Norwalk Tank Farm Update

Presented to the Norwalk Tank Farm Restoration Advisory Board

On behalf of KMEP

August 28, 2014

Presentation Overview

- KMEP Update
  - Remediation Operations Update
  - Biosparge Well Installation
  - Planned Activities
- First Semiannual 2014 Groundwater Monitoring

Remediation Operations Update

- Objectives
  - Contaminant Mass Containment
  - Contaminant Mass Removal
- South-Central and Southeast Areas
  - Soil Vapor Extraction (SVE) System
  - Groundwater Extraction (GWE) System
  - Total Fluids Extraction (TFE) System
    - Free product
    - Groundwater
- West Side Barrier
  - Groundwater Extraction
    - Discontinued August 2008
    - Shut-down based on low concentrations of MTBE and 1,2-DCA
    - Currently monitoring TBA and other constituents

Remediation Systems

- South-Central Area
  - 20 TFE wells (product and groundwater)
  - 24 onsite and 6 off-site SVE wells (most collocated with TFE wells)
- Southeastern Area (24-inch Block Valve Area)
  - 3 TFE wells (GMW-O-15, GMW-O-18, GMW-36)
  - 3 SVE wells (both collocated with TFE wells)
  - 2 GWE Wells (GMW-SF-9, GMW-SF-10)
- Treatment and Discharge
  - SVE Vapors
    - Treatment – Thermal catalytic oxidizer (catox)
    - Discharge – Atmosphere under SCAQMD Permit
  - TFE Liquids
    - Oil/Water Separator – Free product recycled offsite
    - Groundwater Treatment – Liquid-phase GAC, Fluidized Bed Bioreactors (FBBRs) for fuel oxygenates (MTBE, TBA, etc.)
    - Groundwater Discharge – Coyote Creek under NPDES permit

Remediation Systems

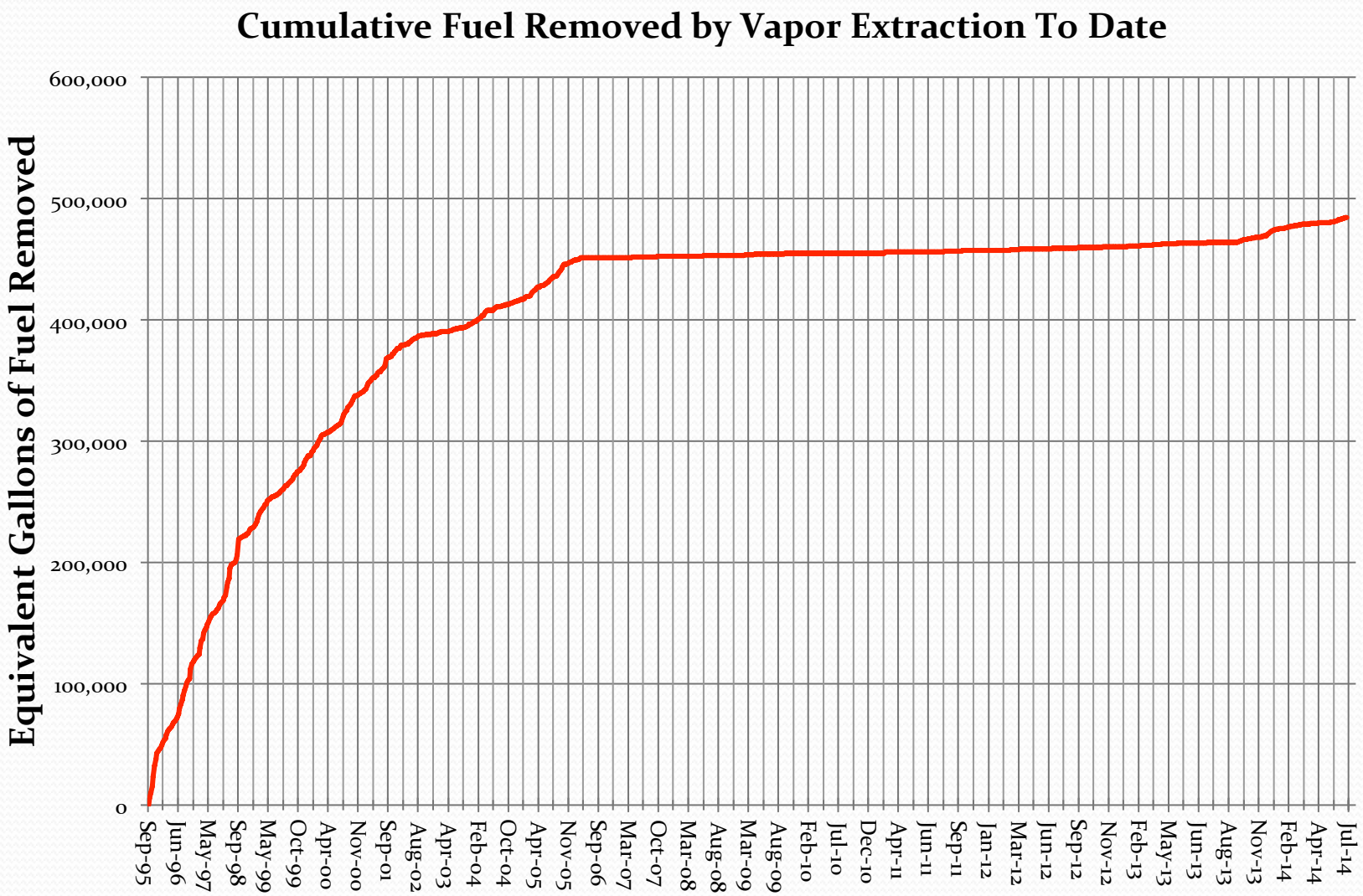
- Operations & Maintenance Activities
  - Weekly inspection and maintenance of SVE, TFE, and TBA treatment systems
  - Weekly data collection
    - Vapor flow rate, vacuum, groundwater extraction rates, hours of operations, and other system parameters
  - Monthly pump inspections
  - Measurement of individual well vapor concentrations
  - Collection and analysis of system influent and effluent vapor and groundwater samples
  - Vacuum recovery or hand bailing product from select remediation wells

