

TABLES

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Table 4.0-3. RMA Remedial Project Status as of March 31, 2020

#	Project Name	Status	Forecast or Date of Final CCR or MCR EPA Approval and 2020 FYRR Cross Reference
1	Corrective Action Management Unit (CAMU)/Basin A Well Abandonment	Completed	CCR September 30, 1998; discussed in 2000 FYRR.
2	CAMU Soil Remediation	Completed	CCR September 30, 1998; discussed in 2000 FYRR.
	CAMU Soils Remediation Completion and Support	Completed	CCR September 29, 2000; discussed in 2005 FYRR.
3	Construction of Hazardous Waste Landfill Wastewater Treatment Unit	Completed	CCR September 27, 2000; discussed in 2005 FYRR.
4	Construct Hazardous Waste Landfill Cell 1	Completed	CCR September 27, 2000; discussed in 2005 FYRR.
5	Section 26 Human Health Exceedance and Biota Exceedance Soils Removal	Completed	CCR October 17, 2000; discussed in 2005 FYRR. Addendum March 30, 2006; discussed in 2010 FYRR.
6	Construct Hazardous Waste Landfill Cell 2	Completed	CCR April 18, 2001; discussed in 2005 FYRR.
7	Operation of Hazardous Waste Landfill Cells 1 and 2	Completed	CCR April 8, 2008; discussed in 2010 FYRR.
8	Hazardous Waste Landfill Cap Construction	Completed	CCR July 21, 2010; discussed in 2015 FYRR.
	Hazardous Waste Landfill Post-Closure O&M	Operating	Post-Closure O&M ongoing; no CCR anticipated; discussed in Sections 4.2.2.1 and 7.1.4.1.
9	Landfill Wastewater Treatment Addition of Ion Exchange	Completed	CCR July 17, 2008; discussed in 2010 FYRR.
10	Operation of Hazardous Waste Landfill Wastewater Treatment System	Completed	CCR October 3, 2011; discussed in 2015 FYRR.
11	Construct Enhanced Hazardous Waste Landfill	Completed	CCR January 29, 2007; discussed in 2010 FYRR.
12	Operation of Enhanced Hazardous Waste Landfill	Completed	CCR May 5, 2009; discussed in 2010 FYRR.
13	Enhanced Hazardous Waste Landfill Cap Construction	Completed	CCR March 24, 2011; discussed in 2015 FYRR.
	Enhanced Hazardous Waste Landfill Post-Closure O&M	Operating	Post-Closure O&M ongoing; no CCR anticipated; discussed in Sections 4.2.2.2 and 7.1.4.2.
14	Basin A Consolidation and Remediation Area Operations/Subgrade	Completed	CCR September 3, 2009; discussed in 2010 FYRR.

- Not Yet Begun
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Table 4.0-3. RMA Remedial Project Status as of March 31, 2020

#	Project Name	Status	Forecast or Date of Final CCR or MCR EPA Approval and 2020 FYRR Cross Reference
15	Integrated Cover System Construction, Basin A Consolidation and Remediation Area	Completed	CCR Part 1 January 26, 2011; discussed in 2015 FYRR.
	Integrated Cover System Interim O&M, Basin A Consolidation and Remediation Area	Interim O&M	CCR Part 2 (O&F determination) forecast 2022; discussed in Sections 4.2.1.1 and 7.1.1.1.
16	Sanitary and Chemical Sewer Manhole Plugging Phase I	Completed	CCR September 30, 1998; discussed in 2000 FYRR.
17	Shell Disposal Trenches Slurry Walls (Construction)	Completed	CCR June 8, 2001; discussed in 2005 FYRR.
	Shell Disposal Trenches Slurry Walls (Dewatering)	Operating	Discussed in Sections 4.1.1.2 and 7.1.2.1.
	Complex (Army) Disposal Trenches Slurry Walls (Construction)	Completed	CCR July 3, 2001; Addendum September 30, 2002 O&F determination; discussed in 2005 FYRR
	Complex (Army) Disposal Trenches Slurry Walls (Dewatering)	Operating	Discussed in Sections 4.1.1.2 and 7.1.2.2.
18	Post-ROD Removal Actions for Structures—Administrative Areas Asbestos Remediation Projects	Completed	CCR September 30, 2003; discussed in 2005 FYRR.
	Post-ROD Removal Actions for Structures—Exterior Piping Chemical-Related Activities	Completed	CCR September 30, 1998; discussed in 2000 FYRR.
	Post-ROD Removal Actions for Structures—Interior Building Chemical Related Activities for South Plants	Completed	CCR September 29, 2000; discussed in 2005 FYRR.
19	Toxic Storage Yards Soil Remediation	Completed	CCR June 20, 2000; discussed in 2005 FYRR.
20	Existing (Sanitary) Landfills Remediation Section 1	Completed	CCR February 29, 2000; discussed in 2000 FYRR. Addendum March 30, 2006; discussed in 2010 FYRR.
21	Existing (Sanitary) Landfills Remediation Section 4	Completed	CCR May 25, 2000; discussed in 2005 FYRR.

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22	Existing (Sanitary) Landfills Remediation Section 36	Completed	CCR July 15, 2004; discussed in 2005 FYRR.
	Existing (Sanitary) Landfills Remediation Section 30	Completed	CCR August 16, 2005; discussed in 2010 FYRR.
23	Lake Sediments Remediation	Completed	CCR April 20, 2000; discussed in 2005 FYRR.
24	Burial Trenches Soil Remediation Part I	Completed	CCR September 25, 2002; discussed in 2005 FYRR.
	Burial Trenches Soil Remediation Part II	Completed	CCR September 30, 2004; discussed in 2005 FYRR.
25	Munitions (Testing) Soil Remediation Part I	Completed	CCR July 15, 2004; discussed in 2005 FYRR.
	Munitions (Testing) Soil Remediation Parts II–IV	Completed	CCRs—April 8, 2008, March 26, 2008, and May 14, 2009, respectively; discussed in 2010 FYRR.
26	Miscellaneous Northern Tier Soil Remediation	Completed	CCR April 20, 2000; discussed in 2005 FYRR. Addendum March 30, 2006; discussed in 2010 FYRR.
27	Miscellaneous Southern Tier Soil Remediation	Completed	CCR July 14, 2000; discussed in 2005 FYRR. Addendum March 30, 2006.
	Miscellaneous Southern Tier Soil Remediation, Sand Creek Lateral	Completed	CCR September 2, 2008; discussed in 2010 FYRR.
28	Bedrock Ridge Extraction System	Operating	Interim CCR September 30, 2008; discussed in Sections 4.1.1.1 and 7.1.2.3; final CCR forecast to be determined.
29	South Plants Structures Demolition and Removal Phase 1	Completed	CCR September 29, 2000; discussed in 2005 FYRR.
	South Plants Structures Demolition and Removal Phase 2	Completed	CCR July 2, 2002; discussed in 2005 FYRR.
30	Miscellaneous RMA Structures Demolition and Removal Phase 1	Completed	CCR September 30, 2002; discussed in 2005 FYRR.
	Miscellaneous RMA Structures Demolition and Removal Phase II	Completed	CCR March 30, 2006; discussed in 2010 FYRR.
	Miscellaneous RMA Structures Demolition and Removal Phase III	Completed	CCR December 8, 2009; discussed in 2010 FYRR.
	Miscellaneous RMA Structures Demolition and Removal Phase IV	Completed	CCR July 13, 2011; discussed in 2015 FYRR.

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Table 4.0-3. RMA Remedial Project Status as of March 31, 2020

#	Project Name	Status	Forecast or Date of Final CCR or MCR EPA Approval and 2020 FYRR Cross Reference
31	Buried M-1 Pits Soil Remediation	Completed	CCR July 18, 2002; discussed in 2005 FYRR.
32	Hex Pit Soil Remediation	Completed	CCR July 21, 2004; discussed in 2005 FYRR.
33	South Plants Balance of Areas and Central Processing Area Soil Remediation Phase 1	Completed	CCR September 24, 2002; discussed in 2005 FYRR.
34	South Plants Balance of Areas and Central Processing Area Soil Remediation Phase 2, Parts 1 and 2	Completed	CCR January 19, 2010; discussed 2010 FYRR.
	Integrated Cover System Construction, South Plants Balance of Areas and Central Processing Area	Completed	CCR Part 1 January 26, 2011, discussed in 2015 FYRR.
	Integrated Cover System O&M, South Plants Balance of Areas and Central Processing Area	Interim O&M	CCR Part 2 (O&F determination) forecast 2022; discussed in Sections 4.2.1.1 and 7.1.1.1.
35	Sanitary Sewer Manhole Plugging Project Phase II	Completed	CCR February 17, 2009; discussed in 2010 FYRR. CCR Addendum 1 December 16, 2013. CCR Addendum 2 August 18, 2017. CCR Addendum 3 forecast 2020; discussed in Sections 4.2.3.1 and 7.1.6.1.
36	Section 36 Balance of Areas Soil Remediation Parts 1 and 2	Completed	Part 1 CCR May 5, 2009 and Part 2 CCR February 22, 2010; discussed in 2010 FYRR.
37	Secondary Basins Soil Remediation, Phase I and II	Completed	CCR July 15, 2004; discussed in 2005 FYRR.
	Secondary Basins Soil Remediation, NCSA-2d (Basin B Drainage Ditch) Contingent Soil Volume	Completed	CCR June 11, 2009; discussed in 2010 FYRR.
	Secondary Basins Soil Remediation, Basin C Supplemental Soil Excavation	Completed	CCR January 30, 2020; discussed in Section 4.2.3.2 and Section 7.1.6.2.
38	Complex (Army) Disposal Trenches Remediation Subgrade Construction	Completed	CCR July 17, 2008; discussed in 2010 FYRR
	Integrated Cover System Construction, Complex (Army) Disposal Trenches Remediation Cover	Completed	CCR Part 1 January 26, 2011; discussed in 2015 FYRR.
	Integrated Cover System O&M, Complex (Army) Disposal Trenches Remediation Cover	Interim O&M	CCR Part 2 (O&F determination) forecast 2022; discussed in Sections 4.2.1.1 and 7.1.1.1.

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Table 4.0-3. RMA Remedial Project Status as of March 31, 2020

#	Project Name	Status	Forecast or Date of Final CCR or MCR EPA Approval and 2020 FYRR Cross Reference
39	Shell Disposal Trenches RCRA-Equivalent Cover Construction	Completed	CCR January 5, 2009; discussed in 2015 FYRR.
	Shell Disposal Trenches RCRA-Equivalent Cover O&M	Interim O&M	ICS CCR Part 2 (O&F determination) forecast 2022; discussed in Sections 4.2.1.2 and 7.1.1.2.
	Integrated Cover System Construction, Shell Disposal Trenches 2-ft Soil Covers	Completed	ICS CCR Part 1 January 26, 2011; discussed in 2015 FYRR.
	Integrated Cover System O&M, Shell Disposal Trenches 2-ft Soil Covers	Interim O&M	ICS CCR Part 2 (O&F determination) forecast 2022; discussed in Sections 4.2.1.1 and 7.1.1.1.
40	North Plants Soil Remediation Free Product Removal—pilot	Operating	Pilot study in progress; CCR/MCR forecast to be determined; discussed in Sections 4.1.1.2 and 7.1.2.4.
41	Section 35 Soil Remediation	Completed	CCR July 15, 2004; discussed in 2005 FYRR.
	Section 35 Soil Remediation, Sand Creek Lateral	Completed	CCR September 2, 2008; discussed 2010 FYRR.
42	North Plants Structure Demolition and Removal	Completed	CCR September 30, 2004; discussed in 2005 FYRR.
43	Basin F Wastepile Remediation	Completed	CCR June 11, 2009; discussed in 2010 FYRR.
44	Former Basin F Principal Threat Soil Remediation (formerly known as Former Basin F Solidification)	Completed	CCR July 16, 2009; discussed in 2010 FYRR.
45	Basin F/Basin F Exterior Remediation Part 1/Phase I	Completed	CCR September 21, 2006; discussed 2010 FYRR.
	Basin F/Basin F Exterior Remediation Part 1/Phase II—Remaining Biota Soil	Completed	CCR December 8, 2009; discussed in 2010 FYRR.
46	Basin F/Basin F Exterior RCRA-Equivalent Cover Construction (Basin F Cover)	Completed	CCR Part 1 August 25, 2011; discussed in 2015 FYRR.
	Basin F/Basin F Exterior RCRA-Equivalent Cover Post-Closure O&M (Basin F Cover)	O&M	CCR Part 2 (O&F determination) September 18, 2019; discussed in Sections 4.2.2.3 and 7.1.4.3.

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Table 4.0-3. RMA Remedial Project Status as of March 31, 2020

#	Project Name	Status	Forecast or Date of Final CCR or MCR EPA Approval and 2020 FYRR Cross Reference
47	Section 36 Lime Basins Soil Remediation Slurry/Barrier Wall, (Construction) including Lime Basins Dewatering Wells	Completed	CCR January 6, 2011; discussed in 2015 FYRR.
	Section 36 Lime Basins Slurry/Barrier Wall (Dewatering)	Operating	Discussed in Sections 4.1.1.2, 6.3.2.3, and 7.1.2.5.
	Integrated Cover System Construction, Section 36 Lime Basins Cover	Completed	CCR Part 1 January 26, 2011; discussed in 2015 FYRR.
	Lime Basins DNAPL Remediation Project (Construction)	Completed	CCR September 5, 2014, discussed in 2015 FYRR.
	Lime Basins DNAPL Remediation Project (O&M)	Operating	Discussed in Sections 4.1.1.2, 6.3.2.4, and 7.1.2.6.
	Integrated Cover System O&M, Section 36 Lime Basins Cover	Interim O&M	CCR Part 2 (O&F determination) forecast 2022; discussed in Sections 4.2.1.1 and 7.1.1.1.
47a	Borrow Areas Operations	Completed	Discussed 2015 FYRR.
	Residual Ecological Risk Soil Remediation	Completed	Part 1 CCR March 30, 2006 and Part 2 CCR September 3, 2009; discussed in 2010 FYRR.
48	Site-Wide Biota Monitoring	Operating	MCR forecast to be determined; discussed in Sections 4.3.1.1, 6.3.5, and 7.1.5.1.
49	Site-Wide Air Monitoring	Completed	MCR for Odor Monitoring June 11, 2009, MCR for Air Monitoring April 7, 2010, Addendum for PM10 December 13, 2010; discussed in 2015 FYRR.
50	Site-Wide Groundwater Monitoring	Operating	Discussed in Sections 6.3.3 and 7.1.5.3.
50a	On-Post Surface Water Quality Monitoring	Completed	MCR May 2021; discussed in Sections 4.1.2.1, 6.3.4.1 and 7.1.5.2.
50b	On-Post Surface Water Management	Completed	No CCR. Discussed in 2015 FYRR.

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#	Project Name	Status	Forecast or Date of Final CCR or MCR EPA Approval and 2020 FYRR Cross Reference
50c	Off-Post Surface Water Monitoring (LTMP)	Operating	MCR forecast to be determined; discussed in Sections 6.3.4.2 and 7.1.5.2.
51	Unexploded Ordnance (UXO) Management	Completed	Munitions Response After Action Report (AAR) DDESB Concurrence August 31, 2010; discussed 2015 FYRR.
52	Medical Monitoring Program	Completed	MCR June 25, 2012; discussed in 2015 FYRR.
53	Western Tier Parcel (deletion)	Completed	Deletion occurred on January 21, 2003; discussed in 2005 FYRR.
54	Trust Fund	Completed	No CCR required; discussed in 2005 FYRR.
55	South Adams County Water Supply	Completed	No CCR required; discussed in 2000 FYRR.
56	Henderson Distribution	Completed	CCR September 30, 1999; discussed in 2000 FYRR.
57	Confined Flow System Well Closures	Completed	CCR September 27, 2000; discussed in 2005 FYRR.
58	Irondale Containment System Main Well Field Treatment Shutdown	Completed	CCR May 21, 2003; discussed in 2005 FYRR.
	Motor Pool Area Extraction System	Completed	Shut-off CCR October 25, 2011; Post-shut-off MCR forecast to be decided; discussed in 2015 FYRR.
	Railyard Containment System	Operating	System shut off in May 2016; Shut-off CCR forecast to be determined; discussed in Sections 4.1.1.1, 6.3.3.10 and 7.1.2.7.
59	North of Basin F Groundwater Plume Remediation System	Completed	CCR September 28, 2005; discussed in 2005 FYRR.
	Basin A Neck System	Operating	CCR forecast to be determined; discussed in Sections 4.1.1.1 and 7.1.2.8.
	Basin A Neck System—Lime Basin Groundwater Treatment Relocation and Basin A Neck Expansion	Completed	CCR May 16, 2012; discussed in 2015 FYRR.
60	Operation of CERCLA Wastewater Treatment Facility	Completed	CCR for demolition covered under Misc. Structures Phase IV July 13, 2011; discussed in 2015 FYRR.
60a	South Tank Farm and Lime Basins Mass Removal Project	Completed	CCR May 16, 2012; discussed in 2015 FYRR
	Post-Shut-Off Monitoring	Completed	Post Shut-off MCR January 7, 2019; discussed in Sections 4.1.2.2, 6.3.3.10 and 7.1.6.4.

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Table 4.0-3. RMA Remedial Project Status as of March 31, 2020

#	Project Name	Status	Forecast or Date of Final CCR or MCR EPA Approval and 2020 FYRR Cross Reference
61	Northwest Boundary Containment System	Operating	CCR forecast to be determined; discussed in Sections 4.1.1.1 and 7.1.2.9.
62	North Boundary Containment System	Operating	CCR forecast to be determined; discussed in Sections 4.1.1.1 and 7.1.2.10.
63	n-Nitrosodimethylamine (NDMA) Monitoring and Assessment	Completed	CCR September 30, 1998; discussed in 2000 FYRR.
64	South Lakes Plume Management	Completed	ESD finalized March 31, 2006; discussed in 2005 FYRR.
65	Basin F Wastepile Operations and Management	Completed	No CCR; discussed in 2010 FYRR.
66	Off-Post Groundwater Intercept and Treatment System (IRA)	Incorporated in RA: see #94	Not applicable.
67	Improvement of North Boundary Containment System and Evaluation of All Existing Boundary Systems (IRA)—North Boundary Containment System Improvements	Incorporated in RA: see #62	Not applicable.
68	Improvement of North Boundary Containment System and Evaluation of All Existing Boundary Systems (IRA)—Irondale Containment System	Incorporated in RA: see #58	Not applicable.
69	Improvement of North Boundary Containment System and Evaluation of All Existing Boundary Systems (IRA)—Northwest Boundary Containment System	Incorporated in RA: see #61	Not applicable.
70	Groundwater Intercept and Treatment North of Basin F (IRA)	Incorporated in RA: see #59	Not applicable.
71	Closure of Abandoned Wells at RMA (IRA)	Completed	Completed October 1989; discussed in 2000 FYRR. For additional identified work see #95.
72	Basin A Neck Containment System (IRA)	Incorporated in RA: see #59	Not applicable.

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Table 4.0-3. RMA Remedial Project Status as of March 31, 2020

#	Project Name	Status	Forecast or Date of Final CCR or MCR EPA Approval and 2020 FYRR Cross Reference
73	Basin F Liquid, Sludge, and Soil Remediation (IRA) Element One, Basin F Wastepile	Incorporated in RA: see #43 and #65	Not applicable.
74	Basin F Liquid, Sludge, and Soil Remediation (IRA) Element Two, Basin F Liquid	Completed	Completed May 1996; discussed in 2000 FYRR.
75	Building 1727 Sump Liquid (IRA)	Completed	Completed November 1987; discussed in 2000 FYRR.
76	Closure of the Hydrazine Facility (IRA)	Completed	Completed July 1992; discussed in 2000 FYRR.
77	Fugitive Dust Control (IRA)	Completed	Completed May 1991; discussed in 2000 FYRR.
78	Sanitary Sewers Remediation (IRA)	Completed	Completed September 1992; discussed in 2000 FYRR.
79	Asbestos Remediation (IRA)	Incorporated in RA: see #18	Not applicable.
80	Remediation of Other Contamination Sources (IRA)—Motor Pool Area, Soil Vapor Extraction	Completed	Completed October 1993; discussed in 2000 FYRR.
81	Remediation of Other Contamination Sources (IRA)—Motor Pool Area, Groundwater Remediation	Completed	Completed October 1993; discussed in 2000 FYRR.
82	Remediation of Other Contamination Sources (IRA)—Rail Classification Yard	Incorporated in RA: see #58	Not applicable.
83	Remediation of Other Contamination Sources (IRA)—Lime Settling Basins	Incorporated in RA: see #47	Not applicable.

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Table 4.0-3. RMA Remedial Project Status as of March 31, 2020

#	Project Name	Status	Forecast or Date of Final CCR or MCR EPA Approval and 2020 FYRR Cross Reference
84	Remediation of Other Contamination Sources (IRA)—South Tank Farm Plume	Completed	Completed October 1993; discussed in 2000 FYRR.
85	Remediation of Other Contamination Sources (IRA)—Army (Complex) Disposal Trenches	Incorporated in RA: see #17, #38, #39, and #50	Not applicable.
86	Remediation of Other Contamination Sources (IRA)—Shell Section 36 Trenches	Incorporated in RA: see #17, #38, #39, and #50	Not applicable.
87	Remediation of Other Contamination Sources (IRA)—M-1 Settling Basins	Incorporated in RA: see #31	Not applicable.
88	Pretreatment of CERCLA Liquid Wastes (IRA)—Wastewater Treatment System	Incorporated in RA: see #60	Not applicable.
89	Pretreatment of CERCLA Liquid Wastes (IRA)— Element One, Waste Management	Incorporated in RA: see #30	Not applicable.
90	Pretreatment of CERCLA Liquid Wastes (IRA)—Element Two, Polychlorinated Biphenyls (PCBs)	Completed	Completed May 1996; discussed in 2000 FYRR.
91	Pretreatment of CERCLA Liquid Wastes (IRA)— Element Three, Waste Storage	Incorporated in RA: see #30	Not applicable.
92	Chemical Process-Related Activities (IRA)	Incorporated in RA: see #27, #29, and #42	Not applicable.

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Table 4.0-3. RMA Remedial Project Status as of March 31, 2020

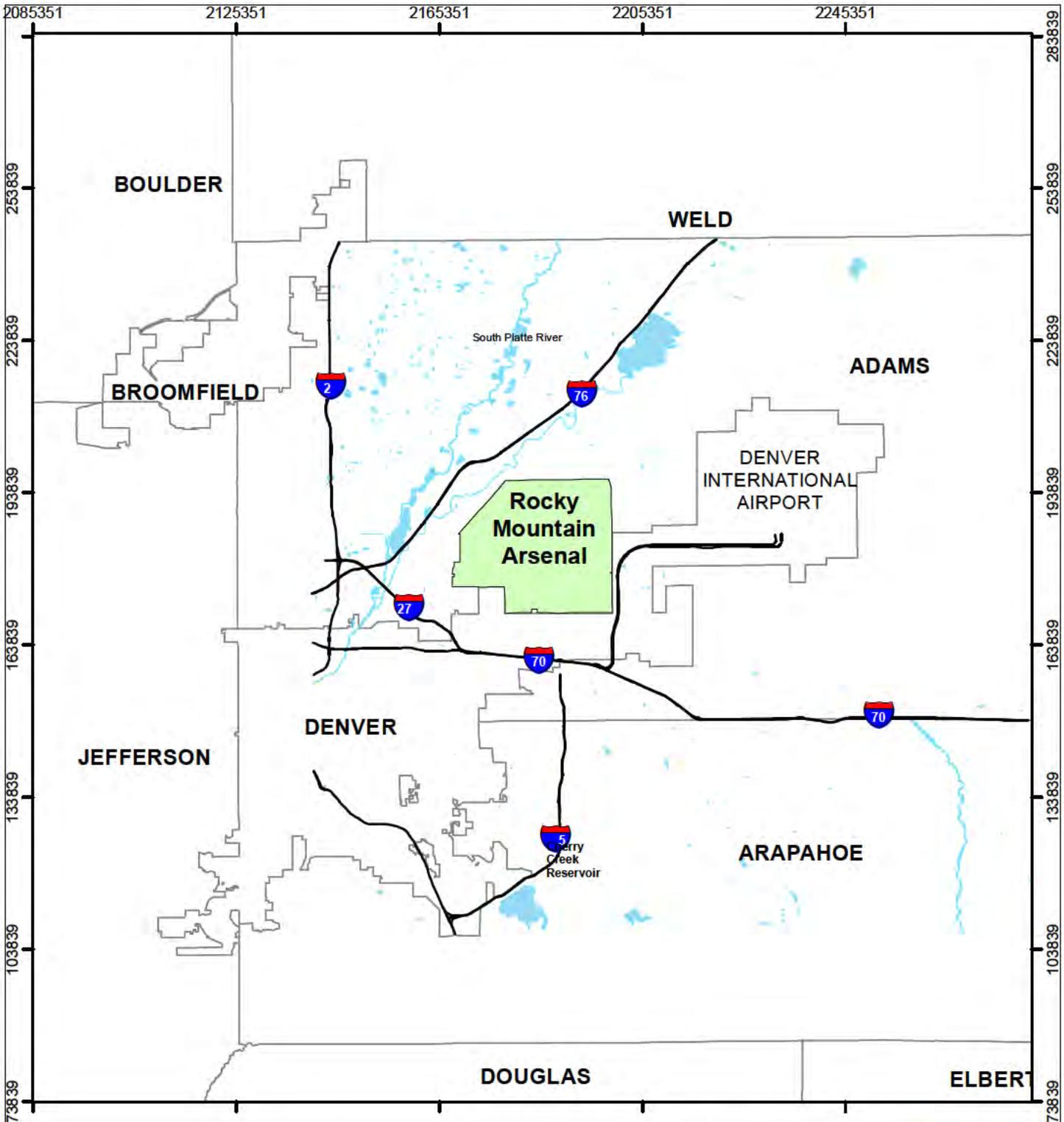
#	Project Name	Status	Forecast or Date of Final CCR or MCR EPA Approval and 2020 FYRR Cross Reference
93	Deep Disposal Well Closure (IRA)	Completed	Discussed in 2000 FYRR.
99	Land Use Controls	Operating	Discussed in Sections 4.3.1.2, 6.3.7 and 7.1.5.4.
Off-Post OU			
94	Off-Post Groundwater Intercept and Treatment System	Operating	CCR forecast to be determined; discussed in Sections 4.1.1.1 and 7.1.3.1.
95	Off-Post Well Abandonment	Completed	CCR September 30, 1999; discussed in 2000 FYRR.
96	Private Well Network	Operating	Discussed in Sections 6.3.3.5 and 7.1.3.2.
97	Off-Post Tillage Task	Completed	CCR September 30, 1998; discussed in 2000 FYRR.
98	Off-Post Institutional Controls	Operating	Discussed in Sections 4.3.1.3 and 7.1.3.3.

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FIGURES

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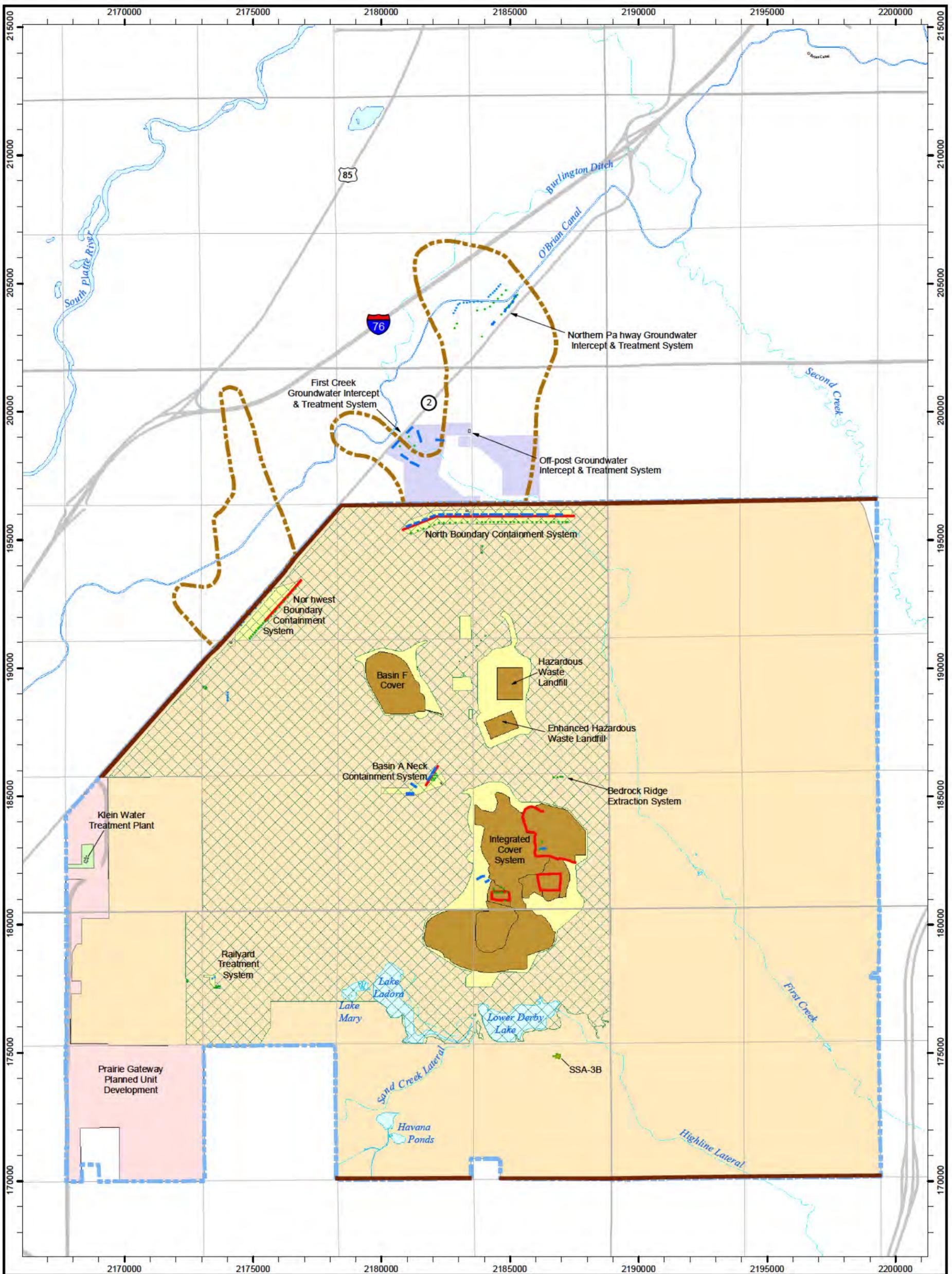


State Plane, Colorado North Zone
 NAD27, US Survey Feet
 Sources: U.S. Army, RMA GIS,
 OMC, Shell/AECOM



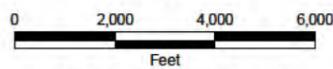
Figure 1.0-1

RMA Location



Legend

- Off-Post Operable Unit
- RMA On-Post Operable Unit
- U.S. Army Jurisdiction
- RMA National Wildlife Refuge
- Transferred Property with Groundwater Remaining on the NPL
- Prairie Gateway Planned Unit Development
- 100-Ft Highway Setbacks
- Shell Property
- SSA-3B Sediment Pile
- Caps and Covers
- Lakes & Ponds
- Slurry Walls
- Recharge Trenches
- Intermittent Streams
- Ditches, Canals
- Township & Range Lines
- Section Lines
- Dewatering Wells
- Recharge Wells



NAD27-NGVD29 Datum, US Survey Feet, Colorado North Zone
Sources: U.S. Army, RMA GIS, OMC, Shell/AECOM

Note: Monitoring wells not shown for clarity. Location of monitoring wells is provided in the Long-Term Monitoring Plan for Groundwater and Surface Water (TIEC & URS 2010)



Program Manager
Rocky Mountain Arsenal
U.S. Army • COMMITTED TO PROTECTION OF THE ENVIRONMENT •

Figure 3.0-1

RMA Details

9th AVENUE (88th Ave)

COLORADO STATE PLUMBING



BASIN F

NCSA-2d
(BASIN C)

NCSA-2b
(BASIN D)

NCSA-2d: B-3

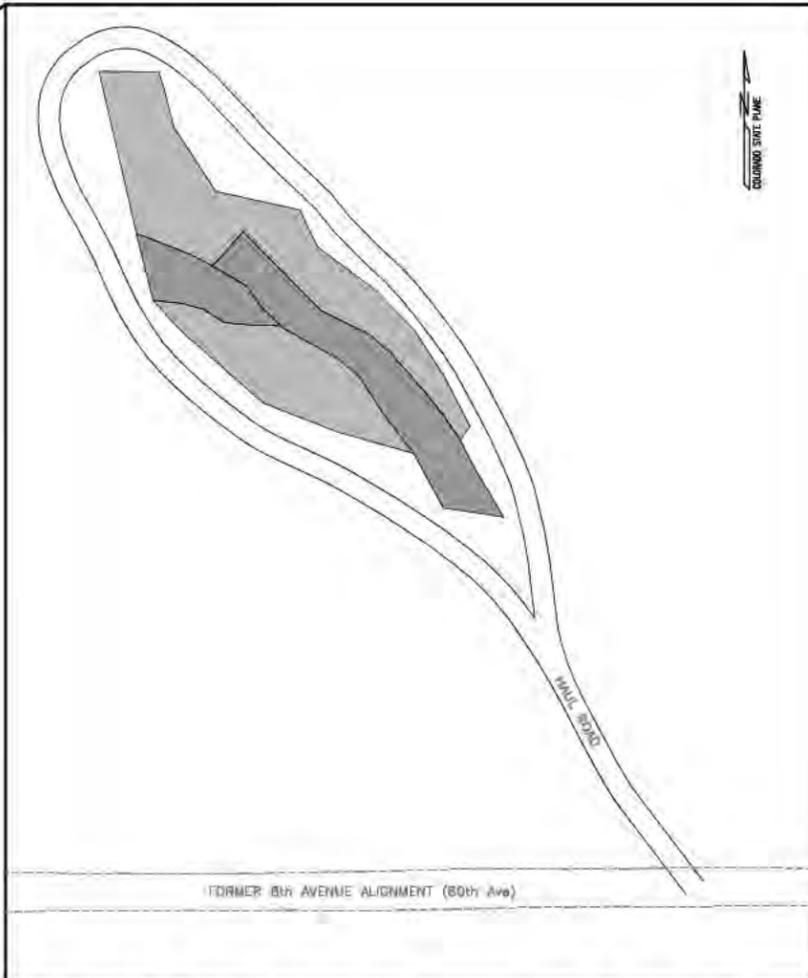
NCSA-2d: B-4

FORMER 8th AVENUE ALIGNMENT (80th Ave)

NCSA-2d: B-2

NCSA-2d: HH-1

COLORADO STATE PLUMBING



FORMER 8th AVENUE ALIGNMENT (80th Ave)

BASIN C SUPPLEMENTAL SOIL EXCAVATION PROJECT AREA

LEGEND

- HUMAN HEALTH EXCEEDANCE SOIL AREA
- BIOTA RISK SOIL AREA

ROCKY MOUNTAIN ARSENAL BOUNDARY

	WEST				EAST			
	17	18	19	20	21	22	23	24
	25	26	27	28	29	30	31	32
T25	33	34	35	36	37	38	39	40
T36	41	42	43	44	45	46	47	48
	49	50	51	52	53	54	55	56
	57	58	59	60	61	62	63	64

SHADED SECTIONS INDICATE DESIGN AND/OR CONSTRUCTION ACTIVITY, NUMBER REFERS TO SECTION NUMBER

KEY PLAN



**ROCKY MOUNTAIN ARSENAL
COMMERCE CITY, COLORADO**

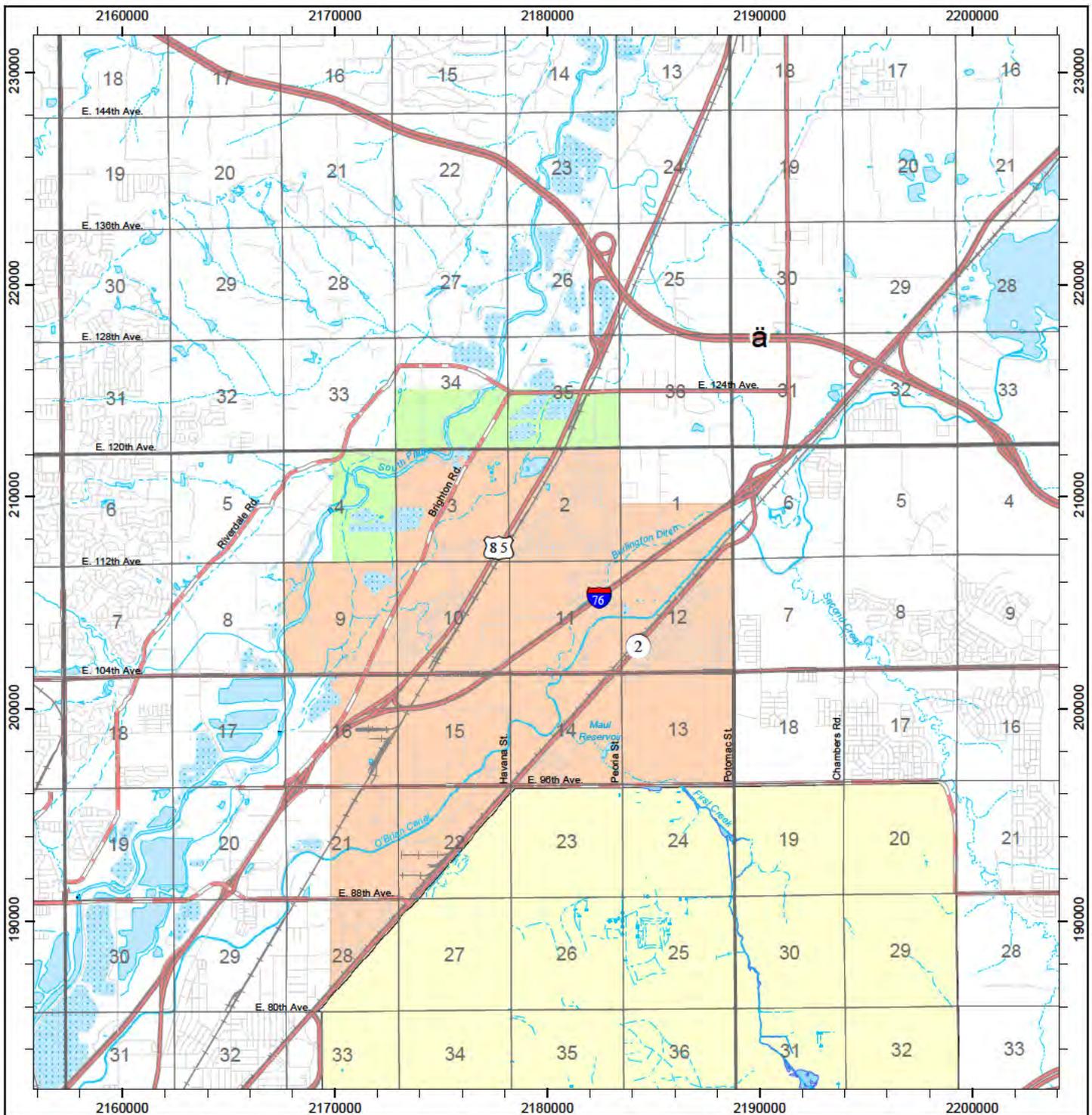
NAVARRO Research and Engineering, Inc.

PROJECT NAME
**2020
FIVE-YEAR REVIEW REPORT**

TITLE
**SECONDARY BASINS – BASIN C
SUPPLEMENTAL SOIL EXCAVATION
SITE PLAN**

DRAWN BY SMG	DATE 08.26.20	FIGURE NUMBER 4.2-1
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NTS
COLORADO STATE PLUMBING



- | | |
|---|---------------------------------------|
| Rocky Mountain Arsenal | Township & Range Lines |
| Potential CSRG Exceedance Notification Area | Railroads |
| Historical Contamination Notification Area | Intermittent Streams |
| Section Lines | Ditches, Canals |
| Gravel Pits | Culverts, Sluices, Siphons, and Weirs |
| Lakes, Ponds, Rivers | Primary Roads |
| Gravel Pits | Secondary Roads |
| Wetlands | Paved Roads |

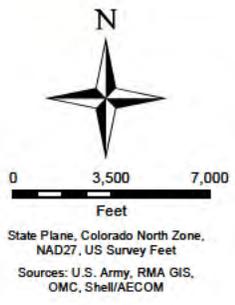
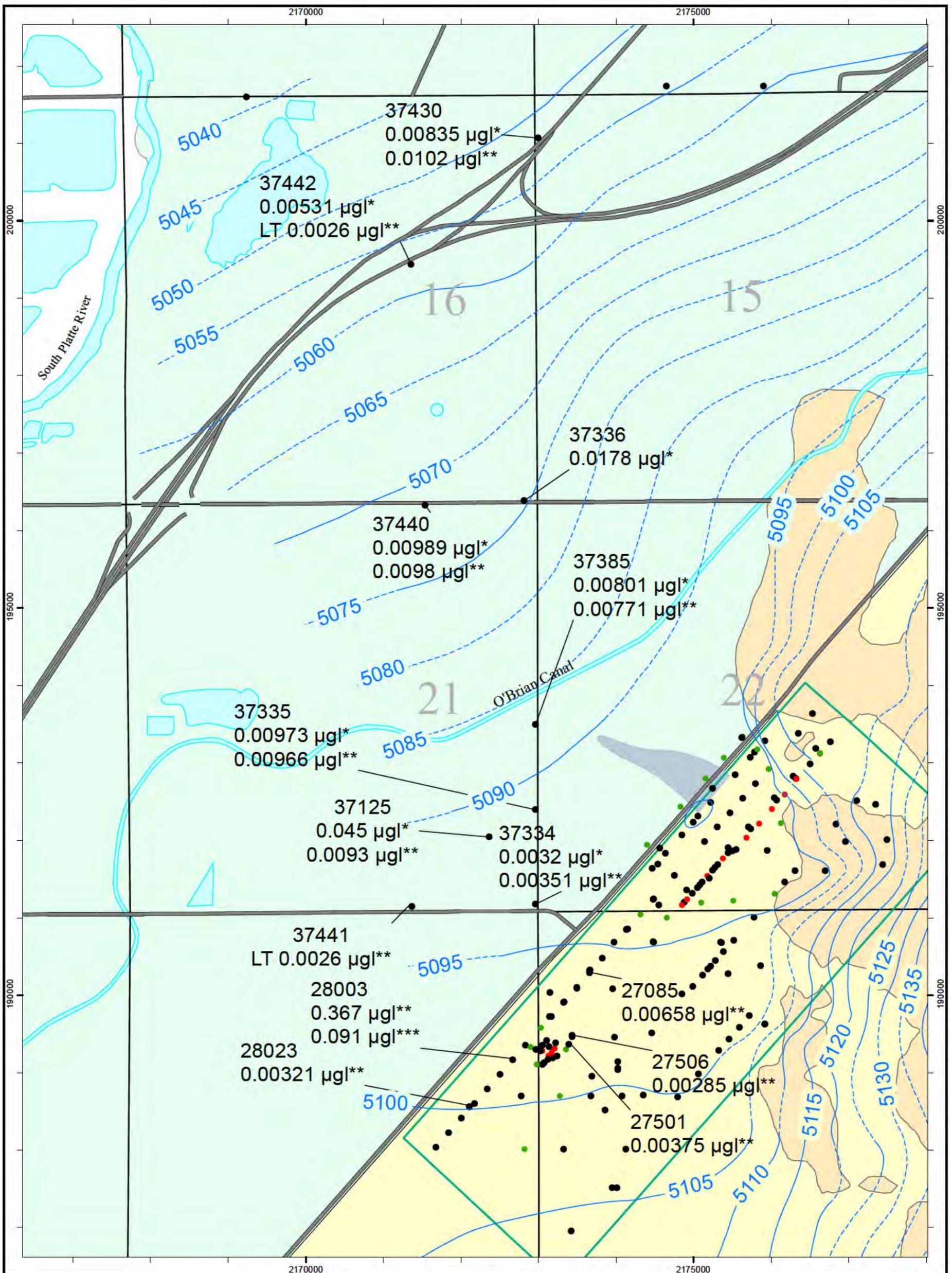


Figure 4.3-1

Well Permit Notification Areas



Legend

- Rocky Mountain Arsenal (On-Post Operable Unit)
- Off-Post Study Area
- Operational Areas
- 2017 CSRG Exceedance Areas for Dieldrin and DIMP
- Lakes, Ponds, Rivers
- Intermittent Streams
- Ditches, Canals
- FY18 Unsaturated Alluvium
- Major Roads
- Section Lines
- Township & Range Lines
- Extraction Wells
- Water Quality Performance Wells
- Monitoring Wells

* January 2019 Dieldrin concentrations shown
** August 2019 Dieldrin concentrations shown
*** November 2019 Dieldrin concentrations shown



0 250 500 1,000 1,500 2,000
Feet

NAD27-NGVD29 Datum, US Survey Feet, Colorado North Zone
Sources: U.S. Army, RMA GIS, OMC, Shell/AECOM



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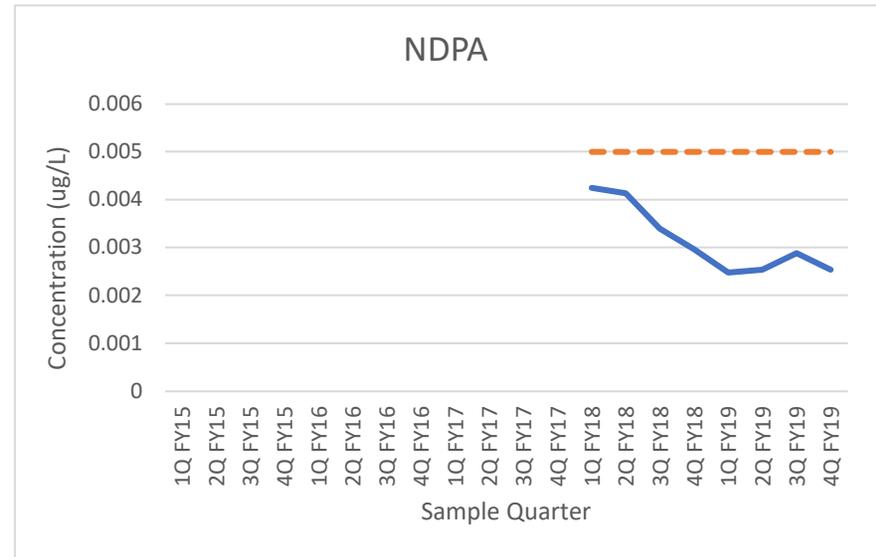
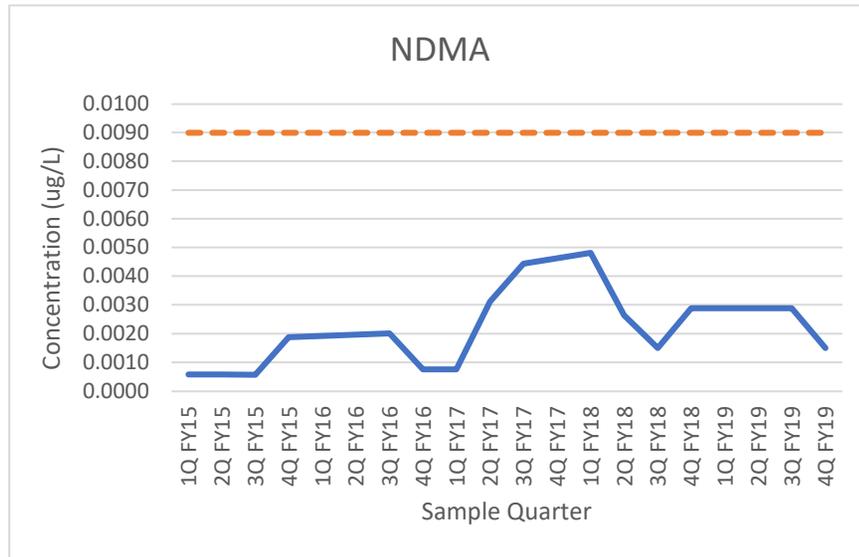
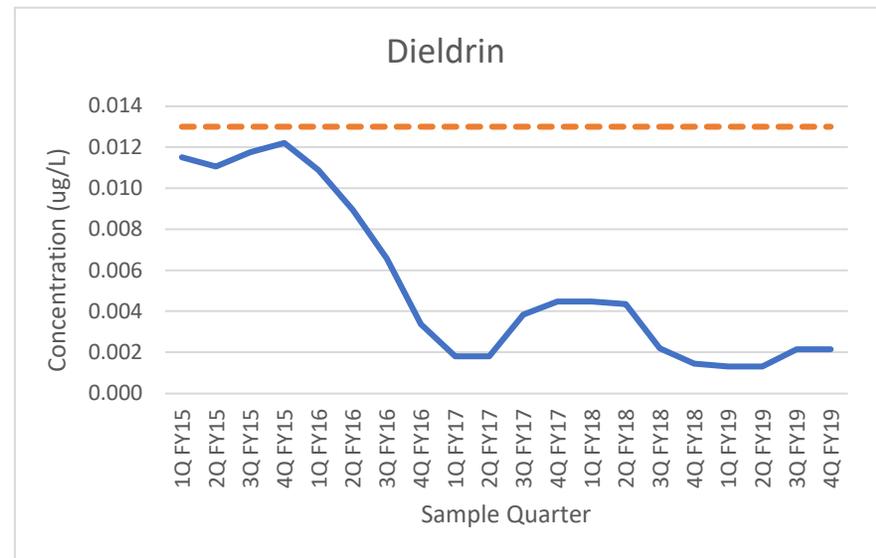
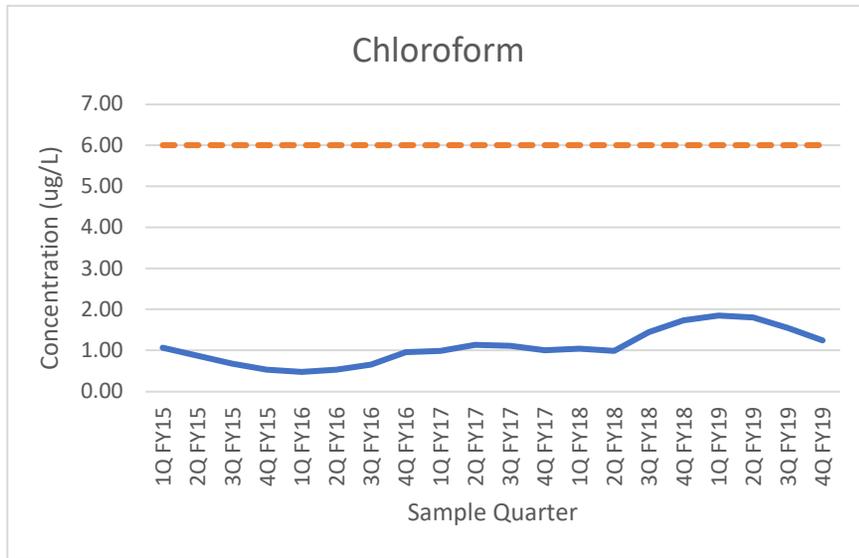


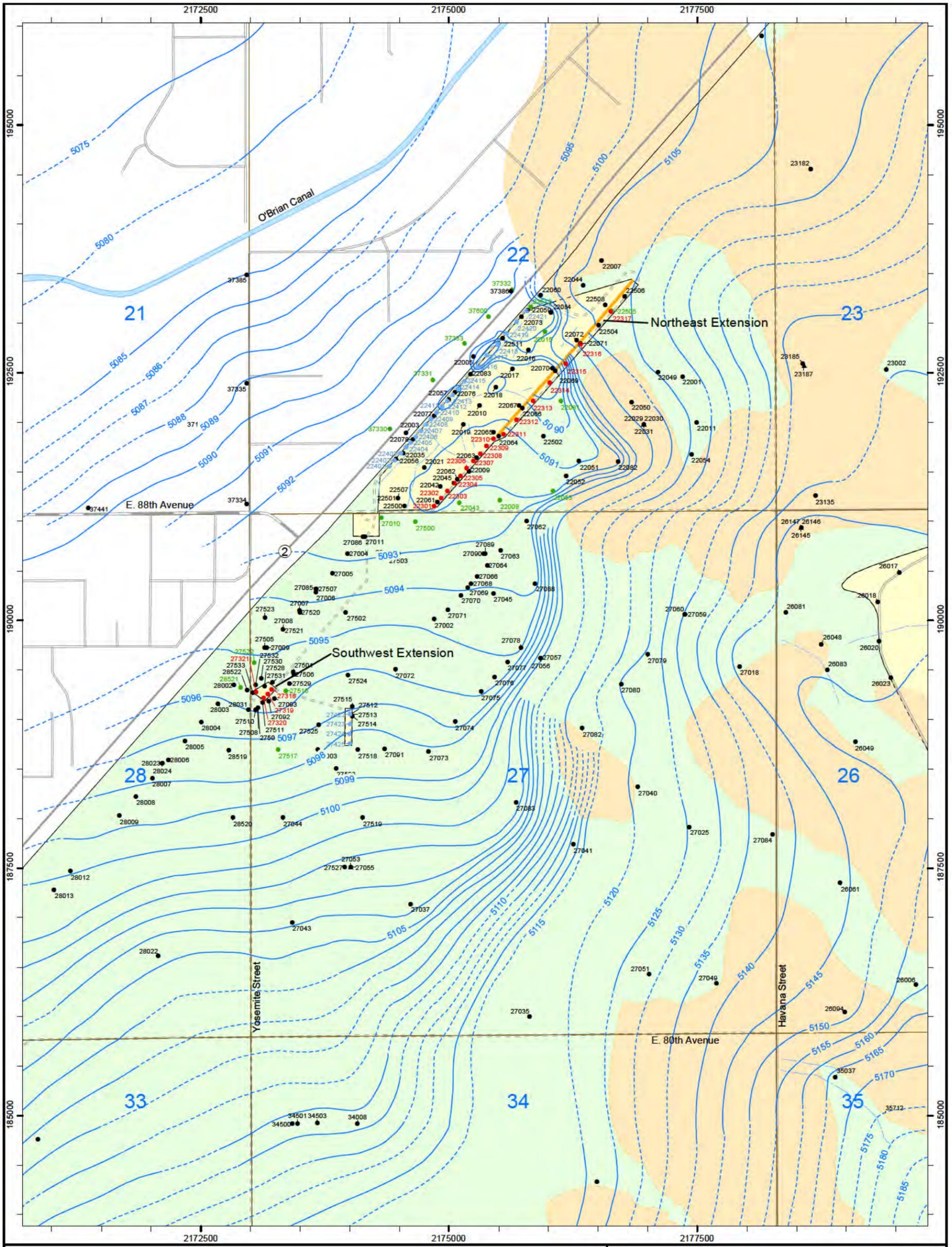
Figure 5.2-1

Off-Post Dieldrin Monitoring Results Downgradient of NWBCS

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11/4/2020

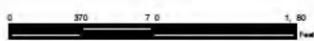
Figure 6.3-2 NWBCS Effluent Four-Quarter Moving Averages





Legend

- Army Maintained Area
- USFWS Managed Area
- Army Maintained Area & USFWS Managed Area Border (shown under the Unsaturated Alluvium layer)
- Lakes, Ponds, Rivers
- Section Lines
- Unsaturated Alluvium
- Light Duty Roads
- Secondary Roads
- Primary Roads
- Unimproved Roads
- Slurry Walls
- Ditches
- Performance Water Quality Wells
- Extraction Wells
- Recharge Wells
- Monitoring Wells**
- Confined Flow System
- Unconfined Flow System
- Water Elevation Contour
- Inferred Water Elevation Contour



State Plane, Colorado North Zone,
NAD27, US Survey Feet
Sources: U.S. Army, RMA GIS, PMC,
OMC, Shell/URS Corp.



