SGW-65138
Revision 0

Hanford Site Interim Status RCRA Groundwater Quarterly Reports for the Combined Months of January Through March 2020 and April Through June 2020

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

Contractor for the U.S. Department of Energy
under Contract 89303320DEM000030

P.O. Box 1464
Richland, Washington 99352

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APPROVED
By Julia Raymer at 3:57 pm, Jul 13, 2021

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1 Introduction

This report provides quarterly determinations of the concentration, rate of migration, and extent of dangerous waste constituents in groundwater at six single-shell tank waste management areas (WMAs). The report is based on the requirements for interim status facilities, as defined by the *Resource Conservation and Recovery Act of 1976* (RCRA), with regulations promulgated by the Washington State Department of Ecology in the *Washington Administrative Code* and the *Code of Federal Regulations* by reference (WAC 173-303-400, "Dangerous Waste Regulations," "Interim Status Facility Standards"; Subpart F, "Ground-Water Monitoring," in 40 CFR 265, "Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities"). Under 40 CFR 265.93(d)(7)(i), "Preparation, Evaluation, and Response," units monitored under groundwater quality assessment programs that have determined dangerous waste has entered the groundwater must determine the rate and extent of migration and the concentrations of the identified waste on a quarterly basis.

This report presents results for two quarters: January through March and April through June 2020. The six WMAs were all sampled as required during the first and second quarters of 2020. However, due to work restrictions related to the COVID-19 pandemic, manual water-level measurements typically made monthly in the 200 East Area and quarterly in the 200 West Area did not occur during the second quarter of 2020. Consequently, this report provides estimates of groundwater flow rates for only the first quarter.

The WMAs in this report (Figures 1 and 2) include the inactive single-shell tank farms at the Hanford Site that are part of an interim status dangerous waste management unit within Rev. 8c of WA7890008967, *Hanford Facility Resource Conservation and Recovery Act (RCRA) Permit, Dangerous Waste Portion for the Treatment, Storage, and Disposal of Dangerous Waste* (Hanford RCRA Permit). Groundwater monitoring plans for each WMA (Table 1) provide specific information on the monitoring networks and sampling programs. The WMAs and their associated dangerous waste constituents in groundwater are identified as follows:

- 200 East Area
  - WMA B-BX-BY – cyanide
  - WMA C – cyanide
- 200 West Area
  - WMA S-SX – chromium[1]
  - WMA T – chromium[1]
  - WMA TX-TY – chromium[1]
  - WMA U – chromium[1]

For each WMA, this report provides summary information of the well network, quarterly sample results of the associated dangerous waste constituent, a discussion of the extent of contamination, and an estimate of the rate and direction of contaminant migration, which is assumed to equal the rate of groundwater flow because cyanide and hexavalent chromium (Cr(VI)) are highly mobile in groundwater.

[1] Total chromium is the dangerous waste constituent specified in the assessment plans, and Cr(VI) is a supporting constituent. Filtered total chromium data were combined with Cr(VI) data to create the plume maps included in this report. Unfiltered samples may include particulate chromium, which is typically not hexavalent. This report lists the specific type of analytical data required by the groundwater monitoring plans.