SVE System Operations Summary

- Equivalent Fuel Treated
  - Based on weekly monitoring of influent vapor concentration, vapor extraction flow rate, and hours of operation.
  - Pounds / 6.6 lbs/gal = gallons

- 1st Quarter 2014– 5,120 gallons (33,792 pounds)
- 2nd Quarter 2014– 4,826 gallons (31,849 pounds)
- Since Second Addendum – 46,253 gallons (305,268 pounds)
- Since 1995 – Approx. 485,000 gallons (3.2 million pounds)

SVE System Operations Summary



TFE/GWE System Operations Summary

- Groundwater Extracted
  - 1st Quarter 2014
    - South-Central and Southeast Areas –1,689,316 gallons
    - West Side Barrier – none (shutdown in third quarter 2008)
  - 2nd Quarter 2014
    - South-Central and Southeast Areas 1,316,215 gallons
    - West Side Barrier – none (shutdown in third quarter 2008)
  - Since 1995
    - South-Central and Southeast Areas– 64 million gallons
    - West Side Barrier – 26.9 million gallons

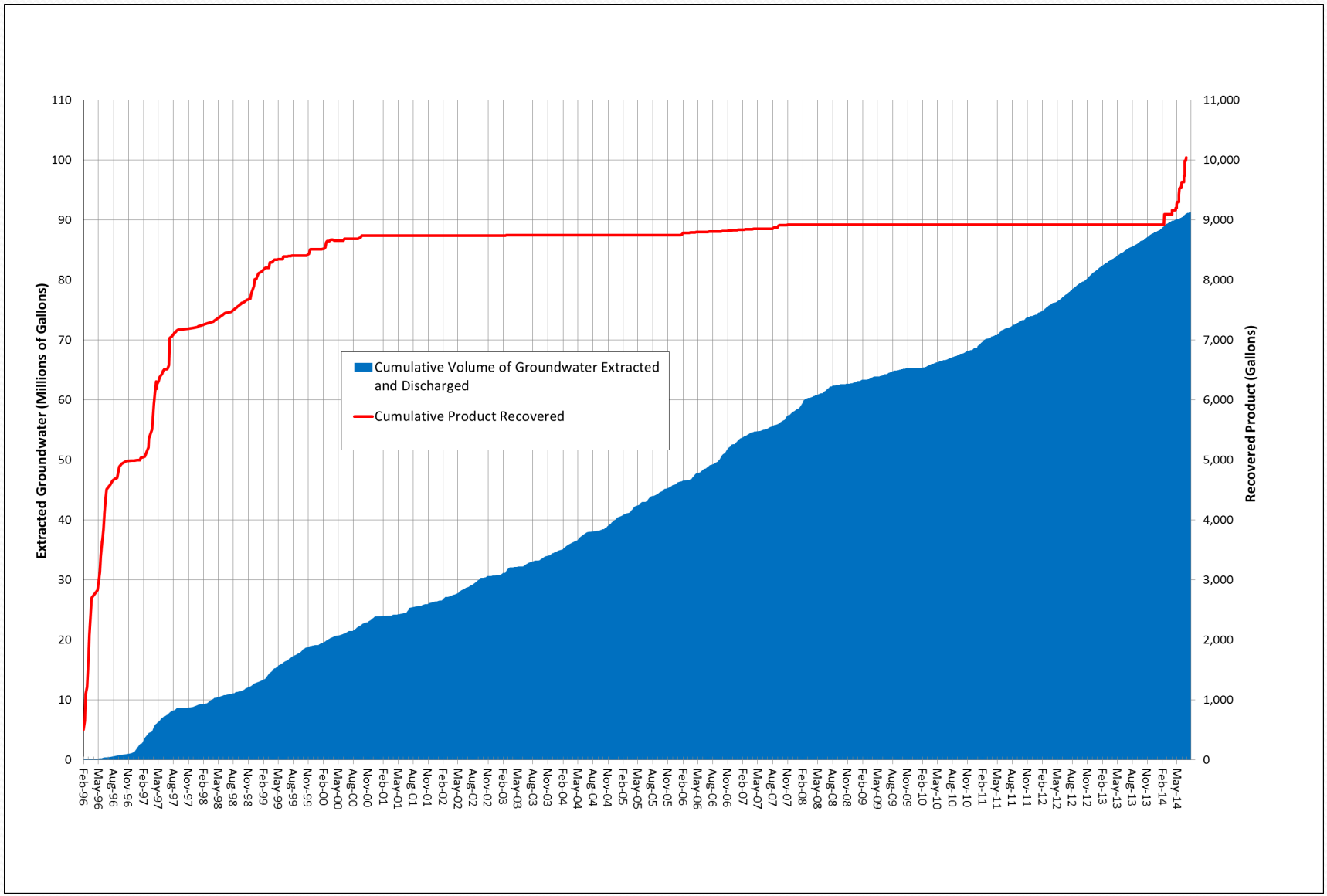
TFE/GWE System Operations Summary

- Mass of TPH removed in Groundwater Extracted
  - 1st Quarter 2014– 162 gallons (969 pounds)
  - 2nd Quarter 2014– 166 gallons (1,093 pounds)
  - Since implementing Second Addendum
    - 667 gallons (4,402 pounds)