Figure 6.3-3
FY19 Northwest Boundary Containment
System Monitoring Well Network and
Potentiometric Surface for the
Unconfined Flow System

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11/3/2020

Northwest Boundary Water Levels

Third Quarter FY2019: 2019-04-01 to 2019-06-30



Northwest Boundary Water Levels

Third Quarter FY2019: 2019-04-01 to 2019-06-30

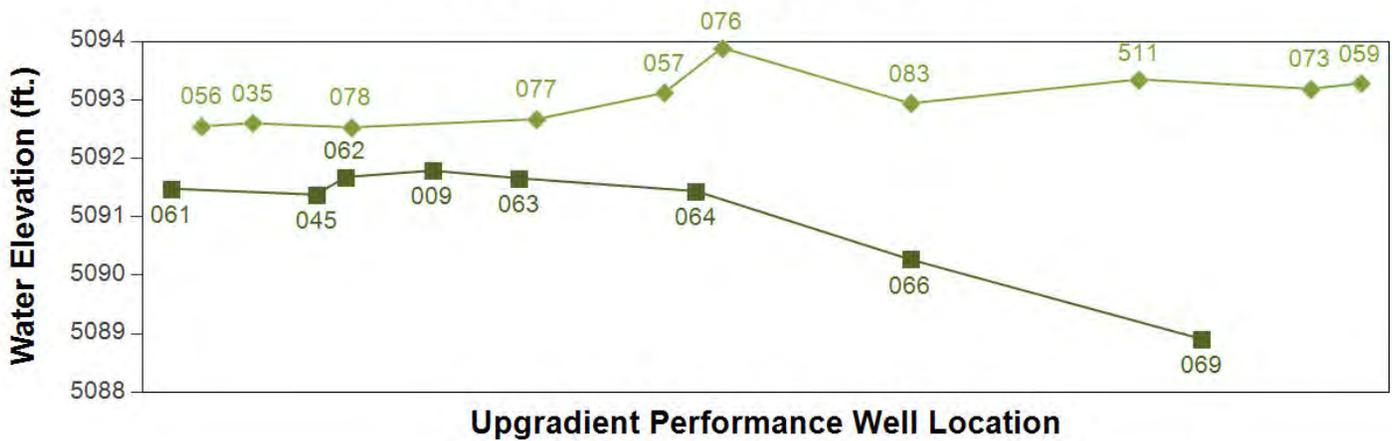
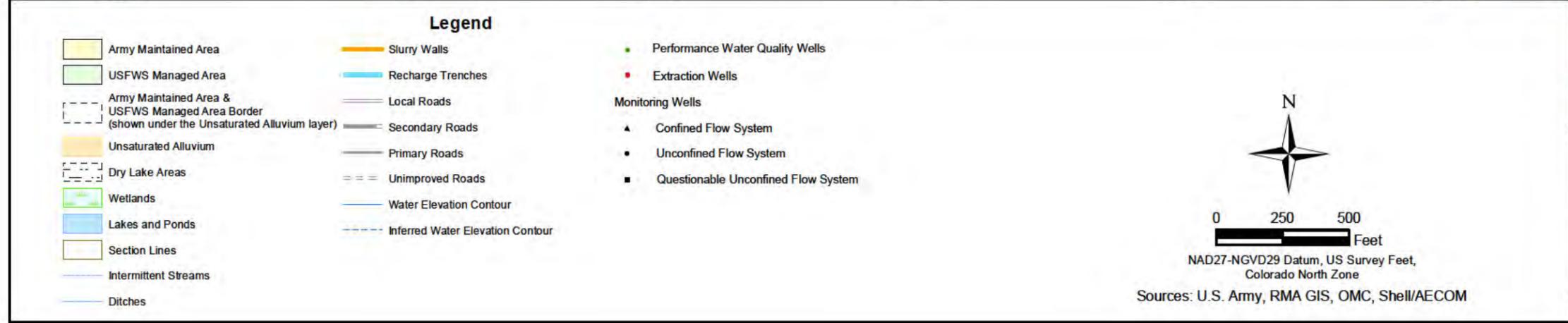
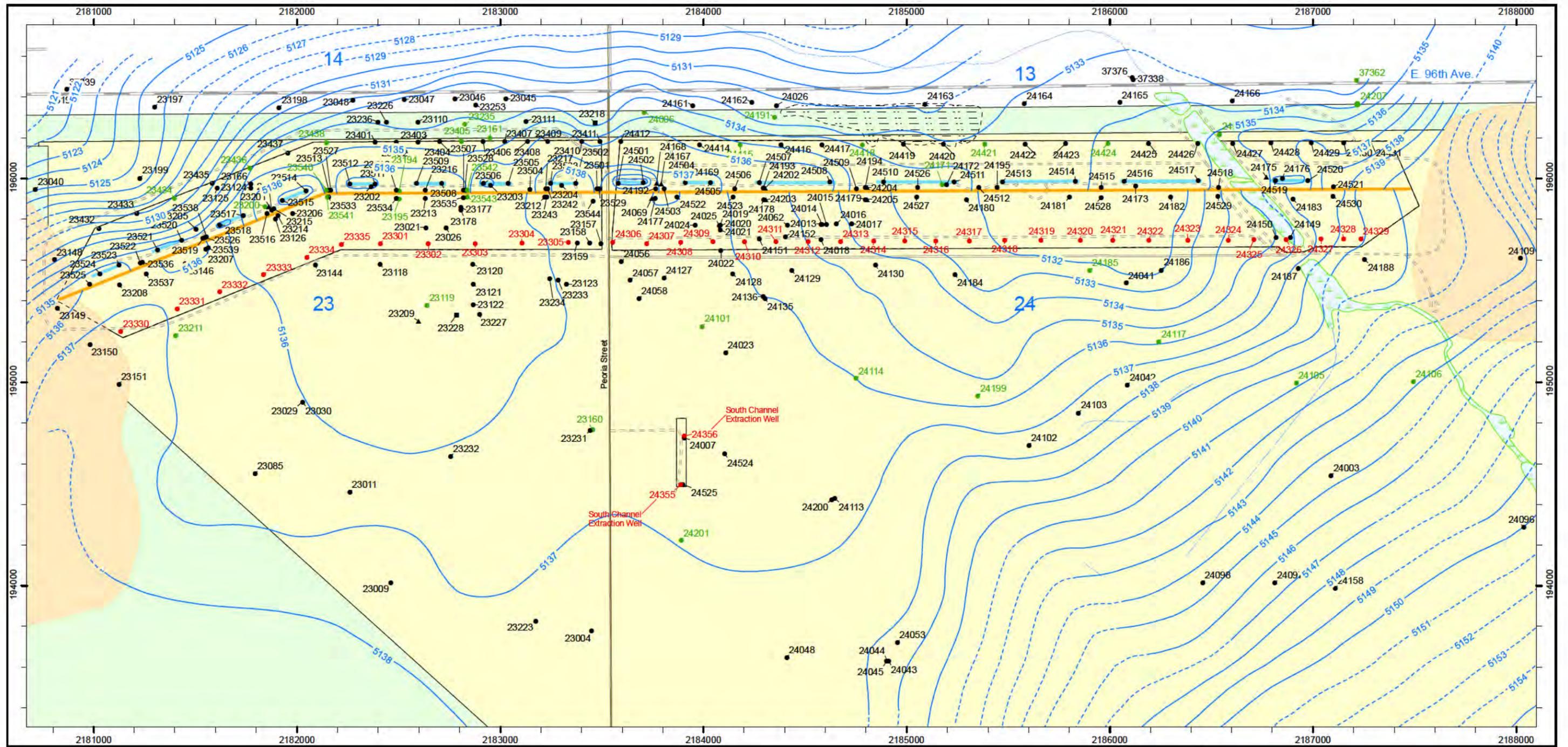


Figure 6.3-4



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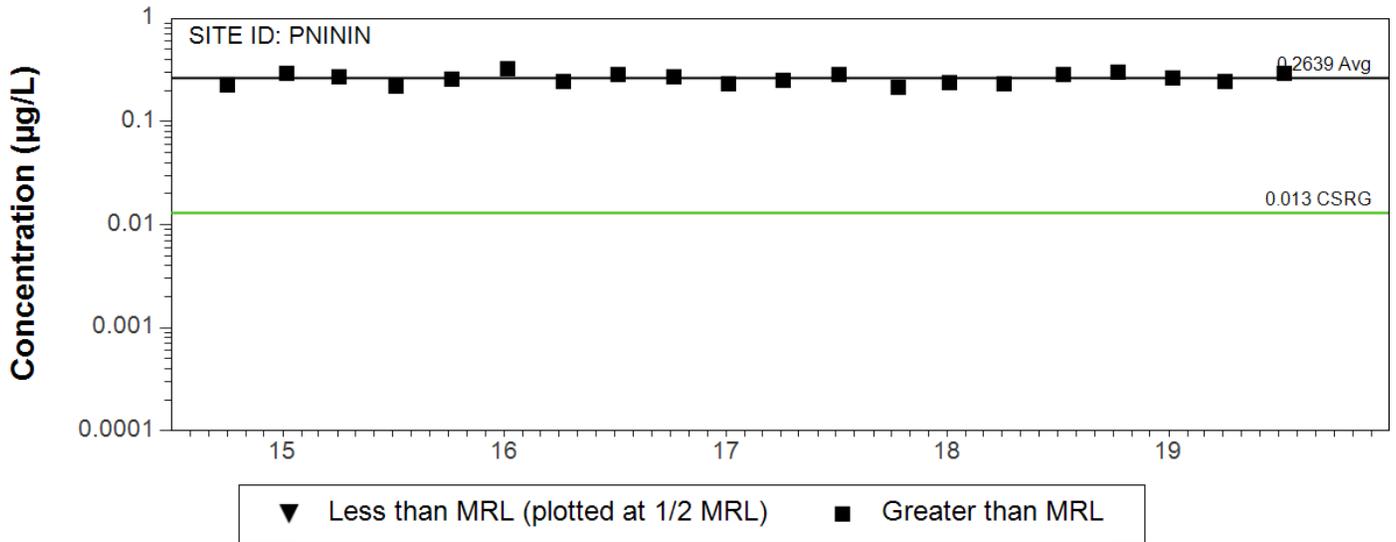
Figure 6.3-7

FY19 North Boundary Containment System Monitoring Well Network and Potentiometric Surface for the Unconfined Flow System

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8/21/2020

North Boundary Treatment Plant Influent - DLDRN

2014-10-01 to 2019-09-30



North Boundary Treatment Plant Effluent - DLDRN

2014-10-01 to 2019-09-30

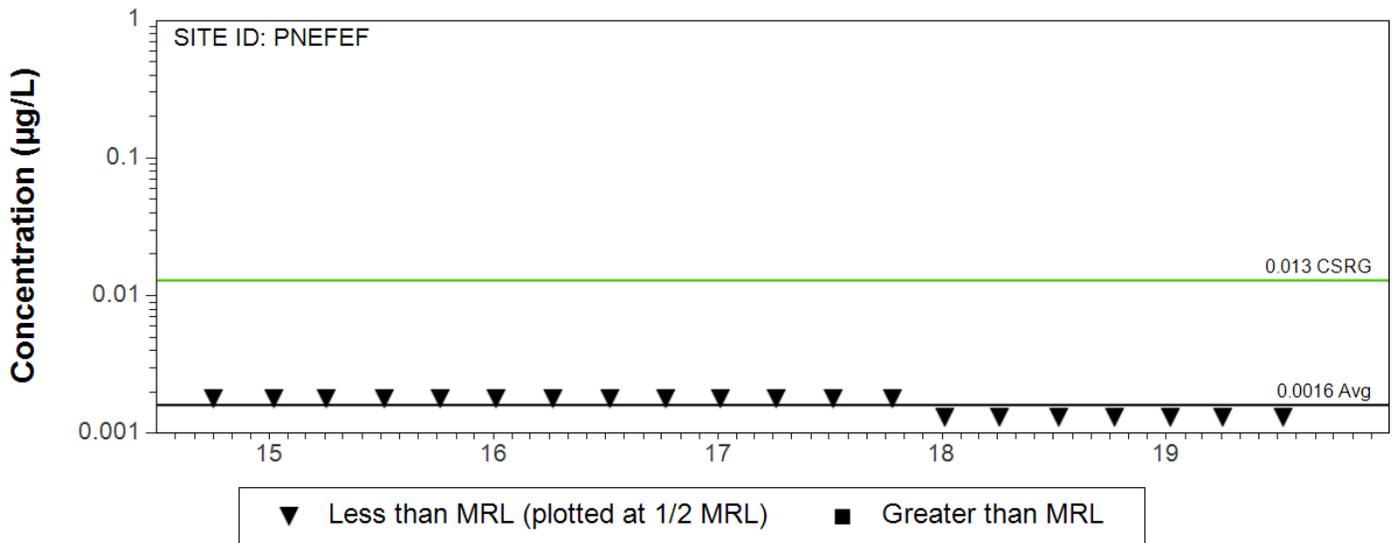
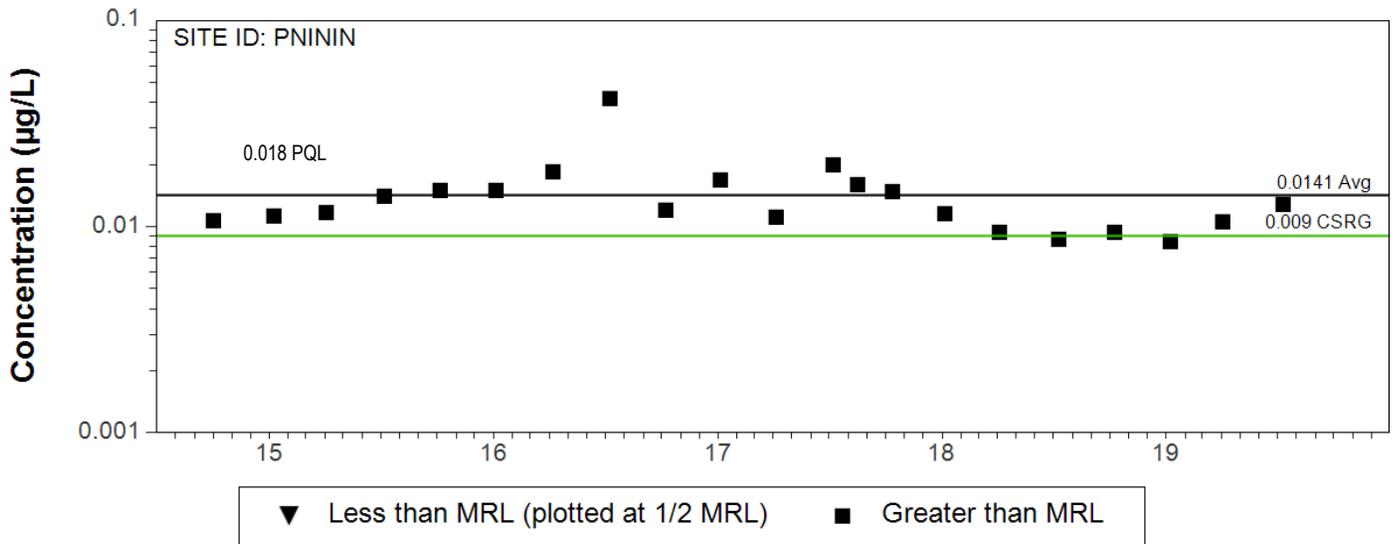


Figure 6.3-8

North Boundary Treatment Plant Influent - NNDMEA

2014-10-01 to 2019-09-30



North Boundary Treatment Plant Effluent - NNDMEA

2014-10-01 to 2019-09-30

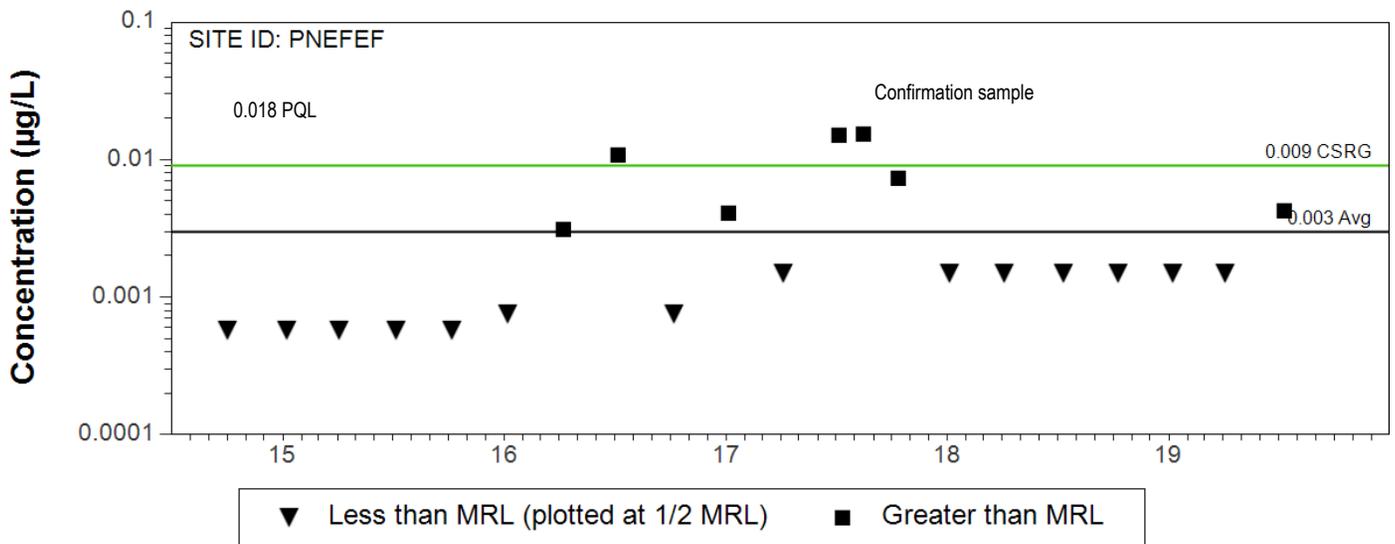
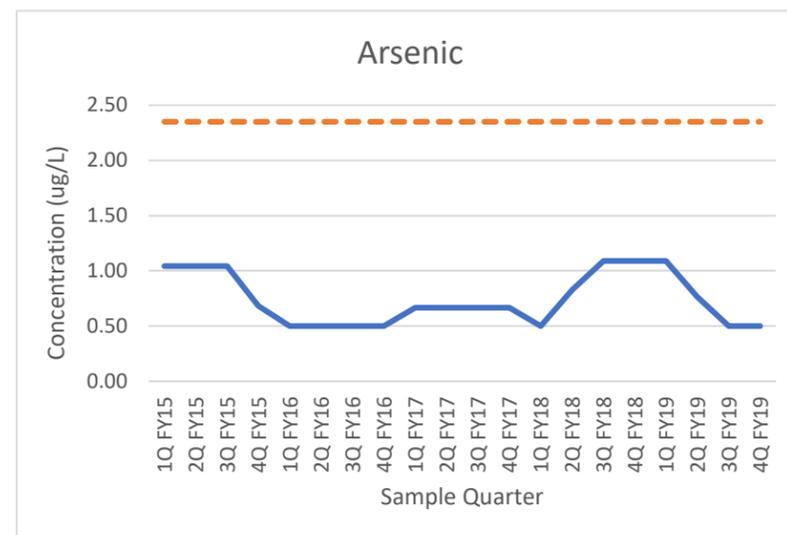
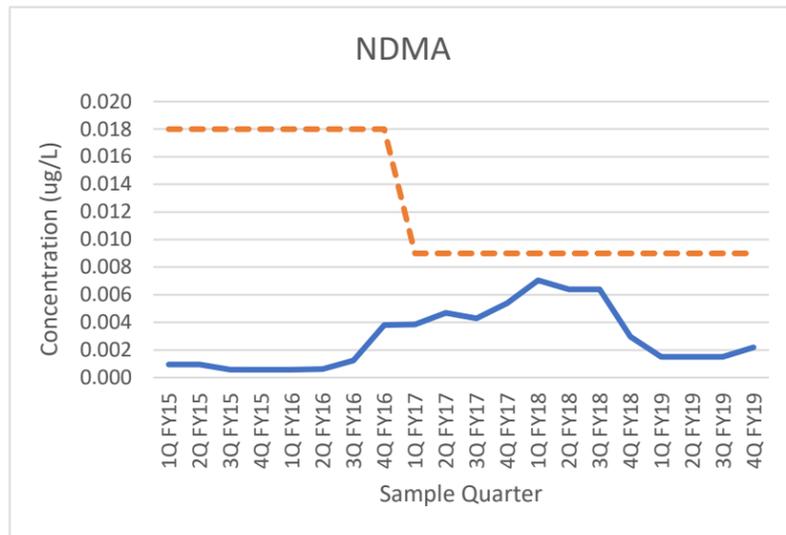
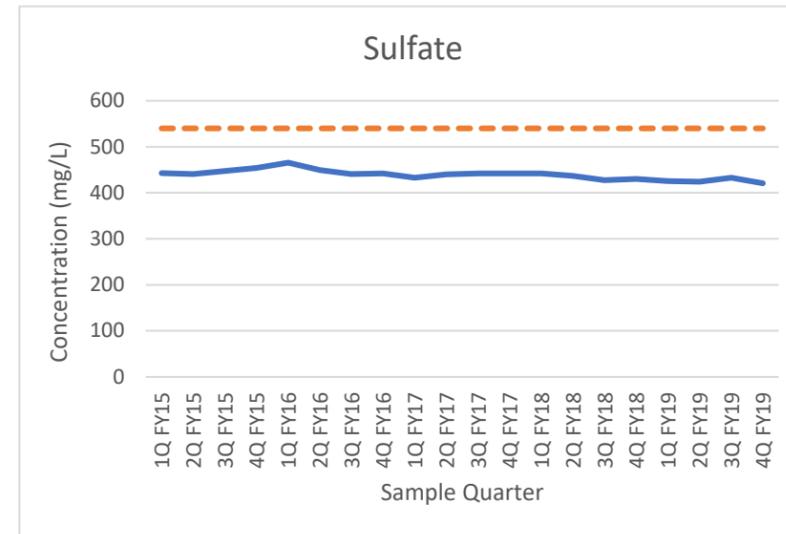
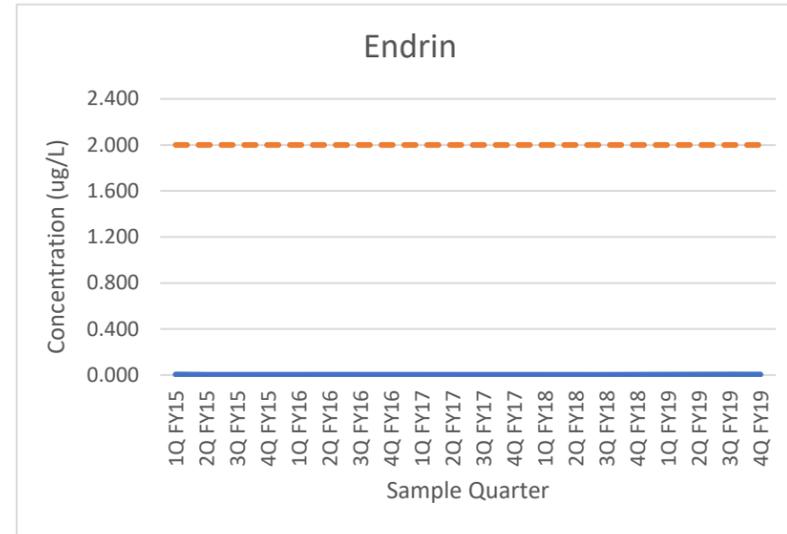
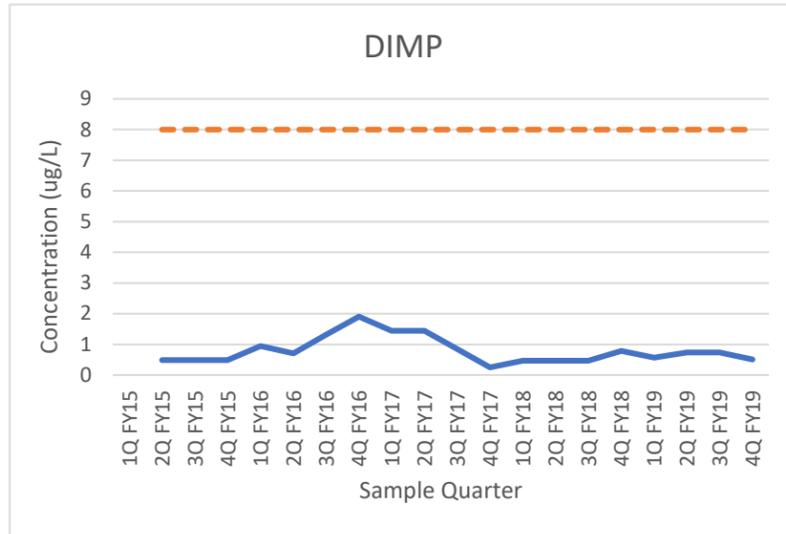
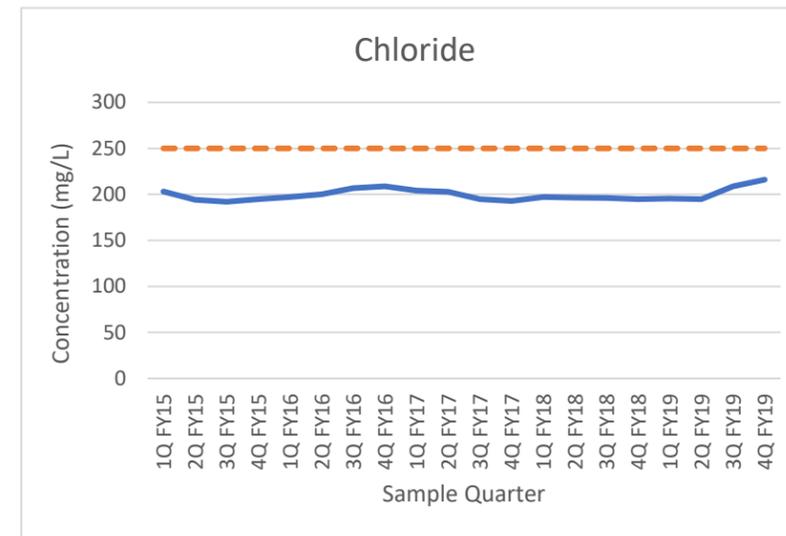
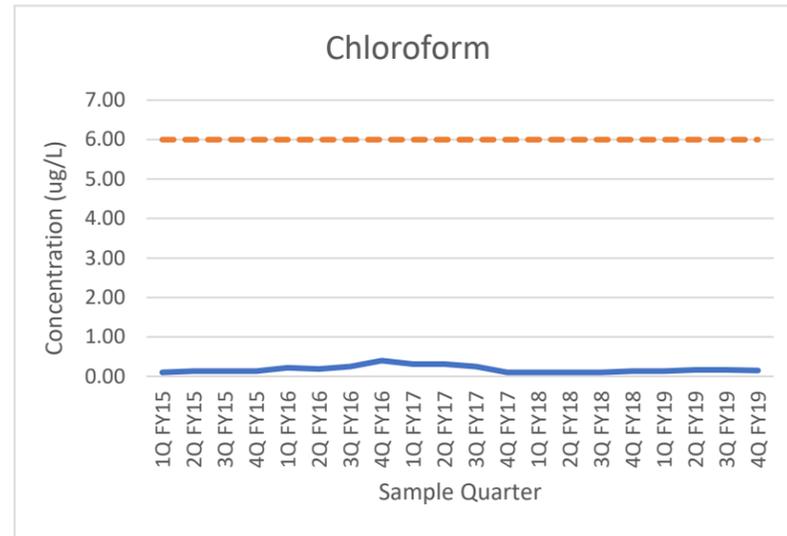
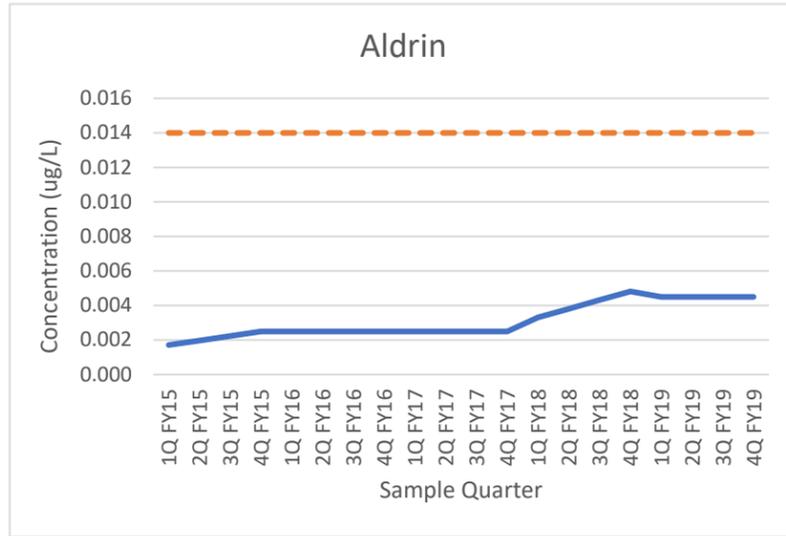


Figure 6.3-9

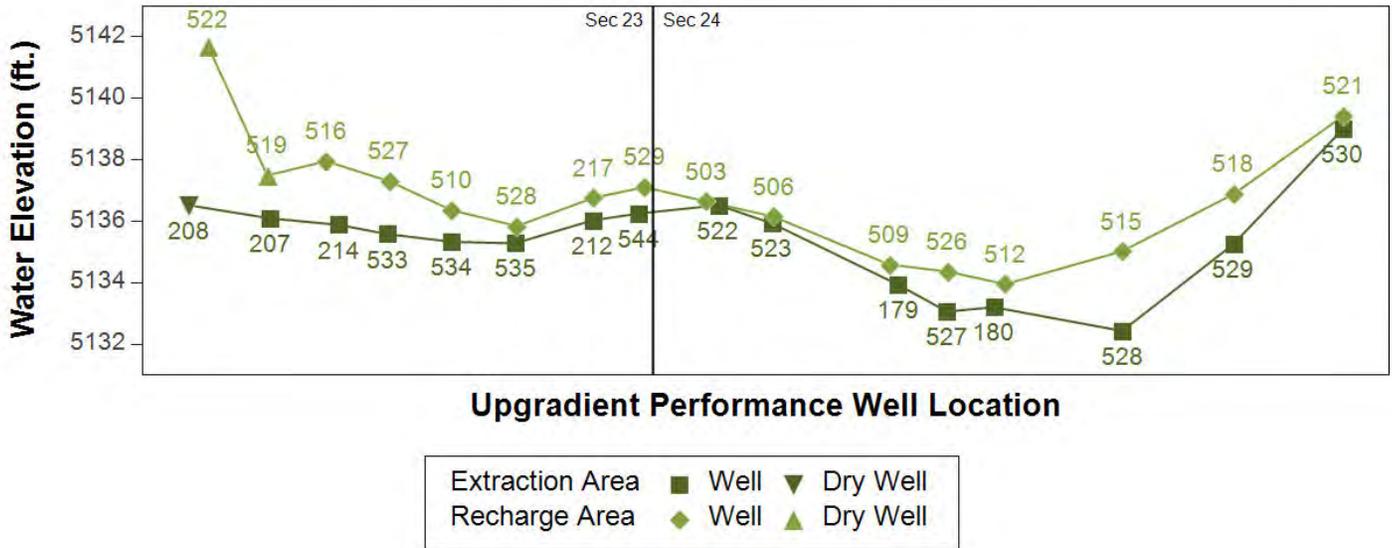
Figure 6.3-10 North Boundary Effluent Four-Quarter Moving Averages (FY15 - FY19)



— Analyte Moving Average - - - CSR/PQL
 Note: Moving averages shown for routine CSRG analytes with effluent detections.

North Boundary Water Levels (Alluvial)

Third Quarter FY2019: 2019-04-01 to 2019-06-30



North Boundary Water Levels (Alluvial)

Fourth Quarter FY2019: 2019-07-01 to 2019-09-30

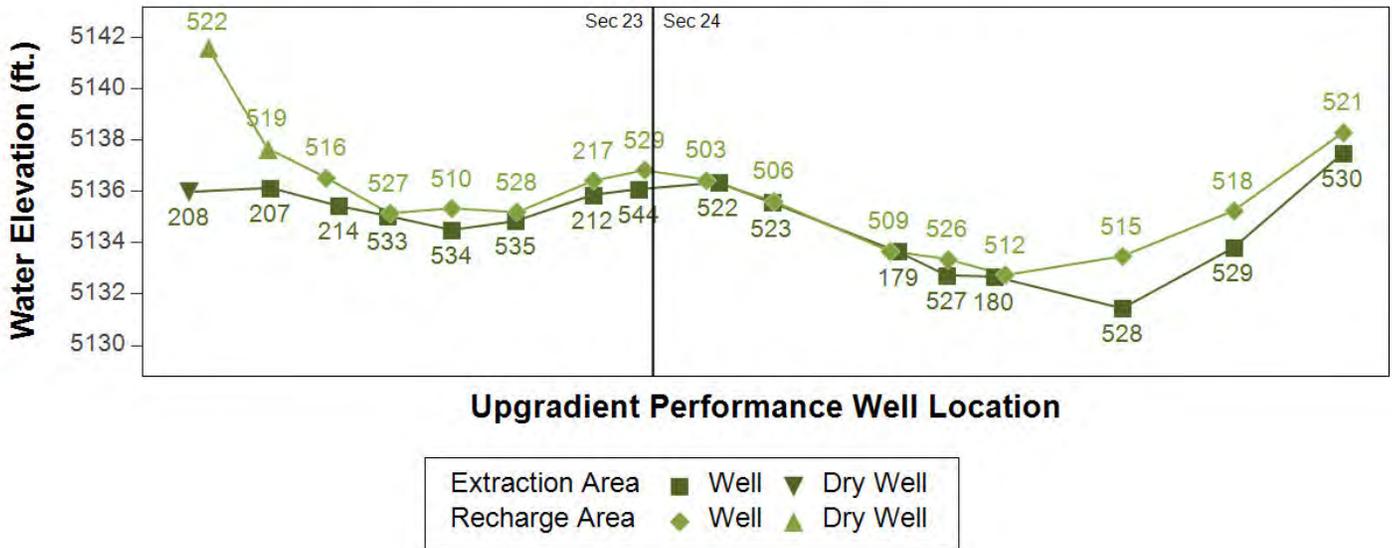
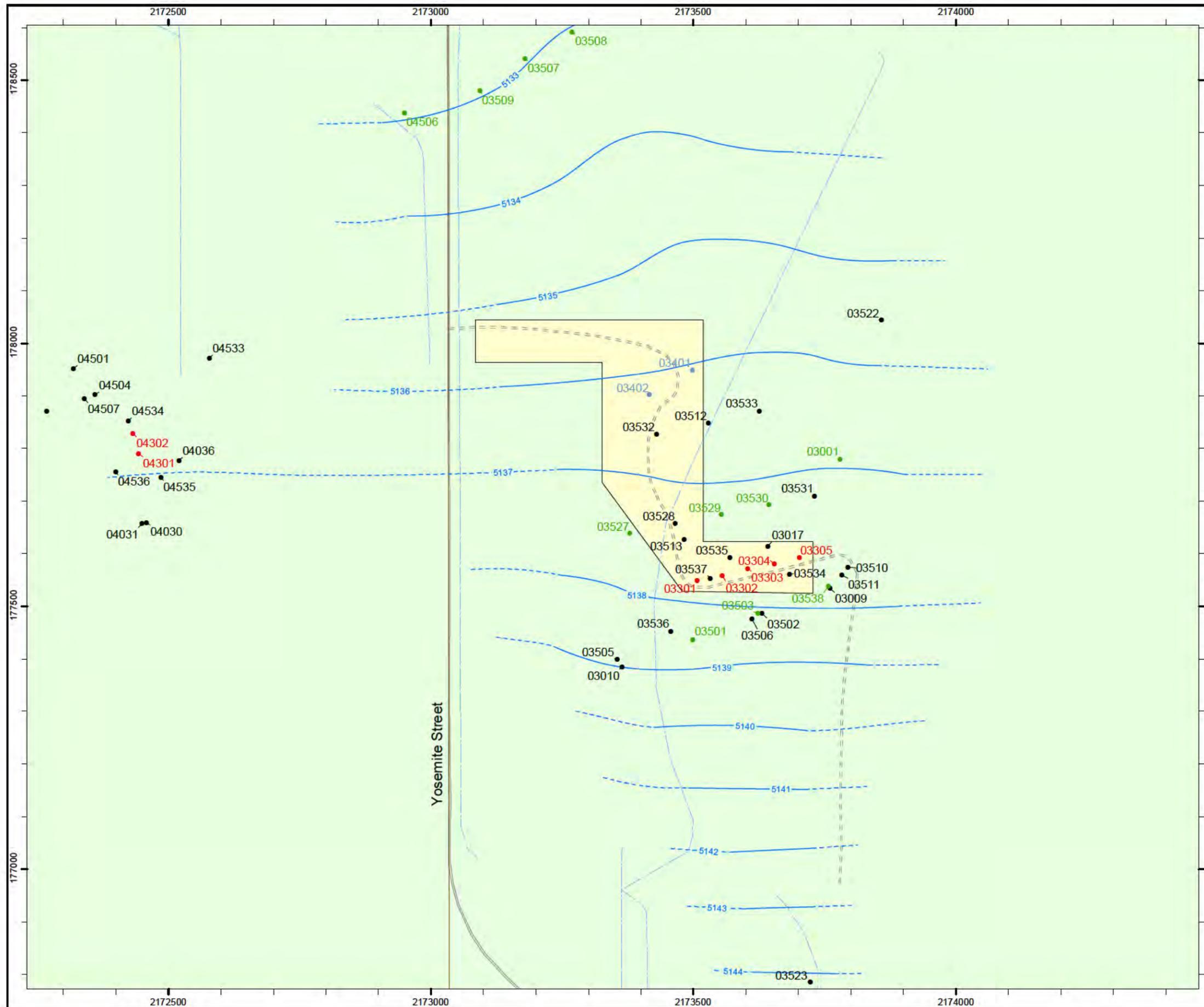


Figure 6.3-11



Legend

- Performance Wells
- Extraction Wells*
- Recharge Wells
- Monitoring Wells
- ▲ Confined Flow System
- Unconfined Flow System
- Ditches
- Paved Roads
- - - Unimproved Roads
- Section Lines
- Army Maintained Area
- USFWS Managed Area
- Water Elevation Contour
- - - Inferred Water Elevation Contour

* The RYCS extraction and recharge wells were shut off in May 2016 in accordance with RYCS Shut-Off Sampling and Analysis Plan and DD-34 (Navarro 2016) and are currently non-operational.

