards 299-E23-1
CP_2018_4	200000	OTHER DATA	Nitrate	200-BP-5;200-PO-1	3	Used for extending the nitrate plume from the source of aquifer loading area near 241-BX-108 to wells 299-E33-48; 299-E33-337 and 299-E33-339.
CP_2018_5	200000	OTHER DATA	Nitrate	200-BP-5;200-PO-1	3	Used to extend nitrate plume from aquifer loading area from UPRs near 241-BX-108 to wells

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
						299-E33-48; 299-E33-337 and 299-E33-339
CP_2018_6	200000	OTHER DATA	Nitrate	200-BP-5;200-PO-1	3	Used to extend nitrate plume from aquifer loading area from UPRs near 241-BX-108 to wells 299-E33-48; 299-E33-337 and 299-E33-339
CP_2019_10	100000	OTHER DATA	Nitrate	200-BP-5;200-PO-1	3	Added control point at west end of former Gable Mountain Pond at concentrations roughly half of well 699-53-48A for consistently in infiltration concentrations with consideration of thicker aquifer
CP_2019_7	100000	OTHER DATA	Nitrate	200-BP-5;200-PO-1	3	Added control point between 299-E26-15 and 299-E26-13 to establish boundary condition
CP_2019_8	100000	OTHER DATA	Nitrate	200-BP-5;200-PO-1	3	Added control point between 299-E26-10 and 299-E26-4 to establish boundary condition
CP_2019_9	100000	OTHER DATA	Nitrate	200-BP-5;200-PO-1	3	Added control point between 299-E27-9 and 299-E27-22 to establish

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
						boundary condition
CP_2017_48	9000	OTHER DATA	Technetium-99	200-BP-5;200-PO-1	3	Required for geometry of south plume extent based on results at wells 299-E27-21; 299-E24-33; and 299-E24-22; and flow direction.
CP_2017_50	9000	OTHER DATA	Technetium-99	200-BP-5;200-PO-1	3	Required for geometry of remnant northwest plume extent created when flow was northwest. Based on geology differences and past results at wells 299-E33-26; 299-E33-34; 299-E33-35 and 699-49-57A; as well as current results at wells 299-E33-34; 299-E33-35; 299-E33-268 and 699-49-57A.
CP_2017_52	500	OTHER DATA	Technetium-99	200-BP-5;200-PO-1	3	Required for geometry of southeast B Complex plume based on results at wells 299-E28-5 and 299-E33-361.
CP_2017_53	600	OTHER DATA	Technetium-99	200-BP-5;200-PO-1	3	Required to separate the Tc-99 plume migrating southeast of B Complex from the Tc-99 detected at 216-B-5 injection well 299-E28-24.

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
CP_2017_54	700	OTHER DATA	Technetium-99	200-BP-5;200-PO-1	3	Required for geometry of southeast B Complex plume based on past and present results at wells 299-E28-5; and flow direction.
CP_2018_26	25000	OTHER DATA	Tritium	200-BP-5;200-PO-1	3	Add CP to maintain main-plume continuity in southeastern 200 East
299-E17-12	0.718	2018	Iodine-129	200-BP-5;200-PO-1;200-UP-1	1	Use reported value (nondetect) instead of MDA which is close to 1 pCi/L
299-E24-18	0.217	2018	Iodine-129	200-BP-5;200-PO-1;200-UP-1	1	Use reported value (nondetect) instead of MDA which is close to 1 pCi/L
CP_2018_27	18000	OTHER DATA	Tritium	200-BP-5;200-PO-1;200-UP-1	3	Add CP for plume separation near PUREX
699-31-53B	50.45	2020	Hexavalent Chromium	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	No 2019 data; 2018 average skewed low. Excluded 2018 and used January 2020
699-34-58	81	2017	Hexavalent Chromium	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-9A. 2017 annual average value
699-34-58B	67.65	2019	Hexavalent Chromium	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-9. 2019 annual average value

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
699-35-57	110.5	2019	Hexavalent Chromium	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-3. 2019 annual average value
699-35-58	73.24	2019	Hexavalent Chromium	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-5. 2019 annual average value
699-35-58D	47.125	2019	Hexavalent Chromium	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-6. 2019 annual average value
699-35-59	59.775	2019	Hexavalent Chromium	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-13. 2019 annual average value
699-36-58A	41.7	2019	Hexavalent Chromium	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-10. 2019 annual average value
699-36-58B	49.62	2019	Hexavalent Chromium	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-8. 2019 annual average value
699-36-58J	58.55	2019	Hexavalent Chromium	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-4. 2019 annual average value
699-36-58K	19.925	2019	Hexavalent Chromium	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-7. 2019 annual average value
699-35-58D	0.3	2014	Iodine-129	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-6. 2014 annual average value (no subsequent data)
699-35-59	0.2	2014	Iodine-129	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-13. 2014 annual average value (no subsequent data)
299-E27-10	62000	2018	Nitrate	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	Annual average revised to exclude an anomalously low 4/10/18 result

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
699-34-58B	16317	2019	Nitrate	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-9. 2019 annual average value
699-35-57	19580.4	2019	Nitrate	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-3. 2019 annual average value
699-35-58	16445.76	2019	Nitrate	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-5. 2019 annual average value
699-35-58D	18348.3	2019	Nitrate	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-6. 2019 annual average value
699-35-59	17105.1	2019	Nitrate	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-13. 2019 annual average value
699-36-58A	16638.9	2019	Nitrate	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-10. 2019 annual average value
699-36-58B	15984	2019	Nitrate	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-8. 2019 annual average value
699-36-58J	16905.3	2019	Nitrate	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-4. 2019 annual average value
699-36-58K	15207	2019	Nitrate	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-7. 2019 annual average value
CP40	0	OTHER DATA	Nitrate	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	2	Geologic control to represent boundary where basalt is present above water table
699-34-58B	0.38825	2019	Trichloroethene	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-9. 2019 annual average value

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
699-35-57	22.55	2019	Trichloroethene	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-3. 2019 annual average value
699-35-58	16.86	2019	Trichloroethene	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-5. 2019 annual average value
699-35-58D	0.333	2019	Trichloroethene	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-6. 2019 annual average value
699-35-59	0.333	2019	Trichloroethene	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-13. 2019 annual average value
699-36-58A	0.333	2019	Trichloroethene	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-10. 2019 annual average value
699-36-58B	0.333	2019	Trichloroethene	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-8. 2019 annual average value
699-36-58J	6.5725	2019	Trichloroethene	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-4. 2019 annual average value
699-36-58K	0.333	2019	Trichloroethene	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-7. 2019 annual average value
699-34-58	2622	2019	Tritium	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-9A. 2019 annual average value
699-34-58B	2652.5	2019	Tritium	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-9. 2019 annual average value
699-35-57	1392.5	2019	Tritium	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-3. 2019 annual average value
699-35-58	1982.5	2019	Tritium	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-5. 2019 annual average value

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
699-35-58D	4094	2019	Tritium	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-6. 2019 annual average value
699-35-59	3292.5	2019	Tritium	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-13. 2019 annual average value
699-36-58A	3070	2019	Tritium	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-10. 2019 annual average value
699-36-58B	2137.5	2019	Tritium	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-8. 2019 annual average value
699-36-58J	1822.5	2019	Tritium	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-4. 2019 annual average value
699-36-58K	6432	2019	Tritium	200-BP-5;200-PO-1;200-UP-1;200-ZP-1	1	US Ecology MW-7. 2019 annual average value
CP_2017_41	800000	OTHER DATA	Nitrate	200-BP-5;200-PO-1;200-ZP-1	3	Required for geometry of plume extent based on geology; flow rate; past results at well 299-E28-30 and current results at well 299-E28-31.
CP_2019_11	0	OTHER DATA	Nitrate	200-BP-5;200-PO-1;200-ZP-1	3	Add control point between 699-49-57A and 699-47-60 with concentration of 0 to establish boundary control. Advection towards well 299-E32-6 suggests nitrate in this area is below DWS.

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
CP_2019_12	0	OTHER DATA	Nitrate	200-BP-5;200-PO-1;200-ZP-1	3	Add control point between 699-49-57A and 699-47-60 with concentration of 0 to establish boundary control. Advection towards well 299-E32-6 suggests nitrate in this area is below the DWS.
699-29-4	0.948	2016	Iodine-129	200-PO-1	1	Sample of 1/1/2019 flagged Y; much higher than previous data and associated with known lab problem. Use 2016 sampled value (non-detect use MDA of 0.948)
699-31-11	0.859	2016	Iodine-129	200-PO-1	1	Sample of 1/21/2019 flagged Y; much higher than previous data and associated with known lab problem. Use 2016 sampled value (0.859)
CP_2020_14	0.5	OTHER DATA	Iodine-129	200-PO-1	3	Added based on groundwater flow direction and projected zone of high Transmissivity extending southeast of 200-East.
CP37	0	OTHER DATA	Iodine-129	200-PO-1	2	Geologic Control to represent boundary where basalt is present above

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
						water table
CP38	0	OTHER DATA	Iodine-129	200-PO-1	2	Geologic Control to represent boundary where basalt is present above water table
CP39	0	OTHER DATA	Iodine-129	200-PO-1	2	Geologic Control to represent boundary where basalt is present above water table
699-15-15B	197	2010	Tritium	200-PO-1	1	Well last sampled in 2010 and maintained as control poit to provide plume boundary for known areas of tritium attenuation
CP_2020_15	60000	OTHER DATA	Tritium	200-PO-1	3	Extend the plume east of 216-A-36B
CP_2020_16	40000	OTHER DATA	Tritium	200-PO-1	3	Extend the plume east of 216-A-36B
CP_2019_89	150	OTHER DATA	Hexavalent Chromium	200-UP-1	3	Extend the >100 µg/L contour to more realistic dimensions
CP_2019_90	150	OTHER DATA	Hexavalent Chromium	200-UP-1	3	Extend the >100 µg/L contour to more realistic dimensions
CP_2020_26	40	OTHER DATA	Hexavalent Chromium	200-UP-1	3	Add CP to extend and delimit western extent

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
CP_2020_27	40	OTHER DATA	Hexavalent Chromium	200-UP-1	3	Add CP to extend and delimit western extent
CP_2019_94	1300	OTHER DATA	Technetium-99	200-UP-1	3	Enlarge the plume at W19-41 slightly
CP_2019_97	3000	OTHER DATA	Technetium-99	200-UP-1	3	Connect northern and southern plume lobes east of WMA S-SX
CP_2019_98	2200	OTHER DATA	Technetium-99	200-UP-1	3	Connect plume to likely source
CP_2020_28	10000	OTHER DATA	Tritium	200-UP-1	3	separate and delimit the part of the plume to the east of the I-129 hydraulic control wells
CP_2020_21	35	OTHER DATA	Uranium	200-UP-1	3	enlarge plume at W20-1 so it's visible
CP_2020_22	40	OTHER DATA	Uranium	200-UP-1	3	connect the plumes in W19-101 and W19-39
CP_2020_23	35	OTHER DATA	Uranium	200-UP-1	3	connect the plumes in W19-101 and W19-39
CP_2014_13	250	OTHER DATA	Chromium	200-UP-1;200-ZP-1	3	This control point is inside the S Tank Farm near 241-S-104; the source tank. Use of this point extends to the plume to the known source.

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
CP_2020_25	0	OTHER DATA	Chromium	200-UP-1;200-ZP-1	3	Location and concentration added based on historical knowledge of source area and westerly upgradient inferred western extent of plume.
299-E11-1	8.2	2019	Hexavalent Chromium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-E20-1	8.2	2019	Hexavalent Chromium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-E20-2	8.2	2019	Hexavalent Chromium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W10-35	8.2	2019	Hexavalent Chromium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W10-36	8.2	2019	Hexavalent Chromium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-226	8.2	2019	Hexavalent Chromium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-227	8.2	2019	Hexavalent Chromium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
299-W15-228	8.2	2019	Hexavalent Chromium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-229	8.2	2019	Hexavalent Chromium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-29	8.2	2019	Hexavalent Chromium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-36	8.2	2019	Hexavalent Chromium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-38	8.2	2019	Hexavalent Chromium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-39	8.2	2019	Hexavalent Chromium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-41	8.2	2019	Hexavalent Chromium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-42	8.2	2019	Hexavalent Chromium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-43	8.2	2019	Hexavalent Chromium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
299-W22-20	381	2002	Hexavalent Chromium	200-UP-1;200-ZP-1	1	Result from 1/28/2002 sampling event. Sampling events after 1/28/2002 not considered representative of aquifer concentrations.
299-W6-13	8.2	2019	Hexavalent Chromium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W6-14	8.2	2019	Hexavalent Chromium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W7-14	8.2	2019	Hexavalent Chromium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
699-30-70	219	2017	Hexavalent Chromium	200-UP-1;200-ZP-1	1	The 2017 concentration from the 102.1 m bgs characterization sample used in lieu of the average 2019 concentration from routine sampling. The average 2018 and 2019 concentrations were substantially lower which likely can be attributed to dilution from the three separate screened intervals with a total length of 27.4 m.
699-43-67	8.2	2019	Hexavalent Chromium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
						200-ZP1 P&T System
699-45-67	8.2	2019	Hexavalent Chromium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
699-46-68	8.2	2019	Hexavalent Chromium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
699-49-69	8.2	2019	Hexavalent Chromium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
CP_2016_14	0	OTHER DATA	Hexavalent Chromium	200-UP-1;200-ZP-1	3	Using last sample result from 299-W22-20 before this well became dry; a replacement well is planned for drilling.
299-E11-1	0.71	2019	Iodine-129	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-E20-1	0.71	2019	Iodine-129	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-E20-2	0.71	2019	Iodine-129	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W10-35	0.71	2019	Iodine-129	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
299-W10-36	0.71	2019	Iodine-129	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W11-87	0.379	2015	Iodine-129	200-UP-1;200-ZP-1	1	Trend calculation for 2015 (2015 MDA>1 pCi/). No subsequent data.
299-W15-226	0.71	2019	Iodine-129	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-227	0.71	2019	Iodine-129	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-228	0.71	2019	Iodine-129	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-229	0.71	2019	Iodine-129	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-29	0.71	2019	Iodine-129	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-36	0.71	2019	Iodine-129	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-38	0.71	2019	Iodine-129	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
299-W18-39	0.71	2019	Iodine-129	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-41	0.71	2019	Iodine-129	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-42	0.71	2019	Iodine-129	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-43	0.71	2019	Iodine-129	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W19-36	0.43	2015	Iodine-129	200-UP-1;200-ZP-1	1	Trend calculation for 2015 (2015 MDA>1 pCi/). No subsequent data.
299-W19-43	0.346	2015	Iodine-129	200-UP-1;200-ZP-1	1	Trend calculation for 2015 (2015 MDA>1 pCi/). No subsequent data.
299-W22-86	0.912	2016	Iodine-129	200-UP-1;200-ZP-1	1	2019 Non-detect value with high MDA; use 2016 mapped value (0.912)
299-W6-13	0.71	2019	Iodine-129	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W6-14	0.71	2019	Iodine-129	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
299-W7-14	0.71	2019	Iodine-129	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
699-43-67	0.71	2019	Iodine-129	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
699-45-67	0.71	2019	Iodine-129	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
699-46-68	0.71	2019	Iodine-129	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
699-49-69	0.71	2019	Iodine-129	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-E11-1	103998	2019	Nitrate	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-E20-1	103998	2019	Nitrate	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-E20-2	103998	2019	Nitrate	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W10-35	103998	2019	Nitrate	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
299-W10-36	103998	2019	Nitrate	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-226	103998	2019	Nitrate	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-227	103998	2019	Nitrate	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-228	103998	2019	Nitrate	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-229	103998	2019	Nitrate	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-29	103998	2019	Nitrate	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-36	103998	2019	Nitrate	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-38	103998	2019	Nitrate	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-39	103998	2019	Nitrate	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
299-W18-41	103998	2019	Nitrate	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-42	103998	2019	Nitrate	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-43	103998	2019	Nitrate	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W22-20	104000	2007	Nitrate	200-UP-1;200-ZP-1	1	Average of 2007 sampling results Well last sampled in 2009. Values from 2008 and 2009 sampling events not considered representative of aquifer concentrations.
299-W6-13	103998	2019	Nitrate	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W6-14	103998	2019	Nitrate	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W7-14	103998	2019	Nitrate	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
699-43-67	103998	2019	Nitrate	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
699-45-67	103998	2019	Nitrate	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
699-46-68	103998	2019	Nitrate	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
699-49-69	103998	2019	Nitrate	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
CP_2016_1	55000	OTHER DATA	Nitrate	200-UP-1;200-ZP-1	3	This control point is inside the S Tank Farm near 241-S-104; the source tank. Use of this point extends to the plume to the known source.
CP_2017_25	100000	OTHER DATA	Nitrate	200-UP-1;200-ZP-1	3	Ensures the nitrate plume extends between wells 299-W23-19 and 299-W22-116 beneath the SX Tank Farm by limiting the influence of 299-W23-236 and 299-W22-80 on the Kriging. The latter two are nearby wells with low concentrations.
CP_2017_26	35000	OTHER DATA	Nitrate	200-UP-1;200-ZP-1	3	This point is inside the S Tank Farm and prevents the plume from extending too far north from control point CP_2016_1.

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
CP_2018_17	50000	OTHER DATA	Nitrate	200-UP-1;200-ZP-1	3	Control plume delineation downgradient of well 299-W22-90.
299-E11-1	101.78	2019	Technetium-99	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-E20-1	101.78	2019	Technetium-99	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-E20-2	101.78	2019	Technetium-99	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W10-35	101.78	2019	Technetium-99	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W10-36	101.78	2019	Technetium-99	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-226	101.78	2019	Technetium-99	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-227	101.78	2019	Technetium-99	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-228	101.78	2019	Technetium-99	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
299-W15-229	101.78	2019	Technetium-99	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-29	101.78	2019	Technetium-99	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-36	101.78	2019	Technetium-99	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-38	101.78	2019	Technetium-99	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-39	101.78	2019	Technetium-99	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-41	101.78	2019	Technetium-99	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-42	101.78	2019	Technetium-99	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-43	101.78	2019	Technetium-99	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W6-13	101.78	2019	Technetium-99	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
299-W6-14	101.78	2019	Technetium-99	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W7-14	101.78	2019	Technetium-99	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
699-43-67	101.78	2019	Technetium-99	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
699-45-67	101.78	2019	Technetium-99	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
699-46-68	101.78	2019	Technetium-99	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
699-49-69	101.78	2019	Technetium-99	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
CP_2014_13	1500	OTHER DATA	Technetium-99	200-UP-1;200-ZP-1	3	UP-1 Tc-99 Middle; Location based on 2014 interpretation of plume extent based on groundwater flow direction.
CP_2017_20	0	OTHER DATA	Technetium-99	200-UP-1;200-ZP-1	3	This point is inside the S Tank Farm and prevents the plume from extending too far north from control

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
						point CP_2014_13.
CP_2017_21	1200	OTHER DATA	Technetium-99	200-UP-1;200-ZP-1	3	This point is downgradient from the U Tank Farm and extends the plume more to the east in an area of no well coverage. It is inferred that the plume extends more to the east due to high concentrations at 299-W19-45.
CP_2017_22	1800	OTHER DATA	Technetium-99	200-UP-1;200-ZP-1	3	This point is downgradient from the U Tank Farm and extends the plume more to the east in an area of no well coverage. It is inferred that the plume extends more to the east due to high concentrations at 299-W19-45.
CP_2020_24	12000	OTHER DATA	Technetium-99	200-UP-1;200-ZP-1	3	This point is inside the SX Tank Farm and joins the high concentration portion of the plume near the source at 299-W23-19 with downgradient high concentrations at 299-W22-116.

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
CP_27	0	OTHER DATA	Technetium-99	200-UP-1;200-ZP-1	3	UP-1 Tc-99 South; Location and concentration added based on historical knowledge of source area and westerly upgradient inferred western extent of plume.
299-E11-1	0.29	2019	Trichloroethene	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-E20-1	0.29	2019	Trichloroethene	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-E20-2	0.29	2019	Trichloroethene	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W10-35	0.29	2019	Trichloroethene	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W10-36	0.29	2019	Trichloroethene	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-226	0.29	2019	Trichloroethene	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-227	0.29	2019	Trichloroethene	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
299-W15-228	0.29	2019	Trichloroethene	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-229	0.29	2019	Trichloroethene	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-29	0.29	2019	Trichloroethene	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-36	0.29	2019	Trichloroethene	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-38	0.29	2019	Trichloroethene	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-39	0.29	2019	Trichloroethene	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-41	0.29	2019	Trichloroethene	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-42	0.29	2019	Trichloroethene	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-43	0.29	2019	Trichloroethene	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
299-W21-3	0.3	2016	Trichloroethene	200-UP-1;200-ZP-1	1	SRL is much higher than the detection limit. Use the detection limit of 0.3
299-W22-114	0.3	2016	Trichloroethene	200-UP-1;200-ZP-1	1	SRL is much higher than the detection limit. Use the detection limit of 0.3
299-W6-13	0.29	2019	Trichloroethene	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W6-14	0.29	2019	Trichloroethene	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W7-14	0.29	2019	Trichloroethene	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
699-43-67	0.29	2019	Trichloroethene	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
699-45-67	0.29	2019	Trichloroethene	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
699-46-68	0.29	2019	Trichloroethene	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
699-49-69	0.29	2019	Trichloroethene	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
299-E11-1	2011.94	2019	Tritium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-E20-1	2011.94	2019	Tritium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-E20-2	2011.94	2019	Tritium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W10-35	2011.94	2019	Tritium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W10-36	2011.94	2019	Tritium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-226	2011.94	2019	Tritium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-227	2011.94	2019	Tritium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-228	2011.94	2019	Tritium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-229	2011.94	2019	Tritium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
299-W15-29	2011.94	2019	Tritium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-36	2011.94	2019	Tritium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-38	2011.94	2019	Tritium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-39	2011.94	2019	Tritium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-41	2011.94	2019	Tritium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-42	2011.94	2019	Tritium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-43	2011.94	2019	Tritium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W6-13	2011.94	2019	Tritium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W6-14	2011.94	2019	Tritium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
299-W7-14	2011.94	2019	Tritium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
699-43-67	2011.94	2019	Tritium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
699-45-67	2011.94	2019	Tritium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
699-46-68	2011.94	2019	Tritium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
699-49-69	2011.94	2019	Tritium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-E11-1	0.98	2019	Uranium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-E20-1	0.98	2019	Uranium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-E20-2	0.98	2019	Uranium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W10-35	0.98	2019	Uranium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
299-W10-36	0.98	2019	Uranium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-226	0.98	2019	Uranium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-227	0.98	2019	Uranium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-228	0.98	2019	Uranium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-229	0.98	2019	Uranium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-29	0.98	2019	Uranium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-36	0.98	2019	Uranium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-38	0.98	2019	Uranium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-39	0.98	2019	Uranium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
299-W18-41	0.98	2019	Uranium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-42	0.98	2019	Uranium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-43	0.98	2019	Uranium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W6-13	0.98	2019	Uranium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W6-14	0.98	2019	Uranium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W7-14	0.98	2019	Uranium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
699-43-67	0.98	2019	Uranium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
699-45-67	0.98	2019	Uranium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
699-46-68	0.98	2019	Uranium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
699-49-69	0.98	2019	Uranium	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
CP_2016_16	0	OTHER DATA	Uranium	200-UP-1;200-ZP-1	3	Location and concentration added based on historical knowledge of source area and westerly upgradient inferred extent of plume.
299-W26-7	250	2000	Hexavalent Chromium	200-UP-W26-13	1	Add W26-7 at 250 (control point; interpolated vale from early 2000s data)
CP_2018_28	0	OTHER DATA	Hexavalent Chromium	200-UP-W26-13	3	Delimit plumes
CP30	0	OTHER DATA	ALL	200-ZP-1	2	Geologic Control to represent boundary where basalt is present above water table
CP31	0	OTHER DATA	ALL	200-ZP-1	2	Geologic Control to represent boundary where basalt is present above water table
CP32	0	OTHER DATA	ALL	200-ZP-1	2	Geologic Control to represent boundary where basalt is present above water table
CP_2019_96	120	OTHER DATA	Hexavalent Chromium	200-ZP-1	3	Expand >100 µg/L contour closer to well

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
						W11-43
CP_2020_37	42	OTHER DATA	Hexavalent Chromium	200-ZP-1	3	Add CP to smooth the eastern contour
CP_2019_100	60000	OTHER DATA	Nitrate	200-ZP-1	3	Added to connect southern part of UP-1 plume with BP-5
CP_2019_91	46000	OTHER DATA	Nitrate	200-ZP-1	3	used only in 200-ZP-1_Nitrate_SSX.dat
CP_2019_92	50000	OTHER DATA	Nitrate	200-ZP-1	3	used only in 200-ZP-1_Nitrate_SSX.dat
CP_2019_93	42000	OTHER DATA	Nitrate	200-ZP-1	3	used only in 200-ZP-1_Nitrate_SSX.dat
CP_2019_99	60000	OTHER DATA	Nitrate	200-ZP-1	3	Added to connect southern part of UP-1 plume with BP-5
CP_2020_29	0	OTHER DATA	Nitrate	200-ZP-1	3	Delimit plume upgradient of injection wells
CP_2020_30	0	OTHER DATA	Nitrate	200-ZP-1	3	Delimit plume upgradient of injection wells
CP_2020_31	55000	OTHER DATA	Nitrate	200-ZP-1	3	Extend plume north of northern injection well
CP_2020_32	0	OTHER DATA	Nitrate	200-ZP-1	3	Delimit plume upgradient of injection wells
CP_2020_33	15000	OTHER DATA	Nitrate	200-ZP-1	3	Delimit plume east of

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
						injection wells
CP_2020_34	15000	OTHER DATA	Nitrate	200-ZP-1	3	Delimit plume east of injection wells
CP_2020_35	15000	OTHER DATA	Nitrate	200-ZP-1	3	Delimit plume east of injection wells
CP_2020_36	25000	OTHER DATA	Nitrate	200-ZP-1	3	Delimit plume east of injection wells
CP_2020_38	1.6	OTHER DATA	Trichloroethene	200-ZP-1	3	Add CP for plume continuity
CP_2018_23	25000	OTHER DATA	Nitrate	300-F-BG	3	Delimit plume in upgradient direction
CP_28_2013	1000	OTHER DATA	Tritium	300-F-BG	3	Based on evaluation of results presented in PNNL-13675 Measurement of Helium 3/Helium 4 Ratios in Soil Gas at the 618- 11 Burial Ground.
ENW-MW-10	304.5	2018	Tritium	300-F-BG	1	2018 average from data collected by Energy Northwest. Results from Table B-11.1 of *2018 Annual Radiological Environmental Operating Report for the Columbia Generating Station*

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
ENW-MW-11	1062	2018	Tritium	300-F-BG	1	2018 average from data collected by Energy Northwest. Results from Table B-11.1 of *2018 Annual Radiological Environmental Operating Report for the Columbia Generating Station*
ENW-MW-12	483.75	2018	Tritium	300-F-BG	1	2018 average from data collected by Energy Northwest. Results from Table B-11.1 of *2018 Annual Radiological Environmental Operating Report for the Columbia Generating Station*
ENW-MW-13	10565	2018	Tritium	300-F-BG	1	2018 average from data collected by Energy Northwest. Results from Table B-11.1 of *2018 Annual Radiological Environmental Operating Report for the Columbia Generating Station*
ENW-MW-14	191.25	2018	Tritium	300-F-BG	1	2018 average from data collected by Energy Northwest. Results from Table B-11.1 of *2018 Annual Radiological Environmental Operating Report for the Columbia*

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
						Generating Station
ENW-MW-3	750.75	2018	Tritium	300-F-BG	1	2018 average from data collected by Energy Northwest. Results from Table B-11.1 of *2018 Annual Radiological Environmental Operating Report for the Columbia Generating Station*
ENW-MW-5	12900	2018	Tritium	300-F-BG	1	2018 average from data collected by Energy Northwest. Results from Table B-11.1 of *2018 Annual Radiological Environmental Operating Report for the Columbia Generating Station*
ENW-MW-6	4700	2018	Tritium	300-F-BG	1	2018 average from data collected by Energy Northwest. Results from Table B-11.1 of *2018 Annual Radiological Environmental Operating Report for the Columbia Generating Station*

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
ENW-MW-9	217.75	2018	Tritium	300-F-BG	1	2018 average from data collected by Energy Northwest. Results from Table B-11.1 of *2018 Annual Radiological Environmental Operating Report for the Columbia Generating Station*
SPC-GM-1	83888	2018	Nitrate	300-FF-5	1	Framatome groundwater data - average 2018 results as control points
SPC-GM-10	101152.4	2018	Nitrate	300-FF-5	1	Framatome groundwater data - average 2018 results as control points
SPC-GM-12	131476	2018	Nitrate	300-FF-5	1	Framatome groundwater data - average 2018 results as control points
SPC-GM-2	101595.1	2018	Nitrate	300-FF-5	1	Framatome groundwater data - average 2018 results as control points
SPC-GM-5	92962.8	2018	Nitrate	300-FF-5	1	Framatome groundwater data - average 2018 results as control points
SPC-GM-6	157815.4	2018	Nitrate	300-FF-5	1	Framatome groundwater data - average 2018 results as control points
SPC-GM-7	142985.6	2018	Nitrate	300-FF-5	1	Framatome groundwater data - average 2018 results

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
						as control points
SPC-GM-8	101595.1	2018	Nitrate	300-FF-5	1	Framatome groundwater data - average 2018 results as control points
399-1-146	34.3	HIGH_2019	Uranium	300-FF-5_HI	1	Use June data from selected wells to define plume. Well is in Miscellaneous Material media but June 2019 uranium results considered representative of aquifer and should be used to map June 2019 uranium plume.
399-1-147	3.47	HIGH_2019	Uranium	300-FF-5_HI	1	Use June data from selected wells to define plume. Well is in Miscellaneous Material media but June 2019 uranium results considered representative of aquifer and should be used to map June 2019 uranium plume.
399-1-148	18.5	HIGH_2019	Uranium	300-FF-5_HI	1	Use June data from selected wells to define plume. Well is in Miscellaneous Material media but June 2019 uranium results considered representative of aquifer and should be used to map

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
						June 2019 uranium plume.
399-1-149	14	HIGH_2019	Uranium	300-FF-5_HI	1	Use June data from selected wells to define plume. Well is in Miscellaneous Material media but June 2019 uranium results considered representative of aquifer and should be used to map June 2019 uranium plume.
399-1-150	2.84	HIGH_2019	Uranium	300-FF-5_HI	1	Use June data from selected wells to define plume. Well is in Miscellaneous Material media but June 2019 uranium results considered representative of aquifer and should be used to map June 2019 uranium plume.

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
399-1-152	1.3	HIGH_2019	Uranium	300-FF-5_HI	1	Use June data from selected wells to define plume. Well is in Miscellaneous Material media but June 2019 uranium results considered representative of aquifer and should be used to map June 2019 uranium plume.
399-1-153	24.7	HIGH_2019	Uranium	300-FF-5_HI	1	Use June data from selected wells to define plume. Well is in Miscellaneous Material media but June 2019 uranium results considered representative of aquifer and should be used to map June 2019 uranium plume.
399-1-154	25.75	HIGH_2019	Uranium	300-FF-5_HI	1	Use June data from selected wells to define plume. Well is in Miscellaneous Material media but June 2019 uranium results considered representative of aquifer and should be used to map June 2019 uranium plume.
CP_2020_40	700	OTHER DATA	Uranium	300-FF-5_HI	3	Add CP to make plume at 399-1-162 visible

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
399-1-158	30	2019	Uranium	300-FF-5_LO	1	Well has October 2019 data but no December 2019 data. Use the October 2019 data as control points on the uranium_low map
399-1-159	0.67	2019	Uranium	300-FF-5_LO	1	Well has October 2019 data but no December 2019 data. Use the October 2019 data as control points on the uranium_low map
399-1-162	28.5	2019	Uranium	300-FF-5_LO	1	Well has October 2019 data but no December 2019 data. Use the October 2019 data as control points on the uranium_low map
399-1-72	9.65	2019	Uranium	300-FF-5_LO	1	Well has October 2019 data but no December 2019 data. Use the October 2019 data as control points on the uranium_low map
CP_2020_41	35	OTHER DATA	Uranium	300-FF-5_LO	3	Extend plume to 399-1-148
CP_2020_42	35	OTHER DATA	Uranium	300-FF-5_LO	3	Extend plume to 399-1-148

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
CP_2020_6	35	OTHER DATA	Uranium	300-FF-5_LO	3	300-FBG Uranium LO add CP to connect plume from 399-8-5A and 8-1
399-8-1	35.5	LOW_2019	Uranium	300-FF-5-399-8-5A_HI	1	Separate plume for 399-8-5A; include values from low RS for 399-8-1; 399-8-2; 399-8-3
399-8-2	2.9	LOW_2019	Uranium	300-FF-5-399-8-5A_HI	1	Separate plume for 399-8-5A; include values from low RS for 399-8-1; 399-8-2; 399-8-3
399-8-3	3.8	LOW_2019	Uranium	300-FF-5-399-8-5A_HI	1	Separate plume for 399-8-5A; include values from low RS for 399-8-1; 399-8-2; 399-8-3
CP_4	5	MAX_2019	Chromium - RUM	100-HR-3	3	Bound plume extent in the RUM, southeast of 100-H
299-E11-1	0.36	2019	Chloroform	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-E20-1	0.36	2019	Chloroform	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-E20-2	0.36	2019	Chloroform	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W10-35	0.36	2019	Chloroform	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
						200-ZP1 P&T System
299-W10-36	0.36	2019	Chloroform	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-226	0.36	2019	Chloroform	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-227	0.36	2019	Chloroform	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-228	0.36	2019	Chloroform	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-229	0.36	2019	Chloroform	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W15-29	0.36	2019	Chloroform	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-36	0.36	2019	Chloroform	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-38	0.36	2019	Chloroform	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
299-W18-39	0.36	2019	Chloroform	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-41	0.36	2019	Chloroform	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-42	0.36	2019	Chloroform	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W18-43	0.36	2019	Chloroform	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W6-13	0.36	2019	Chloroform	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W6-14	0.36	2019	Chloroform	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
299-W7-14	0.36	2019	Chloroform	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
699-43-67	0.36	2019	Chloroform	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
699-45-67	0.36	2019	Chloroform	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System

Table A-5. Other Data Used in the Interpolation

WELL NAME	MAPPING VALUE	YEAR	COI	sspaMAPOU	OTHER DATA TYPE	REASON
699-46-68	0.36	2019	Chloroform	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System
699-49-69	0.36	2019	Chloroform	200-UP-1;200-ZP-1	1	Average 2019 P&T Effluent concentration for 200-ZP1 P&T System

References: DOE/RL-95-59, *200-BP-5 Operable Unit Treatability Test Report*.

