

2014 Benzene (C6H6) Concentrations in the Unconfined Aquifer

Legend

- Open Unconfined Flow System Wells
 - Water Quality Tracking Wells
 - Chemical detected above the CSRG
 - Chemical detected at or below the CSRG
 - Chemical below the MRL
 - U.S. Army Maintained Area
 - USFWS Managed Area
 - Prairie Gateway Planned Unit Development
 - South Adams County
 - U.S. Post Office
 - Section Lines
 - Operational Areas
 - Basins
 - Unsaturated Alluvium (Developed using summer 2014 data)
 - Slurry Walls
 - Recharge Trenches
 - Intermittent Streams
 - Ditches, Canals
 - Sand Creek Lateral
 - 1994 Benzene (C6H6) Concentrations greater than the 1994 MDL of 1.27 µg/L
- 2014 Benzene (C6H6) Concentrations in µg/L
- 0.2 to < 3.0
 - 3.0 to < 100
 - 100 to < 1,000
 - 1,000 to < 10,000
 - 10,000 to < 100,000
 - 100,000 to < 1,000,000
 - 1,000,000 to < 1,500,000

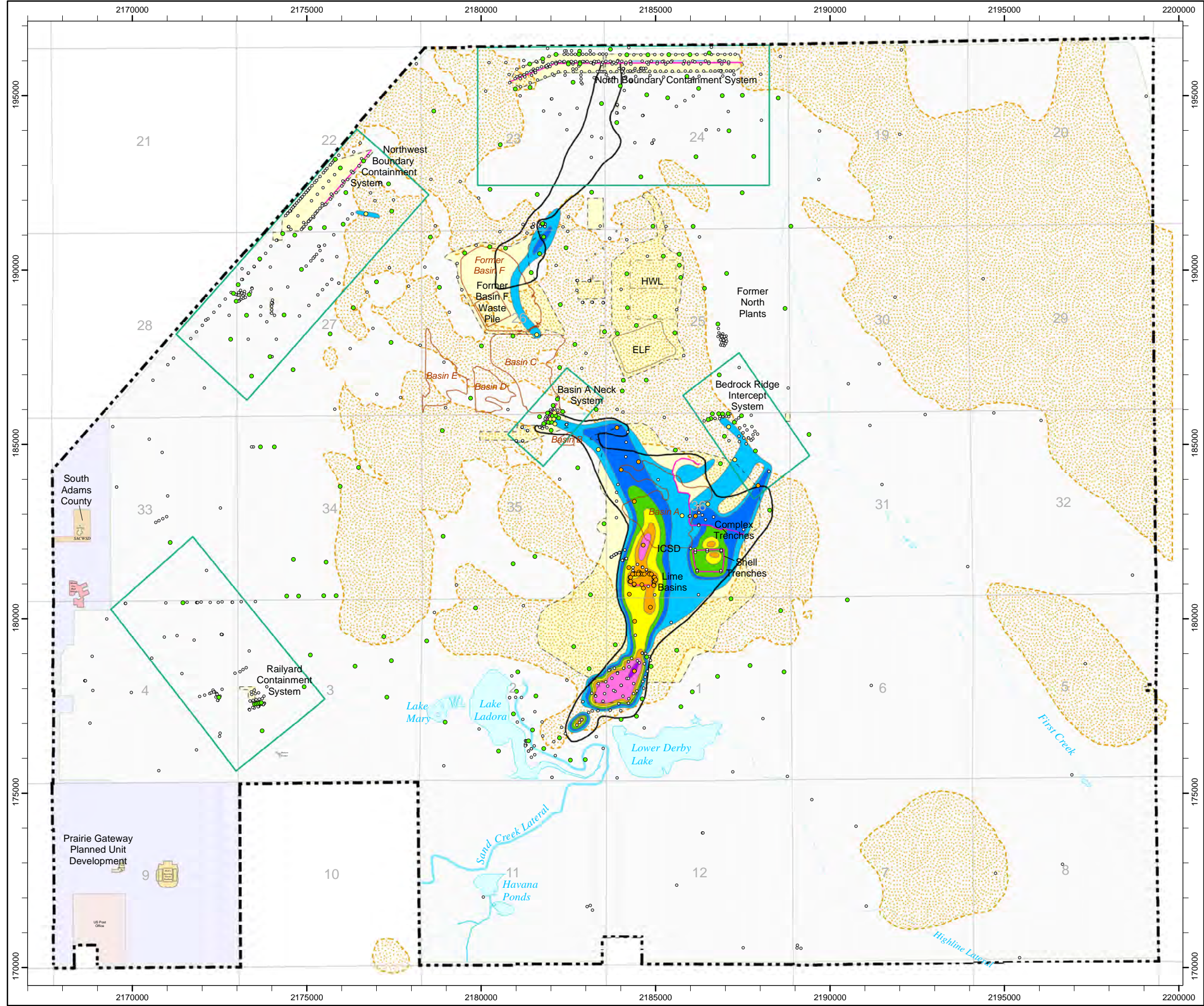
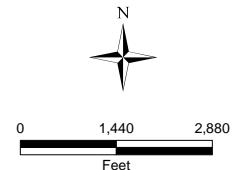


Figure 5.1.5.1-5



NAD27-NGVD29 Datum, US Survey Feet, Colorado North Zone
 Sources: U.S. Army, RVO GIS, PMC, OMC, Shell/URS Corp.

Army/Shell GIS
 9/9/2016 RMITS

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2014 n-Nitrosodimethylamine (NDMA) Concentrations in the Unconfined Aquifer

Legend

- Open Unconfined Flow System Wells
- Water Quality Tracking Wells
- Chemical detected above the PQL
- Chemical detected at or below the PQL
- Chemical below the MRL
- U.S. Army Maintained Area
- USFWS Managed Area
- Prairie Gateway Planned Unit Development
- South Adams County
- U.S. Post Office
- Section Lines
- Operational Areas
- Basins
- Unsaturated Alluvium (Developed using summer 2014 data)
- Slurry Walls
- Recharge Trenches
- Intermittent Streams
- Ditches, Canals
- Sand Creek Lateral
- 1994 n-Nitrosodimethylamine (NDMA) Concentration greater than the 1994 MDL of 0.5 µg/L
- 2014 n-Nitrosodimethylamine (NDMA) Concentrations in µg/L
- 0.00115 to < 0.018
- 0.018 to < 0.033
- 0.033 to < 0.10
- 0.10 to < 1.0
- 1.0 to < 10

Figure 5.1.5.1-7



0 1,440 2,880
Feet

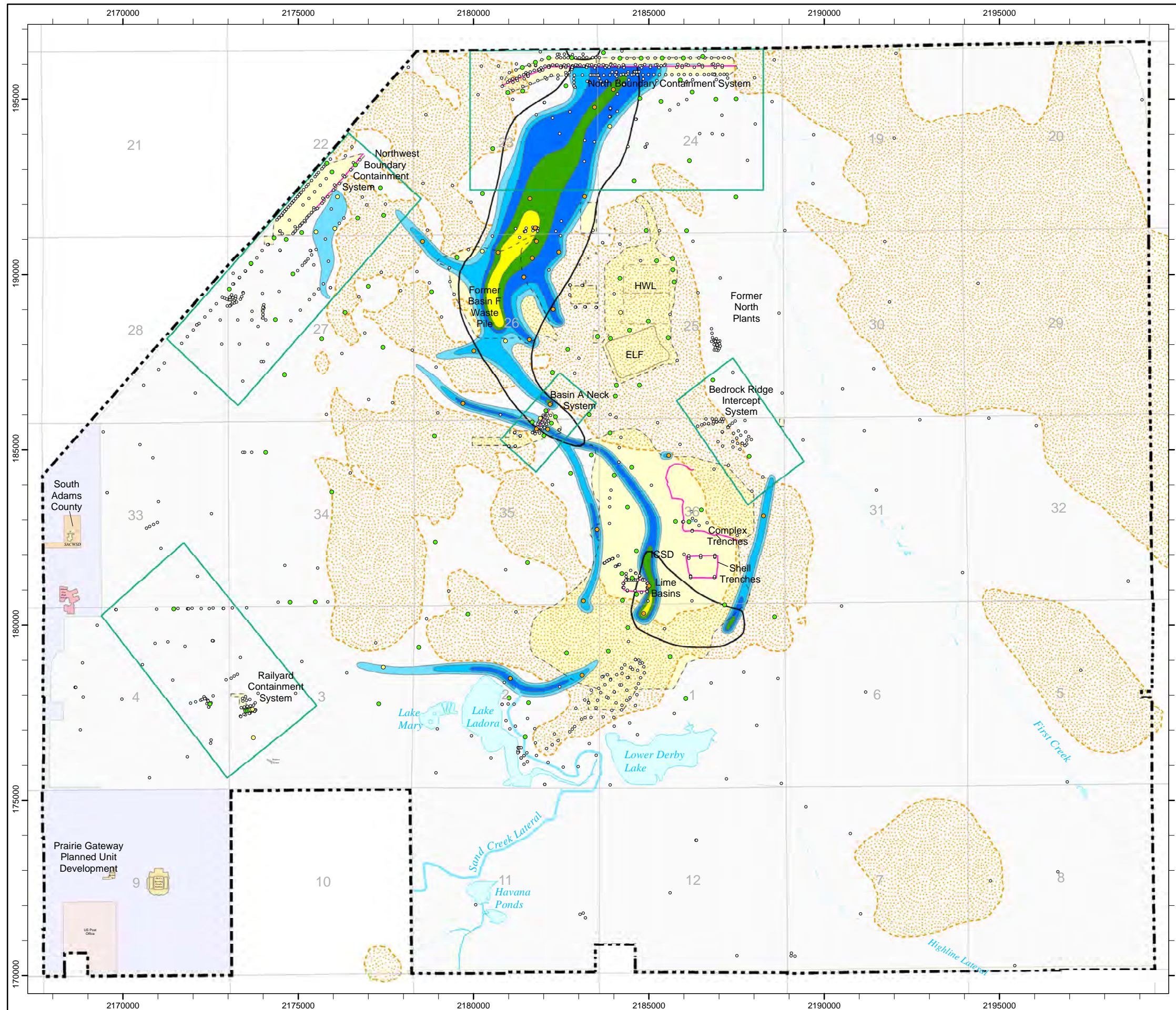
NAD27-NGVD29 Datum, US Survey Feet,
Colorado North Zone

Sources: U.S. Army, RVO GIS, PMC, OMC, Shell/URS Corp.