NAD27-NGVD28 Datum, US Survey Feet, Colorado North Zone
Sources: U.S. Army, RMA GIS, OMC, Shell/AECOM

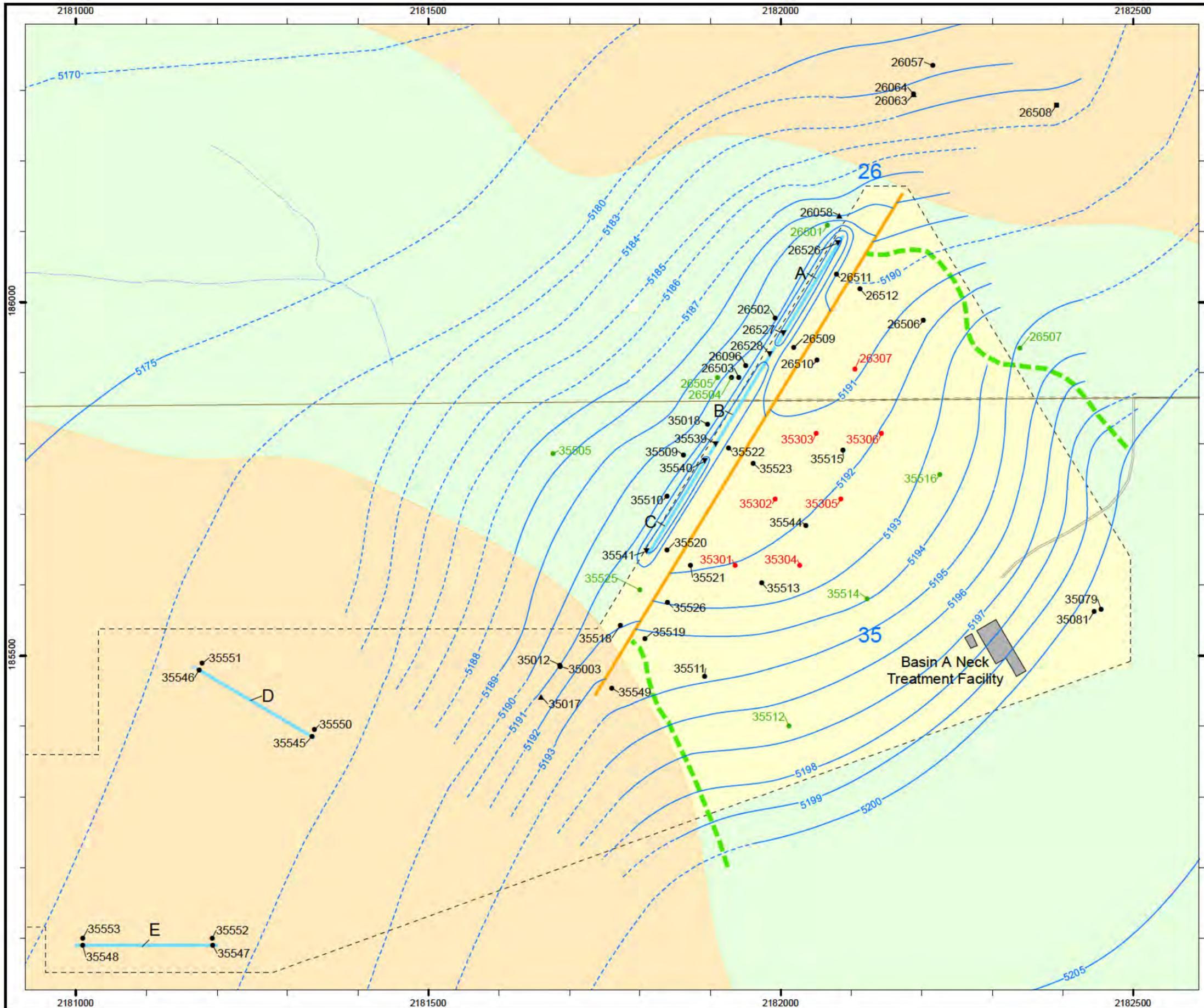
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Figure 6.3-14

FY17 Railyard Containment System Monitoring Well Network and Potentiometric Surface for the Unconfined Flow System

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8/21/2020



Legend

- USFWS Managed Area
- Army Maintained Area
- Army Maintained Area & USFWS Managed Area Border (shown under the Unsaturated Alluvium layer)
- Unsaturated Alluvium
- Section Lines
- Buildings
- Ditches
- Slurry Walls
- Recharge Trenches
- Paved Roads
- Unimproved Roads
- Performance Water Quality Wells
- Extraction Wells

Monitoring Wells

- Confined Flow System
- Unconfined Flow System
- Questionable Unconfined Flow System
- Questionable Flow System
- Water elevation contour - 1 foot interval
- Inferred water elevation contour
- Capture Zone

0 100 200 Feet

NAD27-NGVD29 Datum, US Survey Feet, Colorado North Zone

Sources: U.S. Army, RMA GIS, OMC, Shell/AECOM

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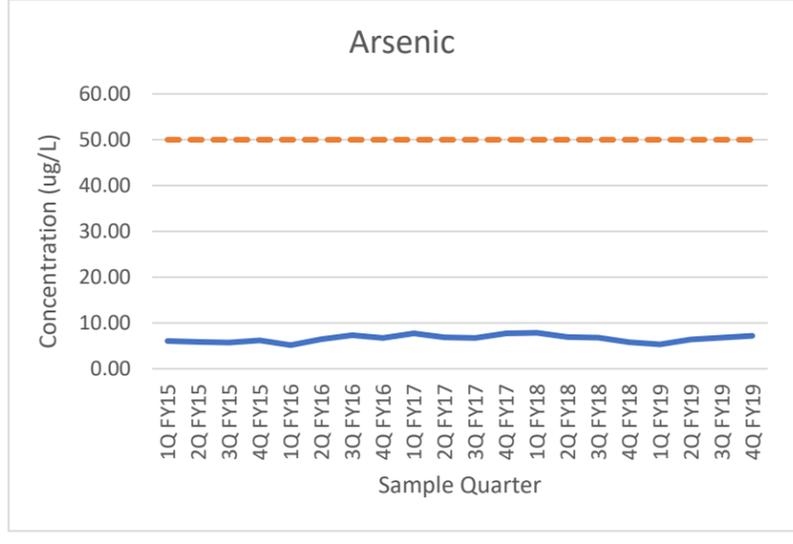
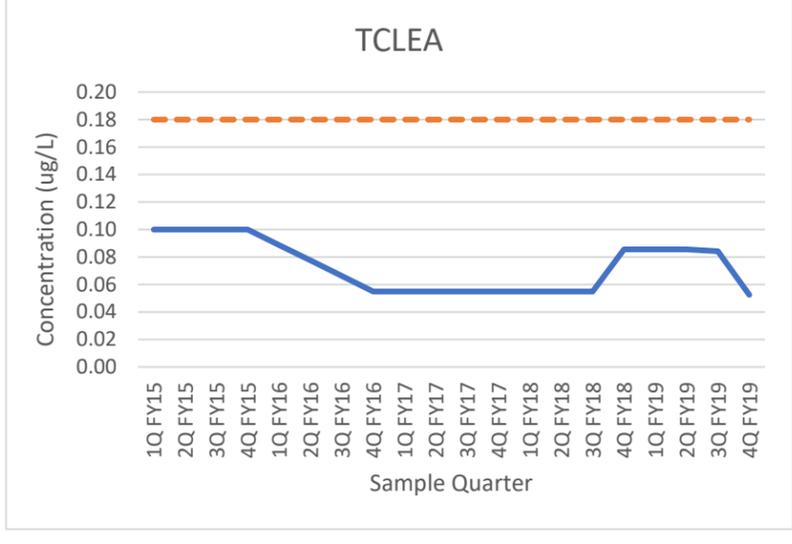
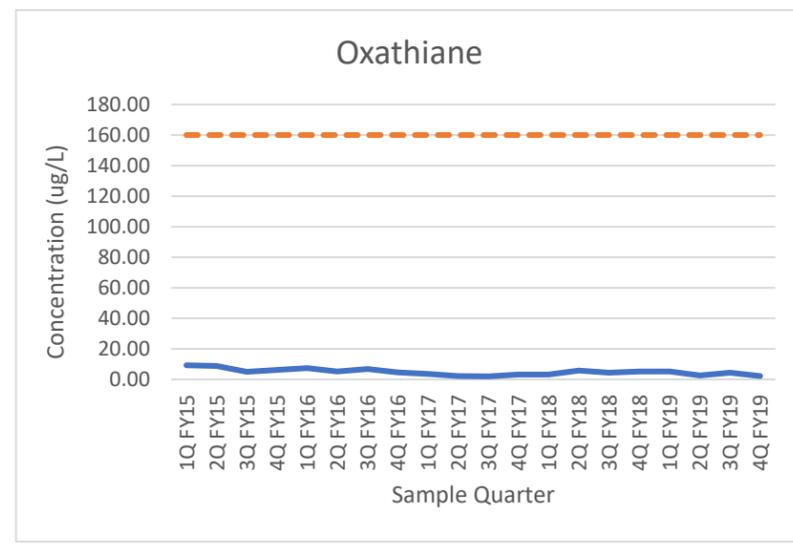
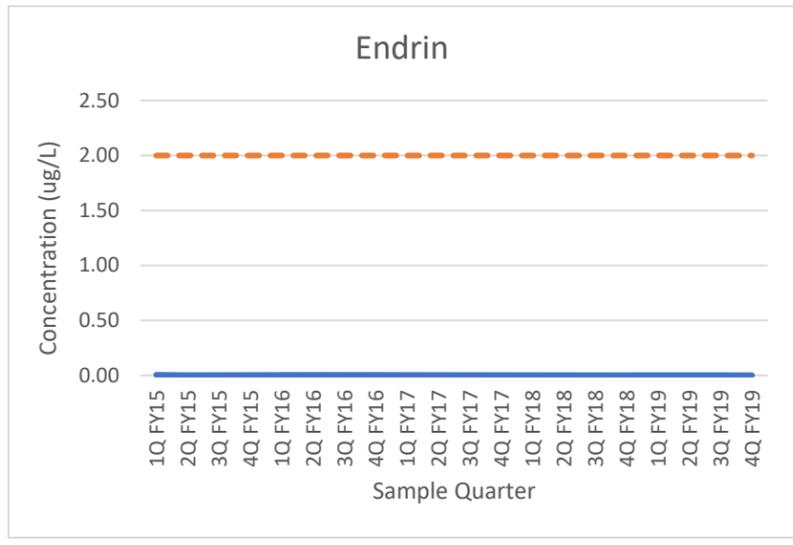
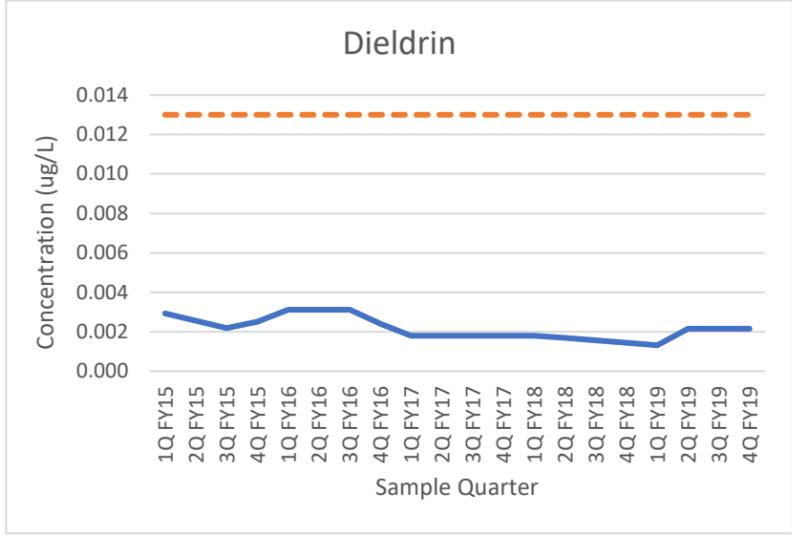
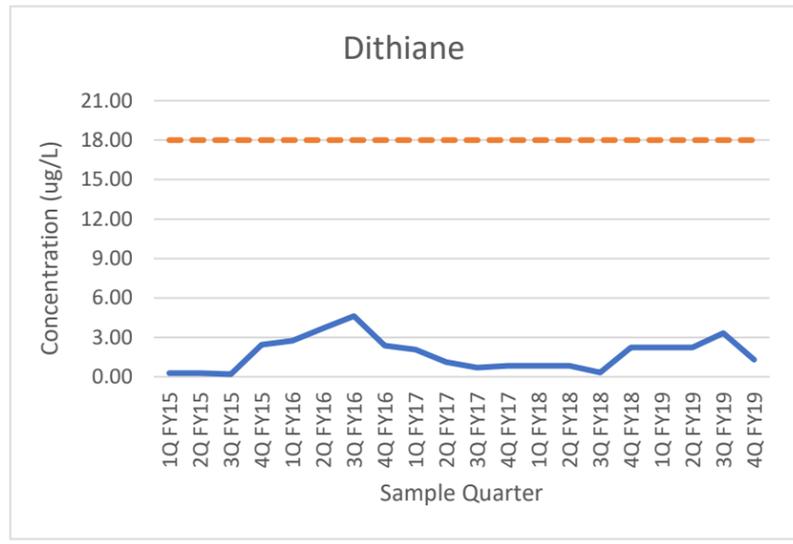
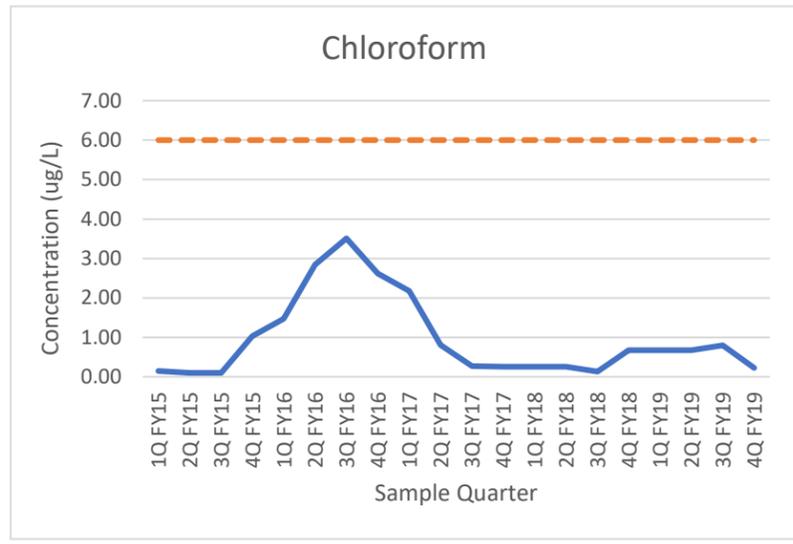
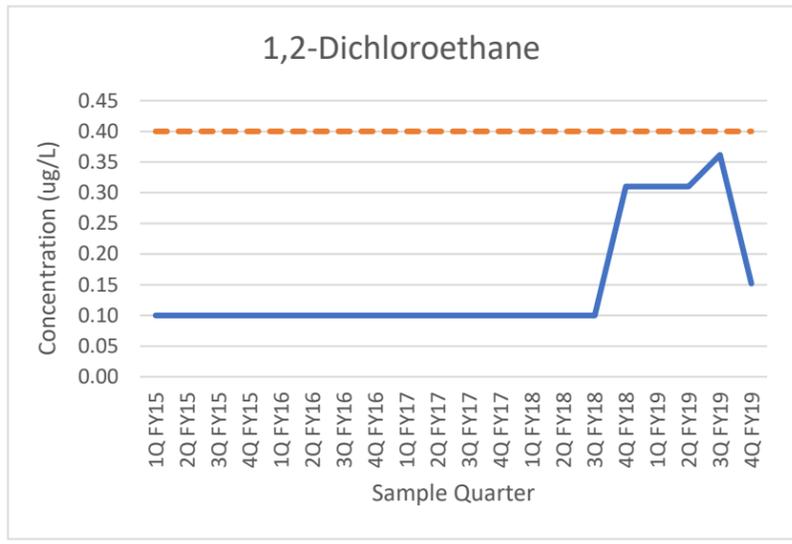
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Figure 6.3-16

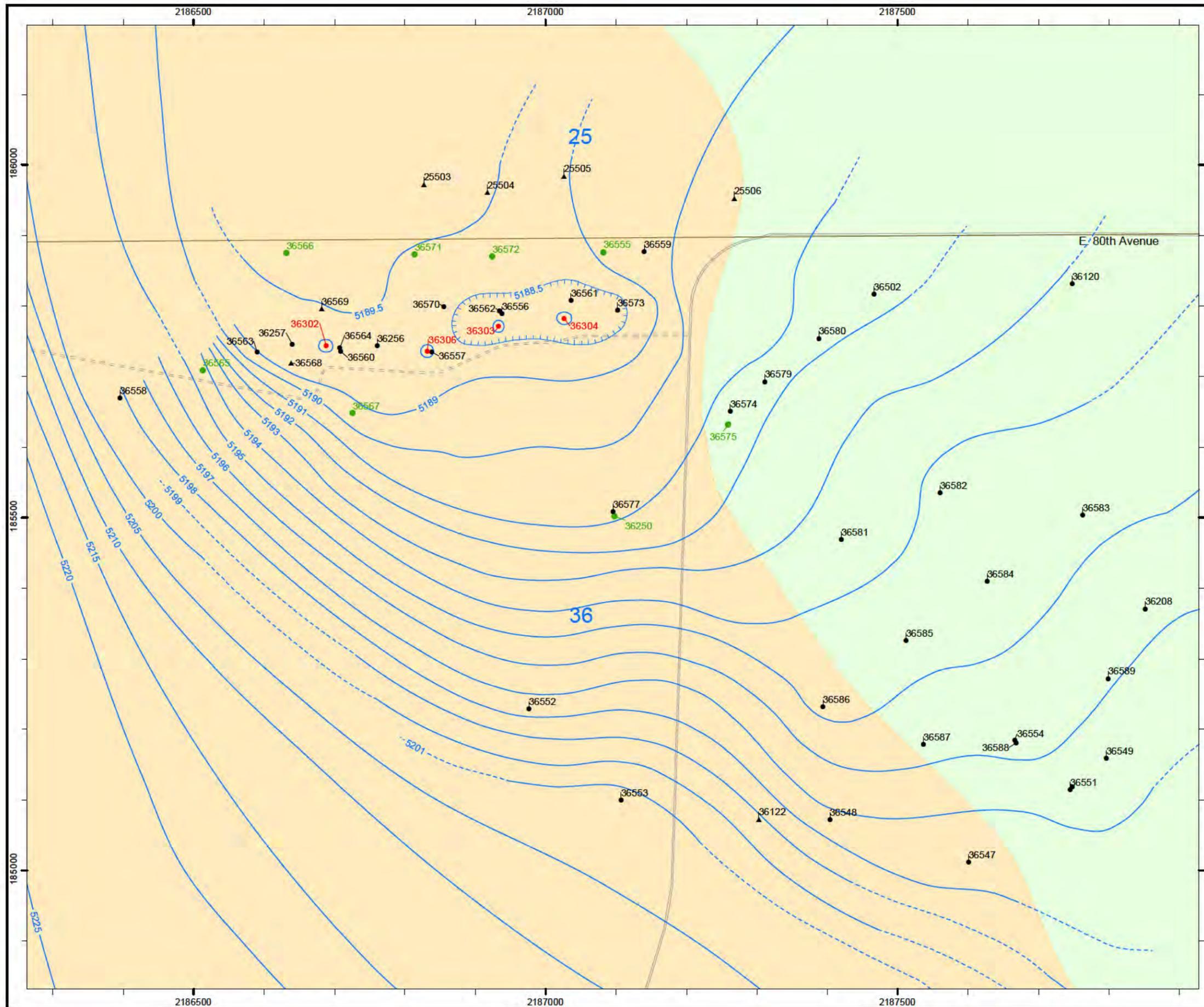
FY19 Basin A Neck Containment System
Monitoring Well Network and Potentiometric
Surface for the Unconfined Flow System

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10/13/2020

Figure 6.3-19 BANS Effluent Four-Quarter Moving Averages (FY15-FY19)



— Analyte Moving Average
 - - - CSR/PQL
 Note: moving averages shown for routine CSRG analytes with effluent detections.



- ### Legend
- USFWS Managed Area
 - Unsaturated Alluvium
 - Section Lines
 - Paved Roads
 - Unimproved Roads
 - Export_Output_brr
 - Extraction Wells
- Monitoring Wells**
- Confined Flow System
 - Unconfined Flow System
 - Water Elevation Contour
 - Inferred Water Elevation Contour

N

0 100 200 Feet

NAD27-NGVD29 Datum, US Survey Feet,
Colorado North Zone

Sources: U.S. Army, RMA GIS, OMC, Shell/AECOM

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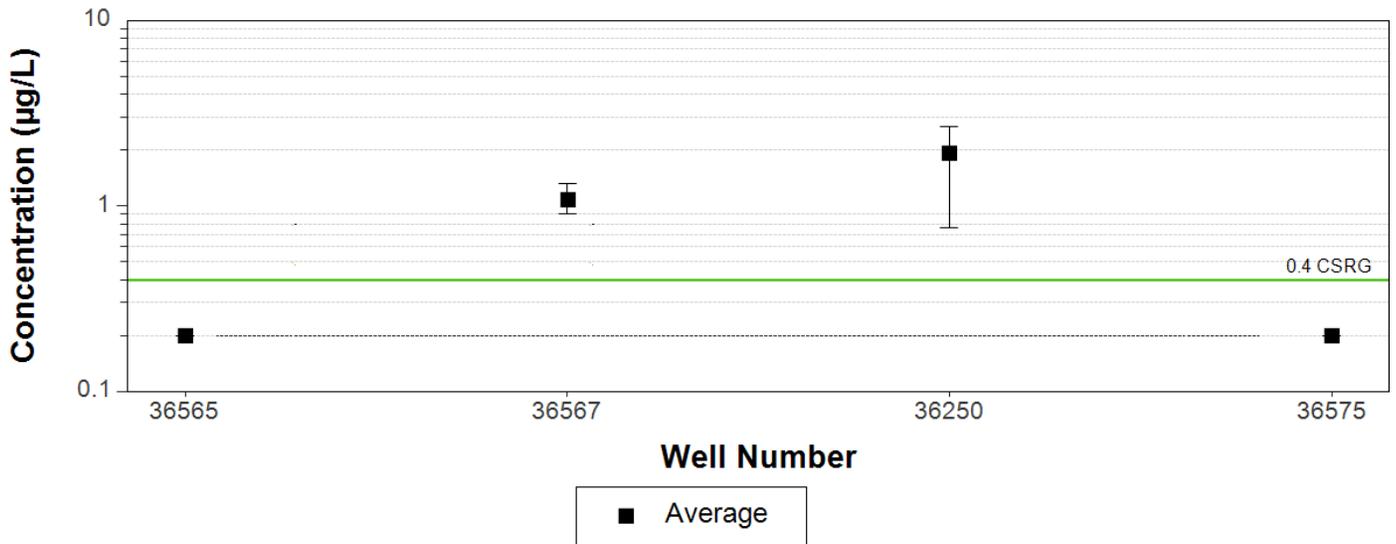
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Figure 6.3-22

FY19 Bedrock Ridge Extraction System
Monitoring Well Network and Potentiometric
Surface for the Unconfined Flow System

Bedrock Ridge Upgradient Performance Wells - 12DCLE

2014-10-01 to 2019-09-30



Bedrock Ridge Downgradient Performance Wells - 12DCLE

2014-10-01 to 2019-09-30

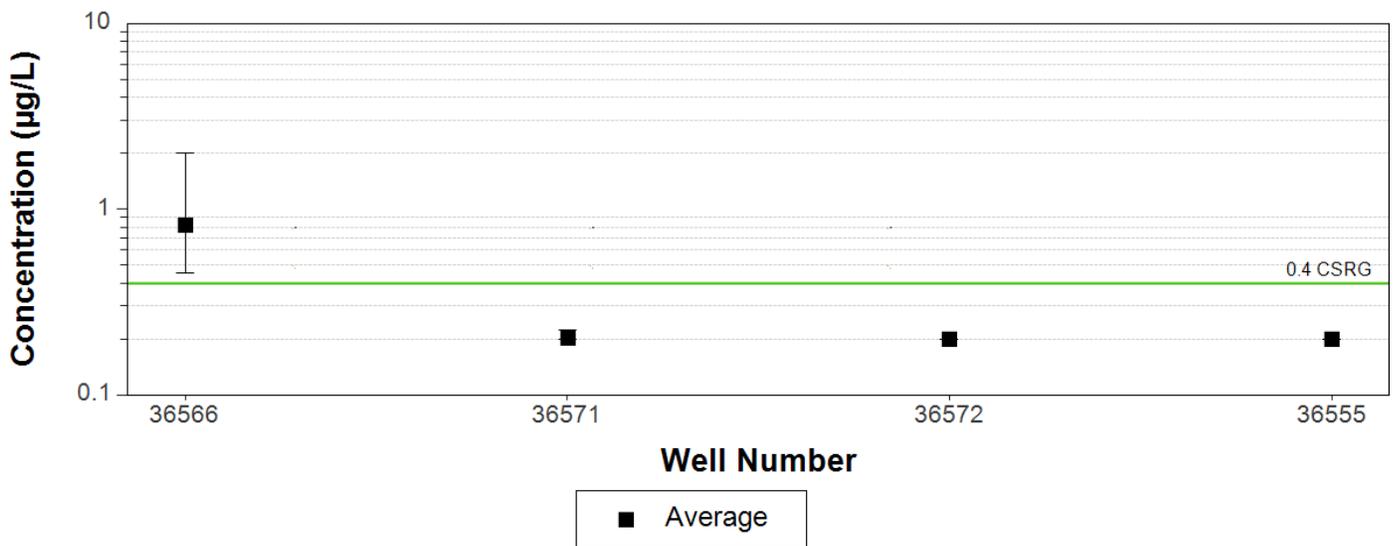
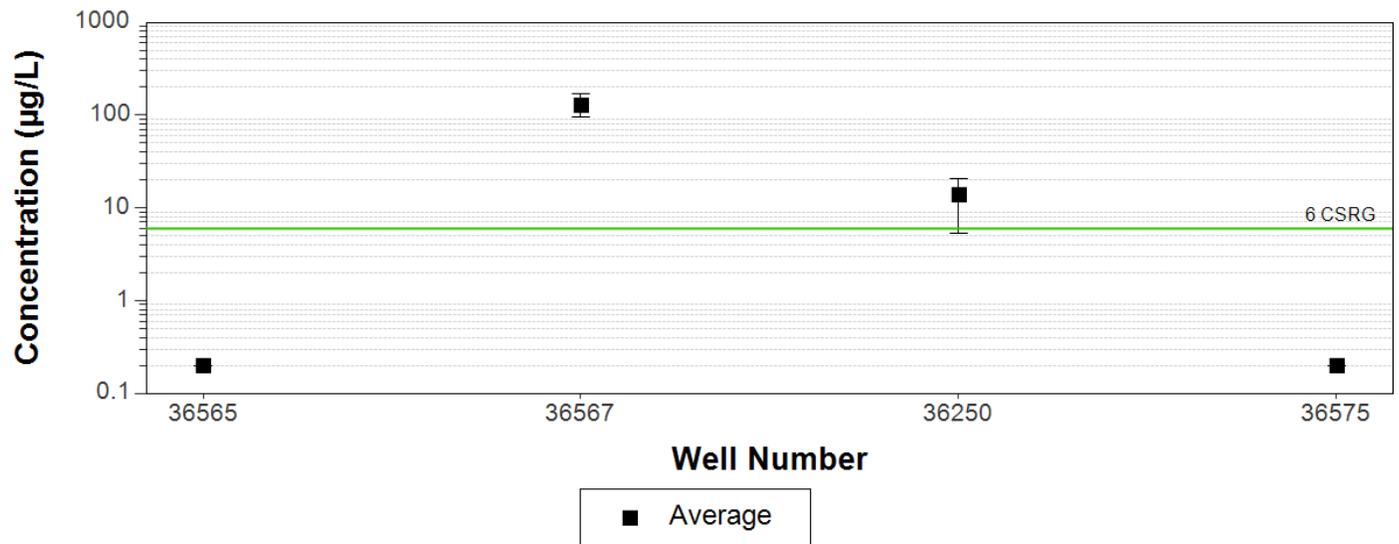


Figure 6.3-23

Bedrock Ridge Upgradient Performance Wells - CHCL3

2014-10-01 to 2019-09-30



Bedrock Ridge Downgradient Performance Wells - CHCL3

2014-10-01 to 2019-09-30

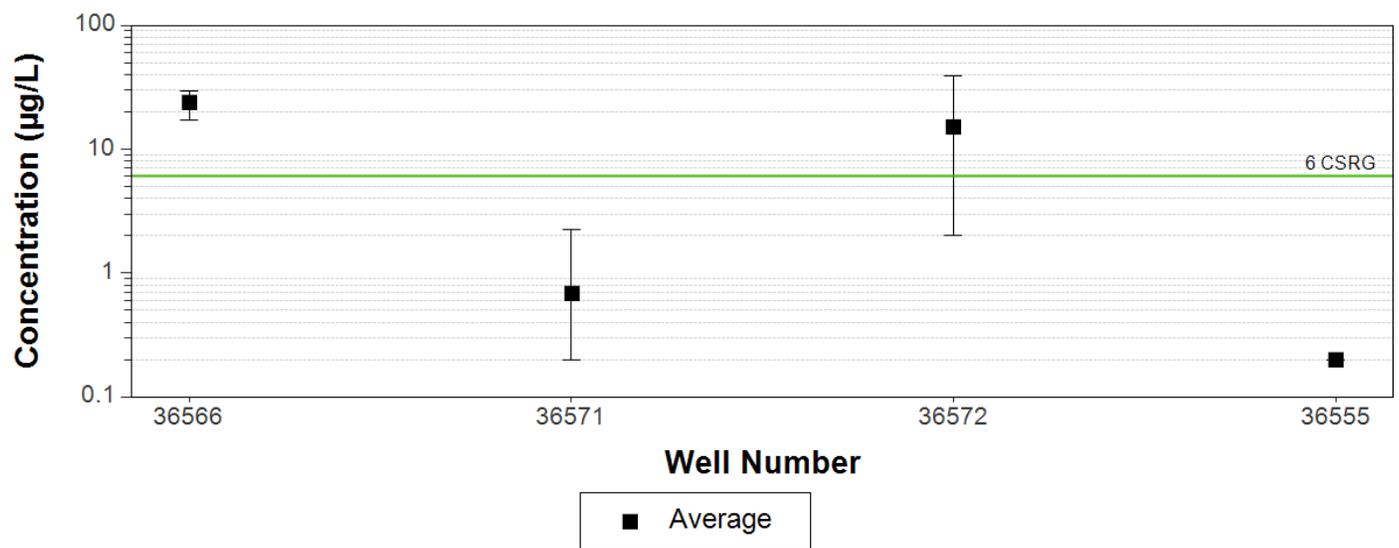
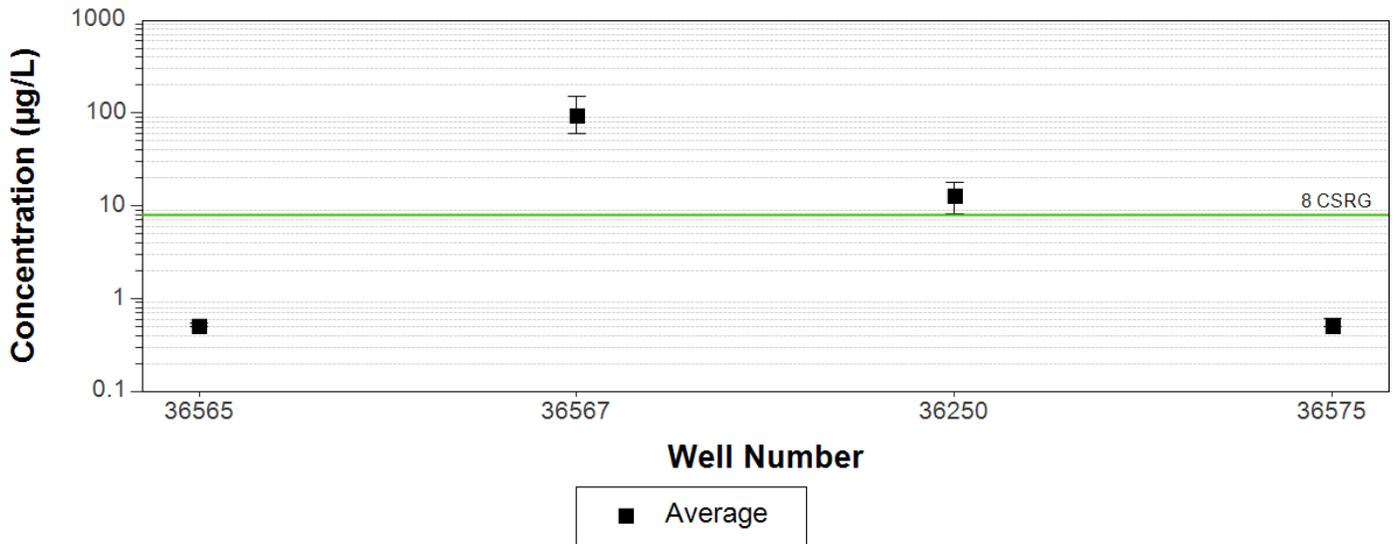


Figure 6.3-24

Bedrock Ridge Upgradient Performance Wells - DIMP

2014-10-01 to 2019-09-30



Bedrock Ridge Downgradient Performance Wells - DIMP

2014-10-01 to 2019-09-30

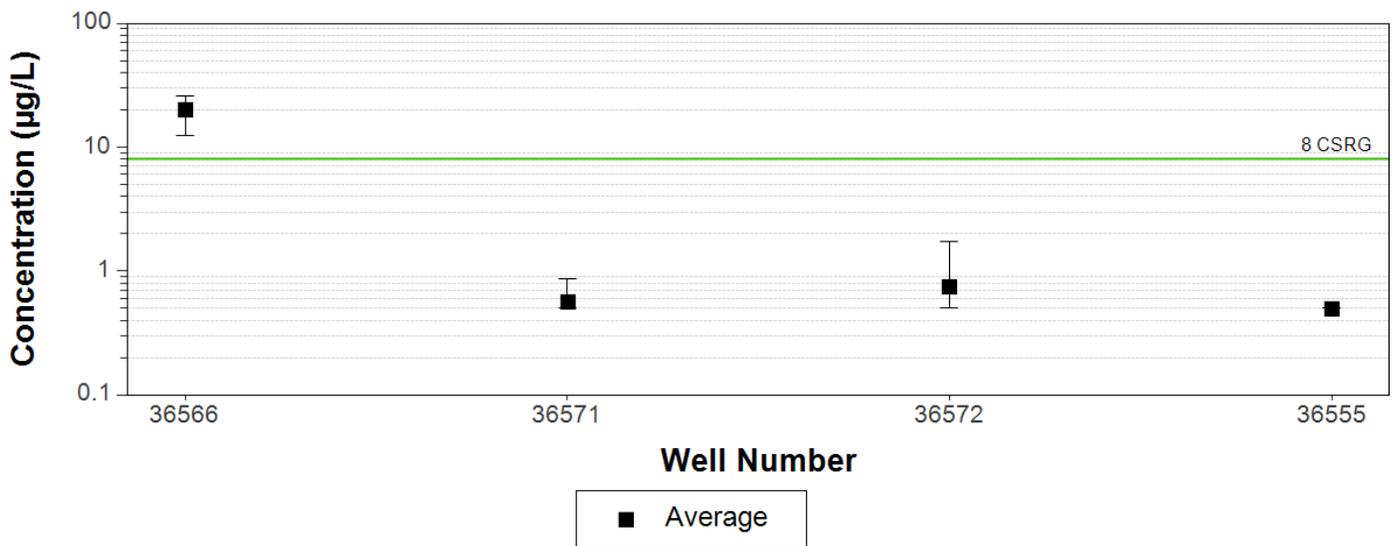
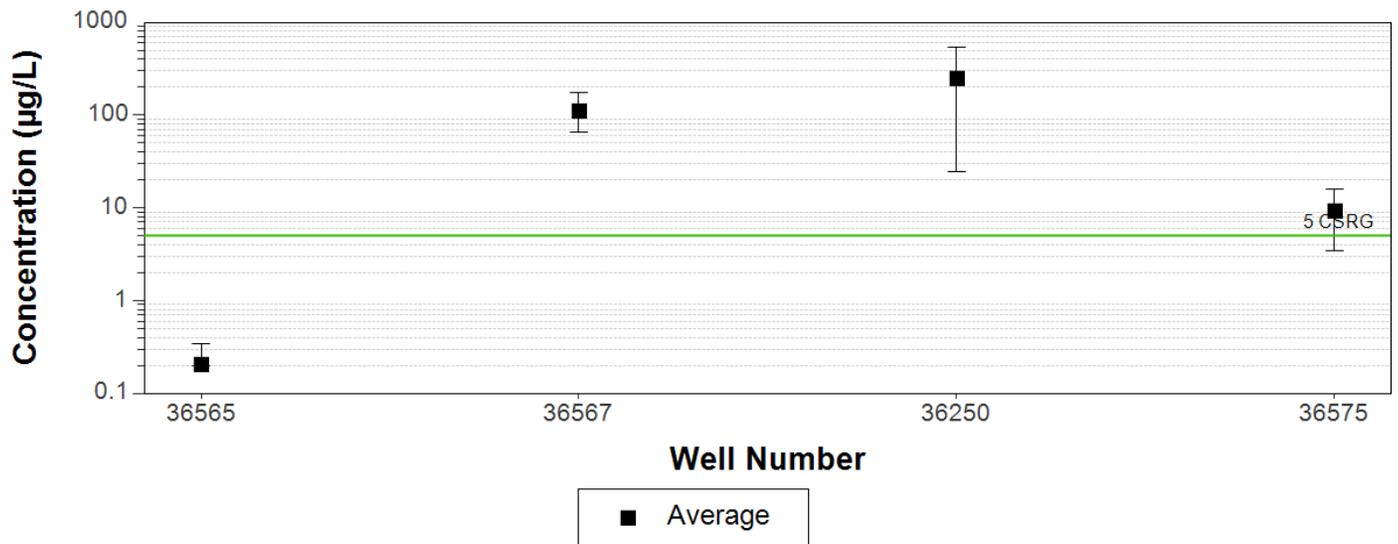


Figure 6.3-25

Bedrock Ridge Upgradient Performance Wells - TCLEE

2014-10-01 to 2019-09-30



Bedrock Ridge Downgradient Performance Wells - TCLEE

2014-10-01 to 2019-09-30

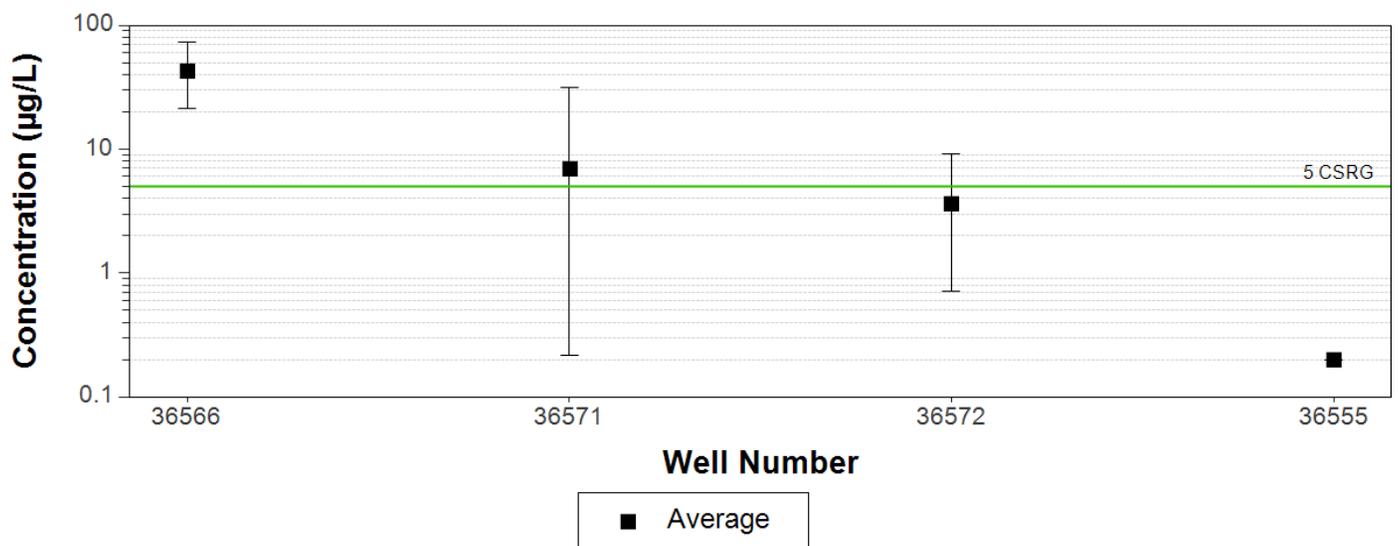
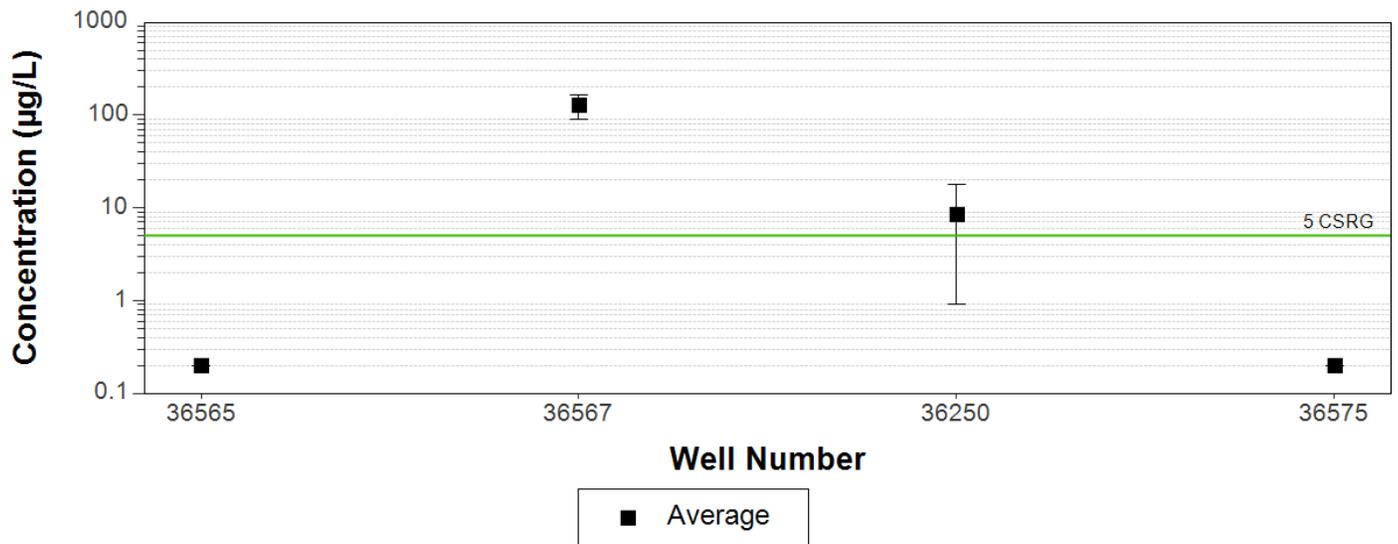


Figure 6.3-26

Bedrock Ridge Upgradient Performance Wells - TRCLE

2014-10-01 to 2019-09-30



Bedrock Ridge Downgradient Performance Wells - TRCLE

2014-10-01 to 2019-09-30

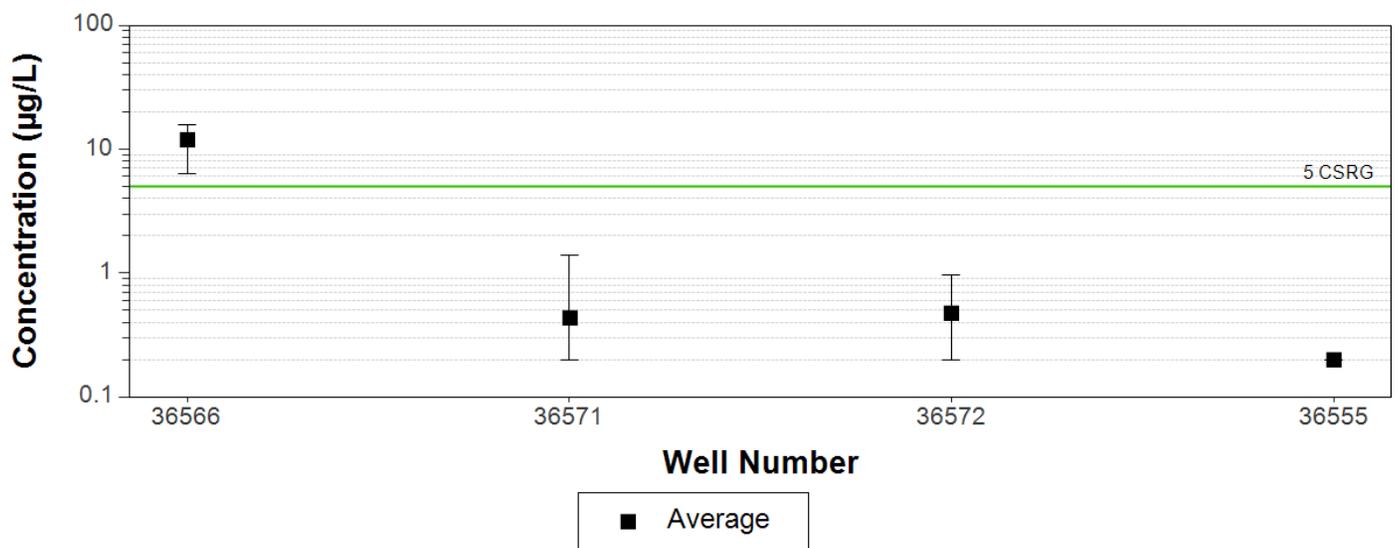
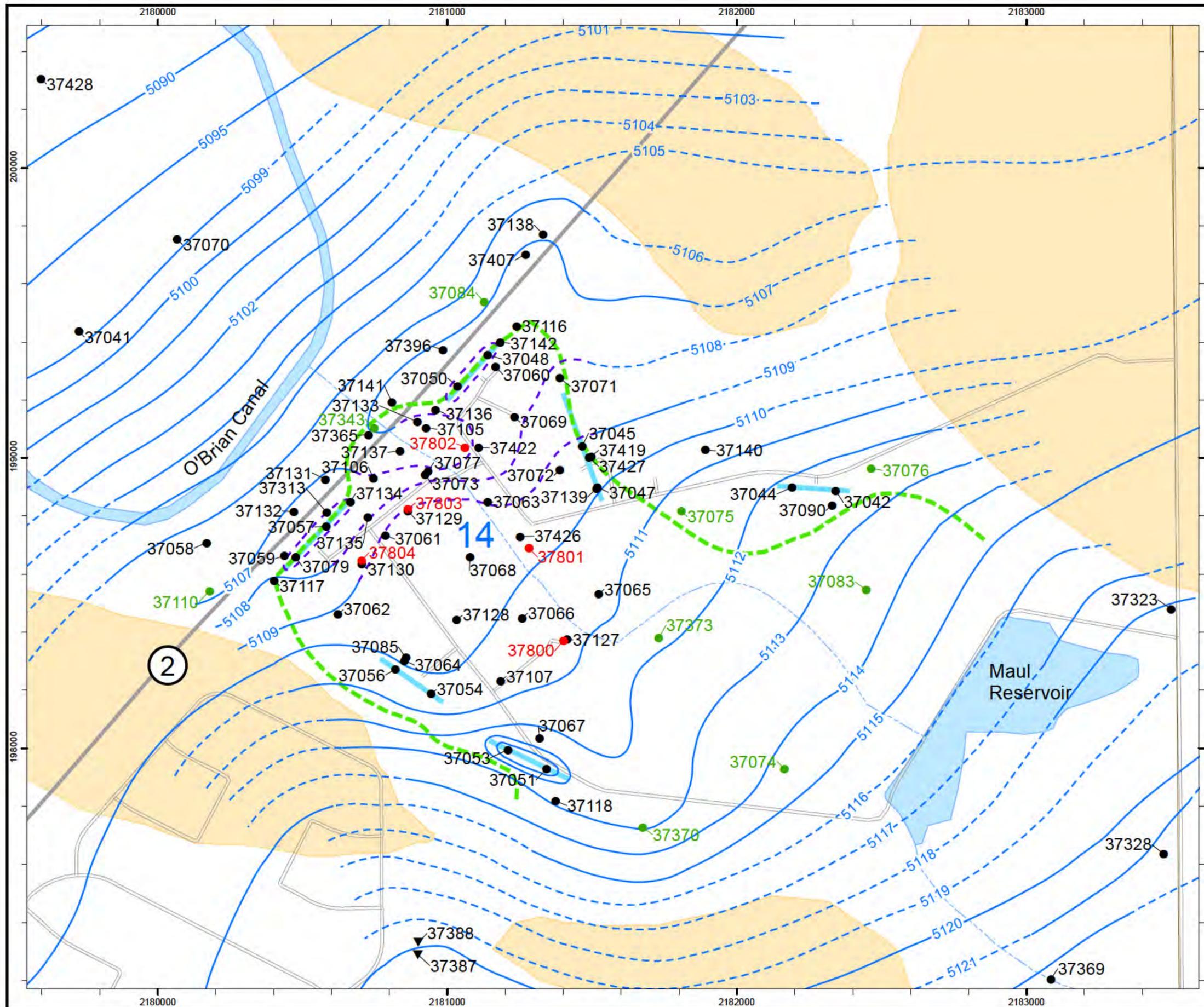


Figure 6.3-27



Legend

- Army Maintained Area
- USFWS Managed Area
- Unsaturated Alluvium
- Section Lines
- Dry Lake Areas
- Lakes, Ponds, and Rivers
- Intermittent Streams
- Ditches
- Recharge Trenches
- Local Roads
- Secondary Roads
- Primary Roads
- Unimproved Roads
- Performance Water Quality Wells
- Extraction Wells

Monitoring Wells

- Questionable Flow System
- Unconfined Flow System
- Water Elevation Contour
- Inferred Water Elevation Contour
- Inferred water elevation contour (due to standing water)
- Capture Zone

0 300 600 Feet

NAD27-NGVD29 Datum, US Survey Feet, Colorado North Zone

Sources: U.S. Army, RMA GIS, OMC, Shell/AECOM

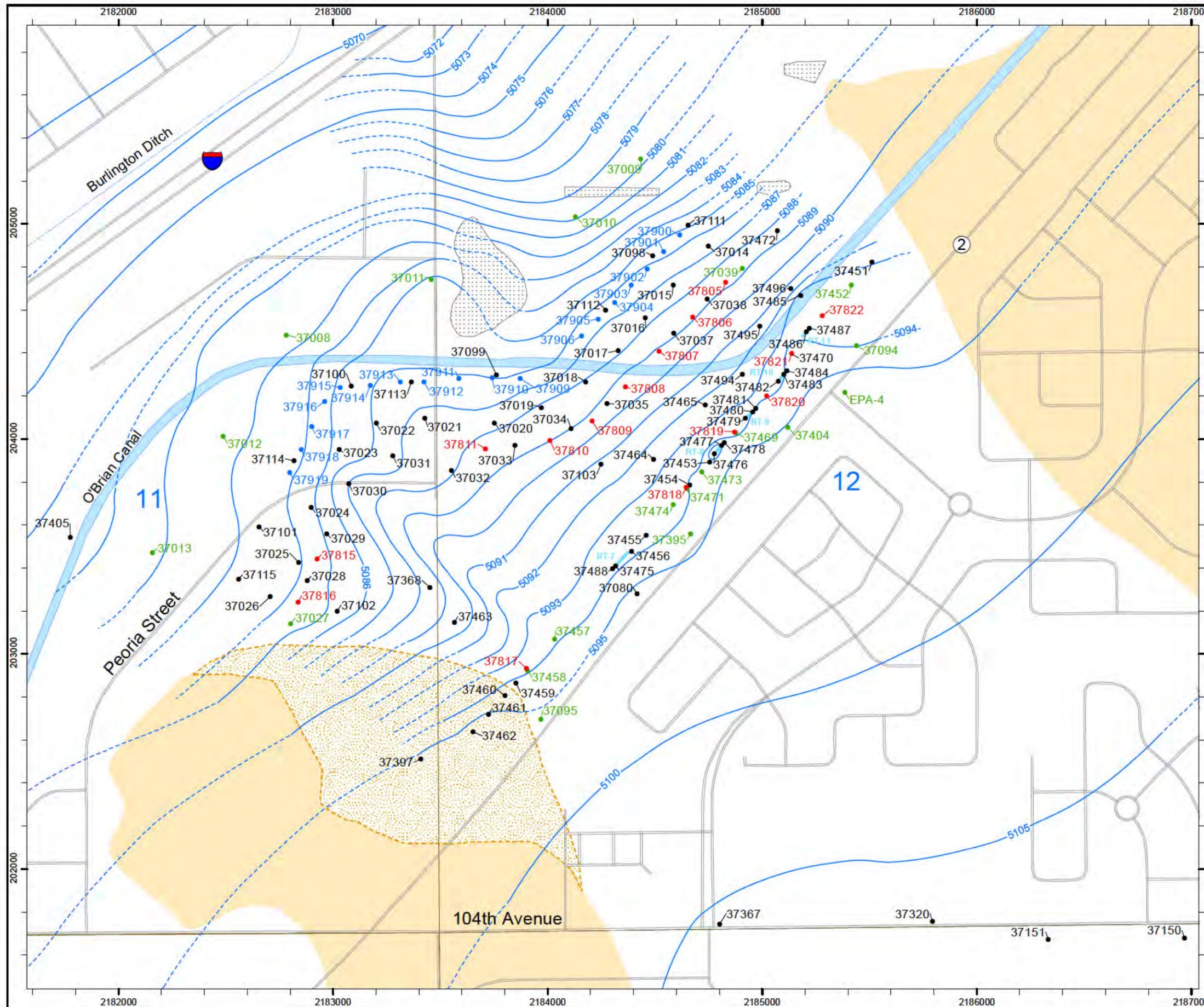
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Figure 6.3-29

