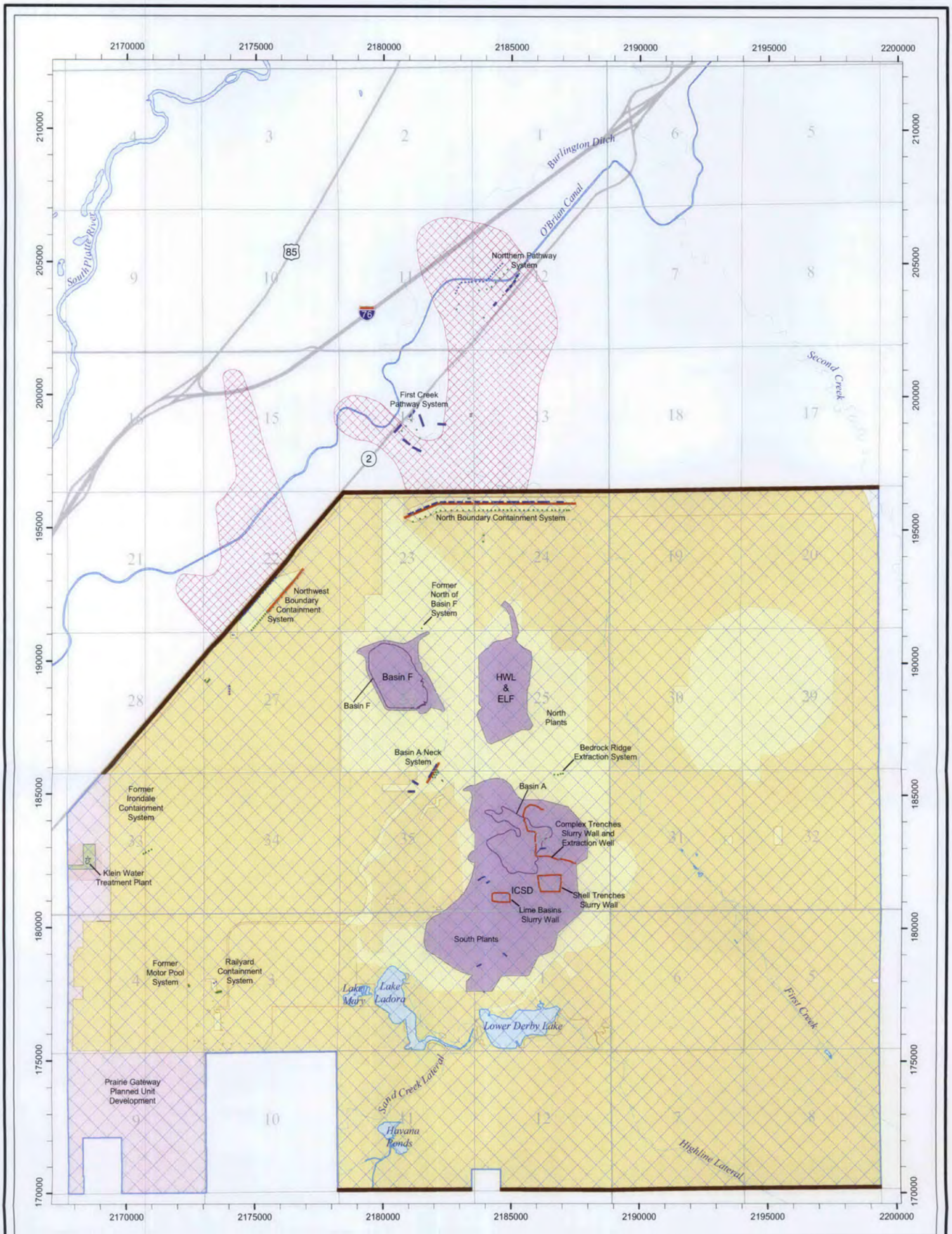
FIGURES



RMA Detail

Figure 1.2-1

Legend

- RMA On-Post Operable Unit
- Off-Post Operable Unit
- U.S. Army
- RMA National Wildlife Refuge
- Prairie Gateway Planned Unit Development
- South Adams County
- Transfer for Roads
- Caps & Covers
- Lakes and Ponds
- Intermittent Streams
- Ditches, Canals
- Section Lines
- Township & Range Lines
- Slurry Walls
- Recharge Trenches
- Dewatering Wells
- Recharge Wells

N

0 2,000 4,000 6,000
Feet

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

Sources: U.S. Army BIMS, U.S. Army COE, Washington Group, USGS DLG, USFWS, Tetra Tech-EC, RVO GIS

Remediation Venture Office GIS

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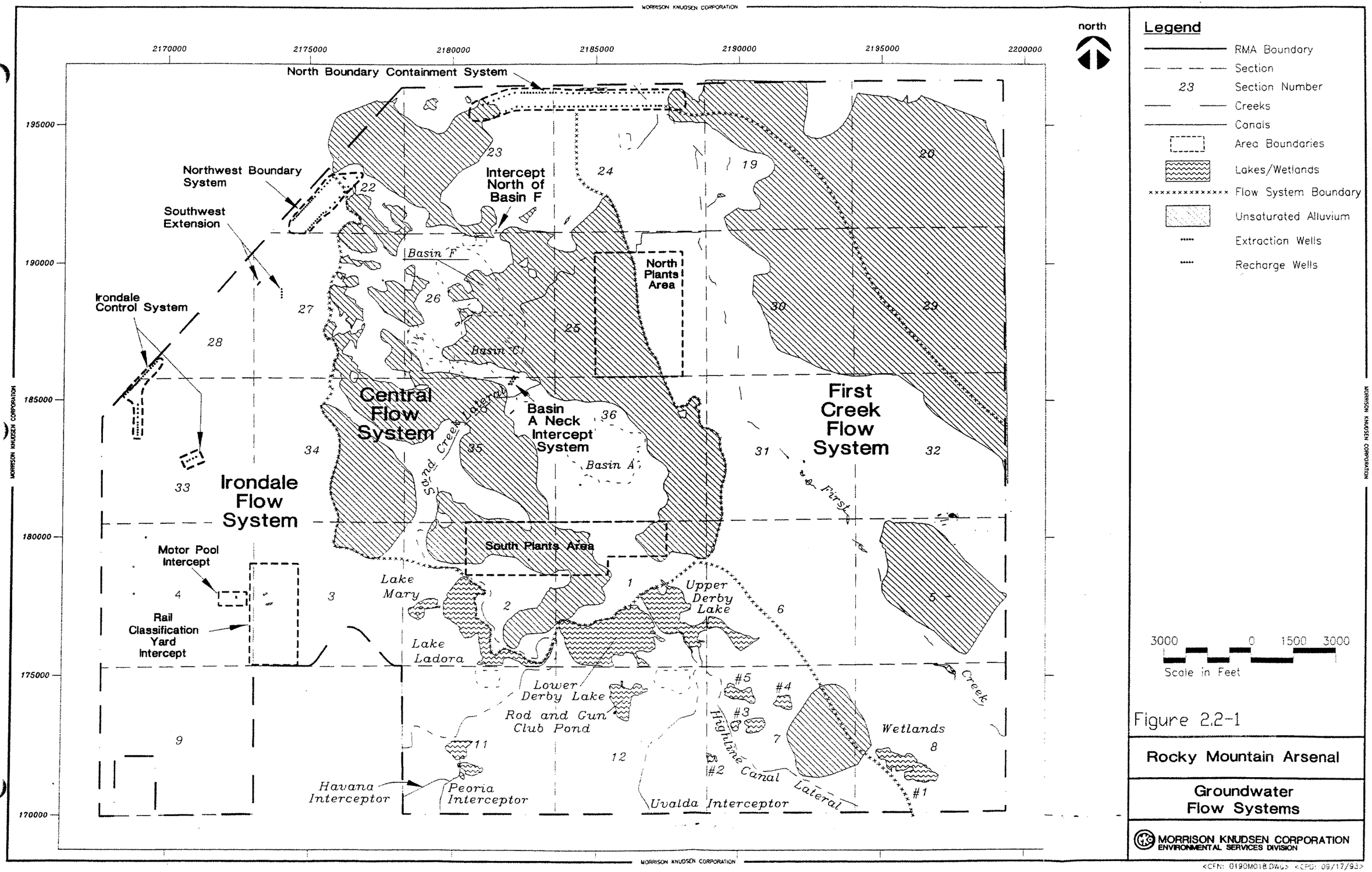


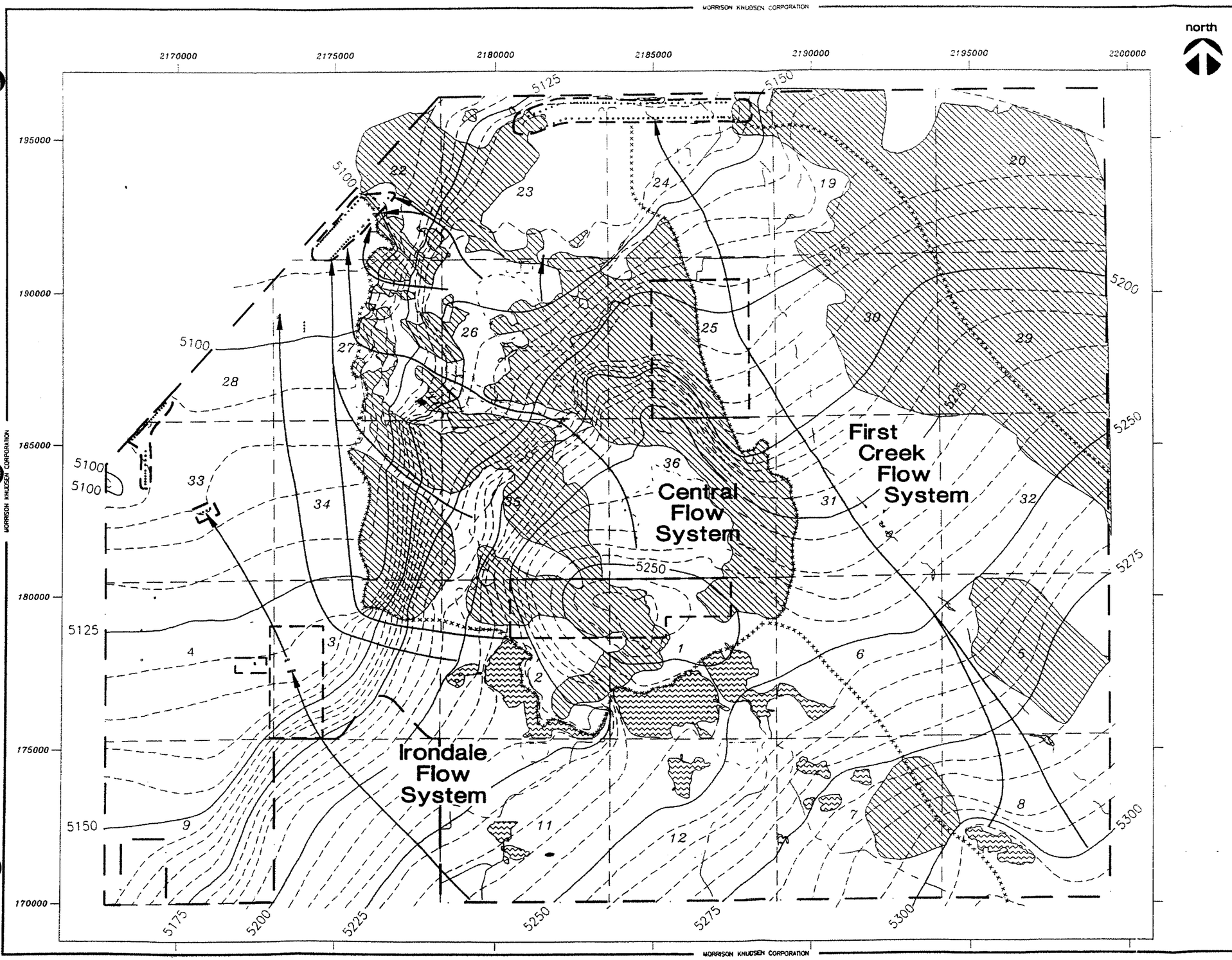
Figure 2.2-1

Rocky Mountain Arsenal

Groundwater Flow Systems

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES DIVISION

<CFN: 0190M018.DWG> <CPD: 09/17/93>



Legend

- RMA Boundary
- Section
- 23 Section Number
- Creeks
- Canals
- Area Boundaries
- Lakes/Wetlands
- Flow System Boundary
- Direction of Ground Water Flow
- Unsaturated Alluvium
- Extraction Wells
- Recharge Wells