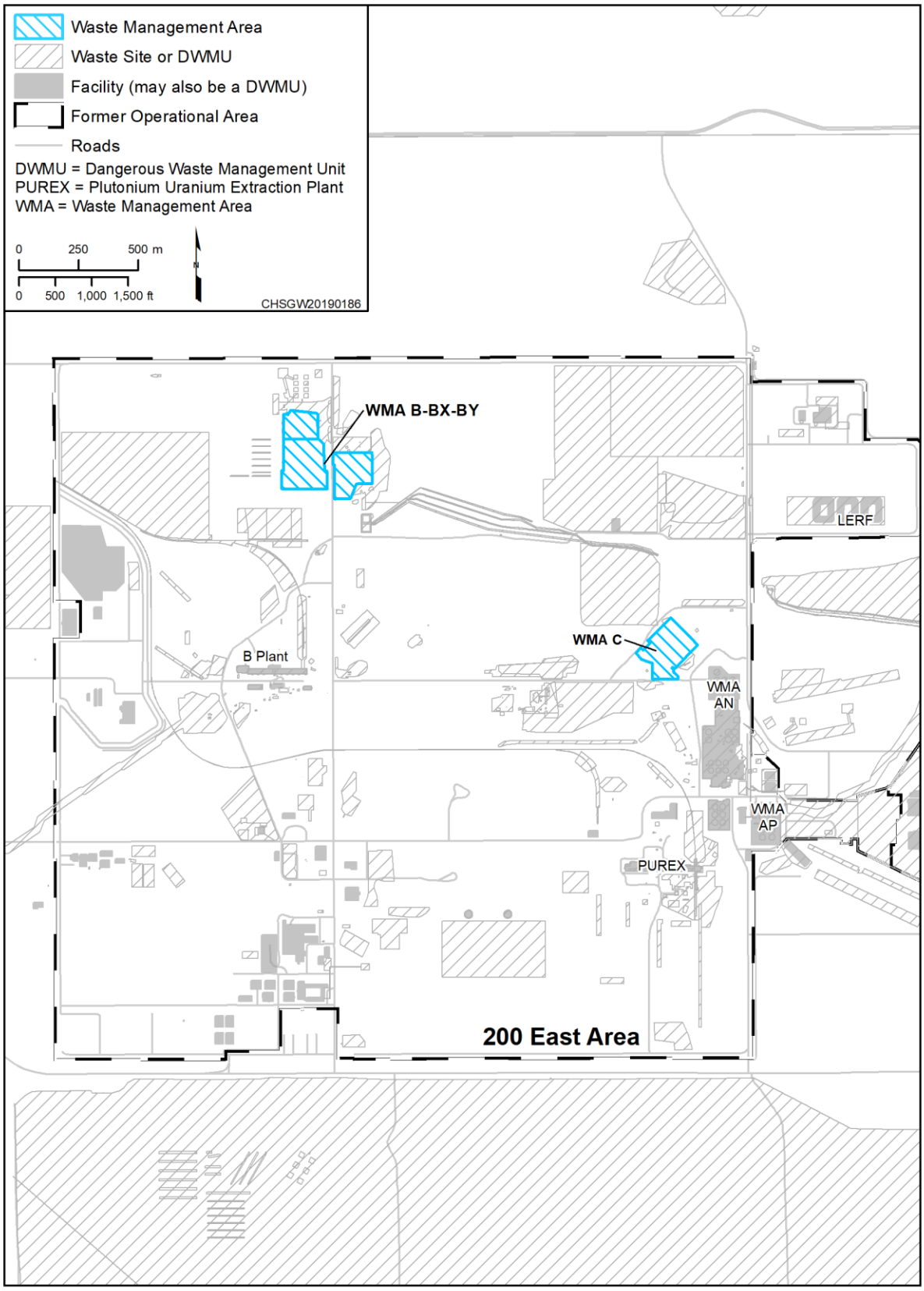


Figure 1. 200 East Area WMAs

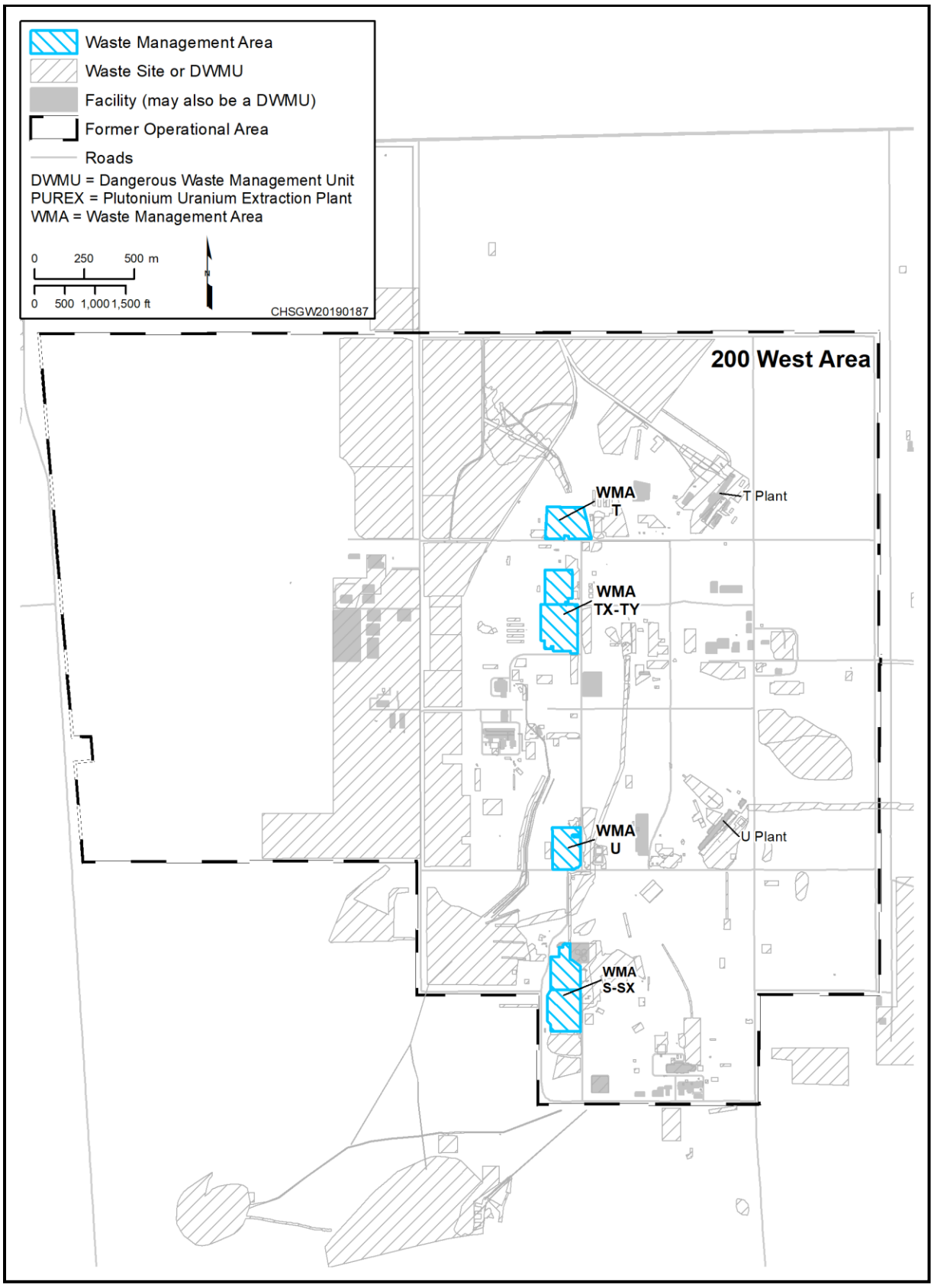


Figure 2. 200 West Area WMAs

Table 1. Groundwater Monitoring Plans and Engineering Evaluation Reports Associated with Single-Shell Tank WMAs

WMA	Groundwater Quality Assessment Monitoring Plan	Engineering Evaluation Report for Groundwater Monitoring
200 West Area		
WMA S-SX	Quarter 1: DOE/RL-2009-73 Quarter 2: RCRA-CN-01_DOE/RL-2009-73_R1	SGW-60577
WMA T	DOE/RL-2009-66	SGW-60575
WMA TX-TY	DOE/RL-2009-67	SGW-60576
WMA U	DOE/RL-2009-74	SGW-60578
200 East Area		
WMA B-BX-BY	DOE/RL-2012-53	SGW-60587
WMA C	DOE/RL-2009-77	SGW-60588

Note: Complete reference citations are provided in Chapter 8.
WMA = waste management area

In June 2020, a combined groundwater quality assessment plan that includes the six WMAs listed above was released (DOE/RL-2019-74, *Interim Status Groundwater Quality Assessment Plan for the Single-Shell Tank System*). The new plan was implemented during the third quarter of 2020 (July through September). Chapters 2 through 7 of this quarterly report provide references to the assessment plans in effect during the reporting period (January through June 2020).

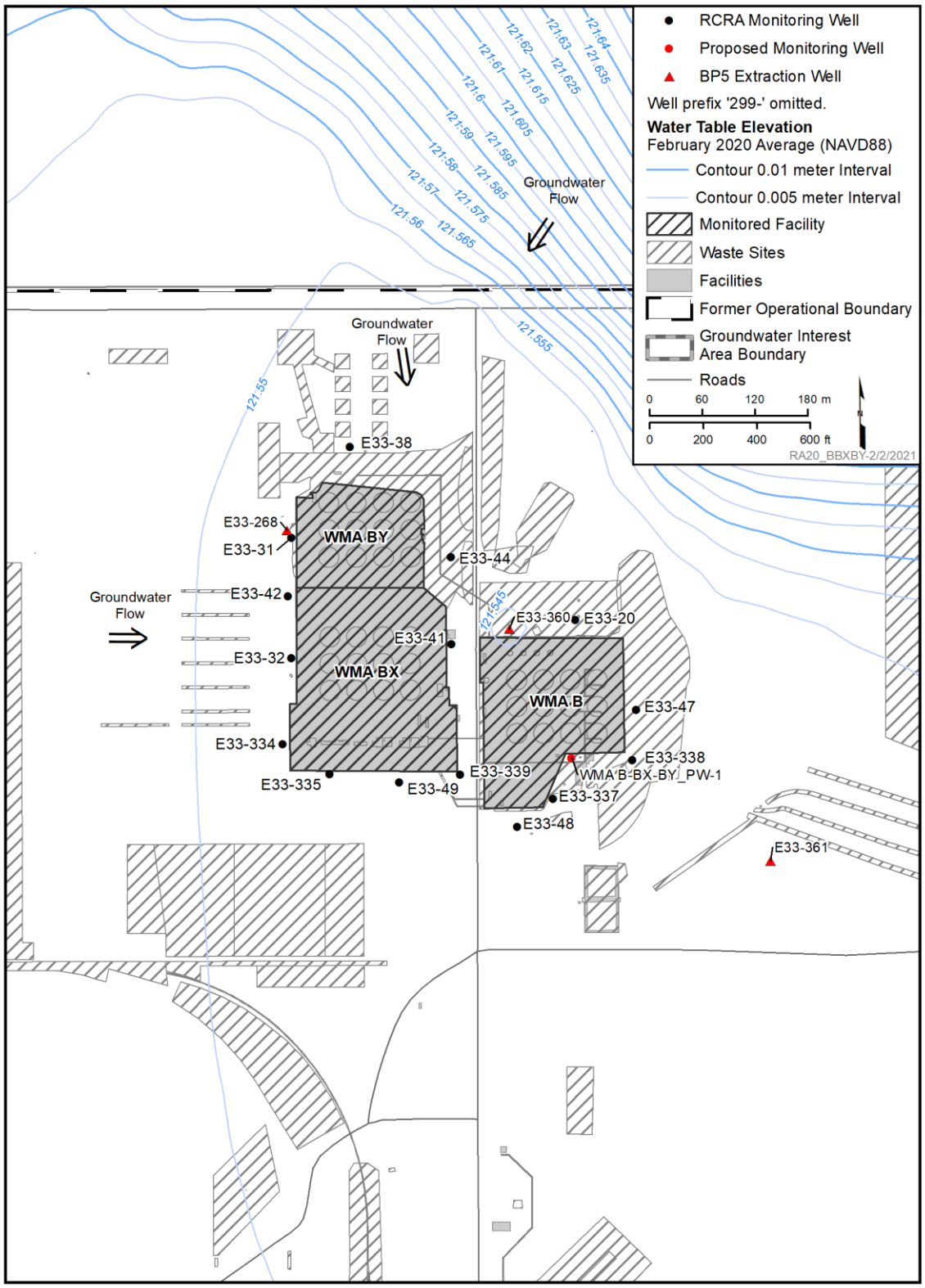
A suite of groundwater monitoring engineering evaluation reports was prepared to support the Part B (final status) permit application for the future Rev. 9 of the Hanford RCRA Permit (WA7890008967). The engineering evaluation reports (Table 1) contain comprehensive background information as well as the geology, hydrogeology, and conceptual contaminant migration models.

2 Waste Management Area B-BX-BY

WMA B-BX-BY, which includes the single-shell tanks and ancillary equipment of the 241-B, 241-BX, and 241-BY Tank Farms, is located in the north-central portion of the 200 East Area (Figure 1). Figure 3 presents the monitoring network with a water table map.

Previous releases from WMA B-BX-BY and nearby waste sites have contributed to groundwater contamination with the dangerous waste constituent cyanide. During the reporting period, the WMA was monitored under DOE/RL-2012-53, *Interim Status Groundwater Quality Assessment Plan for the Single-Shell Tank Waste Management Area B-BX-BY*.

Evaluation of January through March water levels indicated that groundwater beneath WMA B-BX-BY flowed to the east-southeast at 0.62 m/d (2.0 ft/d) (ECF-HANFORD-20-0066, *Hydraulic Gradient and Average Linear Velocity Calculations - Quarter 1 Calendar Year 2020*). The impacts of extraction wells 299-E33-360 and 299-E33-361, which operate adjacent to WMA B-BX-BY (Figure 3), are not easily discerned from water-level data alone because the hydraulic gradient is so low (8.6×10^{-6} during the reporting quarter).



Note: Water table contours from ECF-HANFORD-20-0078, *Preparation of the Hanford Site Water Table Map for January to March 2020*.

Figure 3. WMA B-BX-BY Monitoring Well Network and February 2020 Water Table

During the first two quarters of 2020, WMA B-BX-BY was sampled in February and June (Table 2). The highest total cyanide concentrations were greater than 1,000 µg/L in well 299-E33-44. Figure 4 illustrates the total cyanide plume in 2019. Extraction wells 299-E33-360 and 299-E33-361 limit migration of the plume.