FY19 First Creek System Monitoring Well Network and Potentiometric Surface for the Unconfined Flow System

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11/4/2020



Legend

- Unsaturated Alluvium
- Low Permeability Alluvial Sediments
- Section Lines
- Lakes, Ponds, Rivers
- Gravel Pits
- Ditches
- Recharge Trenches
- Paved Roads
- Unimproved Roads
- Performance Water Quality Wells
- Extraction Well
- Recharge Well

Monitoring Wells

- Unconfined Flow System
- Water Elevation Contour
- Inferred Water Elevation Contour

N
 0 300 600 Feet
 NAD27-NGVD29 Datum, US Survey Feet, Colorado North Zone
 Sources: U.S. Army, RMA GIS, OMC, Shell/AECOM

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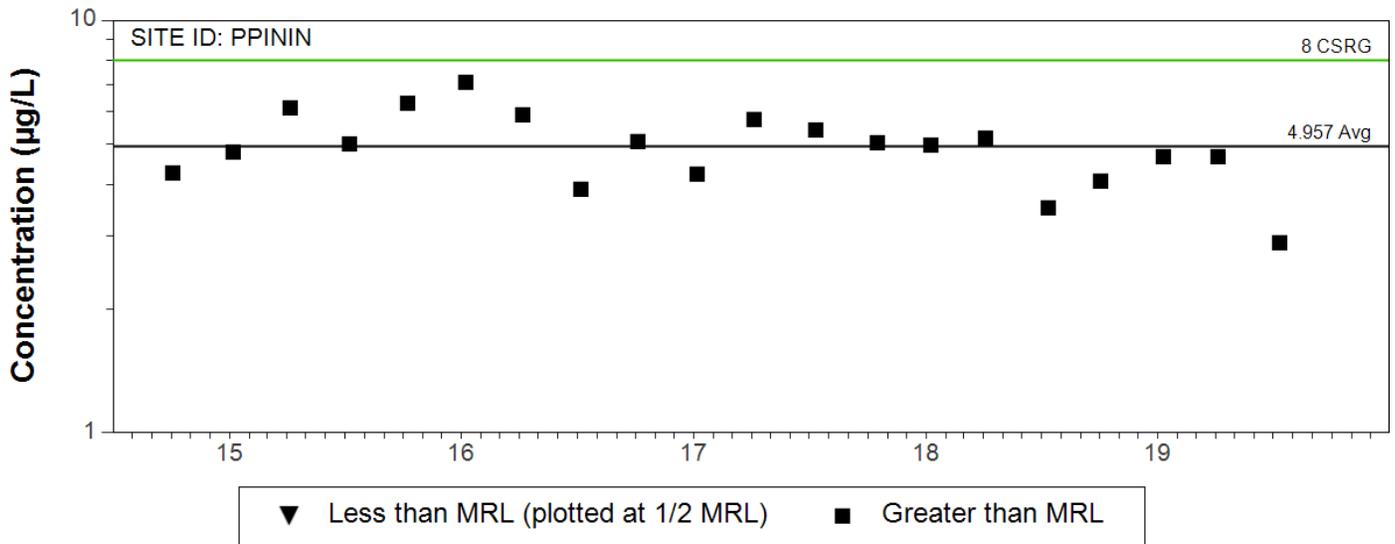
Figure 6.3-30

FY19 Northern Pathway System Monitoring Well Network and Potentiometric Surface for the Unconfined Flow System

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10/13/2020

Offpost Treatment Plant Influent - DIMP

2014-10-01 to 2019-09-30



Offpost Treatment Plant Effluent - DIMP

2014-10-01 to 2019-09-30

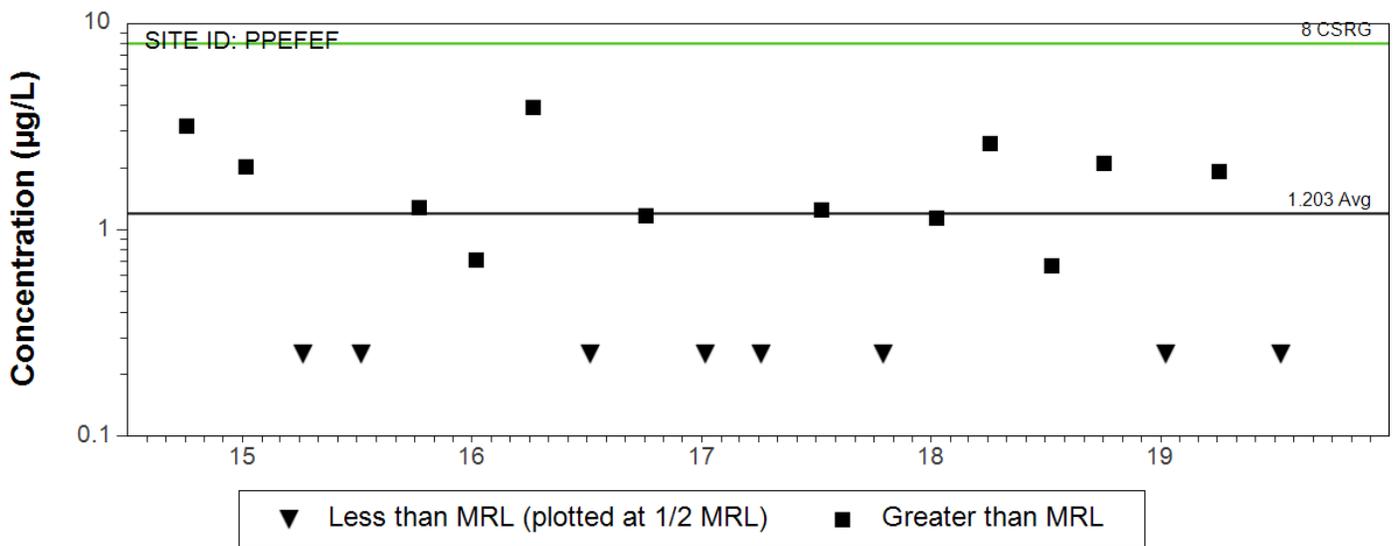
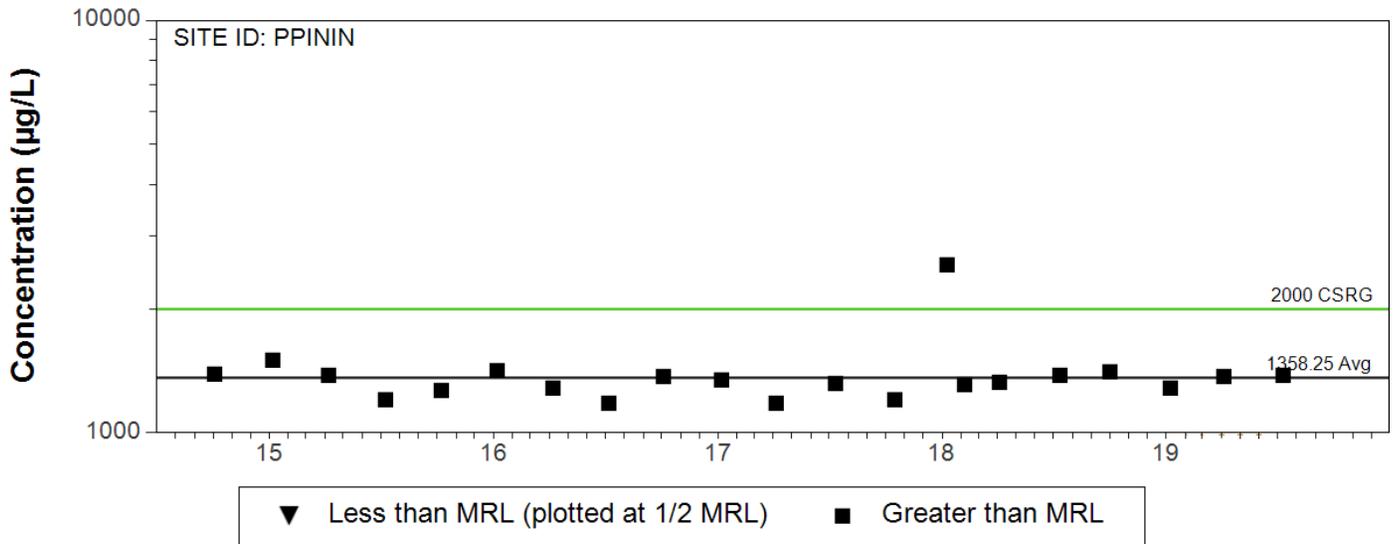


Figure 6.3-32

Offpost Treatment Plant Influent - F

2014-10-01 to 2019-09-30



Offpost Treatment Plant Effluent - F

2014-10-01 to 2019-09-30

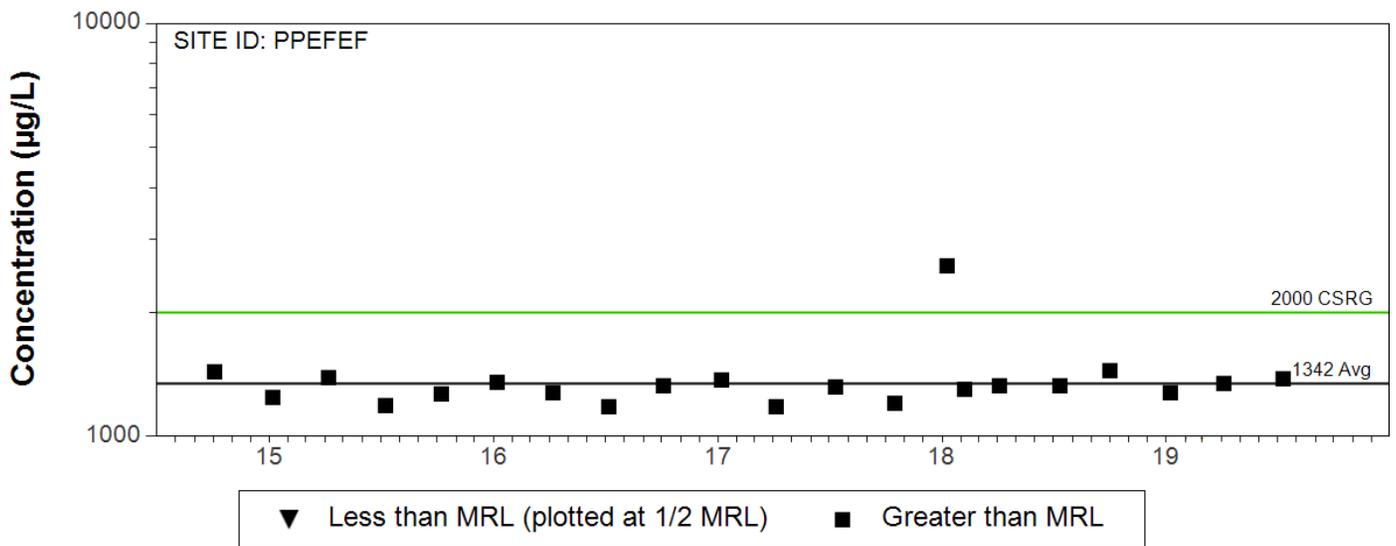
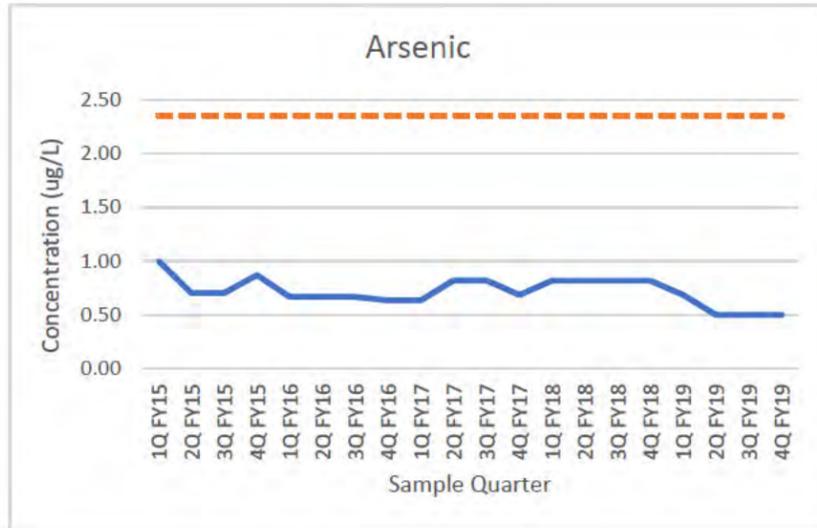
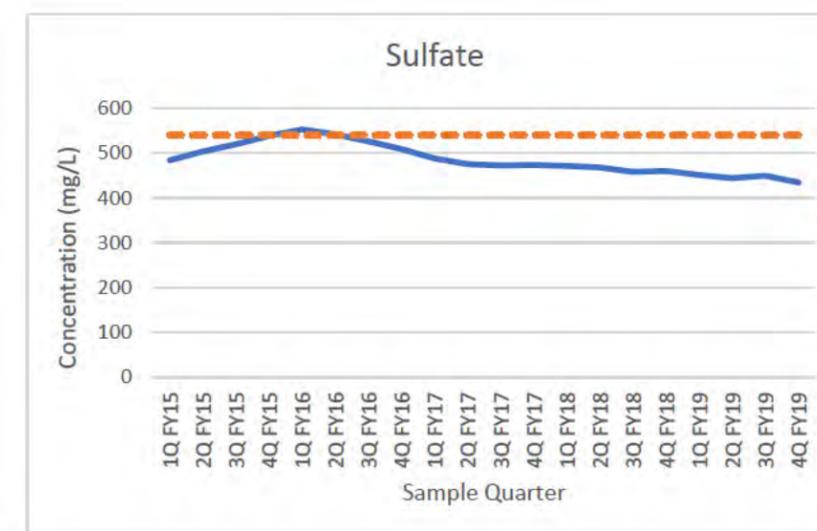
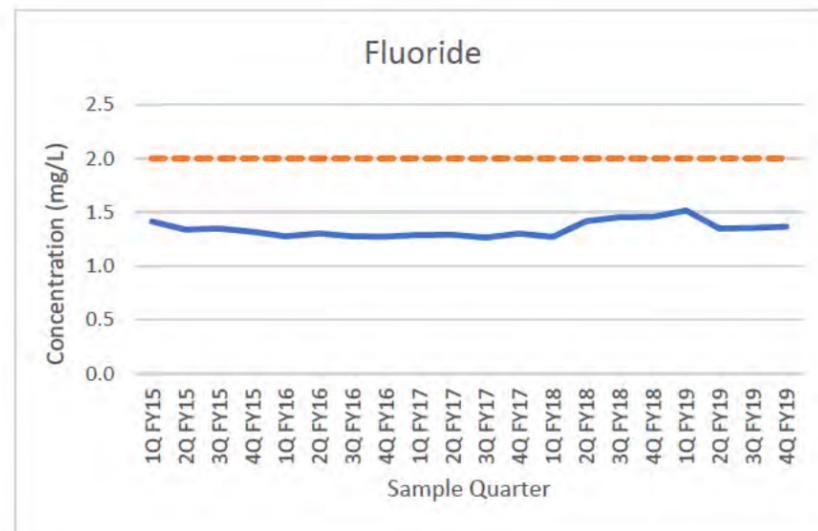
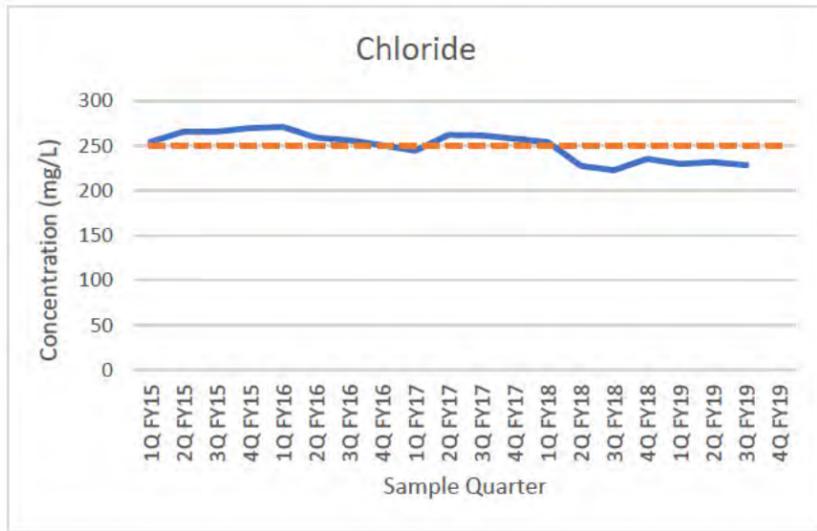
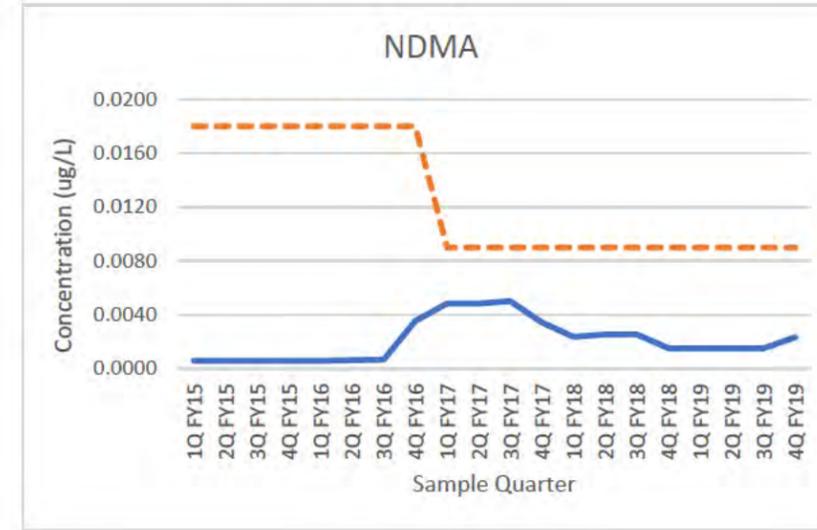
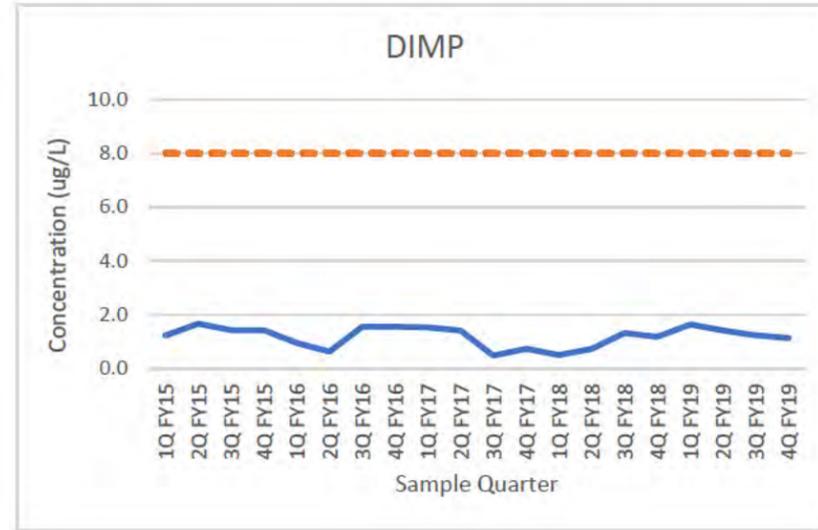
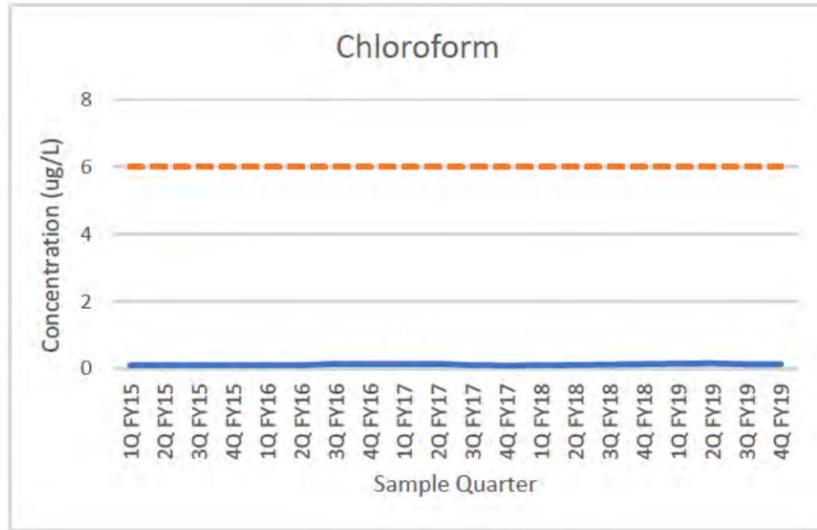
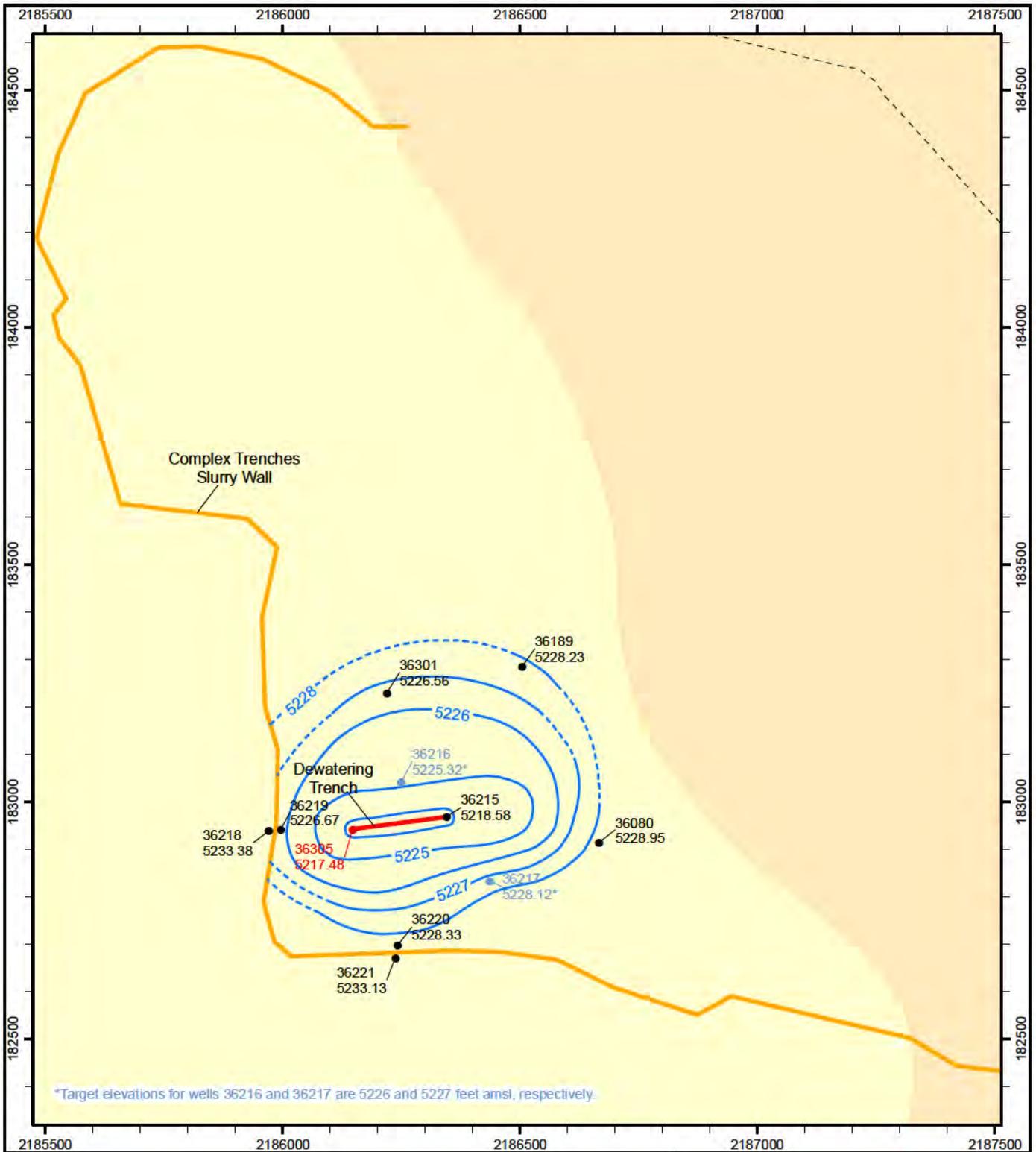


Figure 6.3-33

Figure 6.3-35 OGITS Effluent Four-Quarter Moving Averages (FY15 - FY19)



— Analyte Moving Average - - - CSRG/PQL
 Note: Moving averages shown for routine CSRG analytes with effluent detections.



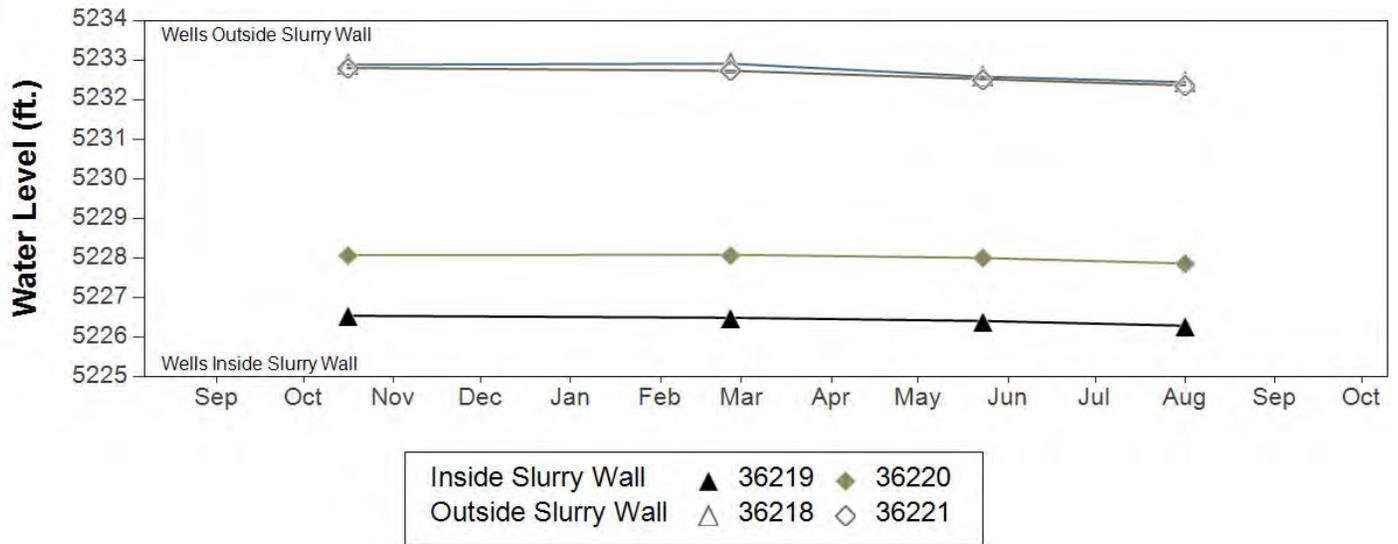
- Legend**
- Army Maintained Area
 - Army Maintained Area & USFWS Managed Area Border (shown under the Unsaturated Alluvium layer)
 - Unsaturated Alluvium (Developed using FY19Q3 data)
 - Dewatering Trench
 - Complex Trenches Slurry Wall
 - Monitoring Wells
 - Compliance Wells
 - Dewatering Well
 - Water Elevation Contours
 - Inferred Water Elevation Contours



Figure 6.3-40
FY19 Complex Army Disposal
Trenches Monitoring Well
Network and Potentiometric
Surface

Complex Army Disposal Trenches Paired Wells

2018-10-01 to 2019-09-30



Complex Army Disposal Trenches Compliance Wells

2018-10-01 to 2019-09-30

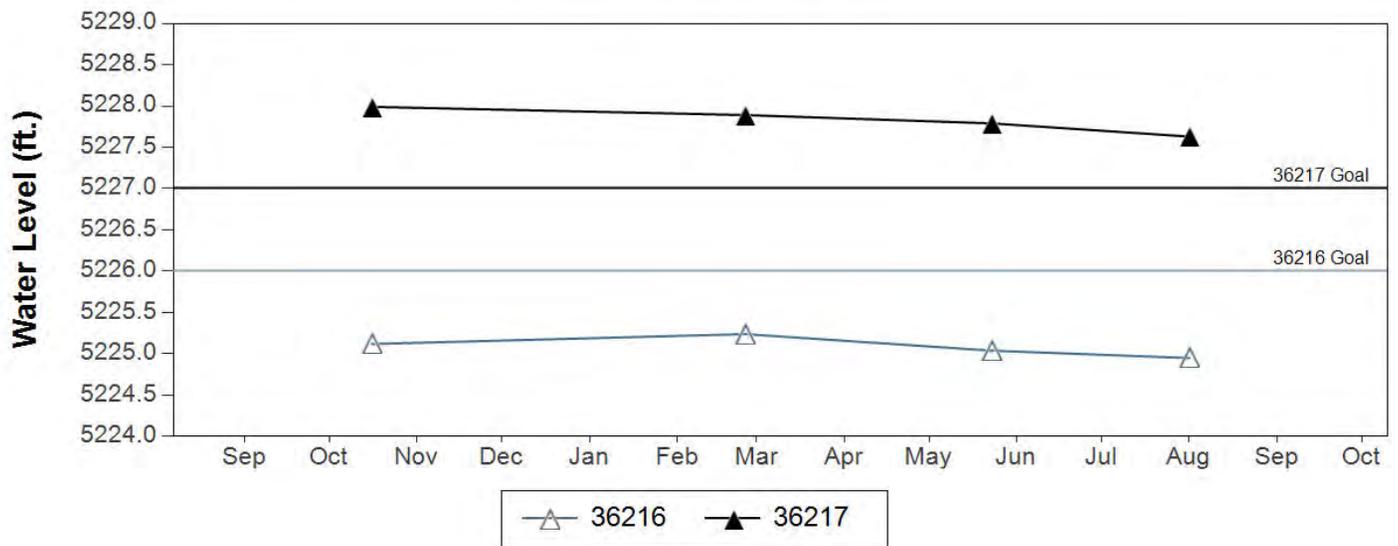
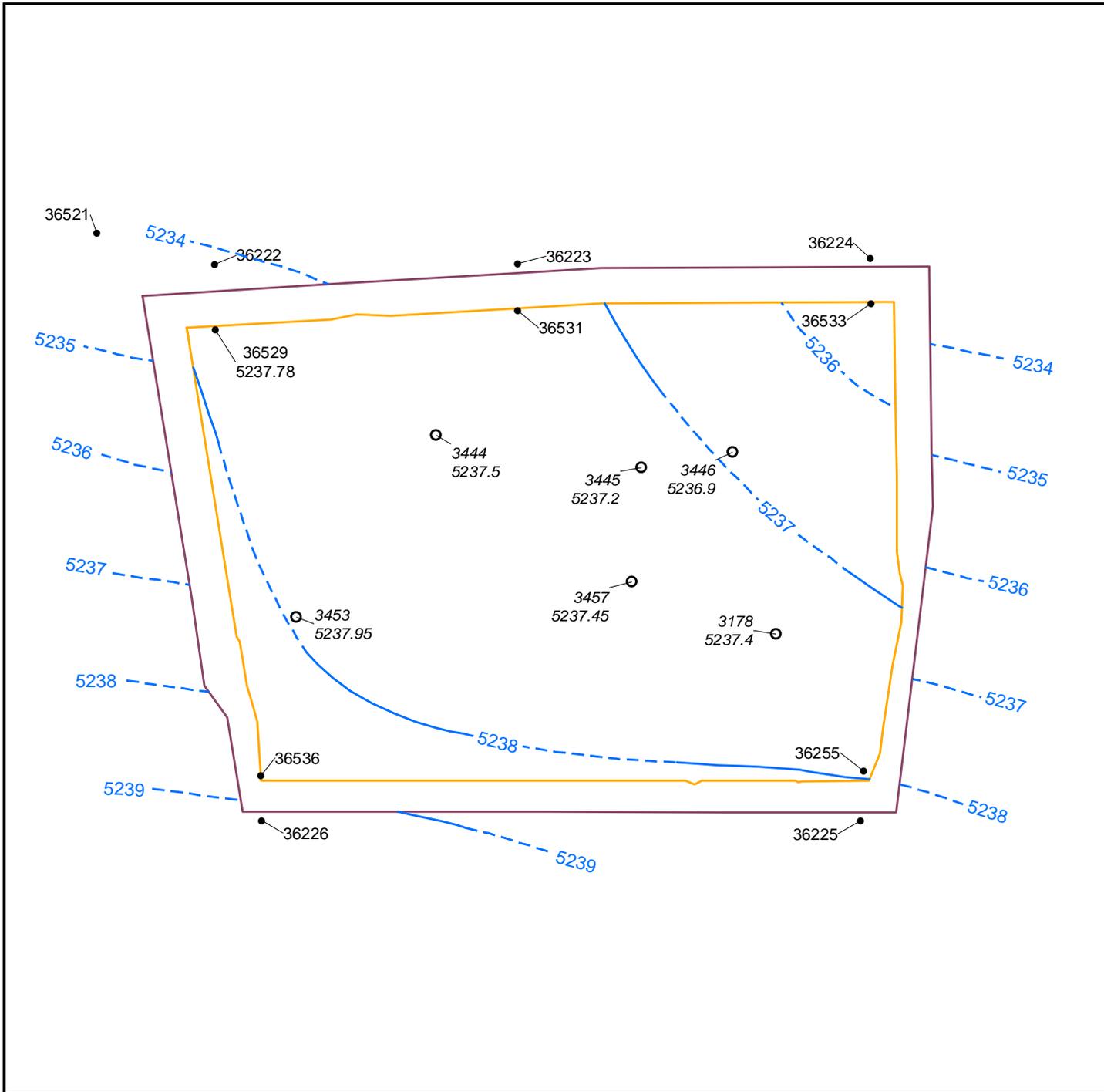


Figure 6.3-41



Legend

- Water elevation contours - 1 foot intervals
- - - Inferred water elevation contours
- ROD Slurry Wall
- IRA Slurry Wall
- Boreholes with Site ID and Water Elevation in Feet (Italics)
- Monitoring Wells with Site ID and Water Elevation in Feet

Note: Water levels were measured in FY19 Quarter 4.

NAD27-NGVD29 Datum, US Survey Feet, Colorado North Zone

Sources: U.S. Army, RMA GIS, OMC, Shell/VAECOM

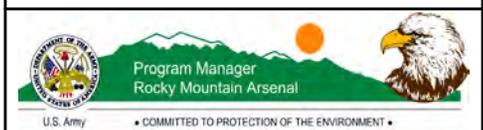
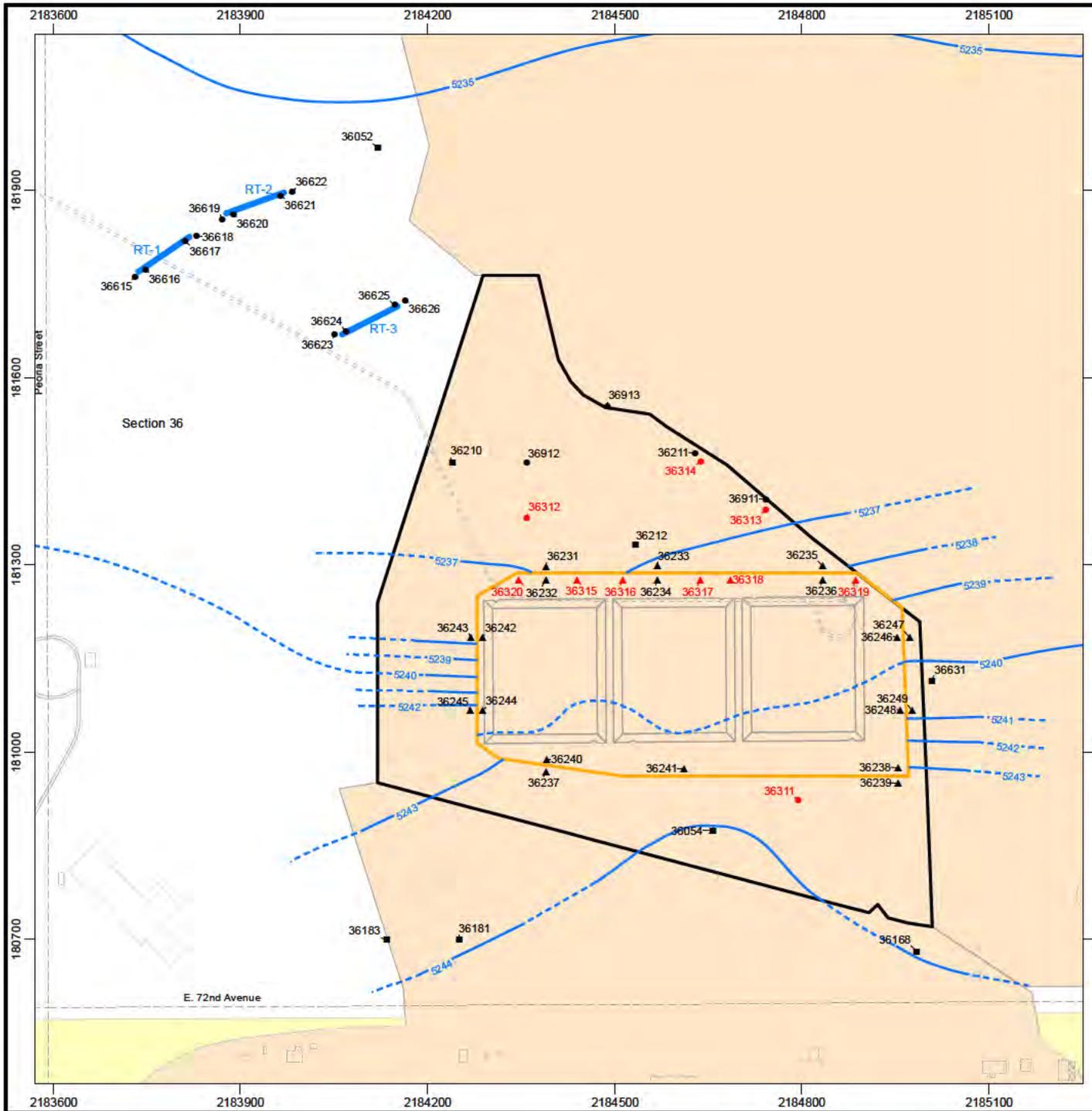


Figure 6.3-42
FY19 Shell Disposal Trenches Well and Borehole Locations and Potentiometric Surface



Legend

Former Groundwater Mass Removal System

- Extraction Wells
- Monitoring Wells

Slurry Wall Dewatering System

- ▲ Extraction Wells
- ▲ Monitoring Wells

LTMP Wells

- Monitoring Wells

Water Elevation Contour

- Water Elevation Contour
- - - Inferred Water Elevation Contour

Recharge Trenches (Not Operational)

- Recharge Trenches (Not Operational)

Slurry Wall

- Slurry Wall

Lime Settling Basins

- Lime Settling Basins

Paved Road

- Paved Road

Unpaved Road

- - - Unpaved Road

Section Line

- Section Line

Section 36 Lime Basins

- ▭ Section 36 Lime Basins

Project Boundary

- ▭ Project Boundary

RCRA-Equivalent Cover

- ▭ RCRA-Equivalent Cover

3-foot Soil Cover

- ▭ 3-foot Soil Cover

Structure Location (Removed)

- ▭ Structure Location (Removed)

NAD27-NGVD29 Datum, US Survey Feet, Colorado North Zone

Sources: U.S. Army, RMA GIS, OMC, Shell/AECOM

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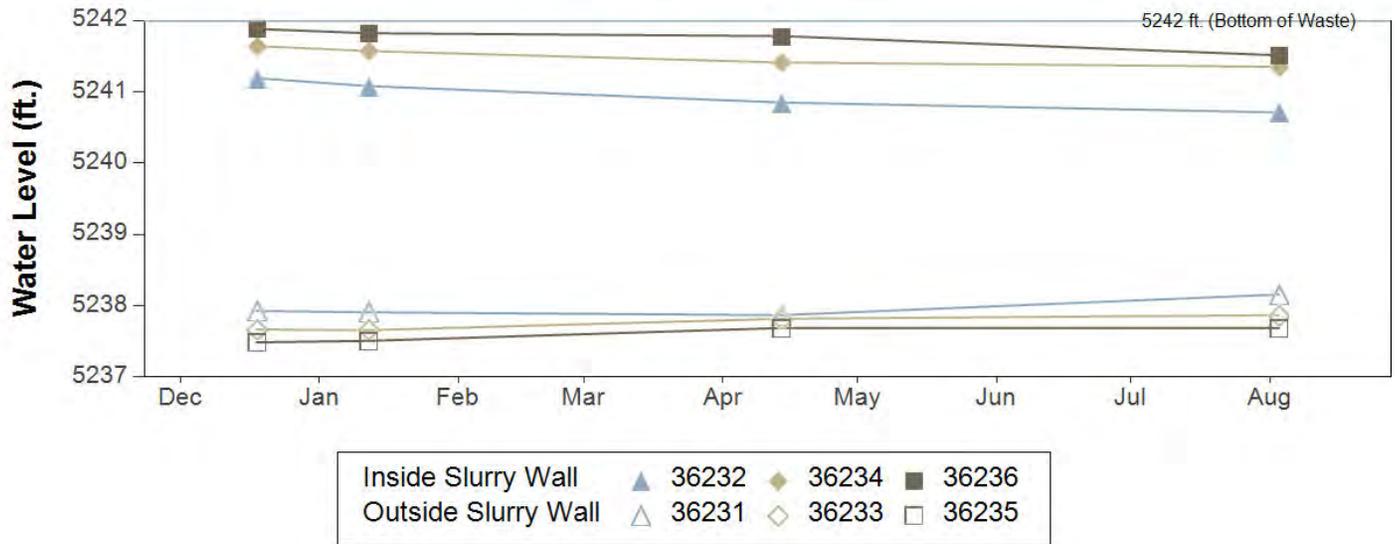
Figure 6.3-43

Lime Basins Monitoring Well Network and FY19 Potentiometric Surface

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8/21/2020

Lime Basins Northern Wells

2014-10-01 to 2015-09-30



Lime Basins Northern Wells

2018-10-01 to 2019-09-30

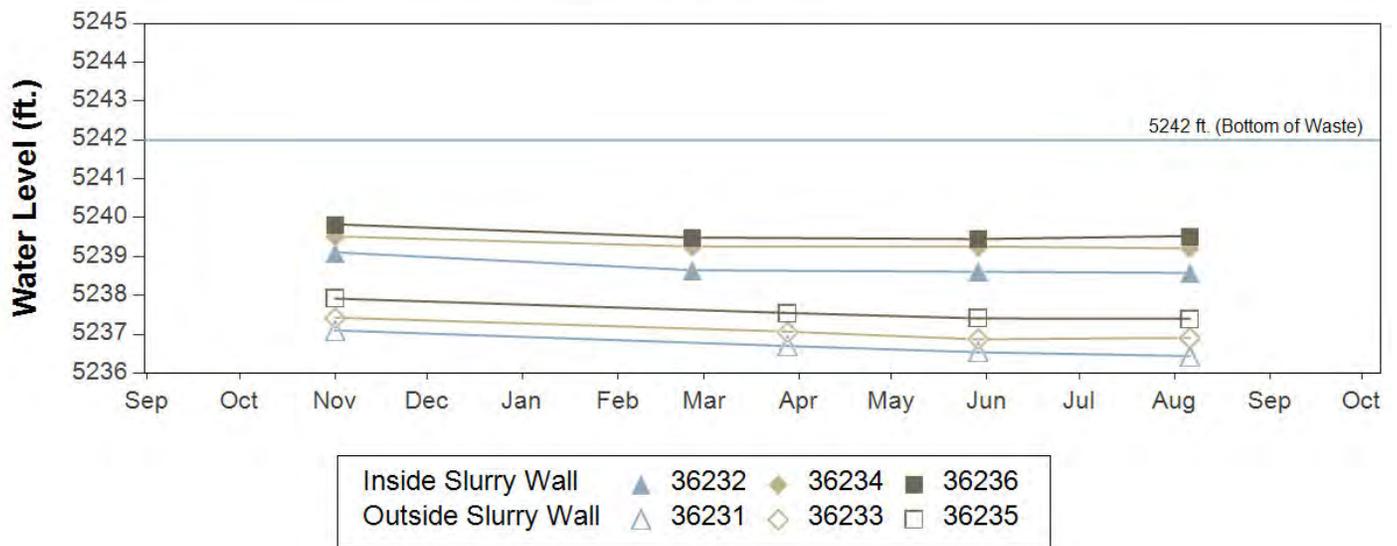
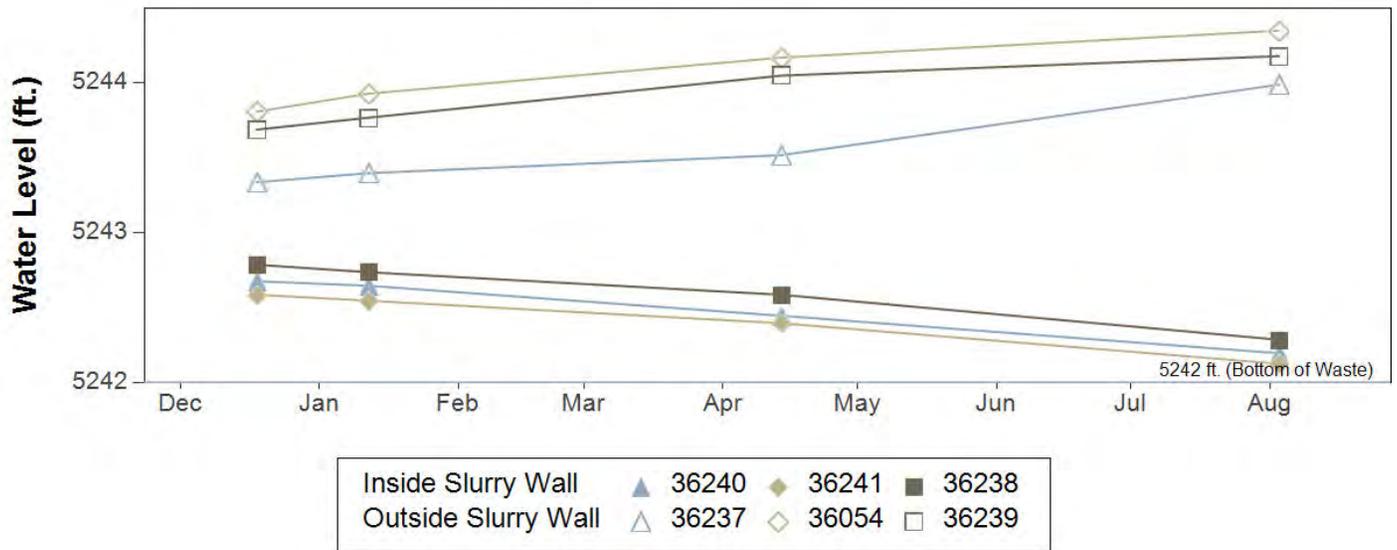