3000 0 1500 3000
Scale in Feet

Figure 2.2-2

Rocky Mountain Arsenal

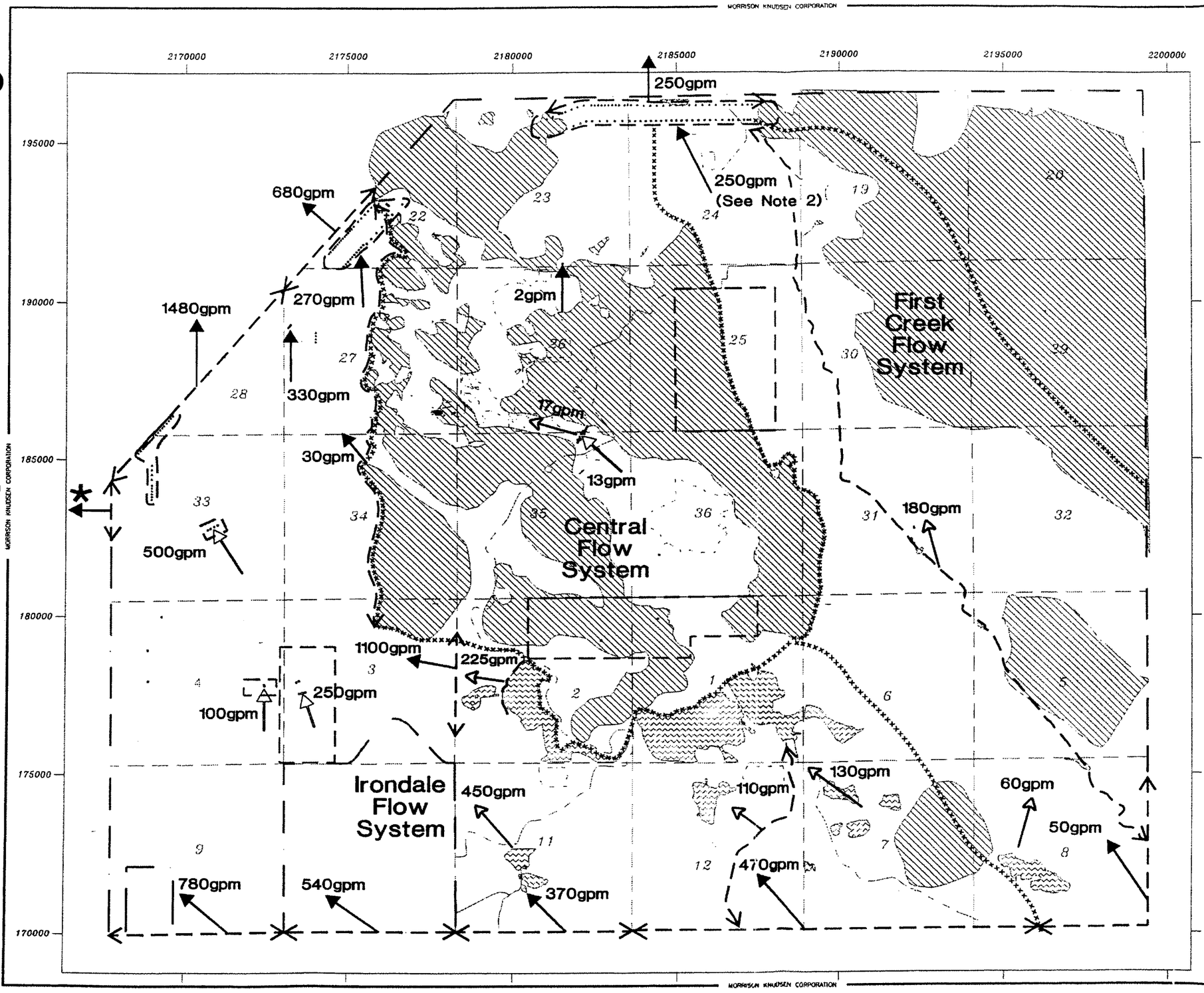
Groundwater Flow Direction

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES DIVISION

<CFN: 0190M019.DWG> <CPD: 09/17/93>

MORRISON KNUDSEN CORPORATION

MORRISON KNUDSEN CORPORATION



Legend

- RMA Boundary
- Section
- 23 Section Number
- Creeks
- Canals
- Area Boundaries
- Lakes/Wetlands
- Flow System Boundary
- Unsaturated Alluvium
- Flow Quantification Limits
- Extraction Wells
- Recharge Wells
- Extraction Flow
- Ground Water Recharge
- Ground Water Flux
- * Flow Varies

Note

1. The magnitude of flows shown in this figure is approximate only. A range of flows exist within each system and in many places flows are only rough estimates.
2. This total flux across the North Boundary System does not include recent seepage from the wetlands.

3000 0 1500 3000
Scale in Feet

Figure 2.2-3

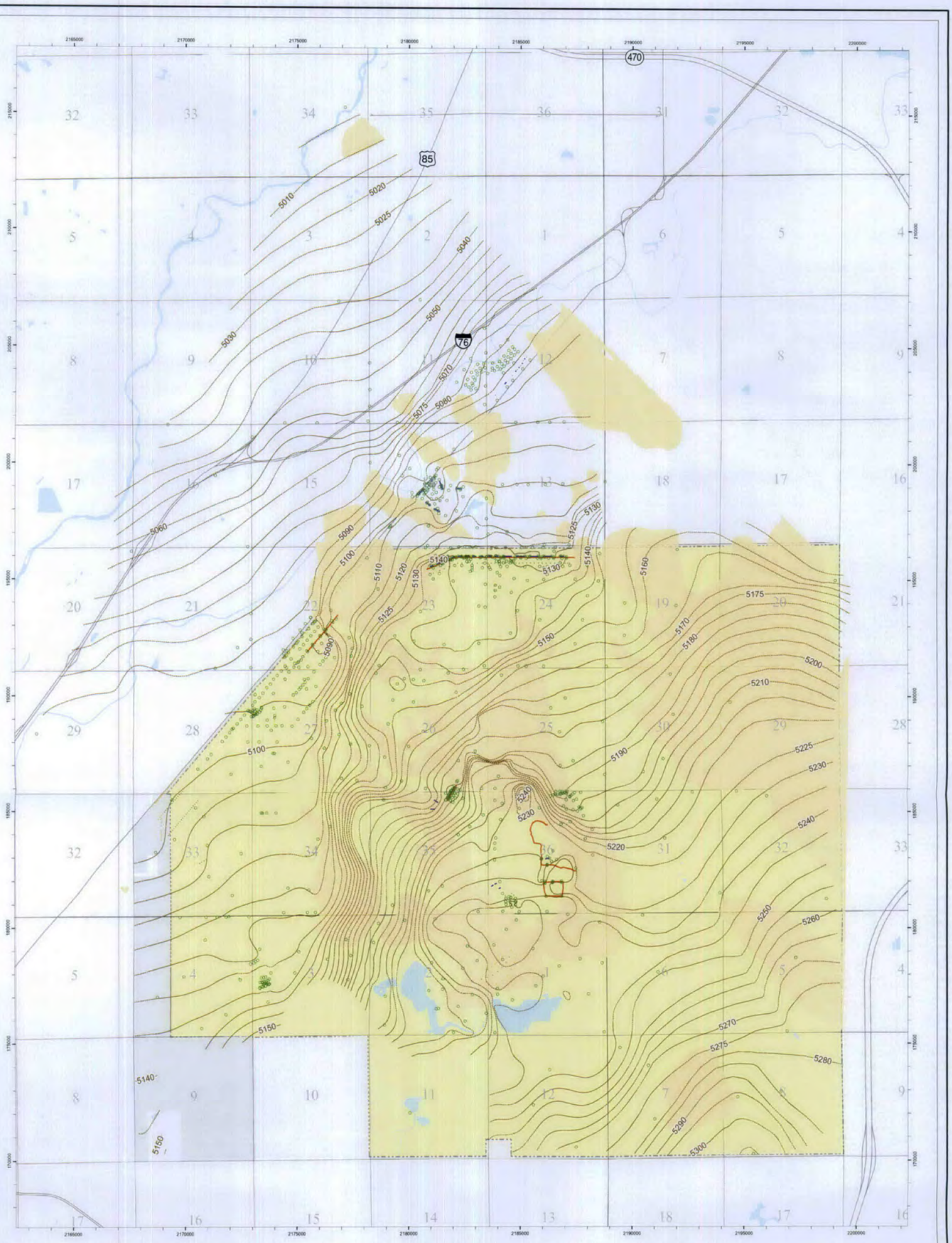
Rocky Mountain Arsenal

Approximate Quantities of Groundwater Flow

MORRISON KNUDSEN CORPORATION
ENVIRONMENTAL SERVICES DIVISION

MORRISON KNUDSEN CORPORATION

<CFN: 0190M020.DWG> <CPD: 09/20/95>



2004 Water Levels
Figure 2.2-4

Legend

- Rocky Mountain Arsenal (On-Post Operable Unit)
- Western Tier and Other Transfer Areas
- Lakes, Ponds, Rivers
- 2004 Dry Alluvium
- Primary Roads
- Slurry Wall
- Trench
- Intermittent Streams
- Ditches and Canals
- Section Lines
- Township & Range Lines
- Water Level Contour - 2004
- Approximate Water Level Contour - 2004
- Wells Used for Groundwater Contouring - 2004
- Extraction Wells
- Recharge Wells

N

0 1,000 2,000 4,000 6,000 8,000
Feet

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

Sources: U.S. Army BIMS, U.S. Army COE, Washington Group, USGS DLG, USFWS, Foster Wheeler, RVO GIS