Energy Northwest, *2018 Annual Radiological Environmental Operating Report for the Columbia Generating Station*.

PNNL-13675, *Measurement of Helium-3/Helium-4 Ratios in Soil Gas at the 618- 11 Burial Ground*.

PNNL-22048, *Updated Conceptual Model for the 300 Area Uranium Groundwater Plume*.

AT = aquifer tube
COI = contaminant of interest
CP = control point
CSM = Conceptual Site Model
DL = detection limit
DWS = drinking water standards
ISRM = in situ redox manipulation
MDA = minimum detectable activity
P&T = pump and treat
RUM = Ringold Formation upper mud
UPR = unplanned release
WMA = waste management area

Table A-6. Data Selection Parameters

OU	COC	DORS	HIGH RIVER STAGE	LOW RIVER STAGE	COMB CHROM	MAX AQ	CT	CTAQ	CTC
100-BC-5	Hexavalent Chromium; Chromium	Hexavalent Chromium; Chromium	4/1/2018-7/15/2018	8/1/2018-12/31/2018	y	y	MEAN_VALOR_ND_SRL	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL
100-BC-5	Nitrate	Nitrate	4/1/2018-7/15/2018	8/1/2018-12/31/2018		y	MEAN_VALOR_ND_SRL	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL
100-BC-5	Strontium-90	Strontium-90	4/1/2018-7/15/2018	8/1/2018-12/31/2018		y	MEAN_VALOR_ND_MDA	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA
100-BC-5	Trichloroethene	Trichloroethene	4/1/2018-7/15/2018	8/1/2018-12/31/2018		y	MEAN_VALOR_ND_SRL	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL
100-BC-5	Tritium	Tritium	4/1/2018-7/15/2018	8/1/2018-12/31/2018		y	MEAN_VALOR_ND_MDA	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA
100-FR-3	Hexavalent Chromium; Chromium	Hexavalent Chromium; Chromium	4/1/2018-7/15/2018	8/1/2018-12/31/2018	y	y	MEAN_VALOR_ND_SRL	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL
100-FR-3	Nitrate	Nitrate	4/1/2018-7/15/2018	8/1/2018-12/31/2018		y	MEAN_VALOR_ND_SRL	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL
100-FR-3	Strontium-90	Strontium-90	4/1/2018-7/15/2018	8/1/2018-12/31/2018		y	MEAN_VALOR_ND_MDA	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA
100-FR-3	Trichloroethene	Trichloroethene	4/1/2018-7/15/2018	8/1/2018-12/31/2018		y	MEAN_VALOR_ND_SRL	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL
100-HR-3	Hexavalent Chromium; Chromium	Hexavalent Chromium; Chromium	4/1/2018-7/15/2018	8/1/2018-12/31/2018	y	y	MEAN_VALOR_ND_SRL	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL

Table A-6. Data Selection Parameters

OU	COC	DORS	HIGH RIVER STAGE	LOW RIVER STAGE	COMB CHROM	MAX AQ	CT	CTAQ	CTC
100-HR-3	Nitrate					y	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL	MAX_VALOR_ND_SRL
100-HR-3	Strontium-90					y	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA	MAX_VALOR_ND_MDA
100-HR-3	Tritium					y	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA	MAX_VALOR_ND_MDA
100-HR-3	Uranium					y	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL	MAX_VALOR_ND_SRL
100-MAX-KR-4	Trichloroethene					y	MAX_VALOR_ND_SRL	MAX_VALOR_ND_SRL	MAX_VALOR_ND_SRL
100-KR-4	Carbon-14					y	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA	MAX_VALOR_ND_MDA
100-KR-4	Hexavalent Chromium; Chromium	Hexavalent Chromium; Chromium	4/1/2018-7/15/2018	8/1/2018-12/31/2018	y	y	MEAN_VALOR_ND_SRL	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL
100-KR-4	Nitrate					y	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL	MAX_VALOR_ND_SRL
100-KR-4	Strontium-90					y	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA	MAX_VALOR_ND_MDA
100-KR-4	Tritium					y	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA	MAX_VALOR_ND_MDA

Table A-6. Data Selection Parameters

OU	COC	DORS	HIGH RIVER STAGE	LOW RIVER STAGE	COMB CHROM	MAX AQ	CT	CTAQ	CTC
100-KW	Carbon-14					y	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA	MAX_VALOR_ND_MDA
100-KW	Hexavalent Chromium; Chromium	Hexavalent Chromium; Chromium	4/1/2018-7/15/2018	8/1/2018-12/31/2018	y	y	MEAN_VALOR_ND_SRL	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL
100-KW	Strontium-90					y	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA	MAX_VALOR_ND_MDA
100-KW	Tritium					y	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA	MAX_VALOR_ND_MDA
100-NR-C7934	Strontium-90					y	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA	MAX_VALOR_ND_MDA
100-NR-C7934	Tritium					y	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA	MAX_VALOR_ND_MDA
100-NR-2	Nitrate					y	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL	MAX_VALOR_ND_SRL
100-NR-2	Strontium-90					y	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA	MAX_VALOR_ND_MDA
100-NR-2	Total petroleum hydrocarbons - diesel range					y	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL	MAX_VALOR_ND_SRL

Table A-6. Data Selection Parameters

OU	COC	DORS	HIGH RIVER STAGE	LOW RIVER STAGE	COMB CHROM	MAX AQ	CT	CTAQ	CTC
100-NR-2	Total petroleum hydrocarbons - diesel range	Total petroleum hydrocarbons - diesel range	6/1/2018-7/31/2018	11/1/2018-12/31/2018		y	MEAN_VALOR_ND_SRL	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL
100-NR-2	Tritium					y	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA	MAX_VALOR_ND_MDA
1100-EM	Uranium					y	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL	MAX_VALOR_ND_SRL
200-BP-5	Cyanide					y	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL	MAX_VALOR_ND_SRL
200-BP-5	Iodine-129					y	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA	MAX_VALOR_ND_MDA
200-BP-5	Nitrate					y	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL	MAX_VALOR_ND_SRL
200-BP-5	Strontium-90					y	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA	MAX_VALOR_ND_MDA
200-BP-5	Technetium-99					y	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA	MAX_VALOR_ND_MDA
200-BP-5	Tritium					y	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA	MAX_VALOR_ND_MDA

Table A-6. Data Selection Parameters

OU	COC	DORS	HIGH RIVER STAGE	LOW RIVER STAGE	COMB CHROM	MAX AQ	CT	CTAQ	CTC
200-BP-5	Uranium					y	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL	MAX_VALOR_ND_SRL
200-BP-E25-32P	Nitrate					y	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL	MAX_VALOR_ND_SRL
200-PO-1	Iodine-129					y	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA	MAX_VALOR_ND_MDA
200-PO-1	Tritium					y	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA	MAX_VALOR_ND_MDA
200-PO-1	Uranium					y	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL	MAX_VALOR_ND_SRL
200-UP-1	Hexavalent Chromium; Chromium				y	y	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL	MAX_VALOR_ND_SRL
200-UP-1	Iodine-129					y	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA	MAX_VALOR_ND_MDA
200-UP-1	Technetium-99					y	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA	MAX_VALOR_ND_MDA
200-UP-1	Tritium					y	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA	MAX_VALOR_ND_MDA
200-UP-1	Uranium					y	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL	MAX_VALOR_ND_SRL

Table A-6. Data Selection Parameters

OU	COC	DORS	HIGH RIVER STAGE	LOW RIVER STAGE	COMB CHROM	MAX AQ	CT	CTAQ	CTC
200-UP-W26-13	Hexavalent Chromium; Chromium				y	y	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL	MAX_VALOR_ND_SRL
200-UP-38-70C	Technetium-99					y	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA	MAX_VALOR_ND_MDA
200-UP-W23-4	Uranium					y	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL	MAX_VALOR_ND_SRL
200-ZP-1	Cyanide					y	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL	MAX_VALOR_ND_SRL
200-ZP-1	Hexavalent Chromium; Chromium				y	y	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL	MAX_VALOR_ND_SRL
200-ZP-1	Iodine-129					y	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA	MAX_VALOR_ND_MDA
200-ZP-1	Nitrate					y	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL	MAX_VALOR_ND_SRL
200-ZP-1	Technetium-99					y	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA	MAX_VALOR_ND_MDA
200-ZP-1	Tritium					y	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA	MAX_VALOR_ND_MDA
200-ZP-1	Trichloroethene					y	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL	MAX_VALOR_ND_SRL

Table A-6. Data Selection Parameters

OU	COC	DORS	HIGH RIVER STAGE	LOW RIVER STAGE	COMB CHROM	MAX AQ	CT	CTAQ	CTC
300-F-BG	Nitrate					y	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL	MAX_VALOR_ND_SRL
300-F-BG	Tritium					y	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA	MAX_VALOR_ND_MDA
300-FF-5	Nitrate					y	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL	MAX_VALOR_ND_SRL
300-FF-5	Tritium					y	MEAN_VALOR_ND_MDA	MAX_VALOR_ND_MDA	MAX_VALOR_ND_MDA
300-FF-5	Trichloroethene					y	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL	MAX_VALOR_ND_SRL
300-FF-5	Uranium	Uranium	8/1/2018-8/31/2018	12/1/2018-12/31/2018		y	MEAN_VALOR_ND_SRL	MEAN_VALOR_ND_SRL	MAX_VALOR_ND_SRL

COC = contaminant of concern
OU = operable unit

A2 Reference

DOE/RL-95-59, 1996, *200-BP-5 Operable Unit Treatability Test Report*, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington. Available at: http://pdw.hanford.gov/arpir/index.cfm/viewDoc?accession=D197189381.

Energy Northwest, 2019, *2018 Annual Radiological Environmental Operating Report for the Columbia Generating Station*, Energy Northwest, Richland, Washington. Available at: https://www.nrc.gov/docs/ML1912/ML19129A419.pdf.

PNNL-13021, 1999, *Water-Level Monitoring Plan for the Hanford Groundwater Monitoring Project*, Pacific Northwest National Laboratory, Richland, Washington. Available at: https://pdw.hanford.gov/document/D2760519.

PNNL-13675, 2001, *Measurement of Helium-3/Helium-4 Ratios in Soil Gas at the 618-11 Burial Ground*, Pacific Northwest National Laboratory, Richland, Washington. Available at: http://www.pnl.gov/main/publications/external/technical_reports/pnnl-13675.pdf.

PNNL-22048, 2012, *Updated Conceptual Model for the 300 Area Uranium Groundwater Plume*, Pacific Northwest National Laboratory, Richland, Washington. Available at: https://pdw.hanford.gov/document/0088379.

Appendix B

Kriging Interpolation Input Files per Contaminant of Interest and Groundwater Interest Area

This page intentionally left blank.

B1 Introduction

The Kriging interpolation input files for each contaminant of interest and groundwater interest area are not provided in hard copy but are available electronically.

This page intentionally left blank.

Appendix C

Contaminant of Interest Plume Maps

This page intentionally left blank.

Figures

Figure C-1. Hexavalent Chromium in 100-BC-5 ..... C-1
Figure C-2. Strontium-90 in 100-BC-5 ..... C-2
Figure C-3. Hexavalent Chromium in 100-FR-3 ..... C-3
Figure C-4. Nitrate in 100-FR-3 ..... C-4
Figure C-5. Strontium-90 in 100-FR-3 ..... C-5
Figure C-6. TCE in 100-FR-3 ..... C-6
Figure C-7. Hexavalent Chromium in 100-HR-3-D – High River Stage C-7
Figure C-8. Hexavalent Chromium in 100-HR-3-H – High River Stage C-8
Figure C-9. Hexavalent Chromium in 100-HR-3-D – Low River Stage C-9
Figure C-10. Hexavalent Chromium in 100-HR-3-H – Low River Stage C-10
Figure C-11. Hexavalent Chromium in the RUM in 100-HR-3 ..... C-11
Figure C-12. Groundwater Elevations in the RUM in 100-HR-3 – May 2019 ..... C-12
Figure C-13. Nitrate in 100-HR-3-D C-13
Figure C-14. Nitrate in 100-HR-3-H C-14
Figure C-15. Strontium-90 in 100-HR-3-D C-15
Figure C-16. Strontium-90 in 100-HR-3-H C-16
Figure C-17. Carbon-14 in 100-KR-4 ..... C-17
Figure C-18. Hexavalent Chromium in 100-KR-4 – High River Stage C-18
Figure C-19. Hexavalent Chromium in 100-KR-4 – Low River Stage C-19
Figure C-20. Hexavalent Chromium in 100-NR-2 – Annual Average C-20
Figure C-21. Nitrate in 100-KR-4 ..... C-21
Figure C-22. Strontium-90 in 100-KR-4 ..... C-22
Figure C-23. Annual Maximum TCE in 100-KR-4 ..... C-23
Figure C-24. Tritium in 100-KR-4 ..... C-24
Figure C-25. Nitrate in 100-NR-2 ..... C-25
Figure C-26. Strontium-90 in 100-NR-2 ..... C-26
Figure C-27. TPH-d in 100-NR-2 ..... C-27
Figure C-28. TPH-d in 100-NR-2 – High River Stage C-28
Figure C-29. TPH-d in 100-NR-2 – Low River Stage C-29
Figure C-30. Tritium in 100-NR-2 ..... C-30
Figure C-31. Cyanide in 200-BP-5 ..... C-31
Figure C-32. Iodine-129 in 200-BP-5 ..... C-32
Figure C-33. Nitrate in 200-BP-5 ..... C-33
Figure C-34. Strontium-90 in 200-BP-5 ..... C-34
Figure C-35. Technetium-99 in 200-BP-5 ..... C-35
Figure C-36. Tritium in 200-BP-5 ..... C-36
Figure C-37. Uranium in 200-BP-5 ..... C-37

Figure C-38. Iodine-129 in 200-PO-1 ..... C-38
Figure C-39. Tritium in 200-PO-1 ..... C-39
Figure C-40. Hexavalent Chromium in 200-UP-1 ..... C-40
Figure C-41. Iodine-129 in 200-UP-1 ..... C-41
Figure C-42. Nitrate in 200-UP-1 ..... C-42
Figure C-43. Technetium-99 in 200-UP-1 ..... C-43
Figure C-44. Tritium in 200-UP-1 ..... C-44
Figure C-45. Uranium in 200-UP-1 ..... C-45
Figure C-46. Cyanide in 200-ZP-1 ..... C-47
Figure C-47. Chloroform in 200-ZP-1 ..... C-48
Figure C-48. Hexavalent Chromium in 200-ZP-1 ..... C-49
Figure C-49. Iodine-129 in 200-ZP-1 ..... C-50
Figure C-50. Nitrate in 200-ZP-1 ..... C-51
Figure C-51. Technetium-99 in 200-ZP-1 ..... C-53
Figure C-52. Tritium in 200-ZP-1 ..... C-54
Figure C-53. TCE in 200-ZP-1 ..... C-55
Figure C-54. Carbon Tetrachloride above the RLM in 200-ZP-1 ..... C-56
Figure C-55. Carbon Tetrachloride below the RLM in 200-ZP-1 ..... C-57
Figure C-56. Carbon Tetrachloride Maximum 2D Footprint in 200-ZP-1 ..... C-58
Figure C-57. Nitrate in 300-FF-5 Burial Ground C-59
Figure C-58. Tritium in 300-FF-5 Burial Ground C-60
Figure C-59. Nitrate in 1100-EM-1 ..... C-61
Figure C-60. Uranium in 300-FF-5 High River Stage (June) C-62
Figure C-61. Uranium in 300-FF-5 Low River Stage (December) C-63
Figure C-62. Uranium in 1100-EM-1 ..... C-64
Figure C-63. Composite COI Plume Mosaic C-65