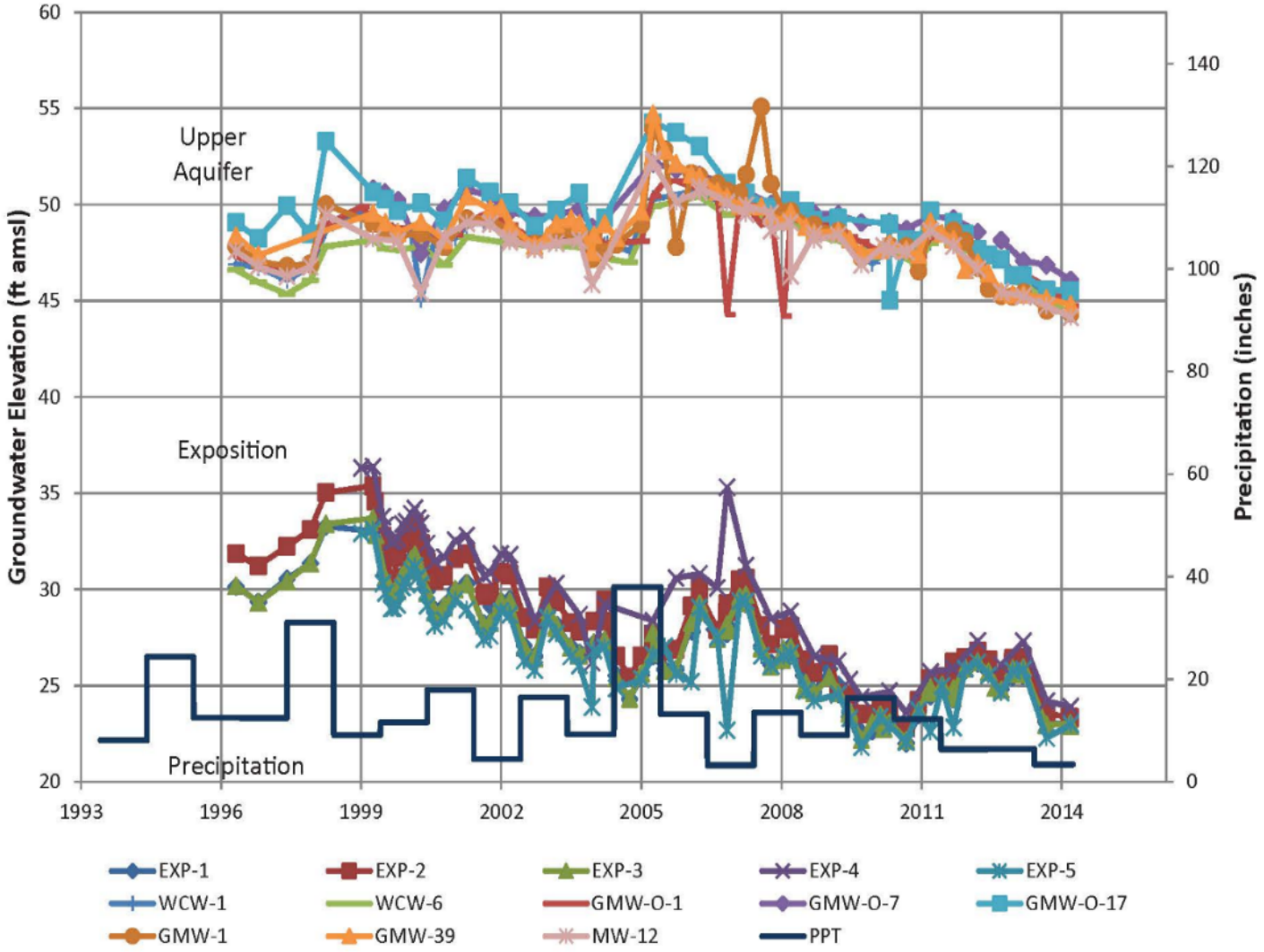
TFE System Operations Summary

- Free Product Extracted
  - 1st Quarter 2014
    - Approximately 176 gallons of free product observed to accumulate in the product holding tank
  - 2nd Quarter 2014
    - Approximately 339 gallons of free product observed to accumulate in the product holding tank
    - Recovered 448 gallons of free product using vacuum recovery
    - Recovered 105 gallons of free product using hand bailing
  - Since 1995 – 9,988 gallons

TFE System Operations Summary



Historical Groundwater Elevations



Confirmation of Pipeline Integrity

- Because of the apparent increase in product thickness beneath the south-central area, SFPP implemented the following activities to confirm that a new fuel release had not occurred:
  - Excavation near block valves: **No staining or strong odors were encountered during pothole activities**.
  - Pressure testing of active pipelines: **All pipelines passed the pressure tests (i.e., no pressure drop) and were put back online.**
  - Forensics analysis of product samples: **Results indicate that the gasoline component of the samples was significantly "weathered" or aged and not indicative of a new release.**
- To take advantage of the historically low water levels and recent increases in product thicknesses, SFPP implemented routine product recovery using a vacuum truck and hand bailing every 1 to 2 weeks.

Remediation System Operations Summary

- SVE System
  - 1st Quarter 2014
    - Operated 94% of time
  - 2nd Quarter 2014
    - Operated 74% of time
    - Operated 93% of time (excluding planned shutdowns)
- TFE/GWE System
  - 1st Quarter 2014
    - Operated 89% of time
  - 2nd Quarter 2014
    - Operated 88% of time
    - Operated 97% of time (excluding planned shutdowns)

Remediation System Downtime

- SVE System
  - Groundwater monitoring
  - Routine maintenance activities
    - Drain water condensate from manifold