Remediation Venture Office GIS

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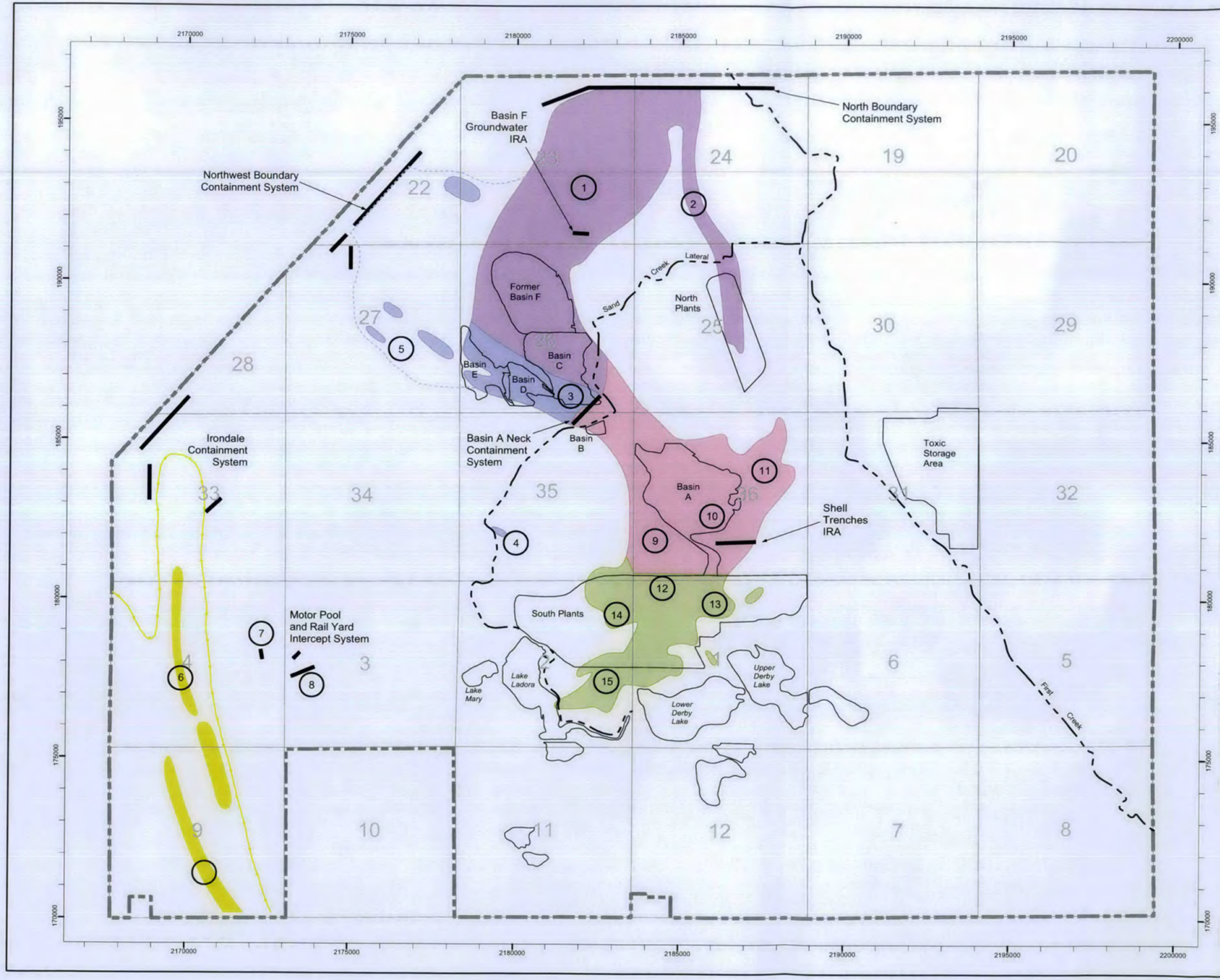

Generalized Contaminant Plume Locations

Figure 2.3-1

Legend

- North Boundary Plume Group
  - (1) Basins C and F Plume
  - (2) North Plants Plume
- Northwest Boundary Plume Group (Outlined: ------)
  - (3) Basin A Neck Plume
  - (4) & (5) Sand Creek Lateral Plumes
- Western Plume Group
  - (6) Western Plume (Outlined: ———)
  - (7) Motor Pool Plume
  - (8) Rail Yard Plume
- Basin A Plume Group
  - (9) South Plants North Plume
  - (10) Basin A Plume
  - (11) Section 36 Bedrock Ridge Plume
- South Plants Plume Group
  - (12) South Plants North Source Plume
  - (13) South Plants Southeast Plume
  - (14) South Plants Southwest Plume
  - (15) South Tank Farm Plume
- Groundwater Control System

Sources: USGS DLG Files, U.S. Army 1994 BIMS, RVO GIS. Plume data from the Record of Decision for the On-Post Operable Unit, 6/96.

N

0 500 1,000 2,000 3,000
Feet

State Plane Coordinate System, CO North Zone, NAD27-NGVD29 Datum, US Survey Feet.

Remediation Venture Office GIS

10/18/2007 DPRA, Inc. P:\projects\ltgmp\mxds\rodplumes_color_11x17.mxd

Water Level Comparison
Water Years 1999 and 2004
Figure 2.2-5

Legend

- Rocky Mountain Arsenal (On-Post Operable Unit)
- Western Tier and Other Transfer Areas
- Lakes, Ponds, Rivers
- 2004 Dry Alluvium
- Primary Roads
- Slurry Wall
- Trench
- Intermittent Streams
- Ditches and Canals
- Section Lines
- Township & Range Lines
- Water Level Contour - 1999
- Approximate Water Level Contour - 1999
- Water Level Contour - 2004
- Approximate Water Level Contour - 2004
- Wells Used for Groundwater Contouring - 1999
- Wells Used for Groundwater Contouring - 2004
- Extraction Wells
- Recharge Wells

N

0 1,000 2,000 4,000 6,000 8,000

Feet

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

Sources: U.S. Army BIMS, U.S. Army COE, Washington Group, USGS DLG, USFWS, Foster Wheeler, RVO GIS

Remediation Venture Office GIS

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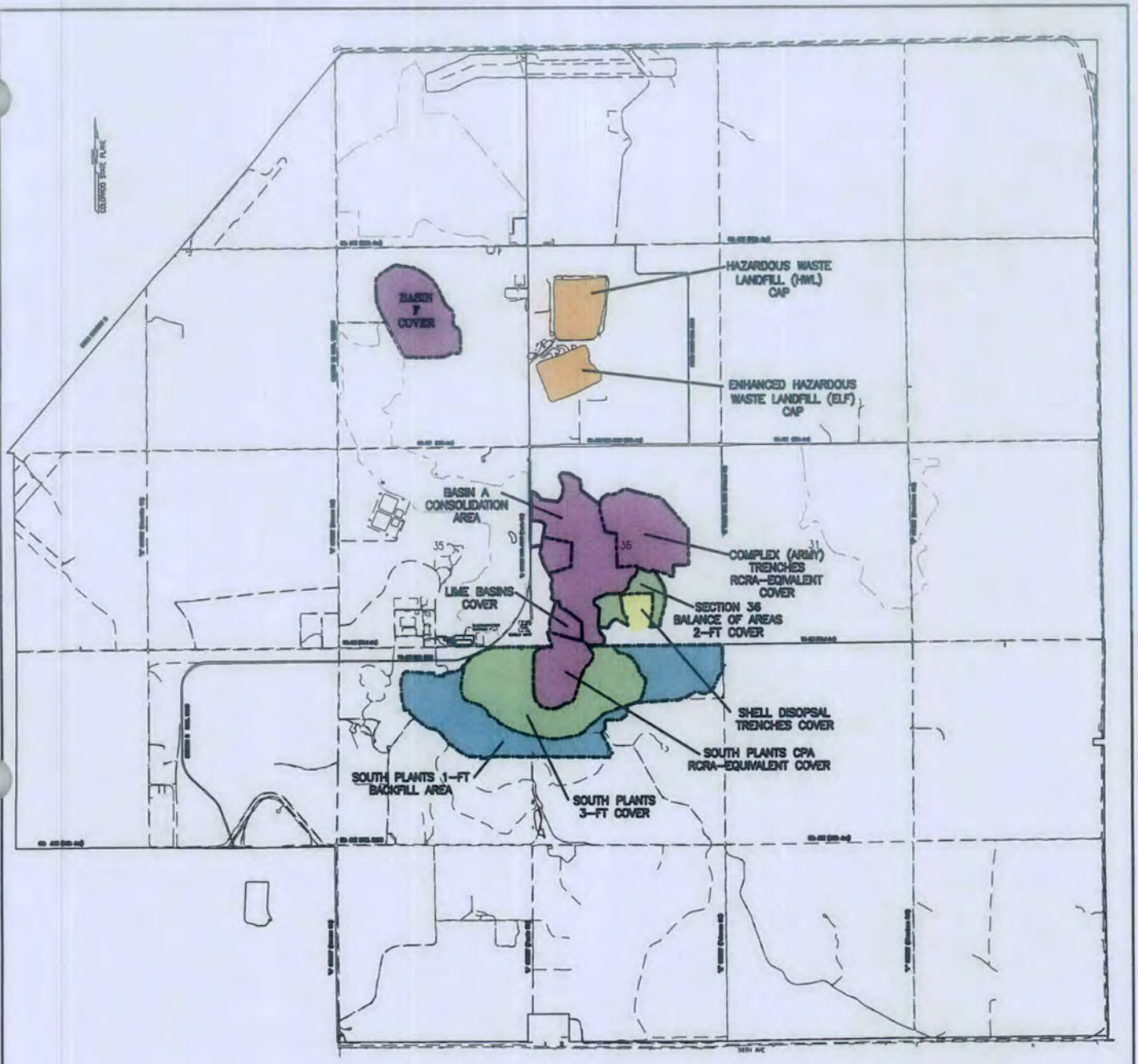

LEGEND

- HWL AND ELF RCRA CAPS
- INTEGRATED COVER SYSTEM AND BASIN F RCRA-EQUIVALENT COVER
- INTEGRATED COVER SYSTEM 2-FT/3-FT COVER
- INTEGRATED COVER SYSTEM 1-FT BACKFILL
- COMPLETED SHELL DISPOSAL TRENCHES RCRA-EQUIVALENT COVER