Figure 6.3-44

Lime Basins Southern Wells

2014-10-01 to 2015-09-30



Lime Basins Southern Wells

2018-10-01 to 2019-09-30

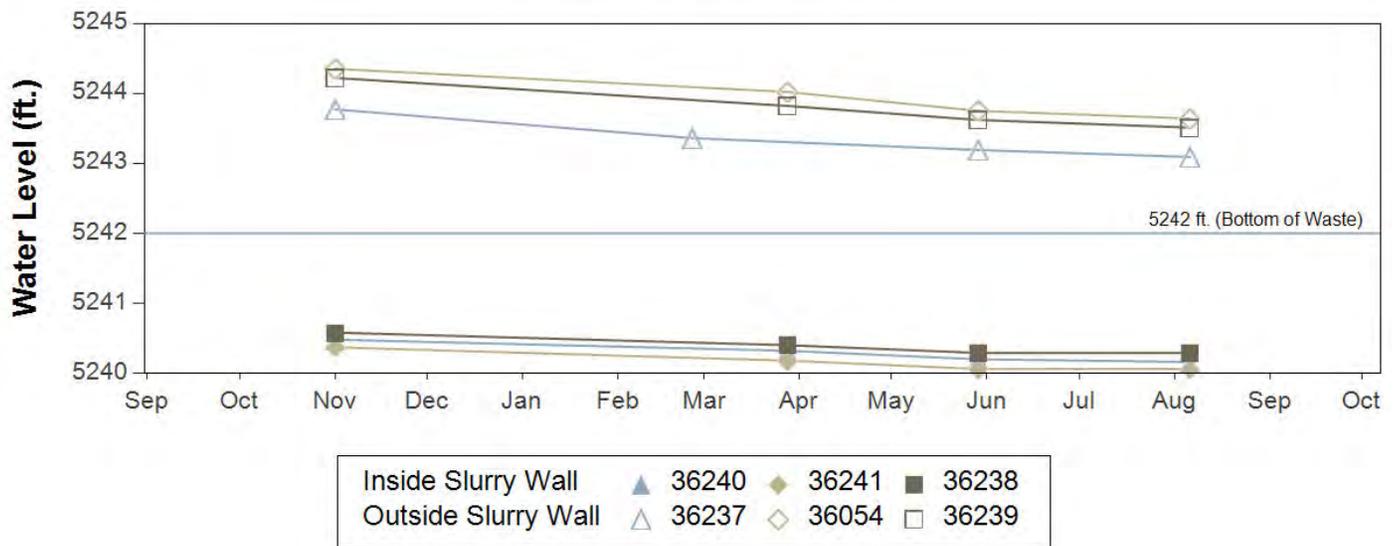
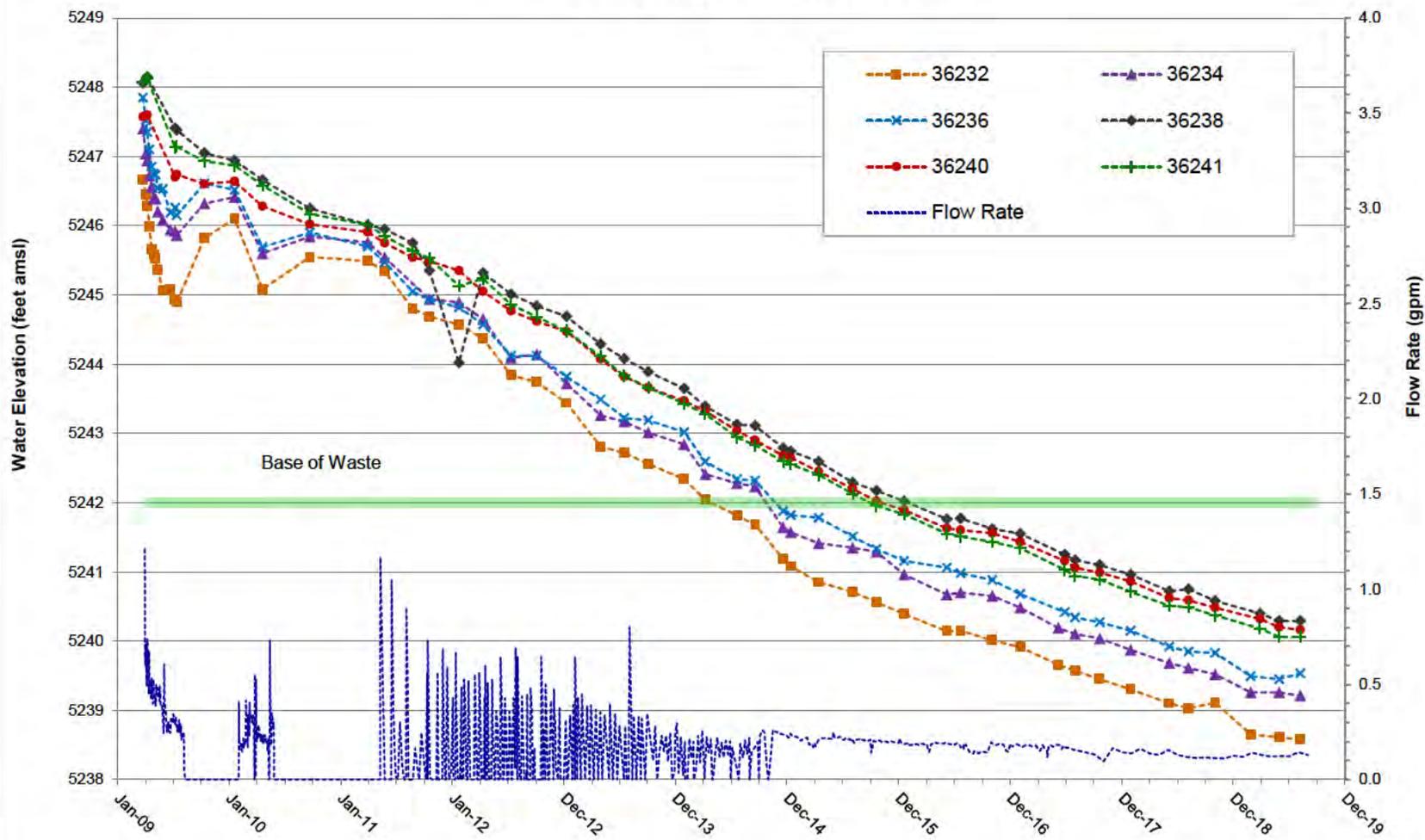
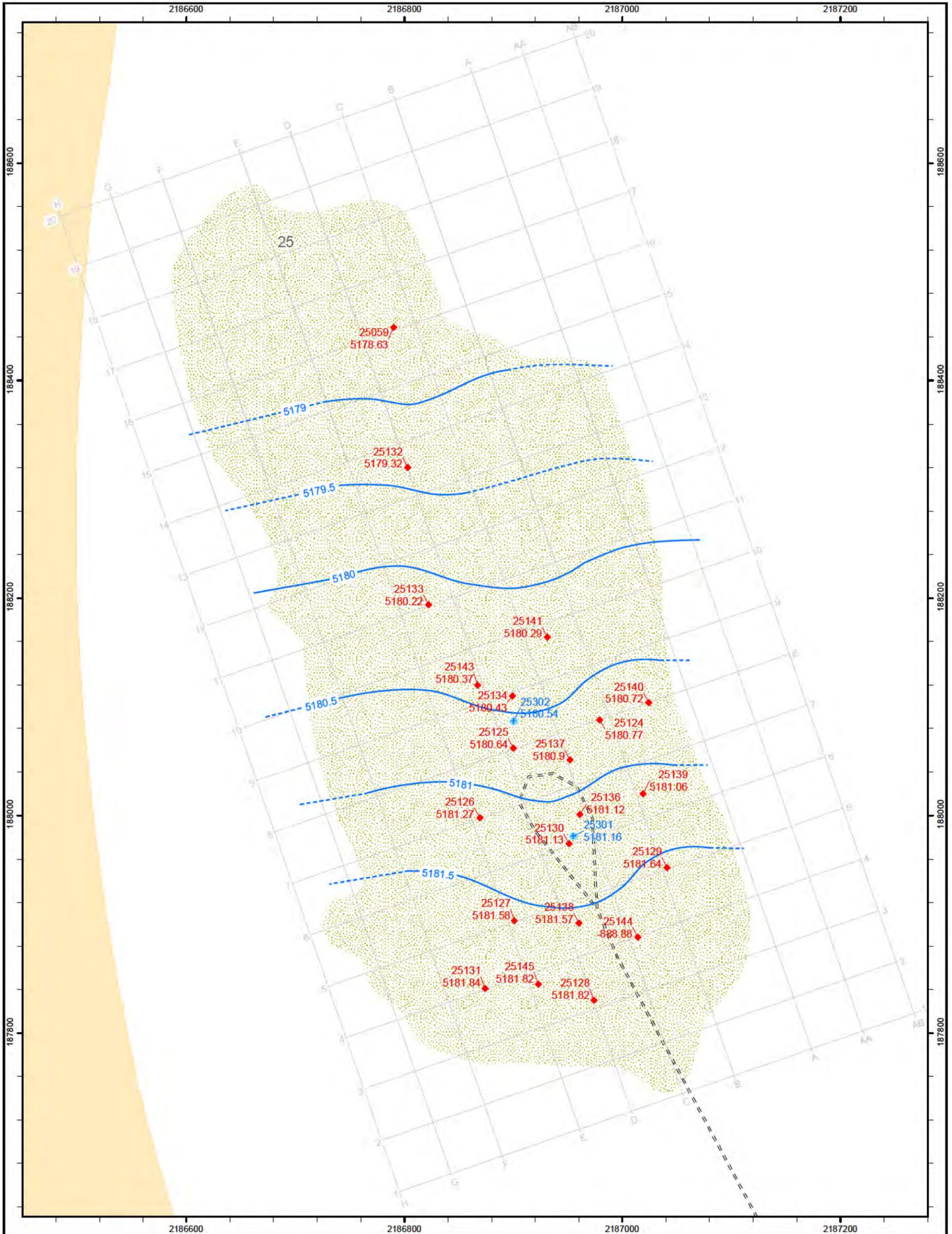


Figure 6.3-45

Figure 6.3-46
Lime Basins Dewatering System Monitoring Well Water Elevations
Inside Slurry Wall and Total Flow Rate





Legend

- Unsaturated Alluvium
- Historically stained and/or contaminated soil
- Water elevation contour - 1 foot interval
- Inferred water elevation contour
- Unpaved Roads
- Piezometer
- Recovery Well

Notes: Water levels were measured in FY19 Quarter 2.
Water level in well 25144 could not be measured due to a damaged casing.

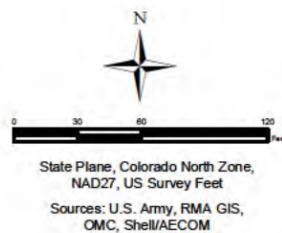
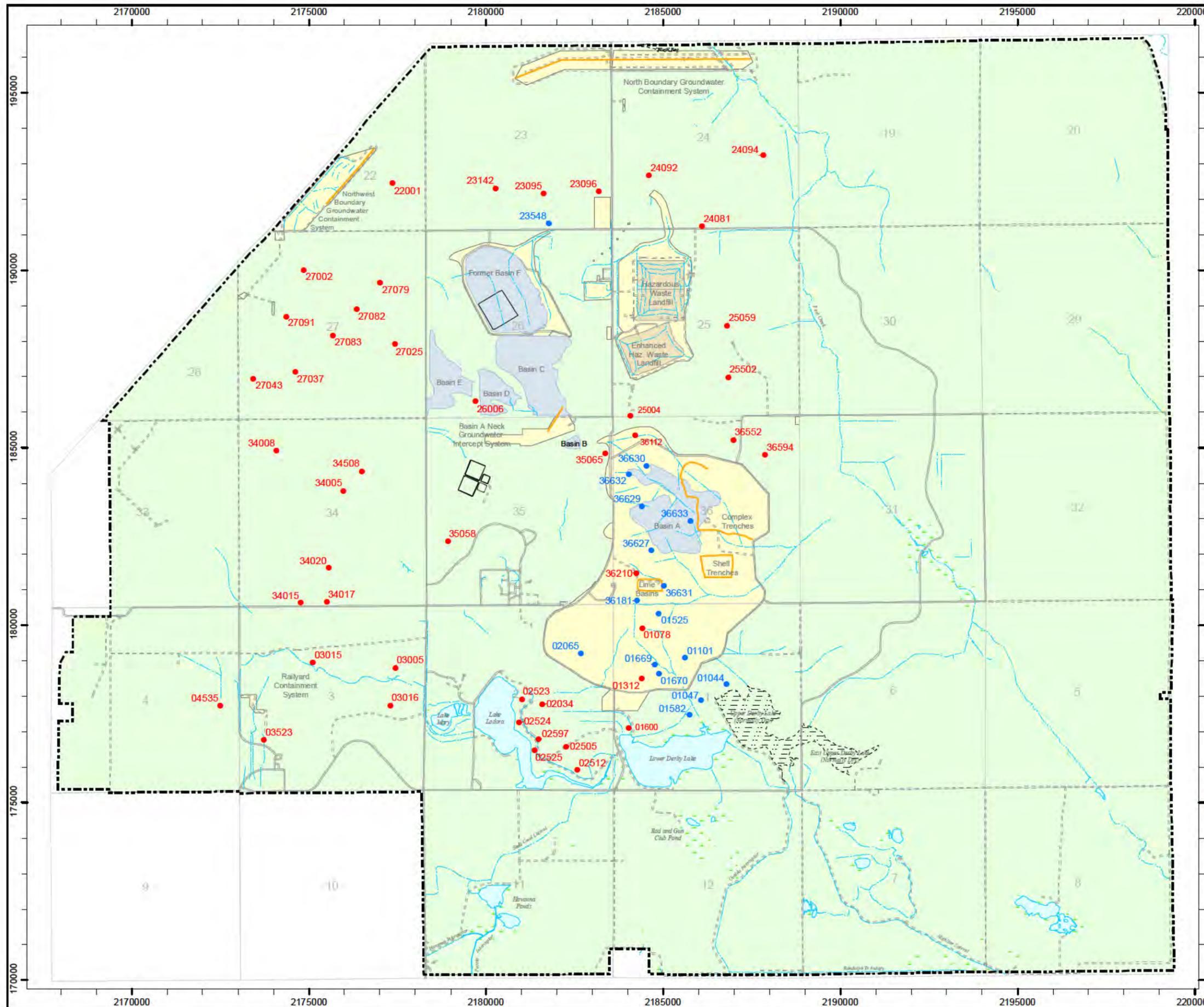


Figure 6.3-47

**North Plants LNAPL Recovery Wells
Water Elevations and LNAPL Thickness**



- ### Legend
- USFWS Managed
 - Army Maintained
 - Hazardous Waste Landfill, & Enhanced Hazardous Waste Landfill
 - Historic Basins
 - Section Lines
 - Lakes and Ponds
 - Dry Lakes/Ponds
 - Wetlands
 - Intermittent Streams
 - Ditches, Canals
 - Slurry Walls
 - Paved Roads
 - Unimproved Roads
 - Water Quality Tracking Wells (Sampled Twice in 5 Years)
 - Water Quality Tracking Wells (Sampled Once in 5 Years)

N

0 1,000 2,000 3,000
Feet

NAD27-NGVD29 Datum, US Survey Feet,
Colorado North Zone

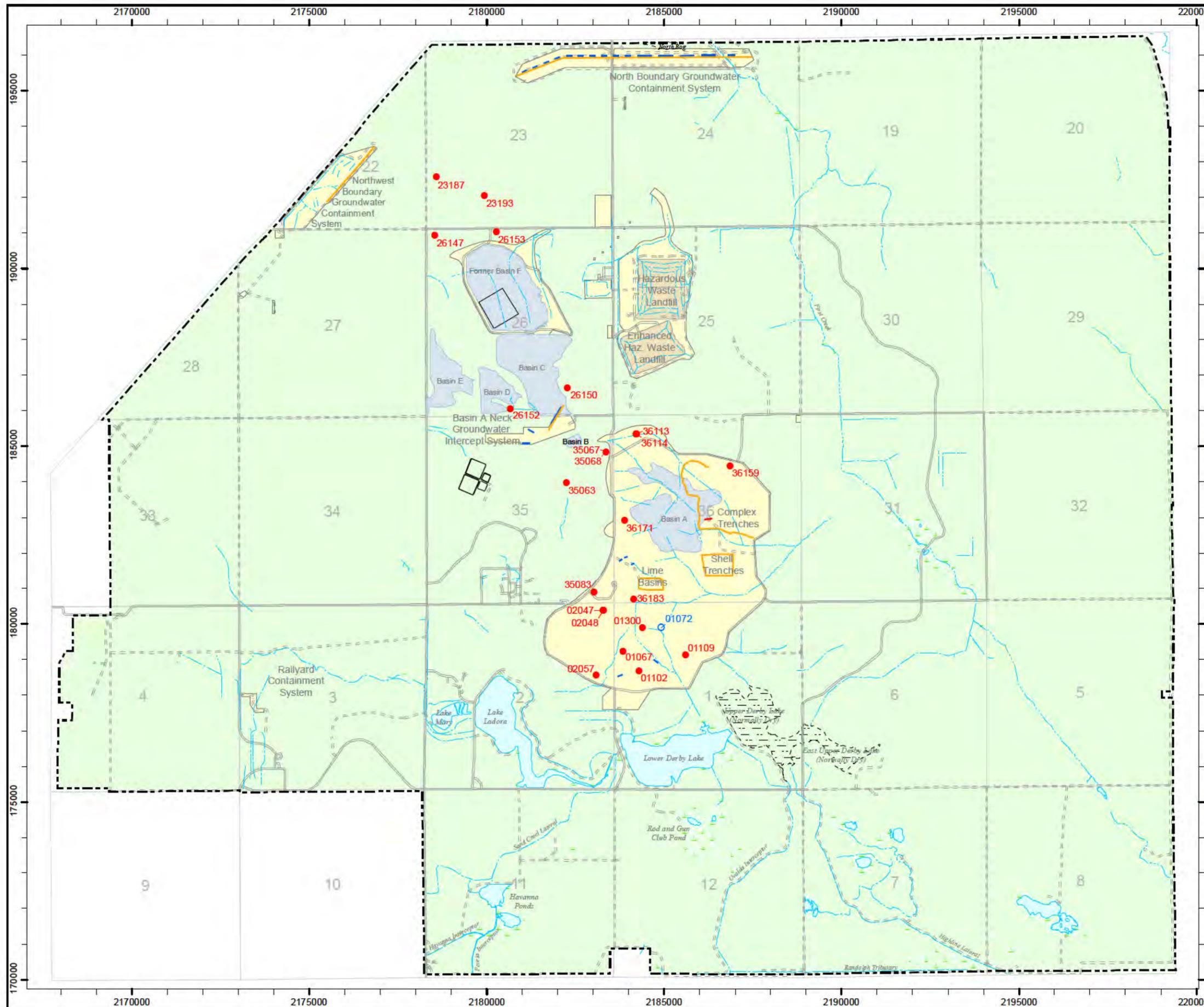
Sources: U.S. Army, RMA GIS, OMC, Shell/AECOM

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Figure 6.3-48

**Rocky Mountain Arsenal
Water Quality Tracking Wells**



- ### Legend
- USFWS Managed
 - Army Maintained
 - Hazardous Waste Landfill, & Enhanced Hazardous Waste Landfill
 - Historic Basins
 - Section Lines
 - Lakes and Ponds
 - Dry Lakes/Ponds
 - Wetlands
 - Intermittent Streams
 - Ditches, Canals
 - Slurry Walls
 - Recharge Trenches
 - Extraction Trenches
 - Paved Roads
 - Unimproved Roads
 - Confined Flow System Water Quality Wells (Sampled Twice in 5 Years)
 - Alternate Confined Flow System Water Quality Wells

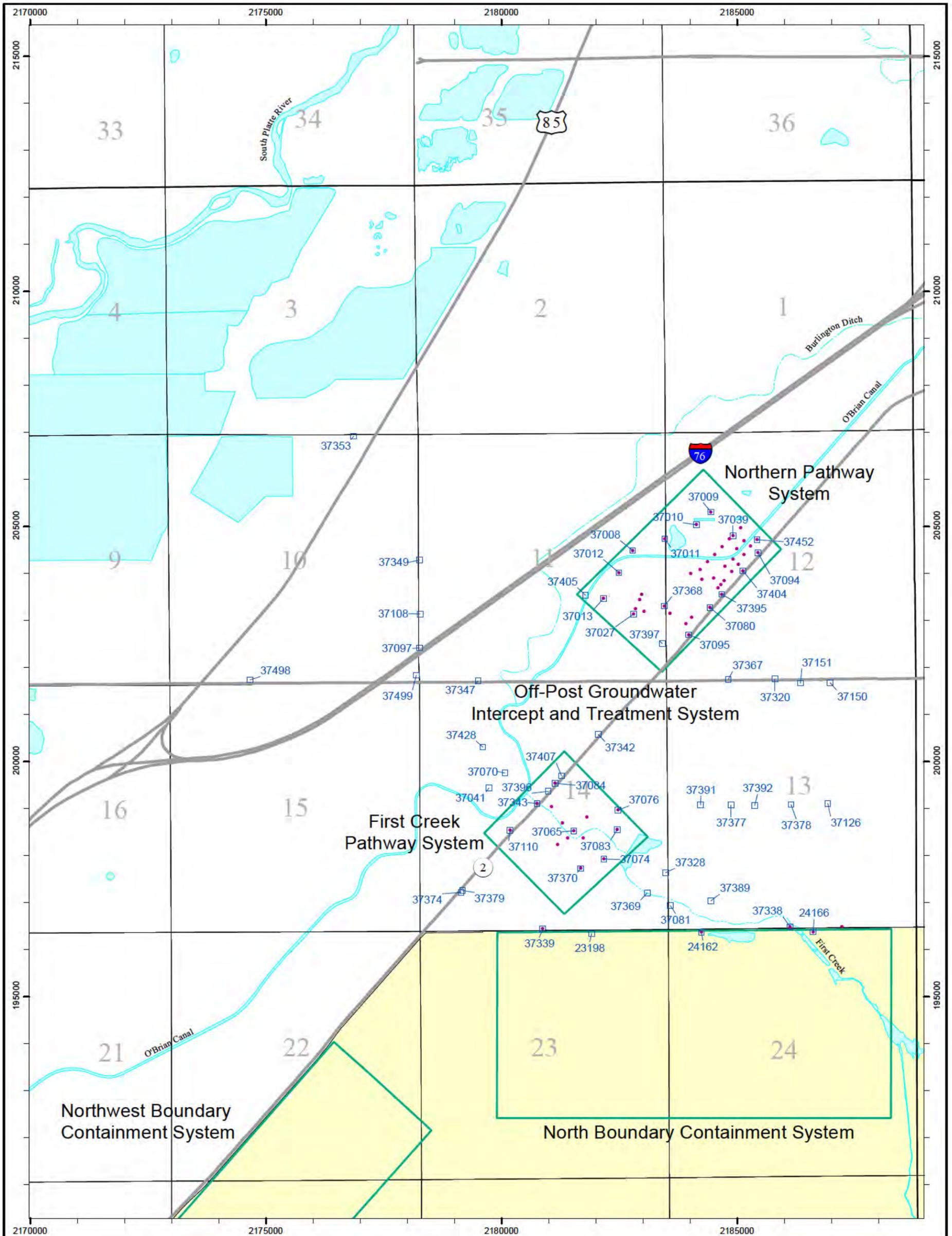
N

0 1,000 2,000 3,000 Feet
NAD27-NGVD29 Datum, US Survey Feet, Colorado North Zone
Sources: U.S. Army, RMA GIS, OMC, Shell/AECOM

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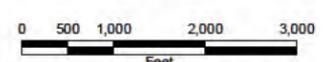
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Figure 6.3-55
Rocky Mountain Arsenal
Confined Flow System
Water Quality Wells



Legend

- Rocky Mountain Arsenal (On-Post Operable Unit)
- Operational Areas
- Lakes, Ponds, Rivers
- Intermittent Streams
- Ditches, Canals
- Primary Roads
- Section Lines
- Township & Range Lines
- CSRG Monitoring Wells
- Water Quality Operational Wells



NAD27-NGVD29 Datum, US Survey Feet, Colorado North Zone
Sources: U.S. Army, RMA GIS, OMC, Shell/AECOM

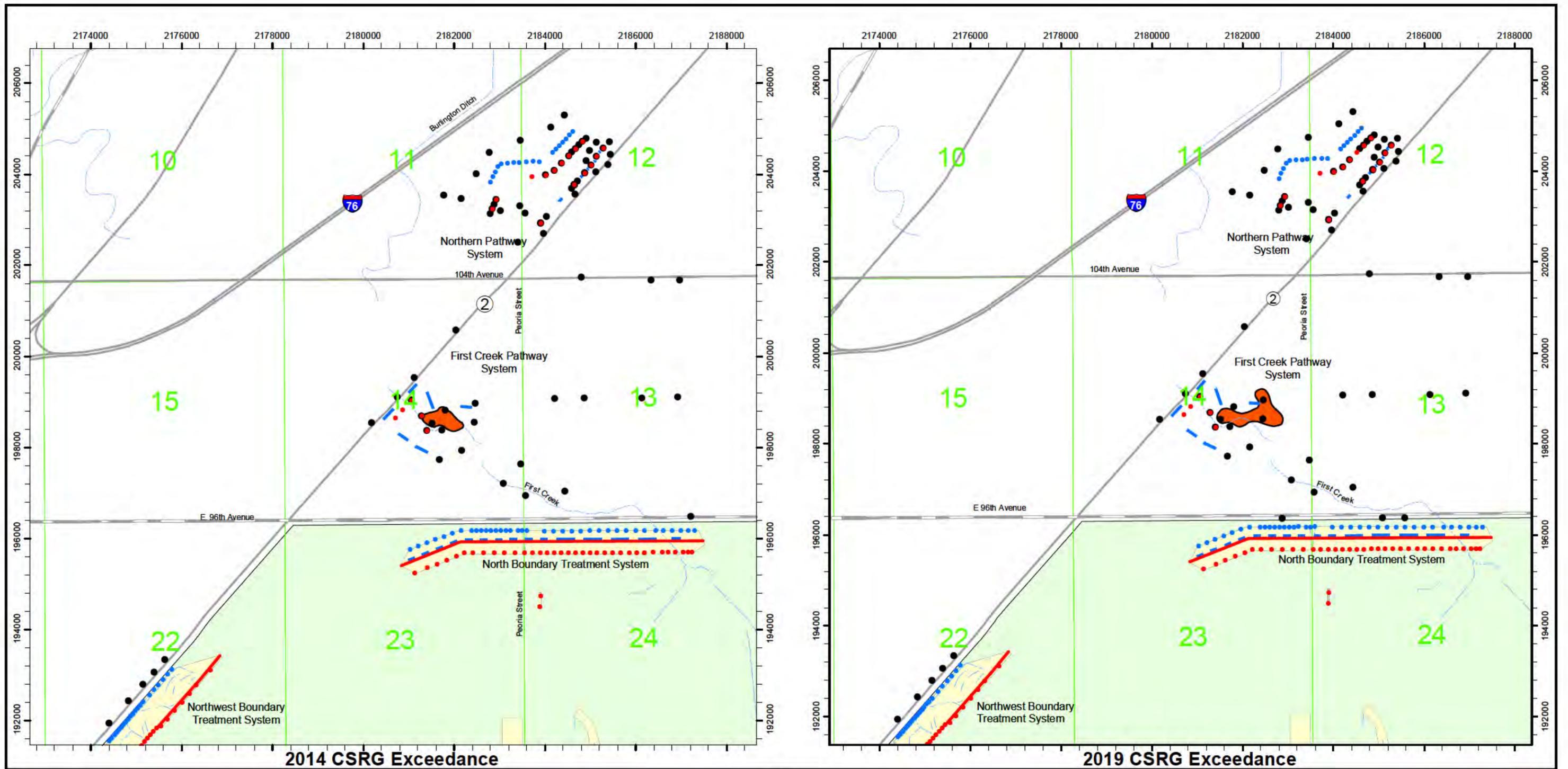
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Figure 6.3-56

Off-Post Exceedance Monitoring Network

M:\projects\FYRR2019\mxd\op_exceedance_2019.mxd
10/15/2020



Legend

- 1,2-Dichloroethane (12DCLE) Plume
- Extraction Well
- Recharge Well
- Monitoring Wells
- Secondary Roads
- Primary Roads
- Slurry Walls
- Recharge Trenches
- Intermittent Streams
- Ditches
- Section Lines

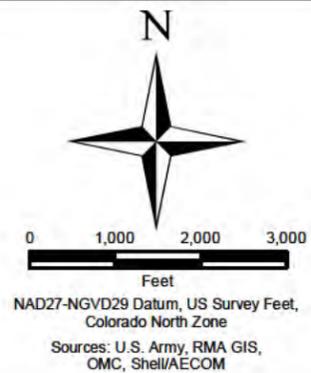
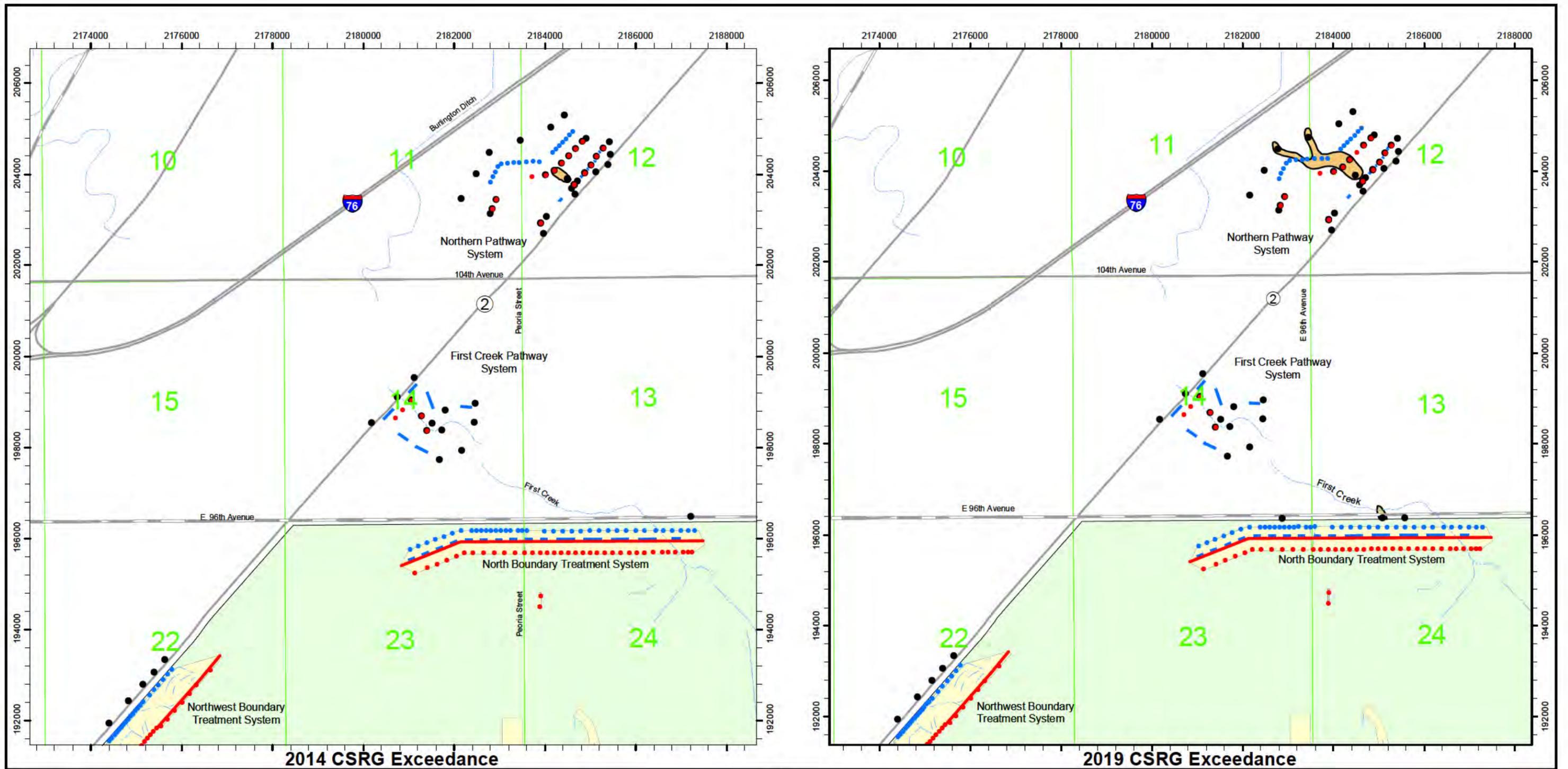


Figure 6.3-57
Off-Post Exceedance Plume Maps for 1,2-Dichloroethane

M:\projects\FYRR\2019\mxd\1_csr_compare_12DCLE.mxd 11/3/2020



Legend

- Arsenic (AS) Plume
- Extraction Well
- Recharge Well
- Monitoring Wells
- Secondary Roads
- Primary Roads
- Slurry Walls
- Recharge Trenches
- Intermittent Streams
- Ditches
- Section Lines

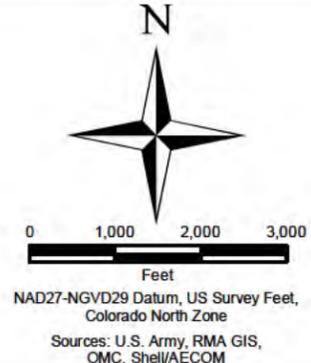
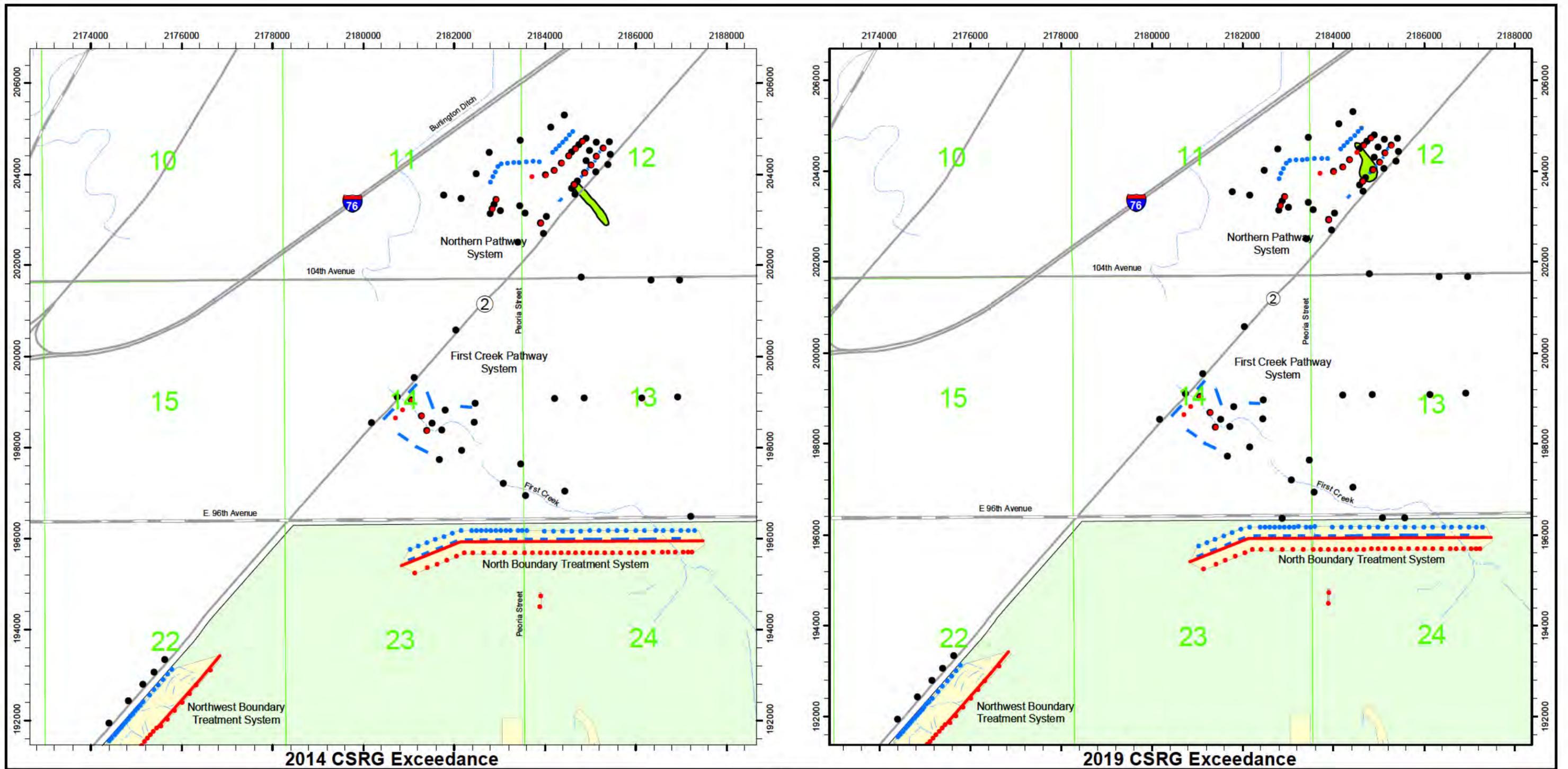


Figure 6.3-58
 Off-Post CSRG Exceedance Plume Maps for Arsenic

M:\projects\FYRR\2019\mxd\c_srg_compare_AS.mxd
 11/3/2020



2014 CSRG Exceedance

2019 CSRG Exceedance

Legend

- Carbon Tetrachloride (CCL4) Plume
- Extraction Well
- Recharge Well
- Monitoring Wells
- Secondary Roads
- Primary Roads
- Slurry Walls
- Recharge Trenches
- Intermittent Streams
- Ditches
- Section Lines

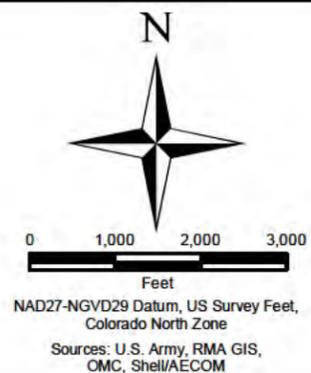
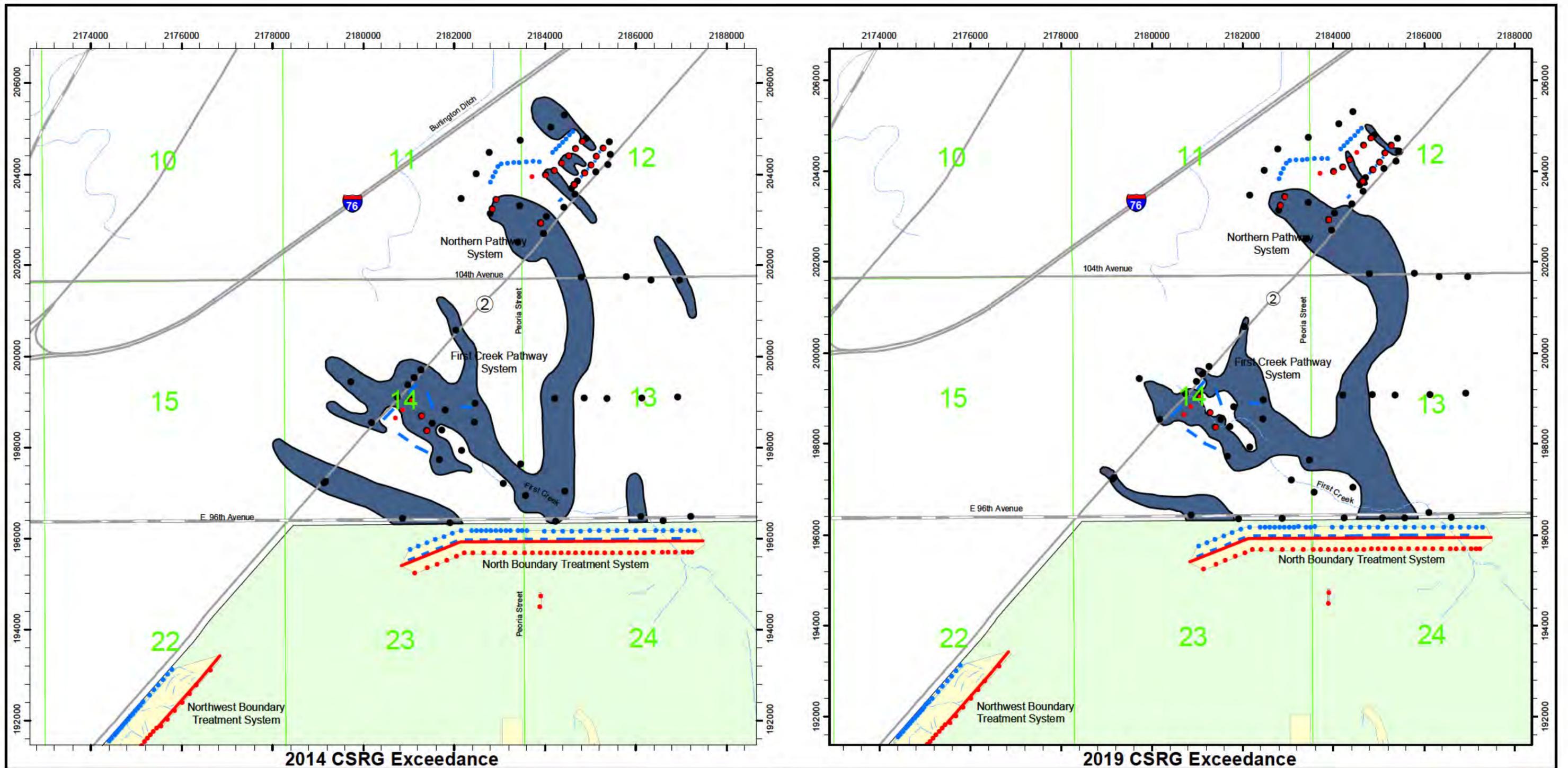


Figure 6.3-59
Off-Post CSRG Exceedance Plume Maps for Carbon Tetrachloride

M:\projects\FYRR\2019\mxd\c_srg_compare_CCL4.mxd 11/3/2020



Legend

- Chloride (CL) Plume
- Extraction Well
- Recharge Well
- Monitoring Wells
- Secondary Roads
- Primary Roads
- Slurry Walls
- Recharge Trenches
- Intermittent Streams
- Ditches
- Section Lines

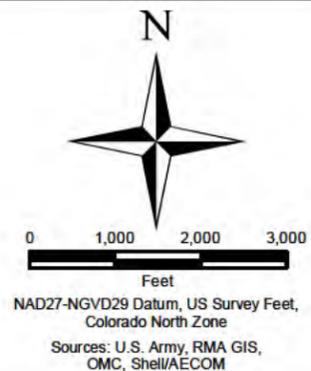
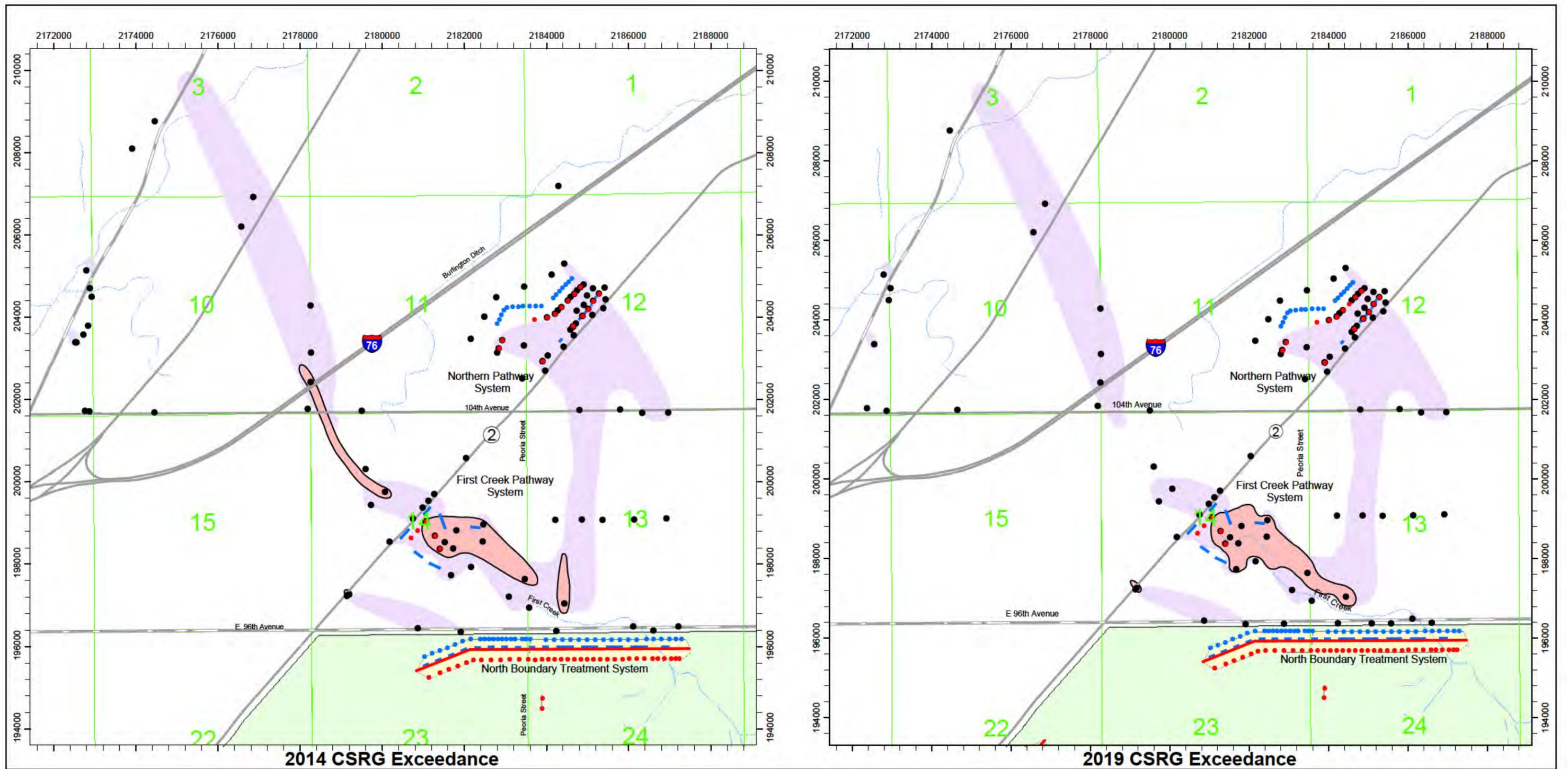


Figure 6.3-60
Off-Post CSRG Exceedance Plume
Maps for Chloride

M:\projects\FYRR\2019\mxd\c_srg_compare_CL.mxd
11/3/2020



- Legend**
- Diisopropylmethylphosphonate (DIMP) Plume
 - 1996 Historic DIMP Plume
 - Extraction Well
 - Recharge Well
 - Monitoring Wells
 - Secondary Roads
 - Primary Roads
 - Slurry Walls
 - Recharge Trenches
 - Intermittent Streams
 - Ditches
 - Section Lines

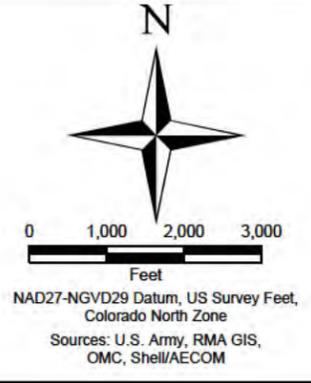
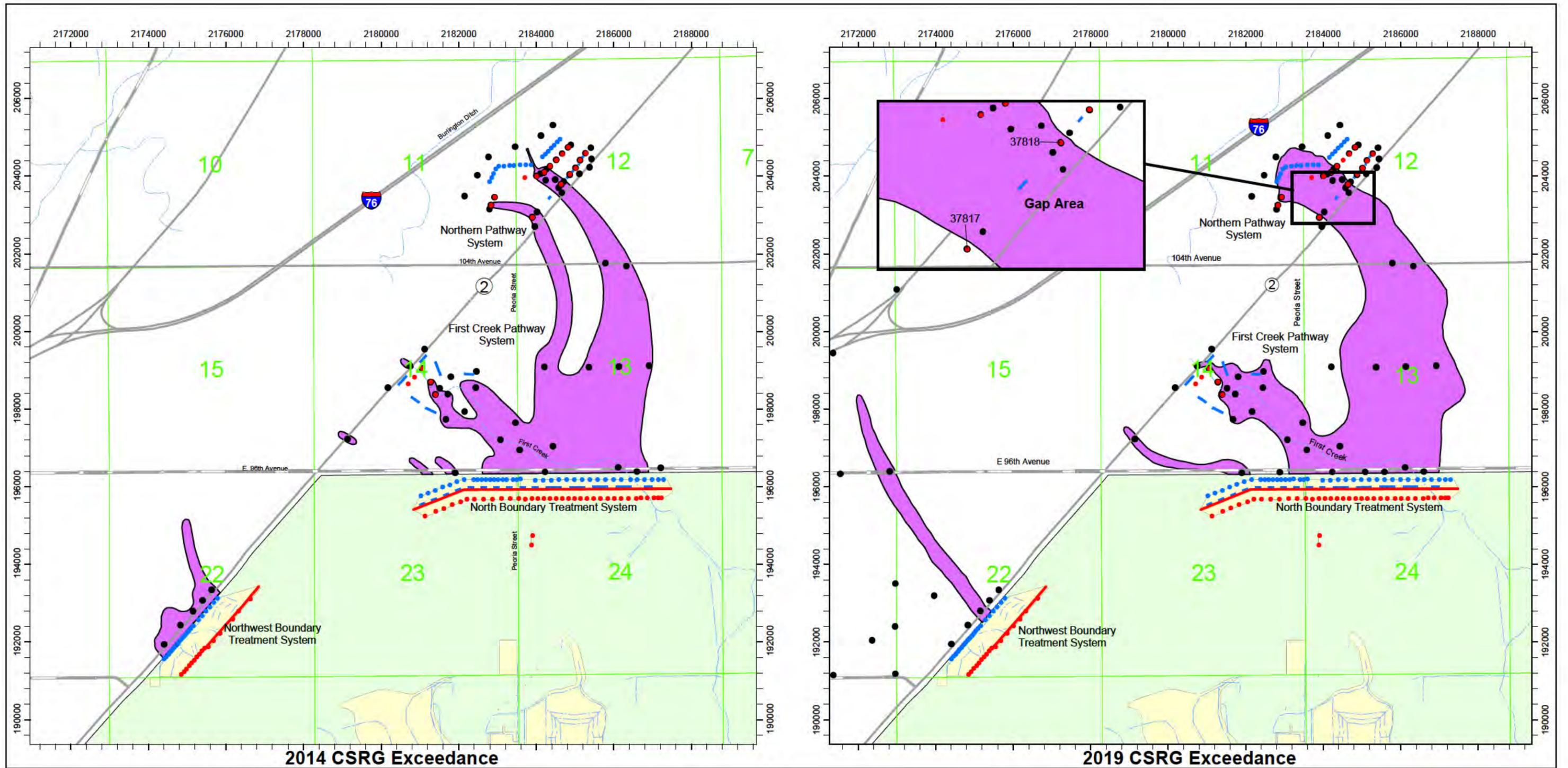


Figure 6.3-61
Off-Post CSG Exceedance Plume
Maps for Diisopropylmethylphosphonate