- TFE/GWE System
  - Groundwater monitoring
  - Carbon change outs
  - High level alarms for transfer tank
    - Changed bag filters, cleaned bag filter housing, backwash LGAC vessels
  - Cleaning of OWS, EQ tank, sump and transfer tank
  - Replacement of FBBR bag filter housings

Preventative Maintenance

- Check pump operation – monthly
- Pump inspection/cleaning/maintenance – ongoing
- Bag filter replacements – twice per week minimum
- Inspection and minor repairs of SVE wells
- Backwashing of lead and polishing LGAC vessels
- Pre-catalyst back pressure monitoring – Weekly
  - Monitor for particulate buildup on catalyst cells
- Sampling between LGAC vessels – Monthly
  - Monitor for breakthrough between carbon vessels; concentrations alert technicians when a change out is required
  - Carbon change outs in lead or polishing LGAC vessels

Preventative Maintenance

- System-specific preventative maintenance schedule for each of the other components of the remediation system
  - South-central System
  - Southeastern System
- Example system-specific preventative maintenance activities
  - Check/inspect valves, blowers, chemical pumps, level switches, hoses, and catox flame arrestor
  - Clean filters (various types), flow sensors, valves, transfer pumps, and catox catalyst
  - Change oil and air filters in various equipment
  - Check/replace belts and hoses on various equipment
  - Maintain pneumatic pumps
  - Clean oil/water separator, sump, and equalization tank
  - Drain and/or pressure wash holding tanks

Remediation System Status

- SVE System
  - Currently down due to leaky heat exchanger
  - Will remain down until repairs are made and AQMD permit modification is complete
- TFE system
  - Currently down to stay in compliance during AQMD permit modification process
- Product Recovery
  - KMEP contractor to continue hand bailing free product from extraction wells on weekly basis