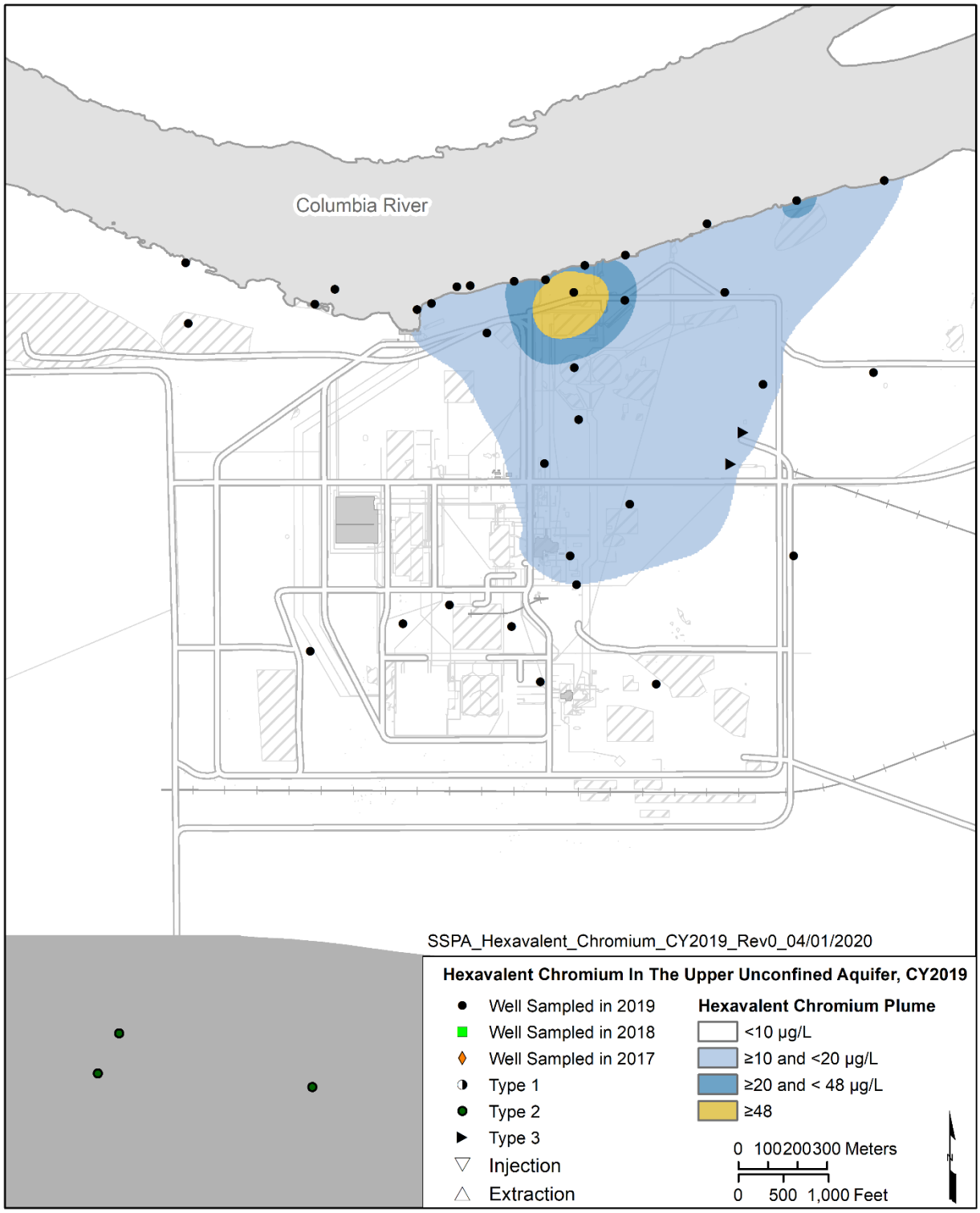


Figure C-1. Hexavalent Chromium in 100-BC-5

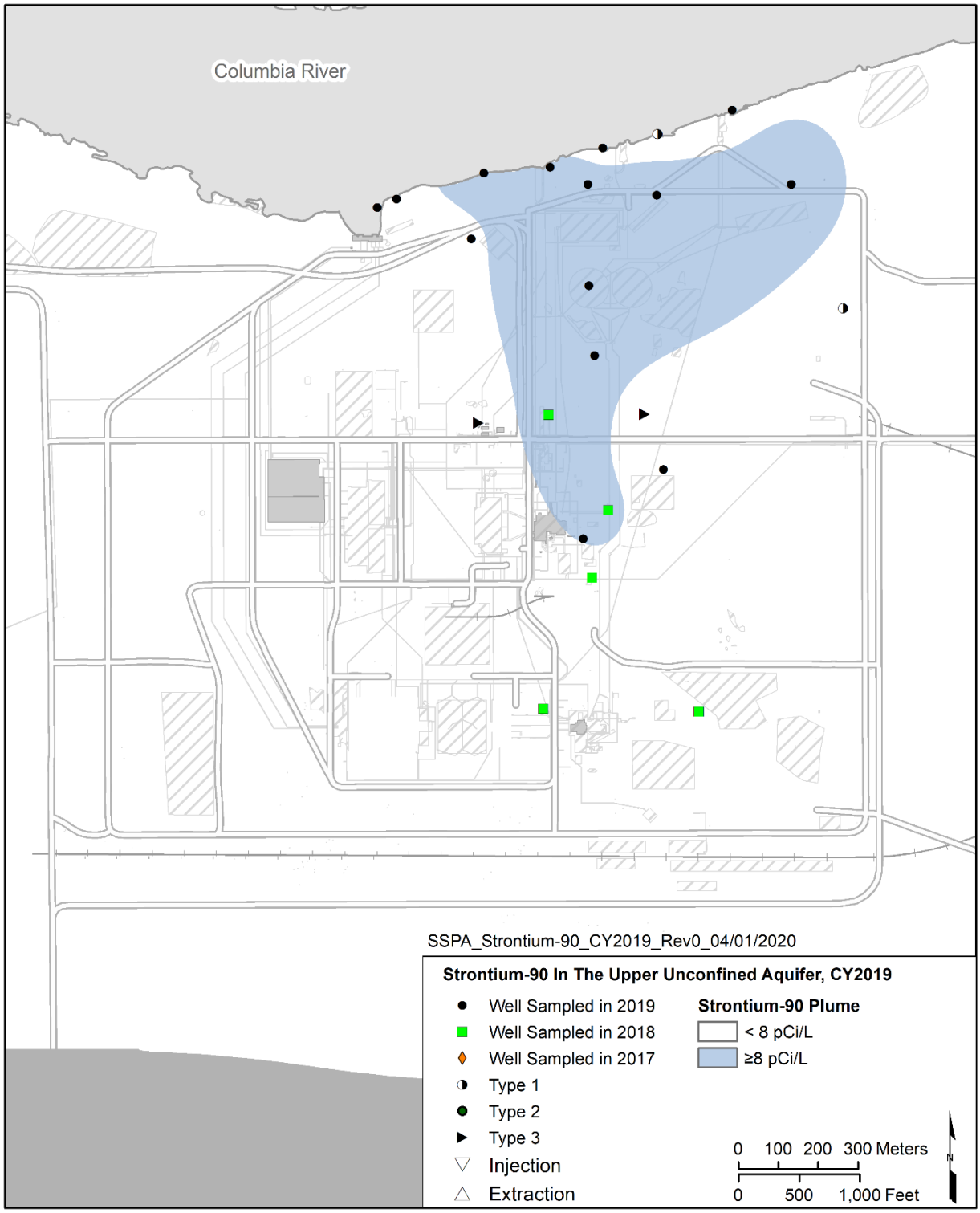


Figure C-2. Strontium-90 in 100-BC-5

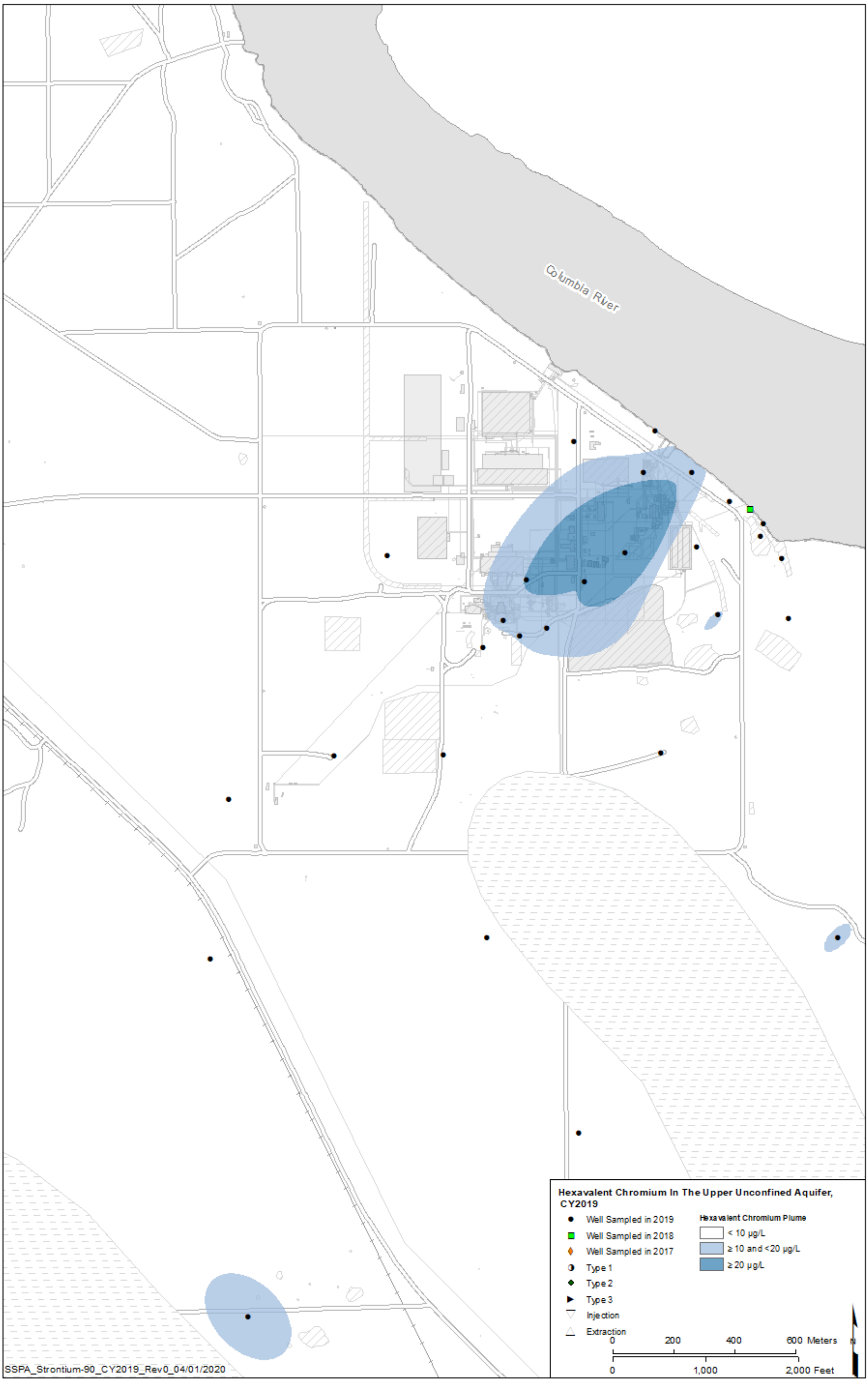


Figure C-3. Hexavalent Chromium in 100-FR-3

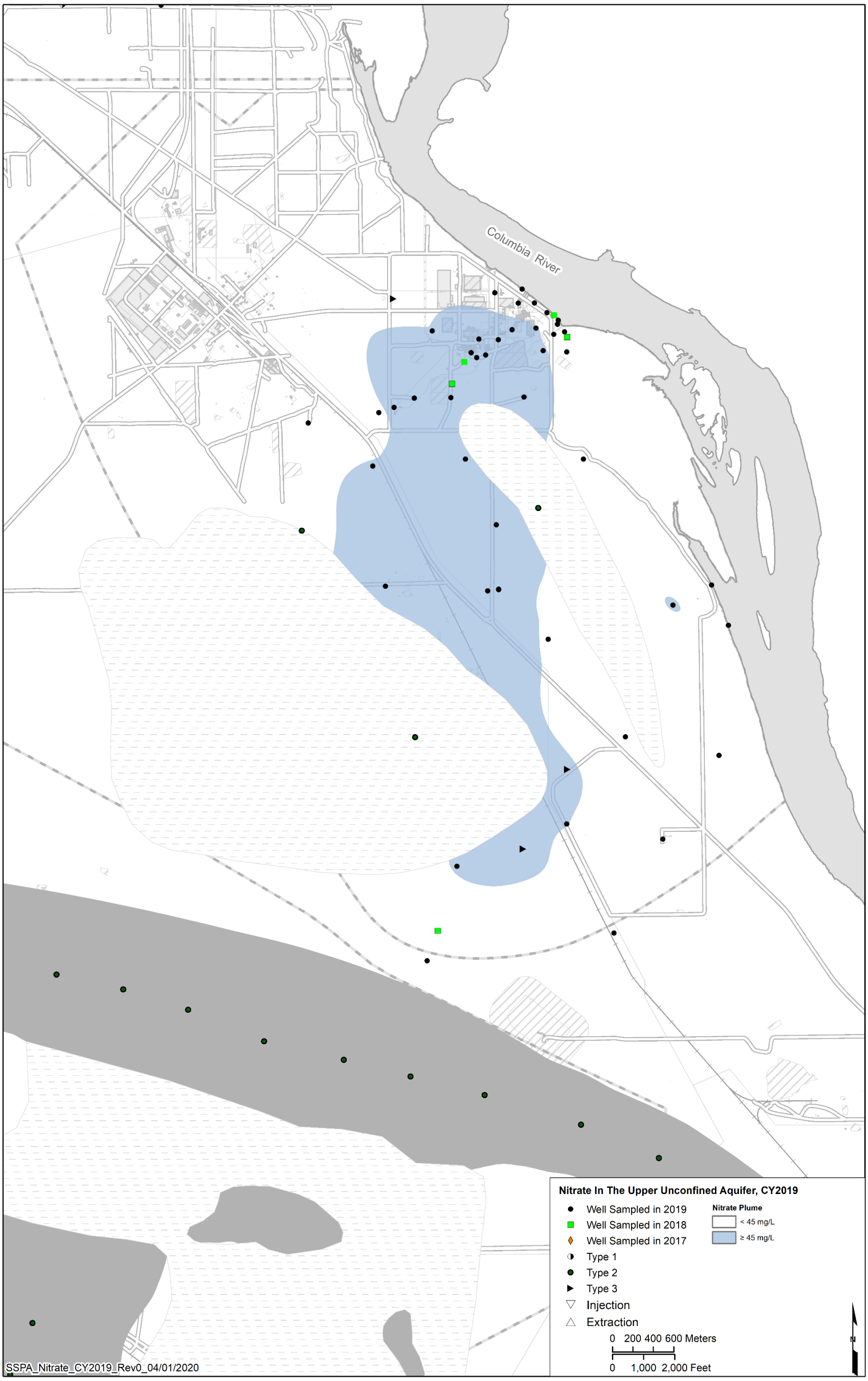


Figure C-4. Nitrate in 100-FR-3

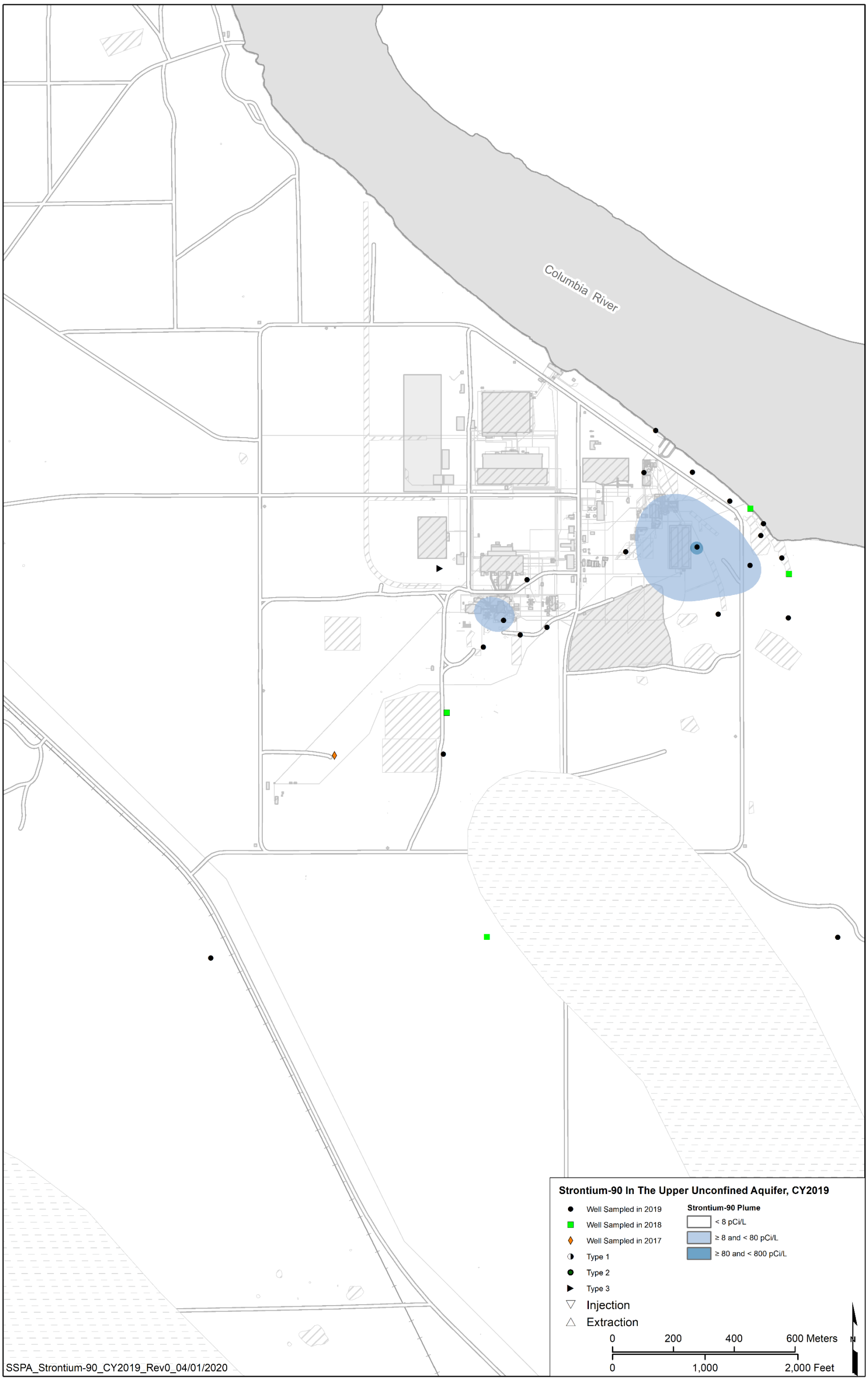


Figure C-5. Strontium-90 in 100-FR-3

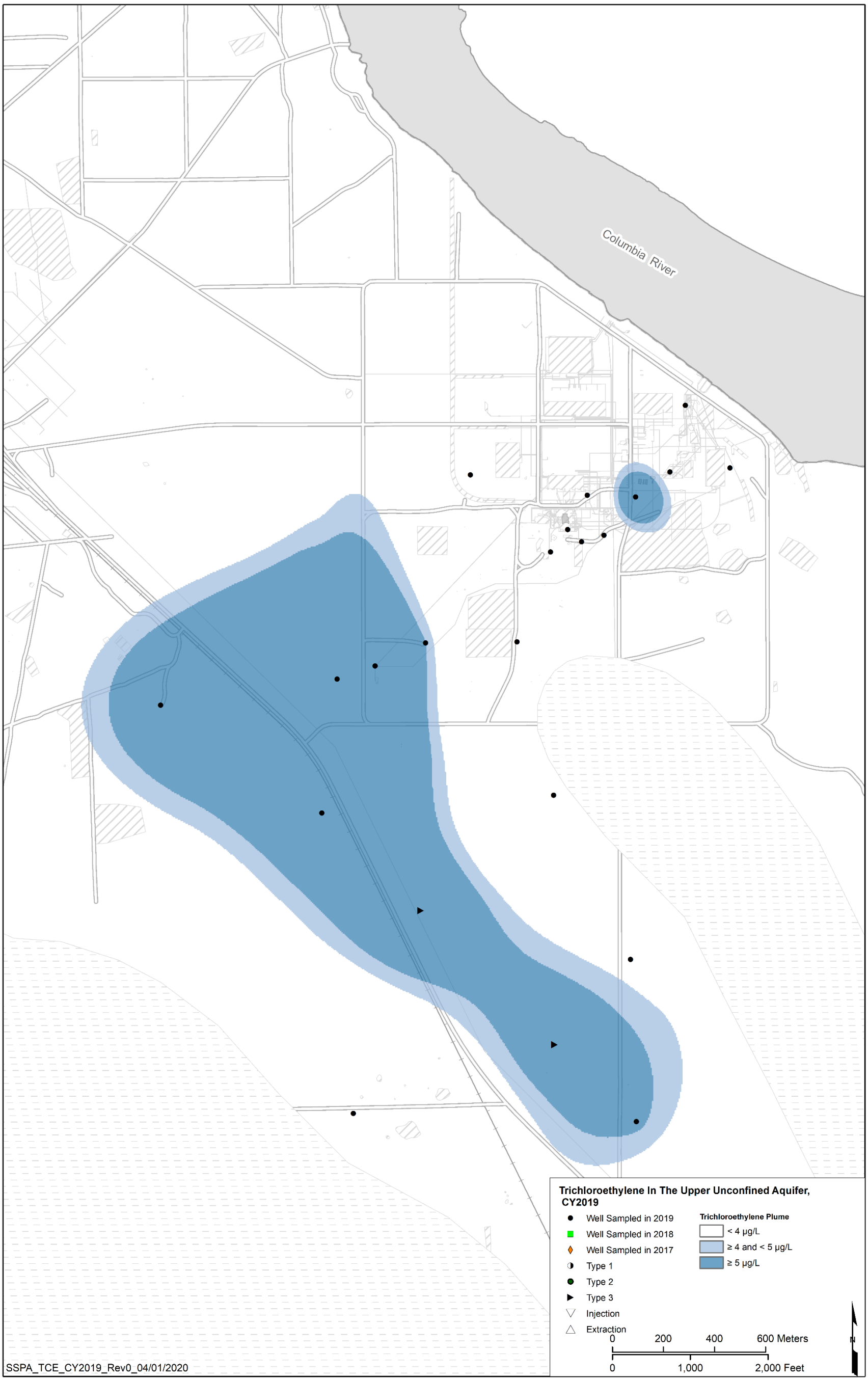


Figure C-6. TCE in 100-FR-3

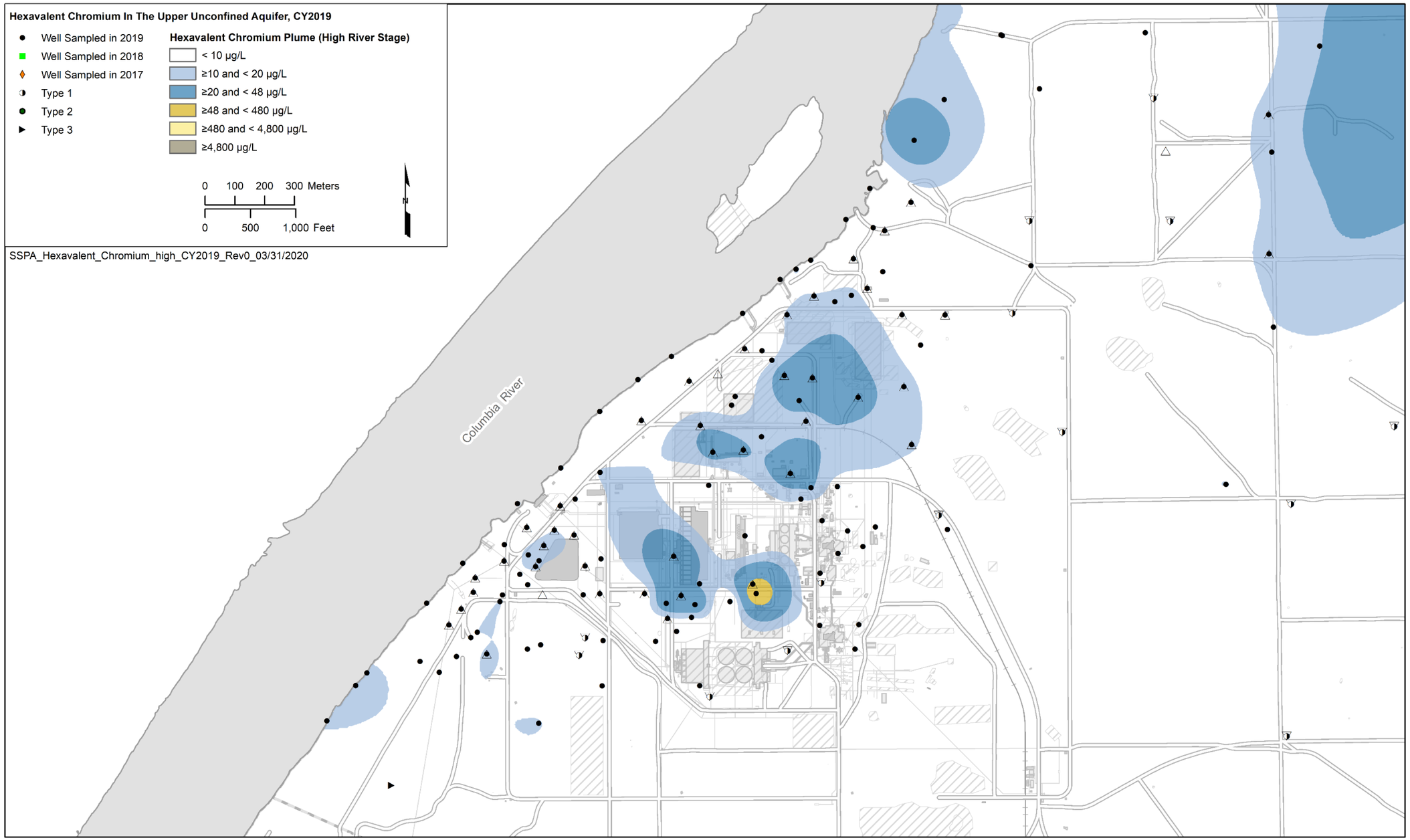


Figure C-7. Hexavalent Chromium in 100-HR-3-D – High River Stage

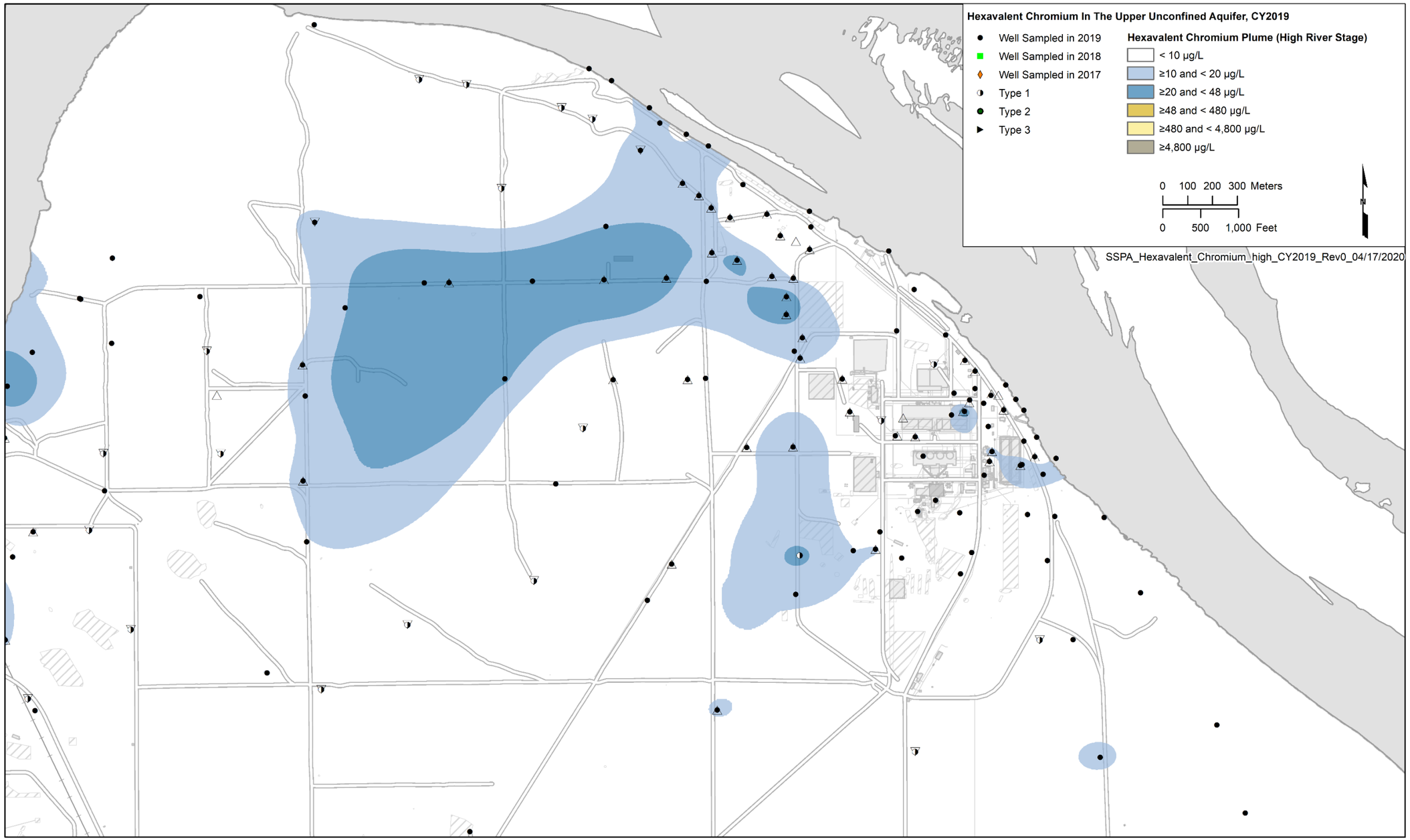


Figure C-8. Hexavalent Chromium in 100-HR-3-H – High River Stage

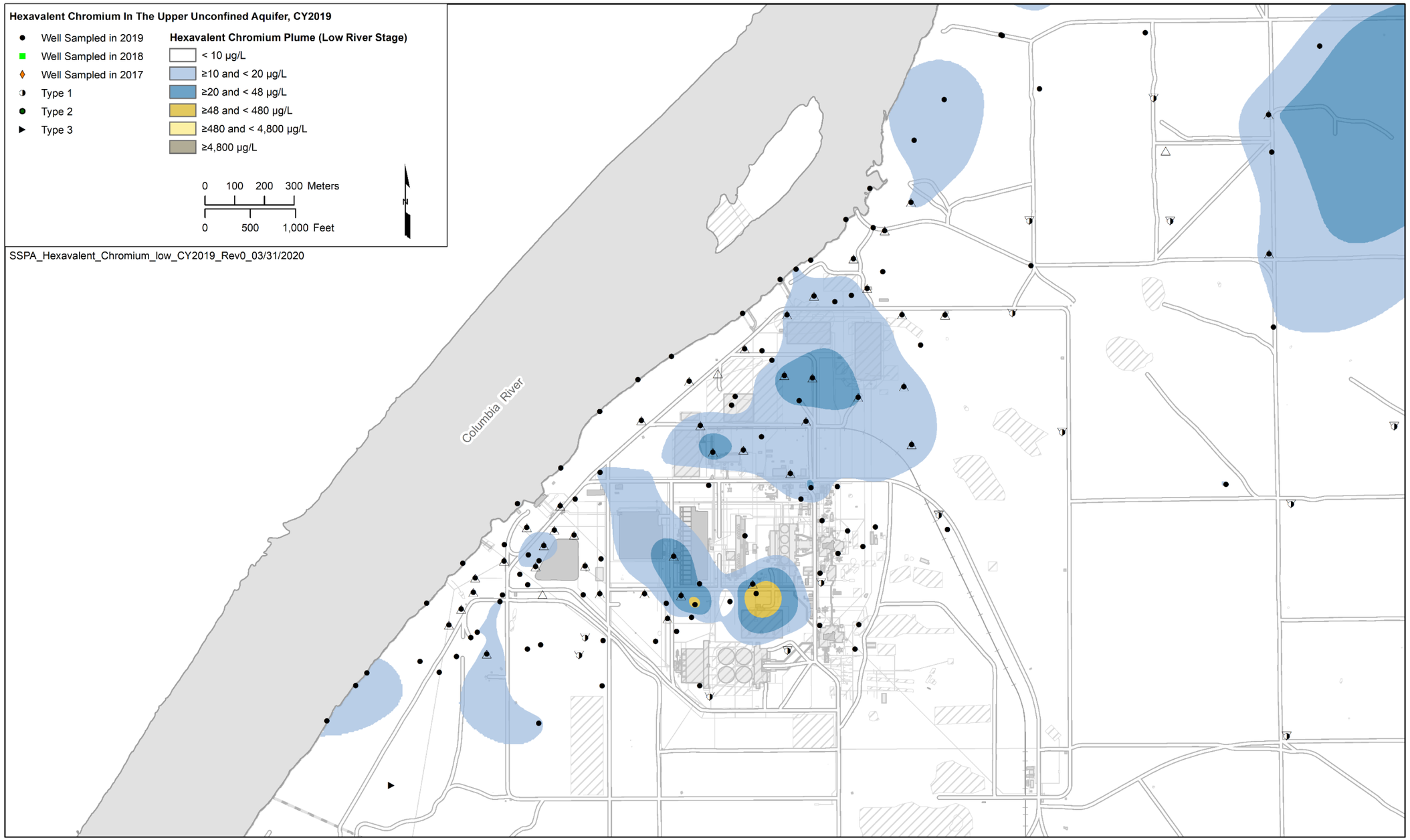


Figure C-9. Hexavalent Chromium in 100-HR-3-D – Low River Stage

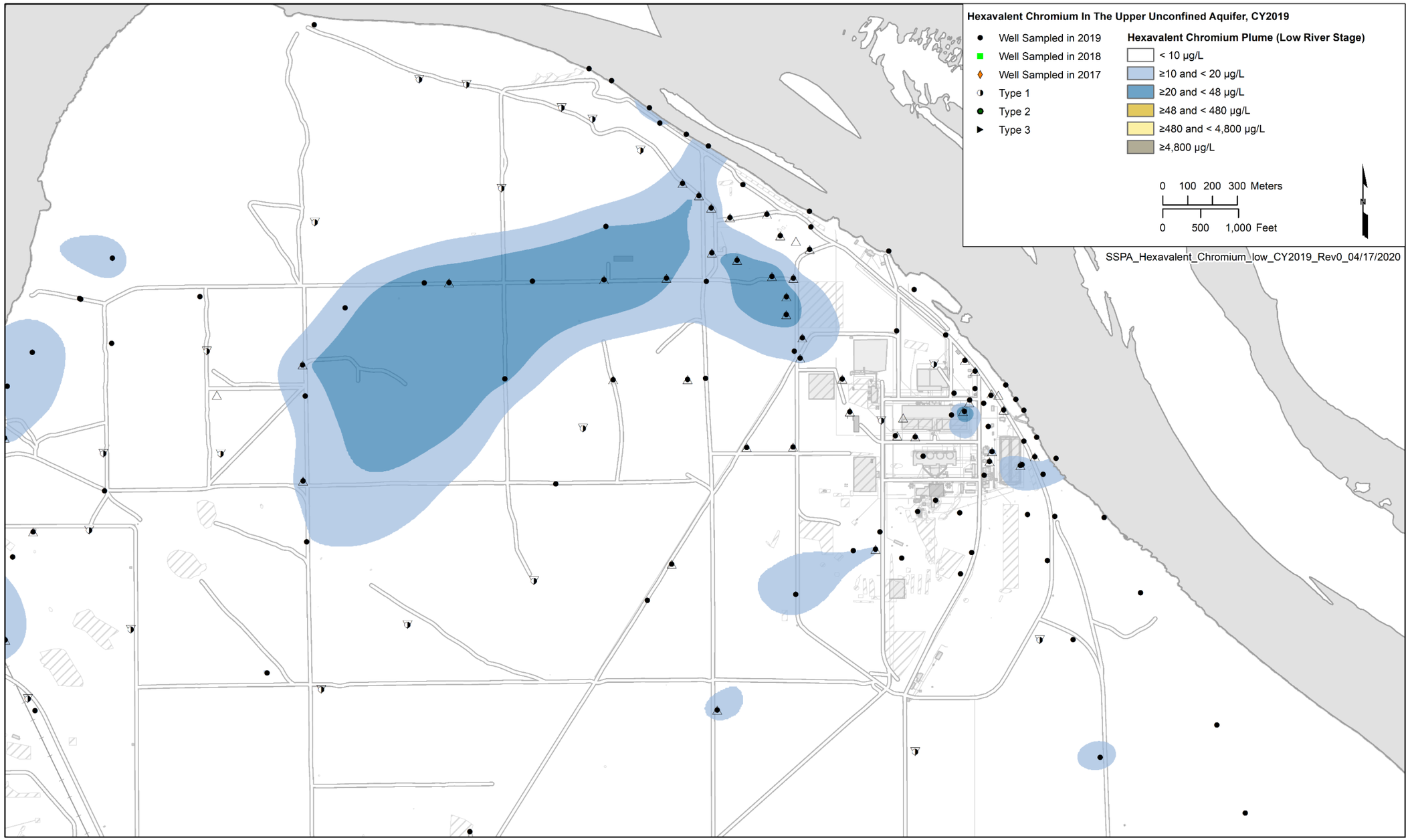


Figure C-10. Hexavalent Chromium in 100-HR-3-H – Low River Stage