Table 2. WMA B-BX-BY Sample Results for January Through June 2020

Well Name	Sample Date	Cyanide (µg/L)	Lab Qualifier	Review Qualifier	Comment
January Through March 2020					
299-E33-20[a,b]	2/6/2020	69.4			
299-E33-31[a]	2/4/2020	79.6			Duplicate samples
		82.3			
299-E33-32[a]	2/4/2020	14.1			
299-E33-334[a]	2/4/2020	4.46	B		
299-E33-335	2/4/2020	1.67	U		
299-E33-337	2/5/2020	60.2			
299-E33-338	2/5/2020	4.08	B		
299-E33-339	2/5/2020	1.76	B		
299-E33-38	2/6/2020	356	D		
299-E33-41	2/6/2020	15.3			
299-E33-42[a]	2/4/2020	25.8			
299-E33-44	2/6/2020	1,070	D		
299-E33-47	2/6/2020	750	D		Duplicate samples
		775	D		
299-E33-48	2/5/2020	2.63	B		
299-E33-49	2/5/2020	1.67	U		
April Through June 2020					
299-E33-20[a,b]	6/11/2020	20.8			
299-E33-31[a]	6/15/2020	26	X	H	
299-E33-32[a]	6/15/2020	13.3	X	H	
299-E33-334[a]	6/16/2020	3.12	B		
299-E33-335	6/16/2020	5.55			
299-E33-337	6/11/2020	73.7			
299-E33-338	6/11/2020	8.64			
299-E33-339	6/16/2020	2.35	B		
299-E33-38	6/15/2020	595	DX	H	
299-E33-41	6/15/2020	16.6	X	H	
299-E33-42	6/15/2020	14	X	H	
299-E33-44	6/16/2020	1,180	D		Duplicate samples
		1,140	D		
299-E33-47	6/16/2020	610	D		
299-E33-48	6/11/2020	8.44			

Table 2. WMA B-BX-BY Sample Results for January Through June 2020

Well Name	Sample Date	Cyanide (µg/L)	Lab Qualifier	Review Qualifier	Comment
299-E33-49	6/15/2020	1.77	BX	H	

Notes: Standardized practical quantitation limit used in analytical requirements for cyanide by Methods 335.4, 9012, 9014, and 4500: 10.5 µg/L
For EPA Method 335.4, see EPA/600/R-93/100, *Methods for the Determination of Inorganic Substances in Environmental Samples*. For four-digit EPA methods, see SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods Compendium*.

a. Upgradient well.

b. Well is not compliant with the construction standards in WAC 173-160, "Minimum Standard for Construction and Maintenance of Wells," and a replacement in kind well will be proposed.

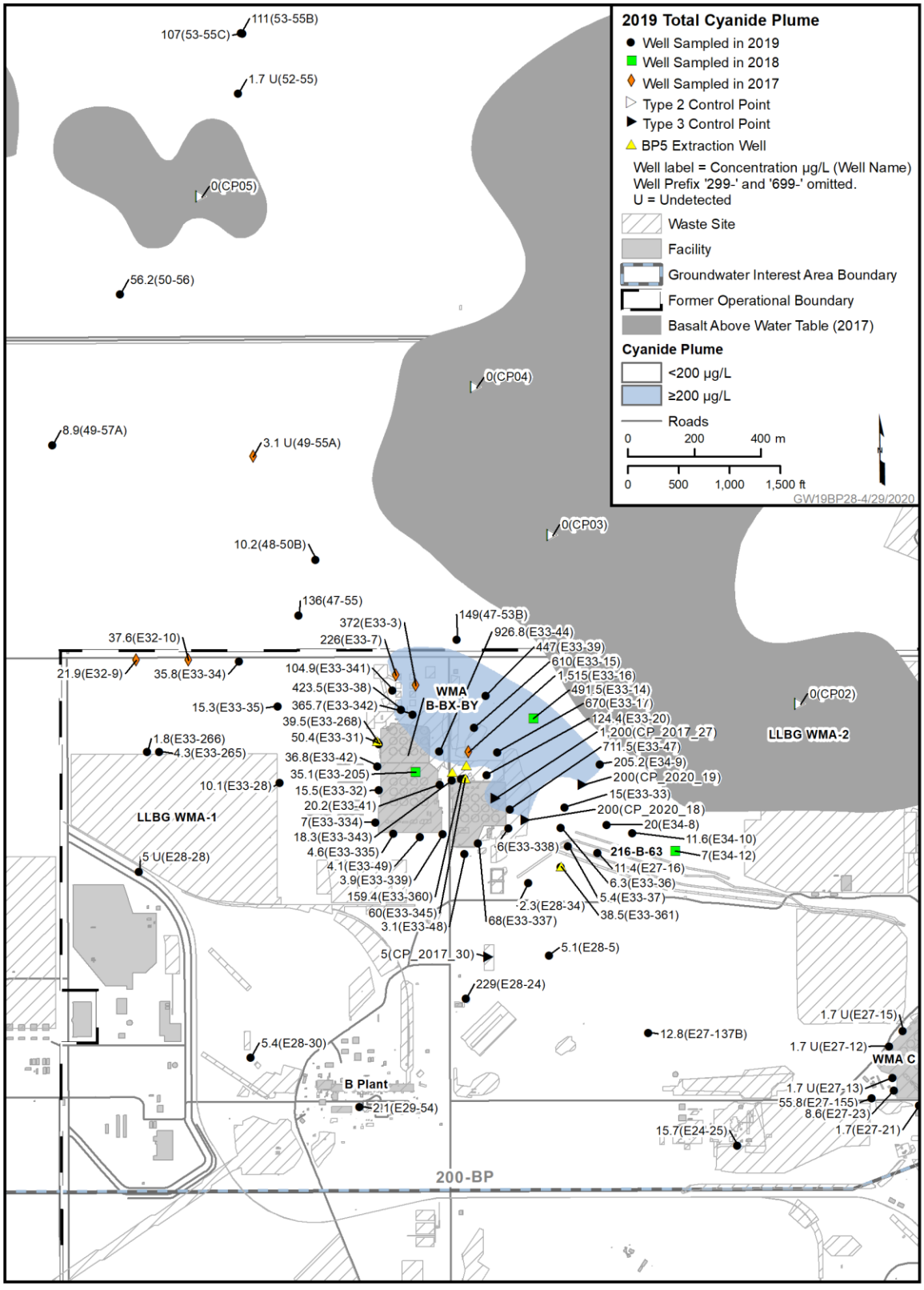
B = detected at a value less than the required detection limit (e.g., practical quantitation limit) but greater than or equal to the method detection limit

D = reported at a secondary dilution factor

H = laboratory holding time exceeded

U = undetected

X = laboratory report noted the samples were analyzed beyond recommended holding time

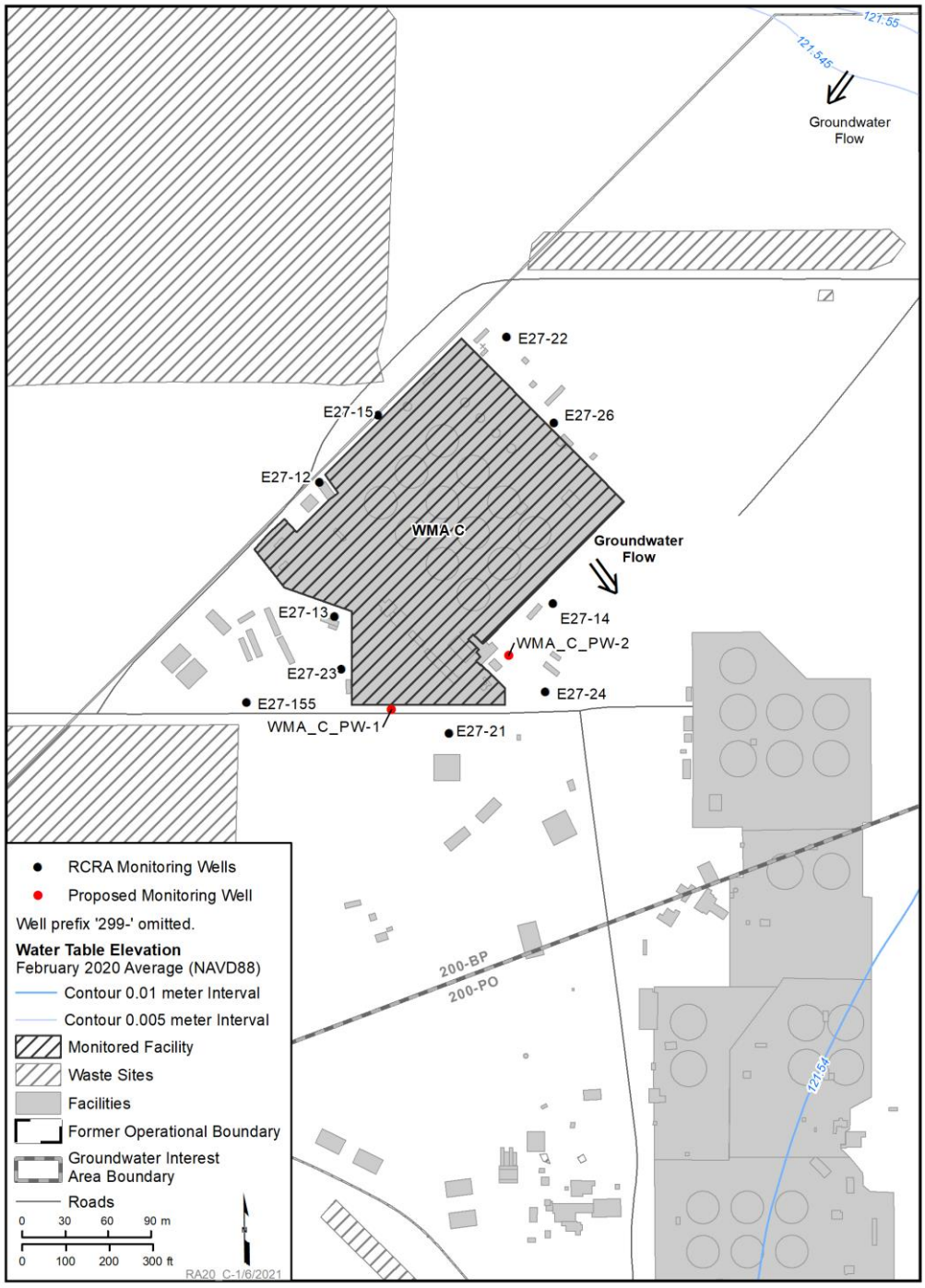


Source: DOE/RL-2019-66, *Hanford Site Groundwater Monitoring Report for 2019*.