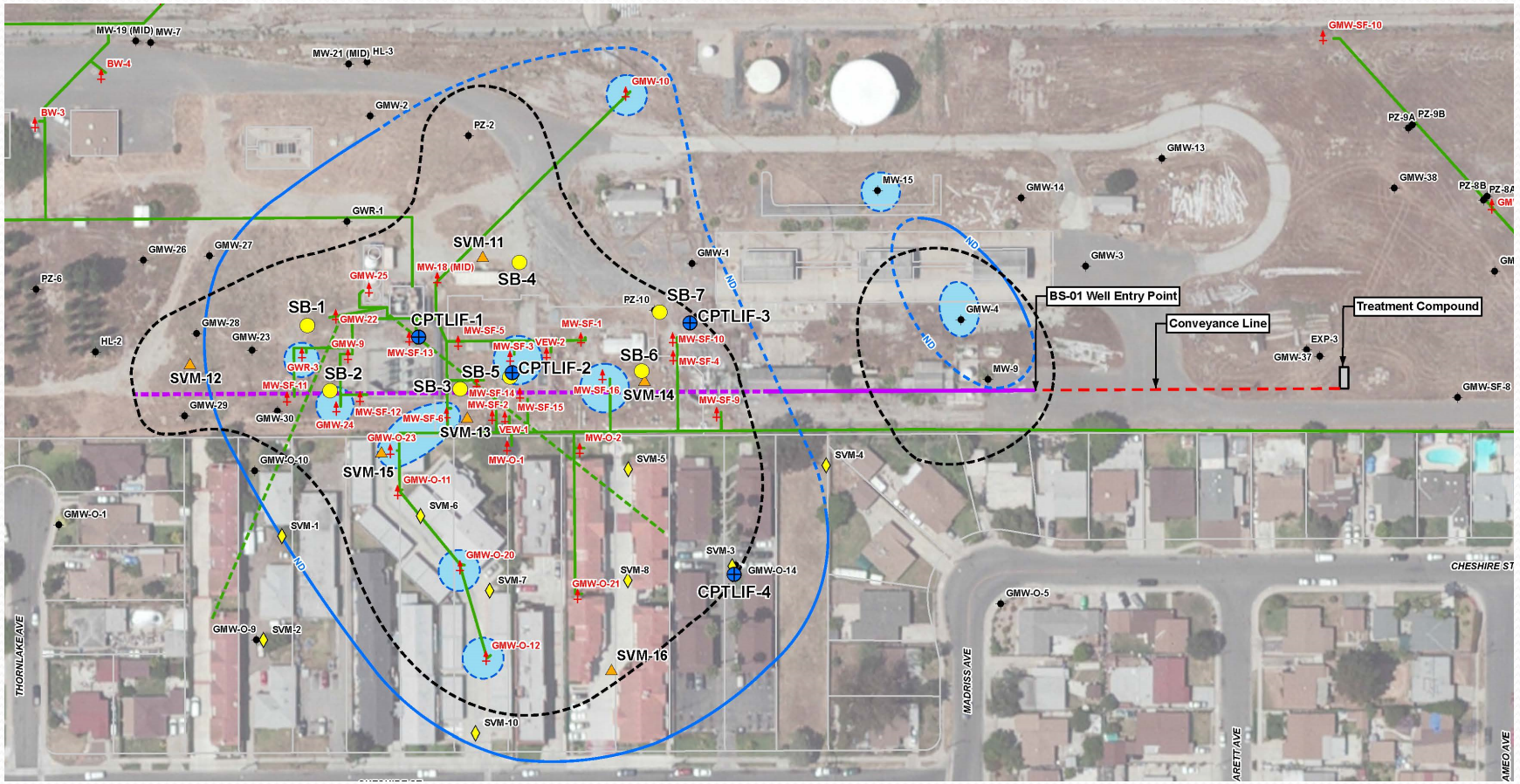
Alternate Interim Remedy Status

- Conceptual Site Model and Proposed Alternate Interim Remedy – September 3, 2013
- Biosparging with SVE
  - Horizontal Well Approach
    - Optimal contact with smear zone
    - Reduces number of wells
    - Minimizes offsite access constraints
    - Minimizes conflicts with future redevelopment
  - SVE used to mitigate potential offgassing
  - Continue TFE for hydraulic containment until plume is stable
- Natural Source Zone Depletion
  - Monitoring and testing conducted in parallel to demonstrate enhanced mass removal and natural attenuation