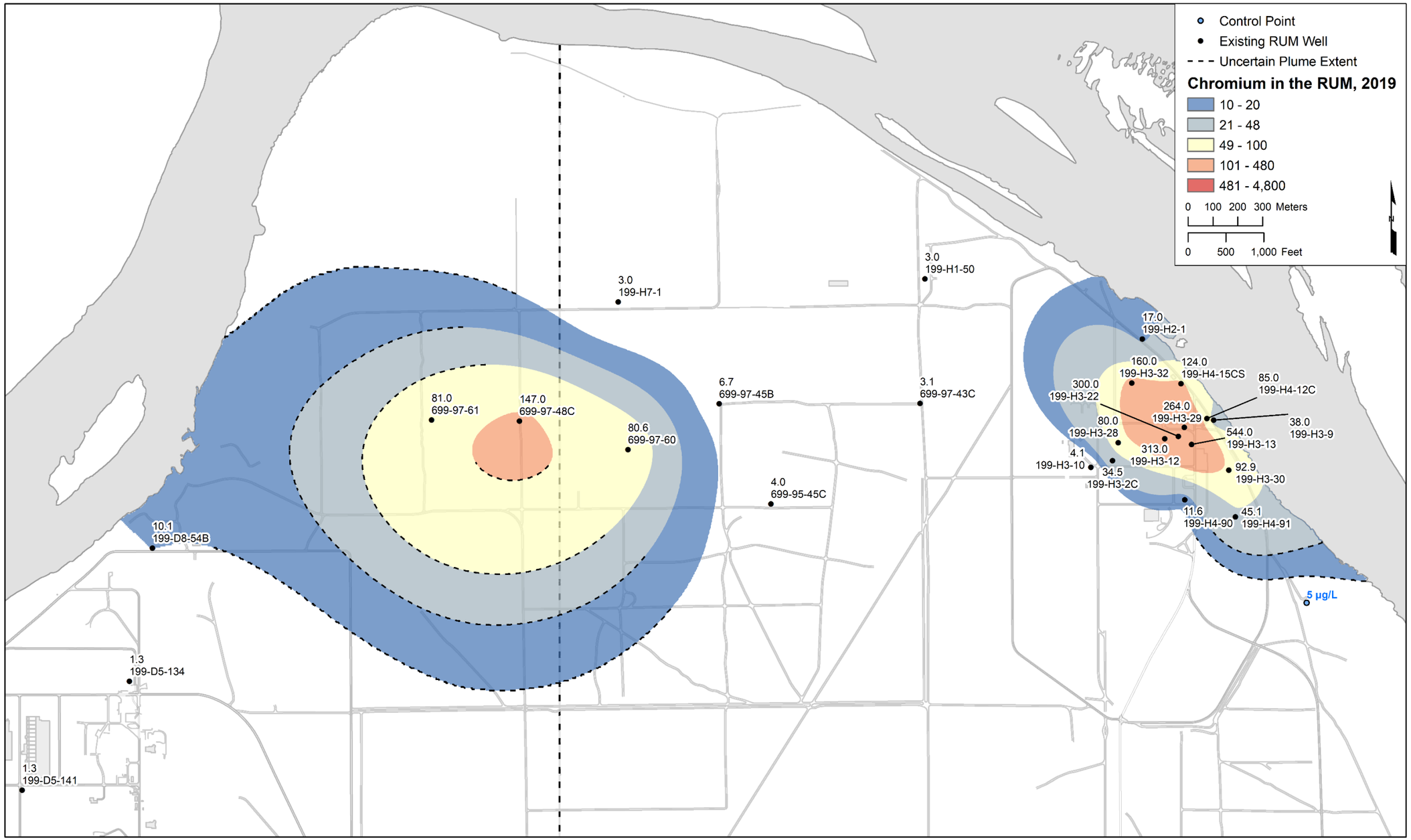


Figure C-11. Hexavalent Chromium in the RUM in 100-HR-3

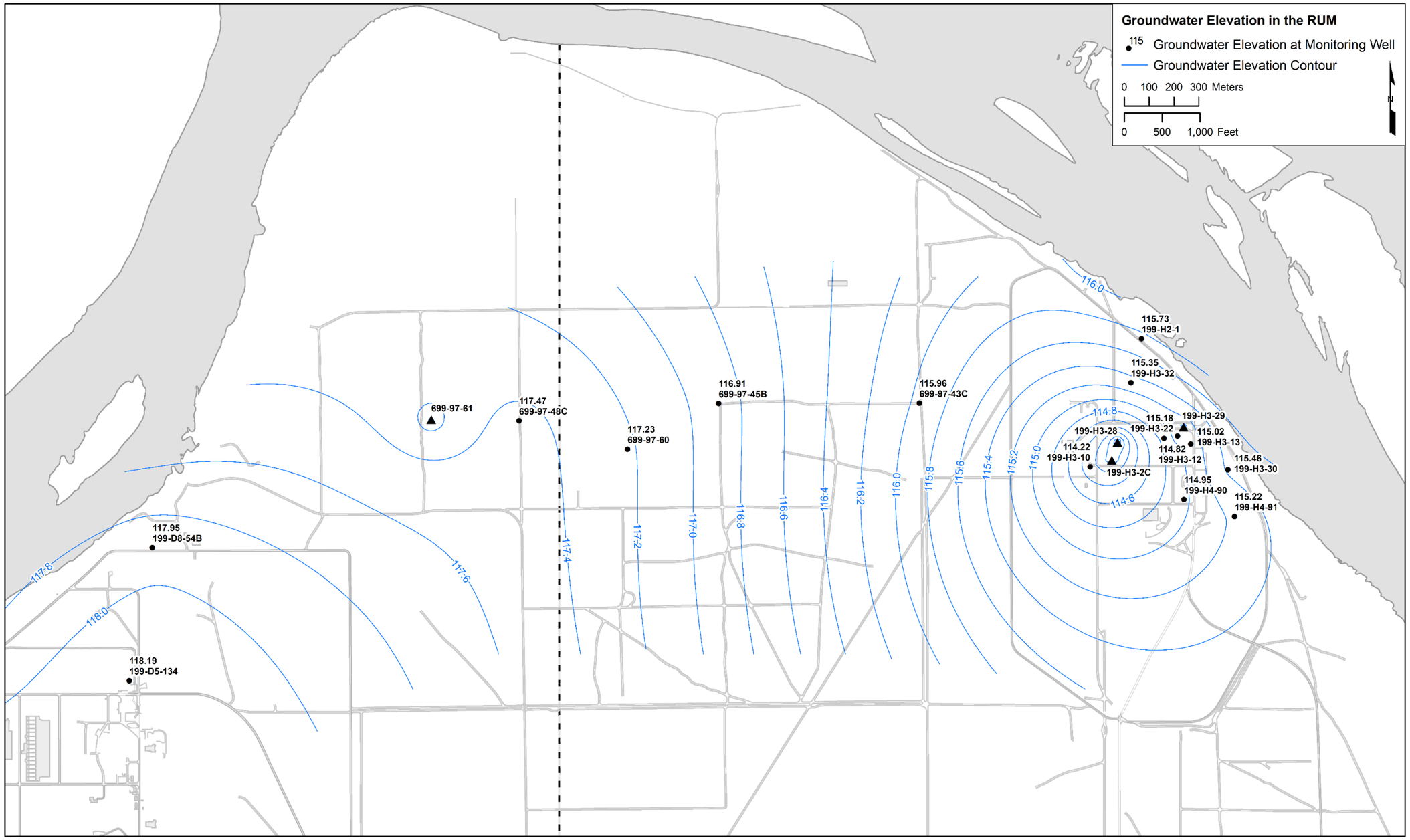


Figure C-12. Groundwater Elevations in the RUM in 100-HR-3 – May 2019

Figure C-13. Nitrate in 100-HR-3-D

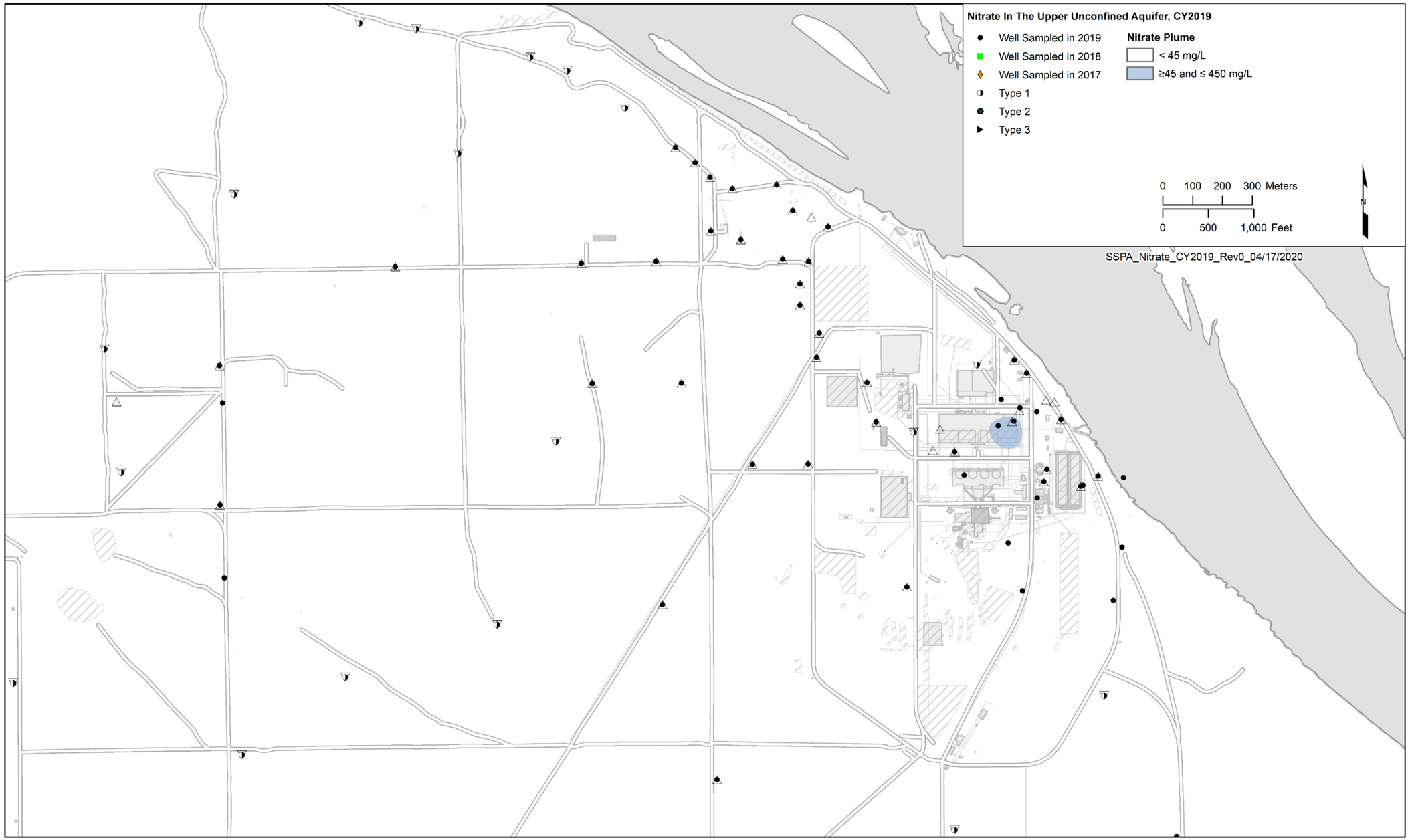


Figure C-14. Nitrate in 100-HR-3-H

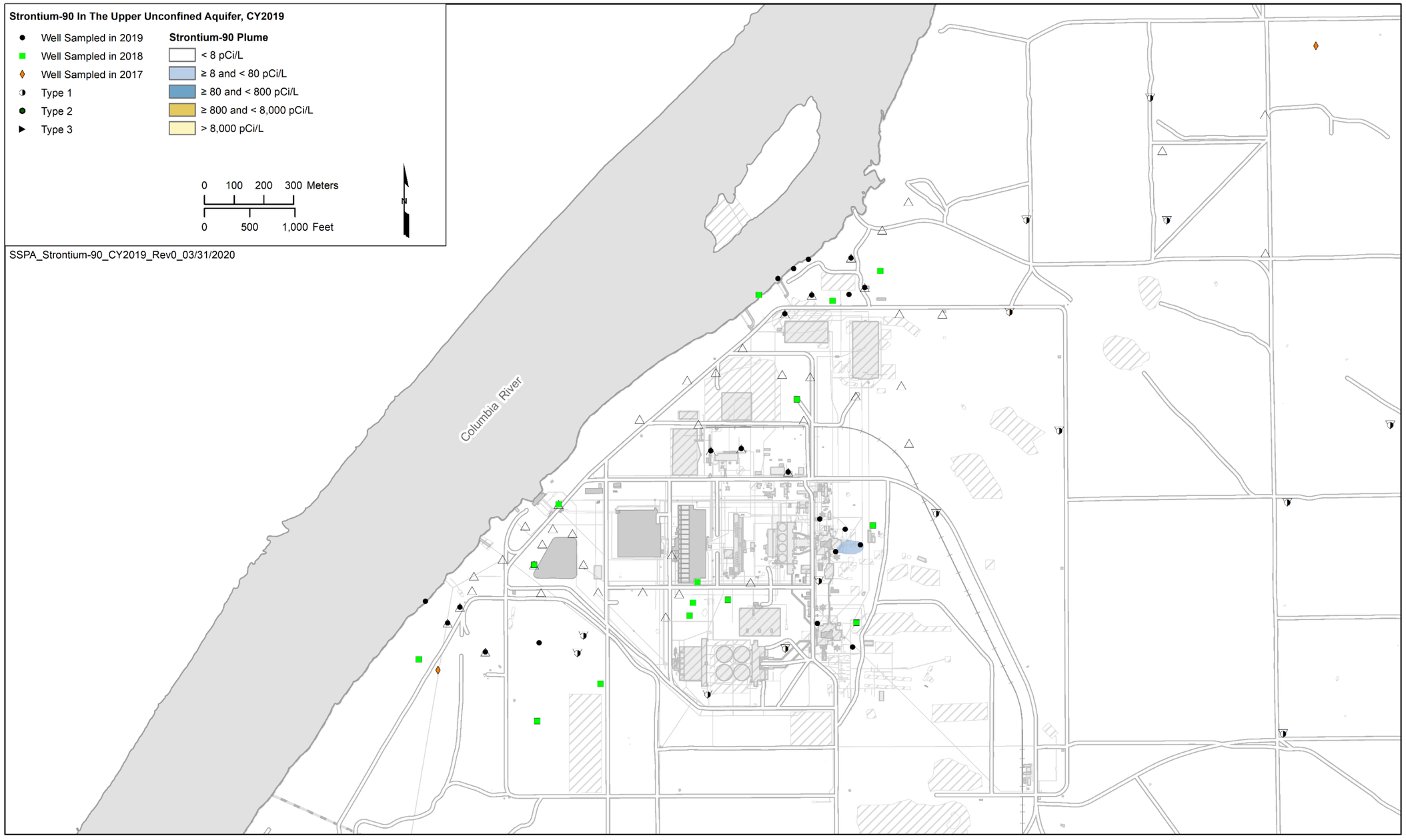


Figure C-15. Strontium-90 in 100-HR-3-D

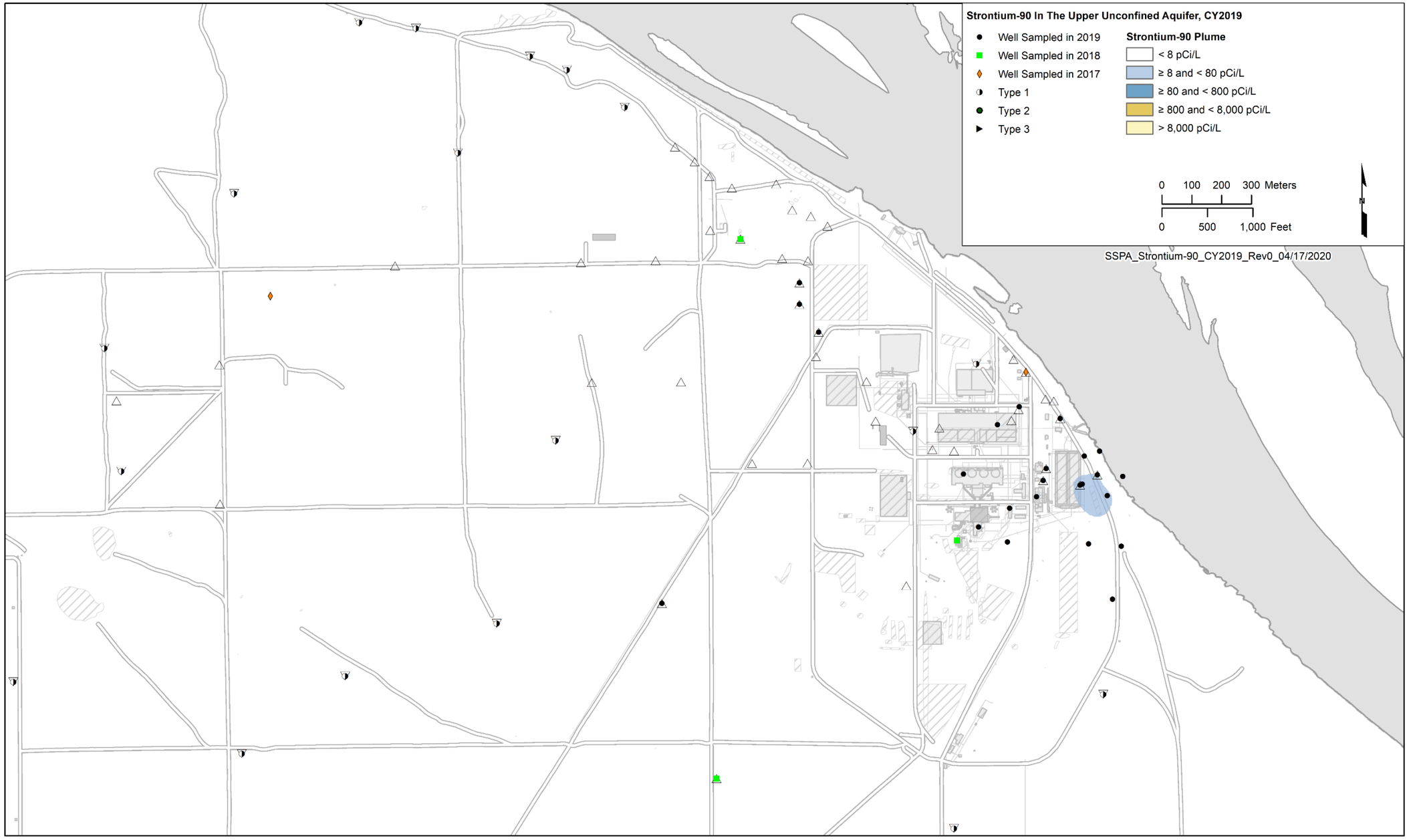


Figure C-16. Strontium-90 in 100-HR-3-H

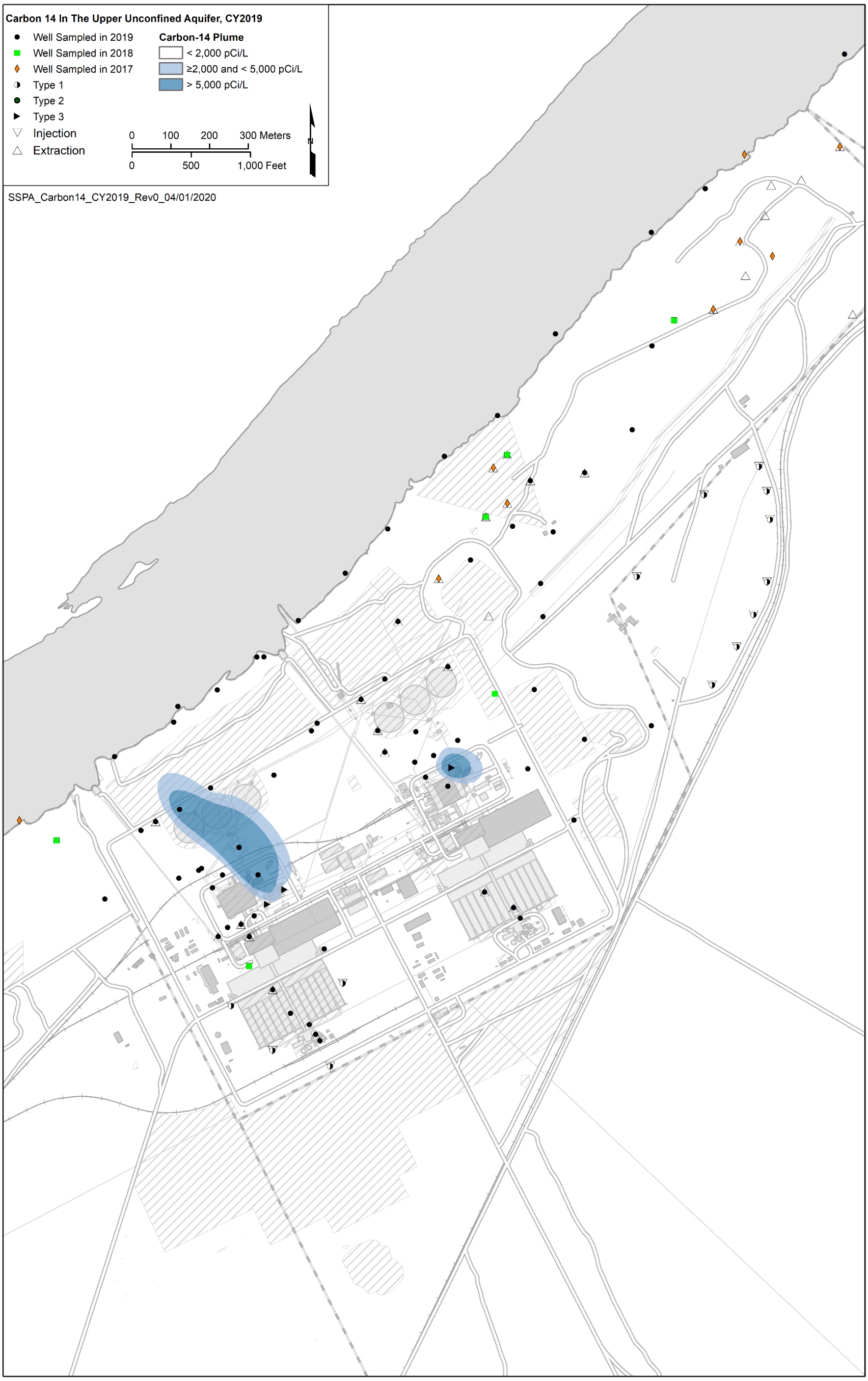


Figure C-17. Carbon-14 in 100-KR-4

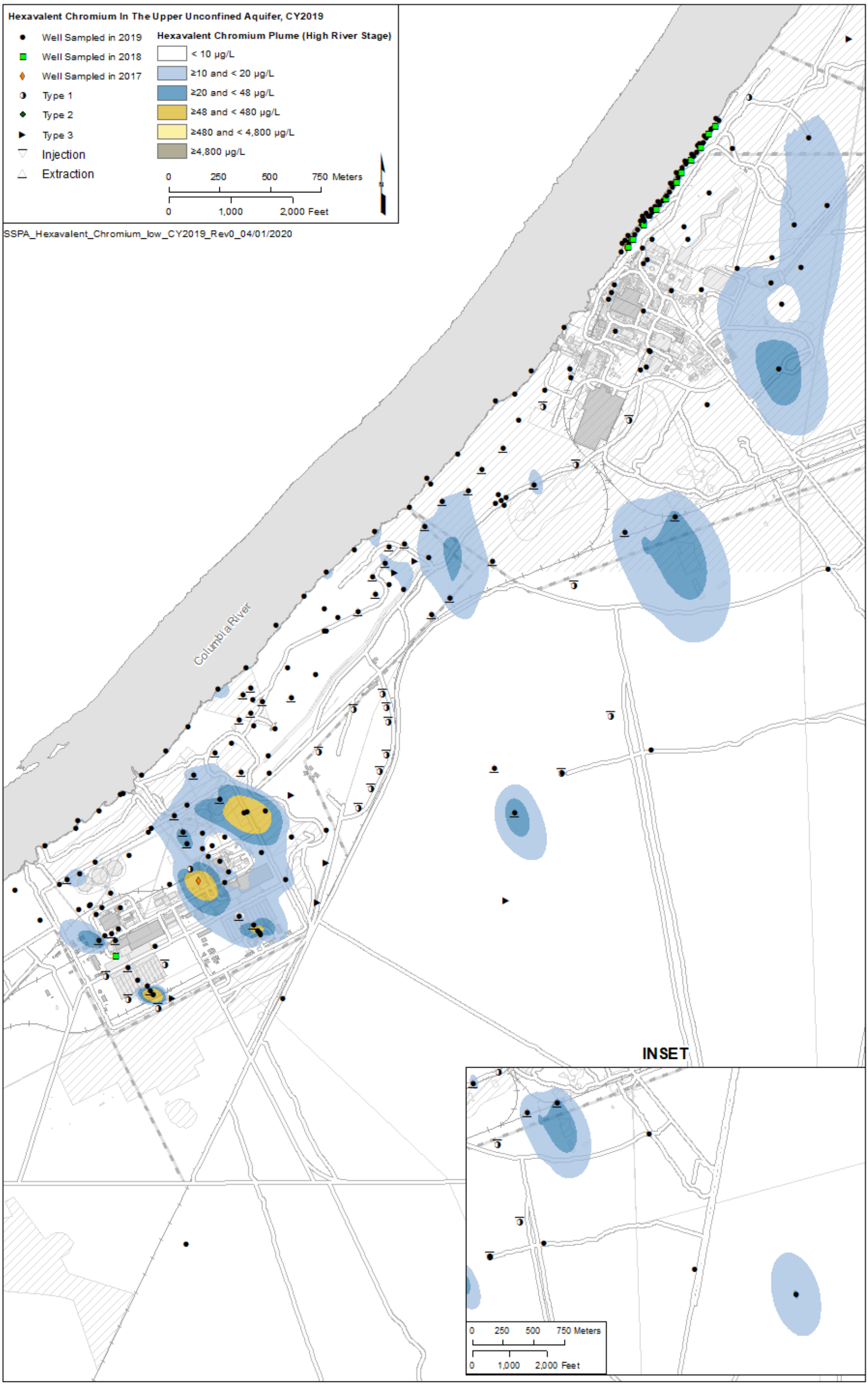


Figure C-18. Hexavalent Chromium in 100-KR-4 – High River Stage

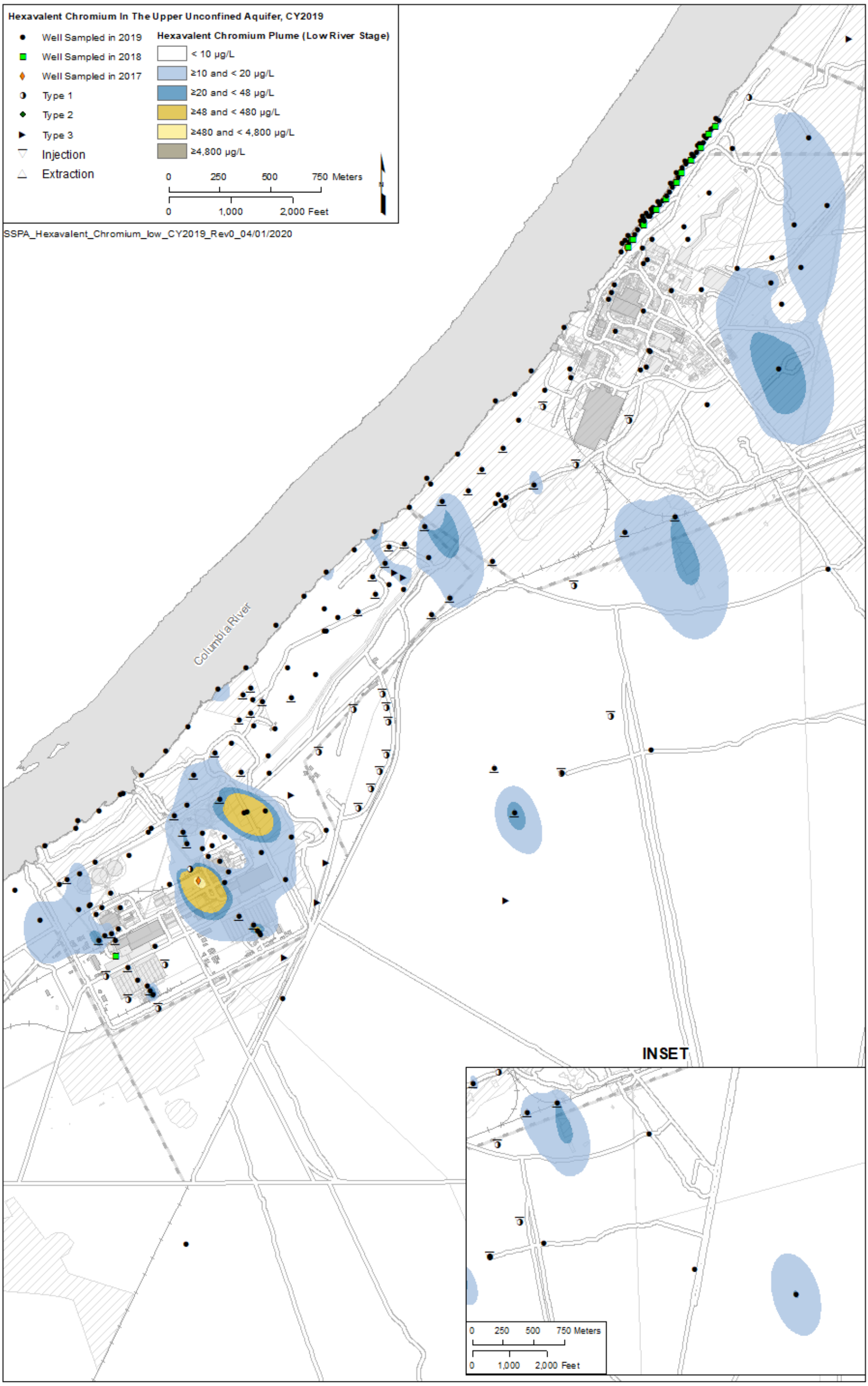


Figure C-19. Hexavalent Chromium in 100-KR-4 – Low River Stage

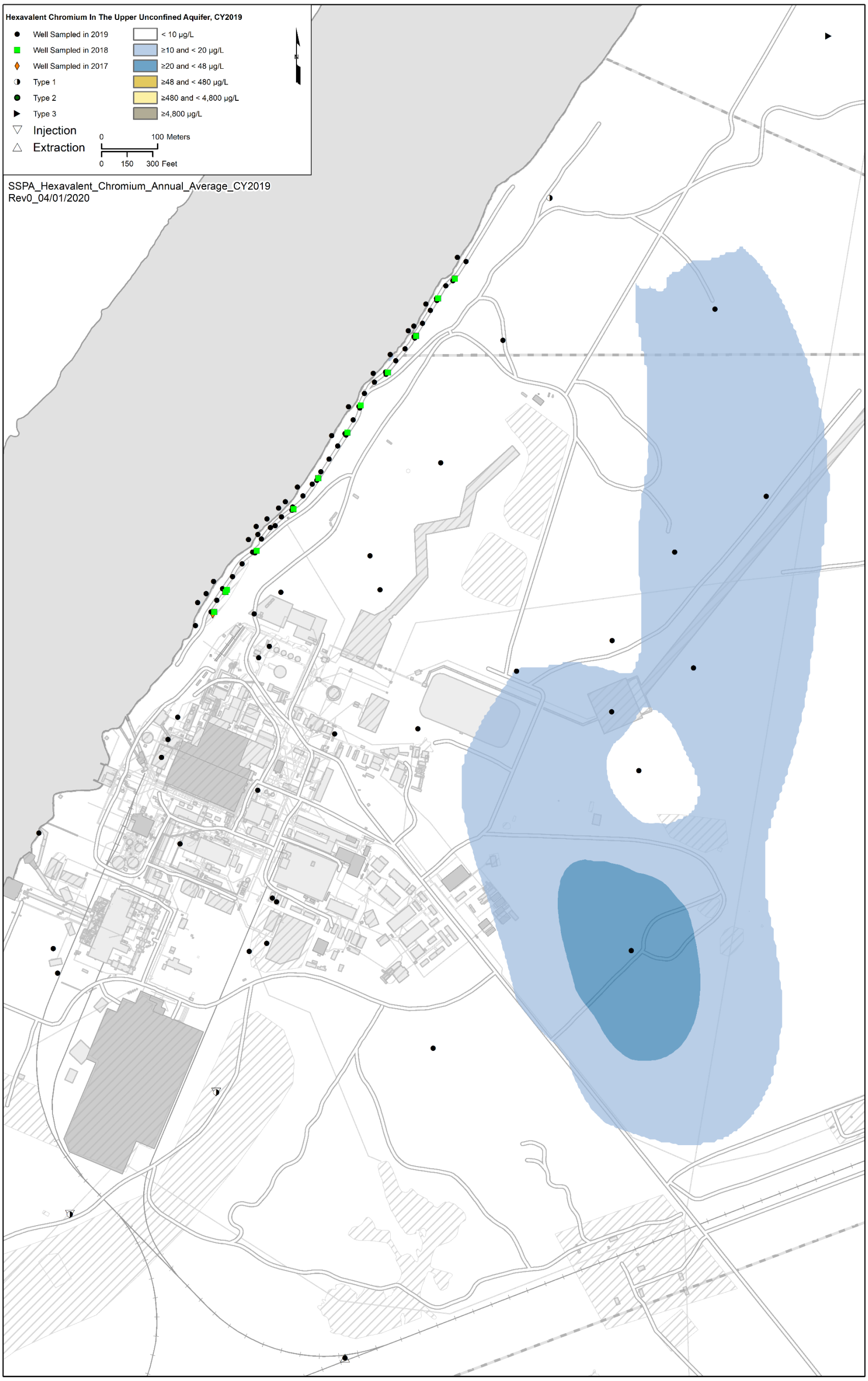


Figure C-20. Hexavalent Chromium in 100-NR-2 – Annual Average