Figure 4. Total Cyanide Plume Near WMA B-BX-BY, 2019

3 Waste Management Area C

WMA C, which includes the single-shell tanks and ancillary equipment of the 241-C Tank Farm, is located in the east-central portion of the 200 East Area (Figure 1). Figure 5 presents the monitoring network with a water table map.



Note: Water table contours from ECF-HANFORD-20-0078, *Preparation of the Hanford Site Water Table Map for January to March 2020*.

Figure 5. WMA C Monitoring Well Network and February 2020 Water Table

During January through March 2020, the average direction of groundwater flow beneath WMA C was southeast and the average velocity was 0.26 m/d (0.86 ft/d) (ECF-HANFORD-20-0066).

Previous releases from WMA C have contributed to groundwater contamination with the dangerous waste cyanide. During the reporting period, the WMA was sampled in March and June under DOE/RL-2009-77, *Groundwater Quality Assessment Plan for the Single-Shell Tank Waste Management Area C*. Table 3 lists cyanide result. The highest concentration during the reporting period was 49.1 µg/L in deep well 299-E27-155. It is likely that the deep contamination originated at an upgradient source (Section 9.9 of DOE/RL-2019-66, *Hanford Site Groundwater Monitoring Report for 2019*). A cyanide plume map is not provided because concentrations are below levels used for contouring plumes in Chapter 9 of DOE/RL-2019-66.

Table 3. WMA C Sample Results for January Through June 2020

Well Name	Sample Date	Cyanide (µg/L)	Lab Qualifier	Review Qualifier	Comment
January Through March 2020					
299-E27-12*	3/13/2020	1.67	U		
299-E27-13	3/13/2020	1.67	U		Duplicate samples
		1.67	U		
299-E27-14	3/12/2020	12.8			
299-E27-15*	3/13/2020	1.67	U		
299-E27-155	3/12/2020	46.4			
299-E27-21	3/13/2020	1.67	U		
299-E27-22*	3/10/2020	1.67	U		
299-E27-23	3/13/2020	5.49			
299-E27-24	3/12/2020	17.4			
299-E27-26*	3/12/2020	13.2			
April Through June 2020					
299-E27-12*	6/25/2020	1.67	U		
299-E27-13	6/25/2020	1.67	U		
299-E27-14	6/25/2020	17.3			
299-E27-15*	6/23/2020	1.67	U		
299-E27-155	6/25/2020	49.1			
299-E27-21	6/23/2020	1.67	U		Duplicate samples
		1.67	U		
299-E27-22*	6/23/2020	2.53	B		
299-E27-23	6/23/2020	6.49			
299-E27-24	6/25/2020	19.9			
299-E27-26*	6/23/2020	13.7			

Notes: Standardized practical quantitation limit used in analytical requirements for cyanide by Methods 335.4, 9012, 9014, and 4500: 10.5 µg/L. For EPA Method 335.4, see EPA/600/R-93/100, *Methods for the Determination of Inorganic Substances in Environmental Samples*. For four-digi EPA methods, see SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods Compendium*.

*Upgradient well.

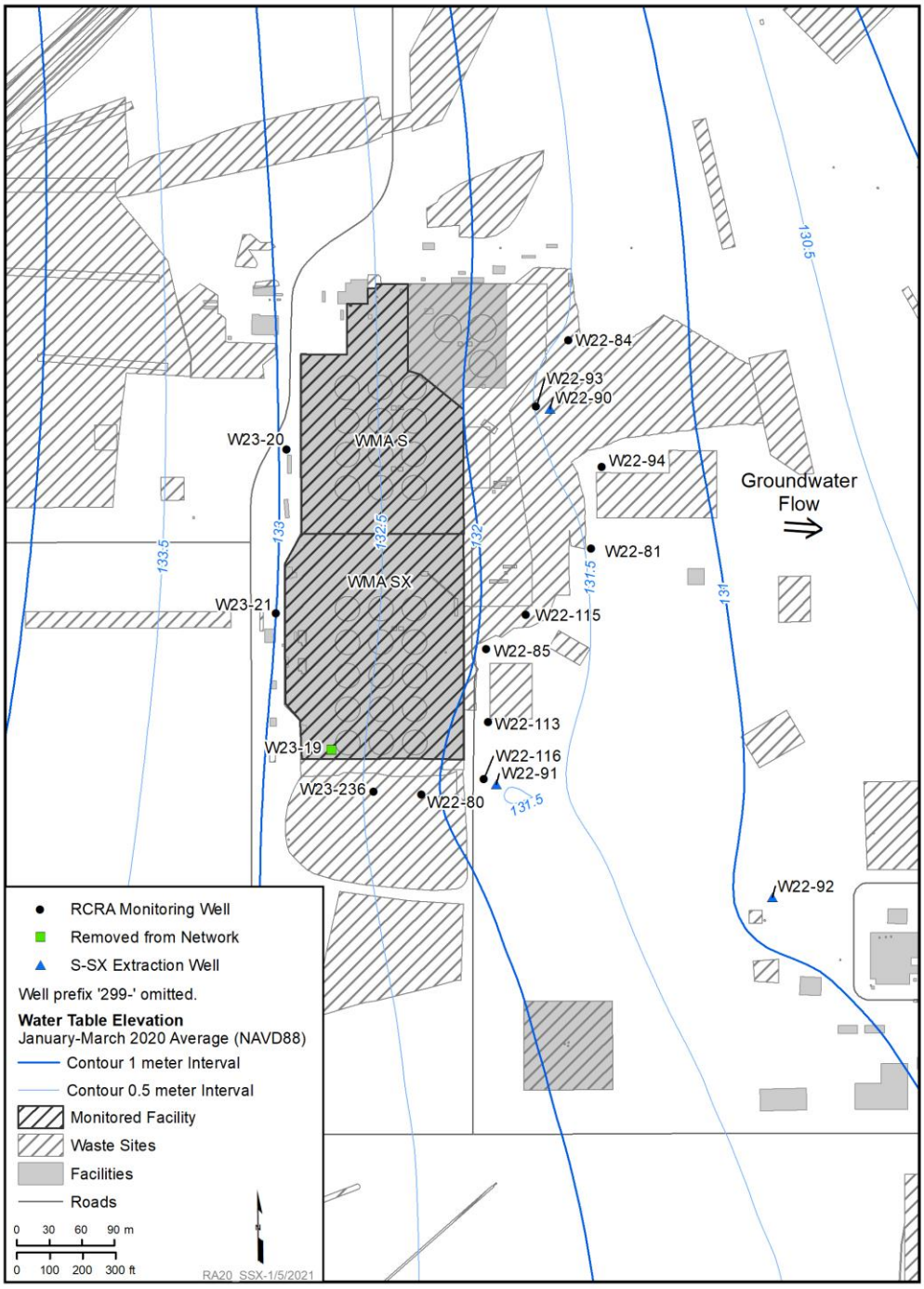
B = detected at a value less than the required detection limit (e.g., practical quantitation limit) but greater than or equal to the method detection limit

U = undetected

WMA = waste management area

4 Waste Management Area S-SX

WMA S-SX, which includes the single-shell tanks and ancillary equipment of the 241-S and 241-SX Tank Farms, is located in the southern portion of the 200 West Area (Figure 2). Figure 6 illustrates the monitoring well network and water table contours.



Note: Water table contours from ECF-HANFORD-20-0078, *Preparation of the Hanford Site Water Table Map for January to March 2020*.

Figure 6. WMA S-SX Monitoring Well Network and January Through March 2020 Water Table

In the first quarter of 2020, sampling was performed in compliance with DOE/RL-2009-73, *Interim Status Groundwater Quality Assessment Plan for the Single-Shell Tank Waste Management Area S-SX*. An interim status change notice was issued and implemented in the second quarter of 2020 (RCRA-CN-01_DOE/RL-2009-73_R1, *Interim Status Change Number 1: Interim Status Groundwater Quality Assessment Plan for the Single-Shell Tank Waste Management Area S-SX*).

Groundwater flow is influenced by extraction wells 299-W22-90 and 299-W22-91, located just east of WMA S-SX. During the first quarter of 2020 the hydraulic gradient was estimated to be 5.0×10^{-3} m/m toward the east, with an estimated average linear velocity of 0.27 m/d (0.90 ft/d) (ECF-HANFORD-20-0066).

Previous releases from WMA S-SX have contributed to groundwater contamination with chromium. During the reporting period, the WMA S-SX wells were sampled in March and June, and results for total chromium and Cr(VI) were greater than 200 µg/L in well 299-W22-93 (Table 4). Two chromium plumes with concentrations above 48 µg/L were defined based on 2019 data (Figure 7). Extraction wells 299-W22-90 and 299-W22-91 capture contaminated groundwater and the plumes are not expanding.