Program Manager
Rocky Mountain Arsenal

ROCKY MOUNTAIN ARSENAL
COMMERCE CITY, COLORADO

TETRA TECH EC

PROJECT NAME
LTMP

TITLE
RMA FINAL CAPS AND COVERS

CAD FILE:	DATE	FIGURE NUMBER
RMA COVERS.DWG	10.17.07	2.4-1

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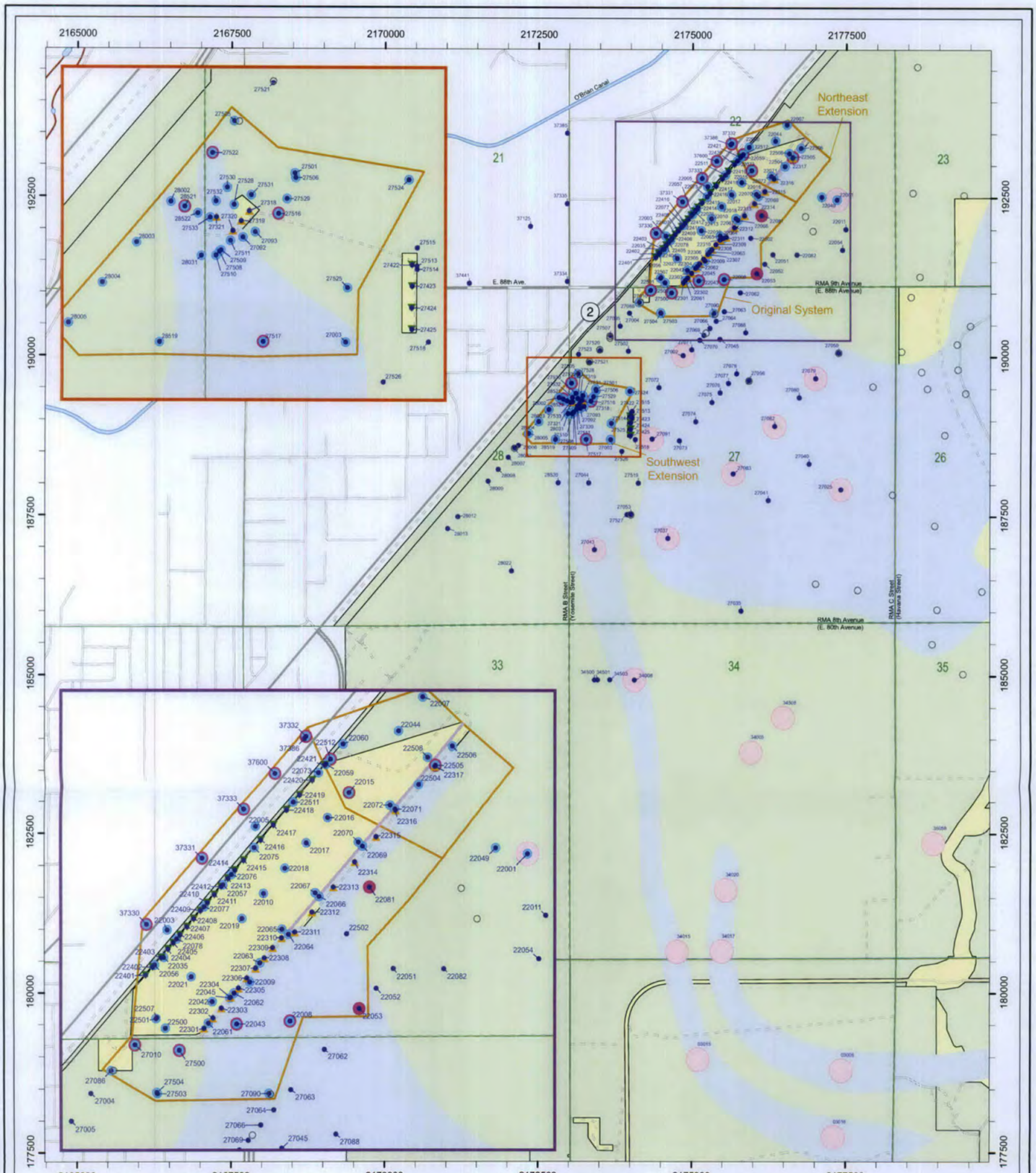

Figure 4.3-1: Northwest Boundary Containment System LTMP Wells

Legend

- Open Wells not in LTMP
- LTMP Wells
- Operational Water Level
- Extraction Wells
- Recharge Wells
- Performance Water Level
- Performance Water Quality
- Water Quality Tracking
- NWBCS Components
- Lakes, Ponds, Rivers
- Slurry Walls
- Local Roads
- Secondary Roads
- Primary Roads
- Ditches
- Section Lines
- Unimproved Roads
- 1994 Dieldrin Plume
- RMA National Wildlife Refuge
- Rocky Mountain Arsenal

N

0 500 1,000 2,000
Feet

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

Sources: USGS, DPRA, Inc., URS - Washington Division, RMA Environmental Database, U.S. Army, Shell Chemical

Remediation Venture Office GIS

10/8/2009 DPRA, Inc.

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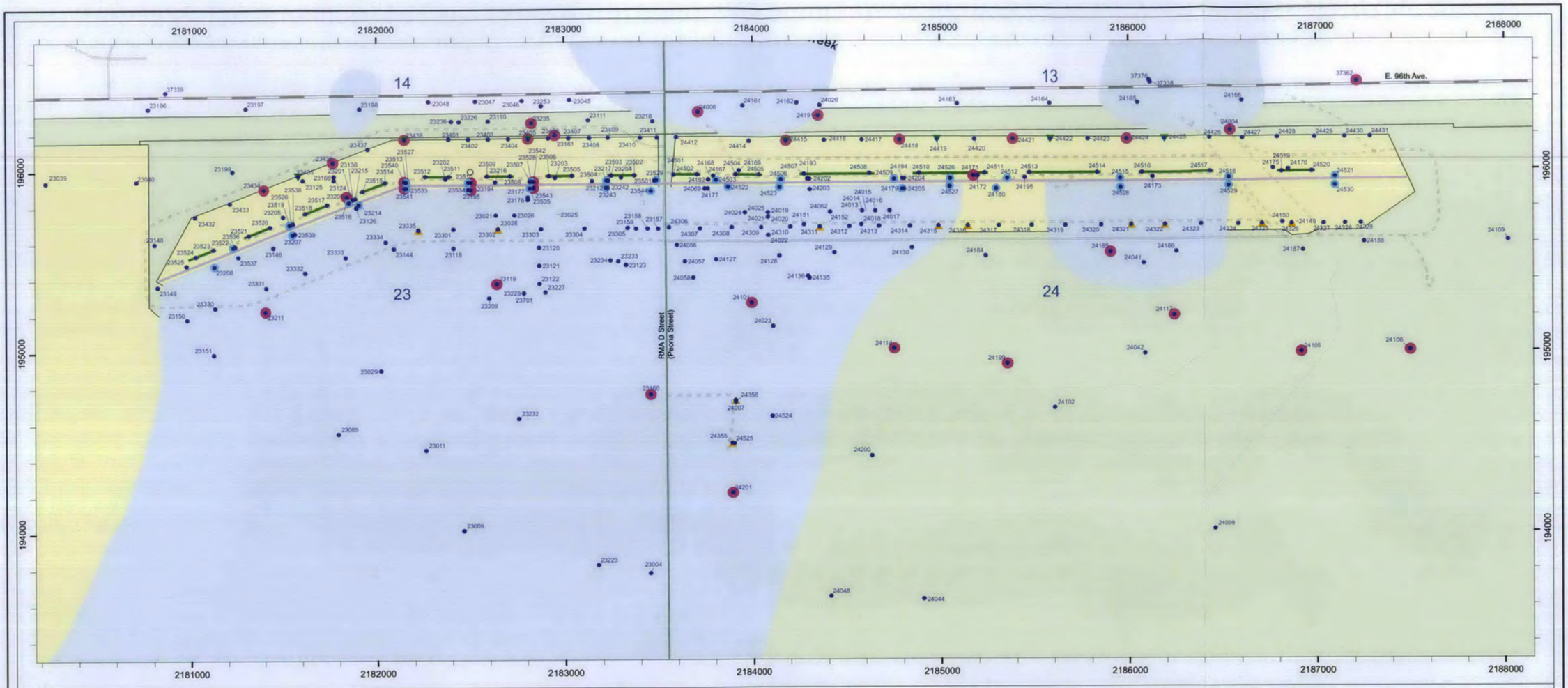


Figure 4.4-1: North Boundary Containment System LTMP Wells

Legend

- Rocky Mountain Arsenal
- RMA National Wildlife Refuge
- Section Lines
- 1994 Dieldrin Plume
- Lakes, Ponds, Rivers
- Local Roads
- Secondary Roads
- Primary Roads
- Unimproved Roads
- Ditches
- Slurry Walls
- Recharge Trench
- Open Wells not in LTMP
- Operational Water Level
- Extraction Wells
- Recharge Wells
- Performance Water Level
- Performance Water Quality

N

0 250 500 Feet

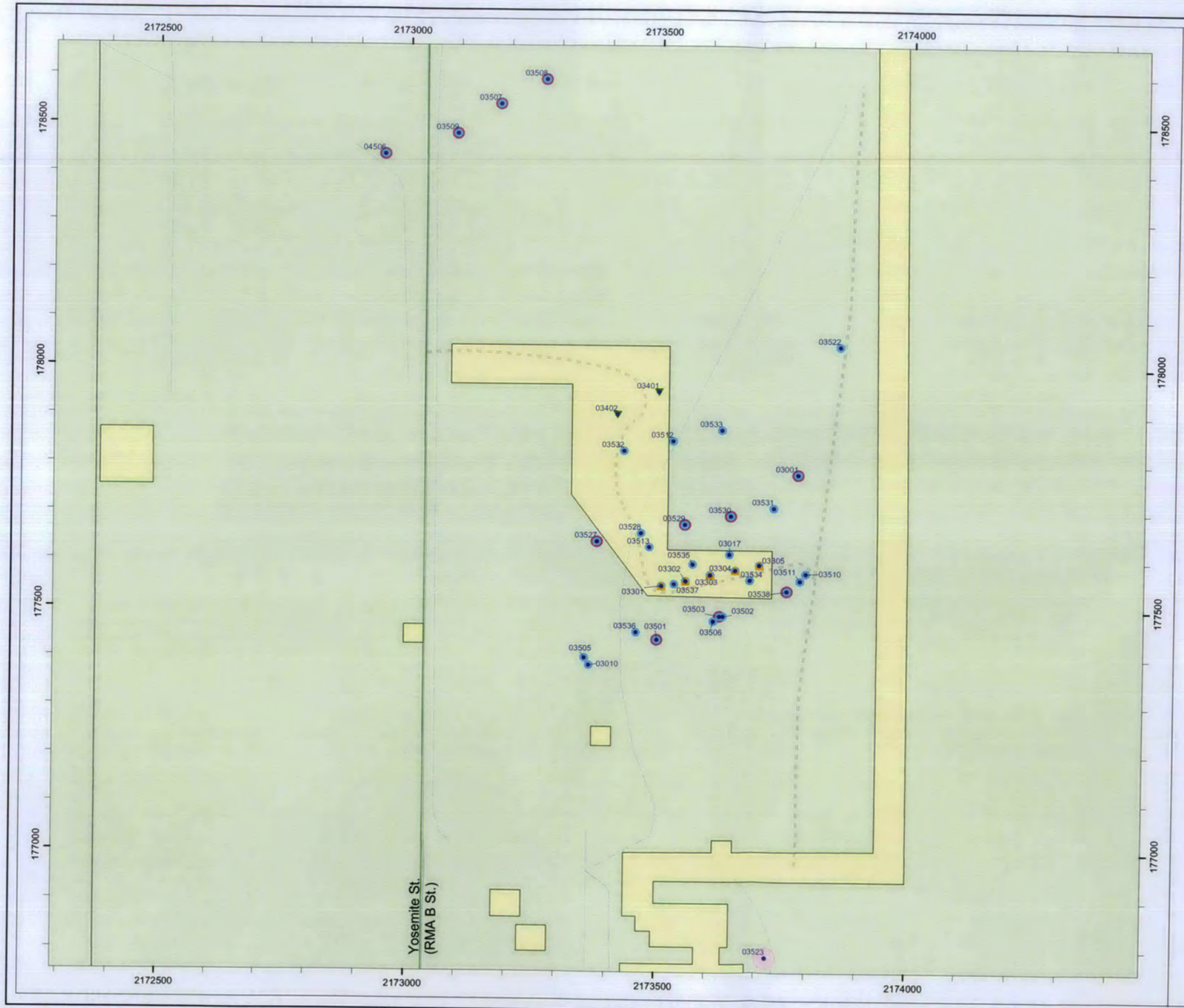
NAD27-NGVD29 Datum, US Survey Feet, Colorado North Zone