Figure C-21. Nitrate in 100-KR-4

Figure C-22. Strontium-90 in 100-KR-4

Figure C-23. Annual Maximum TCE in 100-KR-4

Figure C-24. Tritium in 100-KR-4

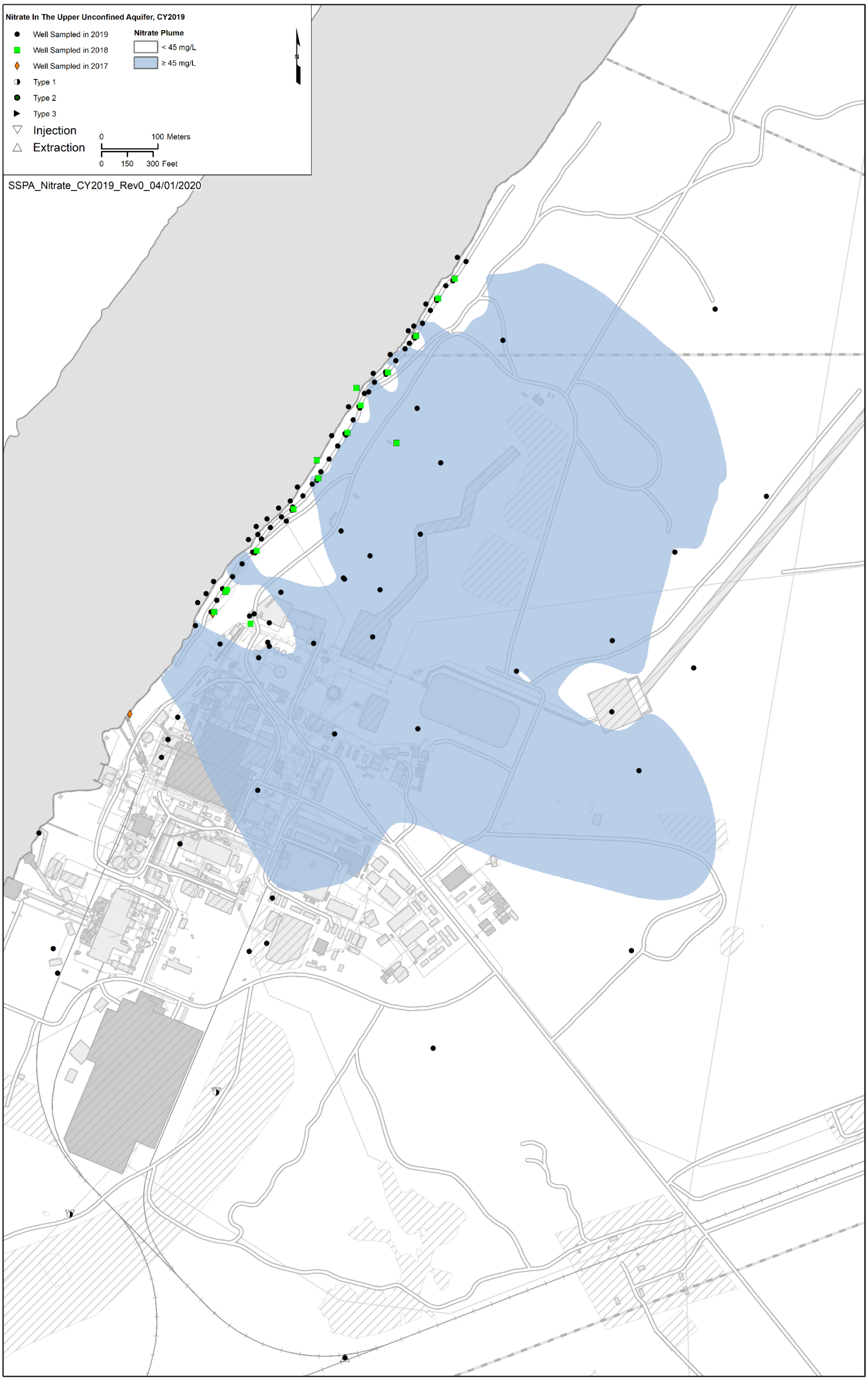


Figure C-25. Nitrate in 100-NR-2

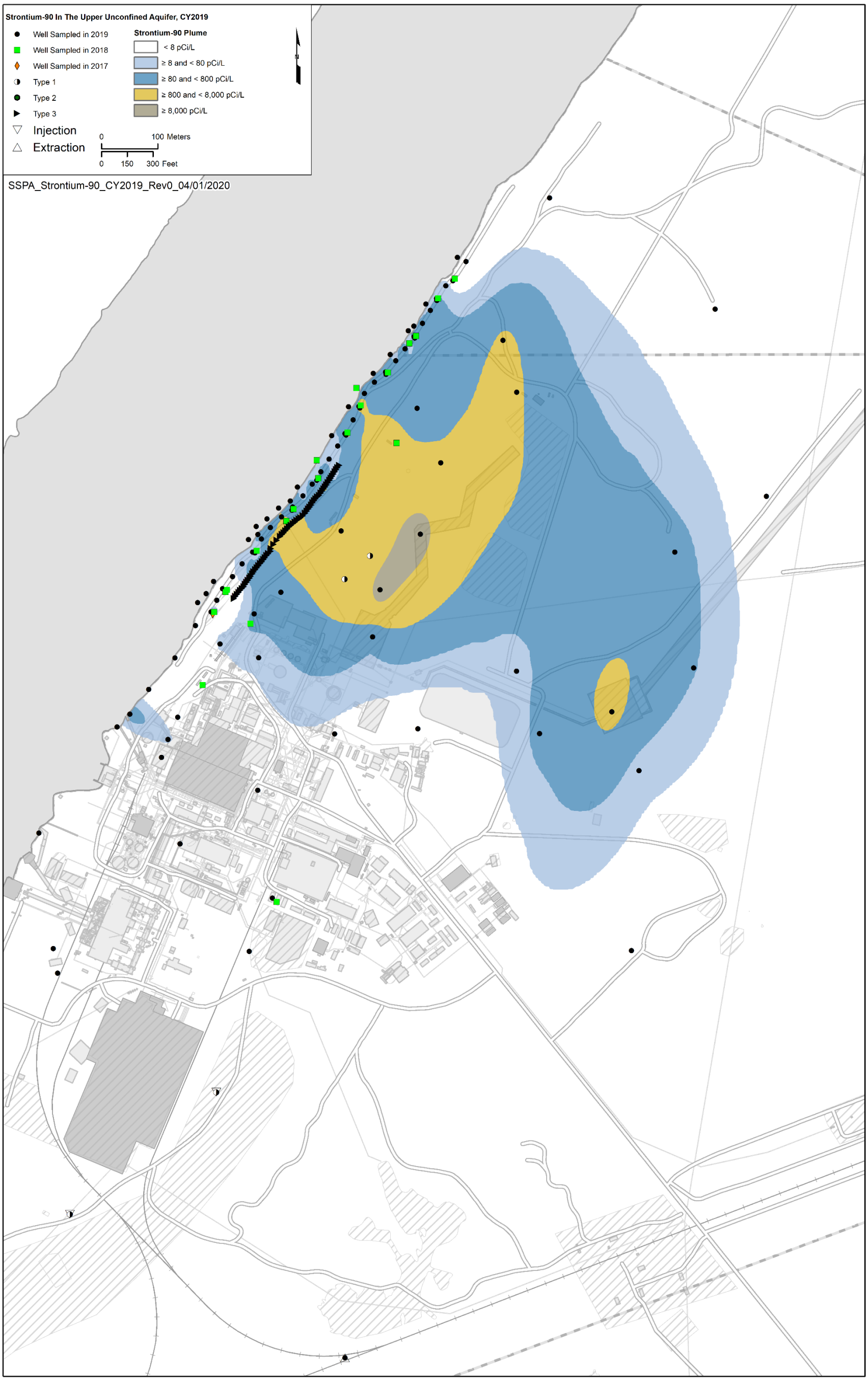


Figure C-26. Strontium-90 in 100-NR-2

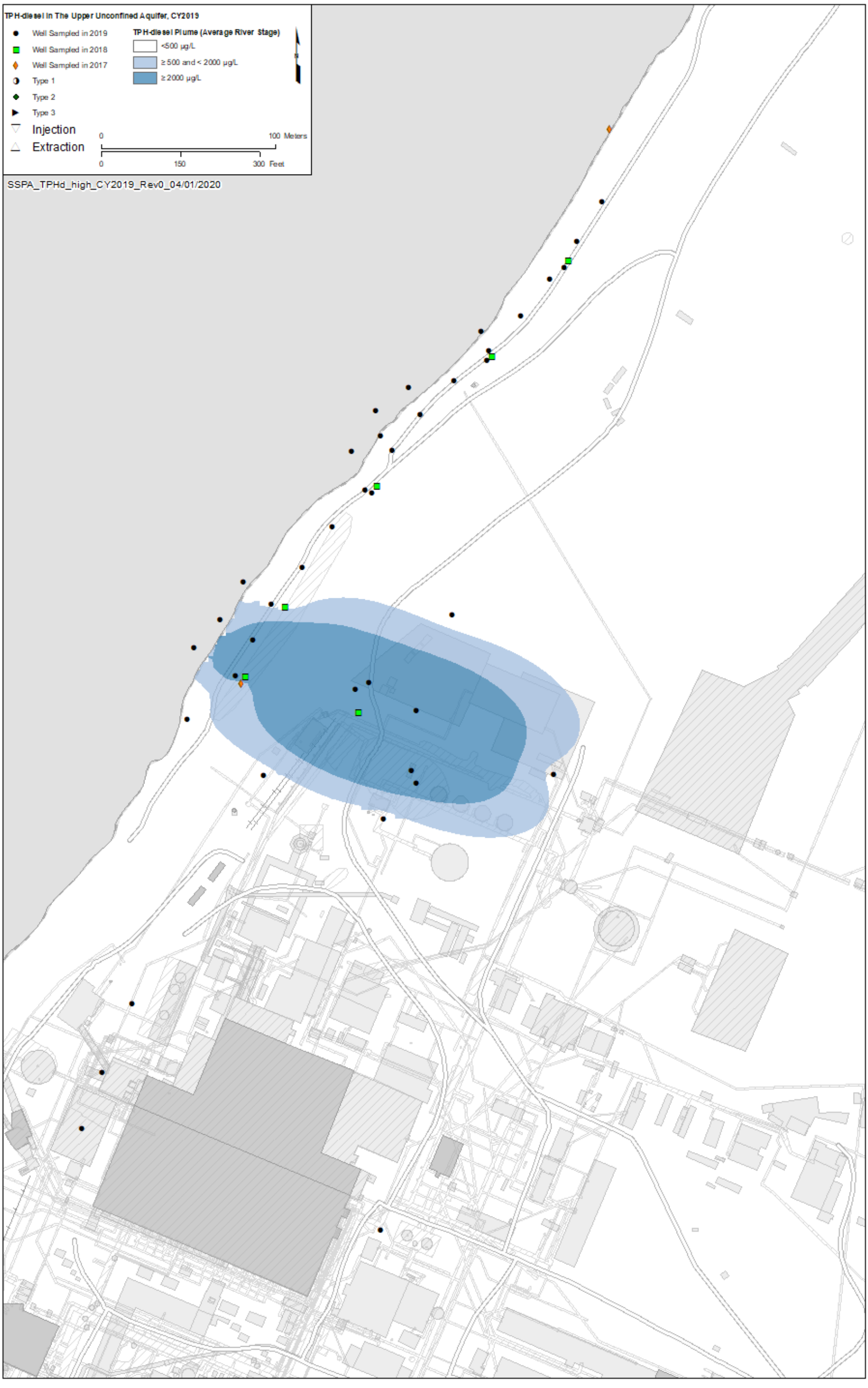


Figure C-27. TPH-d in 100-NR-2

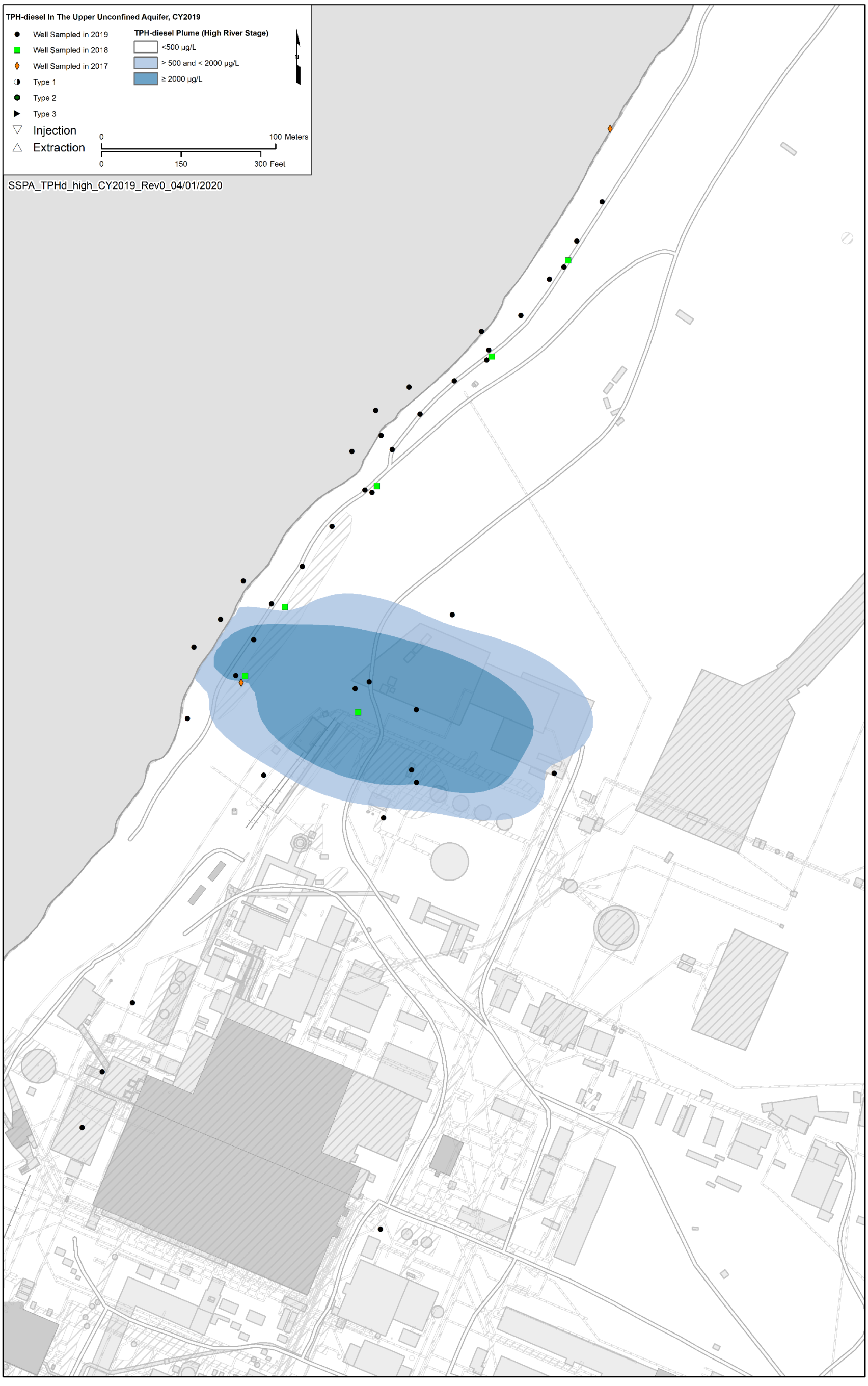


Figure C-28. TPH-d in 100-NR-2 – High River Stage

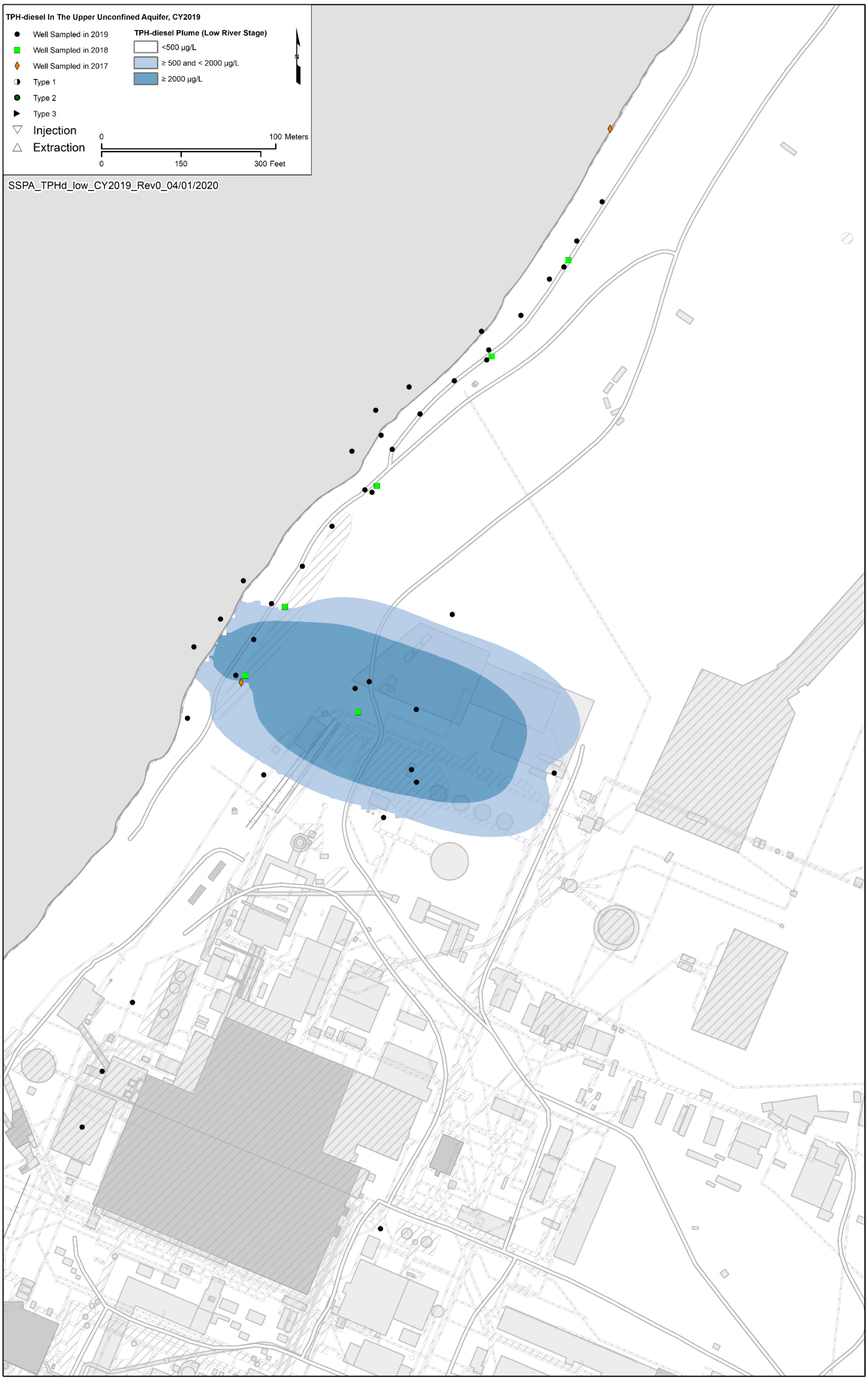


Figure C-29. TPH-d in 100-NR-2 – Low River Stage

Figure C-30. Tritium in 100-NR-2

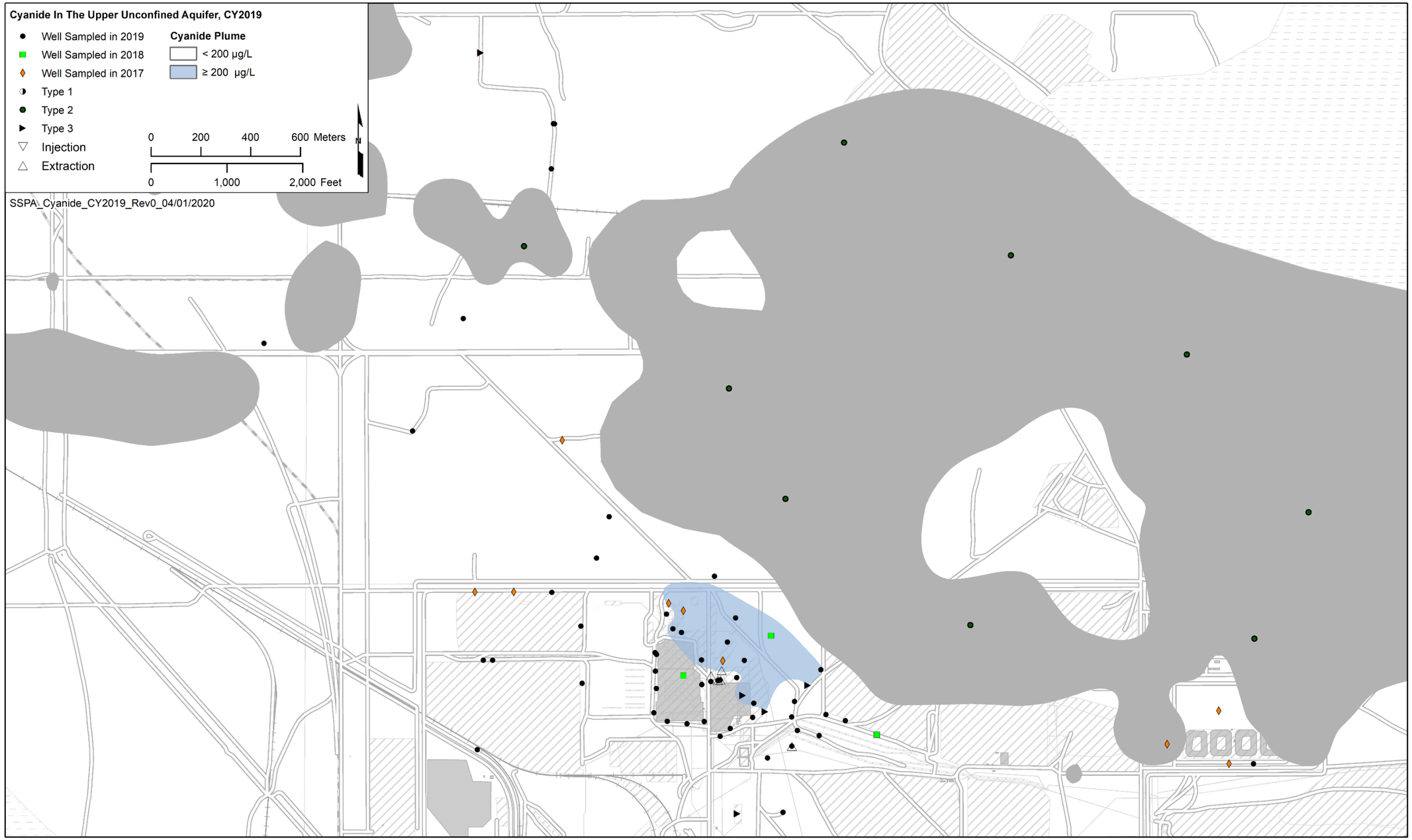


Figure C-31. Cyanide in 200-BP-5

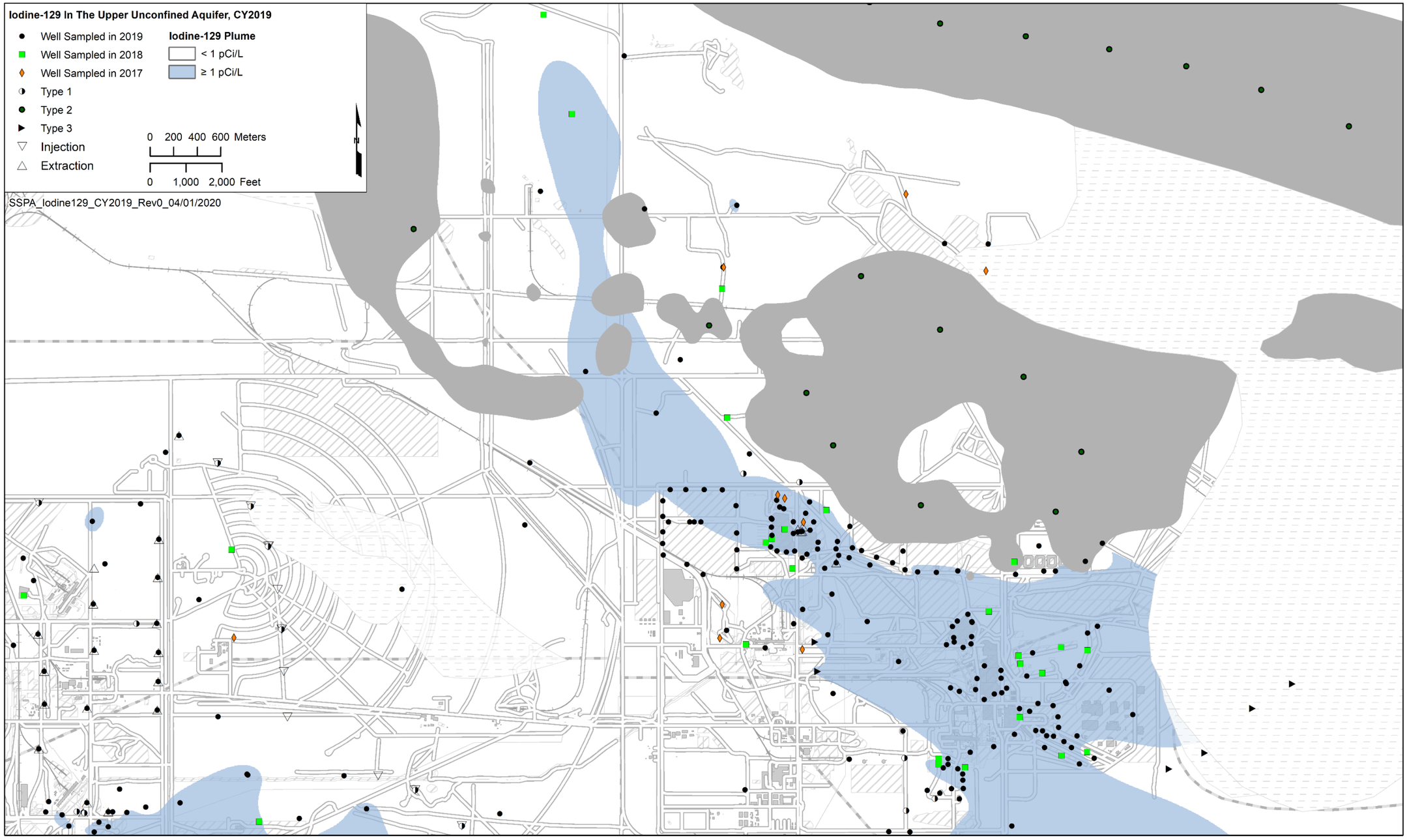


Figure C-32. Iodine-129 in 200-BP-5

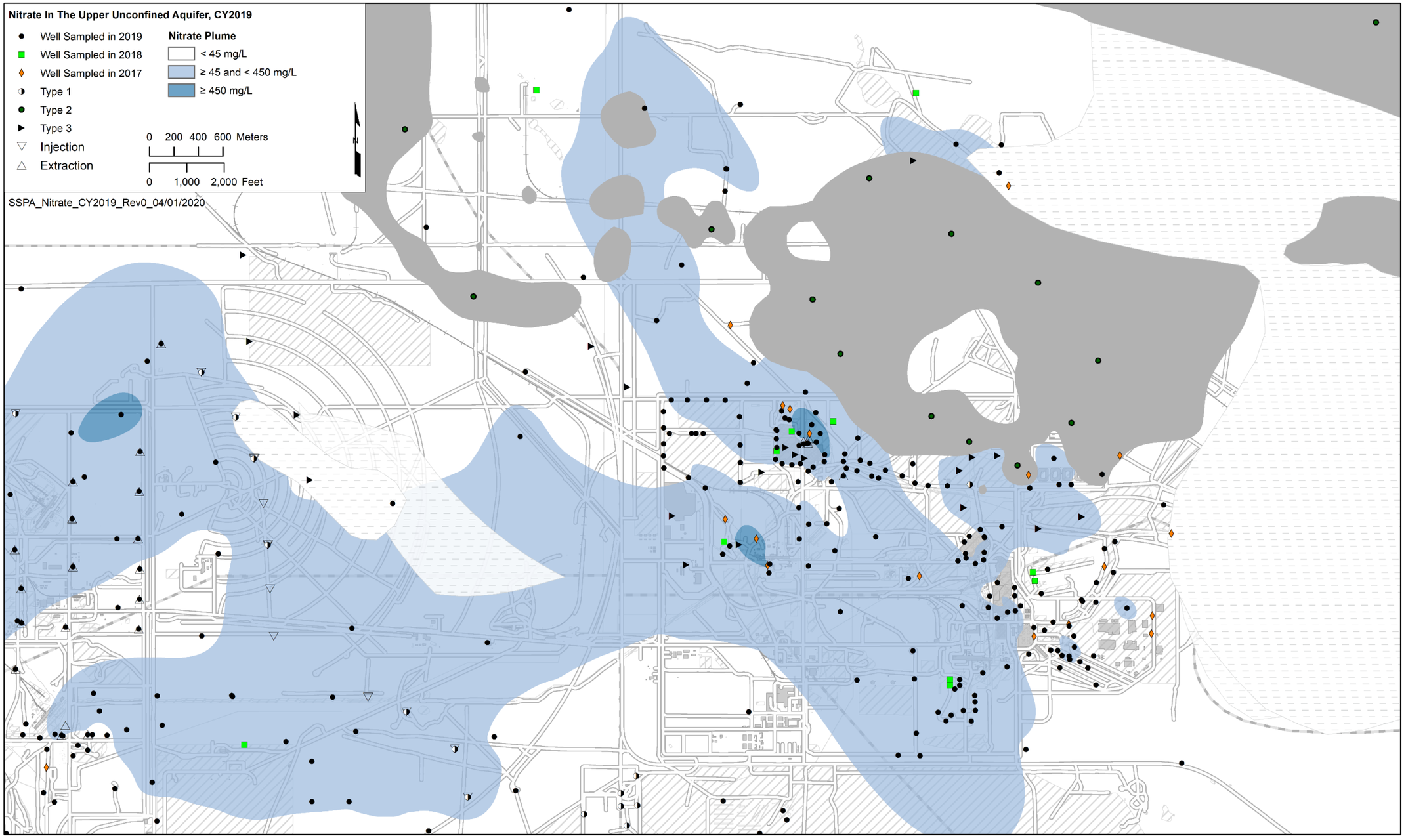


Figure C-33. Nitrate in 200-BP-5

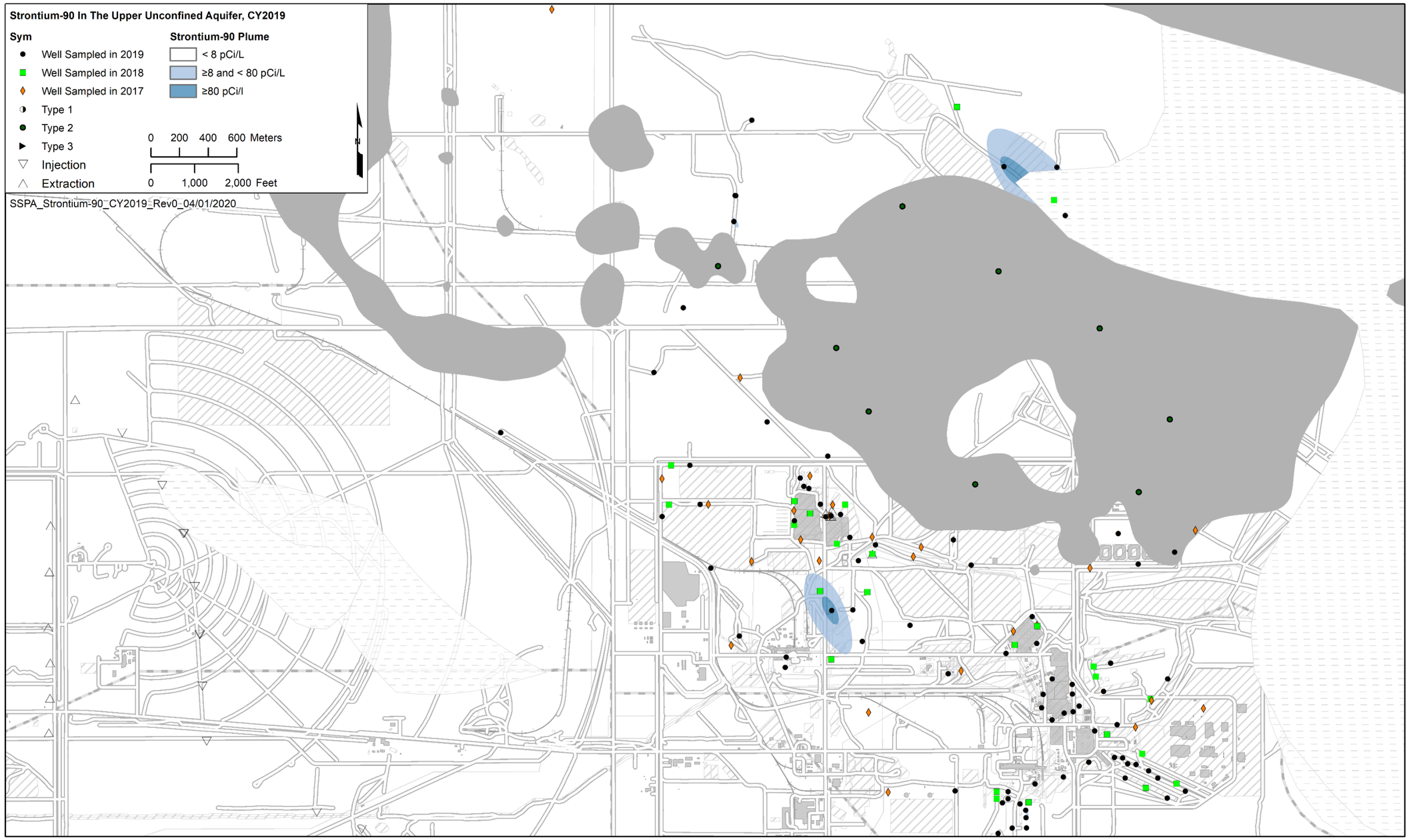


Figure C-34. Strontium-90 in 200-BP-5