Table 4. WMA S-SX Sample Results for January Through June 2020

Well Name	Sample Date	Chromium (µg/L)[a]		Hexavalent Chromium (µg/L)[b]	Comment
		Unfiltered	Filtered		
January Through March 2020					
299-W22-80	3/6/2020	7.44 CB	5.65 CB	5.14	
299-W22-81	3/5/2020	80.8	5.2 B	3.07 B	
299-W22-84	3/9/2020	4.33 B	4.7 B	3.89 B	
299-W22-85	3/6/2020	4.4 B	3.6 B	4.82	
299-W22-93	3/9/2020	237	249	269 D	
299-W22-94	3/6/2020	270	12.8	6.97	
299-W22-113	3/9/2020	4.7B	3.0 U	2.49 B	
299-W22-115	3/6/2020	2.1 B	2.2 B	4.75	
299-W22-116	3/9/2020	131	126	129 D	Duplicate samples
		127	127	130 D	
299-W23-19	3/11/2020	119	113	117 D	
299-W23-20[c]	3/6/2020	7.93 CB	3.92 CB	4.46	
299-W23-21[c]	3/6/2020	3.0 U	3.0 U	4.24	
April Through June 2020					
299-W22-80	6/18/2020	63	5.2 B	4.22	
299-W22-81	6/22/2020	115 Q	3 U	5.67	Duplicate samples. Unfiltered chromium flagged Q because RPD of duplicates >20%.
		189 Q	9.2 B	5.26	
299-W22-84	6/22/2020	4.3 B	4.3 B	5.68	
299-W22-85	6/18/2020	3.2 B	3.1 B	3.56 B	
299-W22-93	6/22/2020	233	223	254	
299-W22-94	6/22/2020	22.6	10.9	7.86 XH	

Table 4. WMA S-SX Sample Results for January Through June 2020

Well Name	Sample Date	Chromium (µg/L)[a]		Hexavalent Chromium (µg/L)[b]	Comment
		Unfiltered	Filtered		
299-W22-113	6/22/2020	3 U	3 U	4.97	
299-W22-115	6/18/2020	2.5 B	2.5 B	3.31 B	
299-W22-116	6/22/2020	130	130	143 D	
299-W23-20[c]	6/18/2020	43	3.5 B	2.61 BXH	
299-W23-21[c]	6/18/2020	3 U	3 U	2.56 BXH	

Notes: Standardized practical quantitation limits used in analytical requirements for chromium by Methods 6010 or 6020: 10.5 µg/L; hexavalent chromium by Method 7196: 10.5 µg/L.

For EPA Method 335.4, see EPA/600/R-93/100, *Methods for the Determination of Inorganic Substances in Environmental Samples*. For four-digit EPA methods, see SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods Compendium.*

a. Chromium by Method 6010, as listed in Table D-1 of DOE/RL-2009-73. Chromium was also analyzed by Method 6020 during reporting quarter.

b. Supporting constituent.

c. Upgradient well.

B = detected at a value less than the required detection limit (e.g., practical quantitation limit) but greater than or equal to method detection limit

C = analyte detected in both the sample and associated laboratory blank

D = reported at a secondary dilution factor

H = laboratory holding time exceeded (see text)

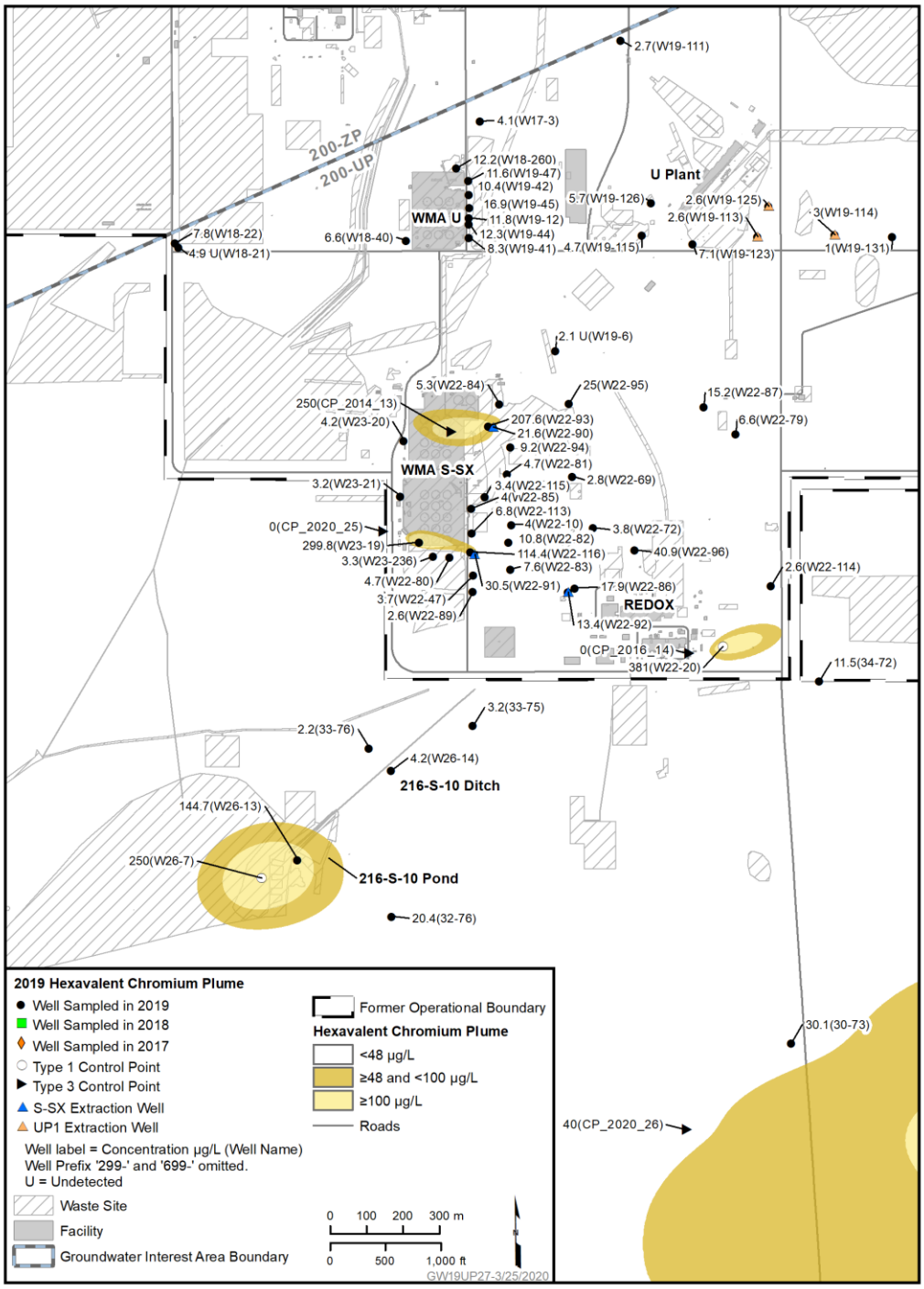
Q = result associated with out-of-limit field quality control sample

RPD = relative percent difference

X = laboratory report noted the samples were analyzed beyond recommended holding time (see text)

U = undetected

WMA = waste management area



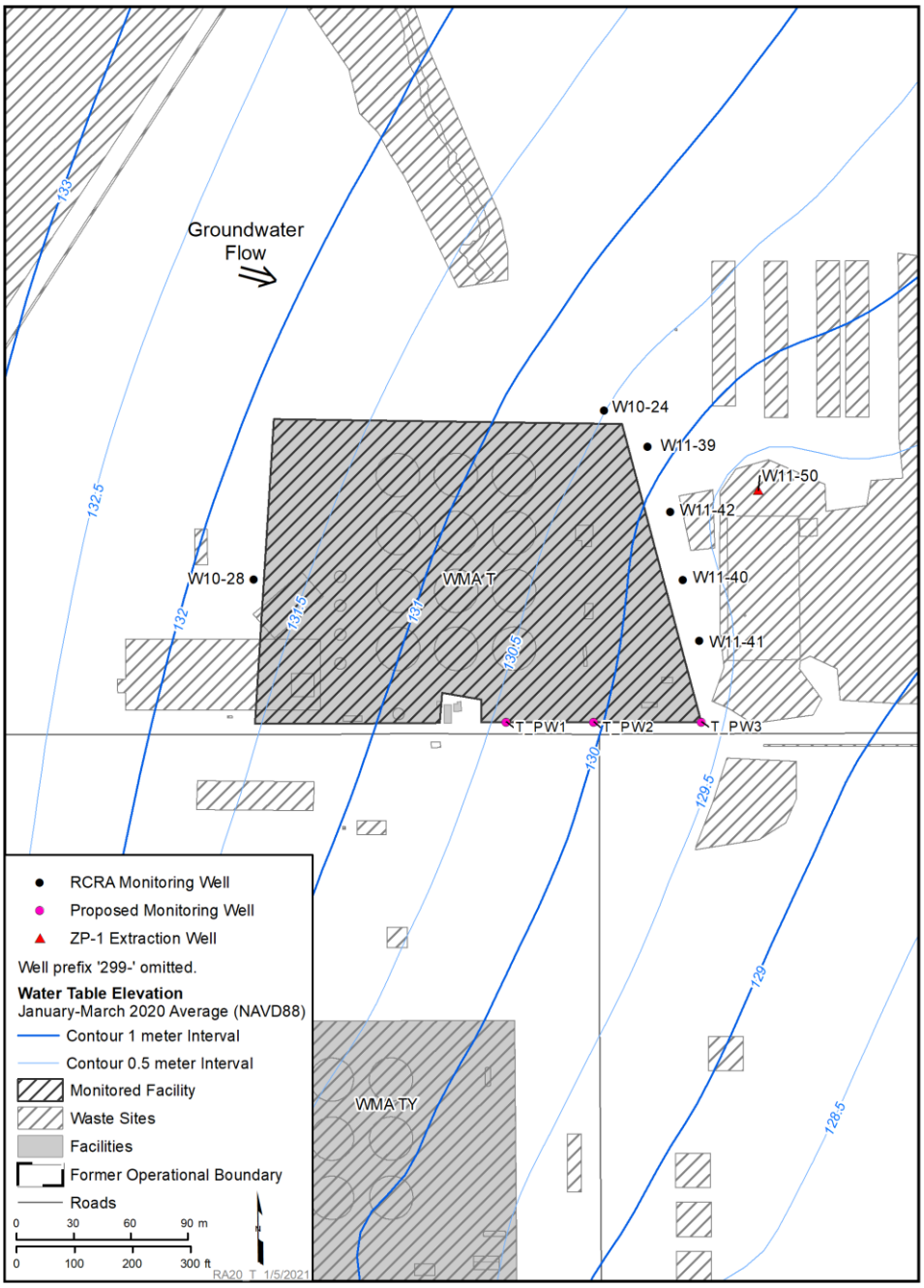
Source: DOE/RL-2019-66, *Hanford Site Groundwater Monitoring Report for 2019*.