Army/Shell GIS

9/9/2016 RMITS

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1994 Carbon Tetrachloride (CCL4) Concentrations in the Unconfined Aquifer

Legend

- Open Unconfined Flow System Wells
 - Water Quality Tracking Wells
 - Chemical detected above the CSRG
 - Chemical detected at or below the CSRG
 - Chemical below the MRL
 - U.S. Army Maintained Area
 - USFWS Managed Area
 - Prairie Gateway Planned Unit Development
 - South Adams County
 - U.S. Post Office
 - Section Lines
 - Operational Areas
 - Basins
 - Unsaturated Alluvium (Developed using summer 2014 data)
 - Slurry Walls
 - Recharge Trenches
 - Intermittent Streams
 - Ditches, Canals
 - Sand Creek Lateral
 - 1994 Carbon Tetrachloride (CCL4) Concentrations greater than the 1994 MDL of 0.263 µg/L
- 1994 Carbon Tetrachloride (CCL4) Concentrations in µg/L
- 0.99 to < 5.0
 - 5.0 to < 50
 - 50 to < 100
 - 100 to < 1,000
 - 1,000 to < 2,000

Figure 5.1.5.1-8



0 1,440 2,880
Feet

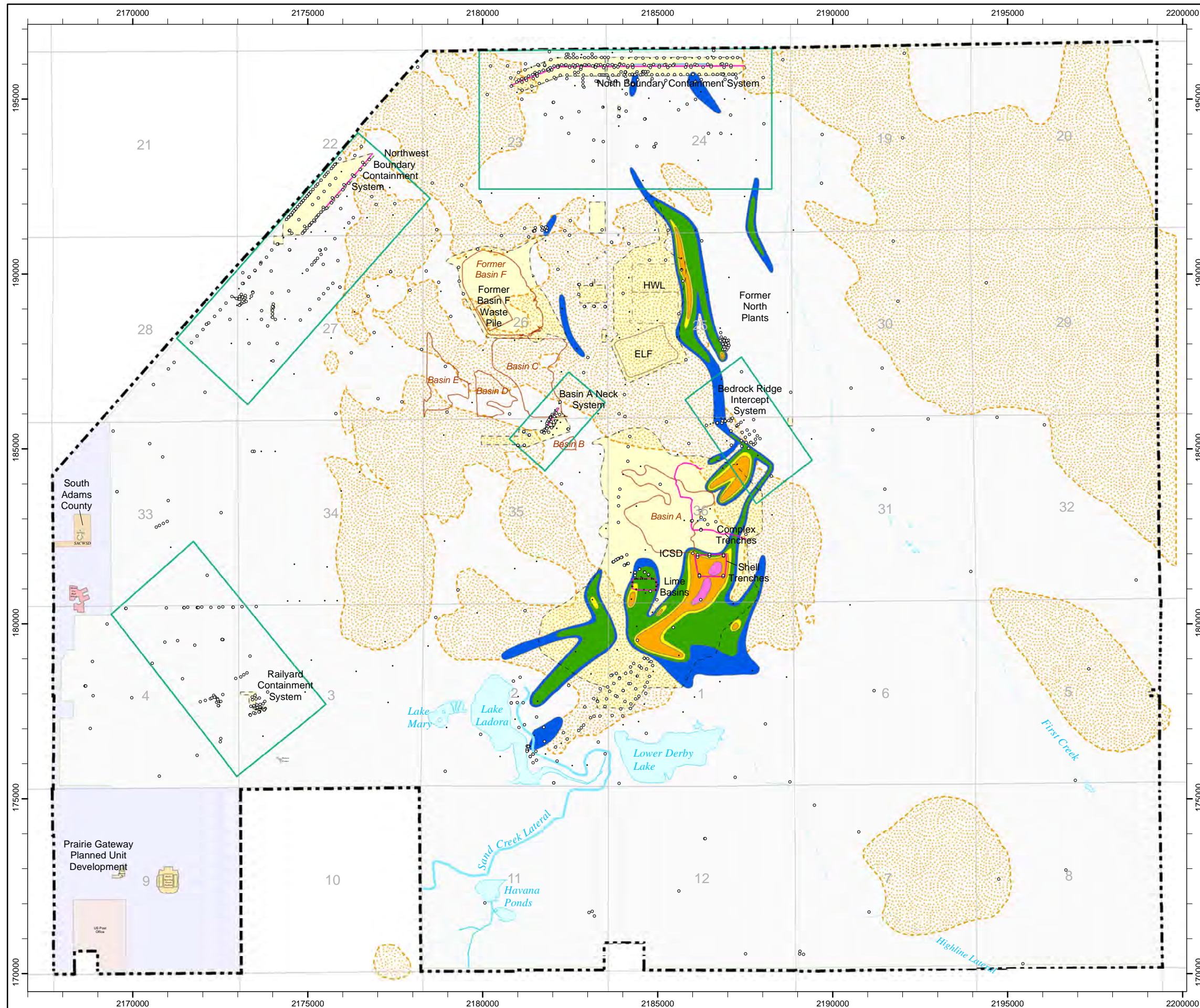
NAD27-NGVD29 Datum, US Survey Feet, Colorado North Zone

Sources: U.S. Army, RVO GIS, PMC, OMC, Shell/URS Corp.

Army/Shell GIS

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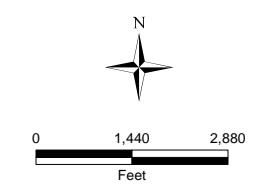


2014 Carbon Tetrachloride (CCL4) Concentrations in the Unconfined Aquifer

Legend

- Open Unconfined Flow System Wells
 - Water Quality Tracking Wells
 - Chemical detected above the CSRG
 - Chemical detected at or below the CSRG
 - Chemical below the MRL
 - U.S. Army Maintained Area
 - USFWS Managed Area
 - Prairie Gateway Planned Unit Development
 - South Adams County
 - U.S. Post Office
 - Section Lines
 - Operational Areas
 - Basins
 - Unsaturated Alluvium (Developed using summer 2014 data)
 - Slurry Walls
 - Recharge Trenches
 - Intermittent Streams
 - Ditches, Canals
 - Sand Creek Lateral
 - 1994 Carbon Tetrachloride (CCL4) Concentrations greater than the 1994 MDL of 0.263 µg/L
- 2014 Carbon Tetrachloride (CCL4) Concentrations in µg/L
- 0.263 to < 5.0
 - 5.0 to < 50
 - 50 to < 100
 - 100 to < 1,000
 - 1,000 to < 2,000

Figure 5.1.5.1-9

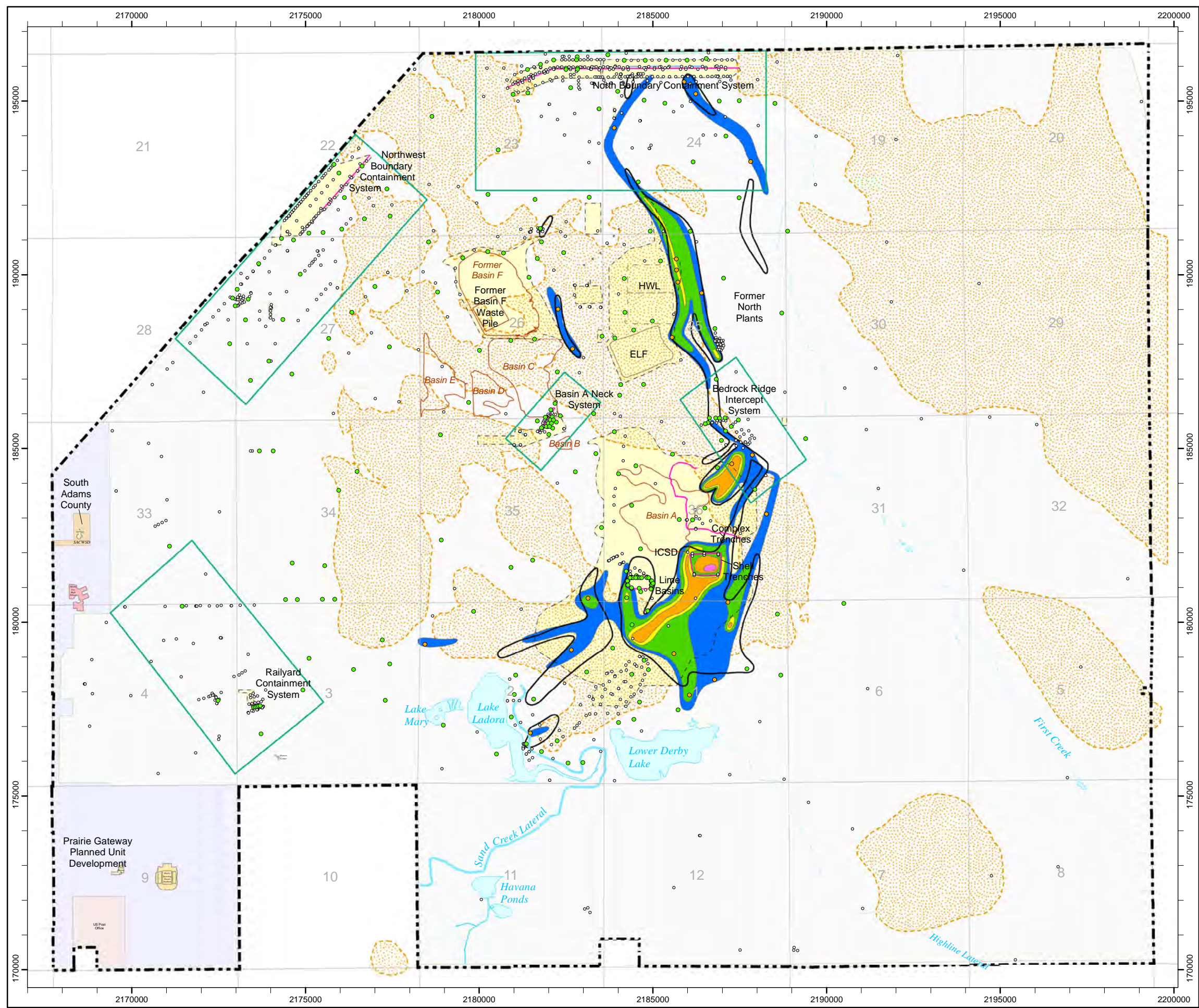


NAD27-NGVD29 Datum, US Survey Feet, Colorado North Zone
 Sources: U.S. Army, RVO GIS, PMC, OMC, Shell/URS Corp.