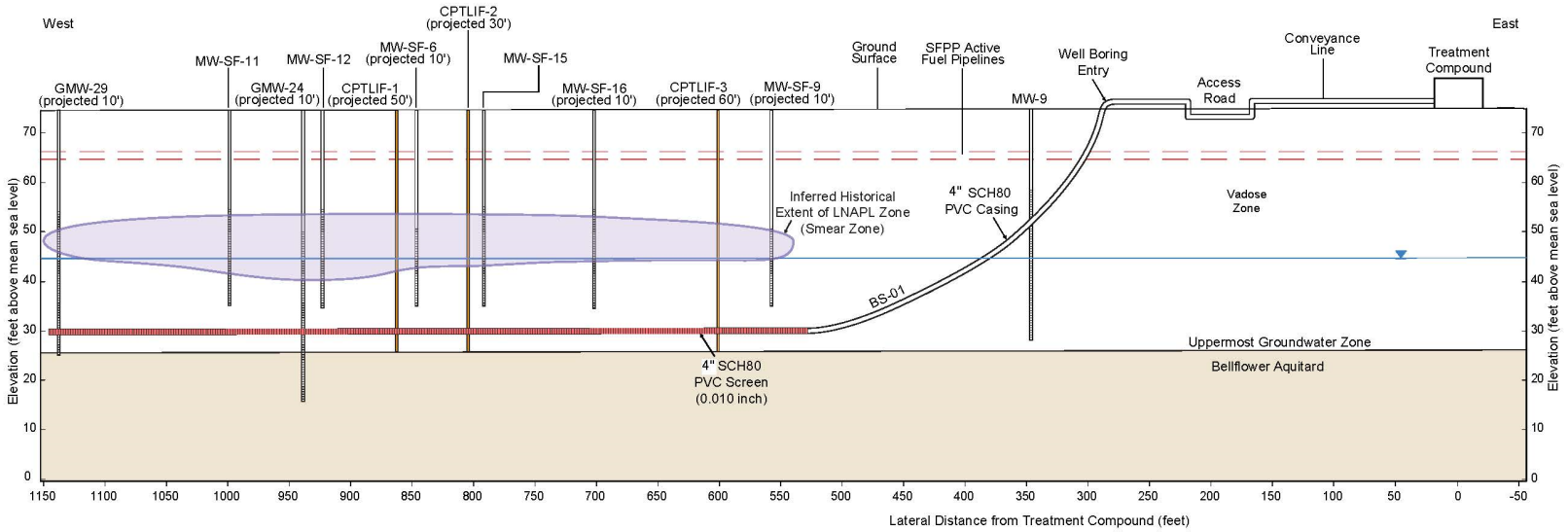
Pilot Biosparge System

- Construction and Pilot Test Work Plan
  - Work Plan – November 18, 2013
  - Response to Comments – February 14, 2014
  - Approved by RWQCB – February 26, 2014
- Implementation
  - Pilot well construction – Currently in field
  - Soil vapor monitoring points – Planned 3Q14
  - Pilot testing for 1 year – Planned start 4Q14
    - Monitor for VOCs, CO_2, O_2, methane, electron acceptor chemistry

Biosparge Well Layout



Conceptual Design



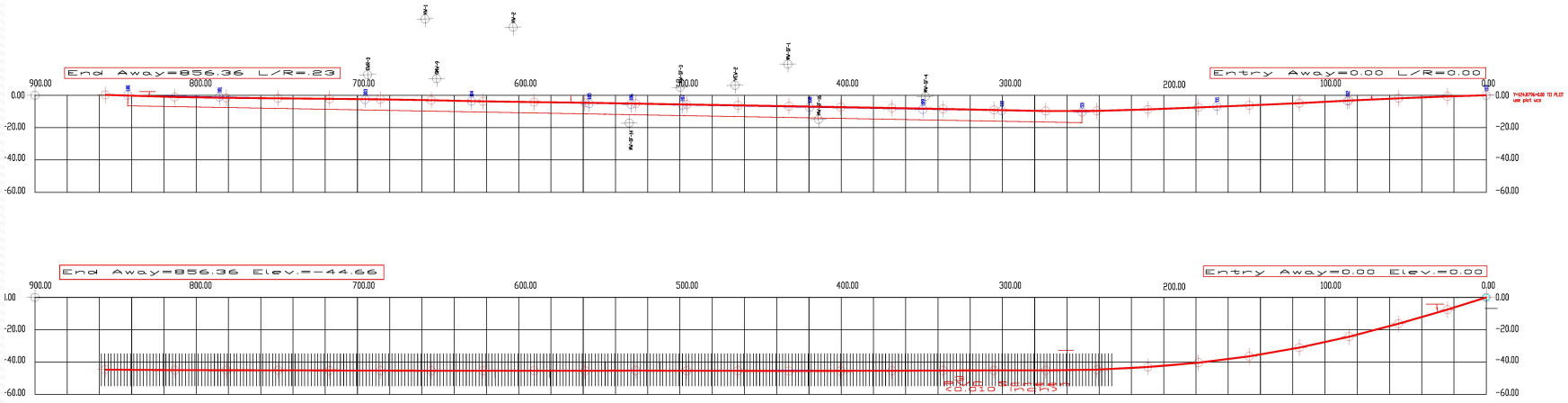
- Well Casing and Screen
  - SCH 80 PVC 4-inch diameter well; 12-inch borehole diameter
  - Open slot design (no sand pack required); max slot width of 0.010 inches
  - Screen depth of 45 feet bgs
  - 260 feet of casing; 600 feet of screen