Figure 7. Chromium Plumes Near WMA S-SX, 2019

Three Cr(VI) samples were analyzed outside the recommended 24-hour holding time (X and H flags in Table 4). The impact on data usability is insignificant. A limited study using Hanford Site groundwater samples in 2013 found that there was no discernible impact on Cr(VI) results analyzed up to 8 weeks after the sample date (Section 4.3.7.2 of DOE/RL-2010-96, *Remedial Investigation/Feasibility Study for the 100-BC-1, 100-BC-2, and 100-BC-5 Operable Units*).

5 Waste Management Area T

WMA T, which includes the single-shell tanks and ancillary equipment of the 241-T Tank Farm, is located in the northern portion of the 200 West Area (Figure 2). Figure 8 illustrates the monitoring well network and water table contours. During the reporting period the WMA was monitored under DOE/RL-2009-66, *Interim Status Groundwater Quality Assessment Plan for the Single-Shell Tank Waste Management Area T*.



Note: Water table contours from ECF-HANFORD-20-0078, *Preparation of the Hanford Site Water Table Map for January to March 2020*.

Figure 8. WMA T Monitoring Well Network and January Through March 2020 Water Table

Extraction well 299-W11-50, east of WMA T, affects local groundwater flow (Figure 8). Groundwater generally flows to the east-southeast, and the estimated average linear velocity during the first quarter of 2020 was 0.43 m/d (1.4 ft/d) (ECF-HANFORD-20-0066.)

Previous releases from WMA T have contributed to groundwater contamination with chromium. During the reporting period, the WMA T wells were sampled in February and June; Table 5 lists sampling results for total chromium and Cr(VI). Filtered total chromium and Cr(VI) concentrations were similar, and the highest concentrations were greater than 100 µg/L in upgradient well 299-W10-28 in June, an increase from 2019. Figure 9 presents the 2019 chromium plume in the vicinity of WMA T.

Table 5. WMA T Sample Results for January Through June 2020

Well Name	Sample Date	Chromium (µg/L)[a]		Hexavalent Chromium (µg/L)[b]	Comment
		Unfiltered	Filtered		
January Through March 2020					
299-W10-24	2/12/2020	8.74 B	8.04 B	9.06 XH	
299-W10-28[c]	2/12/2020	76.1	75.6	64.4	
299-W11-39	2/11/2020	37	26	34.9	
299-W11-40	2/11/2020	32.3	32.2	33.2	
299-W11-41	2/11/2020	44.5	45.7	47.2	
299-W11-42	2/11/2020	20.4	19.8	20.8	
April Through June 2020					
299-W10-24	6/24/2020	10.6 C	9.14 CB	10.1	
299-W10-28[c]	6/24/2020	161	134	131 DH	
299-W11-39	6/29/2020	44	23	24.6 XH	
299-W11-40	6/24/2020	31.6	31	31.4	
299-W11-41	6/29/2020	61.8	52.6	55.1	Duplicate samples
		59.9	52.3	55.5	
299-W11-42	6/29/2020	29.2	28.7	31.1 XH	

Note: Standardized practical quantitation limits used in analytical requirements for chromium by Methods 6010 or 6020: 10.5 µg/L; hexavalent chromium by Method 7196: 10.5 µg/L.

For EPA Method 335.4, see EPA/600/R-93/100, *Methods for the Determination of Inorganic Substances in Environmental Samples*. For four-digi EPA methods, see SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods Compendium*.

a. Chromium by Method 6010 as listed in Table D-1 of DOE/RL-2009-66. Chromium was also analyzed by Method 6020 during the reporting quarter.

b. Supporting constituent.

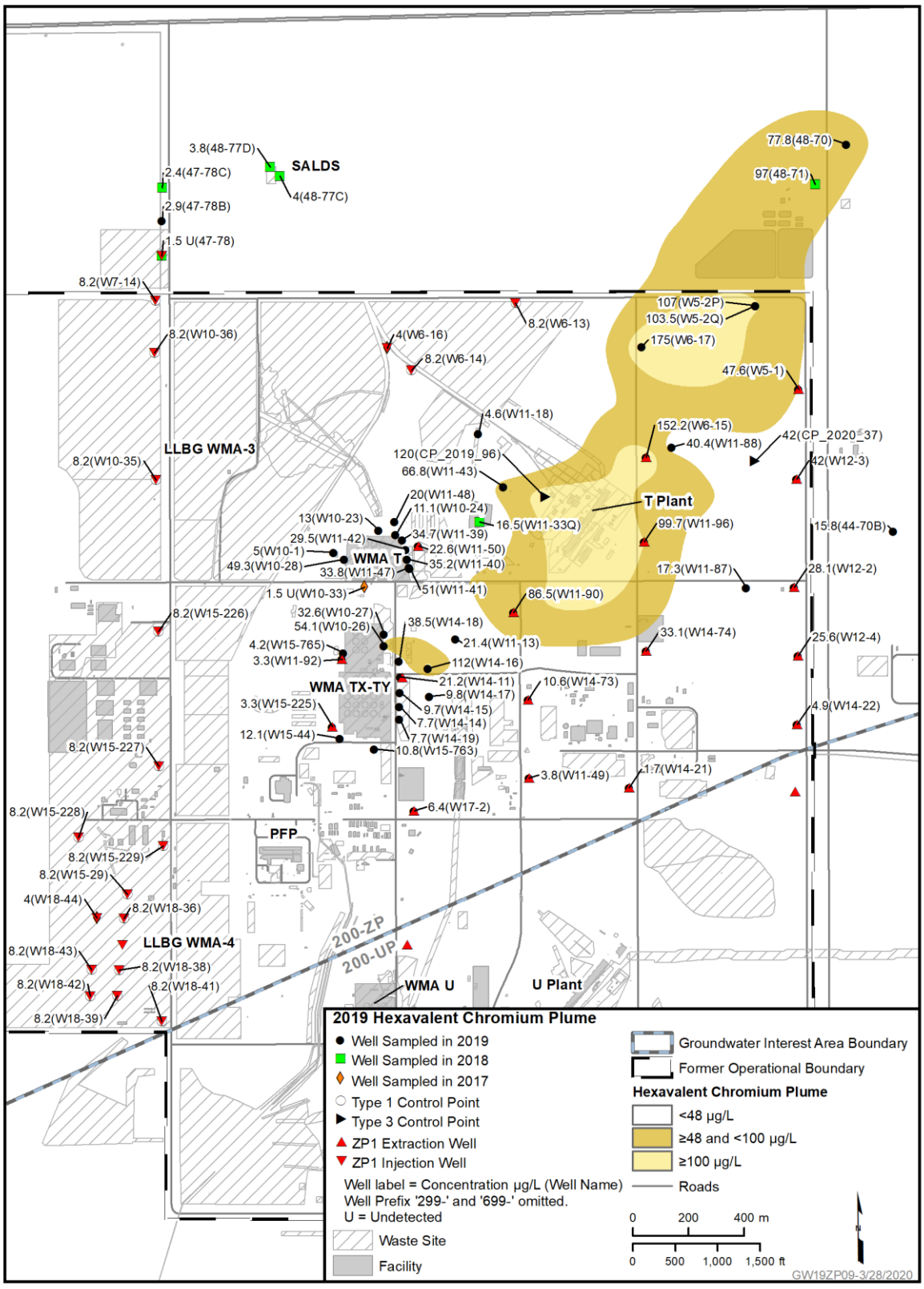
c. Upgradient well.

B = detected at a value less than the required detection limit (e.g., practical quantitation limit) but greater than or equal to the method detection limit.

H = laboratory holding time exceeded (see Chapter 4)

WMA = waste management area

X = laboratory report noted the samples were analyzed beyond recommended holding time (see Chapter 4).