Army/Shell GIS

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2014 Dithiane (DITH) Concentrations in the Unconfined Aquifer

Legend

- Open Unconfined Flow System Wells
 - Water Quality Tracking Wells
 - Chemical detected above the CSRG
 - Chemical detected at or below the CSRG
 - Chemical below the MRL
 - U.S. Army Maintained Area
 - USFWS Managed Area
 - Prairie Gateway Planned Unit Development
 - South Adams County
 - U.S. Post Office
 - Section Lines
 - Operational Areas
 - Basins
 - Unsaturated Alluvium (Developed using summer 2014 data)
 - Slurry Walls
 - Recharge Trenches
 - Intermittent Streams
 - Ditches, Canals
 - Sand Creek Lateral
 - 1994 Dithiane/Oxathiane (DITH/OXAT) Concentration greater than the 1994 MDL of 1.34 µg/L
- 2014 Dithiane (DITH) Concentrations in µg/L
- 0.4 to < 18
 - 18 to < 100
 - 100 to < 1,000
 - 1,000 to < 5,000

Dithiane has the lowest CSRG of all the organosulphur compounds monitored at RMA; therefore, dithiane results were used to draw the contamination plume on this map.

Figure 5.1.5.1-10



0 1,440 2,880
Feet

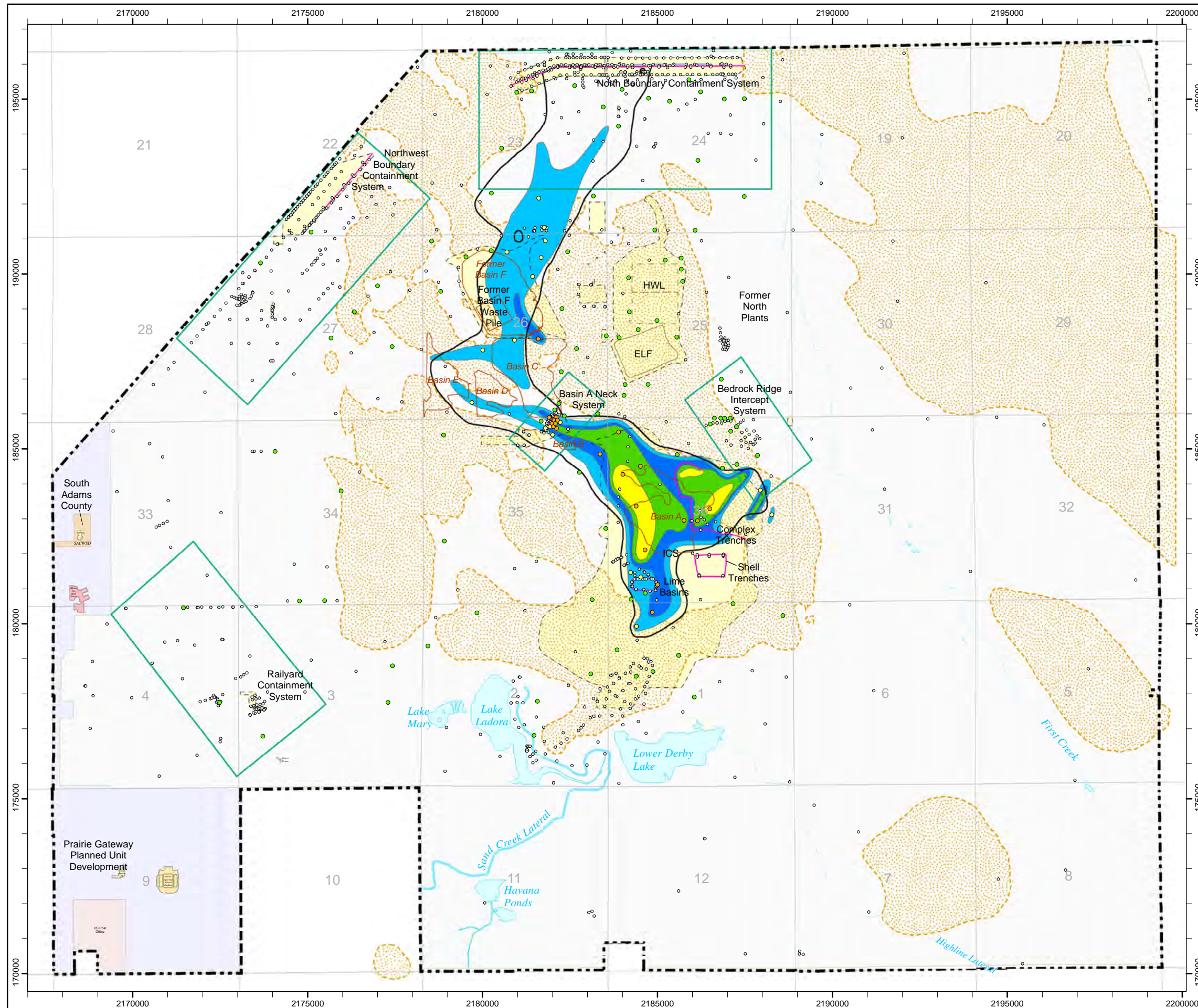
NAD27-NGVD29 Datum, US Survey Feet,
Colorado North Zone

Sources: U.S. Army, RVO GIS, PMC, OMC, Shell/URS Corp.

Army/Shell GIS

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2014 Arsenic (AS) Concentrations in the Unconfined Aquifer

Legend

- Open Unconfined Flow System Wells
 - Water Quality Tracking Wells
 - Chemical detected above the CSRG
 - Chemical detected at or below the CSRG
 - Chemical below the MRL
 - U.S. Army Maintained Area
 - USFWS Managed Area
 - Prairie Gateway Planned Unit Development
 - South Adams County
 - U.S. Post Office
 - Section Lines
 - Operational Areas
 - Basins
 - Unsaturated Alluvium (Developed using summer 2014 data)
 - Slurry Walls
 - Recharge Trenches
 - Intermittent Streams
 - Ditches, Canals
 - Sand Creek Lateral
 - 1994 Arsenic (AS) Concentrations greater than the 1994 MDL of 2.35 µg/L
- 2014 Arsenic (AS) Concentrations in µg/L
- 1.0 to < 2.35
 - 2.35 to < 10
 - 10 to < 50
 - 50 to < 500
 - 500 to < 5,000
 - 5,000 to < 10,000
 - 10,000 to < 100,000

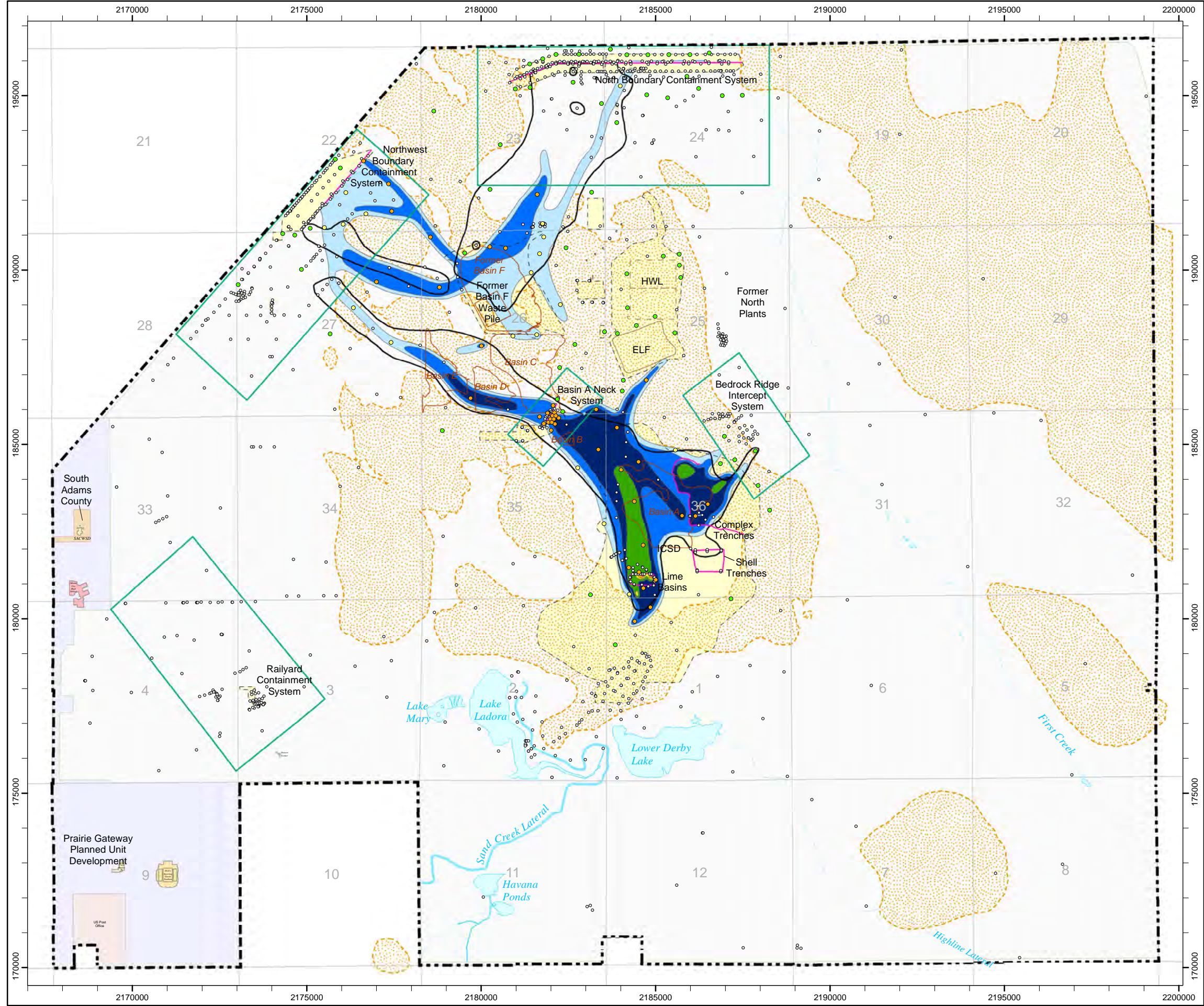
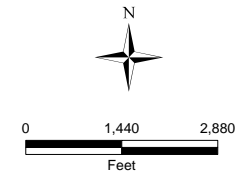


Figure 5.1.5.1-11



NAD27-NGVD29 Datum, US Survey Feet, Colorado North Zone
 Sources: U.S. Army, RVO GIS, PMC, OMC, Shell/URS Corp.