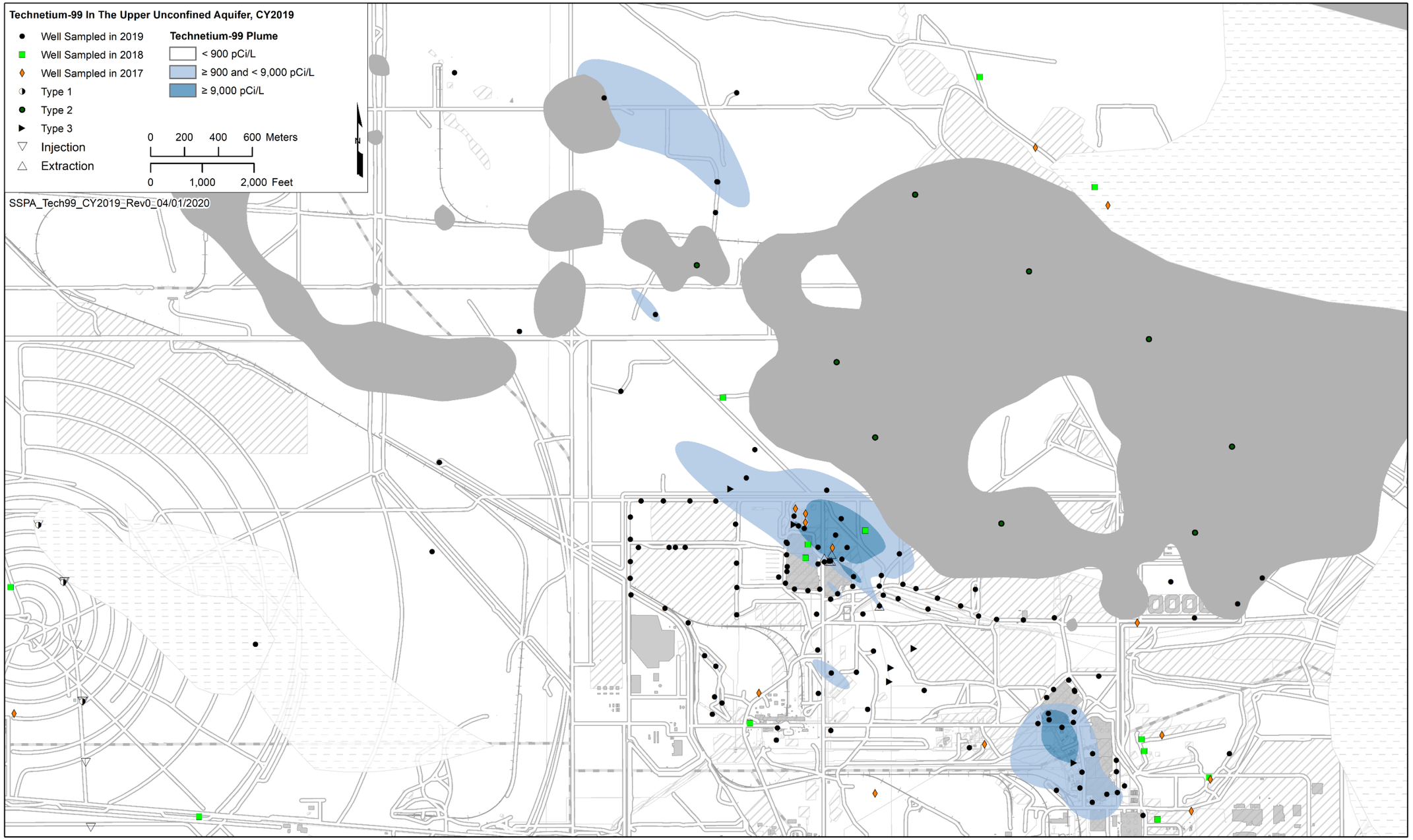


Figure C-35. Technetium-99 in 200-BP-5

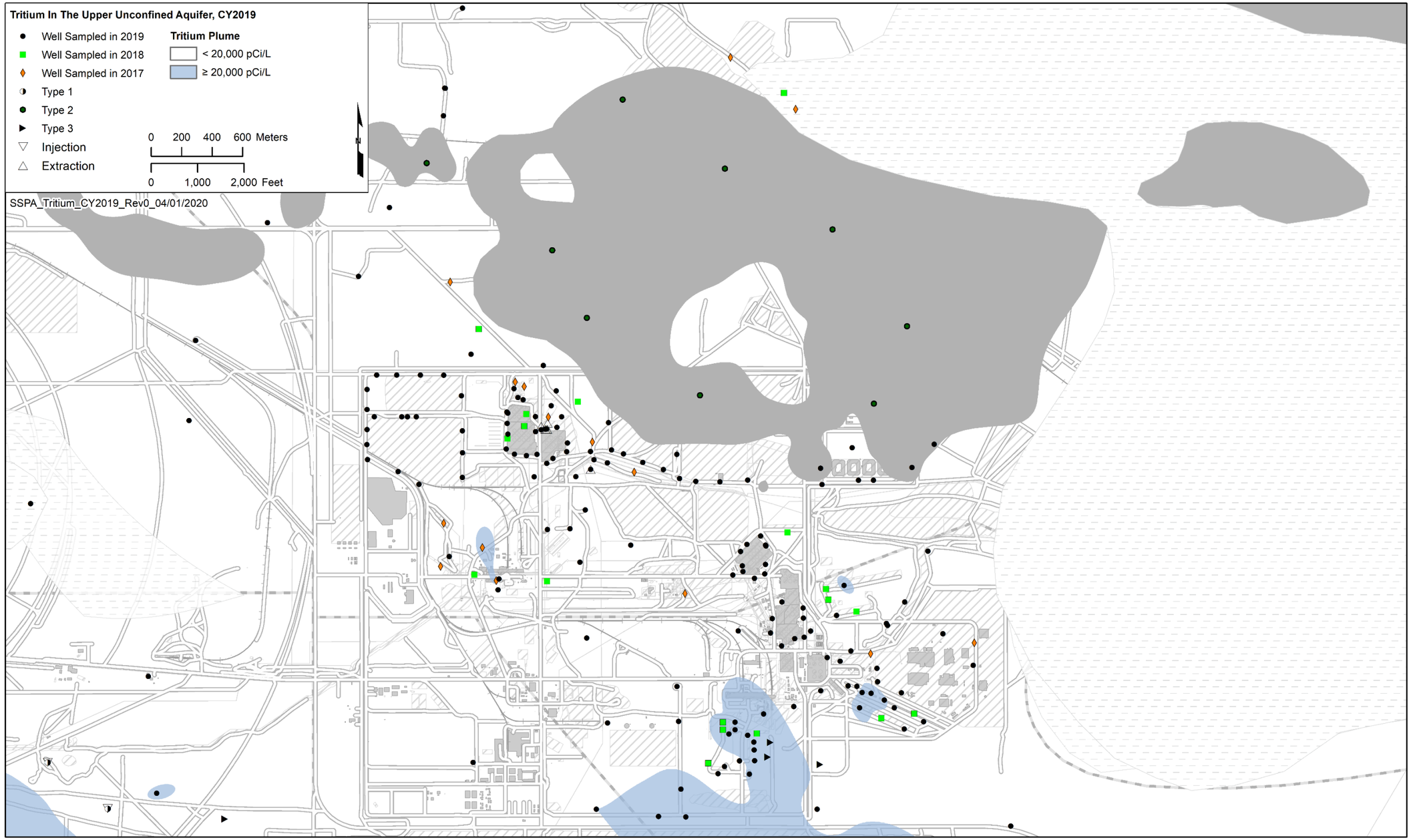


Figure C-36. Tritium in 200-BP-5

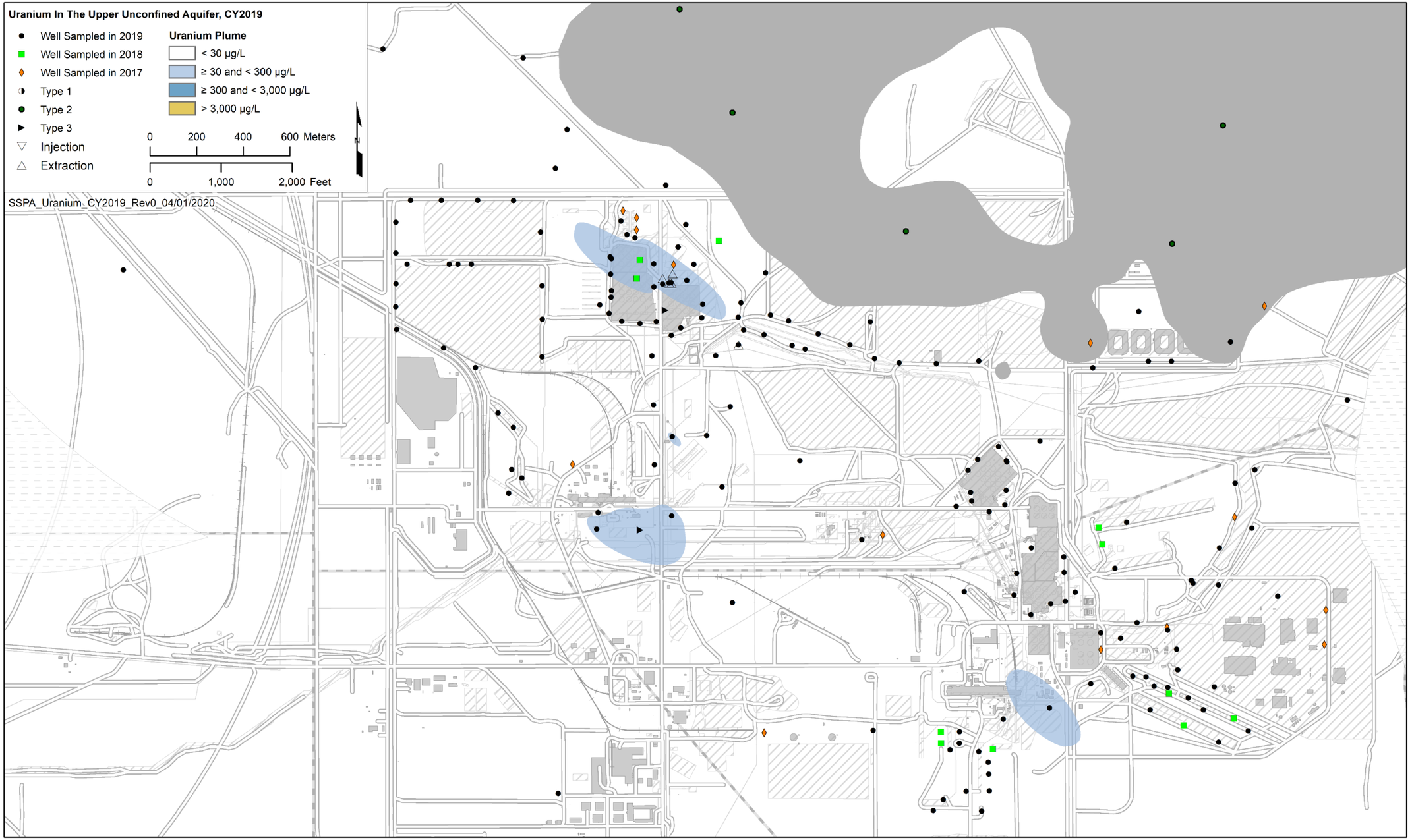


Figure C-37. Uranium in 200-BP-5

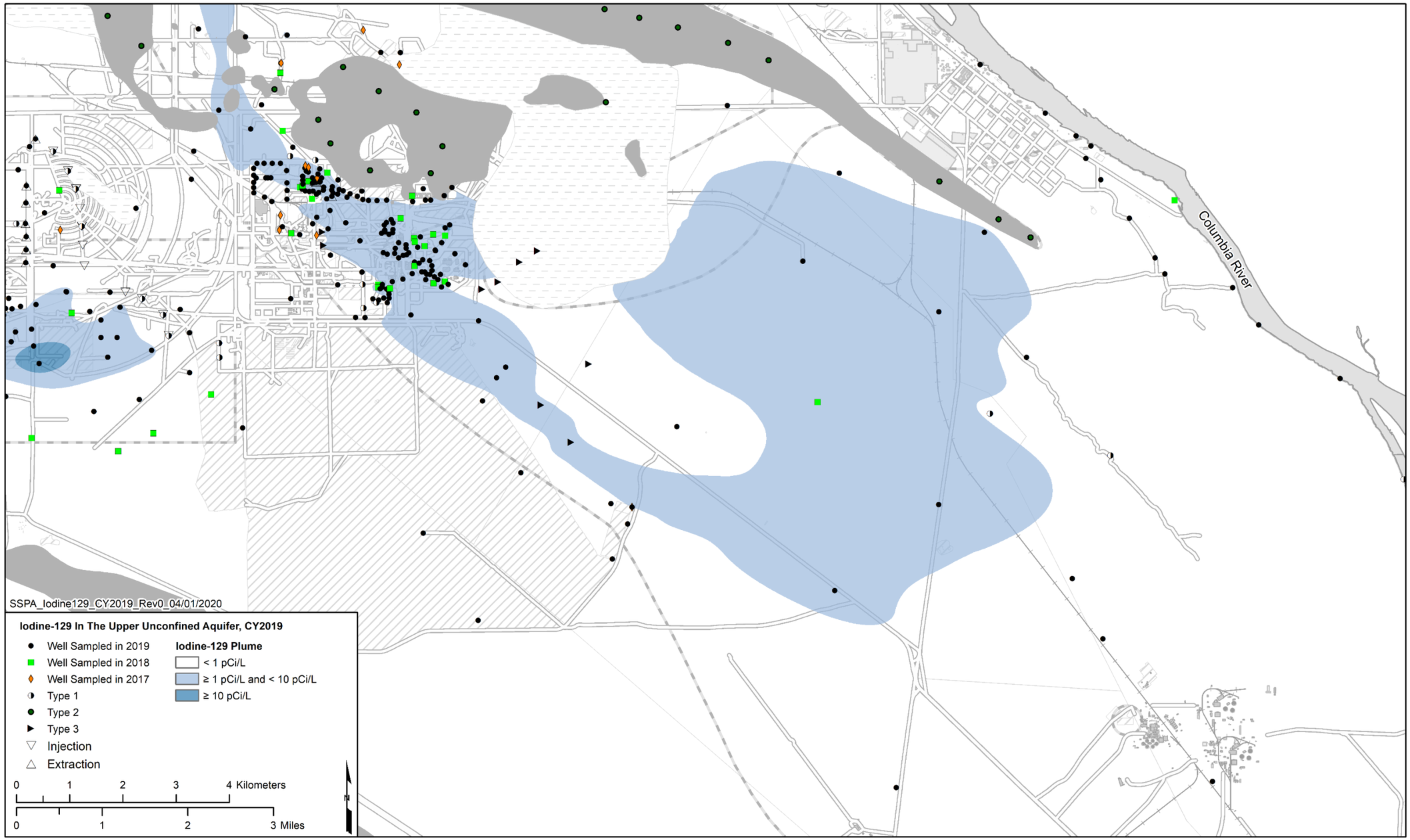


Figure C-38. Iodine-129 in 200-PO-1

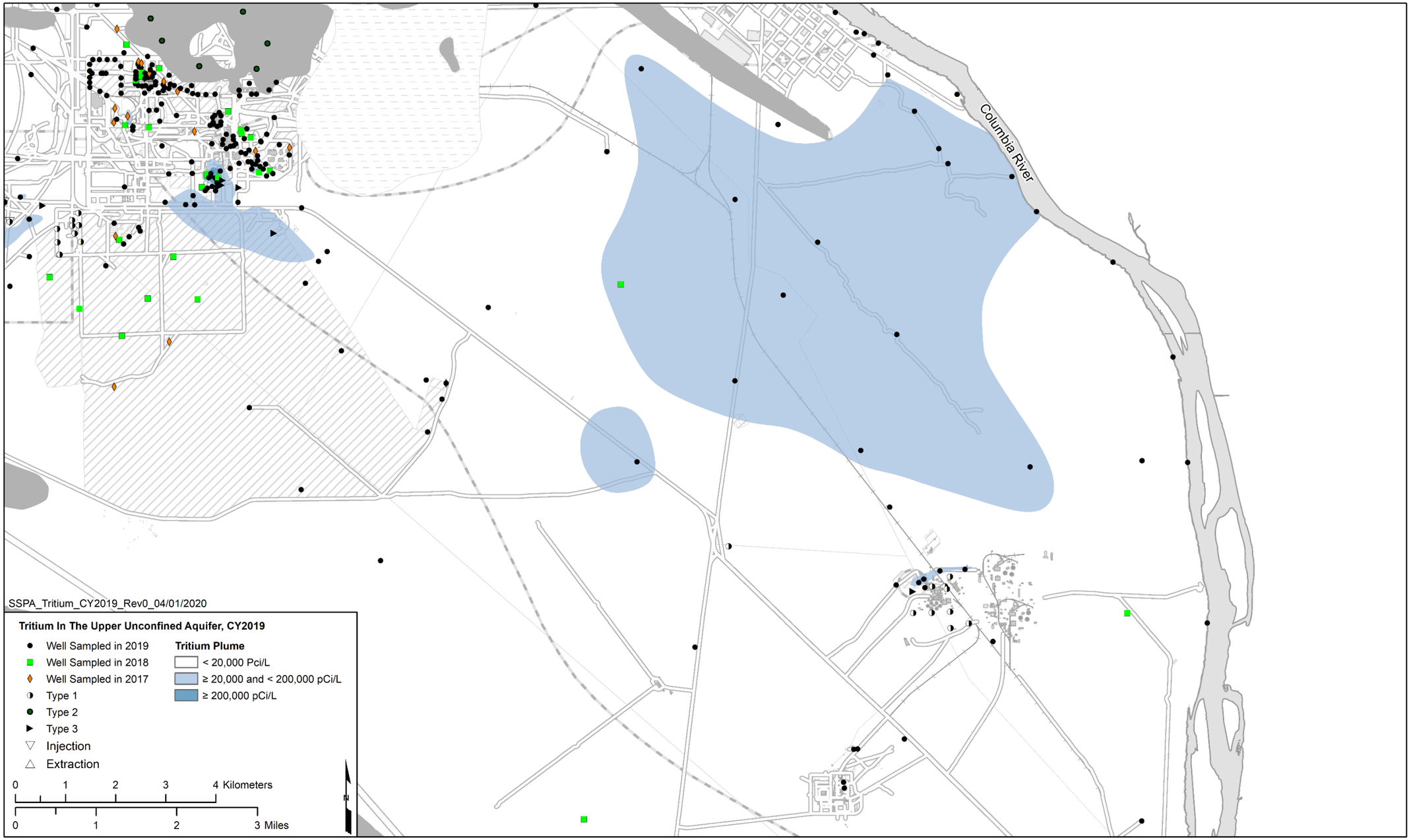


Figure C-39. Tritium in 200-PO-1

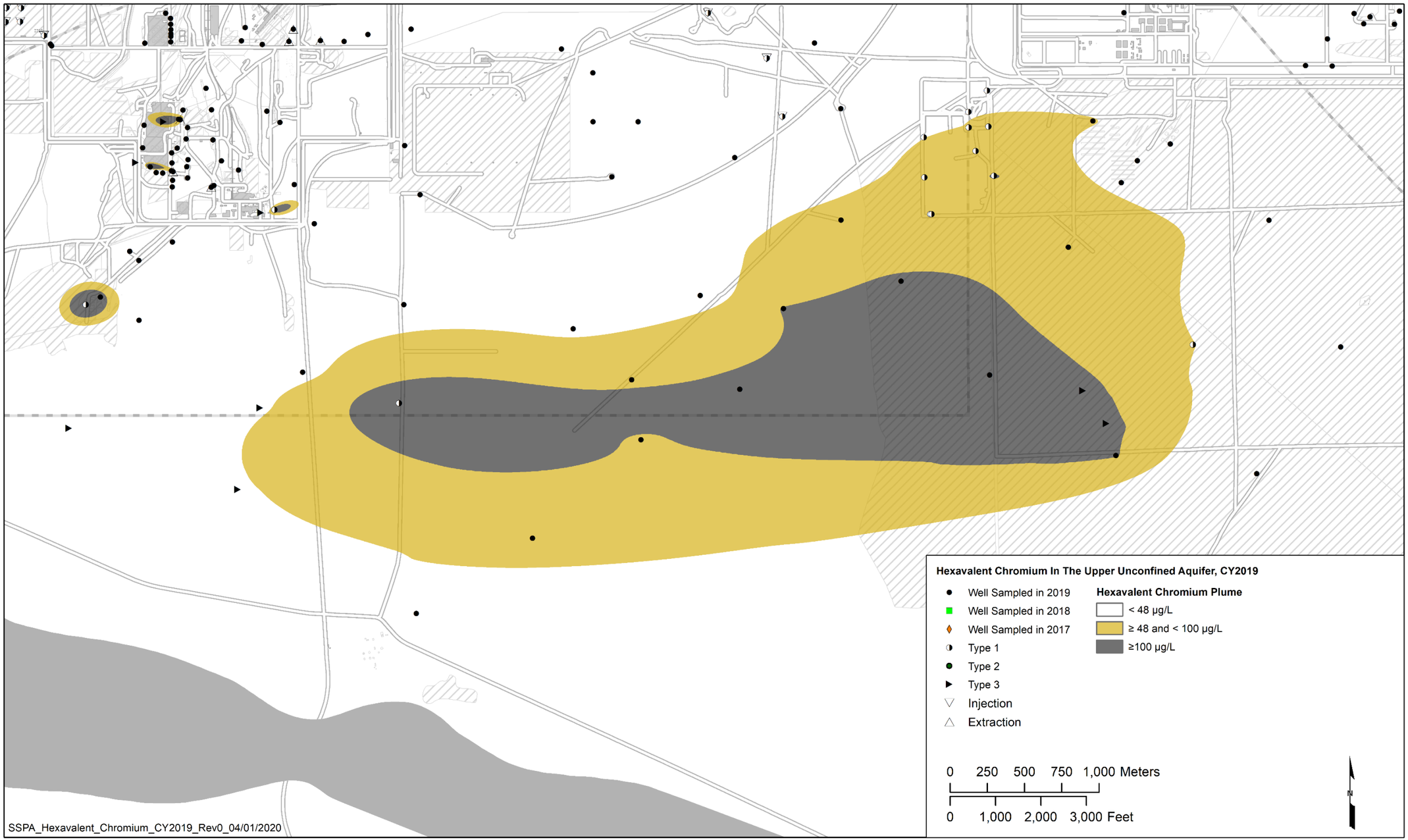


Figure C-40. Hexavalent Chromium in 200-UP-1

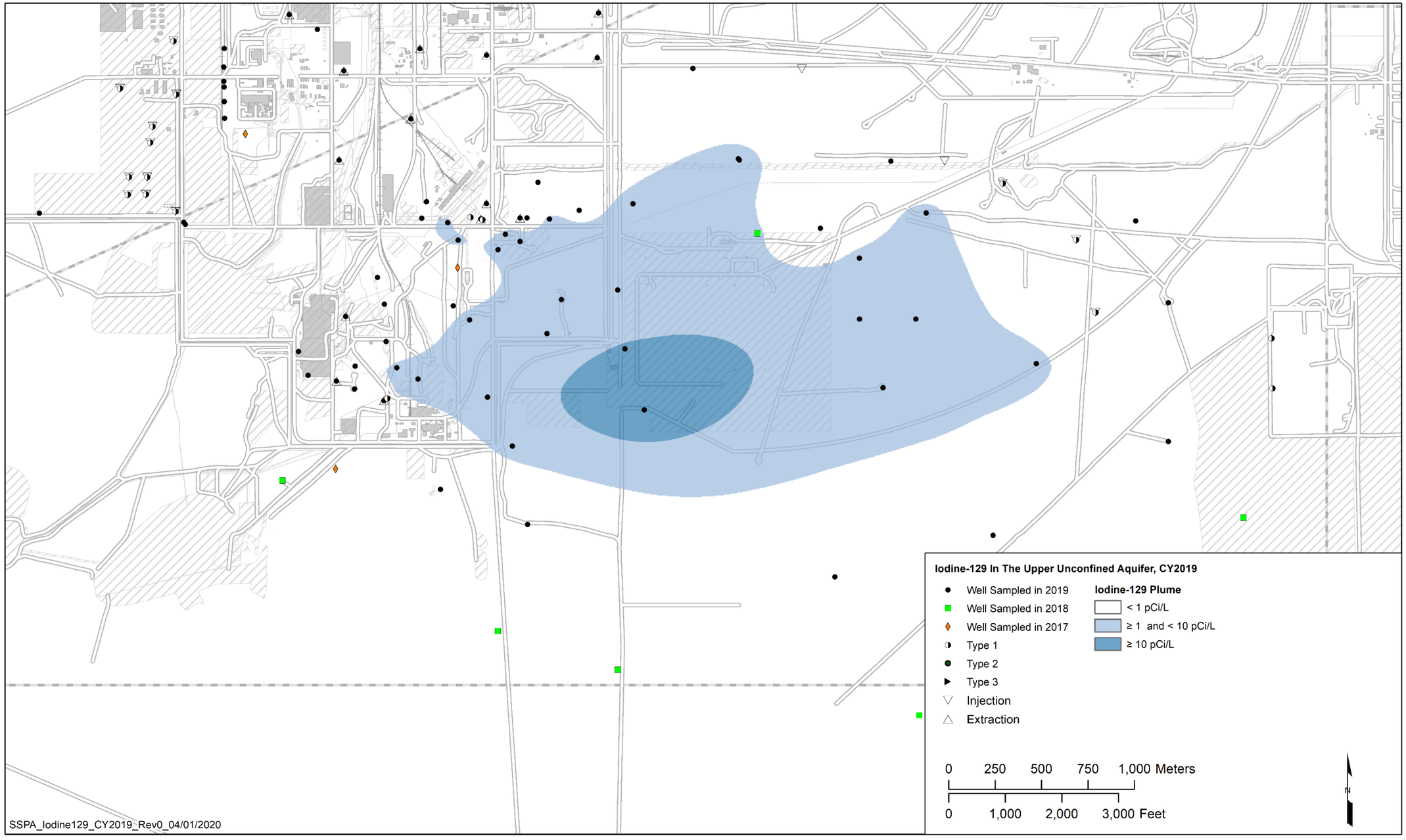


Figure C-41. Iodine-129 in 200-UP-1

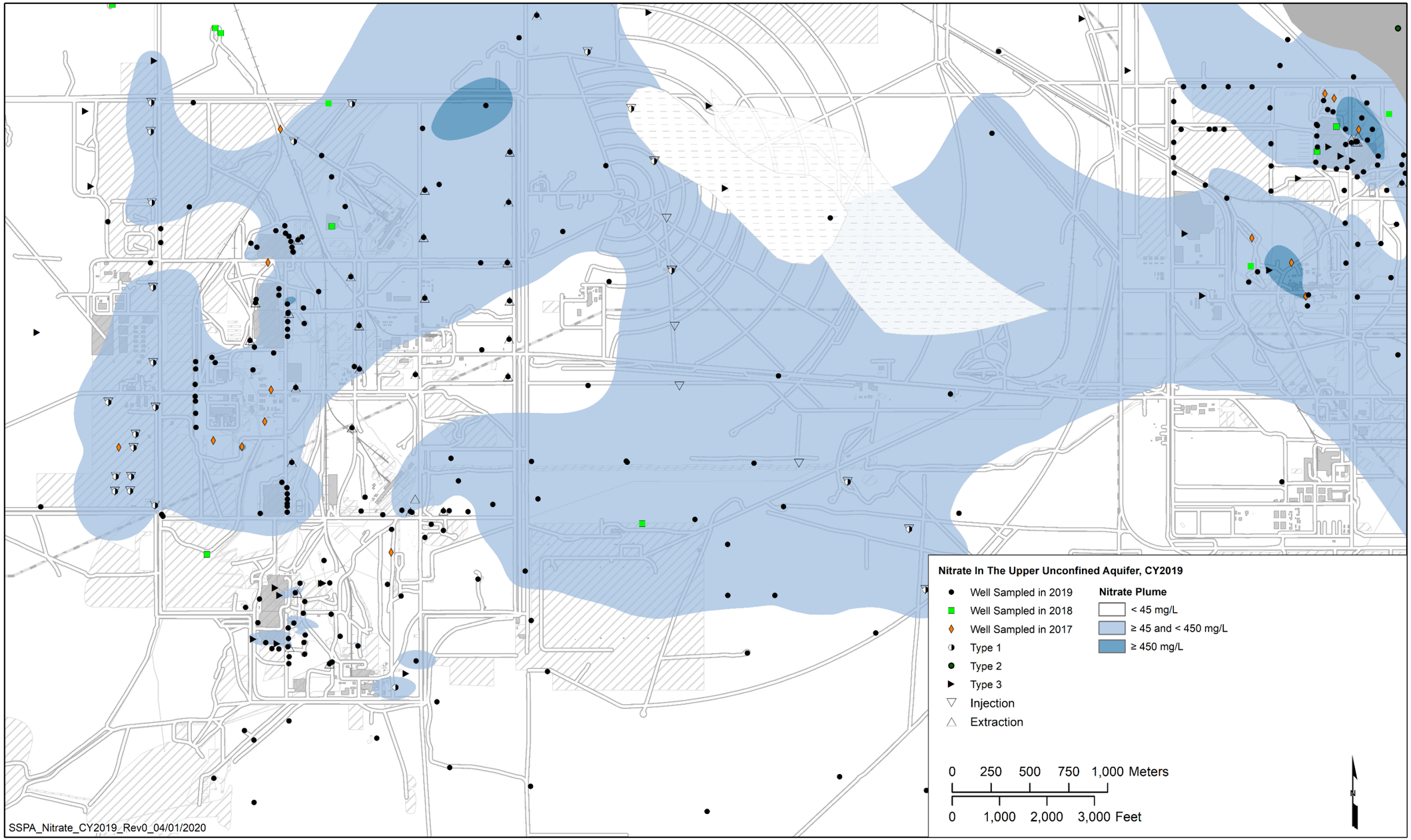


Figure C-42. Nitrate in 200-UP-1

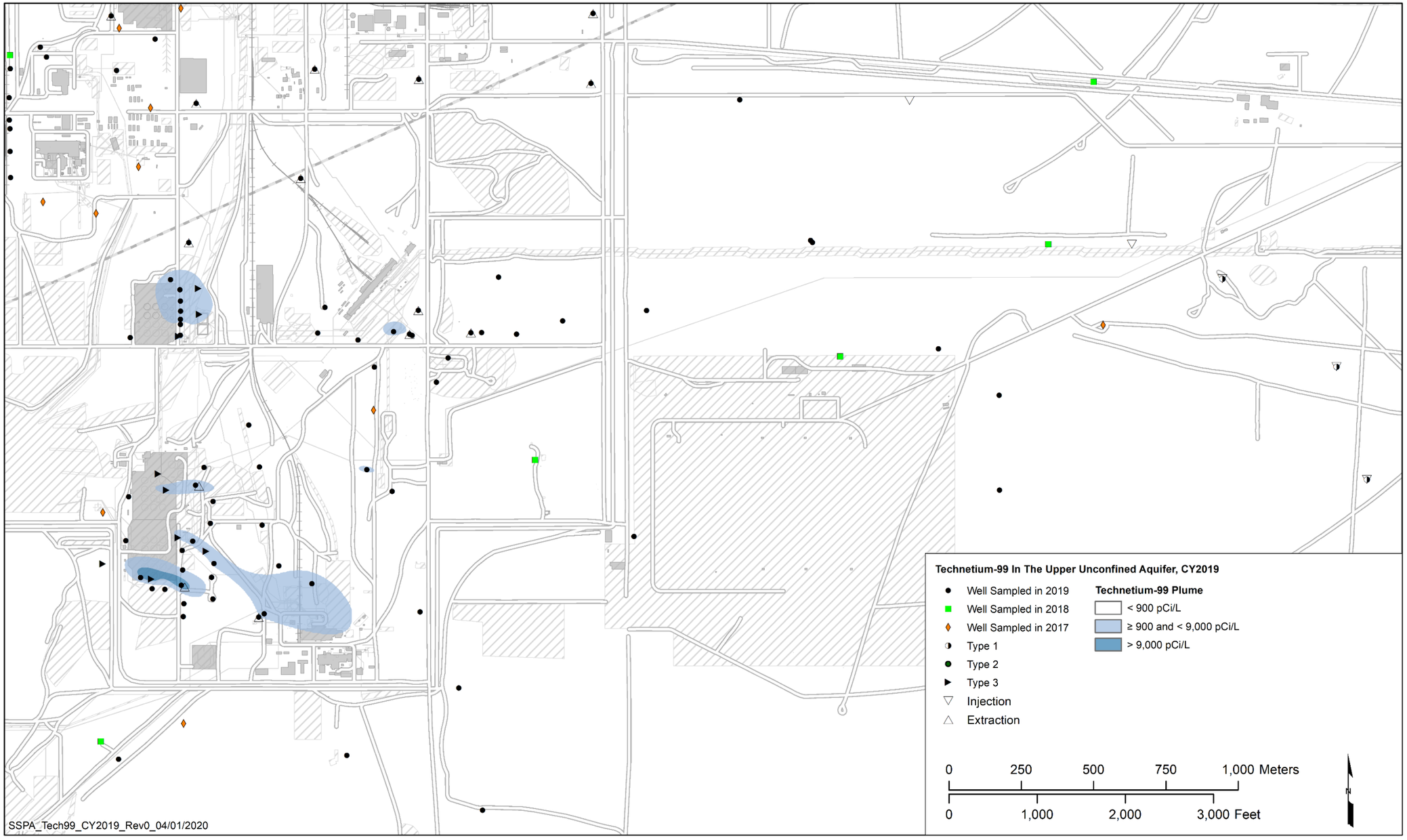


Figure C-43. Technetium-99 in 200-UP-1

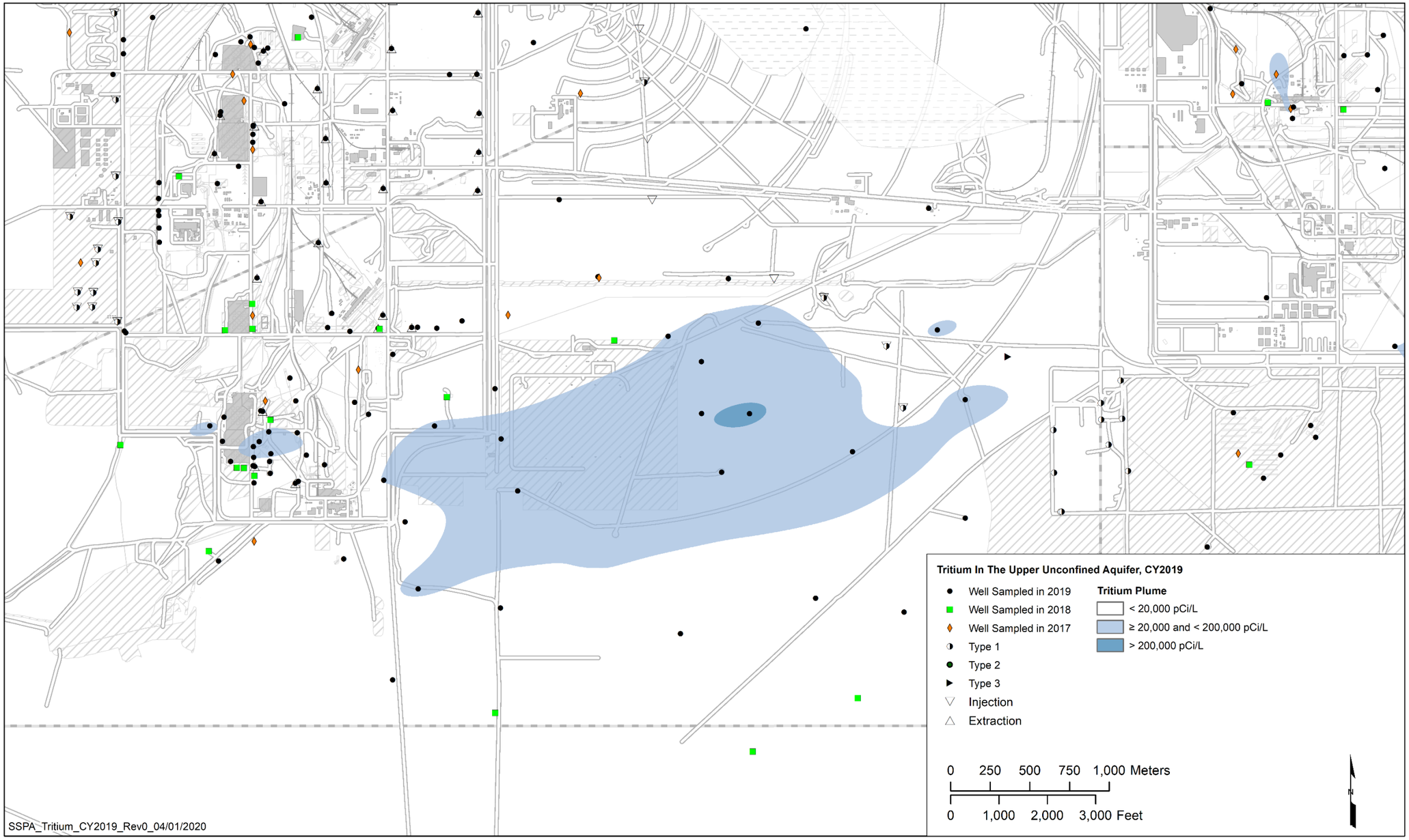


Figure C-44. Tritium in 200-UP-1

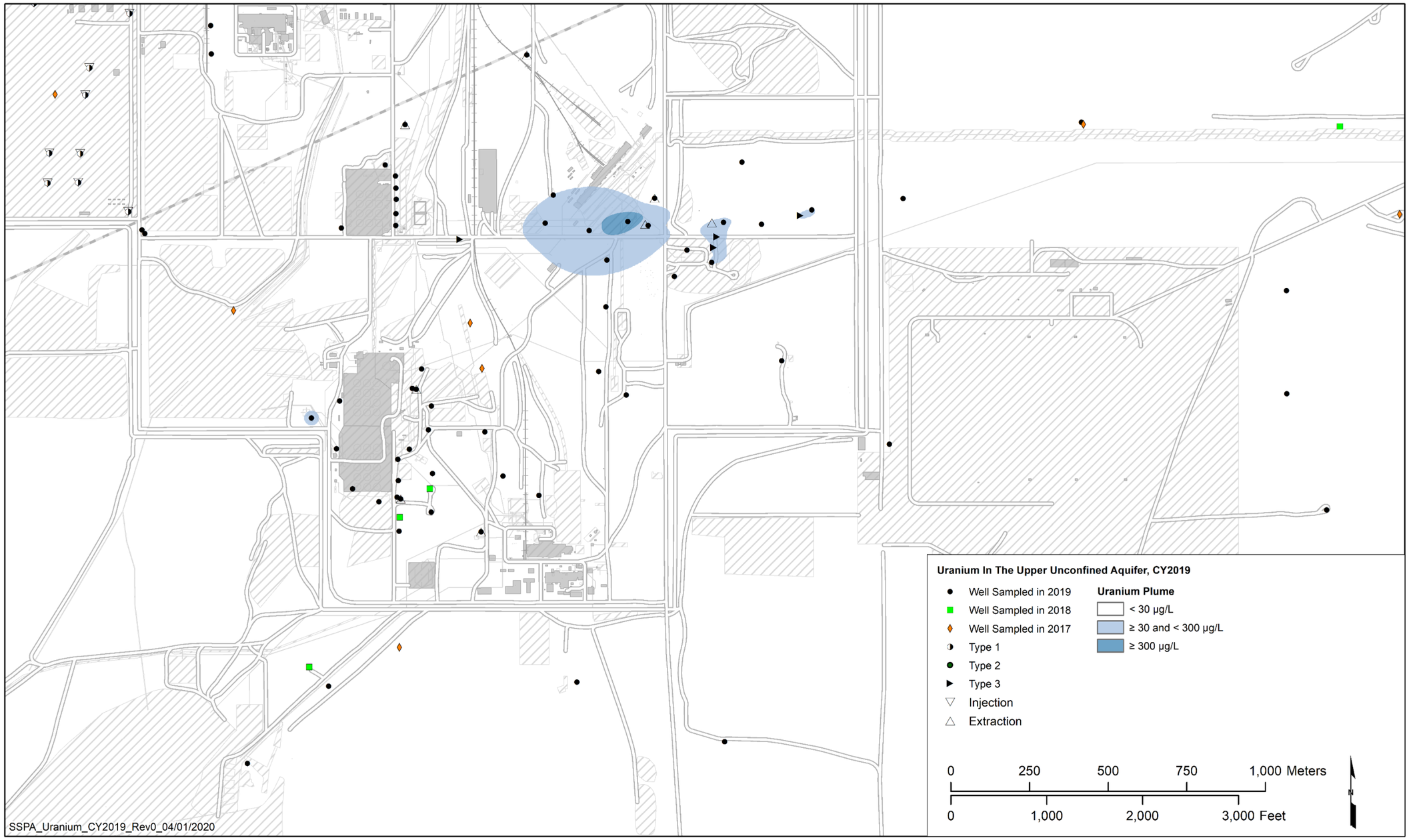


Figure C-45. Uranium in 200-UP-1

This page intentionally left blank.