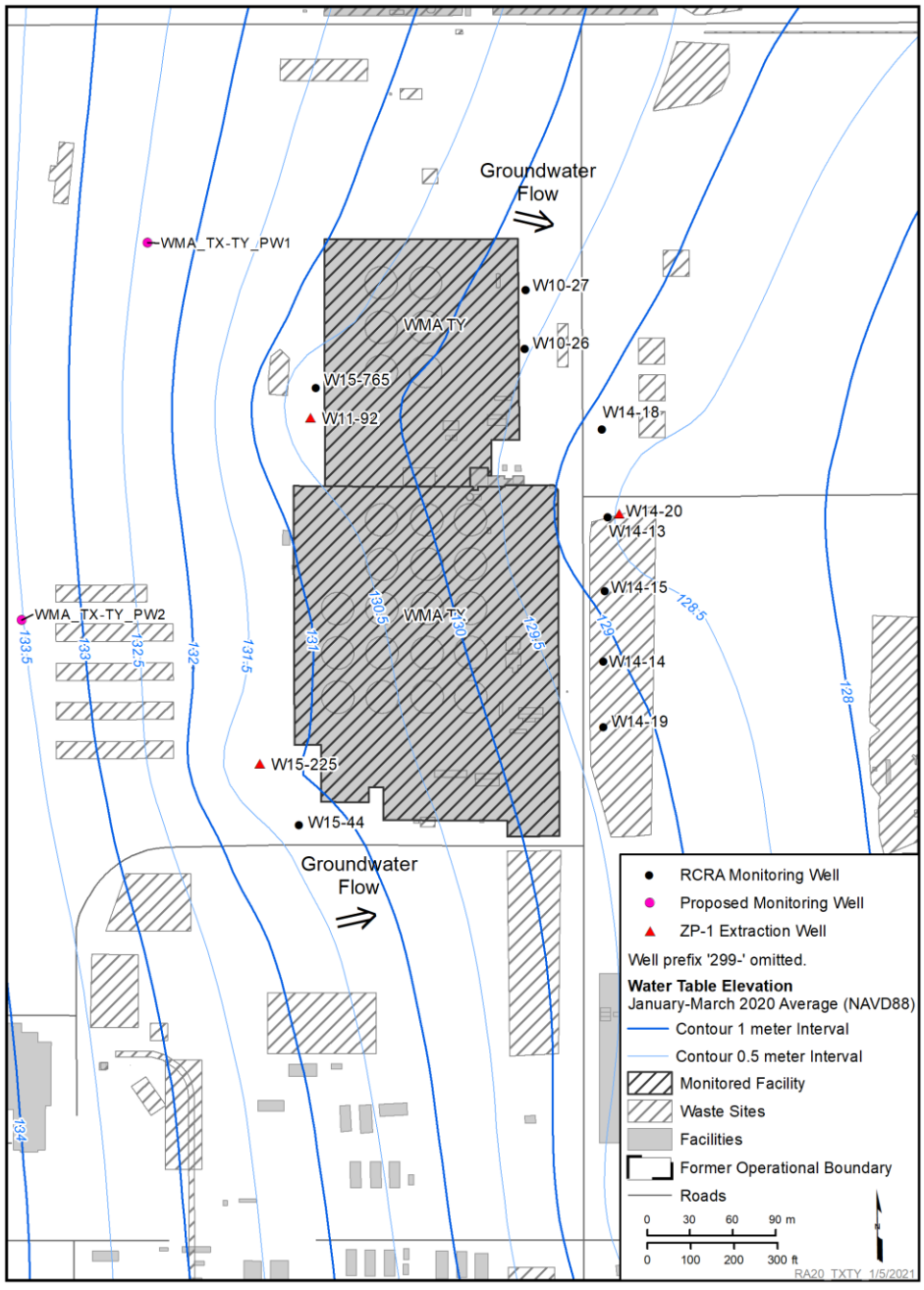


Source: DOE/RL-2019-66, *Hanford Site Groundwater Monitoring Report for 2019*.

Figure 9. Chromium Plumes near WMA T and TX-TY, 2019

6 Waste Management Area TX-TY

WMA TX-TY, which includes the single-shell tanks and ancillary equipment of the 241-TX and 241-TY Tank Farms, is located in the northern portion of the 200 West Area (Figure 2). Figure 10 illustrates the monitoring well network and water table contours. During the reporting period the WMA was monitored under DOE/RL-2009-67, *Interim Status Groundwater Quality Assessment Plan for the Single-Shell Tank Waste Management Area TX-TY.*



Note: Water table contours from ECF-HANFORD-20-0078, *Preparation of the Hanford Site Water Table Map for January to March 2020*.

Figure 10. WMA TX-TY Monitoring Well Network and January Through March 2020 Water Table

The 200 West extraction wells on the east, west, and south sides of the WMA alter the groundwater flow direction and hydraulic gradients (Figure 10). Based on 2020 water-level data for the reporting quarter, the overall flow direction is toward the east, but local directions vary from southeast (northern portion of the WMA) to east-northeast (southern portion of the WMA). The hydraulic gradient averaged 8.9×10^{-3} m/m, and the average linear velocity was estimated at 0.48 m/d (1.6 ft/d) (ECF-HANFORD-20-0066).

Previous releases from WMA TX-TY have contributed to groundwater contamination with chromium. During the reporting period, the WMA TX-TY wells were sampled in March and June (two wells were delayed until July 1) and Table 6 lists sampling results for total chromium and Cr(VI). Figure 9 illustrates the chromium plume in 2019. Filtered total chromium and Cr(VI) concentrations were similar, and the highest concentrations were approximately 80 µg/L in well 299-W14-13 in June, an increase from 2019. Groundwater extraction well 299-W14-20 located east of the plume captures contaminated groundwater.

Table 6. WMA TX-TY Sample Results for January Through June 2020

Well Name	Sample Date	Chromium (µg/L)[a]		Hexavalent Chromium (µg/L)[b]	Comment
		Unfiltered	Filtered		
January Through March 2020					
299-W10-26	2/19/2020	33	25	27.3	
299-W10-27	2/18/2020	23.5 D	21.7 D	23.8	
299-W14-13	2/20/2020	73	11	11.4	
299-W14-14	2/20/2020	10.9	10.7	10.3	
299-W14-15	2/20/2020	11	9.8 B	10.8	Duplicate samples
		10	9.9 B	10.7	
299-W14-18	2/19/2020	64.1	62.7	60	
299-W14-19	2/20/2020	9.57 B	7.83 B	7.76	
299-W15-44[c]	2/19/2020	156 D	33.9 D	7.91	
299-W15-765[c]	2/19/2020	5.67 B	3.91 B	5.11	
April Through June 2020					
299-W10-26	6/30/2020	30	21	24	Duplicate samples
		30	20	24.2	
299-W10-27	6/30/2020	31	25	28.9	
299-W14-13	6/29/2020	84	77	82.4 G	
299-W14-14	6/30/2020	12.9	12	12.2	
299-W14-15	6/30/2020	6.58 B	6.95 B	7.22	
299-W14-18	7/1/2020	57.1	59.6	55.2	
299-W14-19	6/30/2020	6.9	6.5 B	7.63	
299-W15-44[c]	7/1/2020	147 D	28.4 D	3.92 B	
299-W15-765[c]	6/30/2020	3.88 B	4.38 B	3.96 B	

Table 6. WMA TX-TY Sample Results for January Through June 2020

Well Name	Sample Date	Chromium (µg/L)[a]		Hexavalent Chromium (µg/L)[b]	Comment
		Unfiltered	Filtered		

Note: Standardized practical quantitation limits used in analytical requirements for chromium by Methods 6010 or 6020: 10.5 µg/L; hexavalent chromium by Method 7196: 10.5 µg/L.

For EPA Method 335.4, see EPA/600/R-93/100, *Methods for the Determination of Inorganic Substances in Environmental Samples*. For four-digi EPA methods, see SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods Compendium.*

a. Chromium by Method 6020. Table D-1 of DOE/RL-2009-67, *Interim Status Groundwater Quality Assessment Plan for the Single-Shell Tank Waste Management Area T*, lists Method 6010 for chromium, but Section A.3.1 allows the use of equivalent methods.

b. Supporting constituent.

c. Upgradient well.

B = detected at a value less than the required detection limit (e.g., practical quantitation limit) but greater than or equal to the method detection limit

D = reported at a secondary dilution factor

G = record has been reviewed and determined to be correct or the record has been corrected with laboratory confirmation or other supporting information

WMA = waste management area

Cyanide was not a required constituent under the assessment plan in effect during the reporting period (DOE/RL-2009-67), but selected wells were sampled for total and free cyanide under other programs. Total cyanide concentrations were greater than 200 µg/L in wells 299-W10-26 and 299-W14-18 (Table 7). The highest free cyanide concentration was 14.3 µg/L in well 299-W14-18 (less than the 200 µg/L primary DWS but greater than MTCA Method B cleanup level of 4.8 µg/L; WAC 173-340]).

Table 7. Cyanide Data for WMA TX-TY Wells, January Through June 2020

Well Name	Sample Date	Total Cyanide (µg/L)	Free Cyanide (µg/L)
299-W10-26	1/23/2020	212 D	6.77
	2/19/2020	150	3.0
299-W10-27	2/18/2020	1.67 U	1.0 U
299-W14-13	2/20/2020	1.67 U	1.0 U
	6/29/2020	1.67 U	1.0 U
299-W14-18	1/23/2020	1,250 D	14.3
	2/19/2020	1,260 D	12.5
	7/1/2020	1,430 D	11.1

Notes: Cyanide data were not required under DOE/RL-2009-67, *Interim Status Groundwater Quality Assessment Plan for the Single-Shell Tank Waste Management Area TX-TY*, and are provided for information.

Standardized practical quantitation limits used in analytical requirements for total cyanide by Methods 335.4, 9012, 9014, or 4500: 10.5 µg/L; for free cyanide by Method 9014: 4 µg/L.