Army/Shell GIS

9/9/2016 RMITS

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2014 Dibromochloropropane (DBCP) Concentrations in the Unconfined Aquifer

Legend

- Open Unconfined Flow System Wells
 - Water Quality Tracking Wells
 - Chemical detected above the CSRG
 - Chemical detected at or below the CSRG
 - Chemical below the MRL
 - U.S. Army Maintained Area
 - USFWS Managed Area
 - Prairie Gateway
 - Planned Unit Development
 - South Adams County
 - U.S. Post Office
 - Section Lines
 - Operational Areas
 - Basins
 - Unsaturated Alluvium (Developed using summer 2014 data)
 - Slurry Walls
 - Recharge Trenches
 - Intermittent Streams
 - Ditches, Canals
 - Sand Creek Lateral
 - 1994 Dibromochloropropane (DBCP) Concentration greater than the 1994 MDL of 0.2 µg/L
- 2014 Dibromochloropropane (DBCP) Concentrations in µg/L
- 0.02 to < 0.2
 - 0.2 to < 5
 - 5 to < 50
 - 50 to < 1,000
 - 1,000 to < 2,000

Figure 5.1.5.1-12



0 1,440 2,880
Feet

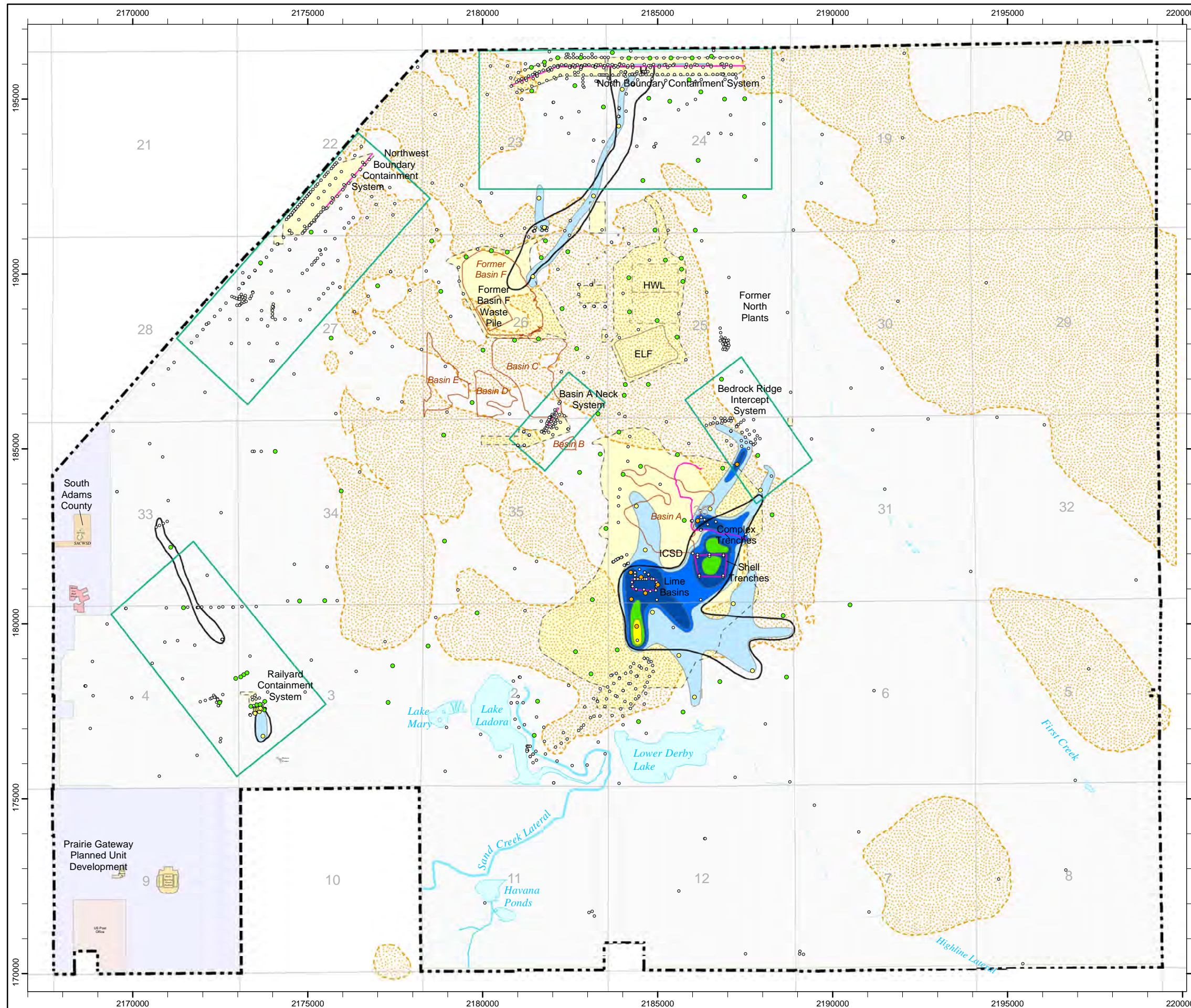
NAD27-NGVD29 Datum, US Survey Feet,
Colorado North Zone

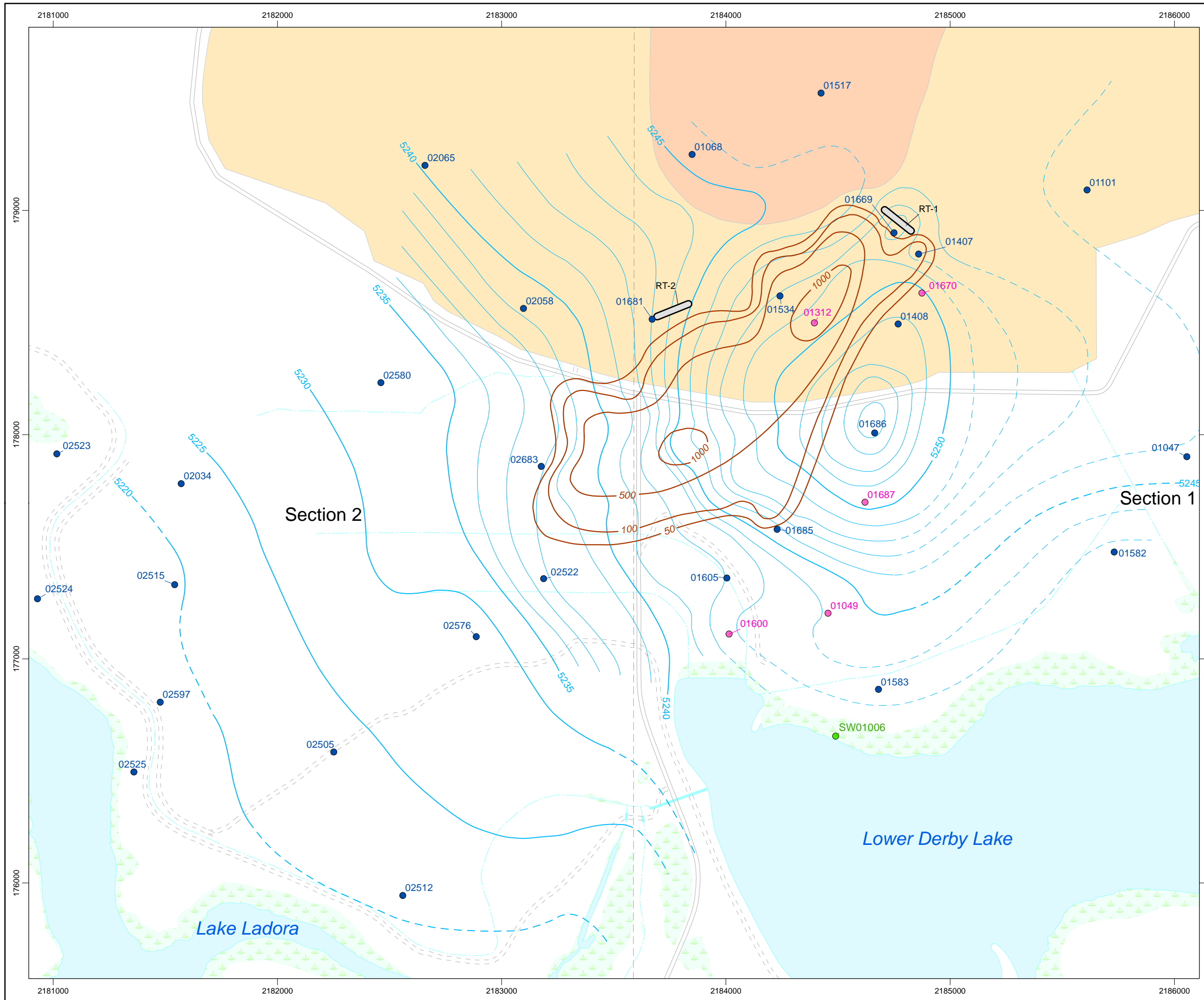
Sources: U.S. Army, RVO GIS, PMC, OMC, Shell/URS Corp.