M:\projects\FYRR\2019\mxd\1_csrg_compare_DIMP_historic.mxd
8/10/2021



Legend

- Dieldrin (DLDRN) Plume
- Extraction Well
- Recharge Well
- Monitoring Wells
- Secondary Roads
- Primary Roads
- Slurry Walls
- Recharge Trenches
- Intermittent Streams
- Ditches
- Section Lines

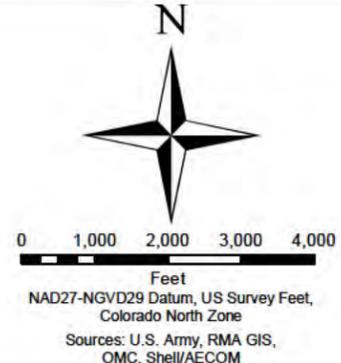
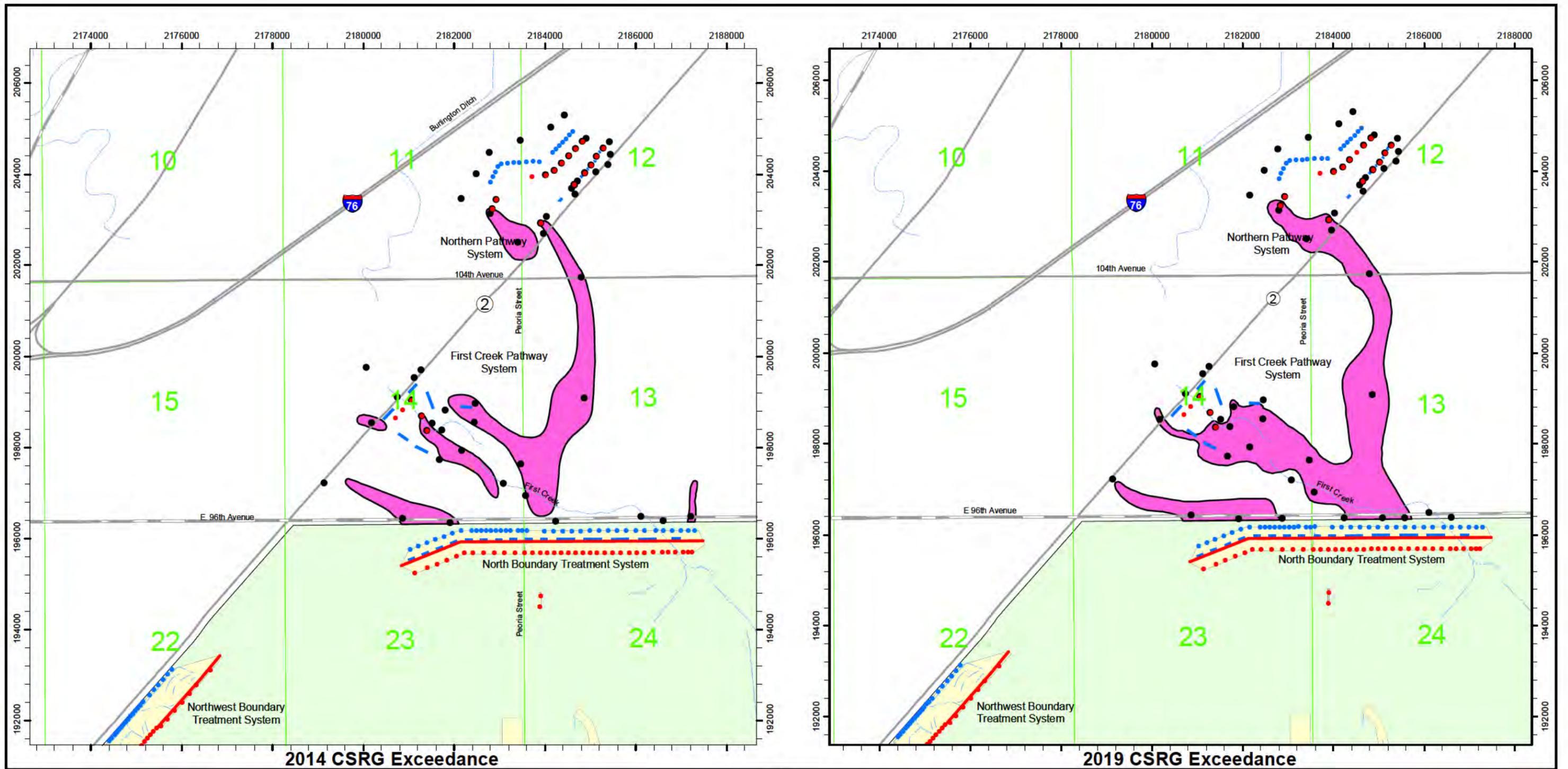


Figure 6.3-62
Off-Post CSRG Exceedance Plume Maps for Dieldrin

M:\projects\FYRR2019\mxdsl_csrsg_compare_DLDRN.mxd 3/11/2021



Legend

- Fluoride (F) Plume
- Extraction Well
- Recharge Well
- Monitoring Wells
- Secondary Roads
- Primary Roads
- Slurry Walls
- Recharge Trenches
- Intermittent Streams
- Ditches
- Section Lines

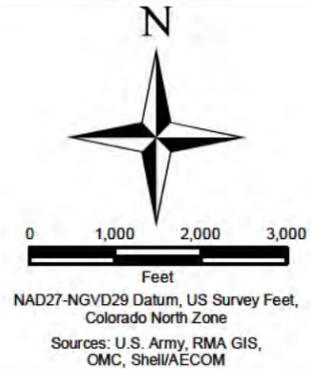
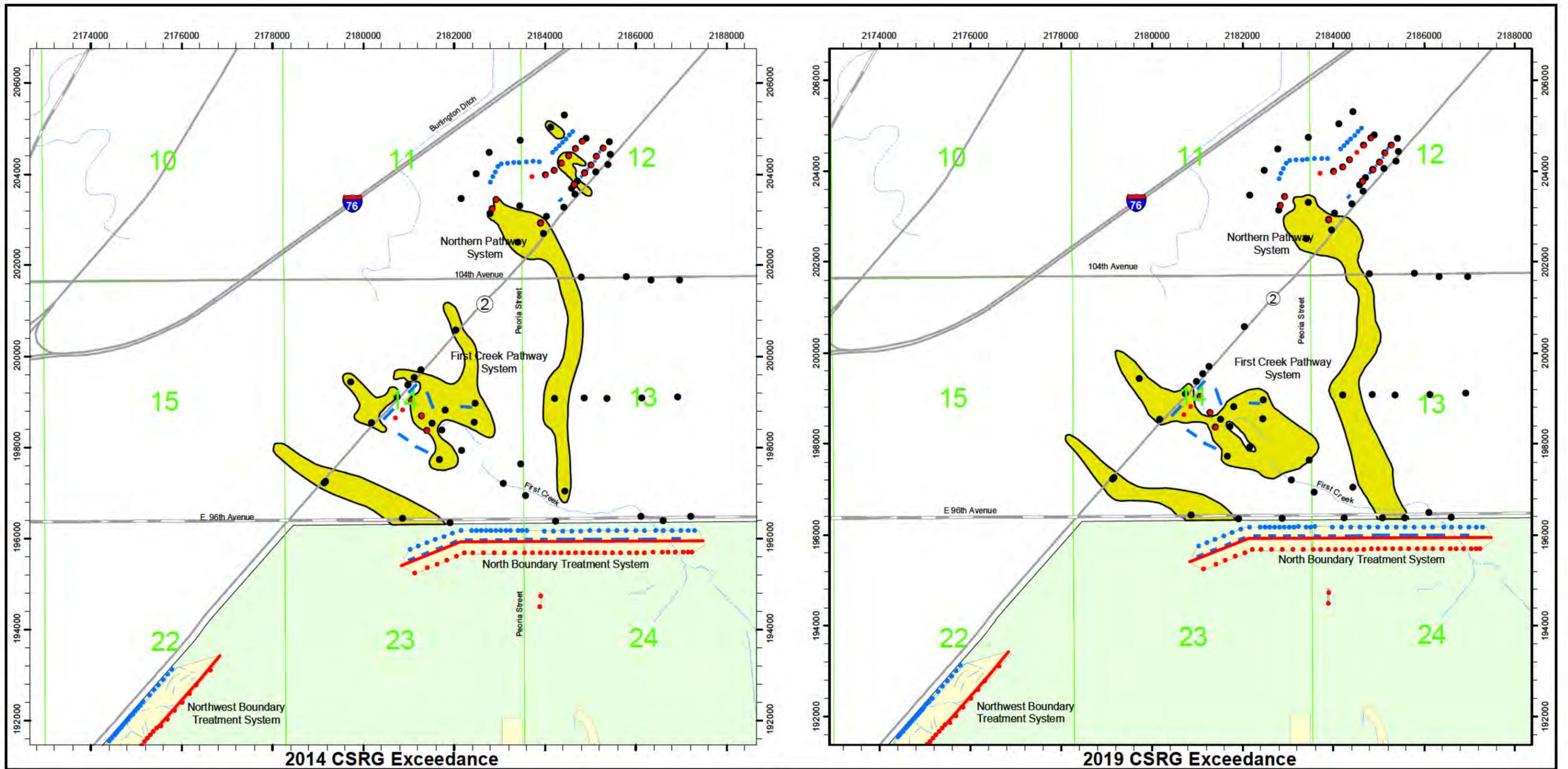


Figure 6.3-63
Off-Post CSRG Exceedance Plume
Maps for Fluoride

M:\projects\FYRR\2019\mxd\c_srg_compare_F.mxd
11/3/2020



Legend

- Sulfate (SO₄) Plume
- Extraction Well
- Recharge Well
- Monitoring Wells
- Secondary Roads
- Primary Roads
- Slurry Walls
- Recharge Trenches
- Intermittent Streams
- Ditches
- Section Lines

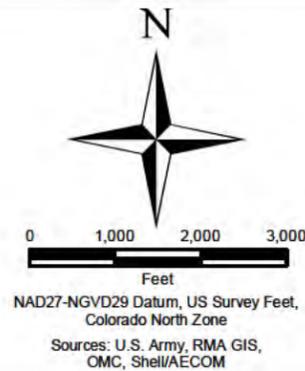
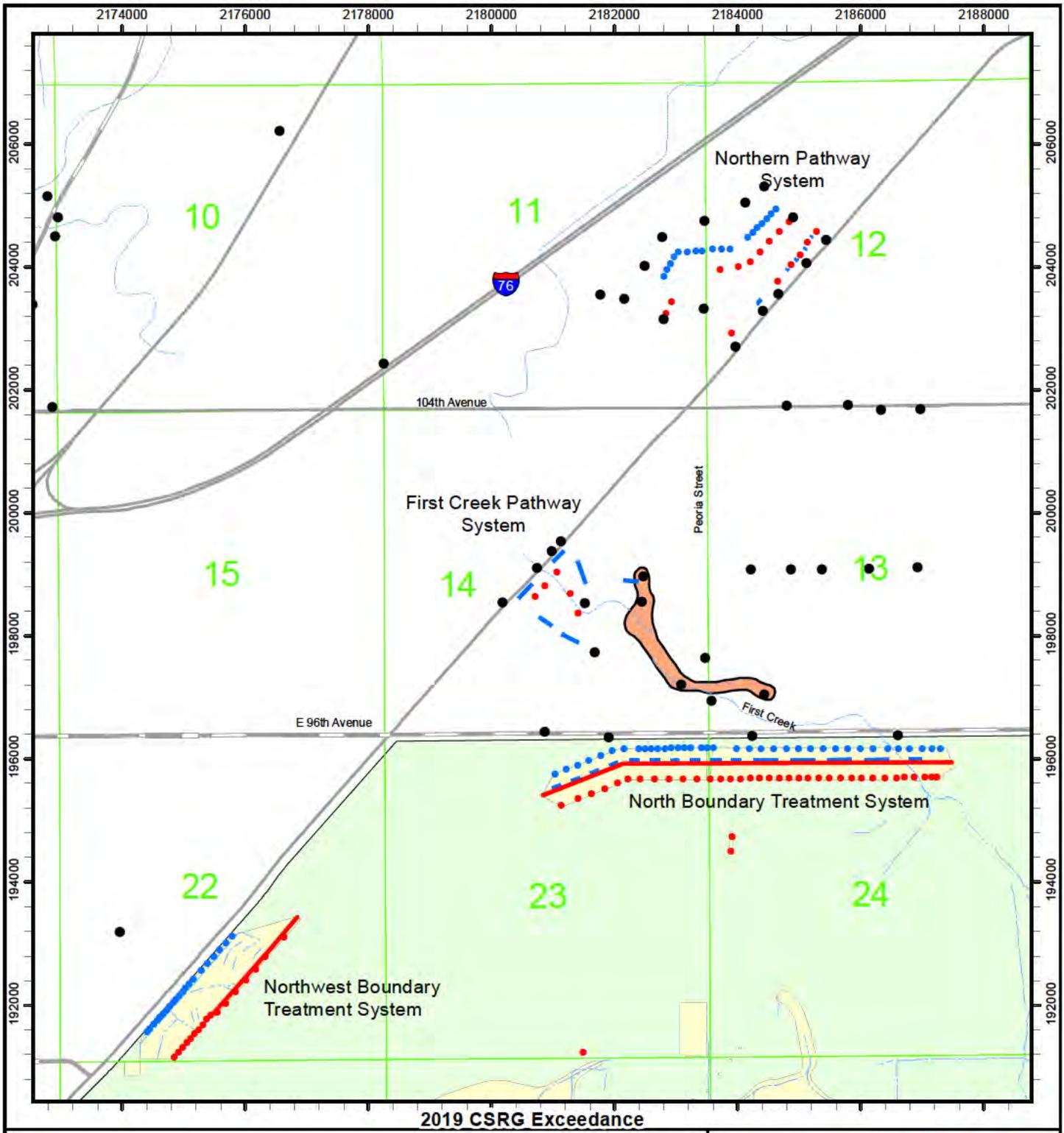


Figure 6.3-64
Off-Post CSRG Exceedance Plume Maps for Sulfate

M:\projects\FYRR\2019\mxd\c_srg_compare_SO4.mxd
11/3/2020



2019 CSRG Exceedance

Legend

- 1,4-Dioxane (14DIOX) Plume
- Extraction Well
- Recharge Well
- Monitoring Wells
- Secondary Roads
- Primary Roads
- Slurry Walls
- Recharge Trenches
- Intermittent Streams
- Ditches
- Section Lines



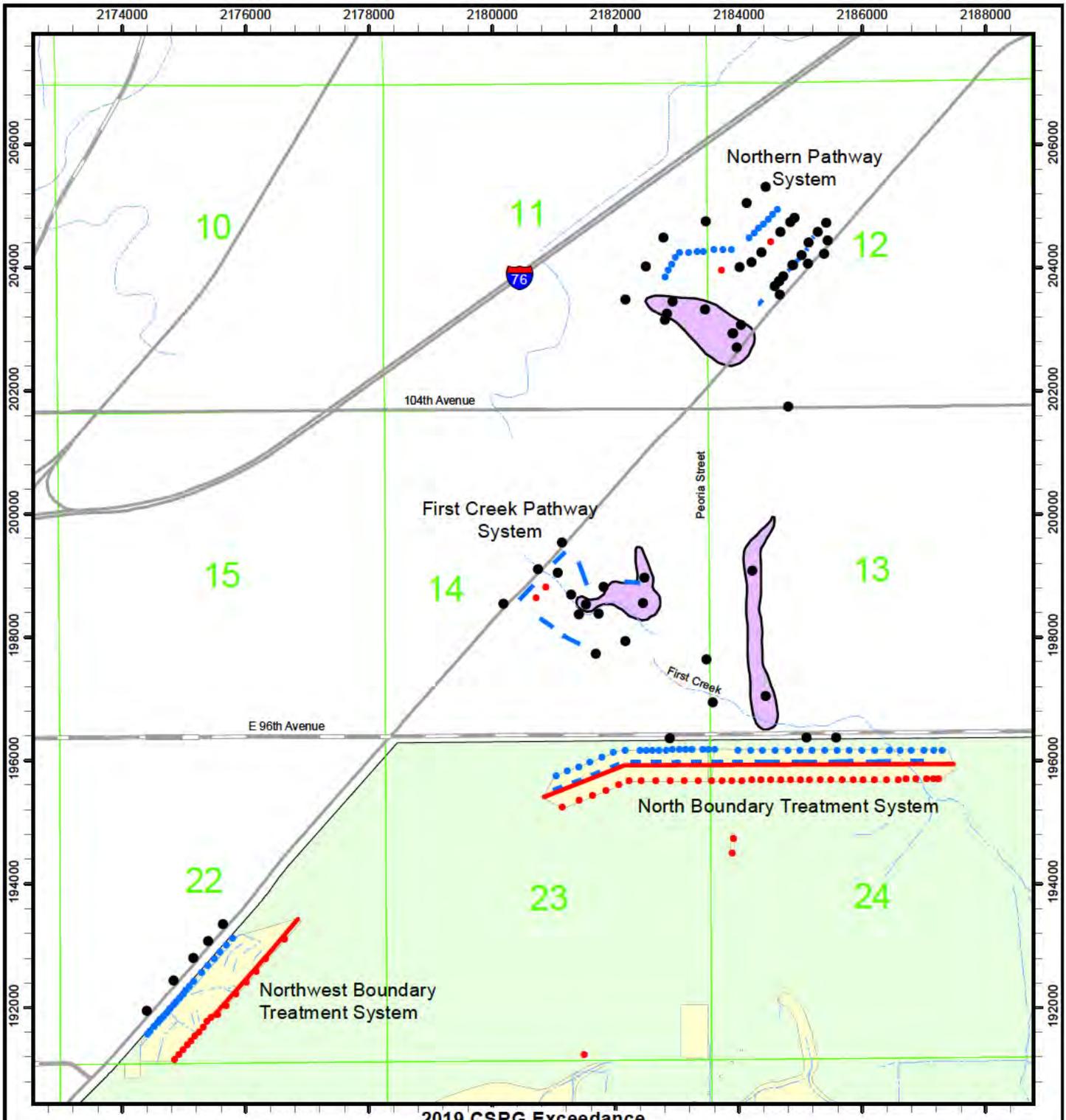
State Plane, Colorado North Zone
 NAD27, US Survey Feet
 Sources: U.S. Army, RMA GIS,
 OMC, Shell/AECOM



Figure 6.3-65

Off-Post CSRG Exceedance Plume Map for 1,4-Dioxane

M:\projects\FYRR\2019\mxdsl_csrgr_14diox.mxd
 8/21/2020



Legend

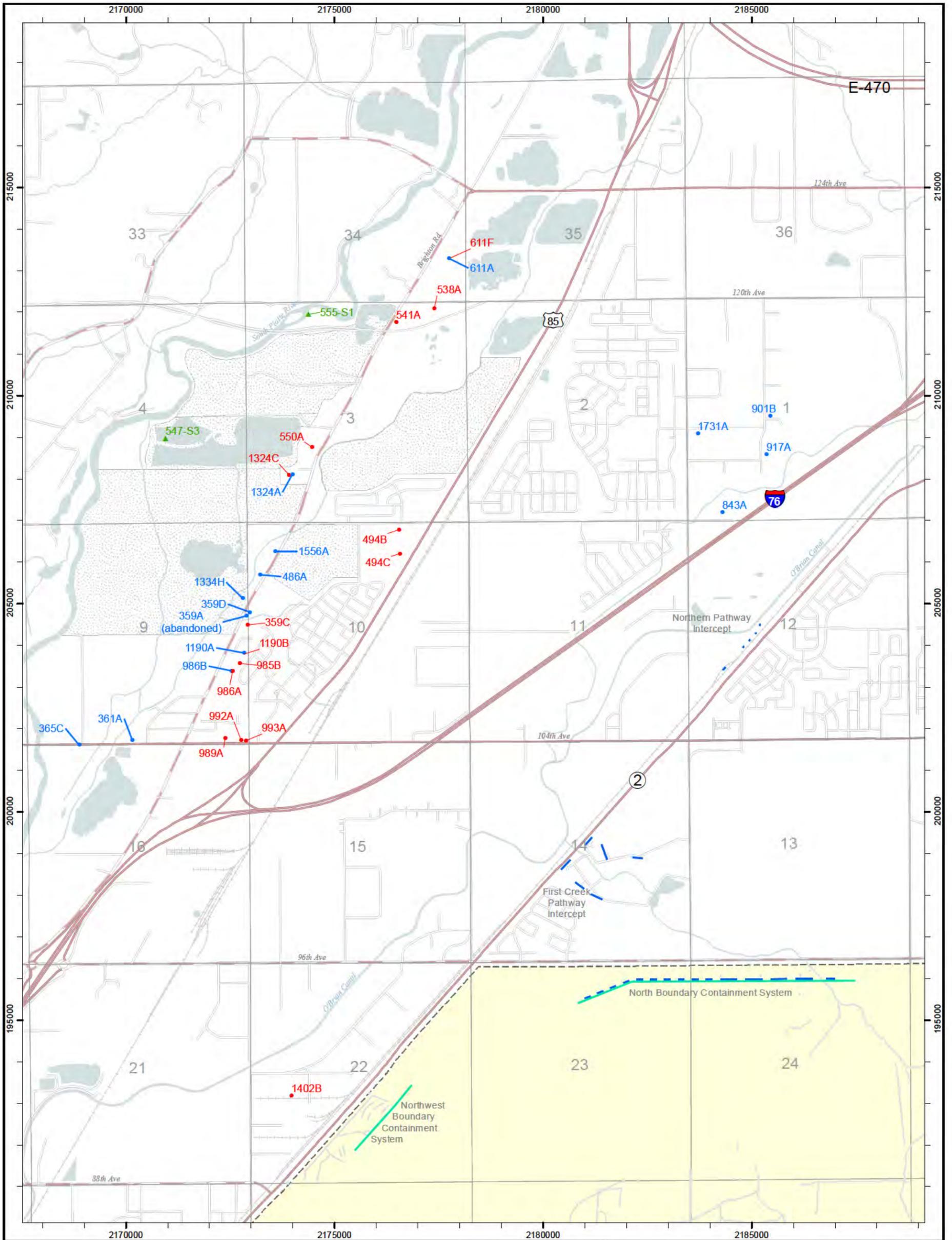
- N-nitrosodi-n-propylamine (NDPA) Plume
- Extraction Well
- Recharge Well
- Monitoring Wells
- Secondary Roads
- Primary Roads
- Slurry Walls
- Recharge Trenches
- Intermittent Streams
- Ditches
- Section Lines



State Plane, Colorado North Zone
 NAD27, US Survey Feet
 Sources: U.S. Army, RMA GIS,
 OMC, Shell/AECOM



Figure 6.3-66
 Off-Post CSG Exceedance
 Plume Map for
 N-nitrosodi-n-propylamine



Legend

- Alluvial Well
- Arapahoe Well
- ▲ Surface Water Sample Point
- Recharge Trenches
- Slurry Walls
- Rocky Mountain Arsenal
- ▨ Gravel Pits
- Lake, Pond, River, Canal, Stream

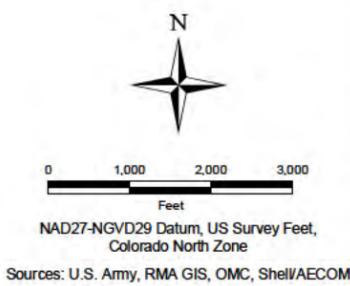
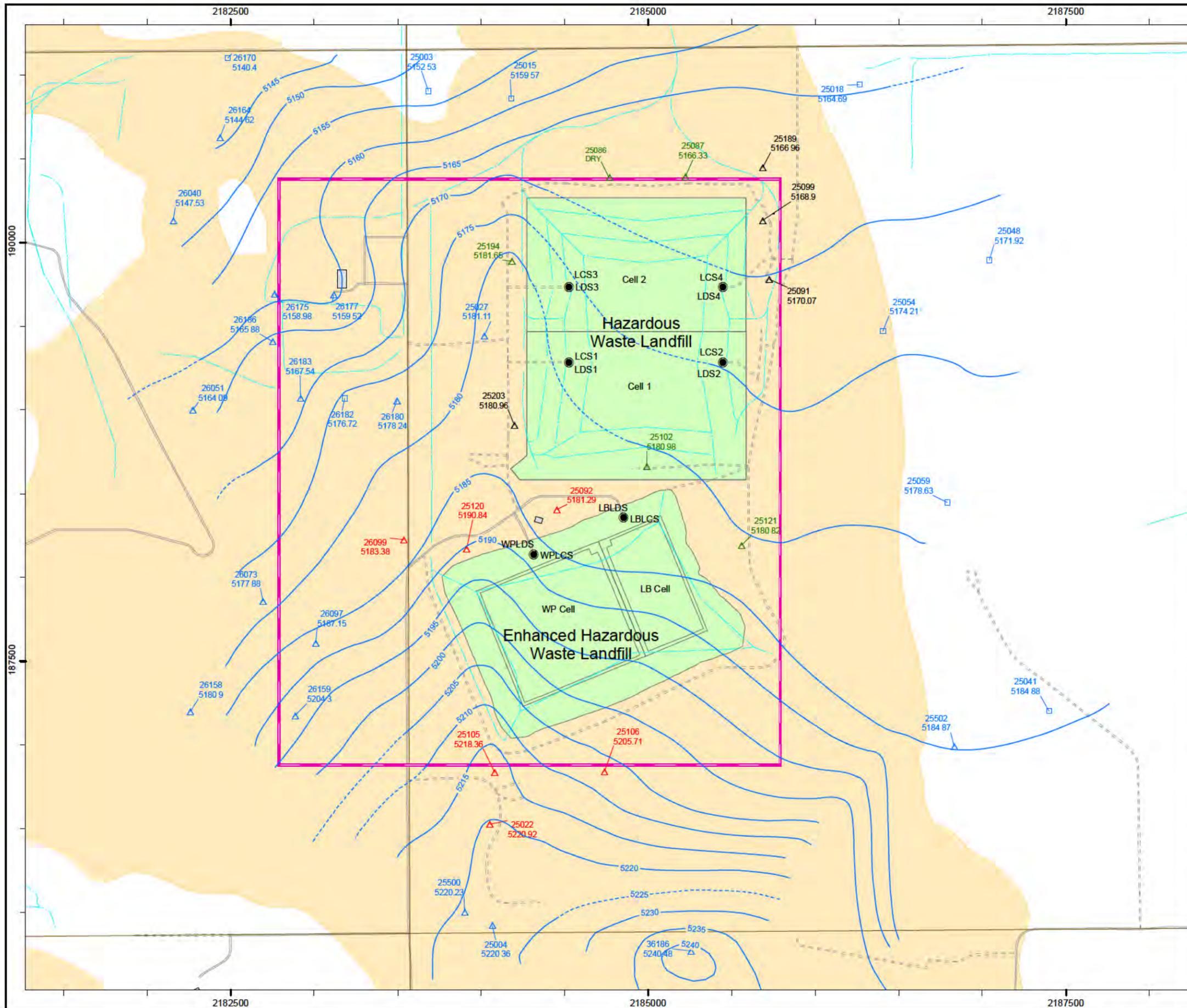


Figure 6.3-67

Off-Post Private Well Sampling Program

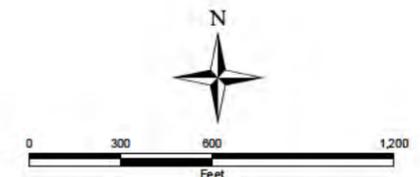
M:\projects\FYRR\2019\mxd\lchd_fyr_wells.mxd
10/13/2020



Legend

- CAMU Boundary
- Section Lines
- Light Duty Roads
- Unpaved Roads
- Ditches, Canals
- Buildings
- Unsaturated Alluvium
- Water Elevation Contour - 5-foot Interval
- Inferred Water Elevation Contours
- Sumps

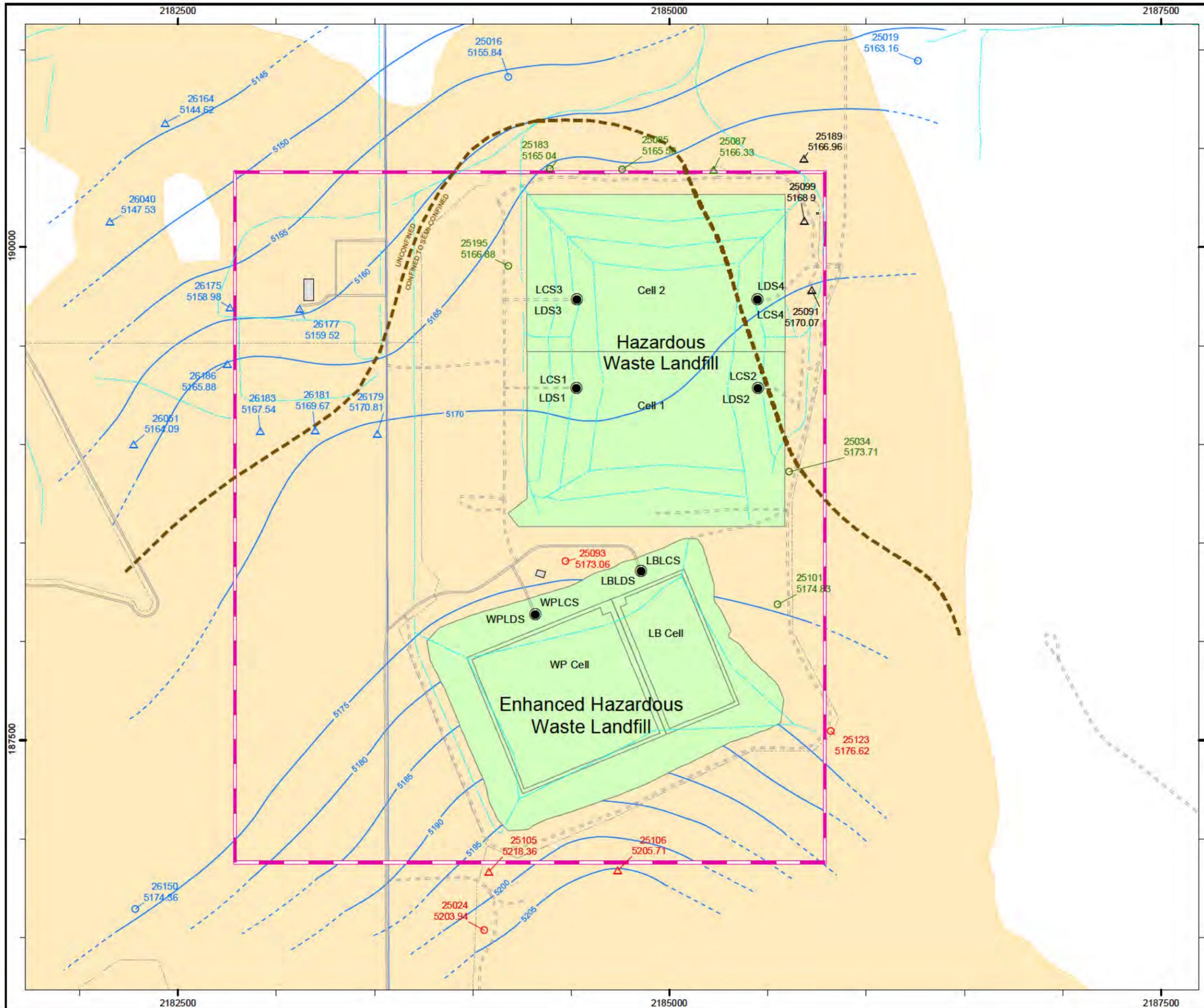
Monitoring Well Network	Flow System/Aquifer	
	Unconfined Alluvial	Unconfined Denver
Hazardous Waste Landfill (HWL)		▲
HWL Supplemental Operations		▲
Enhanced Hazardous Waste Landfill (ELF)		▲
Water Level Only	□	▲



NAD27-NGVD29 Datum, US Survey Feet, Colorado North Zone
Sources: U.S. Army, RMA GIS, OMC, Shell/AECOM



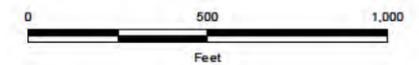
Figure 6.3-68
Potentiometric Surface of the Unconfined Flow System, Hazardous Waste and Enhanced Hazardous Waste Landfills



Legend

- Approximate Boundary of the Lower Sandstone Units
- Ditches, Canals
- Section Lines
- CAMU Boundary
- Light Duty Roads
- Unpaved Roads
- Buildings
- Unsaturated Alluvium
- Water Elevation Contour - 5-foot Interval
- Inferred Water Elevation Contour
- Sumps

Monitoring Well Network	Flow System/Aquifer	
	Confined Denver	Unconfined Denver
Hazardous Waste Landfill (HWL)		
HWL Supplemental Operations		
Enhanced Hazardous Waste Landfill (ELF)		
Water Level Only		



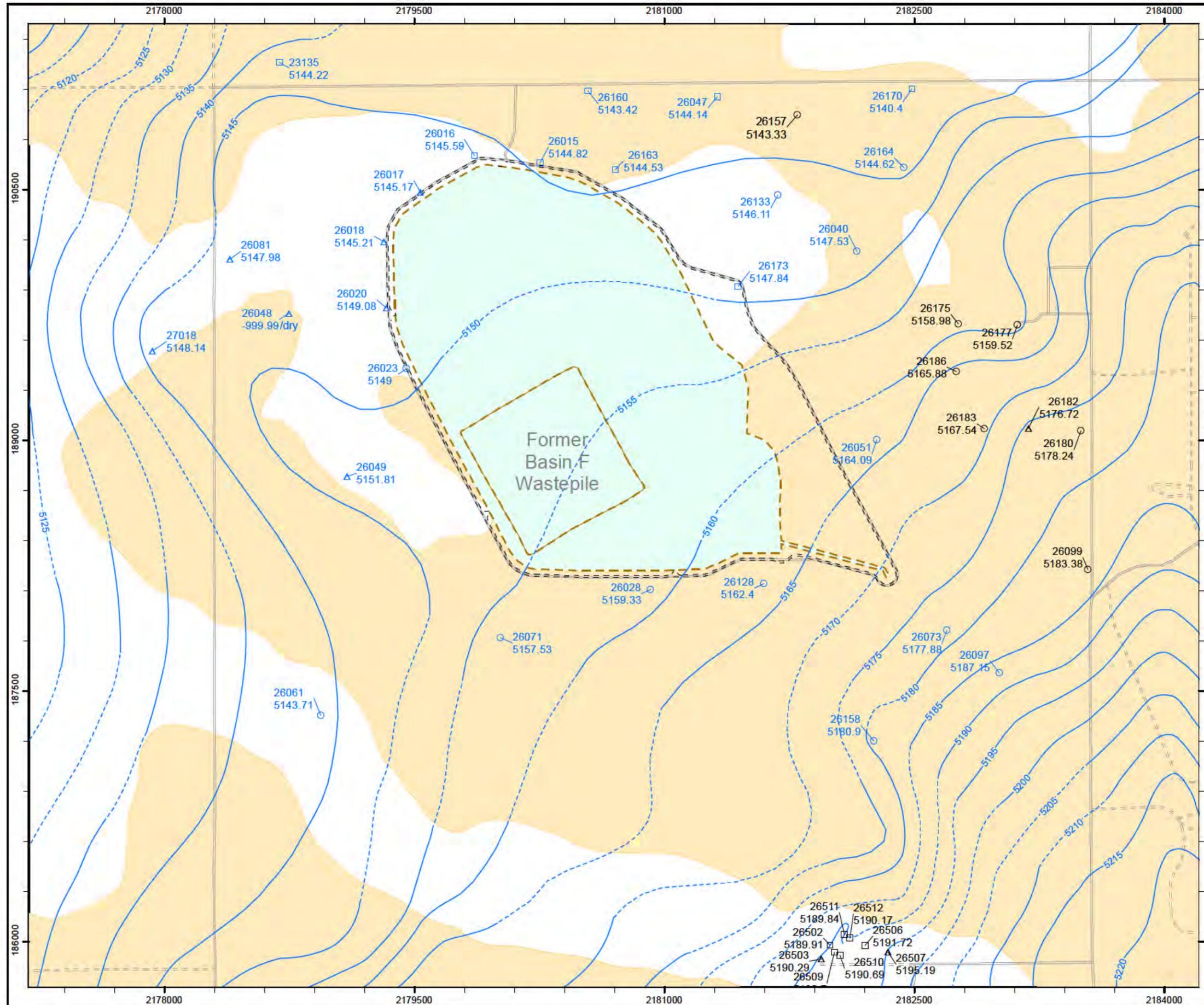
NAD27-NGVD29 Datum, US Survey Feet, Colorado North Zone

Sources: U.S. Army, RMA GIS, OMC, Shell/AECOM



Figure 6.3-69

Potentiometric Surface for the Lower Sandstone Unit and Equivalent Units

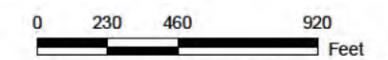


Legend

- Unsaturated Alluvium
- Water elevation contour - 5 foot interval
- Inferred water elevation contour
- Former Basin F Surface Impoundment
- Paved Roads
- Unpaved Roads
- 26051 Well ID and Groundwater Elevation
5161.20

Note: Water levels were measured in FY19 Quarter 2.

Monitoring Well/ Piezometer Network	Flow System / Aquifer		
	Unconfined Alluvial	Unconfined Alluvial/Denver	Unconfined Denver
Water Level Network	△	□	○
Other Network Wells	△	□	○



NAD27-NGVD29 Datum, US Survey Feet, Colorado North Zone
Sources: U.S. Army, RMA GIS, OMC, ShellWAECOM

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Figure 6.3-70

FY19 Potentiometric Surface of the Unconfined Flow System, Former Basin F

Figure 6.3-70a
Basin F Wastepile and Principal Threat Well Monitoring Networks –
Time vs. Concentration for Arsenic

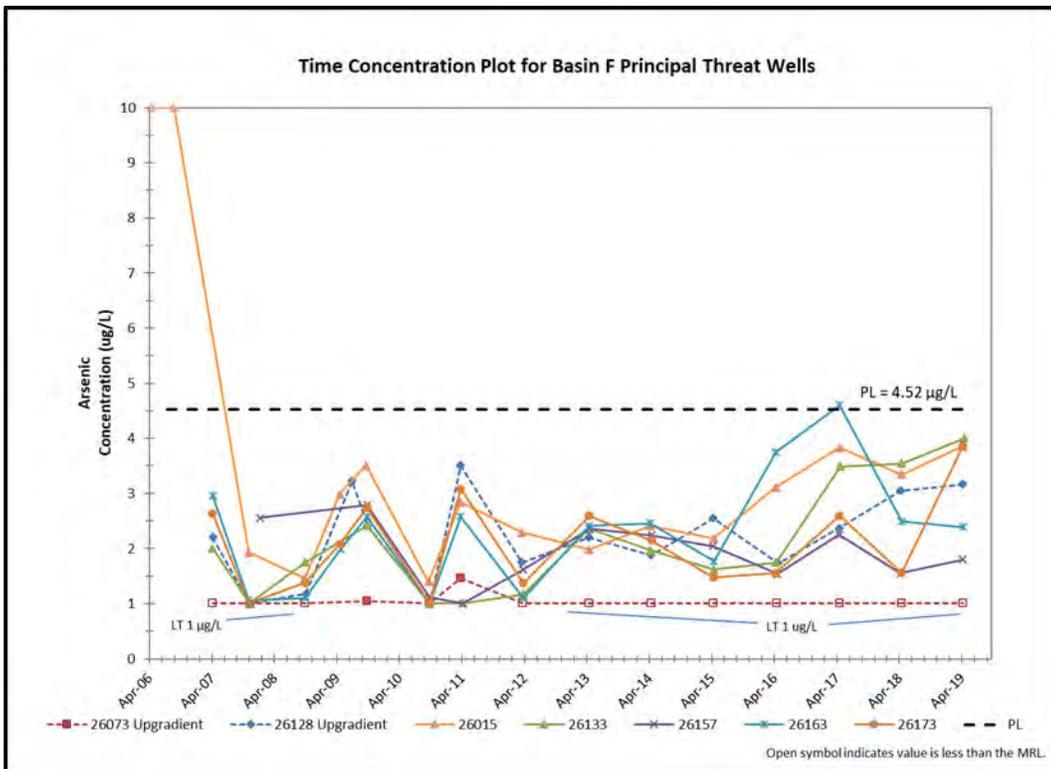
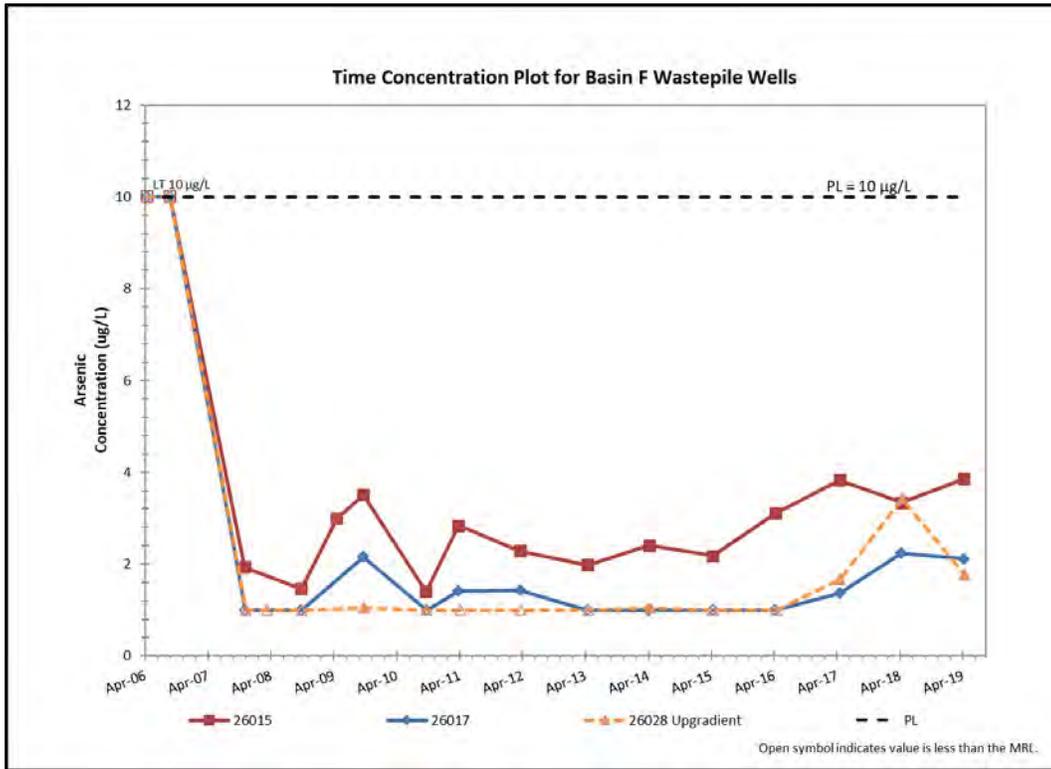


Figure 6.3-70b
Basin F Wastepile and Principal Threat Well Monitoring Networks –
Time vs. Concentration for Chloroform

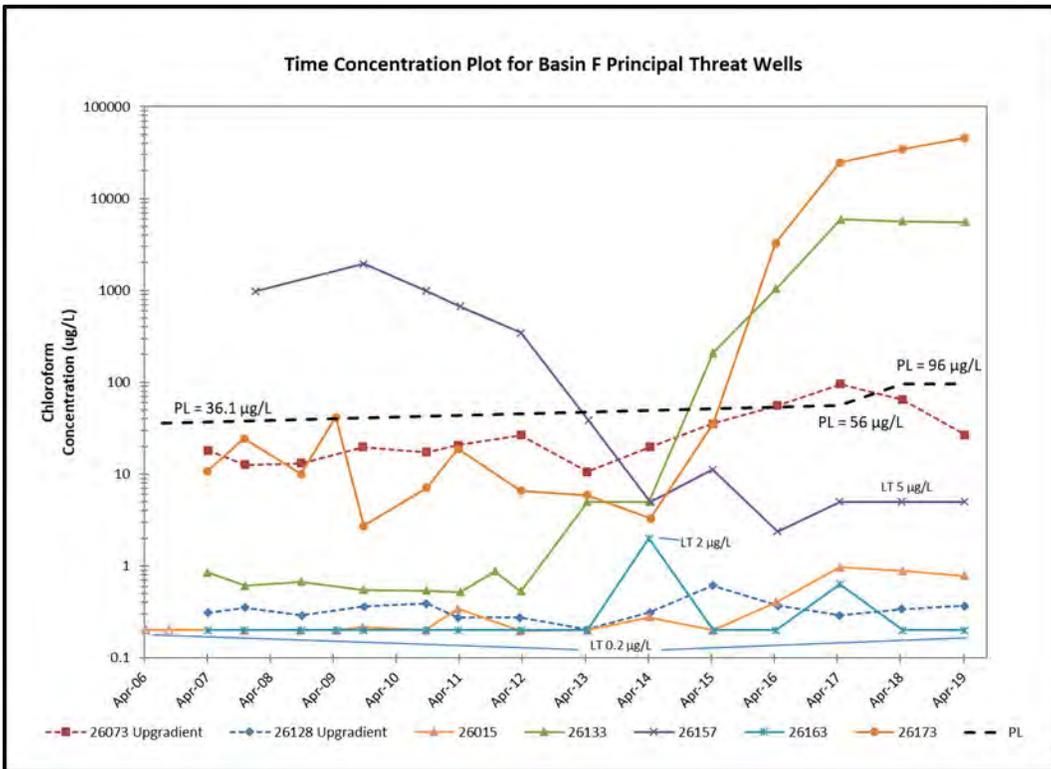
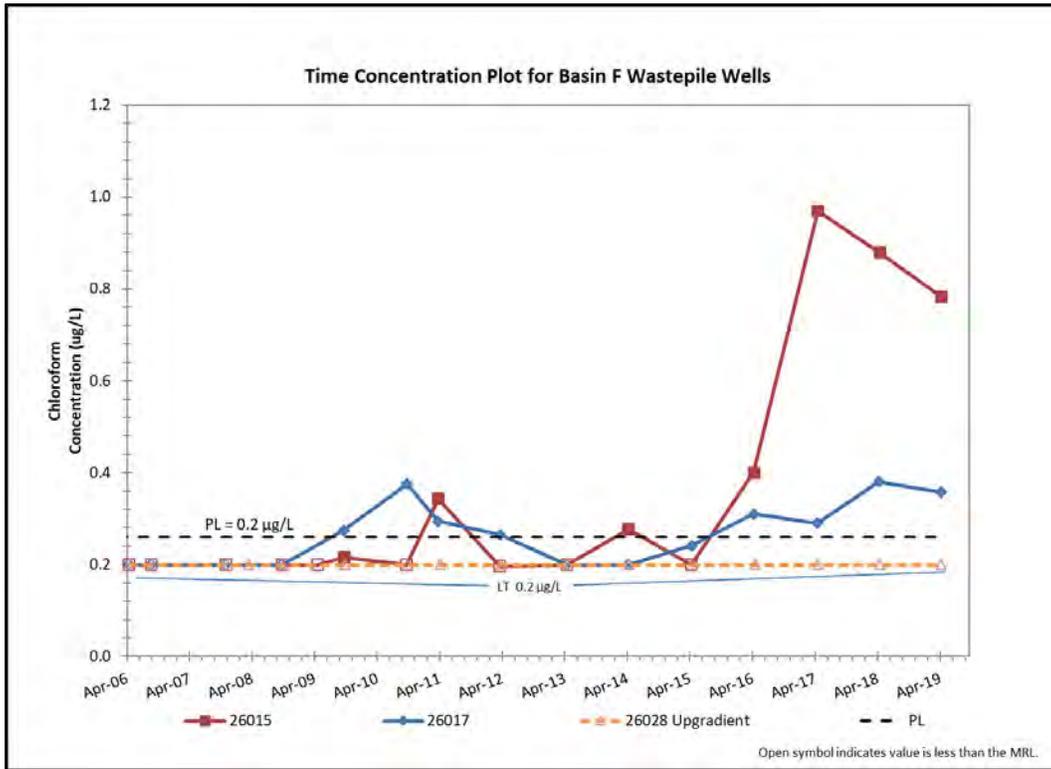


Figure 6.3-70c
Basin F Wastepile and Principal Threat Well Monitoring Networks –
Time vs. Concentration for Chloride