Sources: USGS, DPRA, Inc., URS - Washington Division, RMA Environmental Database, U.S. Army, Shell Chemical

Remediation Venture Office GIS

10/5/2009 DPRA, Inc. Q:\projects\ltmp_06_07\mxds\nb_well_location.mxd

Figure 4.5-1
Railyard Containment System LTMP Wells



Legend

- Open Wells not in LTMP
- Operational Water Level
- Extraction Wells
- Recharge Wells
- Performance Water Level
- Performance Water Quality
- Water Quality Tracking
- Lakes, Ponds, Rivers
- Slurry Walls
- Local Roads
- Secondary Roads
- Primary Roads
- Ditches
- Section Lines
- 1994 Dieldrin Plume
- Paved Roads
- Unimproved Roads
- Rocky Mountain Arsenal
- RMA National Wildlife Refuge

N

0 100 200 Feet

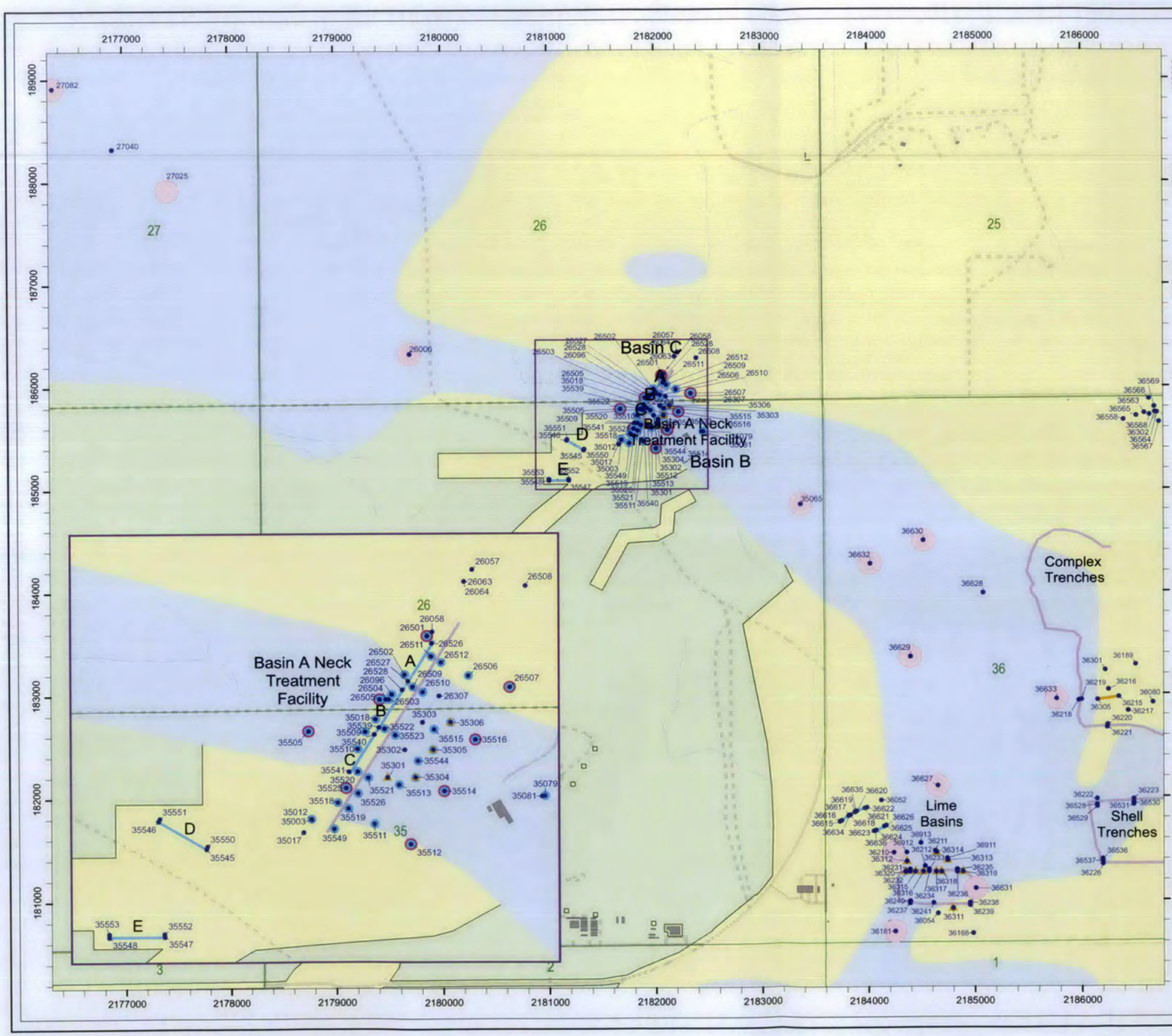
NAD27-NGVD29 Datum, US Survey Feet, Colorado North Zone

Sources: USGS, DPRA, Inc., URS - Washington Division, RMA Environmental Database, U.S. Army, Shell Chemical

Remediation Venture Office GIS

10/8/2009 DPRA, Inc. Q:\projects\ltmp_06_07\mxds\ry_well_location08.mxd

Figure 4.6-1: Basin A Neck System LTMP Wells



Legend

- Operational Water Level
- Extraction Wells
- Performance Water Level
- Performance Water Quality
- Water Quality Tracking
- Lakes, Ponds, Rivers
- Slurry Walls
- Recharge Trenches
- Dewatering Trench
- Local Roads
- Secondary Roads
- Primary Roads
- Ditches
- Section Lines
- Paved
- Unimproved Roads
- Buildings
- 1994 Dieldrin Plume
- Rocky Mountain Arsenal
- RMA National Wildlife Refuge

N

0 500 1,000 1,500 Feet

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

Sources: USGS, DPRA, Inc., URS - Washington Division, RMA Environmental Database, U.S. Army, Shell Chemical

Remediation Venture Office GIS

10/27/2008 DPRA, Inc. Q:\projects\ltmp_06_07\mxds\ban_well_location08.mxd

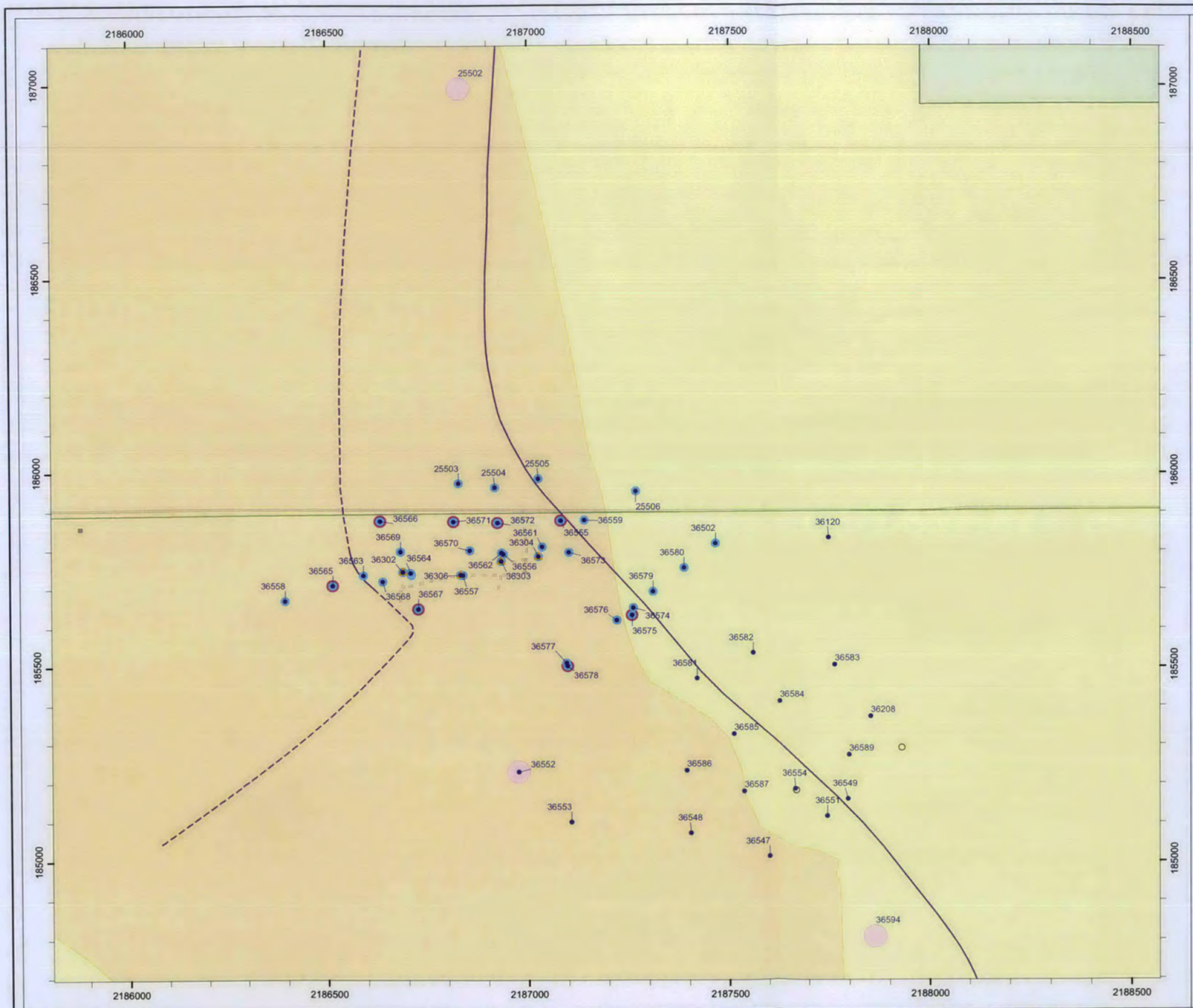


Figure 4.7-1
Bedrock Ridge Intercept System
LTMP Wells

Legend

- Operational Water Level
- Extraction Wells
- Performance Water Level
- Open Wells not in LTMP
- Performance Water Quality
- Water Quality Tracking
- Lakes, Ponds, Rivers
- Slurry Walls
- RechargeTrenches
- Local Roads
- Secondary Roads
- Primary Roads
- Ditches
- Section Lines
- Paved
- Unimproved Roads
- 1994 Dieldrin Plume
- Unsaturated Alluvium (Developed using summer 2006 data)
- Rocky Mountain Arsenal
- RMA National Wildlife Refuge
- 1998 Bedrock Ridge Composite Plume Extent
- Inferred
- Interoplated