Drill Rig and Support Equipment

Mud System

Drilling

Borehole Navigation using Gyroscopic Steering Tool



Casing and Screen Installation

Well Development

Planned Remediation Activities

- Continue weekly product recovery by hand bailing select wells in south-central and southeastern areas
- Install 5 triple nested soil vapor monitoring probes in south-central area – September 2014
- Conduct baseline pilot test soil vapor monitoring in south-central and southeastern areas – October 2014
- Initiate pilot testing of biosparge well – December 2014

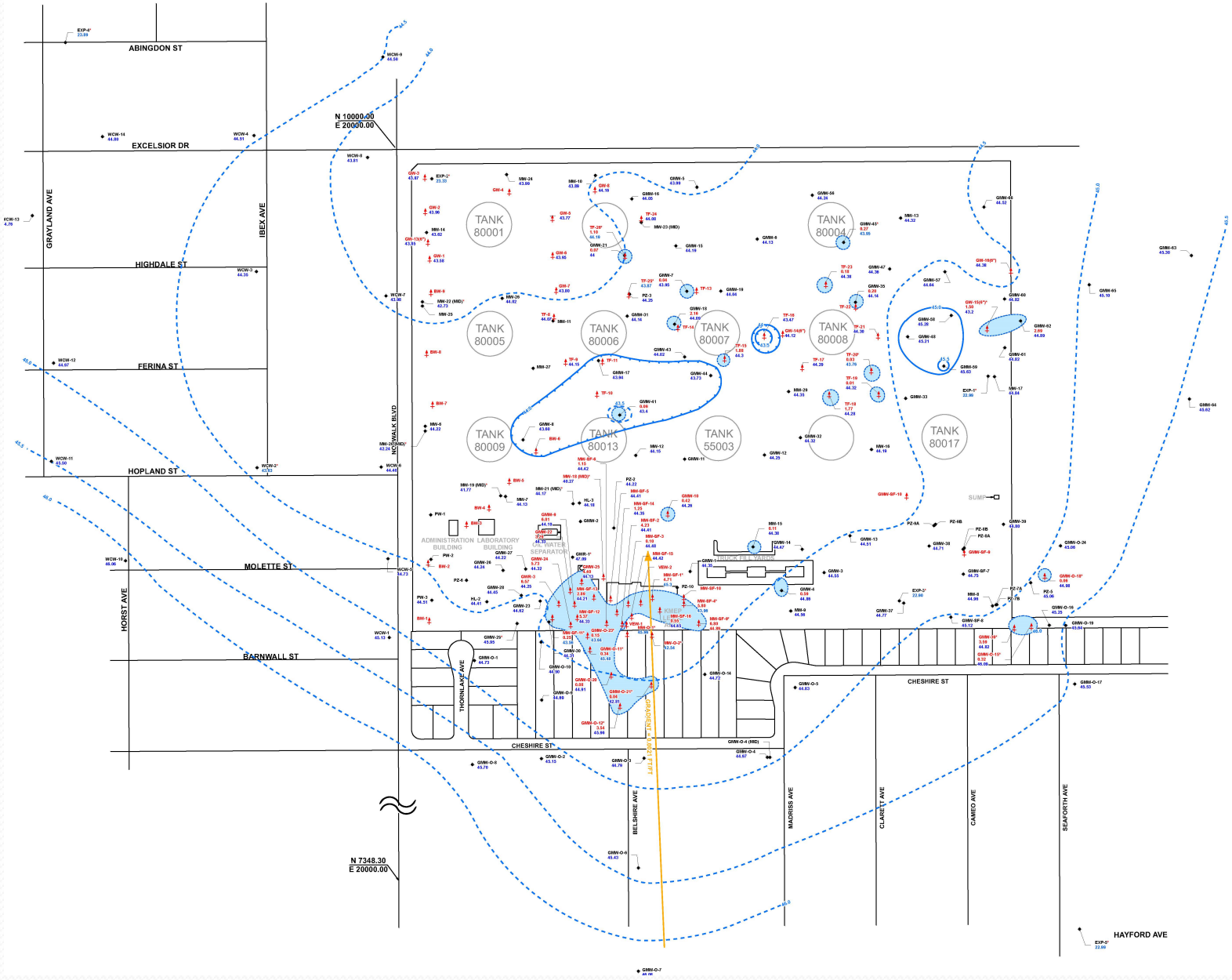
First Semiannual 2014 Groundwater Monitoring Report