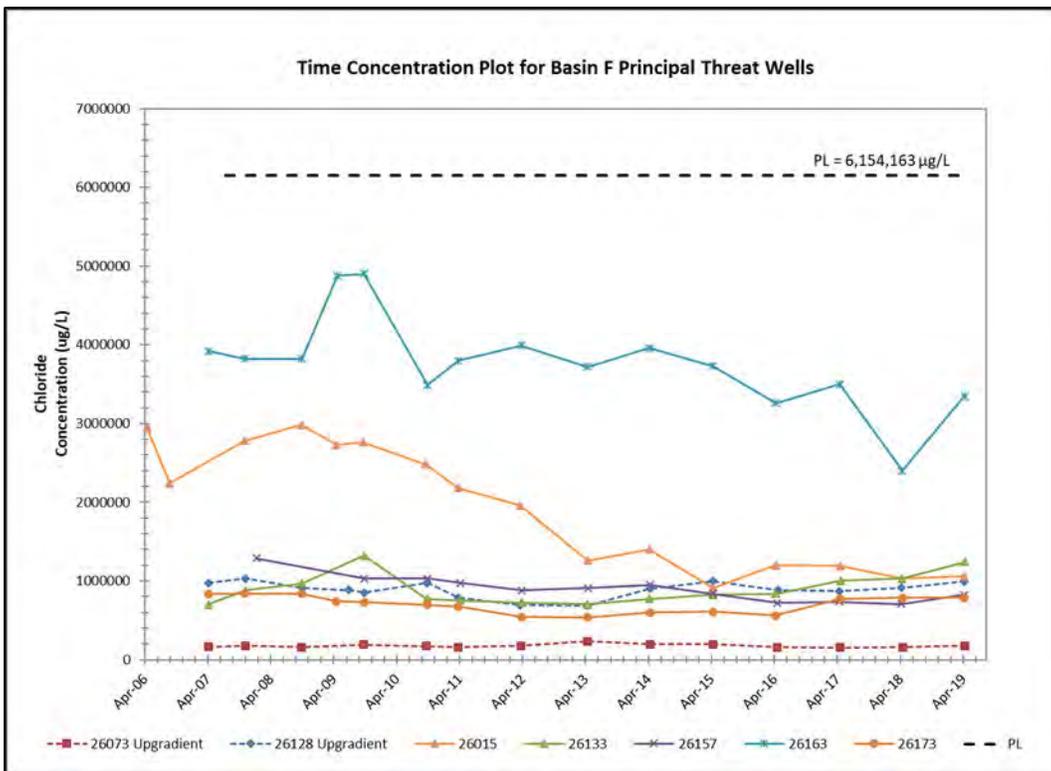
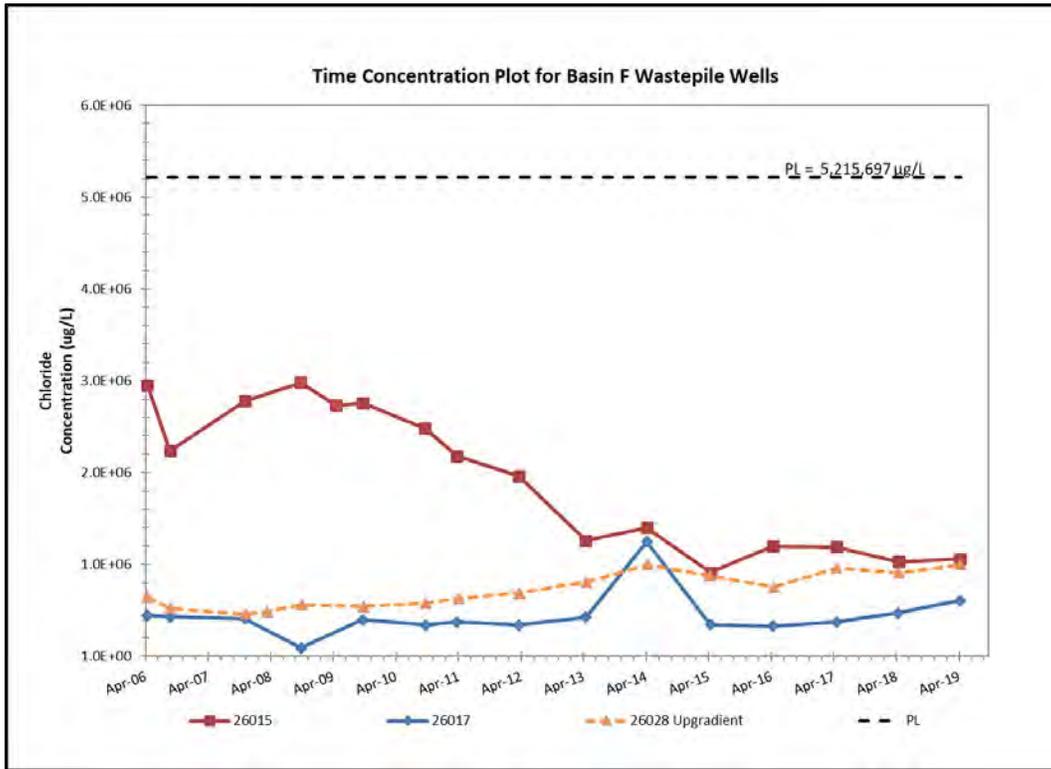


Figure 6.3-70d
Basin F Wastepile and Principal Threat Well Monitoring Networks –
Time vs. Concentrations for CPMSO2

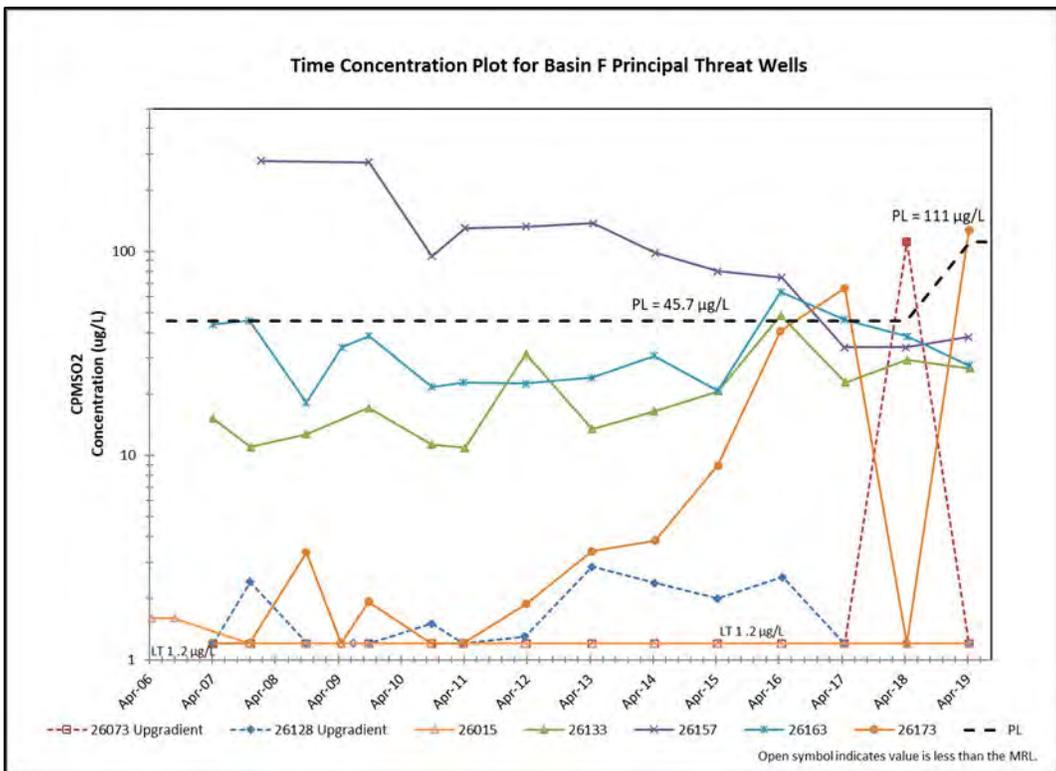
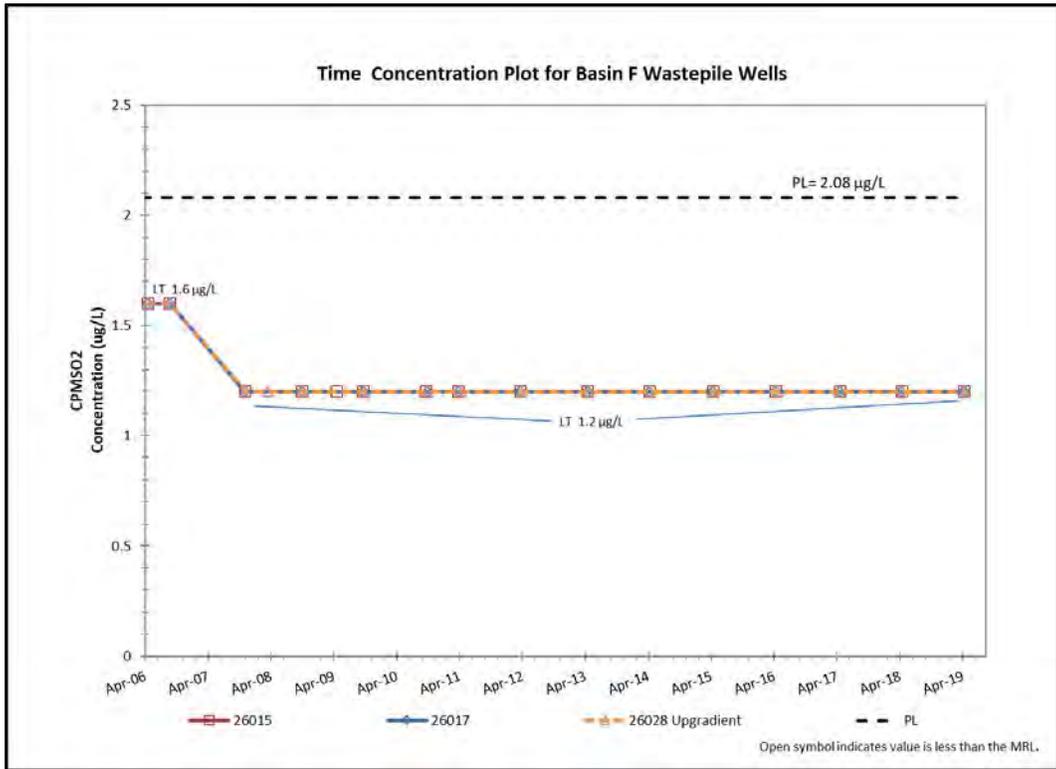


Figure 6.3-70e
Basin F Wastepile and Principal Threat Well Monitoring Networks –
Time vs. Concentration for Copper

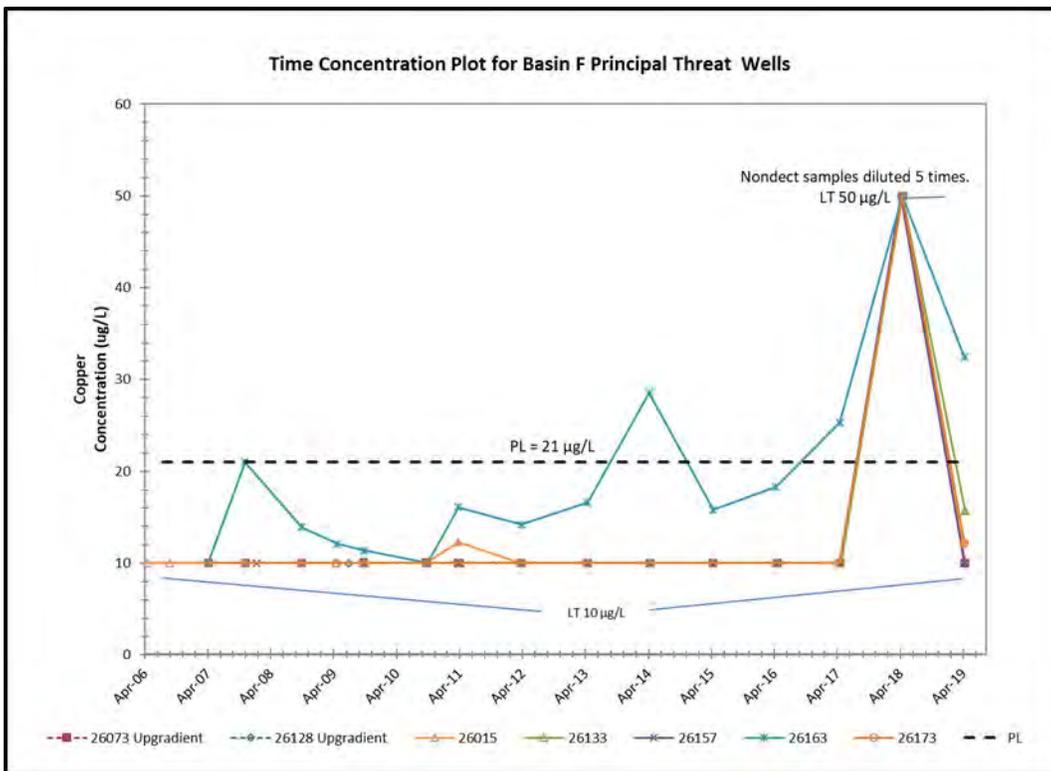
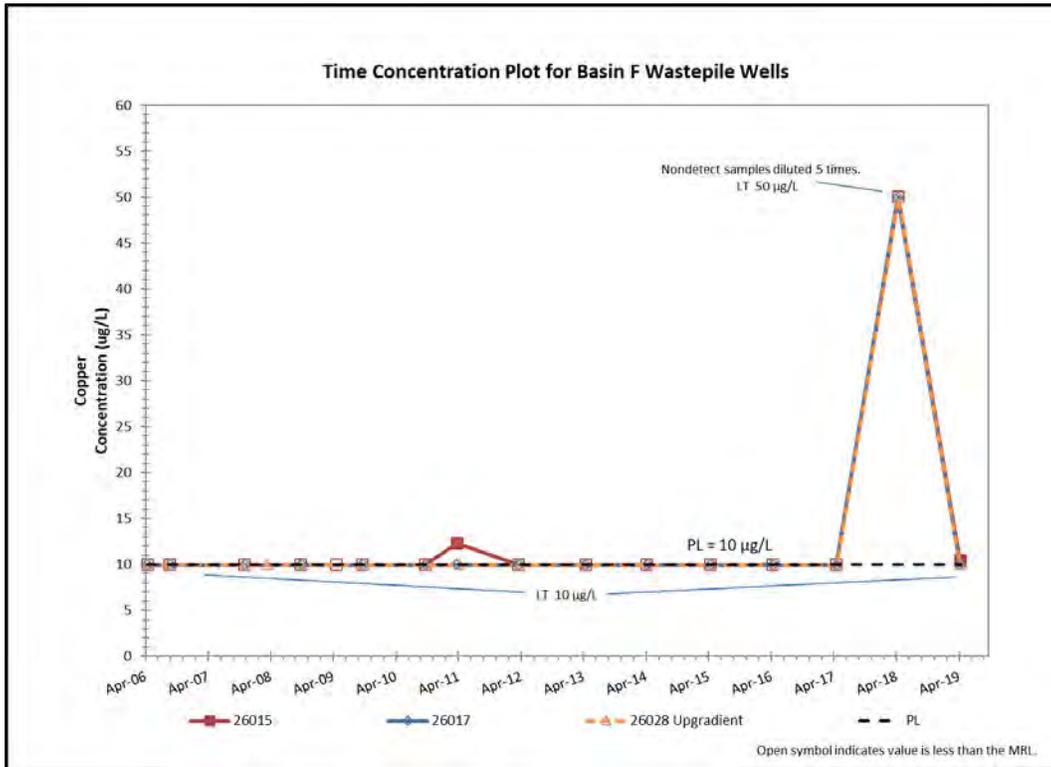


Figure 6.3-70f
Basin F Wastepile and Principal Threat Well Monitoring Networks –
Time vs. Concentration for DCPD

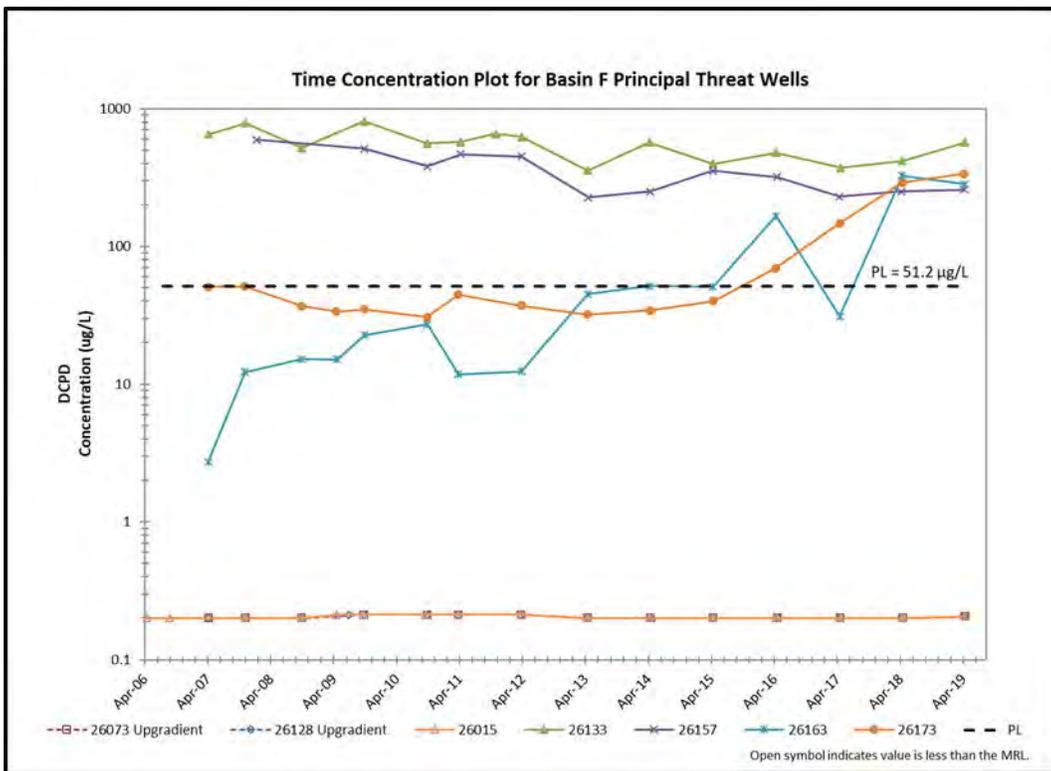
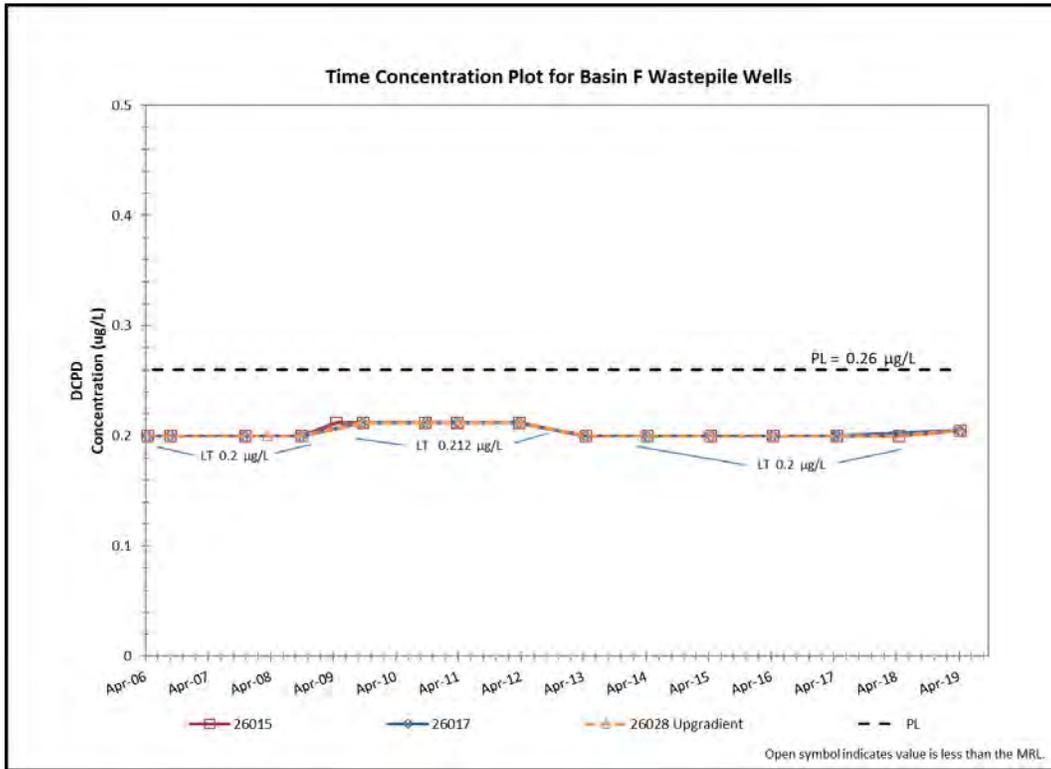


Figure 6.3-70g
Basin F Wastepile and Principal Threat Well Monitoring Networks –
Time vs. Concentrations for DIMP

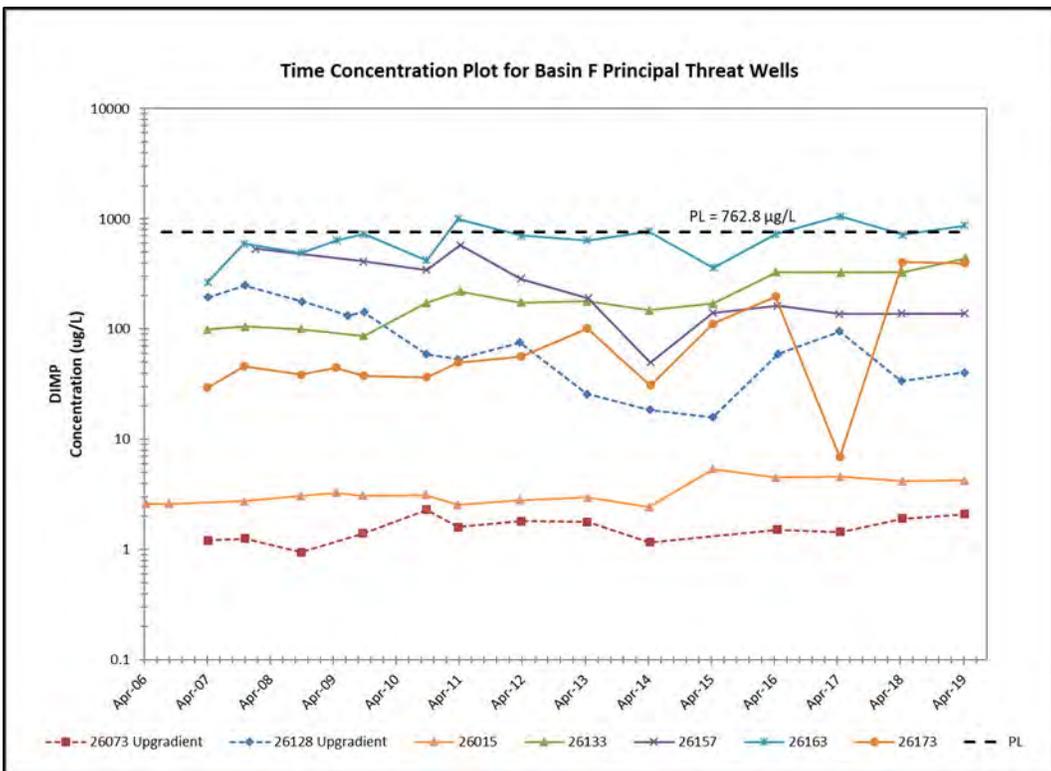
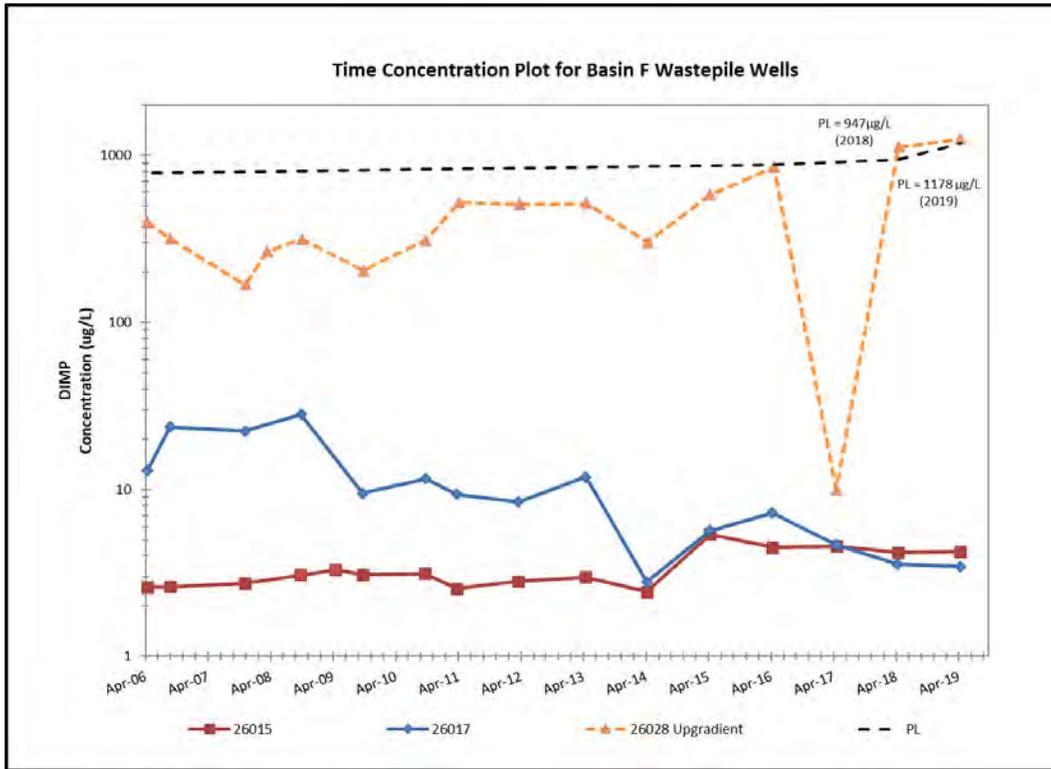


Figure 6.3.70h
Basin F Wastepile and Principal Threat Well Monitoring Networks –
Time vs. Concentrations for Dieldrin

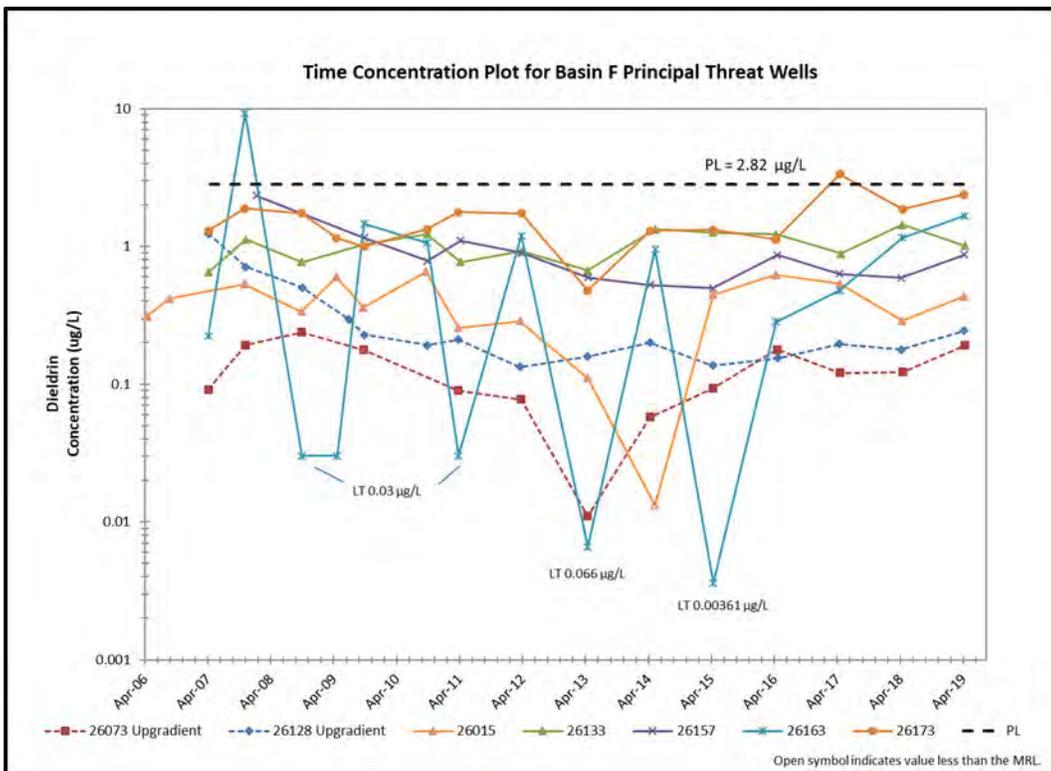
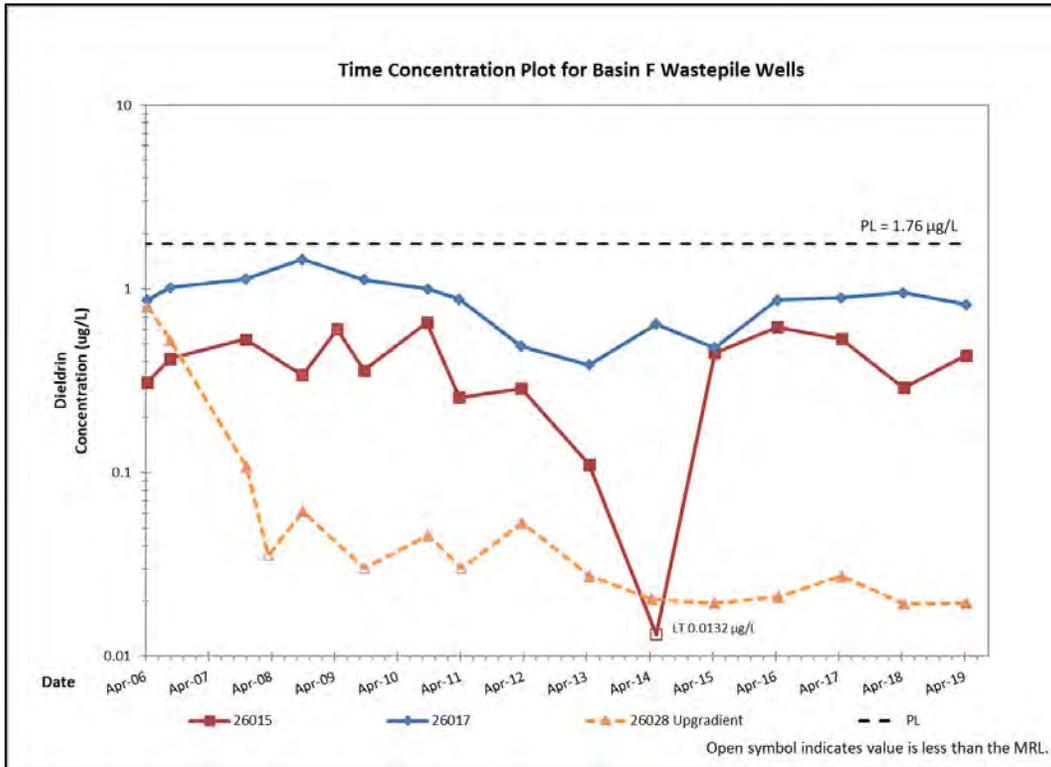


Figure 6.3-70i
Basin F Wastepile and Principal Threat Well Monitoring Networks –
Time vs. Concentrations for NNDMEA

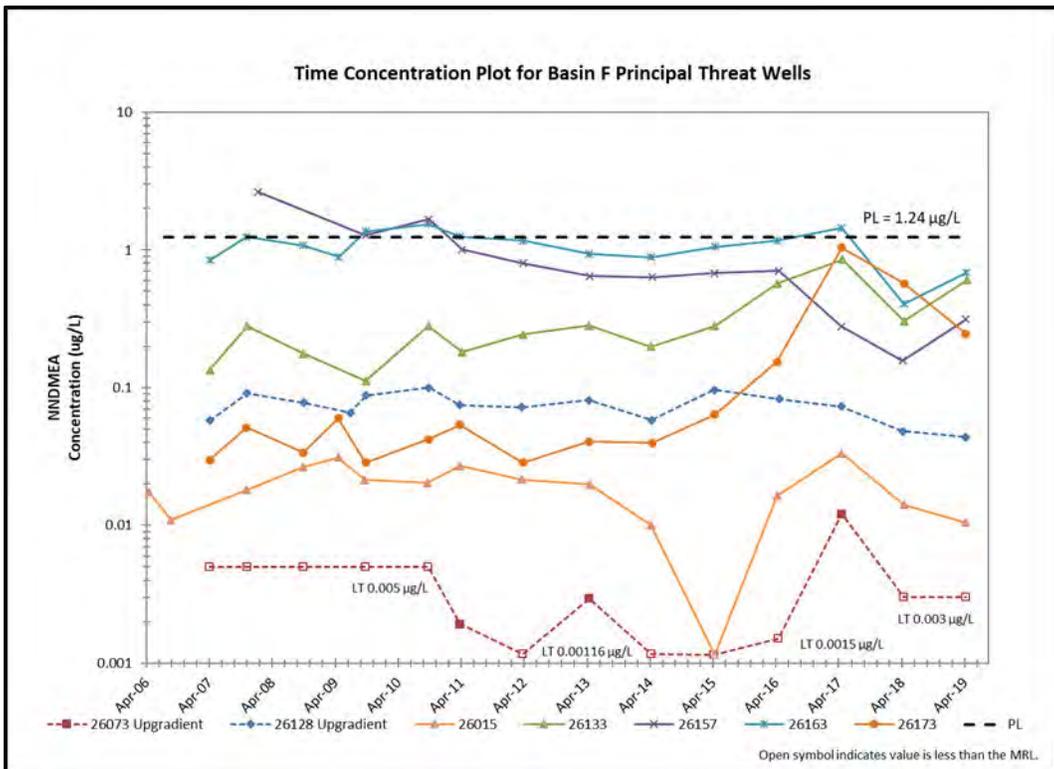
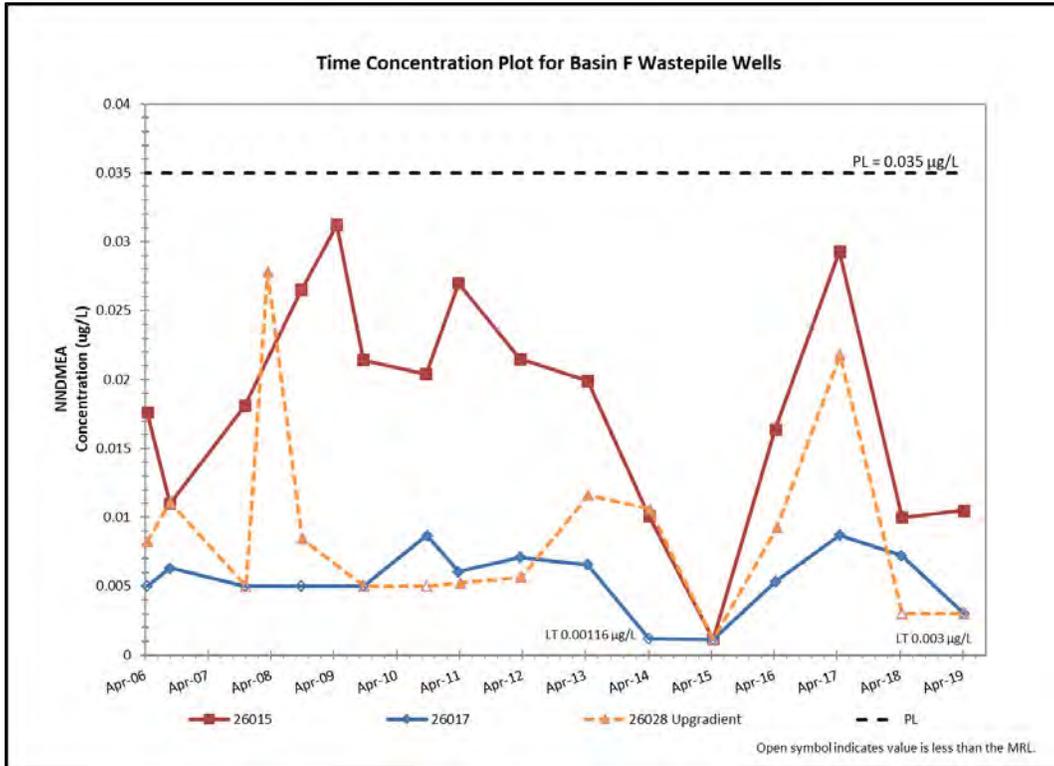


Figure 6.3-70j
Basin F Wastepile and Principal Threat Well Monitoring Networks –
Time vs. Concentrations for Sulfate

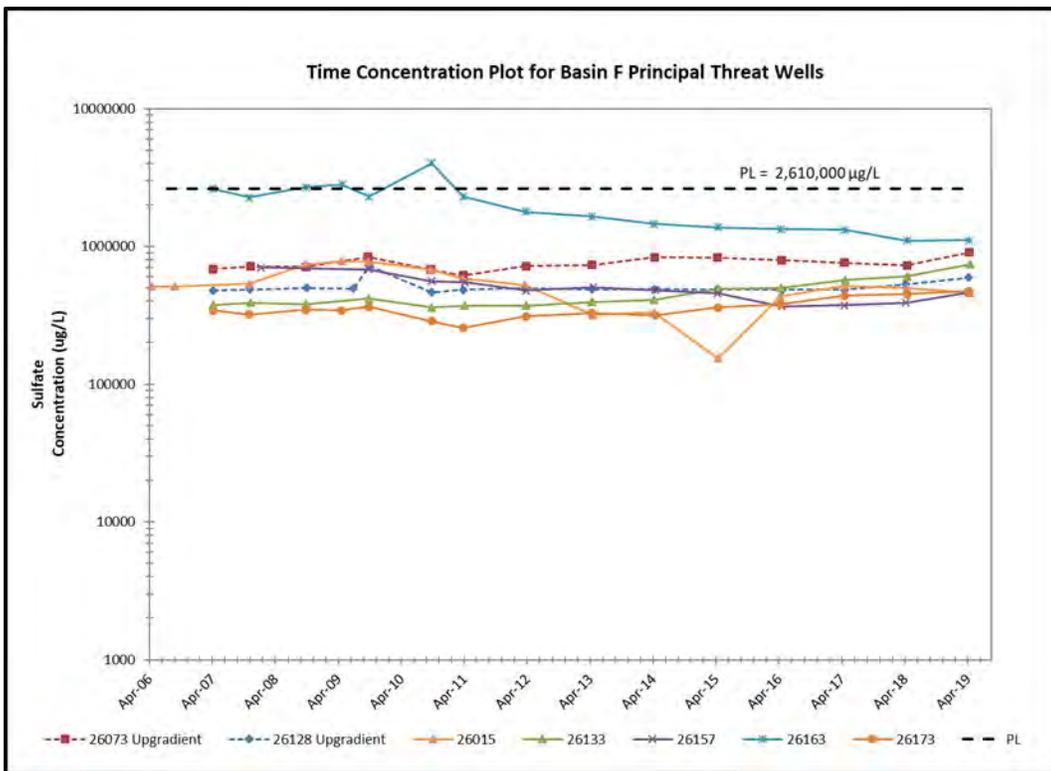
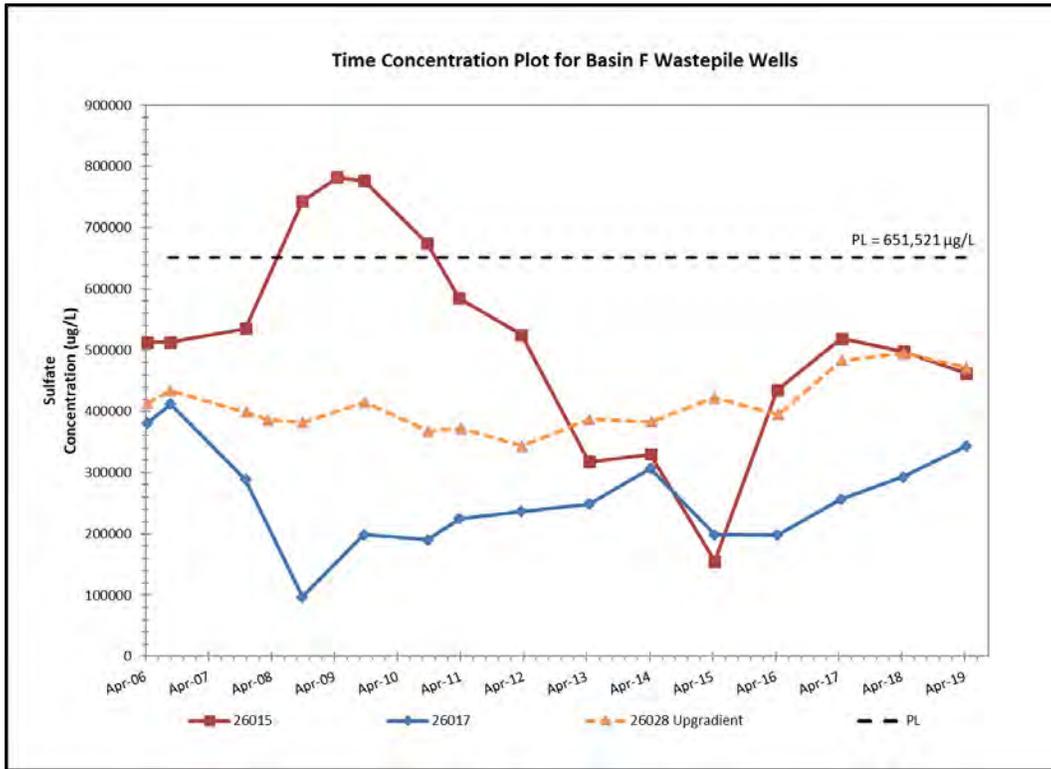
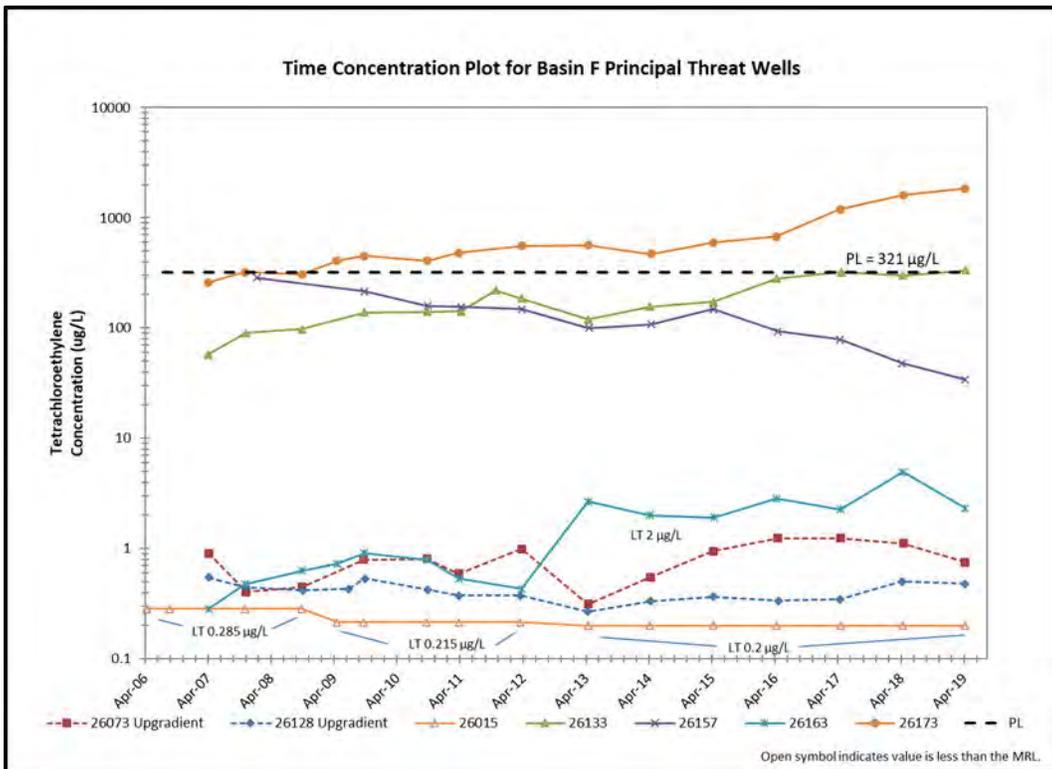
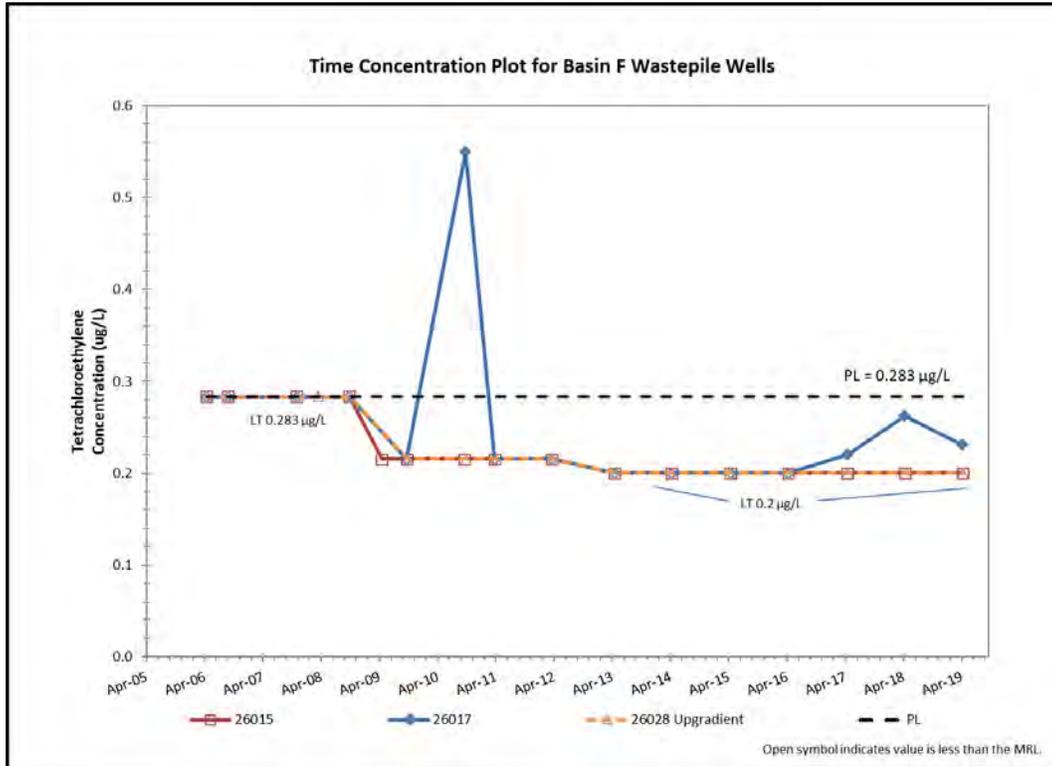
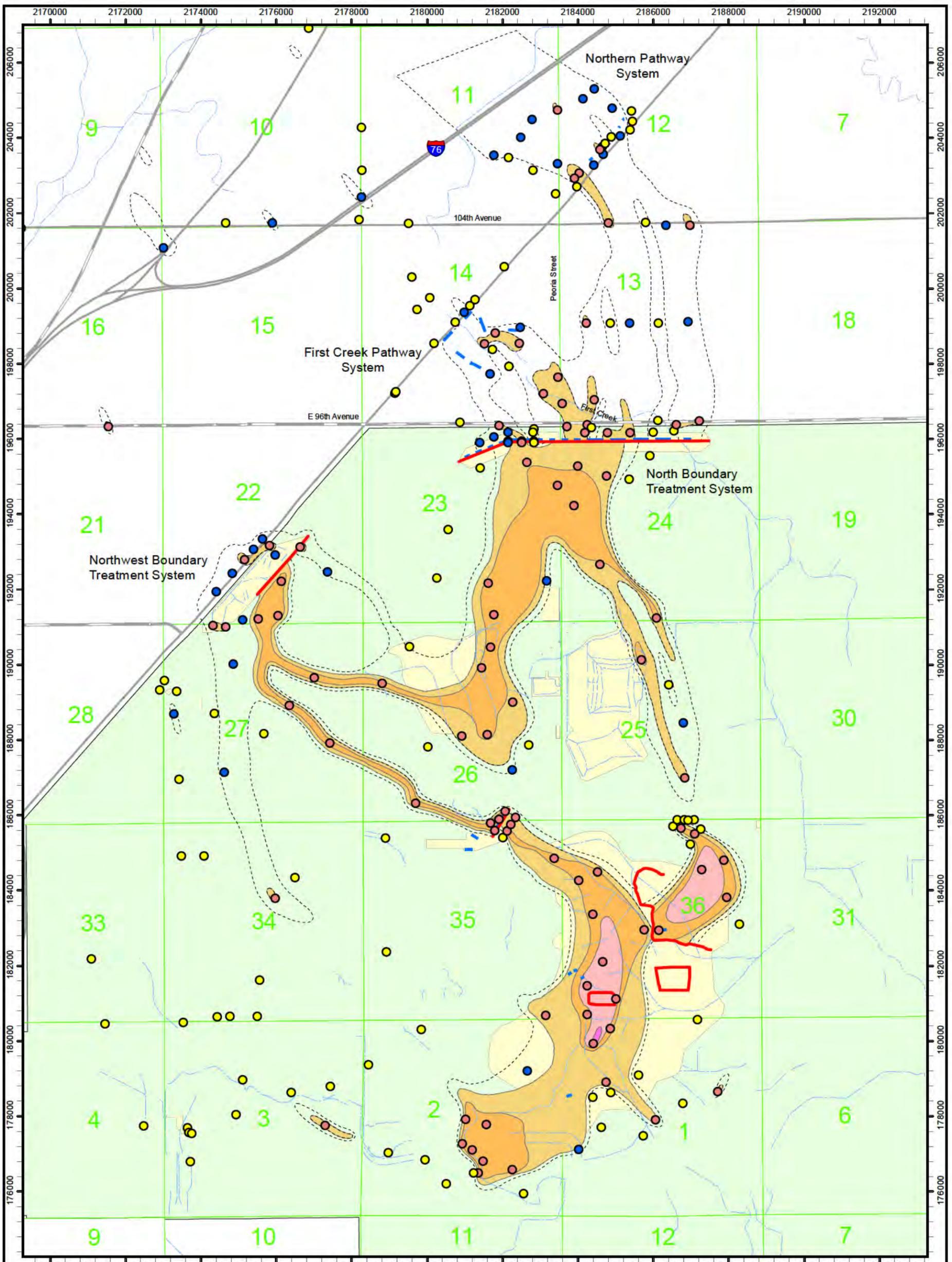


Figure 6.3-70k
Basin F Wastepile and Principal Threat Well Monitoring Networks –
Time vs. Concentrations for Tetrachloroethylene





Legend

2017/2018 Sample Locations

- Non-Detect
- Detection Below CBSG
- Above CBSG
- Secondary Roads
- Primary Roads
- Slurry Walls
- Recharge Trenches
- Intermittent Streams
- Ditches
- Section Lines

Unconfined Flow System

Contour Intervals (µg/L)

- 0.137 to 0.35
- 0.35 to 1.0
- 1.0 to 10
- 10 to 100
- > 100



State Plane, Colorado North Zone
NAD27, US Survey Feet
Sources: U.S. Army, RMA GIS,
OMC, Shell/AECOM



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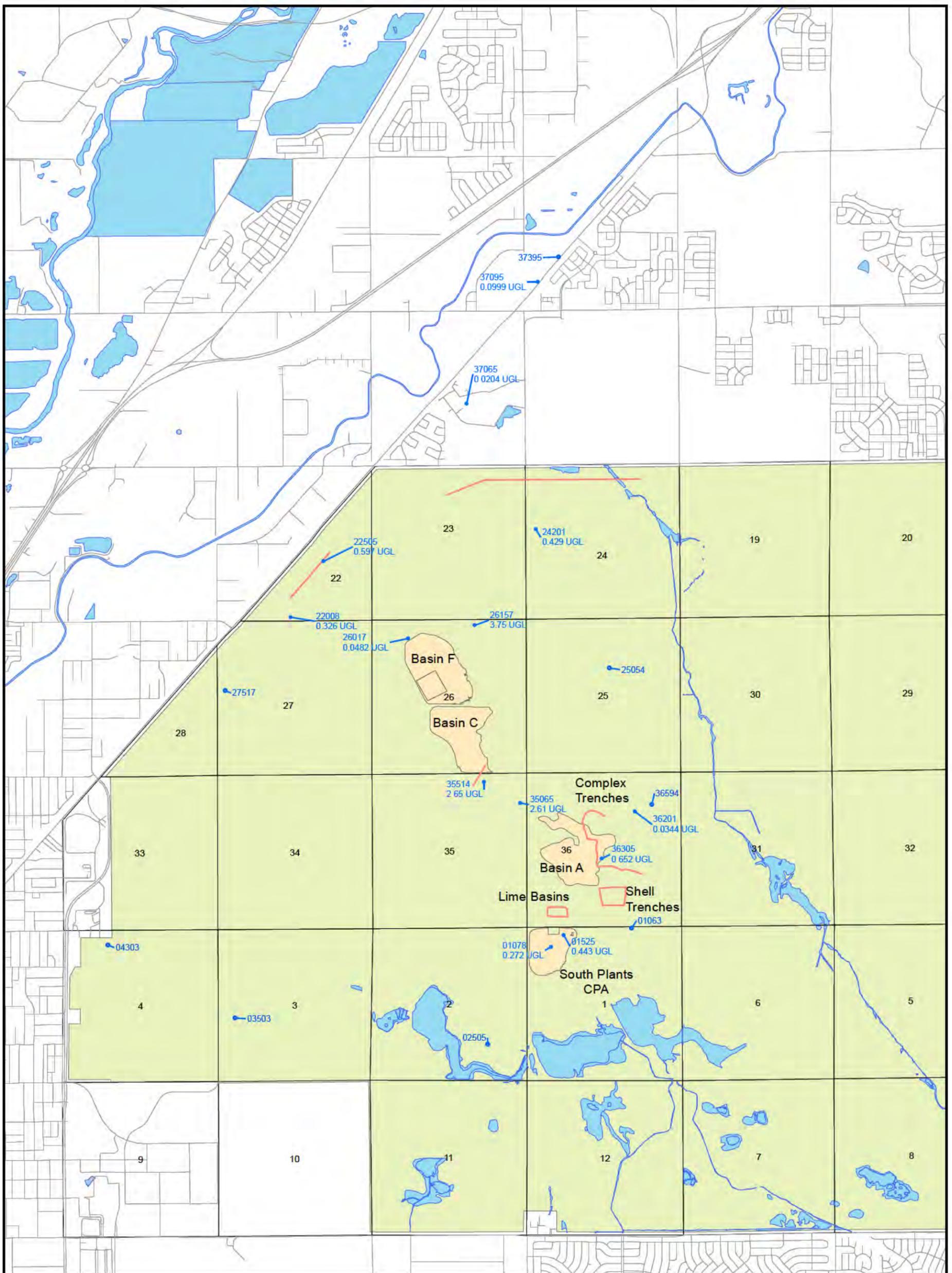


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Figure 6.3-71

**Rocky Mountain Arsenal
2018 1,4-Dioxane Plume**



Legend

- NDPA Investigative Wells
- Detections (Concentrations in UGL)
- Non-Detects
- Slurry Walls
- Source Areas
- Bodies of Water
- RMA Boundary

Note: All detections exceed the Colorado Basic Standard for Groundwater (CBSG) of 0.005 µg/l. Samples were collected in 2017 and 2018.