N

0 75 150 Feet

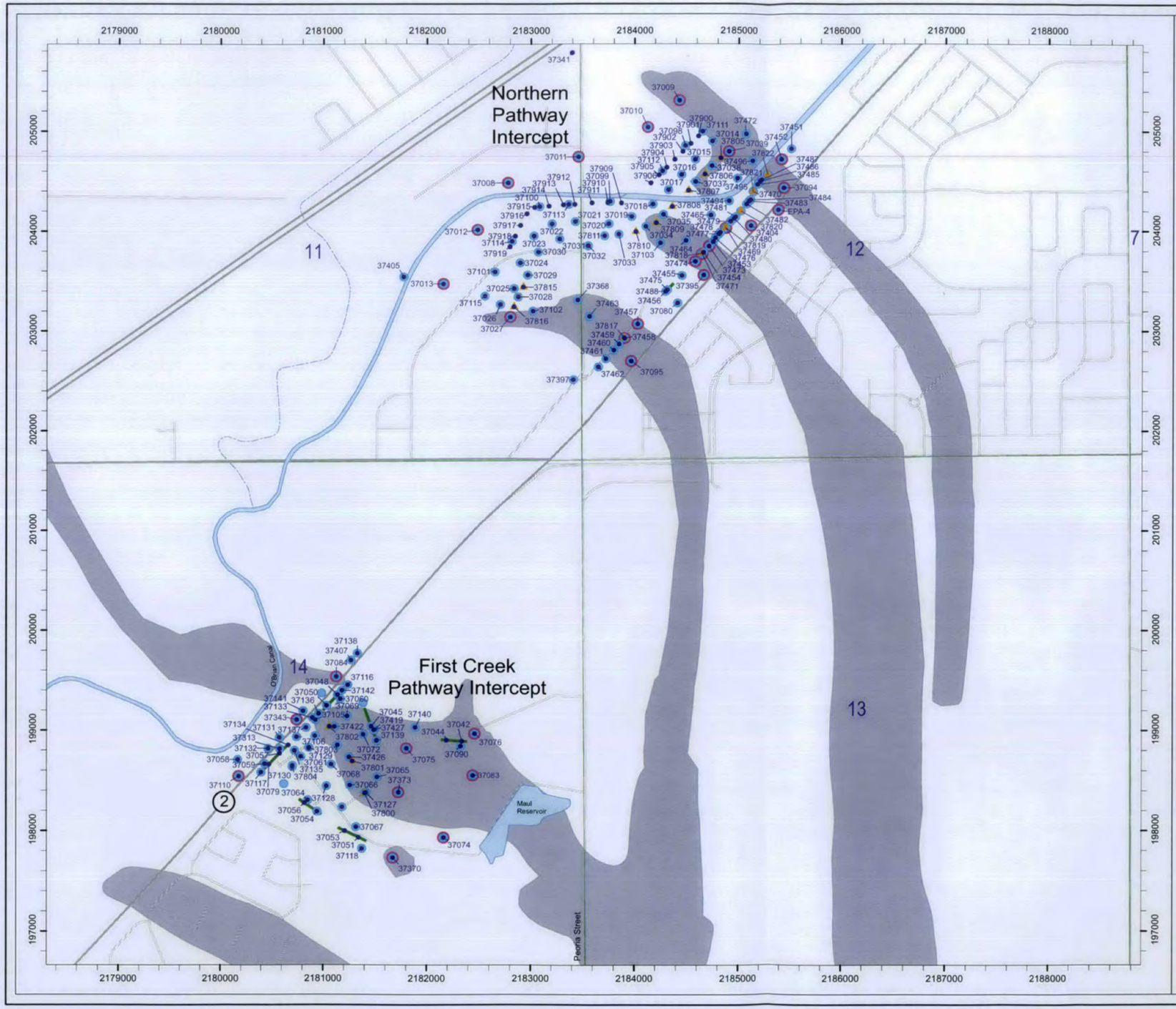
NAD27-NGVD29 Datum, US Survey Feet, Colorado North Zone

Sources: USGS, DPRA, Inc., Washington Group, RMA Environmental Database, U.S. Army, Shell Chemical

Remediation Venture Office GIS

11/4/2008 DPRA, Inc. Q:\projects\ltmp_06_07\mxds\brr_well_location08.mxd

Figure 4.8-1: Offpost Groundwater Intercept and Treatment System LTMP Wells



Legend

- 2007 CSRG Exceedance Areas for Carbon tetrachloride, Chloroform, DCPD, Dieldrin, DIMP, and Tetrachloroethylene
- Lakes, Ponds, Rivers
- Local Roads
- Secondary Roads
- Primary Roads
- Ditches
- Recharge Trench
- Operational Water Level
- Extraction Wells
- Recharge Wells
- Performance Water Level
- Performance Water Quality

N

0 150 300 600
Feet

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

Sources: USGS, DPRA, Inc., Washington Group, RMA Environmental Database, U.S. Army, Shell Chemical