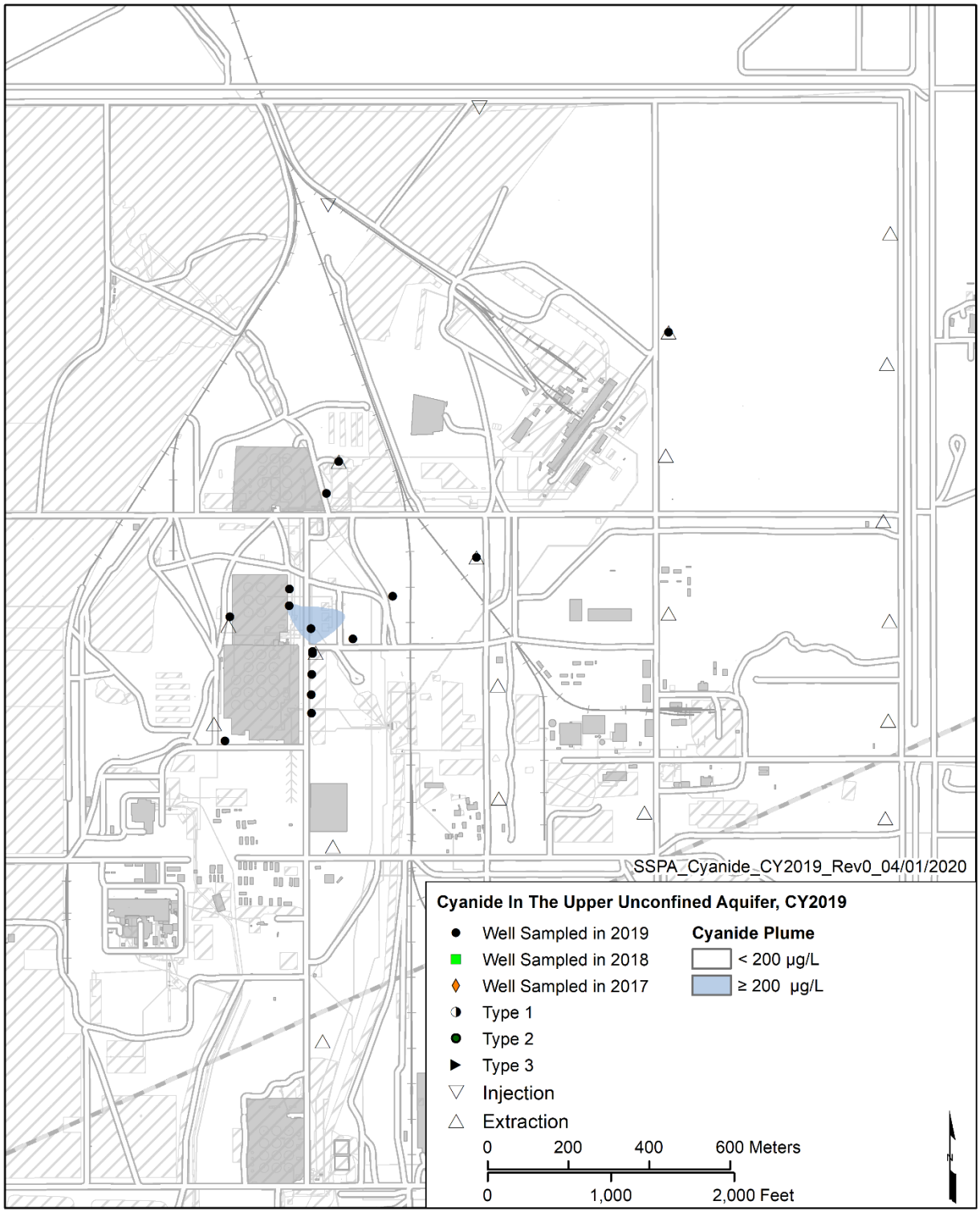


Figure C-46. Cyanide in 200-ZP-1

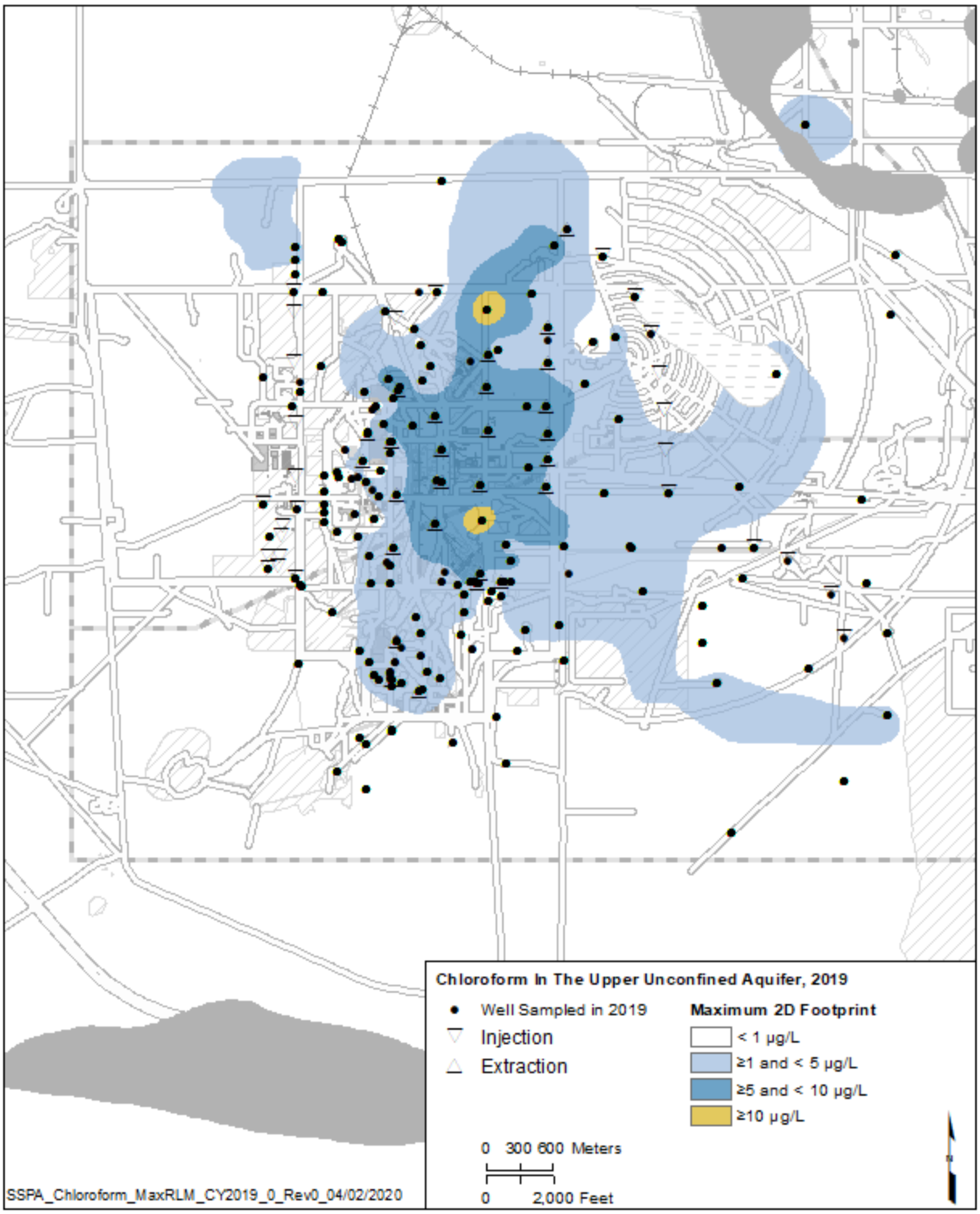


Figure C-47. Chloroform in 200-ZP-1

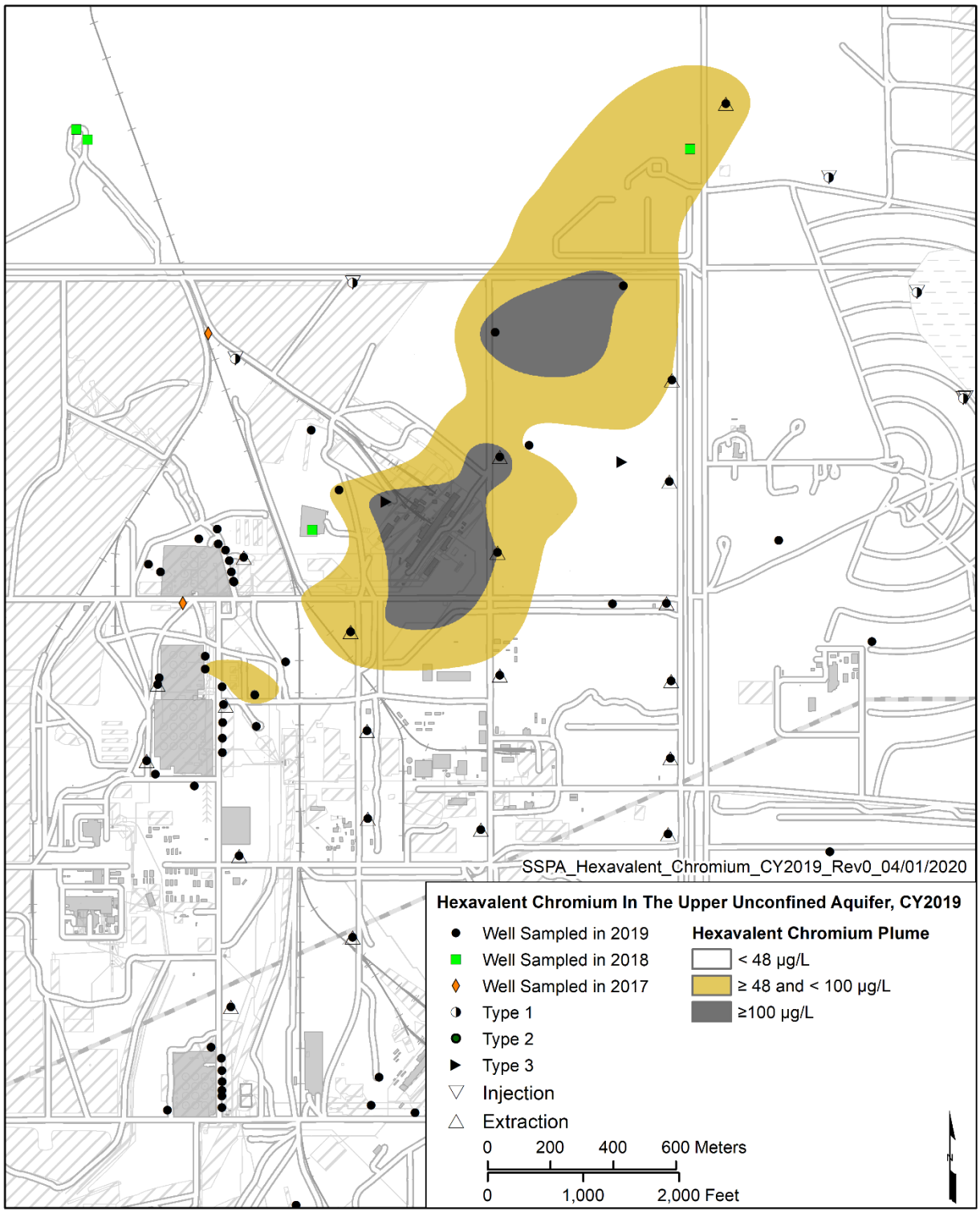


Figure C-48. Hexavalent Chromium in 200-ZP-1

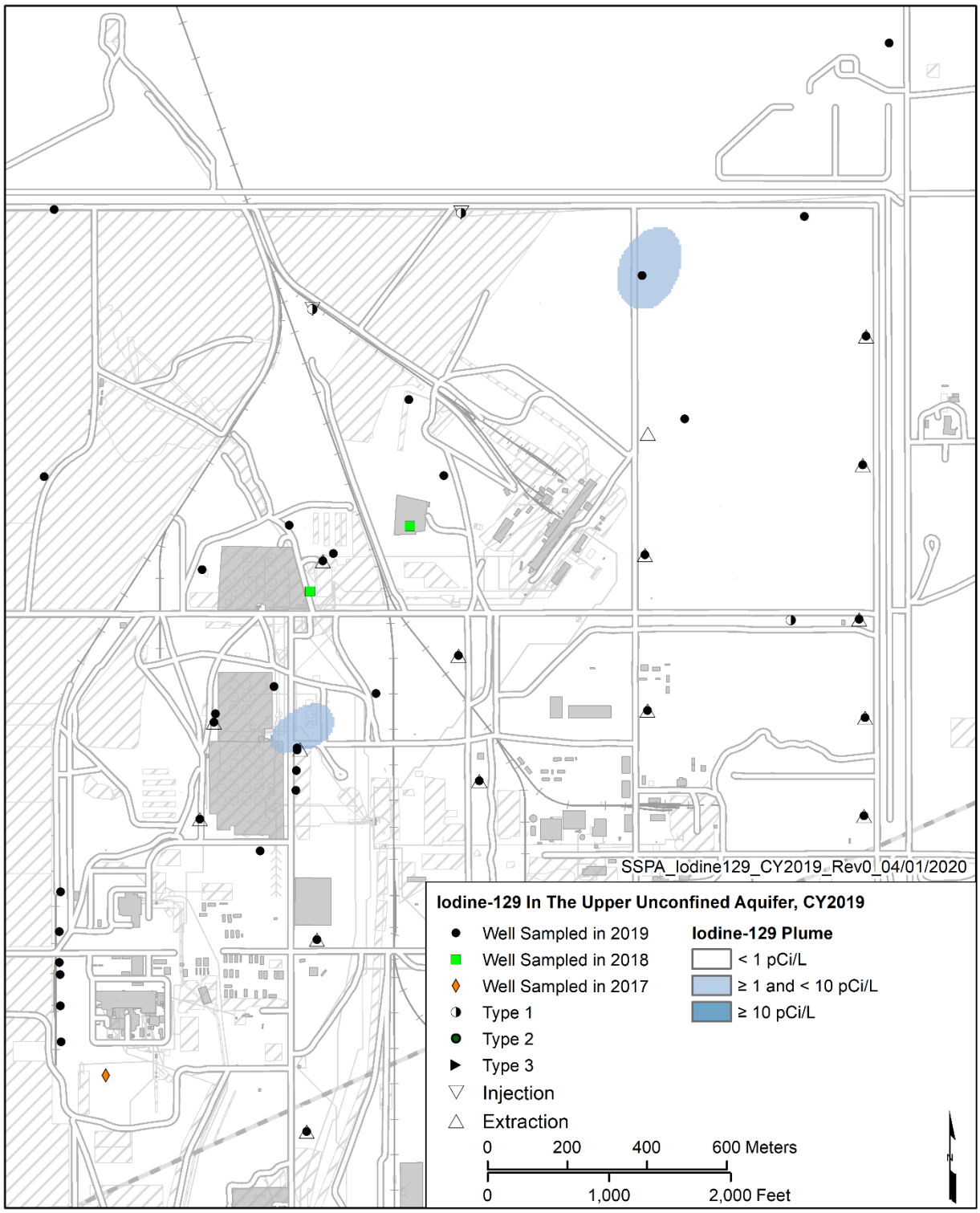


Figure C-49. Iodine-129 in 200-ZP-1

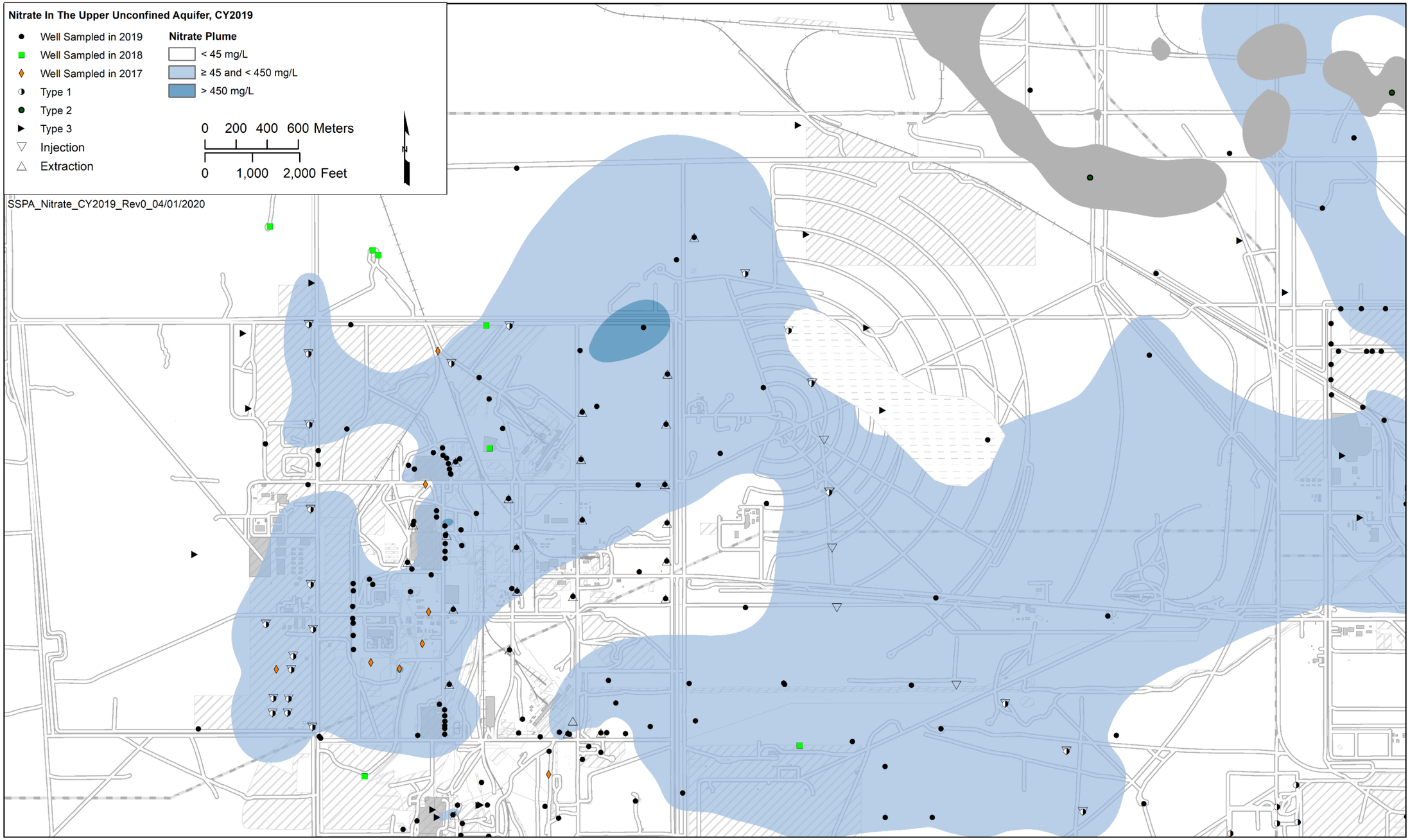


Figure C-50. Nitrate in 200-ZP-1

This page intentionally left blank.