State Plane, Colorado North Zone,
NAD27, US Survey Feet
Sources: U.S. Army, RMA GIS,
PMC, OMC, Shell/URS Corp.



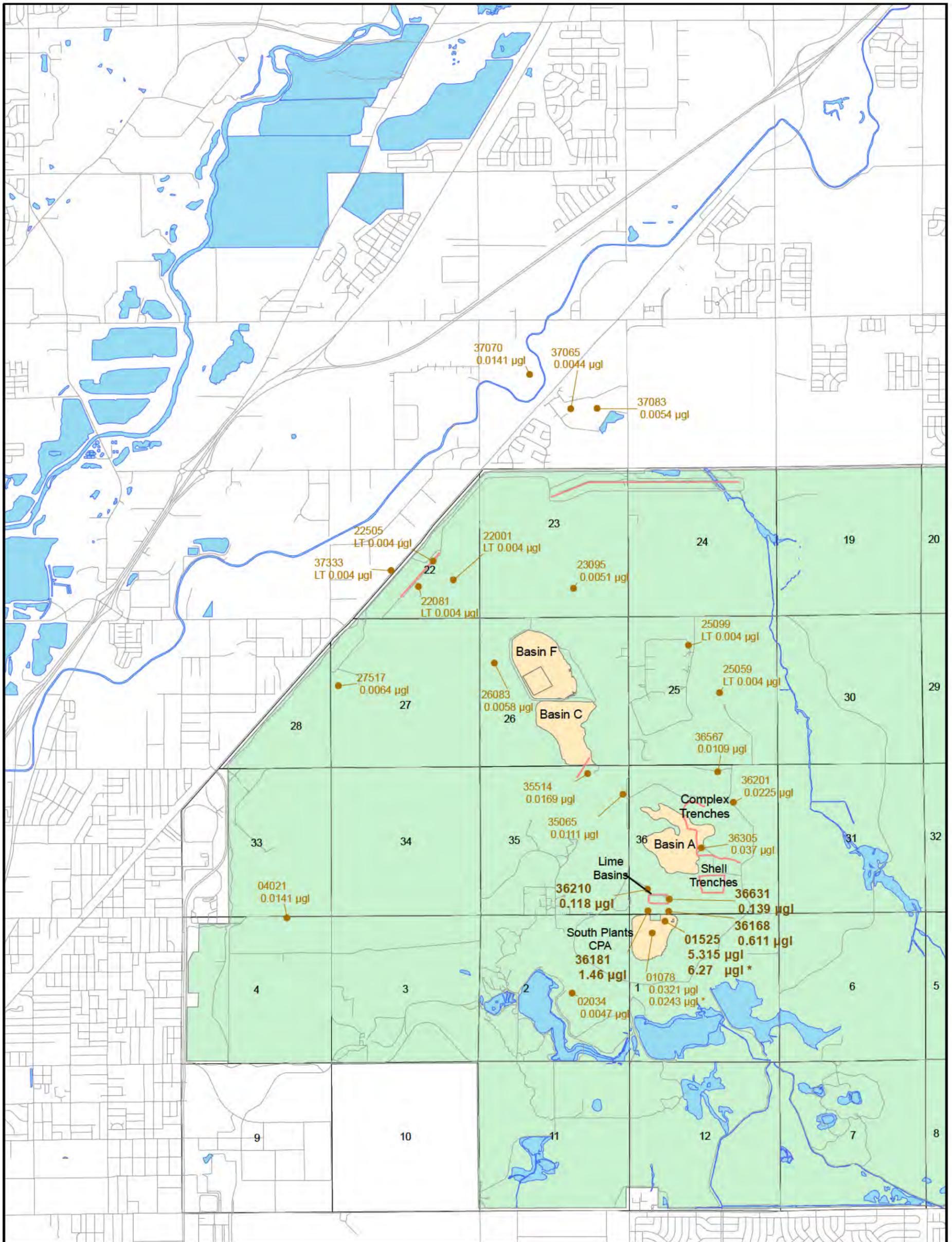
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Figure 6.3-72

**N-nitrosodi-n-propylamine (NDPA)
Monitoring Results**



Legend

- Slurry Walls
- Source Areas
- Bodies of Water
- RMA Boundary
- PFAS Well Results (September 2019)
- * Wells resampled December 2019.

NOTE: PFAS results have been summed. PFAS health advisory of 0.07 µg/l can be exceeded based on individual PFOA and PFOS detections or the summed concentrations of PFOA and PFOS detections. Values in bold exceed the health advisory.

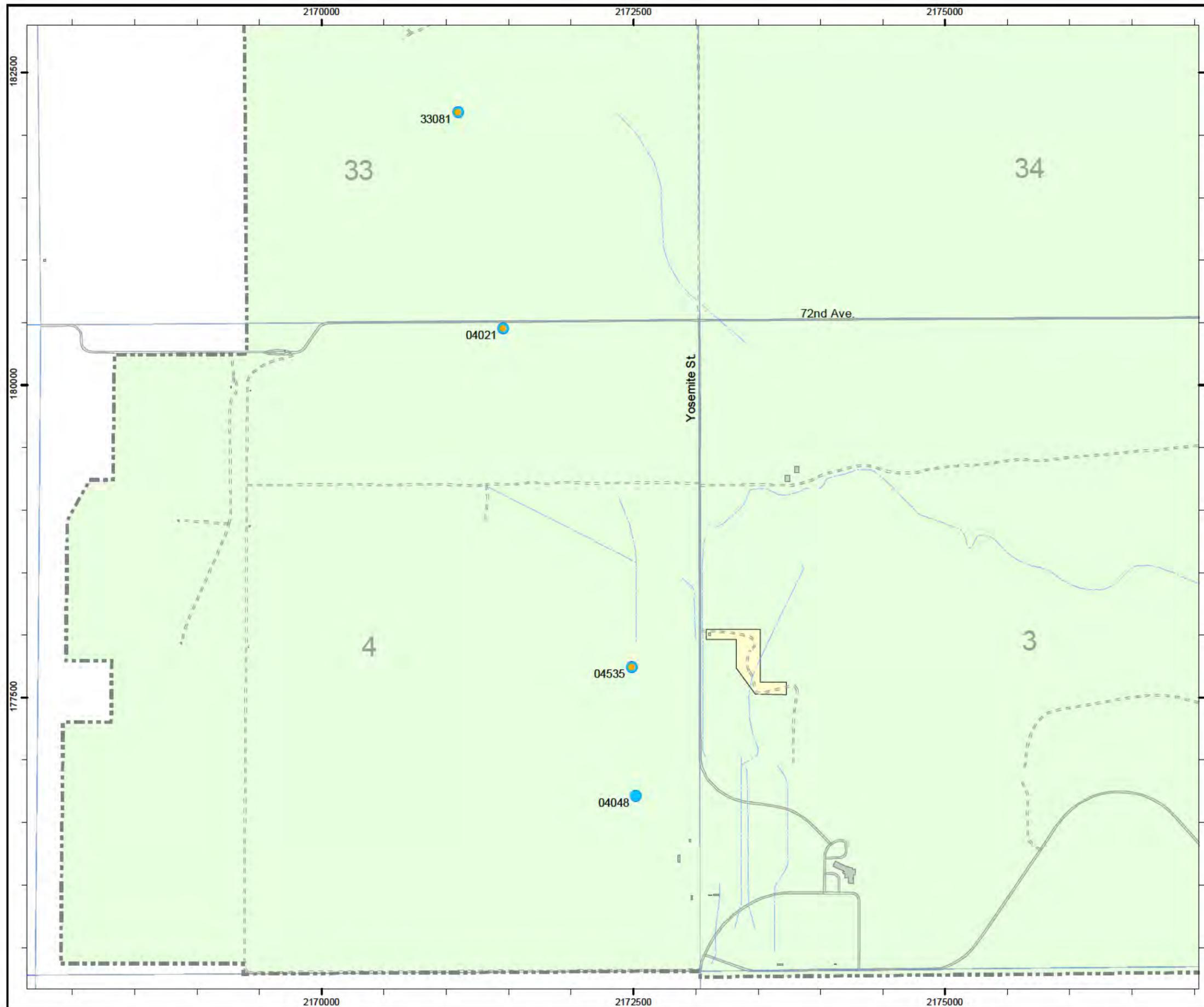


State Plane, Colorado North Zone, NAD27, US Survey Feet
Sources: U.S. Army, RMA GIS, PMC, OMC, Shell/URS Corp.

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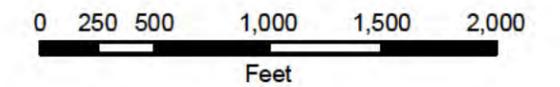
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Figure 6.3-73
FY19 Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) Monitoring Results



Legend

- Water Quality Network Well
- Water Level Network Well
- Ditches
- Paved Roads
- - - - Unimproved Roads
- Section Lines
- Buildings
- Army Maintained Area
- USFWS Managed Area
- RMA Boundary



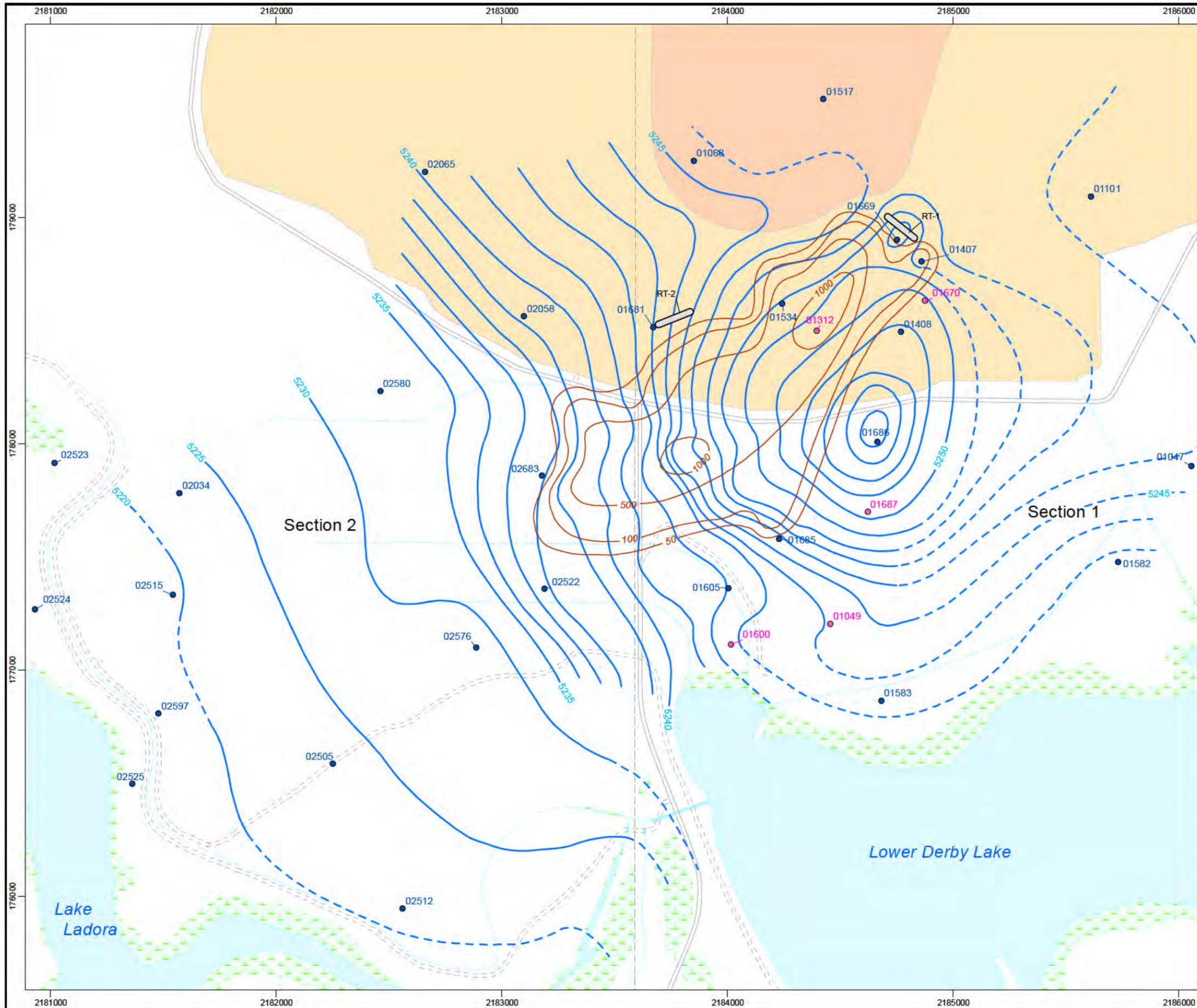
NAD27-NGVD29 Datum, US Survey Feet,
Colorado North Zone

Sources: U.S. Army, RMA GIS, OMC, Shell/AECOM



Figure 6.3-74

**Motor Pool/Irondale Containment System
Post-Shut-Off Monitoring Well Location Map**



Legend

- LTMP Water-Level Tracking Well
- GWMR Water Quality Well
- ▭ Recharge Trench
- Water Elevation Contours
- - - Inferred Water Elevation Contours
- 2009 Isoconcentration of Benzene in mg/L
- ▭ Paved
- ▭ Unpaved
- Section Line
- Ditch, Spillway
- Culvert, Siphon, Sluice, Weir
- ▭ RCRA-Equivalent Cover
- ▭ South Plants Cover
- ▭ Lake or Pond
- ▭ Wetland

Note: Water levels measured in September 2010.

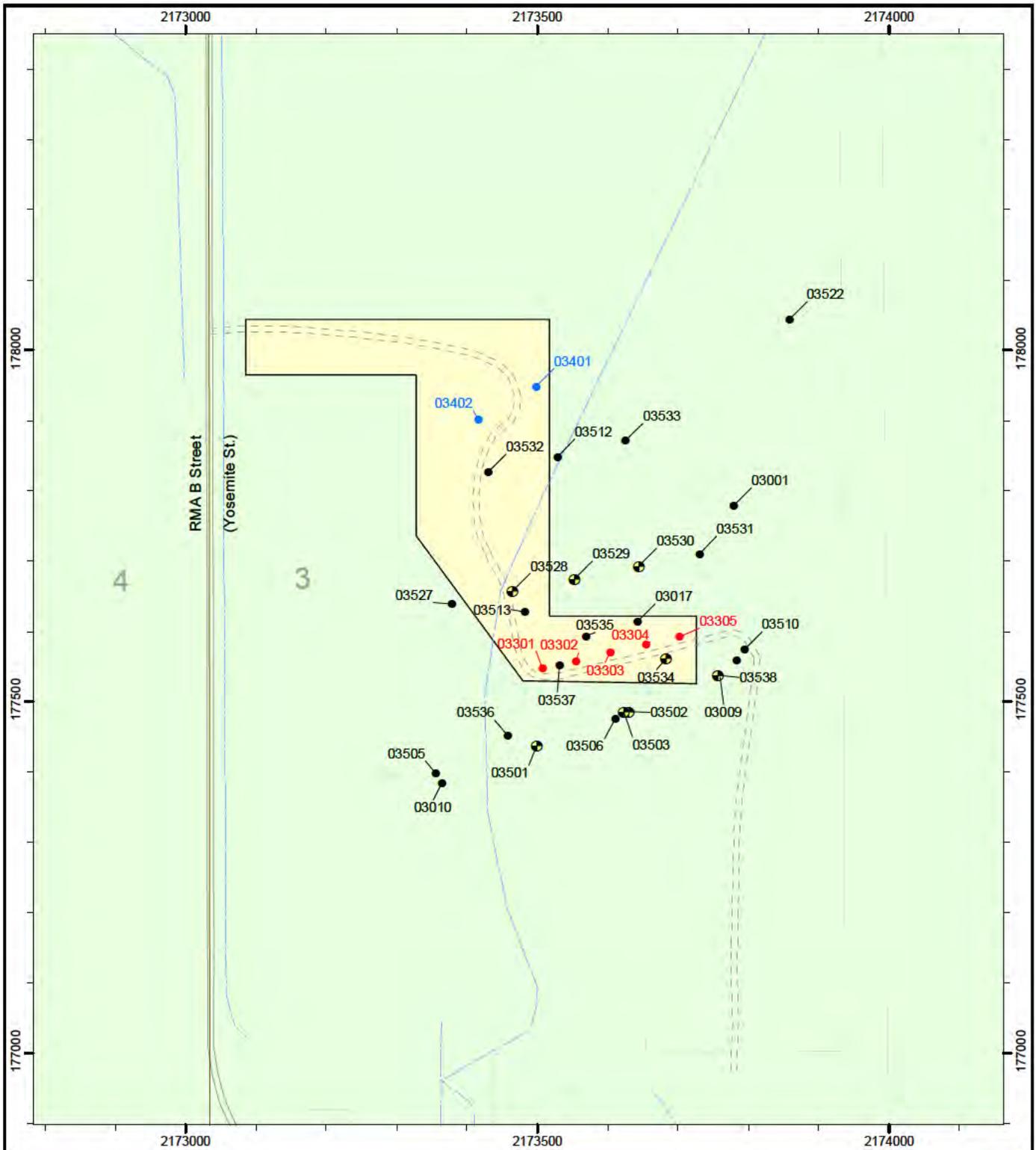
0 200 400
Feet
NAD27-NGVD29 Datum, US Survey Feet, Colorado North Zone

Sources: U.S. Army, RMA GIS, OMC, Shell/AECOM

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Figure 6.3-75
South Tank Farm System
GWMR Post-Shut Off
Well Network



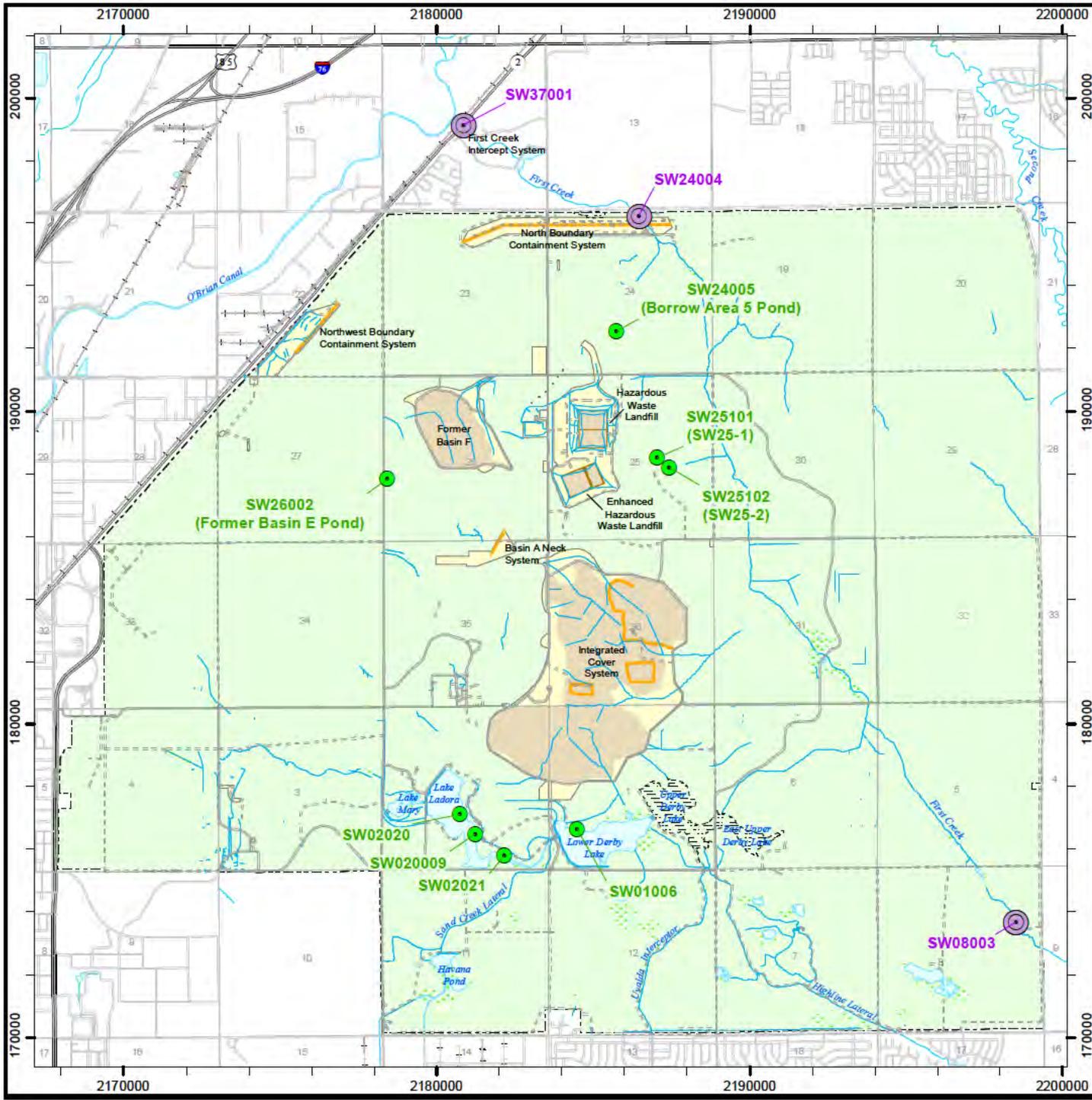
Legend

- USFWS National Wildlife Refuge
- Army Maintained Area
- Section Lines
- Buildings
- Paved Roads
- Unimproved Roads
- Ditches
- Shut-Off Water Quality Wells
- Extraction Wells
- Monitoring Wells
- Recharge Wells



Figure 6.3-76
Railyard Containment System
Shut-Off Water Quality
Monitoring Well Network

M:\projects\FYRR\2019\mxds_ry19_shut_off.mxd
 8/21/2020

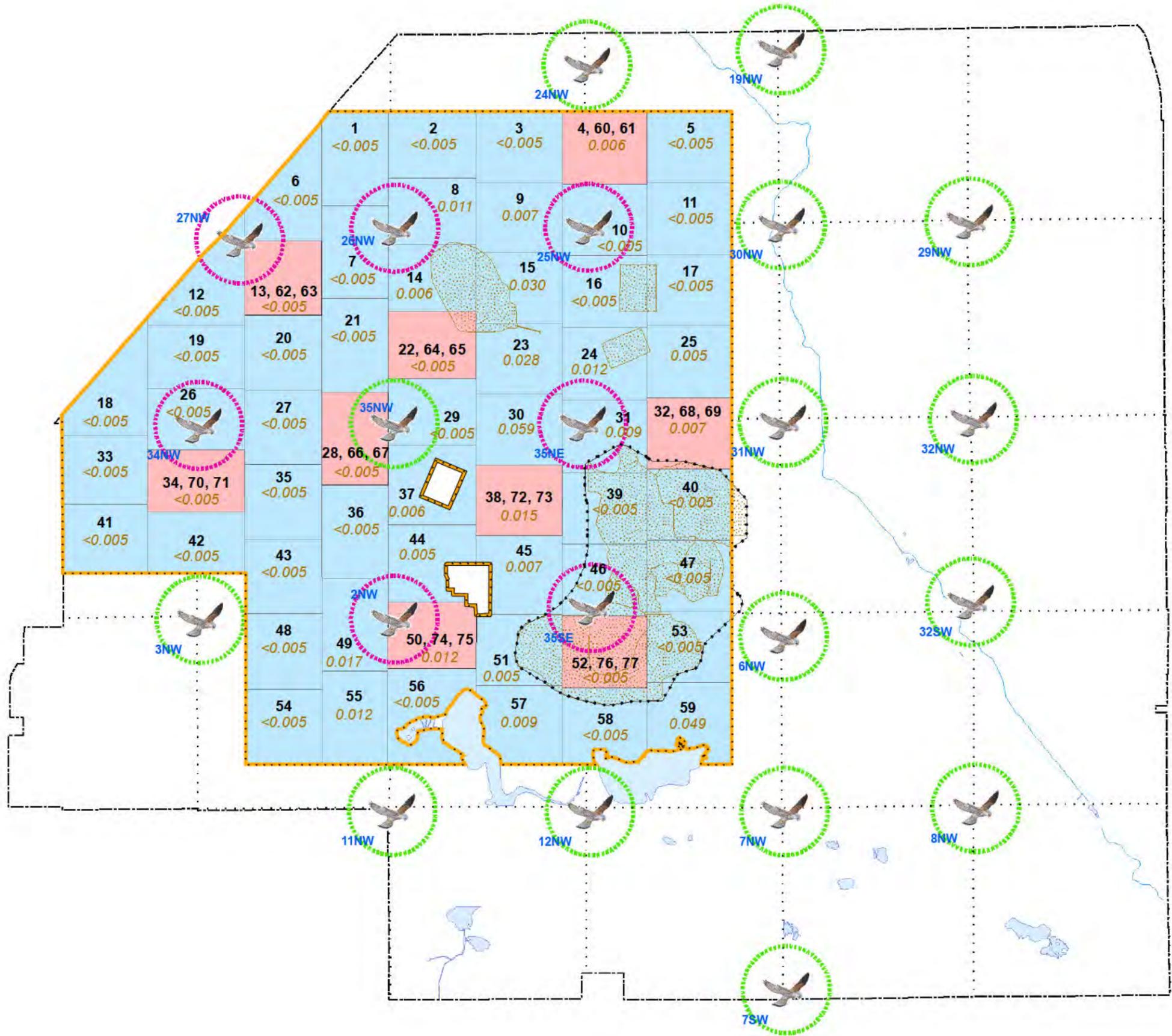


- ### Legend
- RMA Boundary
 - Army Maintained
 - Soil Caps and Covers
 - Dry Lake or Pond
 - Lake, Pond, Ditch or Canal
 - Wetland, Marsh, Swamp, or Bog
 - Intermittent Streams
 - Ditch or Spillway
 - Culvert
 - Dam
 - Flume, Siphon, Sluice, or Weir
 - Slurry Wall
- Surface water Monitoring Locations
- Short-Term Locations
 - LTMP Locations

N
0 2,000 4,000 6,000
Feet
NAD27-NGVD29 Datum, US Survey Feet,
Colorado North Zone
Sources: U.S. Army, RMA GIS, OMC, Shell/AECOM



Figure 6.3-77
Rocky Mountain Arsenal
Surface Water
Monitoring Locations

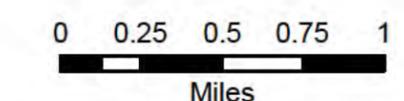


Legend

- Nest Box Area Requiring Additional Monitoring
- Nest Box Area With No Additional Monitoring Needed
- Phase 2 Soil Investigation Area
- Section Lines
- ICS Fence
- Caps and Covers
- Decision units requiring ISM sample
- Decision unit requiring ISM sample and two replicate samples.
- Replicate samples provided in Table 4.1-2. Value shown is the mean of the replicate samples.

1 Decision Unit
 <0.005 Concentrations shown in micrograms/gram (ug/g)

**The dieldrin Eco-SSL developed for the avian carnivore in soil is 0.11 ug/g. All results were below the Eco-SSL.

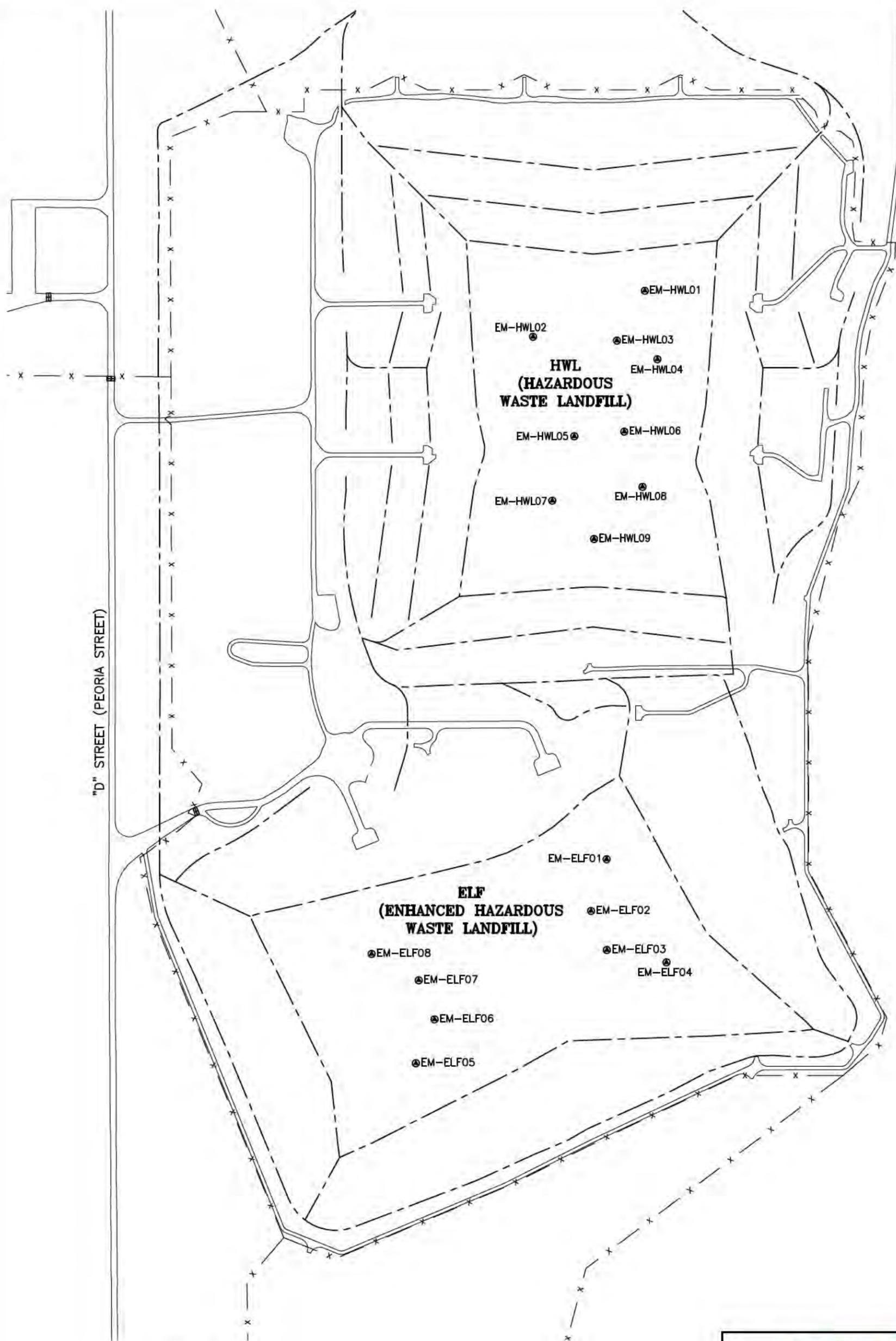


Sources: U.S. Army, RMA GIS, OMC, Shell/AECOM
 State Plane, Colorado North Zone, NAD27, US Survey Feet

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Figure 6.3-78
 Rocky Mountain Arsenal
 Biomonitoring Program Phase 2
 Soil Sampling Decision Units and Results



LEGEND

- ROAD
- FENCE
- DRAINAGE CHANNEL
- COVER EROSION/SETTLEMENT MONUMENT



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NAVARRO Research and Engineering, Inc.		
PROJECT NAME 2020 FIVE-YEAR REVIEW REPORT		
TITLE HAZARDOUS WASTE LANDFILL AND ENHANCED HAZARDOUS WASTE LANDFILL RCRA-CAPS DETAILS (SHEET 1 OF 2)		
DRAWN BY SMG	DATE 08.26.20	FIGURE NUMBER 6.3-79



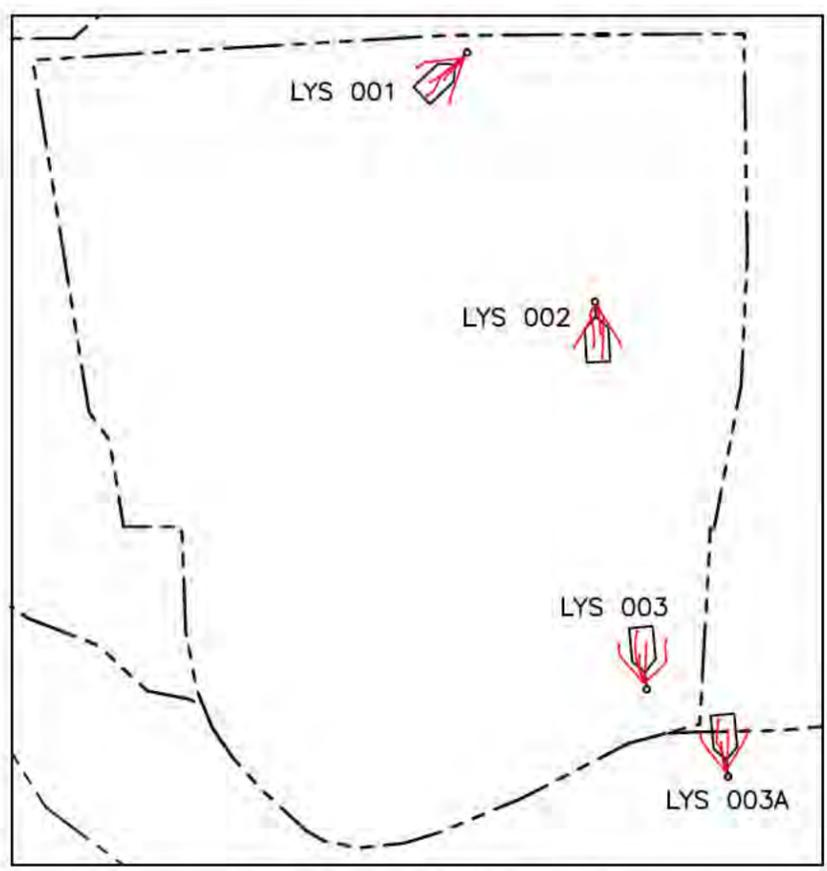
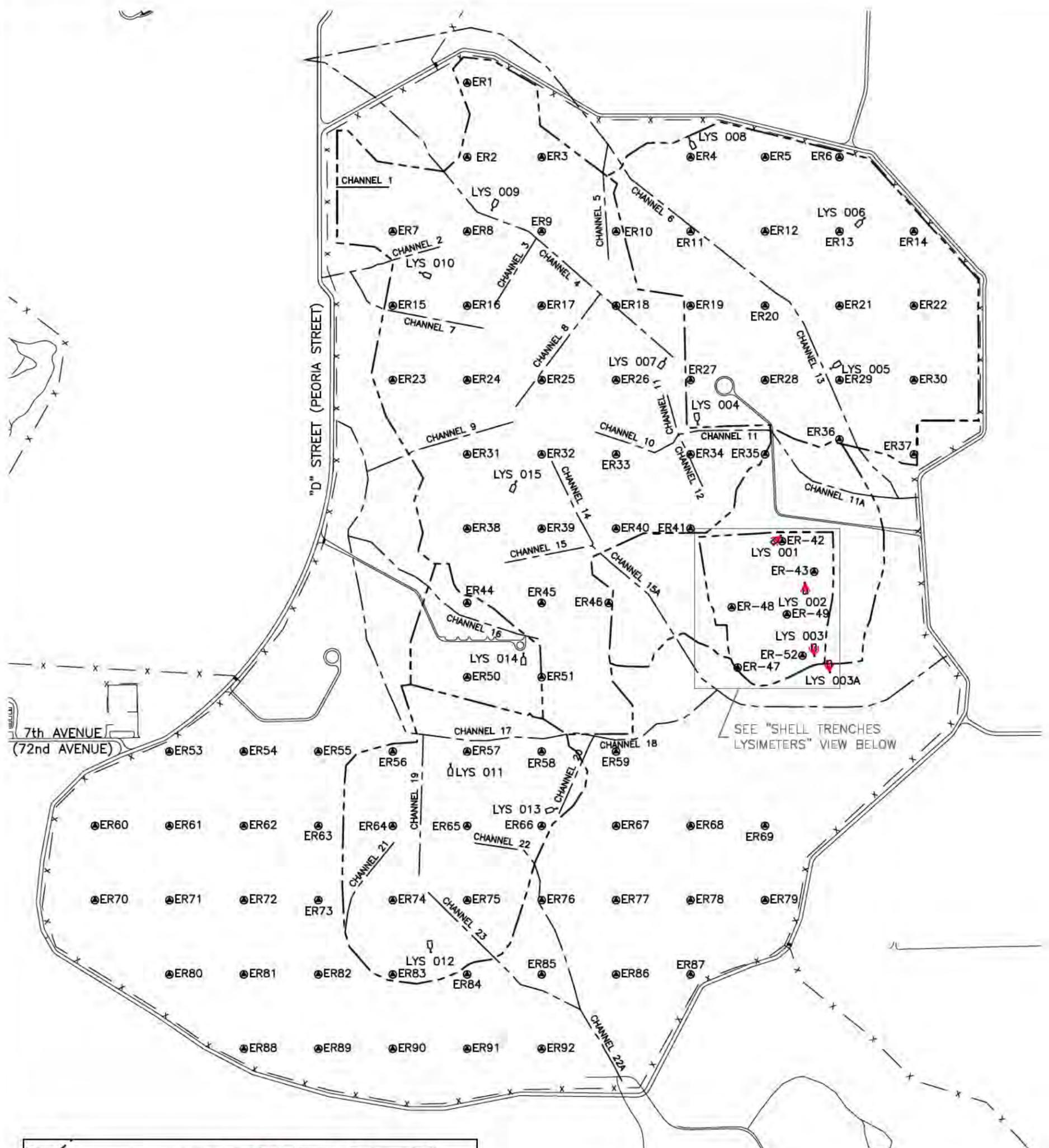
**SEE FIGURE 6.3-79 HAZARDOUS WASTE LANDFILL AND ENHANCED HAZARDOUS WASTE LANDFILL RCRA-CAPS DETAILS (SHEET 1 OF 2) FOR AREA DETAILS.

NOTE: AERIAL IMAGE SHOWN IS FROM 2014.



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<p>NAVARRO NAVARRO Research and Engineering, Inc.</p>		
<p>PROJECT NAME 2020 FIVE-YEAR REVIEW REPORT</p>		
<p>TITLE HAZARDOUS WASTE LANDFILL AND ENHANCED HAZARDOUS WASTE LANDFILL RCRA-CAPS DETAILS (SHEET 2 OF 2)</p>		
DRAWN BY	DATE	FIGURE NUMBER
SMG	08.26.20	6.3-79



SHELL TRENCHES LYSIMETERS

- LEGEND**
- RCRA-EQUIVALENT COVER LIMITS
 - ROAD
 - FENCE
 - DRAINAGE CHANNEL
 - LYSIMETER/FORMER MOISTURE PROBE SYSTEM
 - COVER EROSION/SETTLEMENT MONUMENT

NTS

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TITLE INTEGRATED COVER SYSTEM DETAILS (SHEET 1 OF 2)		
DRAWN BY: SMG	DATE 08.26.20	FIGURE NUMBER 6.3-80



**SEE FIGURE 6.3-80 INTEGRATED COVER SYSTEM DETAILS (SHEET 1 OF 2) FOR AREA DETAILS.

NOTE: AERIAL IMAGE SHOWN IS FROM 2014.

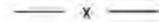


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<p>TITLE INTEGRATED COVER SYSTEM DETAILS (SHEET 2 OF 2)</p>		
DRAWN BY SMG	DATE 08.26.20	FIGURE NUMBER 6.3-80



LEGEND

-  RCRA-EQUIVALENT COVER LIMITS
-  ROAD
-  FENCE
-  DRAINAGE CHANNEL
-  LYSIMETER
-  COVER EROSION/SETTLEMENT MONUMENT



		
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PROJECT NAME 2020 FIVE-YEAR REVIEW REPORT		
TITLE BASIN F RCRA-EQUIVALENT COVER DETAILS (SHEET 1 OF 2)		
DRAWN BY SMG	DATE 08.26.20	FIGURE NUMBER 6.3-81



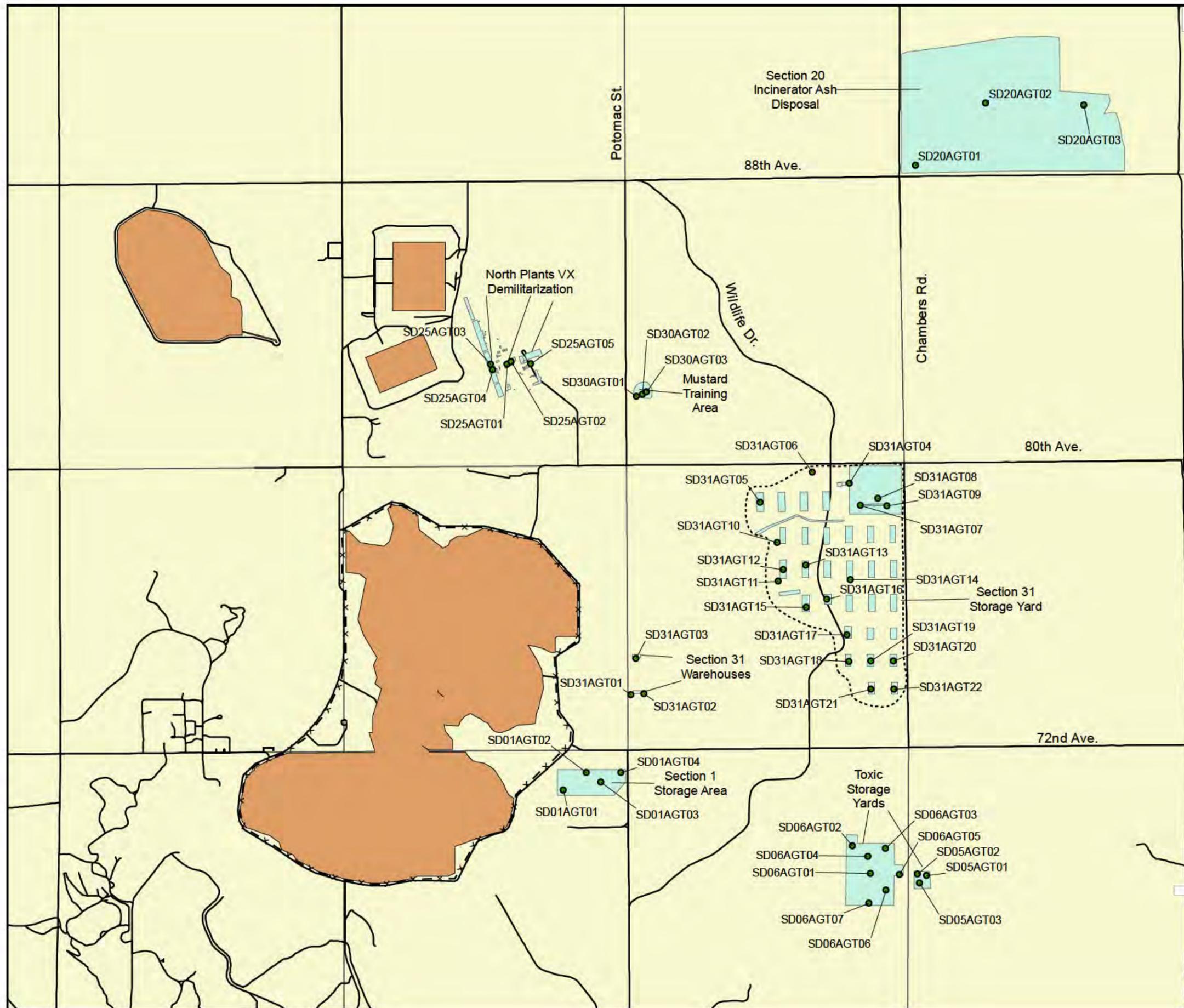
**SEE FIGURE 6.3-81 BASIN F RCRA-EQUIVALENT COVER DETAILS (SHEET 1 OF 2) FOR AREA DETAILS.

NOTE: AERIAL IMAGE SHOWN IS FROM 2014.

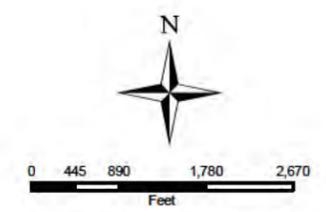


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<p>TITLE BASIN F RCRA-EQUIVALENT COVER DETAILS (SHEET 2 OF 2)</p>		
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- ### Legend
- Chemical Agent Sample
 - × - × ICS Fencing
 - Caps and Covers
 - Chemical Agent Storage or Disposal
 - Roads
 - Section Lines
 - RMA Property



Sources: U.S. Army, RMA GIS, OMC, Shell/AECOM
 State Plane, Colorado North Zone NAD27, US Survey Feet



Figure 6.3-83
 Rocky Mountain Arsenal
 Chemical Agent Sampling Locations