Remediation Venture Office GIS

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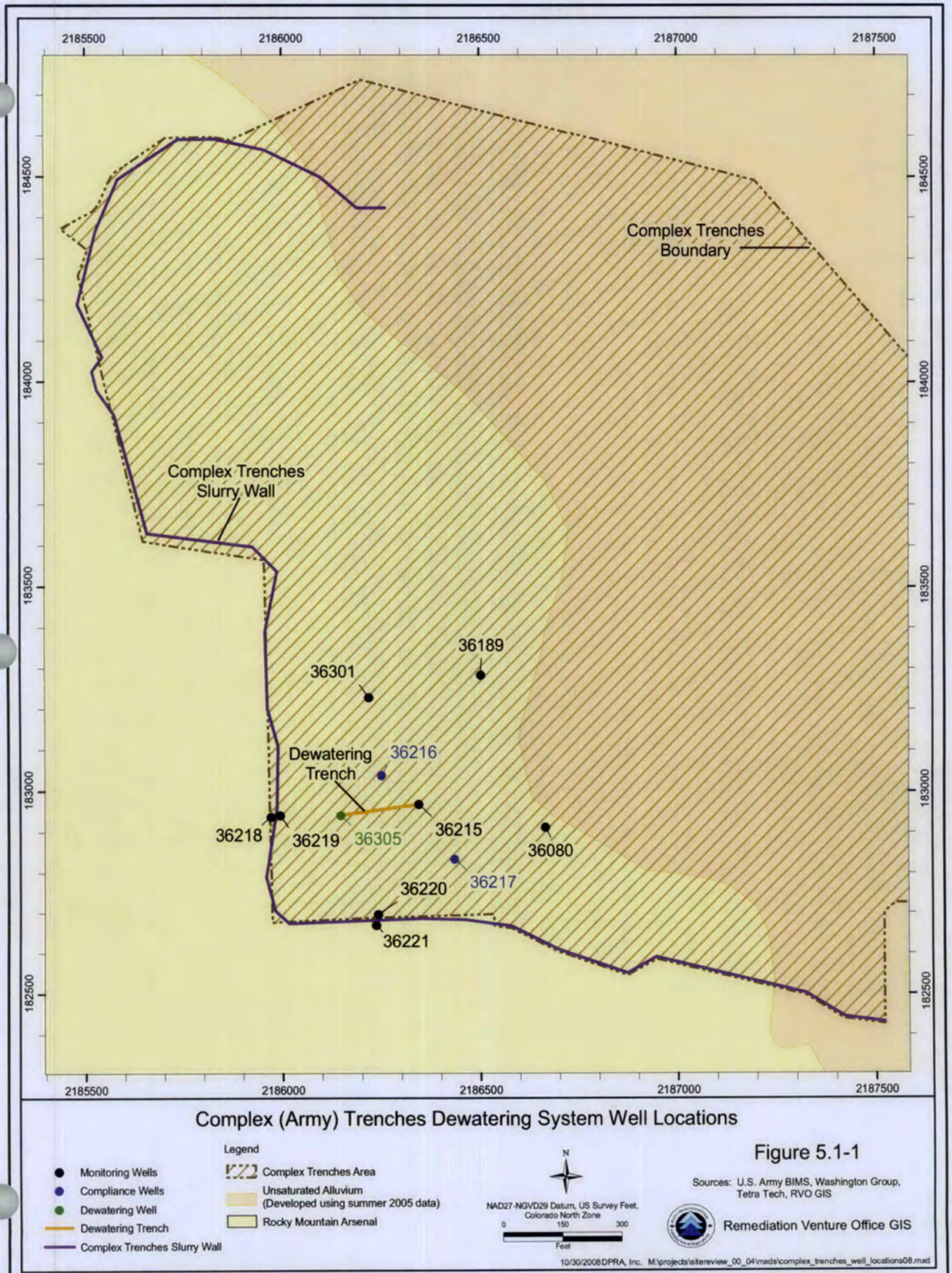
2185500
2186000
2186500
2187000
2187500
184500
184000
183500
183000
182500
Complex Trenches Boundary
Complex Trenches Slurry Wall
36189
36301
Dewatering Trench
36216
36218
36219
36305
36215
36080
36217
36220
36221
Complex (Army) Trenches Dewatering System Well Locations
Legend
Monitoring Wells
Compliance Wells
Dewatering Well
Dewatering Trench
Complex Trenches Slurry Wall
Complex Trenches Area
Unsaturated Alluvium (Developed using summer 2005 data)
Rocky Mountain Arsenal
N
NAD27-NGVD29 Datum, US Survey Feet, Colorado North Zone
0
150
300
Feet
Figure 5.1-1
Sources: U.S. Army BIMS, Washington Group, Tetra Tech, RVO GIS
Remediation Venture Office GIS
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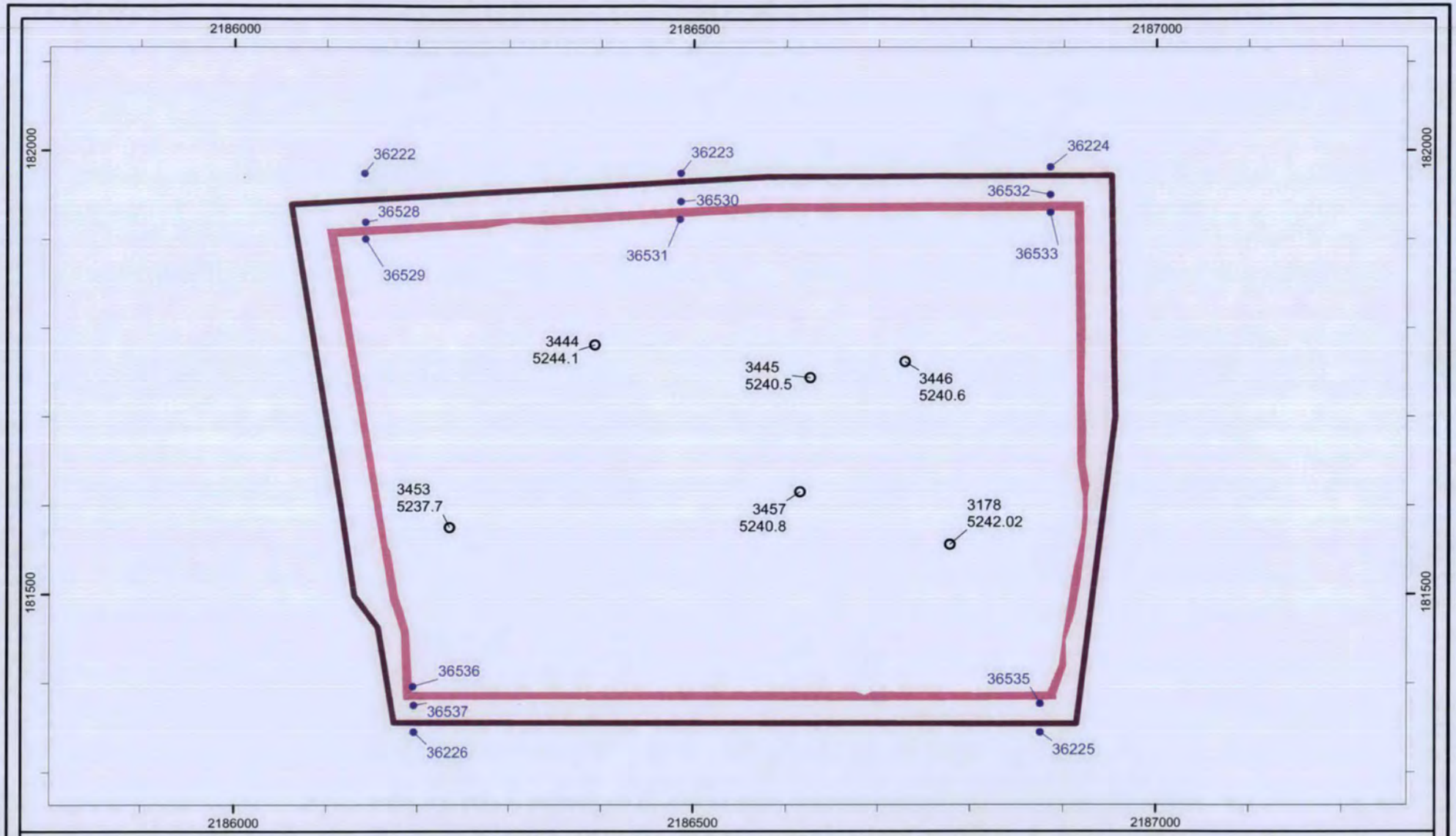
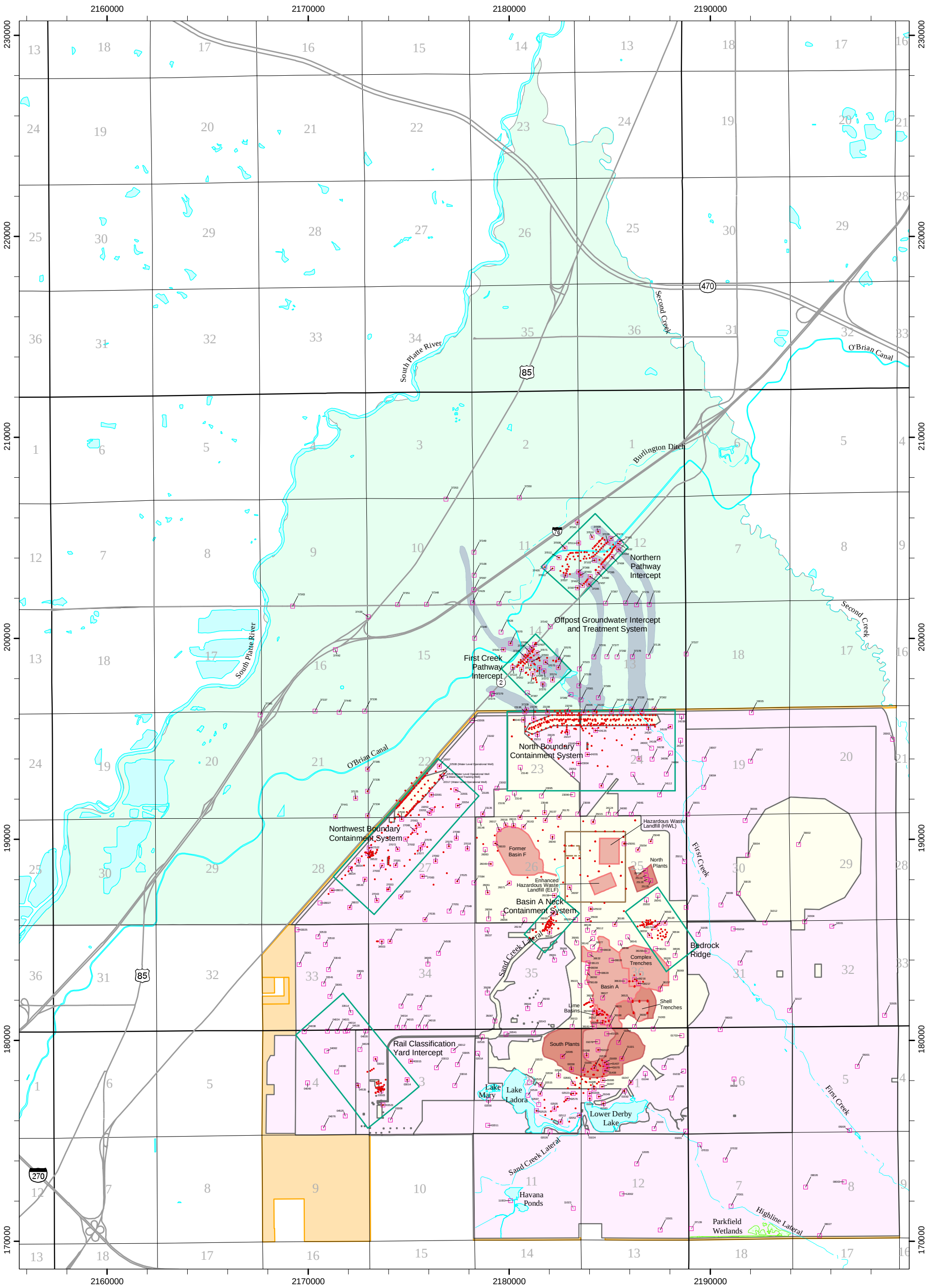


Shell Trenches Well and Borehole Locations

Figure 5.2-1

10/27/2008 DPRA, Inc. M:\projects\sitereview_00_04\mxds\shell_trenches_watelev08.mxd



Water Level Tracking Wells
Figure 6.1-1

Legend

- Water Level Tracking Wells
- Water Level Operational Wells
- Primary Roads
- Wetlands
- Operational Areas
- LWTS Basins
- CAMU Boundary
- Section Lines
- Township & Range Lines
- Intermittent Streams
- Ditches, Canals
- Lakes, Ponds, Rivers
- Off-Post Study Area
- Caps
- Soil Covers
- Western Tier and Other Transfer Areas
- 2007 CSRG Exceedance Areas for Carbon tetrachloride, Chloroform, DCPD, Dieldrin, DIMP, and Tetrachloroethylene
- Rocky Mountain Arsenal
- RMA National Wildlife Refuge

N

0 1,750 3,500 7,000 Feet

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

Sources: U.S. Army BIMS, U.S. Army COE, Washington Group, USGS DLG, USFWS, Foster Wheeler, RVO GIS

Remediation Venture Office GIS

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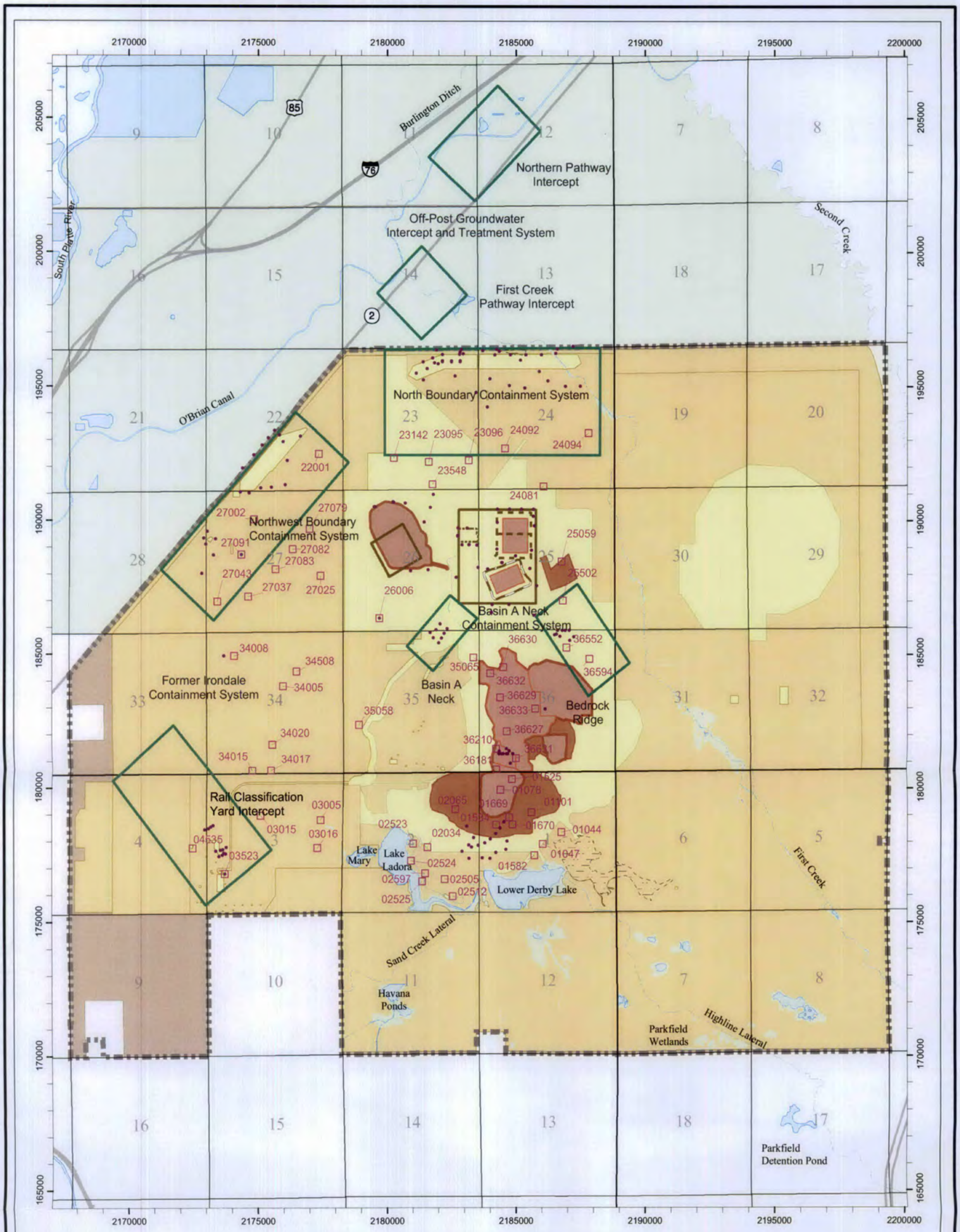

Water Quality Tracking Wells

Figure 6.1-2

Rocky Mountain Arsenal

Confined Flow System Water Quality and Water Level Monitoring Wells

Legend

- Rocky Mountain Arsenal
- RMA National Wildlife Refuge
- Western Tier Parcel (Prairie Gateway)
- Hazardous Waste Landfill, Enhanced Hazardous Waste Landfill, and Landfill Wastewater Treatment System
- Detention Basin Area
- CAMU Boundary
- Historic Basins
- Lakes and Ponds
- Dry Lakes/Ponds
- Wetlands
- Section Lines
- Intermittent Streams
- Ditches, Canals
- Paved Roads
- Unpaved Roads
- Slurry Walls
- Recharge Trenches
- NBCS Performance CFS Wells
- Confined Flow System Wells
- Water Levels Only
- Alternate South Plants CFS Wells
- UFS Paired Wells

Figure 6.1-3

N

0 1,000 2,000 3,000

Feet

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

Sources: U.S. Army BIMS, DPRA, Inc., Washington Group, Tetra Tech EC, Inc.