Army/Shell GIS

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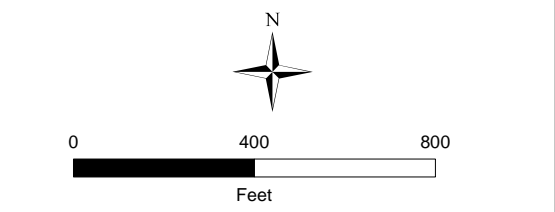
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South Tank Farm System GWMR Post-Shut-Off Monitoring Well Location Map

- Legend
- LTMP Water-Level Tracking Wells
 - GWMR Water Quality Wells
 - Surface Water Sampling Location
 - Recharge Trench
 - Water Table Contour - Sep. 2010
 - Inferred Water Table Contour - Sep. 2010
 - 2009 Isoconcentration of Benzene in mg/L
 - Paved Road
 - Unpaved Road
 - Section Line
 - Ditch, Spillway
 - Culvert, Siphon, Sluice, Weir
 - RCRA-Equivalent Cover
 - 3-foot Soil Cover
 - Lake or Pond
 - Wetland



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

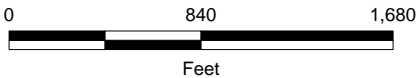
Figure 5.1.5.2-1

Army/Shell GIS
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Rocky Mountain Arsenal MPS/ICS Post-Shut-Off Monitoring Well Location Map

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



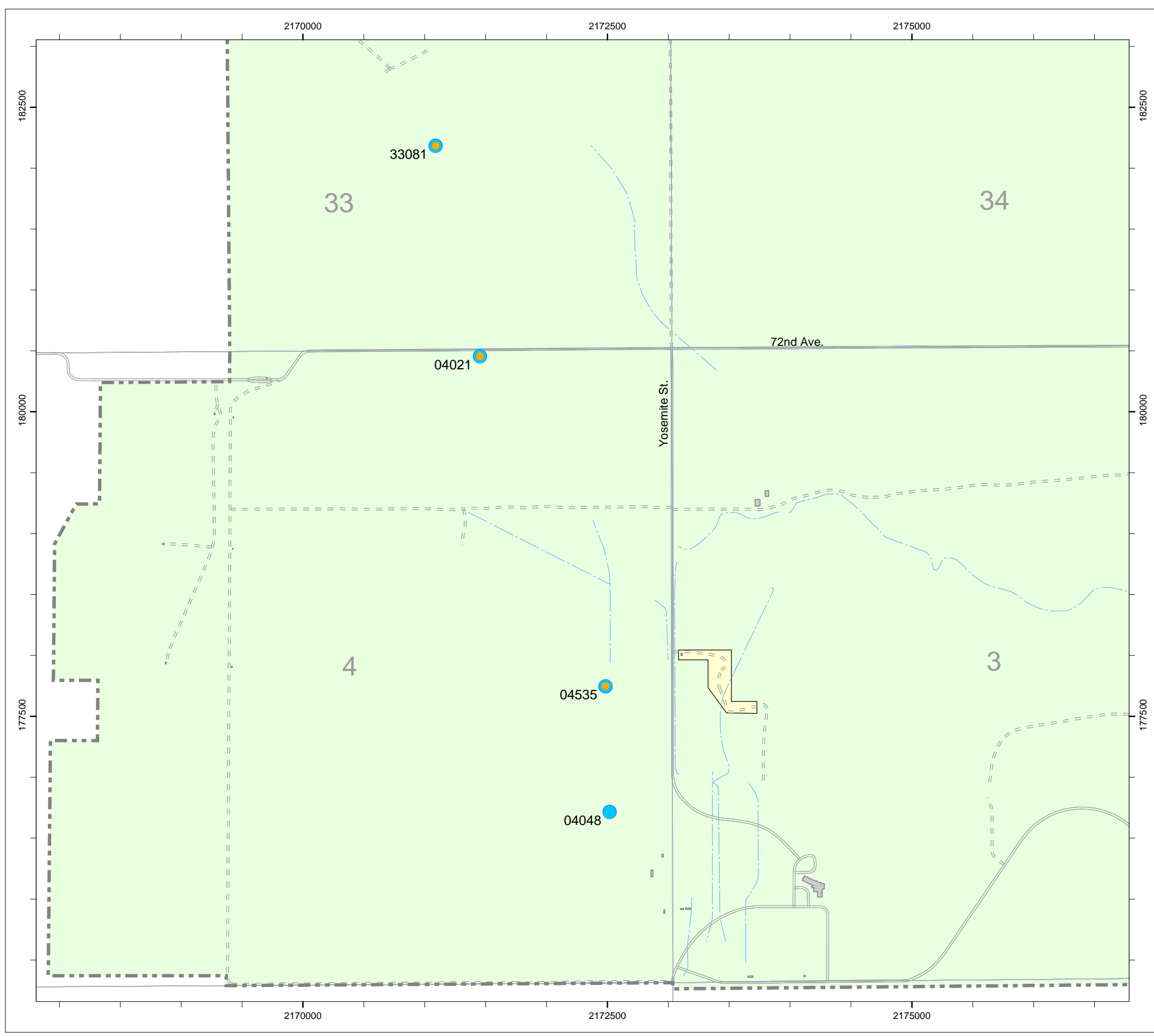
NAD27-NGVD29 Datum, US Survey Feet,
Colorado North Zone

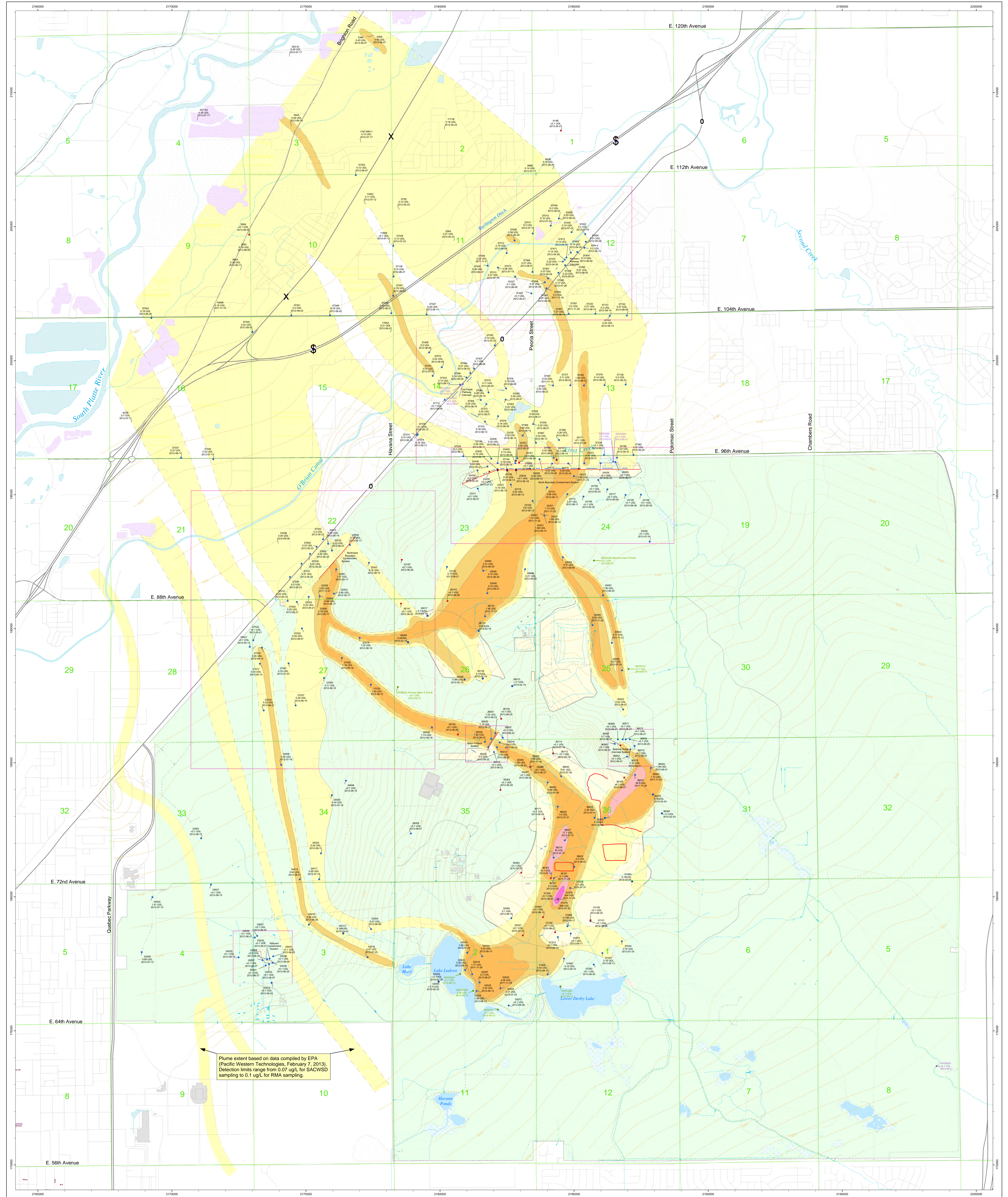
Sources: U.S. Army, RMA GIS, PMC, OMC, Shell/URS Corp.

Figure 5.1.5.2-2

Army/Shell GIS

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Plume extent based on data compiled by EPA (Pacific Western Technologies, February 7, 2013). Detection limits range from 0.07 ug/L for SACWSD sampling to 0.1 ug/L for RMA sampling.

Rocky Mountain Arsenal 1,4-Dioxane Monitoring Results

<ul style="list-style-type: none"> U.S. Army Maintained Area USFWS Managed Area Treatment System Boundary Section Lines Buildings Lakes, Ponds, Canals, Ditches Gravel Pit Augmentation Pond Dry Lake Areas Wetlands Slurry Wall Recharge Trench Intermittent Streams Ditches Culverts, Siphons, Sluices, and Weirs Offpost Primary Roads Offpost Secondary Roads Offpost Light Duty Roads 	<ul style="list-style-type: none"> ● Confined Flow System ● Unconfined Flow System ● NBCS UFS Denver Wells ● Surface Water Monitoring Locations ● Short-Term Locations ● LTMP Locations Water Level Contour - 2012 Approximate Water Level Contour - 2012 Unsaturated Alluvium (Developed using summer 2012 data) Low Permeable Alluvial Sediments 2012 	<p>Unconfined Flow System Contour Intervals (µg/L)</p> <ul style="list-style-type: none"> 0.10 to 0.35 0.35 to 1.00 1.00 to 10 10 to 100 100 or Greater 	<p>Figure 5.1.5.3-1 Army / Shell GIS</p> <p>9/9/2016 RMITS</p> <p style="font-size: small;">Sources: US Army BIMS, USGS, RMA GIS, Navarro Research and Engineering, Inc.</p> <p style="font-size: x-small;">C:\projects\14-Dioxane\RMARSMA_14Dioxane_results_15.mxd</p>
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FY14 First Creek Pathway Monitoring Well Network of the Unconfined Aquifer

Legend

- Performance Water Quality Wells
- ▲ Performance Extraction Wells
- Extraction Wells
- Recharge Wells

Monitoring Wells

- ▲ Confined Flow System
- Unconfined Flow System
- Questionable Unconfined Flow System
- ◆ Questionable Confined Flow System
- ▼ Questionable Flow System

- Recharge Trenches
- Local Roads
- Secondary Roads
- Primary Roads
- - - Unimproved Roads
- - - Dry Lake Areas
- Lakes, Ponds, and Rivers
- - - Intermittent Streams
- - - Ditches
- Section Lines
- Unsaturated Alluvium (Developed using summer 2014 data)
- Army Maintained Area
- USFWS Managed Area

N

0 150 300 600
Feet

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

Sources: U.S. Army, RMA GIS, PMC, OMC, Shell/URS Corp.