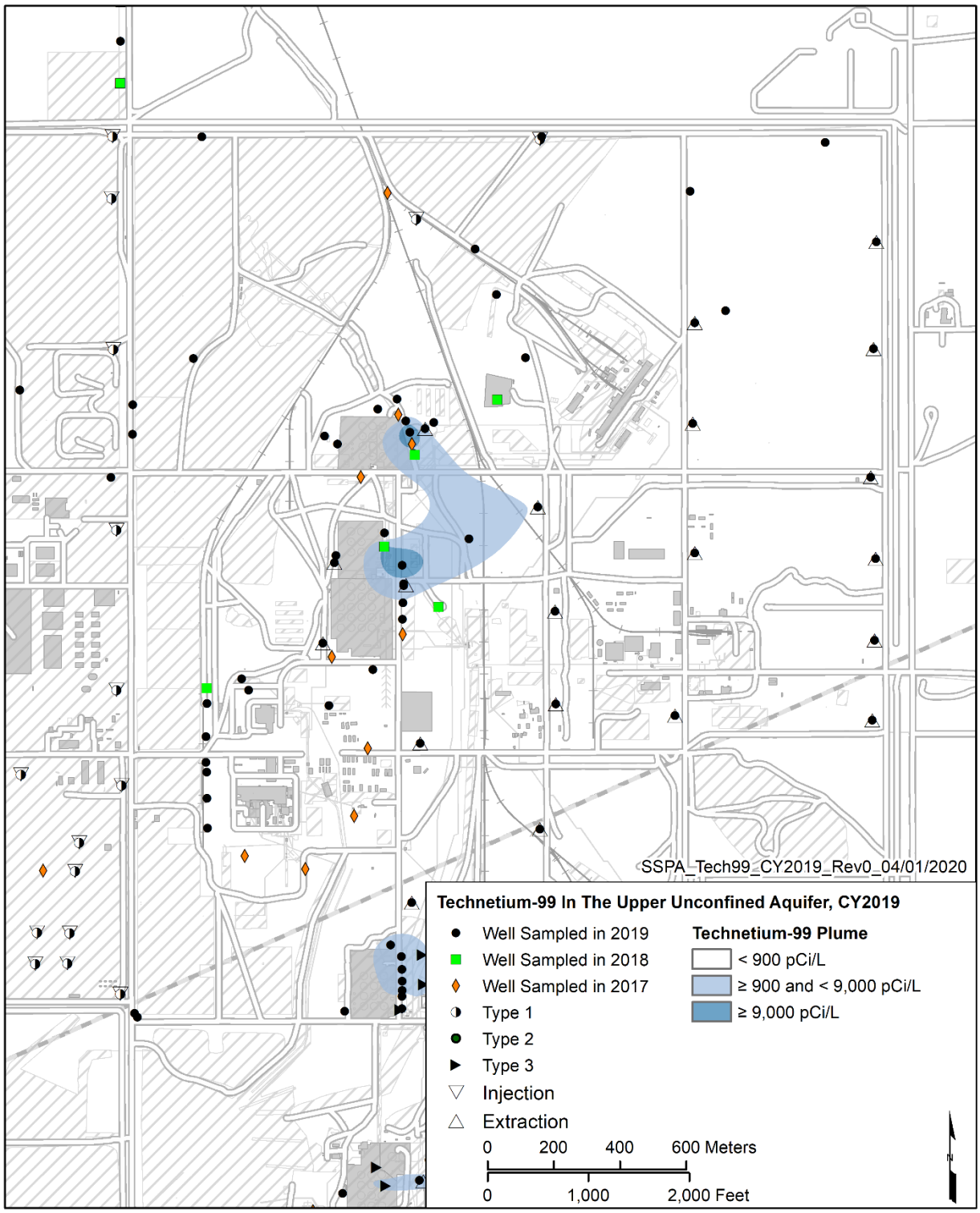


Figure C-51. Technetium-99 in 200-ZP-1

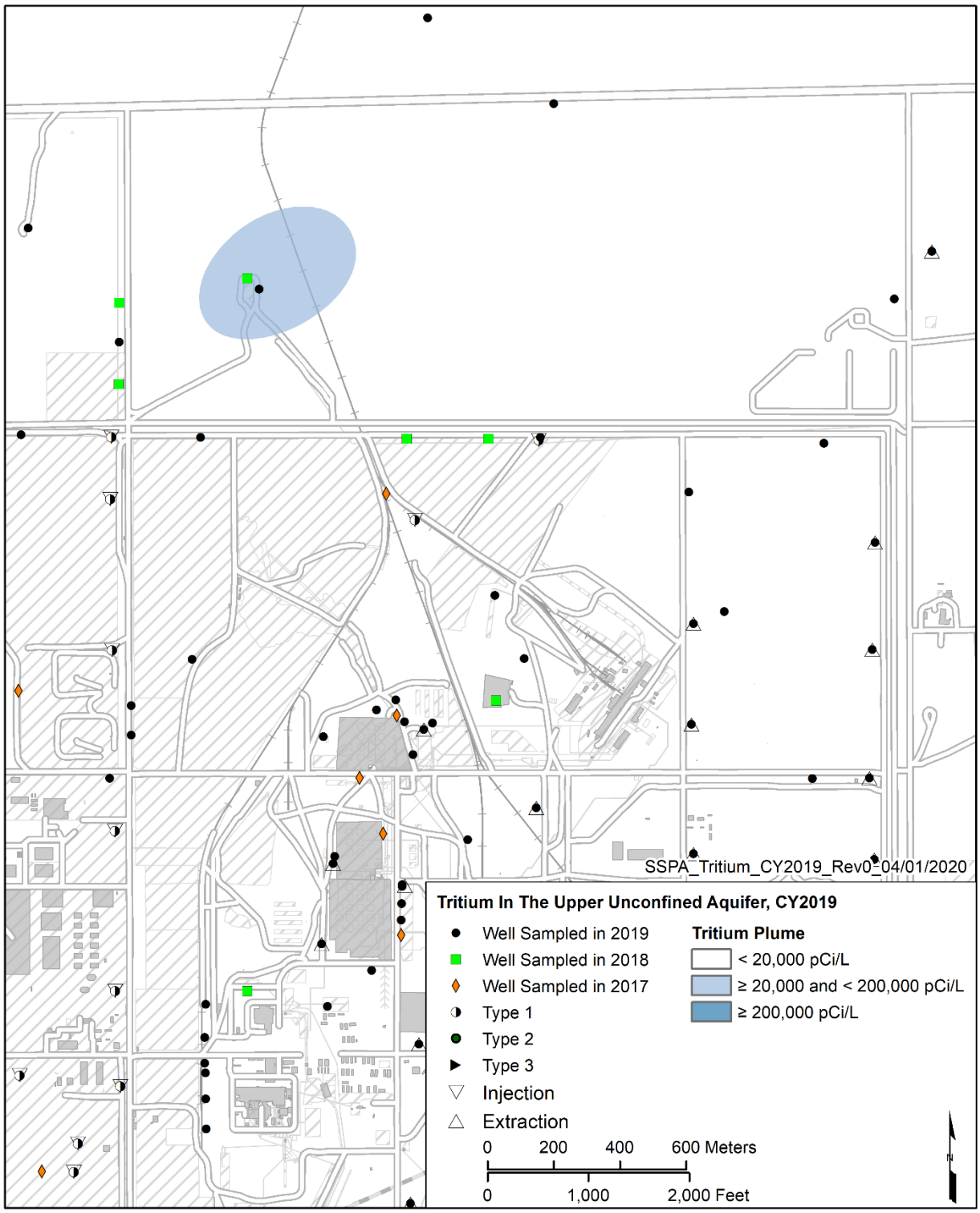


Figure C-52. Tritium in 200-ZP-1

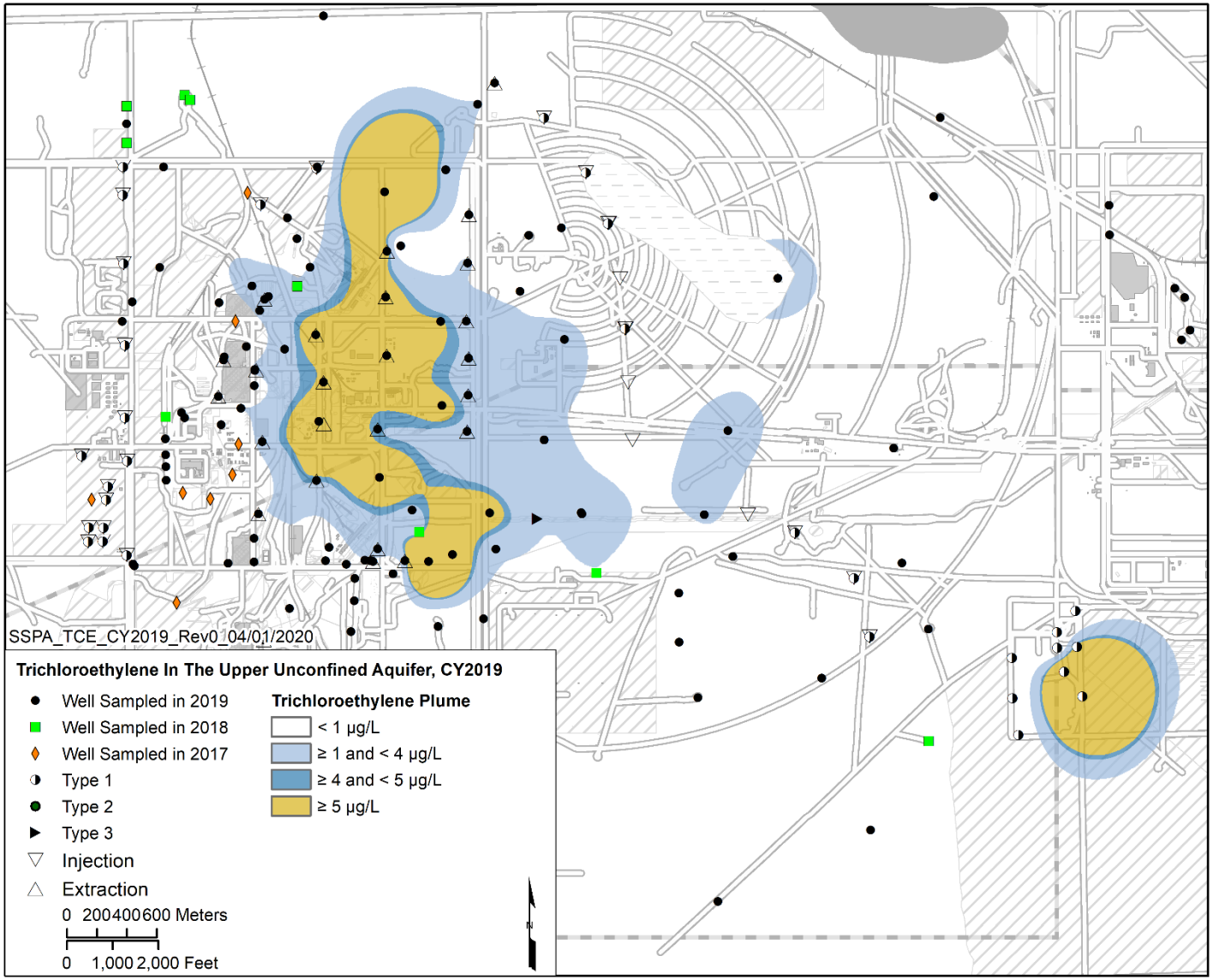


Figure C-53. TCE in 200-ZP-1

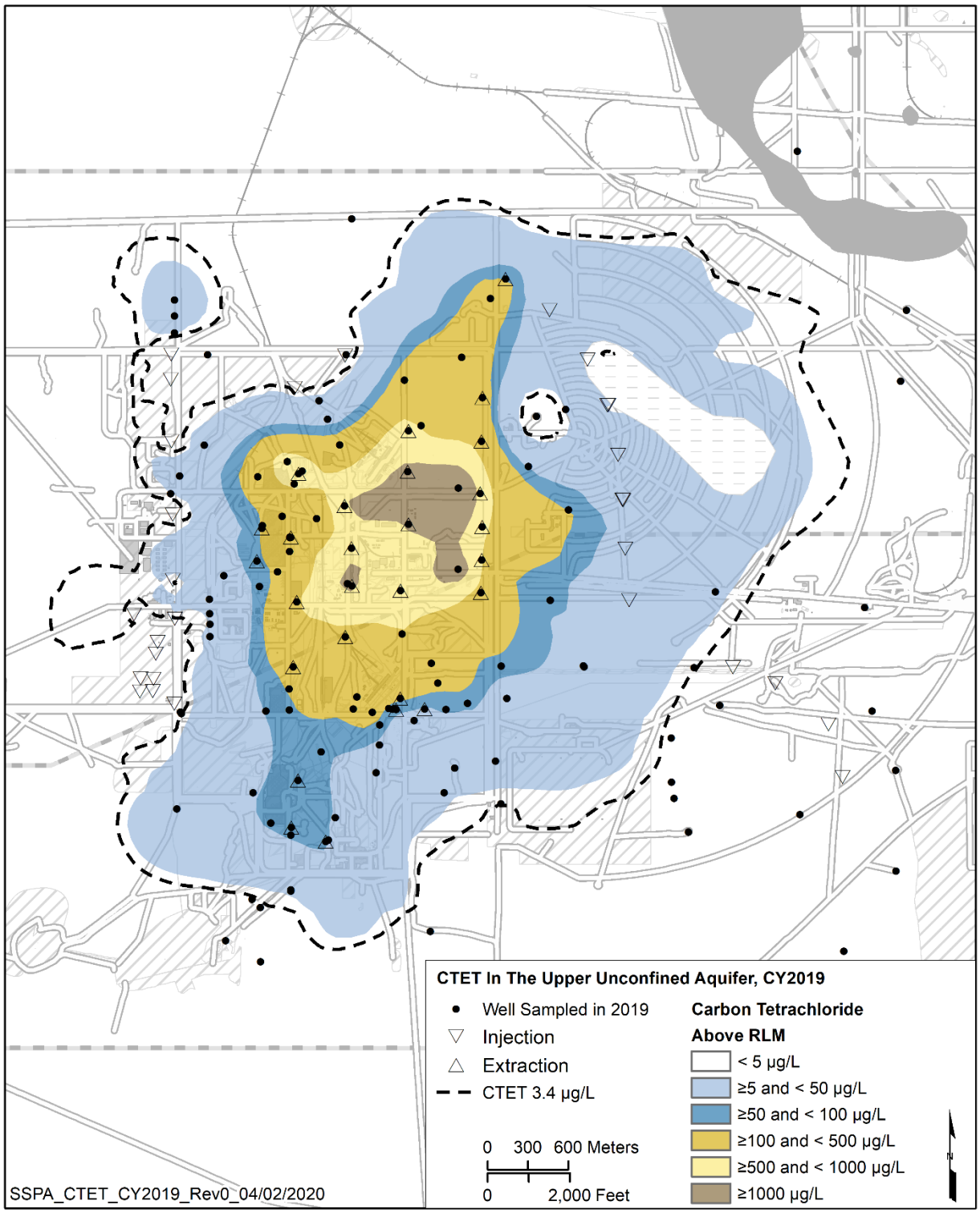


Figure C-54. Carbon Tetrachloride above the RLM in 200-ZP-1

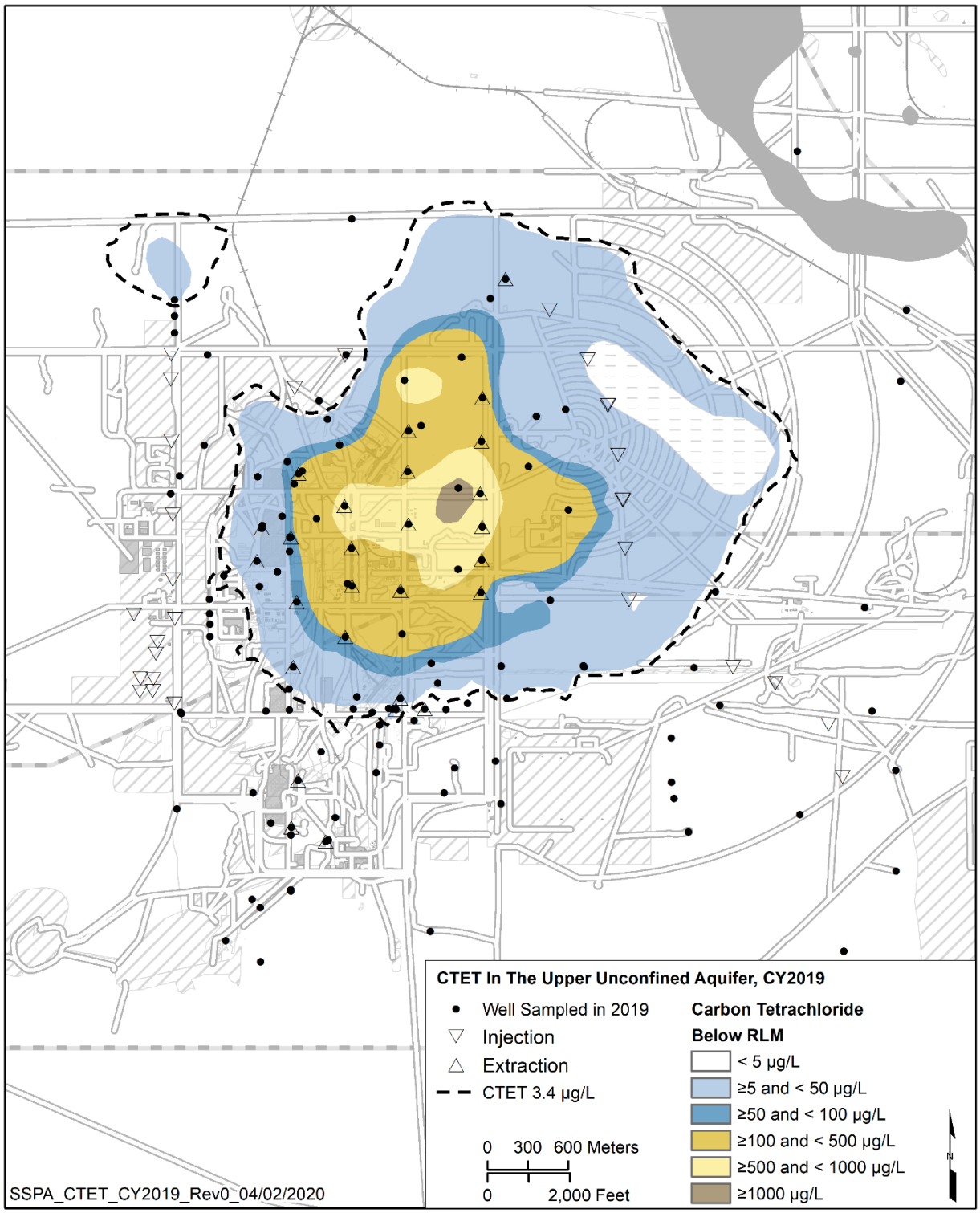


Figure C-55. Carbon Tetrachloride below the RLM in 200-ZP-1

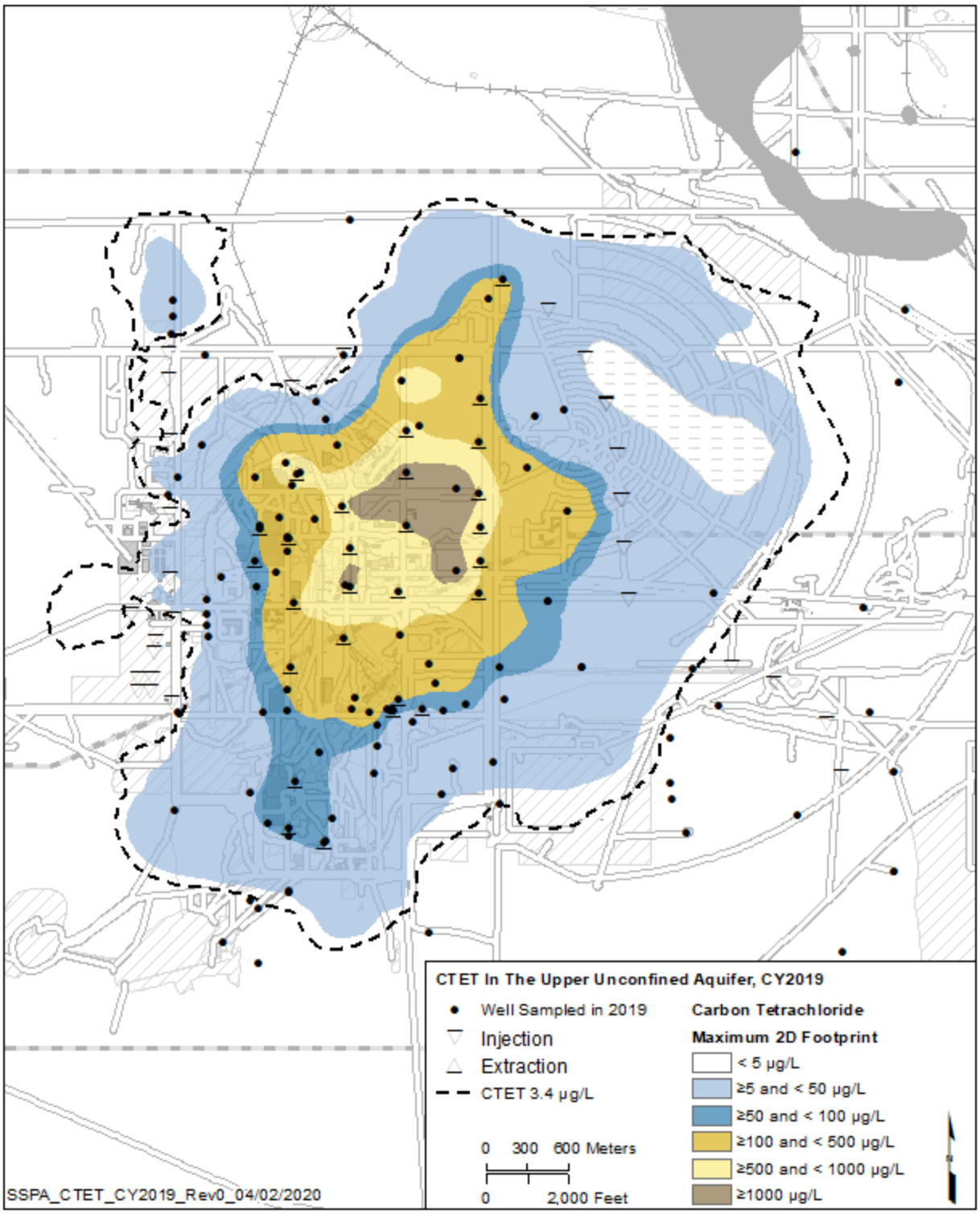


Figure C-56. Carbon Tetrachloride Maximum 2D Footprint in 200-ZP-1

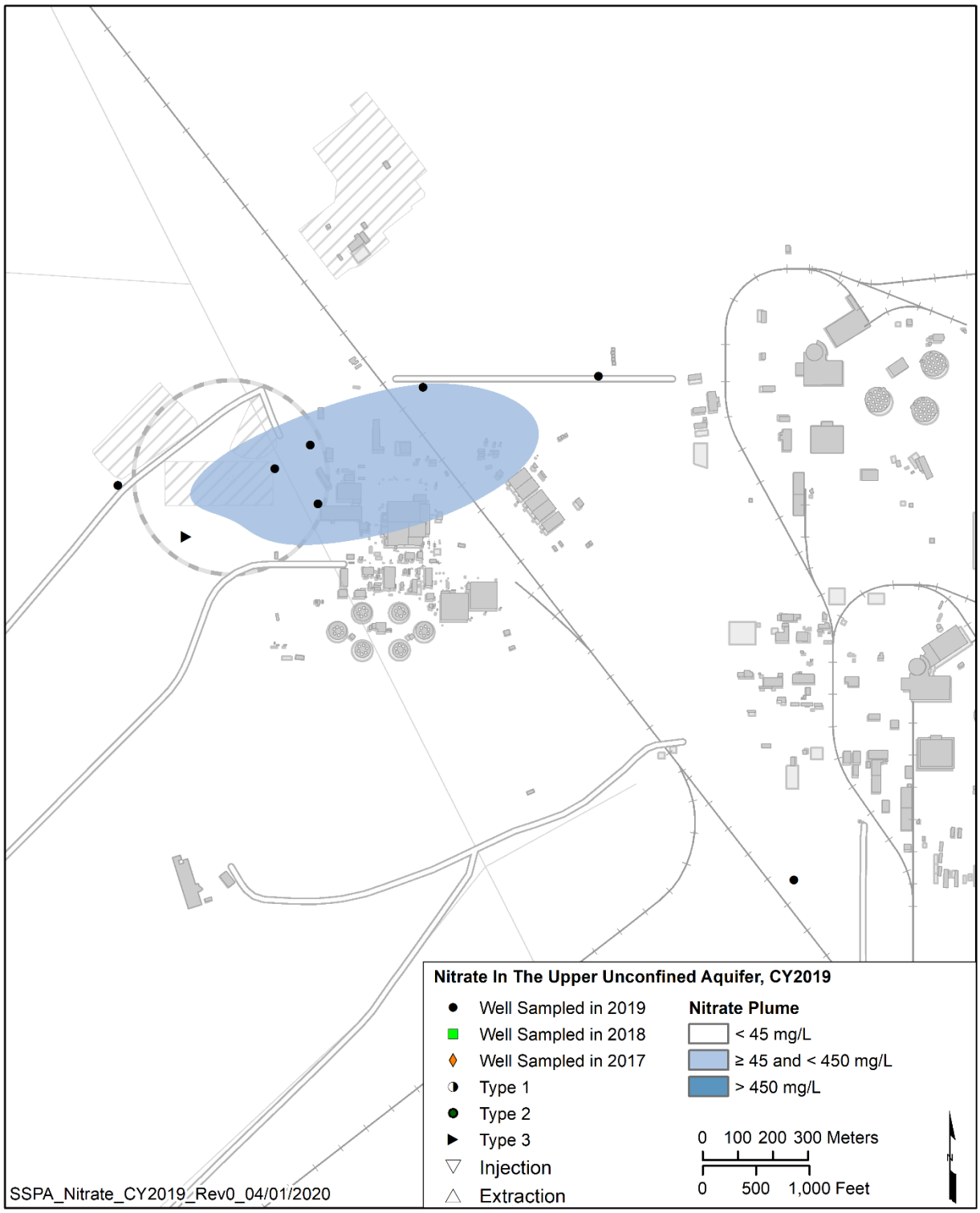


Figure C-57. Nitrate in 300-FF-5 Burial Ground

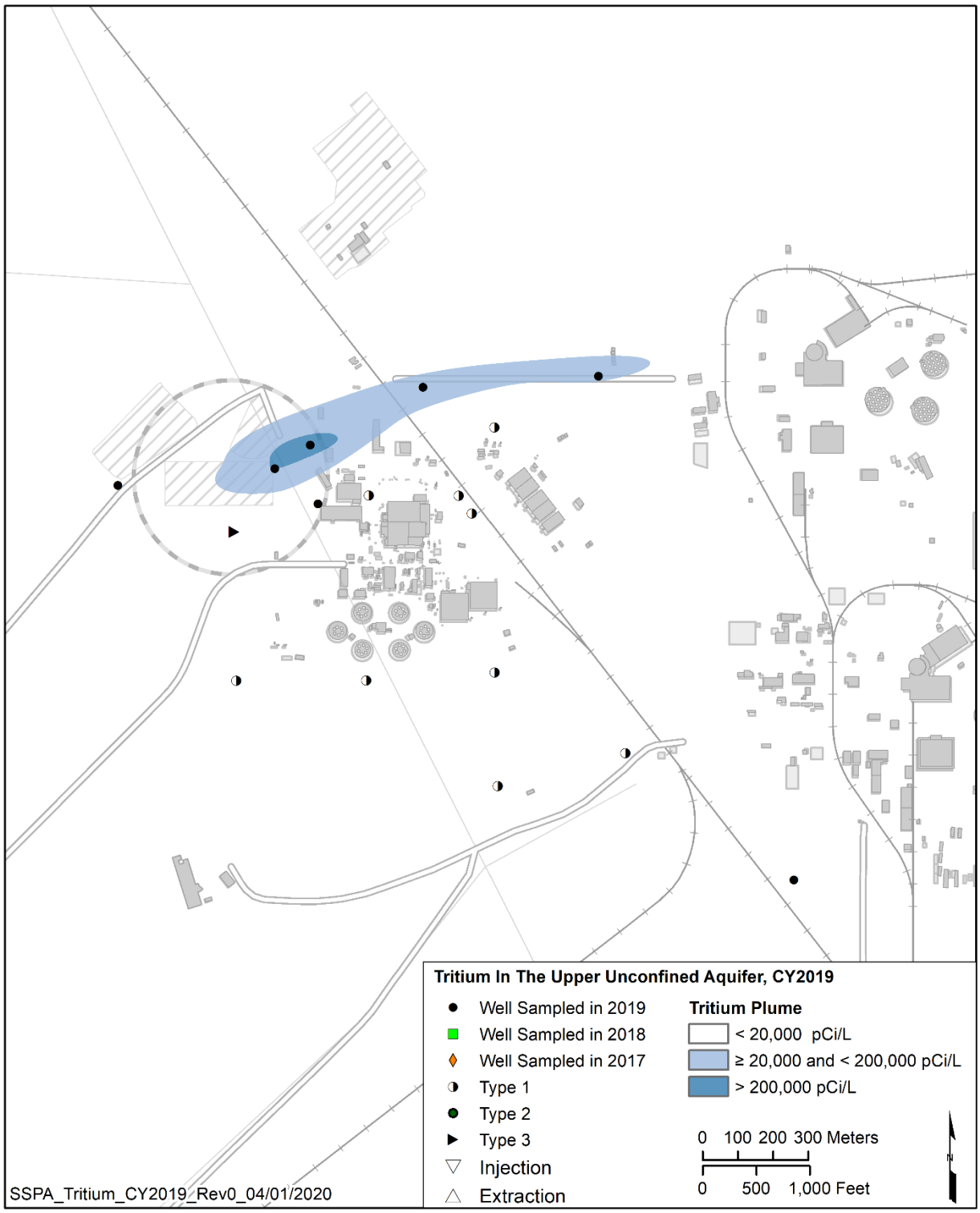


Figure C-58. Tritium in 300-FF-5 Burial Ground

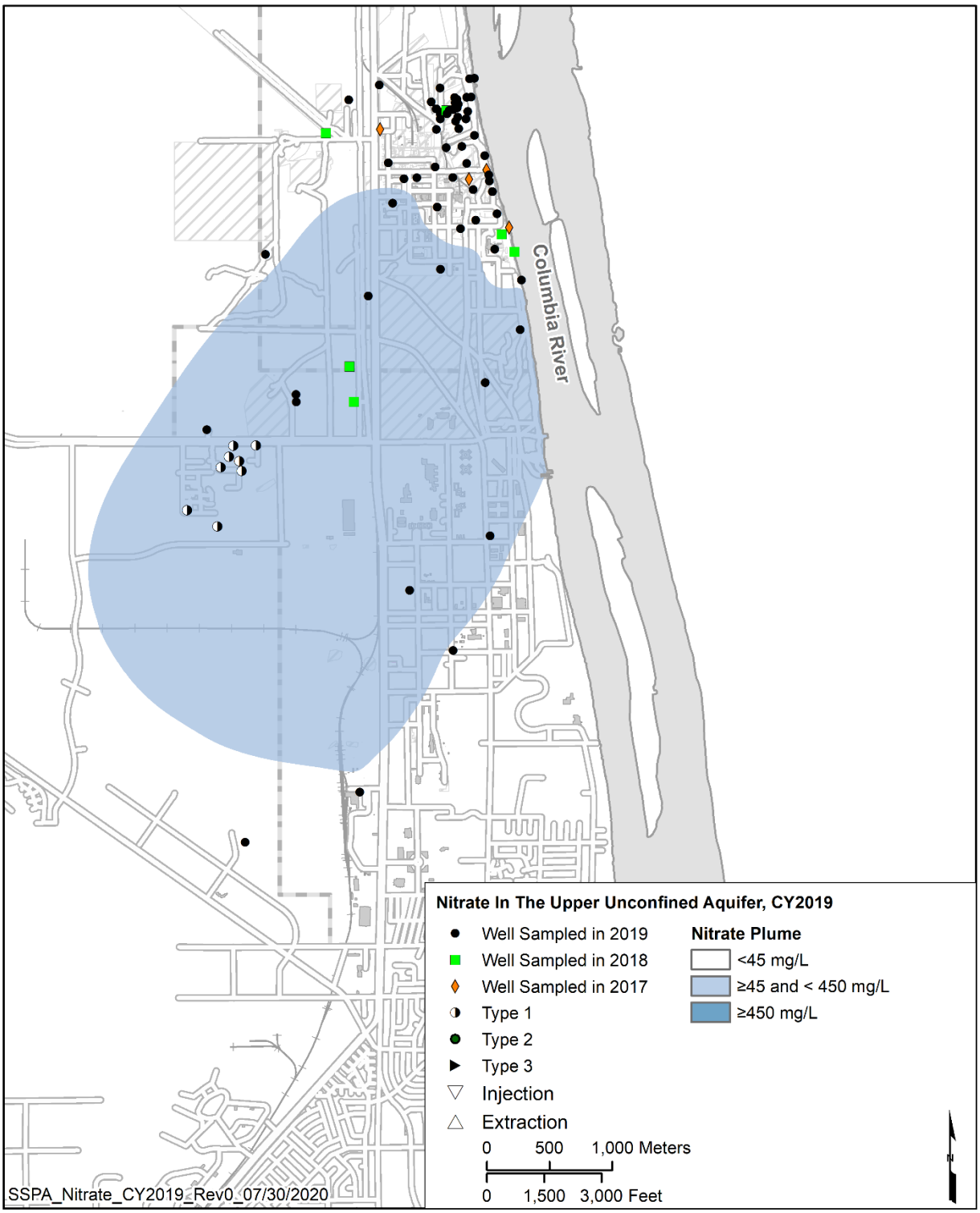


Figure C-59. Nitrate in 1100-EM-1

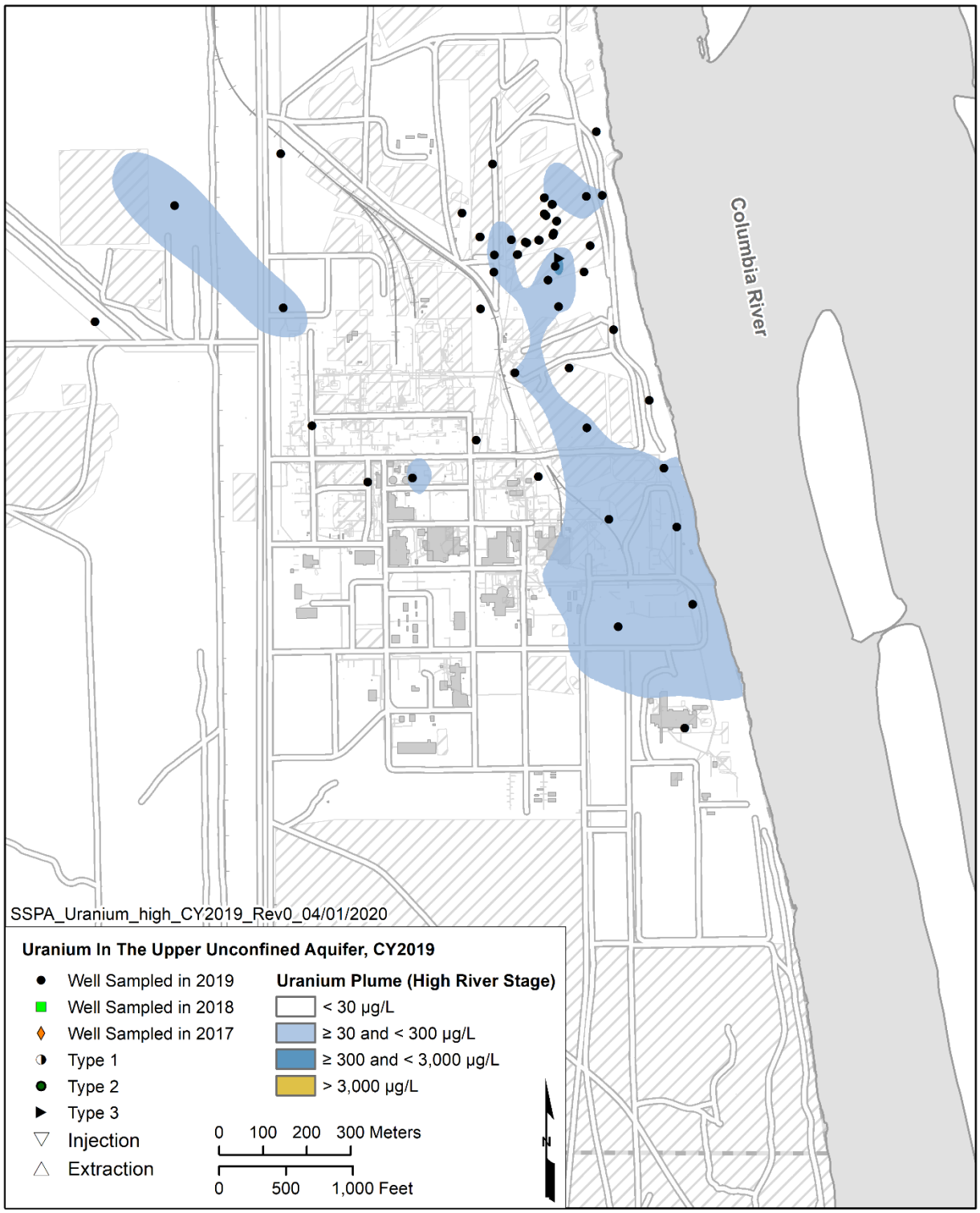


Figure C-60. Uranium in 300-FF-5 High River Stage (June)

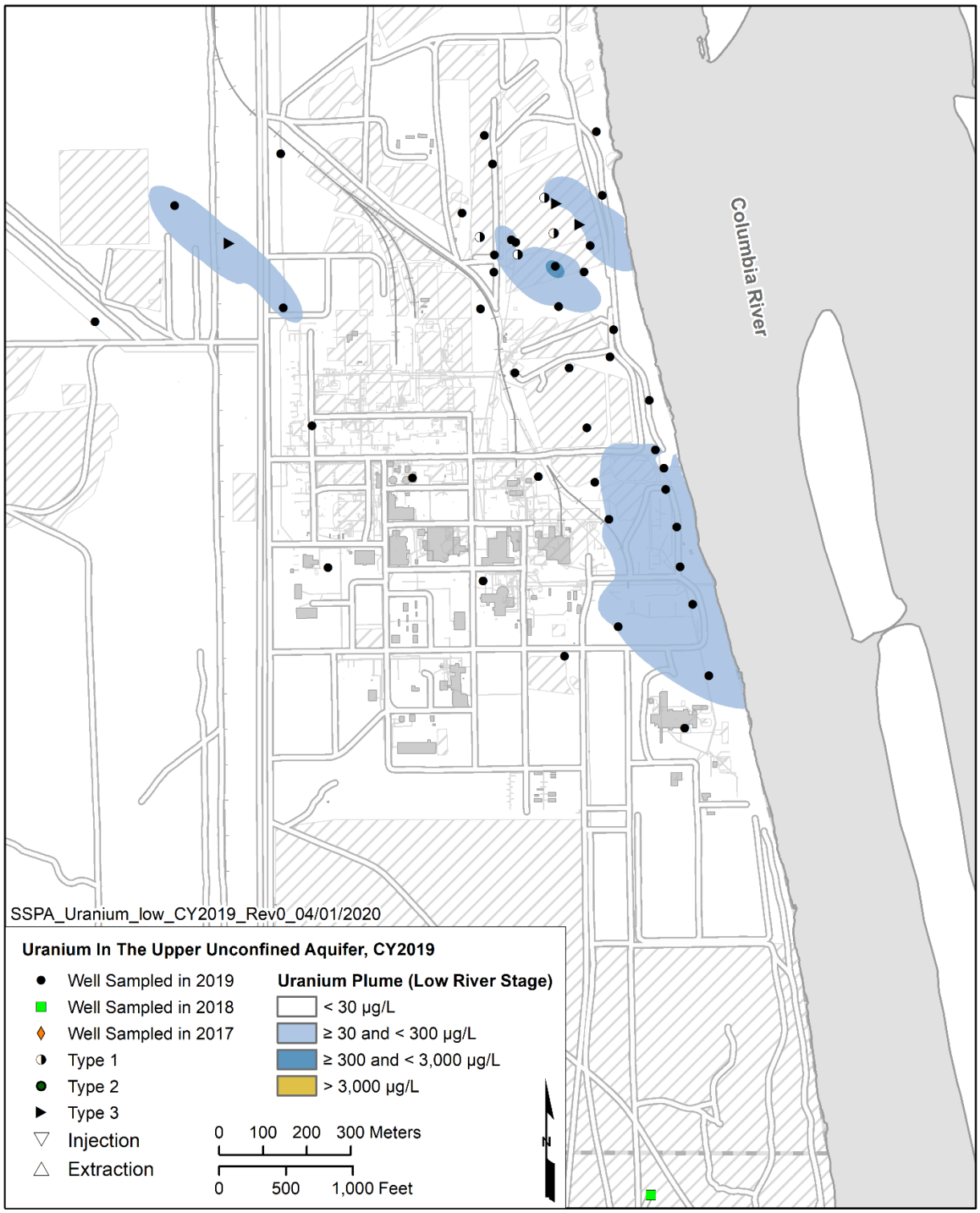


Figure C-61. Uranium in 300-FF-5 Low River Stage (December)

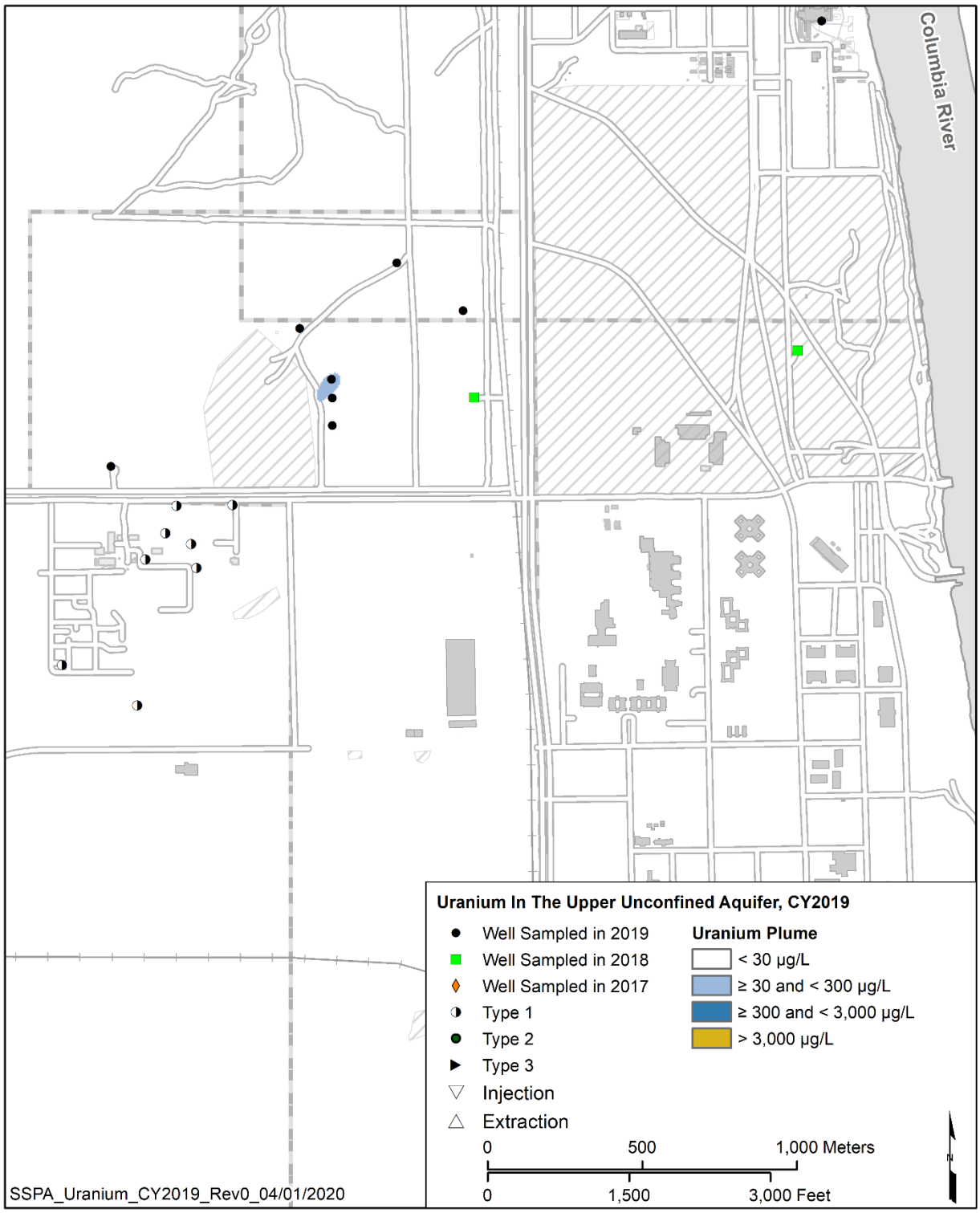


Figure C-62. Uranium in 1100-EM-1

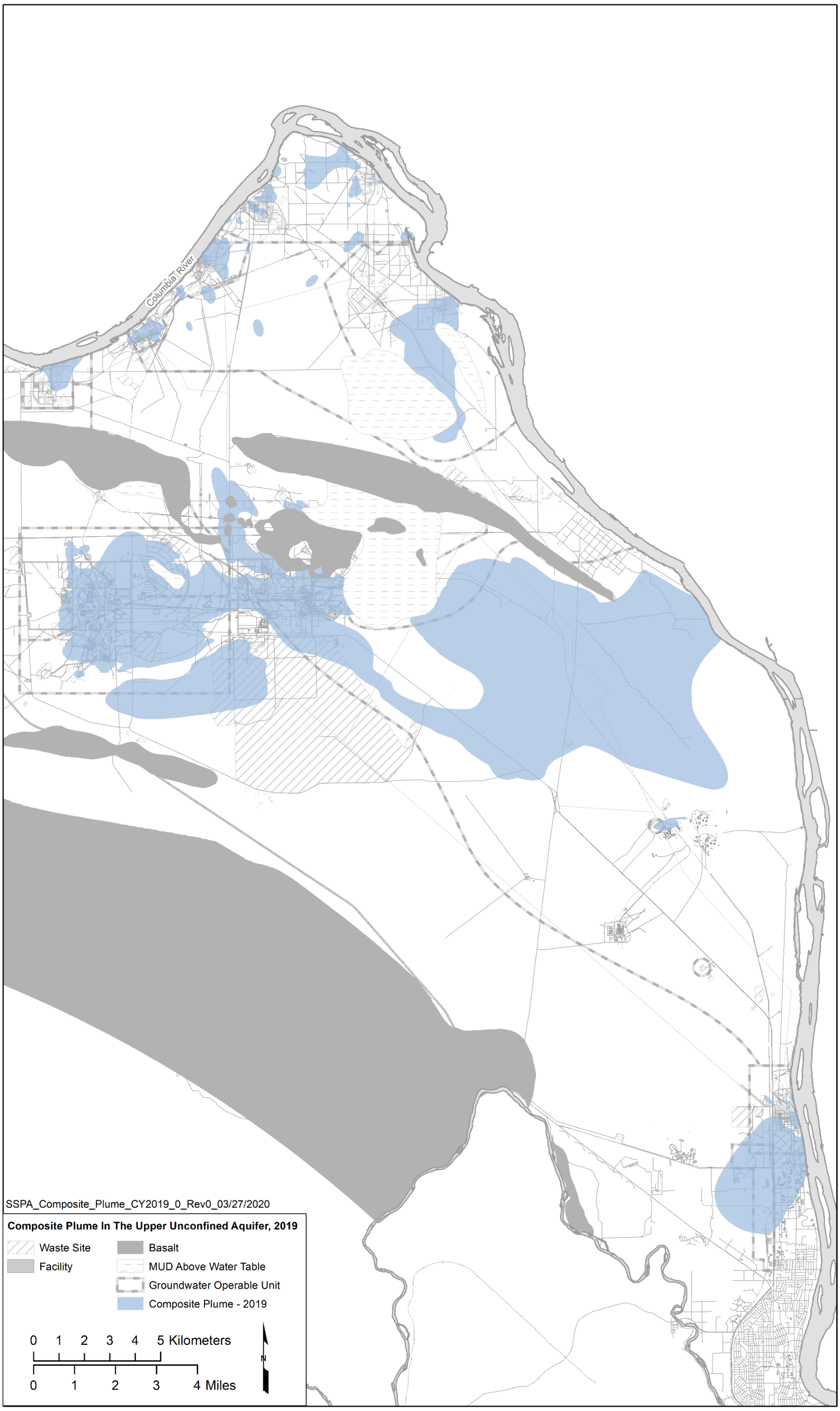


Figure C-63. Composite COI Plume Mosaic

This page intentionally left blank.