Remediation Venture Office GIS

10/16/2009 DPRA, Inc.

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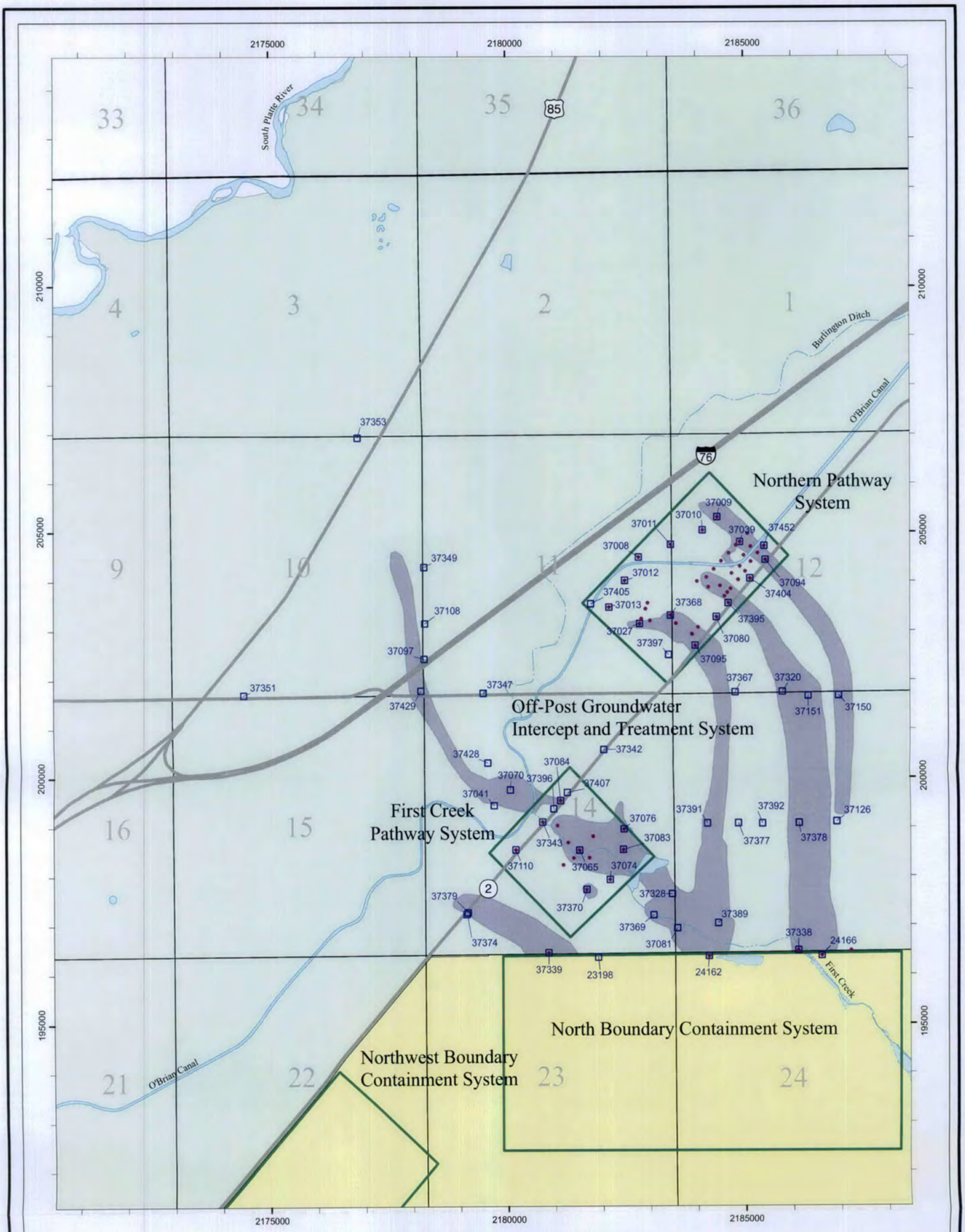


Exceedance Monitoring Wells
Figure 6.2-1

Legend

- Rocky Mountain Arsenal (On-Post Operable Unit)
- Off-Post Study Area
- Operational Areas
- 2007 CSRG Exceedance Areas for Carbon tetrachloride, Chloroform, DCPD, Dieldrin, DIMP, and Tetrachloroethylene
- Lakes, Ponds, Rivers
- Intermittent Streams
- Ditches, Canals
- Primary Roads
- Section Lines
- Township & Range Lines
- CSRG Exceedance Monitoring Wells
- Water Quality Operational Wells

N

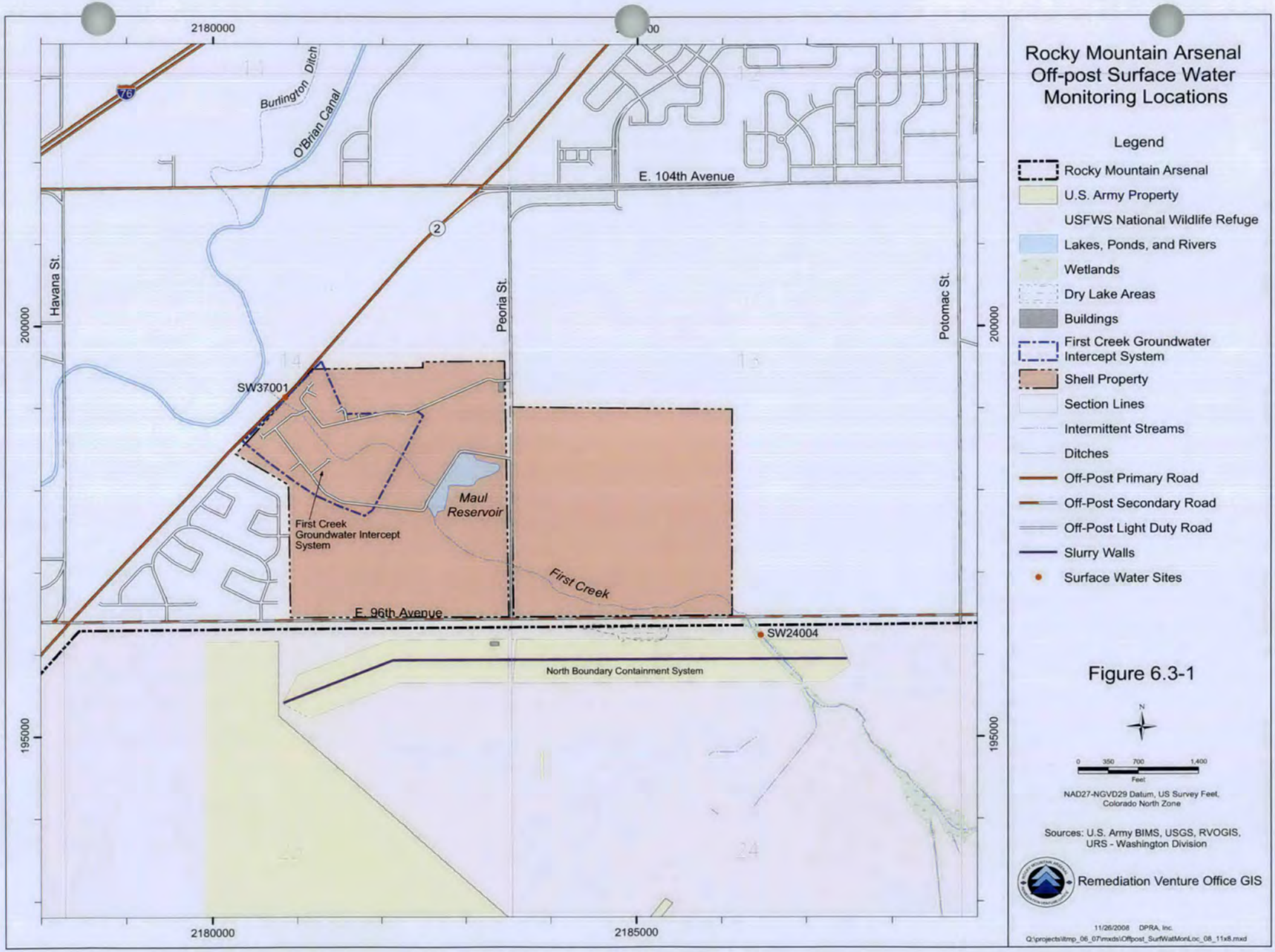
0 500 1,000 2,000 3,000
Feet

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

Sources: U.S. Army BIMS, U.S. Army COE, Washington Group, USGS DLG, USFWS, Tetra Tech-EC, RVO GIS

Remediation Venture Office GIS

10/13/2009 DPRA, Inc. Q:\projects\well_closures\mxds\wy07wnu\op_exceed_wy07wnu08.mxd


2180000
2185000
200000
195000
Burlington Ditch
O'Brian Canal
E. 104th Avenue
Havana St.
Peoria St.
Potomac St.
SW37001
Maul Reservoir
First Creek Groundwater Intercept System
First Creek
E. 96th Avenue
SW24004
North Boundary Containment System
Rocky Mountain Arsenal Off-post Surface Water Monitoring Locations
Legend
Rocky Mountain Arsenal
U.S. Army Property
USFWS National Wildlife Refuge
Lakes, Ponds, and Rivers
Wetlands
Dry Lake Areas
Buildings
First Creek Groundwater Intercept System
Shell Property
Section Lines
Intermittent Streams
Ditches
Off-Post Primary Road
Off-Post Secondary Road
Off-Post Light Duty Road
Slurry Walls
Surface Water Sites
Figure 6.3-1
N
0 350 700 1,400
Feet
NAD27-NGVD29 Datum, US Survey Feet, Colorado North Zone
Sources: U.S. Army BIMS, USGS, RVOGIS, URS - Washington Division
Remediation Venture Office GIS
11/26/2008 DPRA, Inc.
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