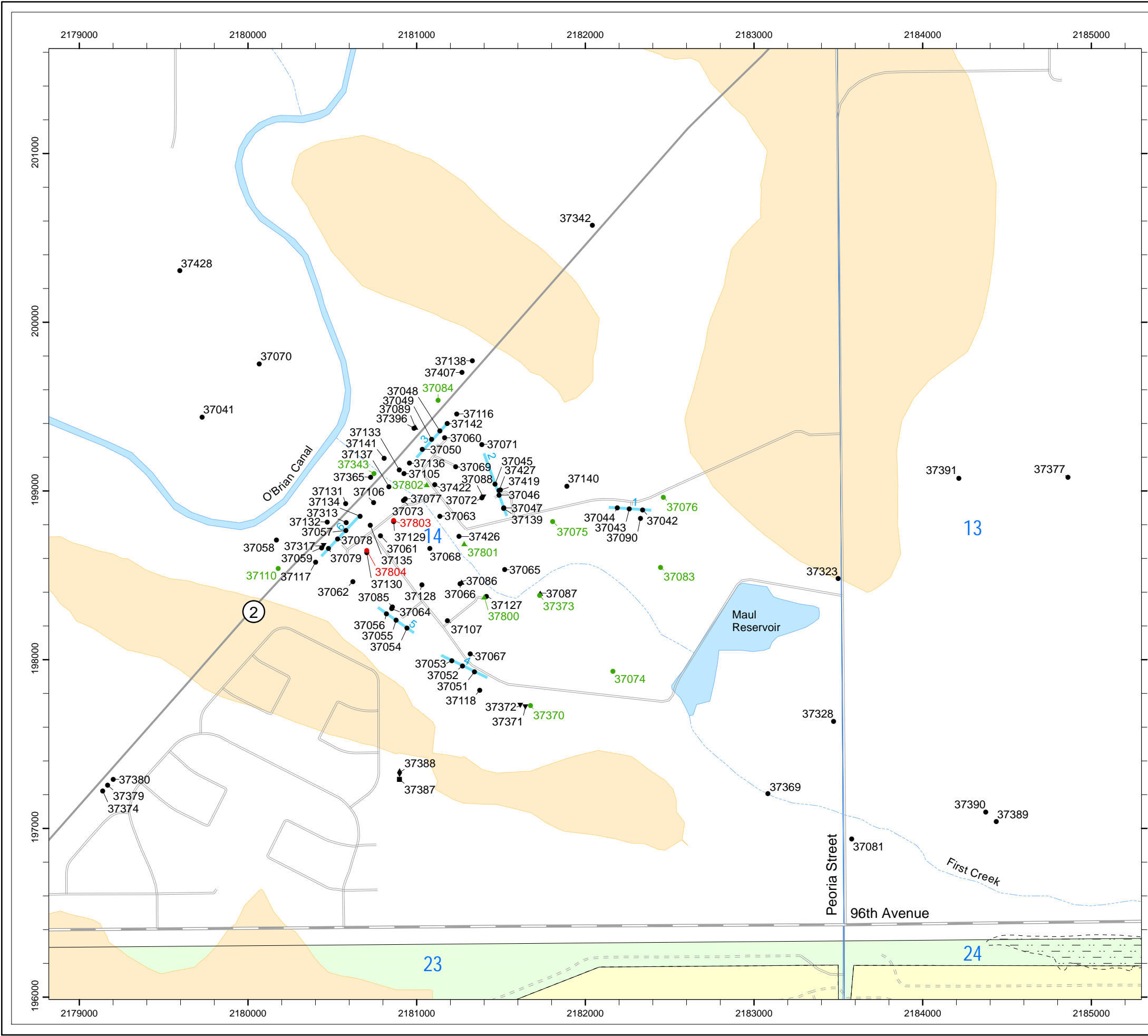


Figure 5.2.1-1

Army/Shell GIS

9/9/2016 RMITS

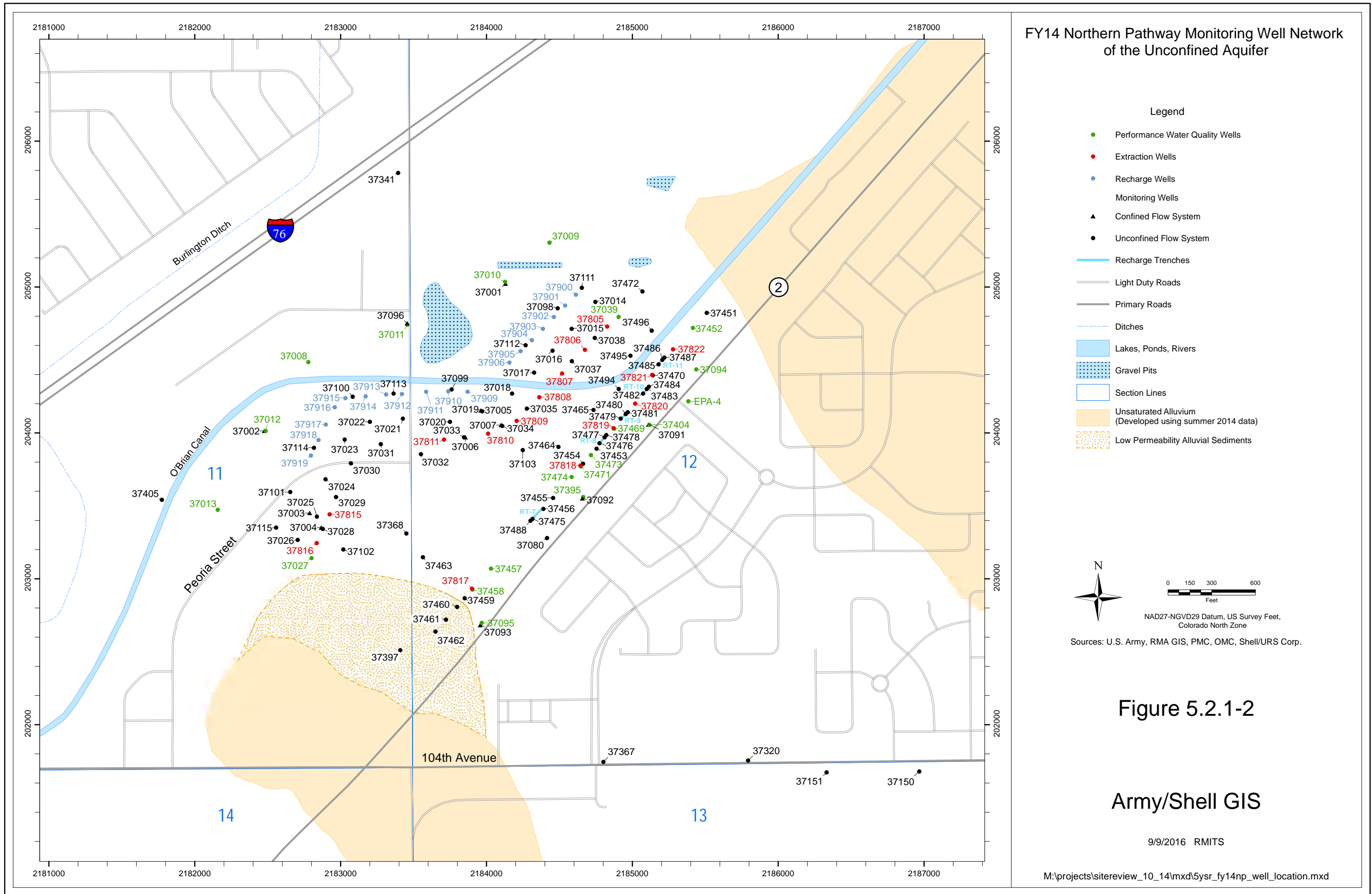
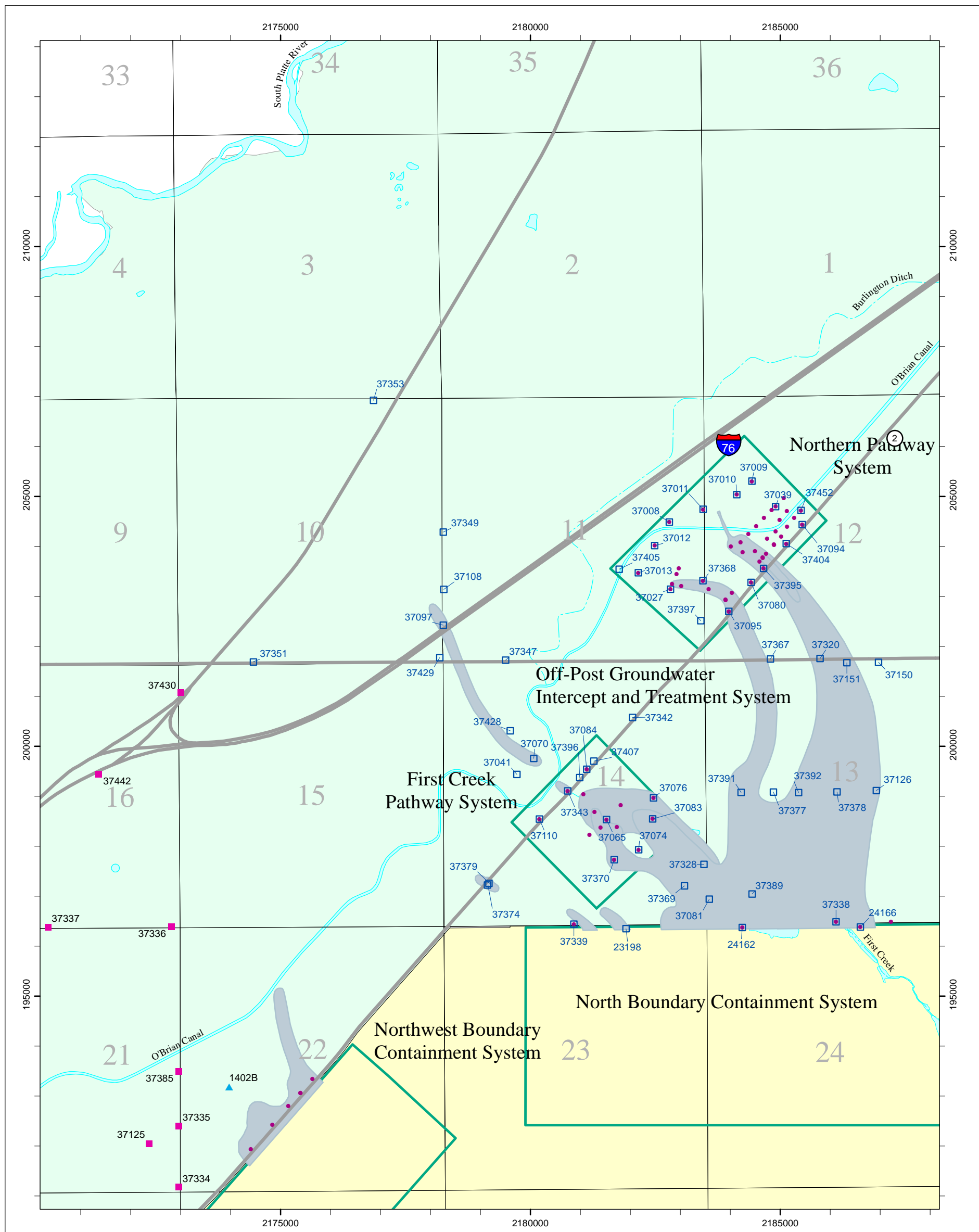