D = reported at a secondary dilution factor

U = undetected

WMA = waste management area

In 2020, a statistical evaluation of cyanide sample results from WMA TX-TY monitoring wells was performed (ECF-200ZP1-20-0024, *Calculation of Temporal Trends and Confidence Limits for Chromium and Cyanide In Groundwater at Waste Management Area TX-TY*). Based on data collected between January 2012 and December 2019, the statistical evaluation concluded that the concentrations of free

cyanide at wells 299-W10-26 and 299-W14-18 were above the MTCA Method B groundwater cleanup level of 4.8 µg/L (Table 11 in ECF-200ZP1-20-0024).

Four single-shell tanks in WMA TX-TY (241-TX-118, 241-TY-101, 241-TY-103, and 241-TY-104) received ferrocyanide waste from the ferrocyanide scavenging process used in the 1950s (Table 1 in HNF-SA-3126-FP, *Resolution of the Hanford Site Ferrocyanide Safety Issue*). Tanks 241-TY-103 and 241-TY-104 are assumed leakers with estimated leak volumes of 13,600 and 5,300 L (3,600 and 1,400 gal), respectively (Table 4-2 in HNF-EP-0182, *Waste Tank Summary Report for Month Ending October 31, 2020*). Due to the presence of ferrocyanide in tanks that are assumed to have leaked and statistically significant concentrations of free cyanide above the MTCA cleanup value in monitoring wells located downgradient of the TY Tank Farm, the presence of cyanide in groundwater is considered attributable to WMA TX-TY. DOE/RL-2019-74 will be updated to add cyanide as a site-specific sampling constituent.

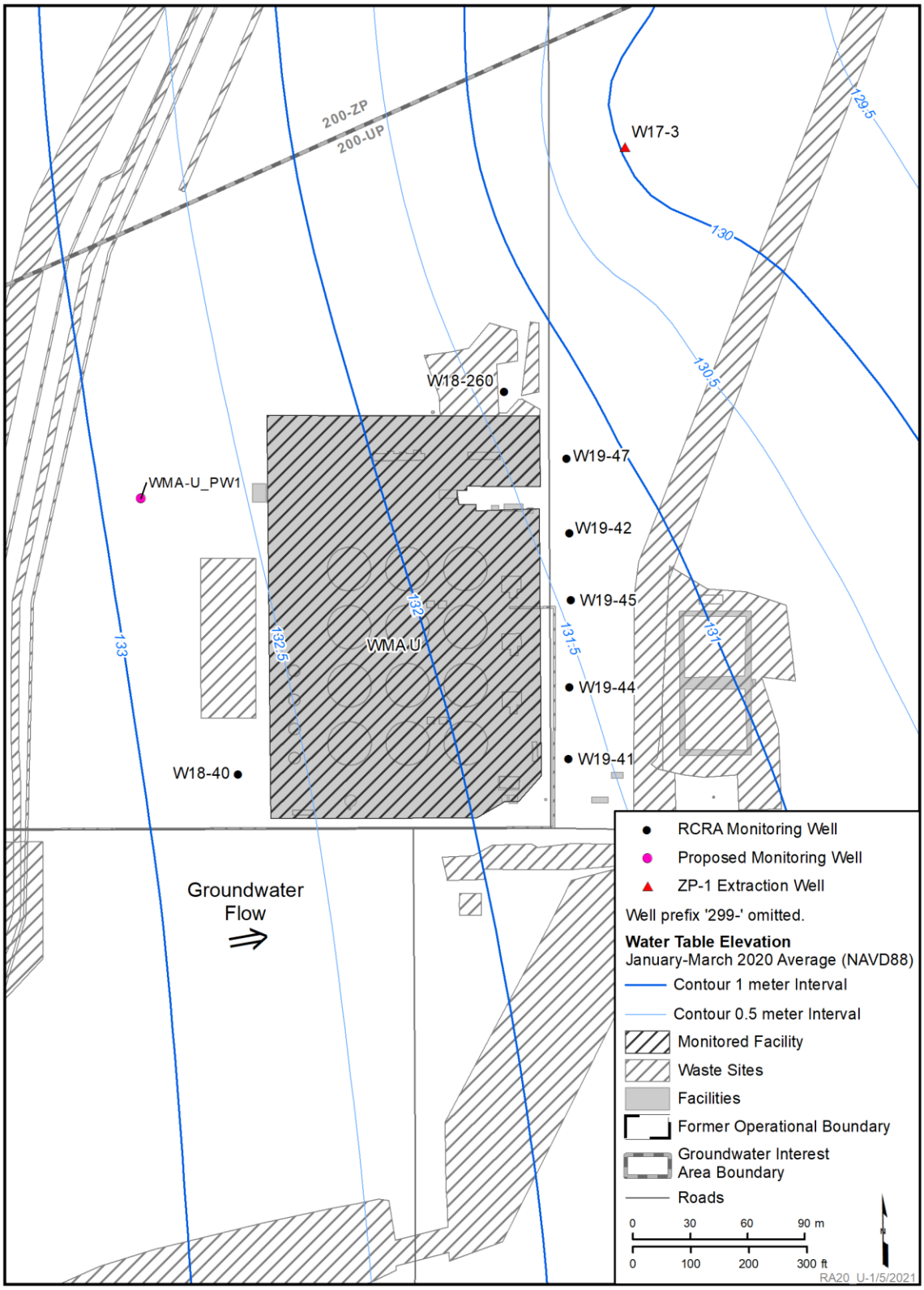
7 Waste Management Area U

WMA U, which includes the single-shell tanks and ancillary equipment of the U Tank Farm, is located in the south-central portion of the 200 West Area (Figure 2). Figure 11 illustrates the monitoring well network and water table contours. During the reporting period the WMA was monitored under DOE/RL-2009-74, *Interim Status Groundwater Quality Assessment Plan for the Single-Shell Tank Waste Management Area U*.

Groundwater flow beneath WMA U is affected by groundwater extraction from well 299-W17-3 (Figure 11). In January through March 2020, the hydraulic gradient sloped to the east-northeast with a magnitude of 6.9×10^{-3} m/m, and the estimated average linear velocity was 0.38 m/d (1.2 ft/d) (ECF-HANFORD-20-0066).

Previous releases from WMA U have contributed to groundwater contamination with chromium. During the reporting period, WMA U wells were sampled in January and June; Table 8 lists sampling results for chromium and Cr(VI). Filtered total chromium and Cr(VI) concentrations were similar, and the highest concentrations were greater than 20 µg/L in well 299-W19-45. A contaminant plume map is not provided because chromium concentrations are below levels used for contouring plumes in Chapter 11 of DOE/RL-2019-66.

Many of the Cr(VI) samples were analyzed outside the recommended 24-hour holding time (X and H flags in Table 8). The impact on data usability is insignificant (Chapter 4).



Note: Water table contours from ECF-HANFORD-20-0078, *Preparation of the Hanford Site Water Table Map for January to March 2020*.

Figure 11. WMA U Monitoring Well Network and January Through March 2020 Water Table

Table 8. WMA U Sample Results for January Through June 2020

Well Name	Sample Date	Chromium (µg/L)[a]		Hexavalent Chromium (µg/L)[b]	Comment
		Unfiltered	Filtered		
January Through March 2020					
299-W18-40[c]	1/22/2020	6.5 B	5.6 B	6.9 XH	
299-W18-260	1/23/2020	9.6 B	9.1 B	9.5 X	Duplicate sample
		9.8 B	8.7 B	10 XH	
299-W19-41	1/22/2020	15	10.4	6.33 XH	
299-W19-42	1/22/2020	16.4	11.9	10.6 XH	
299-W19-44	1/22/2020	10.6	9.5 B	8.27 XH	
299-W19-45	1/22/2020	24	22	22 XH	Duplicate samples
		21	21	21.7 XH	
299-W19-47	1/22/2020	11	10	11.4 XH	
April Through June 2020					
299-W18-40[c]	6/23/2020	6.1 B	5.8 B	5.9	
299-W18-260	6/23/2020	11.7	11.2	10.5 H	
299-W19-41	6/23/2020	25	9.4 B	5.35	
299-W19-42	6/24/2020	33.4	10.3	7.89 XH	
299-W19-44	6/23/2020	9.2 B	8 B	7.1 X	
299-W19-45	6/24/2020	37	25	19.4 XH	
299-W19-47	6/23/2020	9.6 B	9.3 B	8.9 XH	Duplicate samples
		9.7 B	9.2 B	9.45 XH	

Note: Standardized practical quantitation limits used in analytical requirements for chromium by Method 6010 or 6020: 10.5 µg/L; hexavalent chromium by Method 7196: 10.5 µg/L.

For EPA Method 335.4, see EPA/600/R-93/100, *Methods for the Determination of Inorganic Substances in Environmental Samples*. For four-digit EPA methods, see SW-846, *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods Compendium.*

a. Chromium by Method 6010, as required by Table D-1 of DOE/RL-2009-74, *Interim Status Groundwater Quality Assessment Plan for the Single-Shell Tank Waste Management Area U*. Chromium was also analyzed by Method 6020 during the reporting quarters.

b. Supporting constituent.

c. Upgradient well.

B = detected at a value less than the required detection limit (e.g., practical quantitation limit) but greater than or equal to the method detection limit

H = laboratory holding time exceeded (see Chapter 4)

WMA = waste management area

X = laboratory report noted the samples were analyzed beyond recommended holding time (see Chapter 5)

8 References

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