Figure 5.2.1-2

Army/Shell GIS

9/9/2016 RMITS



Exceedance Monitoring Wells

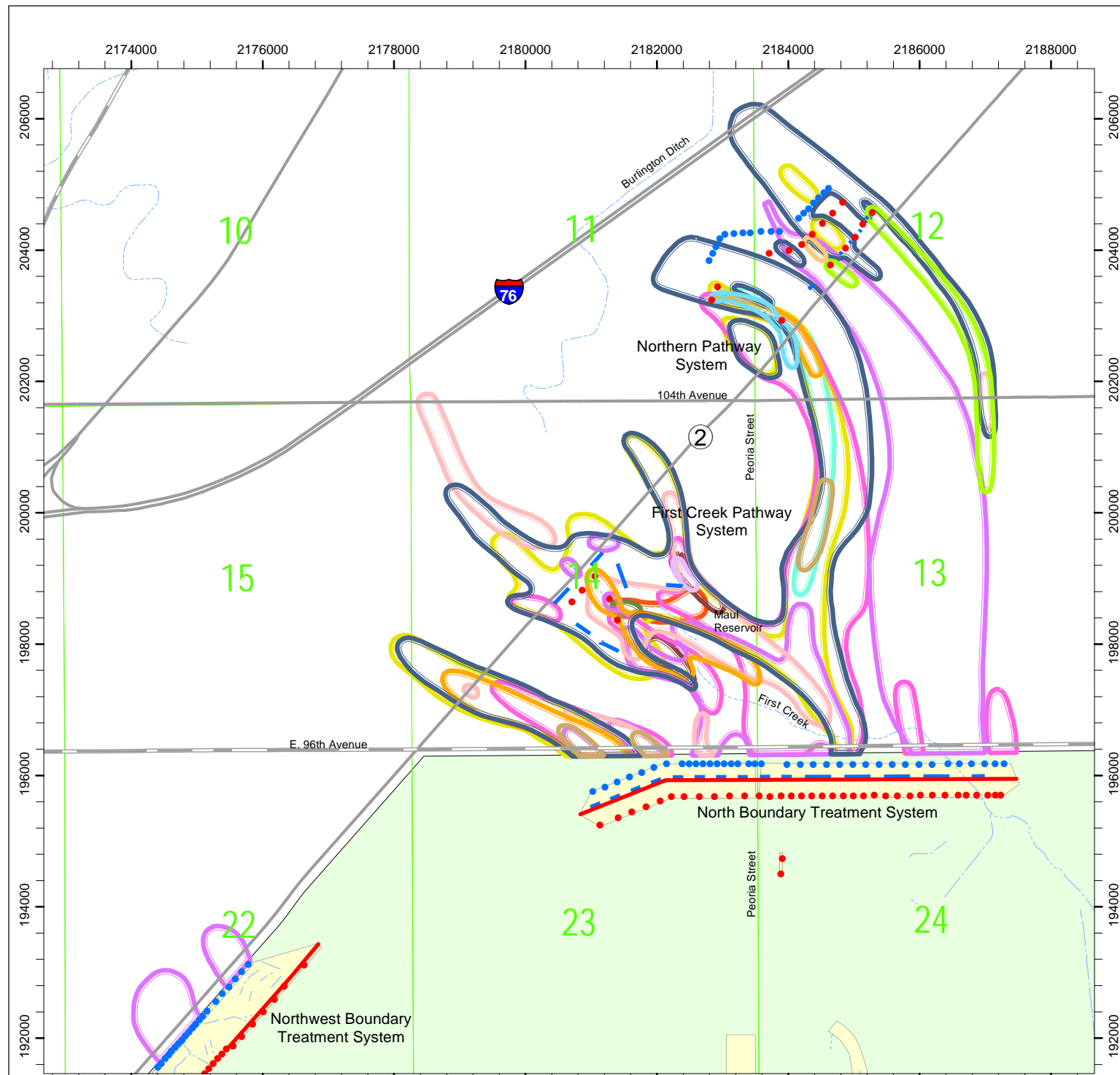
- Rocky Mountain Arsenal (On-Post Operable Unit)
- Off-Post Study Area
- Operational Areas
- 2014 CSGR Exceedance Areas for Carbon Tetrachloride, Dieldrin, and DIMP.
- Section Line
- Lakes, Ponds, Rivers
- Intermittent Streams
- Ditches, Canals
- Primary Roads

- CSGR Exceedance Monitoring Wells
 - Water Quality Operational Wells
 - Private Well
 - Proposed Addition to CSGR Exceedance Network
- 0 1,000 2,000
Feet
- NAD27-NGVD29 Datum, US Survey Feet, Colorado North Zone
Sources: U.S. Army, RMA GIS, PMC, OMC, Shell/URS Corp.

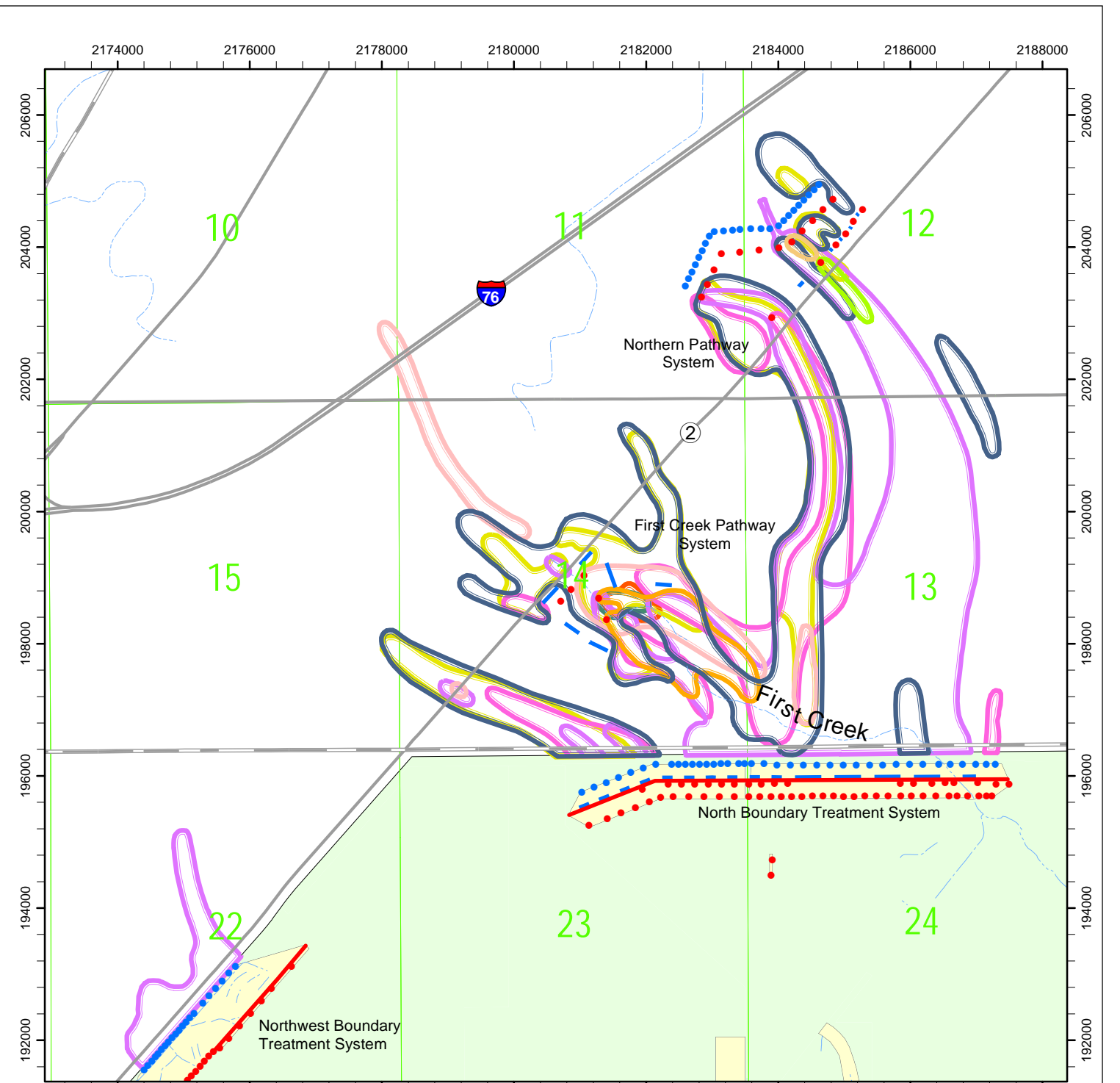
Figure 5.2.2-1



9/12/2016 RMITS



2012 CSG Exceedance



2014 CSG Exceedance

- Aldrin (ALDRN) Plume
- Arsenic (AS) Plume
- Carbon Tetrachloride (CCL4) Plume
- Chloroform (CHCL3) Plume
- Chloride (CL) Plume
- Chlordane (CLDAN) Plume

- Dicyclopentadiene (DCPD) Plume
- Diisopropylmethylphosphonate (DIMP) Plume
- Dieldrin (DLDRN) Plume
- Fluoride (F) Plume
- Isodrin (ISODR) Plume
- n-Nitrosodimethylamine (NNDMEA) Plume

- 2,2-Bis (p-chlorophenyl) -1,1,1-Trichloroethane (PPDDT) Plume
- Sulfate (SO4) Plume
- Tetrachloroethylene (TCLEE) Plume
- 1,2-Dichloroethane (12DCLE) Plume
- Extraction Well
- Recharge Well

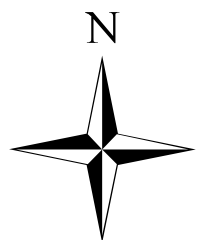
- Slurry Walls
- Recharge Trenches
- Secondary Roads
- Primary Roads
- Intermittent Streams
- Ditches
- Section Lines

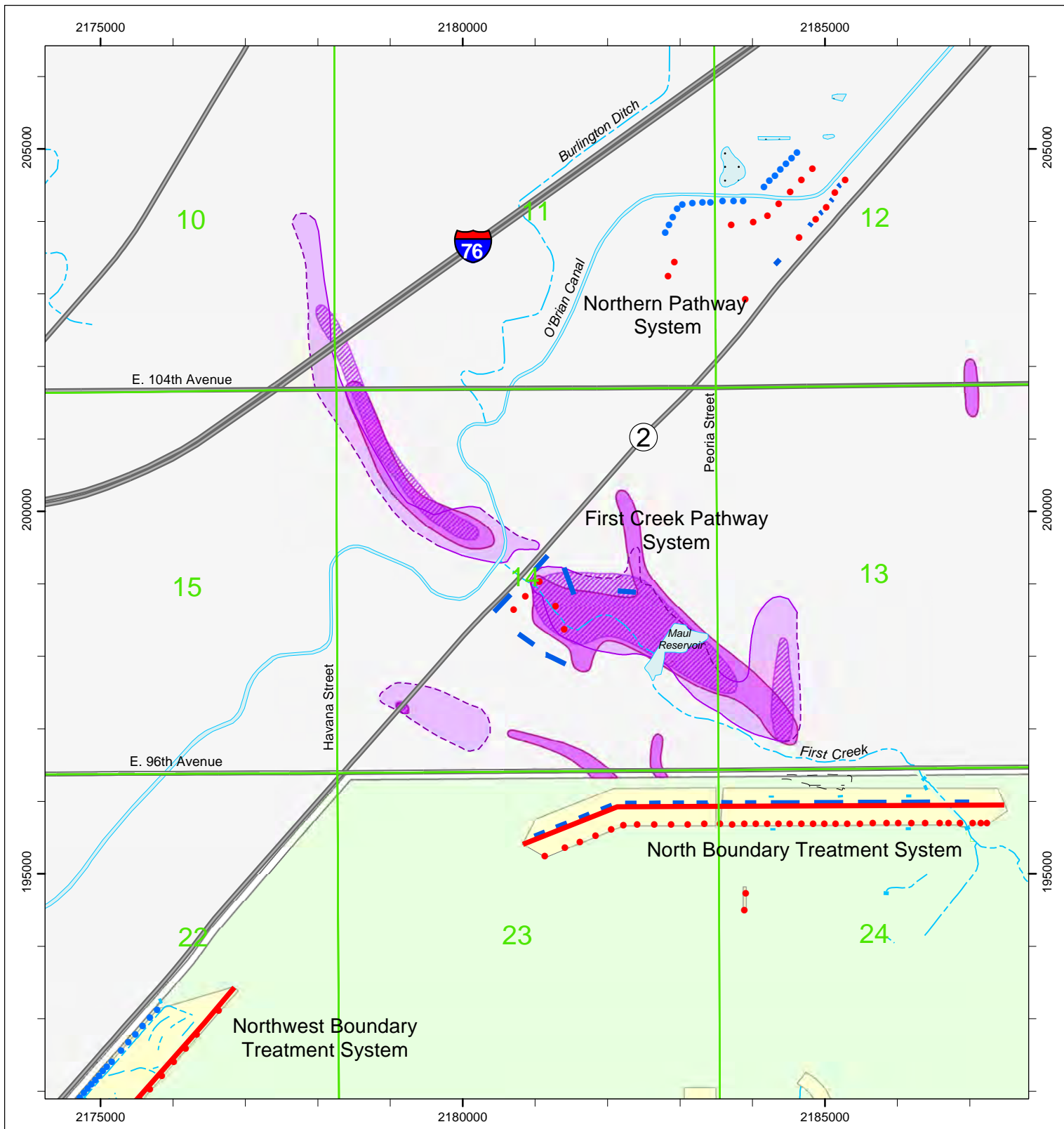
Exceedance Maps for 2012 and 2014

Figure 5.2.2-2



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





DIMP Exceedance Area Comparisons 2009, 2012, & 2014

Legend

- Extraction Wells
- Recharge Wells
- Slurry Walls
- Recharge Trenches
- Army Maintained Area
- USFWS Managed Area

- DIMP Concentrations ≥ 8 ug/L
(Dashed outlines where approximate)
- 2014
- 2012
- 2009


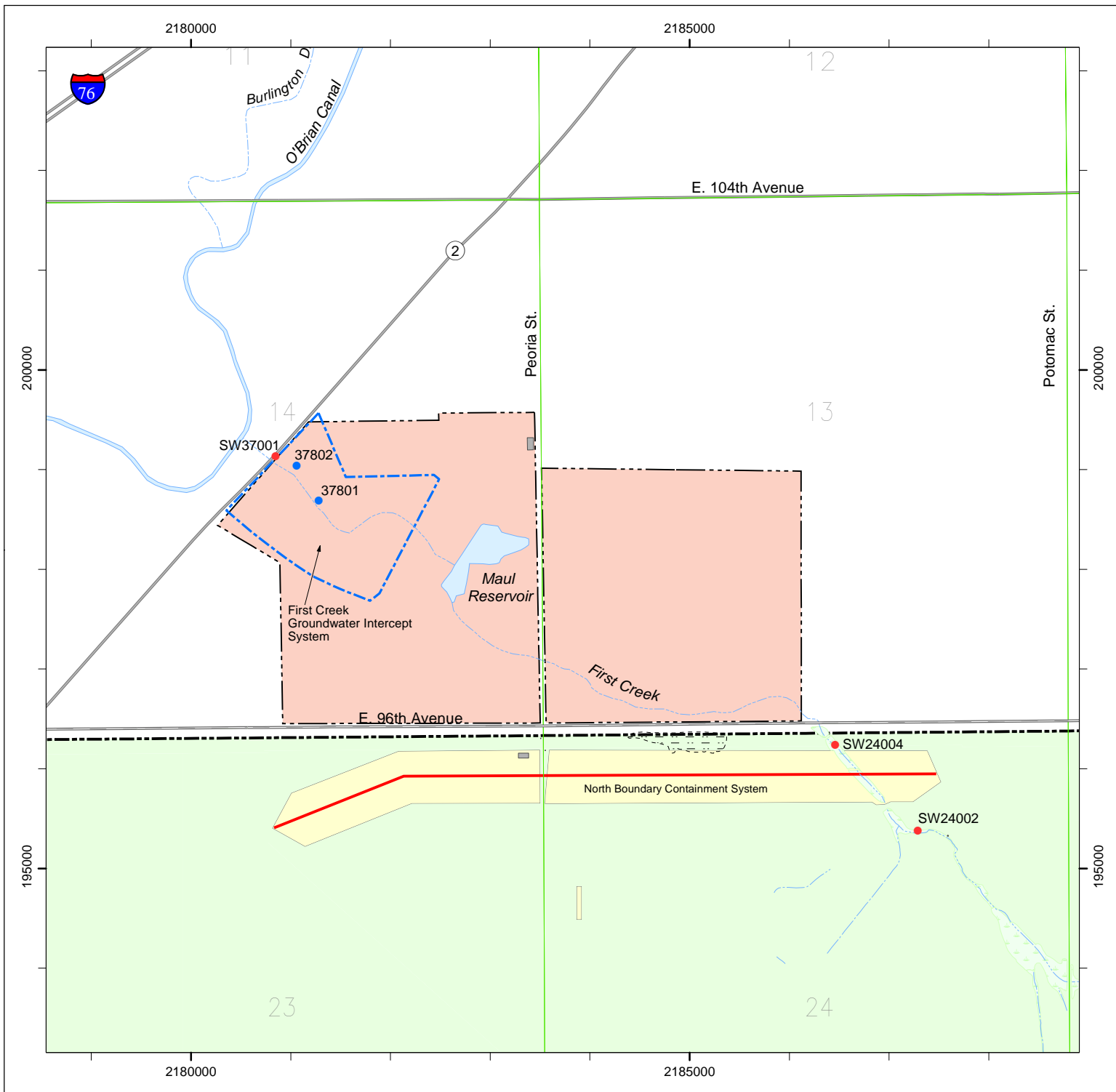

 0 1,000 2,000
 Feet
 NAD27-NGVD29 Datum, US Survey Feet,
 Colorado North Zone
 Sources: U.S. Army, RMA GIS, PMC,
 OMC, Shell/URS Corp.

Figure 5.2.2-3

Army/Shell GIS

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Rocky Mountain Arsenal Off-post Surface Water Monitoring Locations

Legend

- Rocky Mountain Arsenal
- Army Maintained Area
- USFWS Managed Area
- Lakes, Ponds, and Rivers
- Wetlands
- Dry Lake Areas
- Buildings
- First Creek Groundwater Intercept System
- Shell Property
- Section Lines
- Intermittent Streams
- Ditches
- Slurry Walls
- Surface Water Sites
- Selected Groundwater Wells



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

Figure 5.2.4-1

Army/Shell GIS

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