- Site-wide monitoring in April 2014 – both KMEP and DLA Energy
- Well Gauging by Blaine Tech and Parsons
  - 226 wells gauged in 167 wells
- Well Sampling by Blaine Tech
  - Low-flow sampling methods
  - 98 wells sampled
  - SFPP and DLA remediation systems remained offline during gauging activities

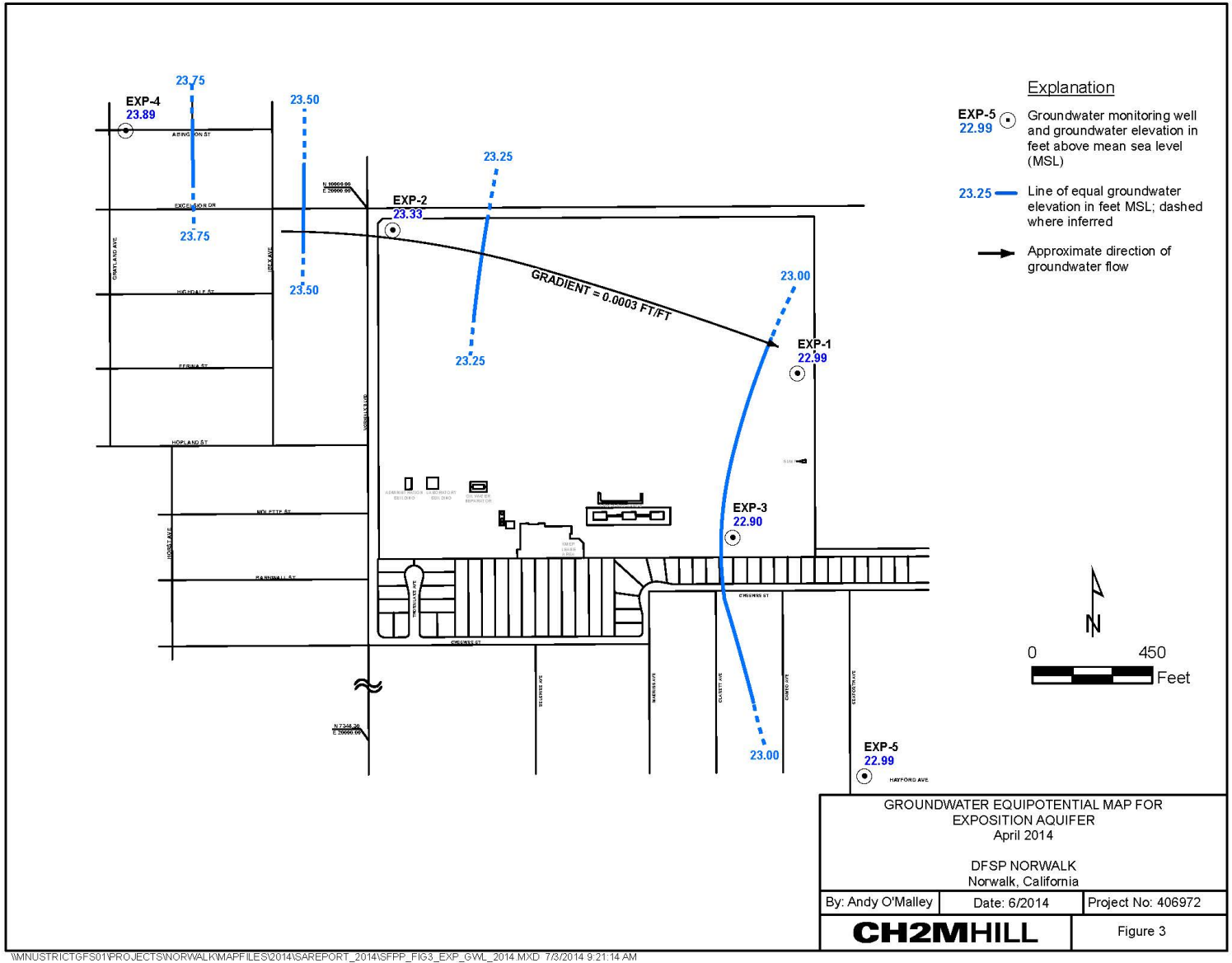
First Semiannual 2014 Groundwater Monitoring Report

- Uppermost Aquifer Groundwater Elevations and Flow
  - Groundwater elevations approximately 1 foot lower than those reported for April 2013
  - Groundwater elevations near historical lows since monitoring first began in 1990s
  - Horizontal hydraulic gradient of 0.0021 ft/ft toward the north
- Exposition Aquifer Groundwater Elevations and Flow
  - Groundwater elevations were approximately 3 feet lower than those reported for April 2013
  - Horizontal groundwater gradient was approximately 0.0003 ft/ft toward the east-southeast, substantially different than the uppermost groundwater zone

Groundwater Elevations - Water Table



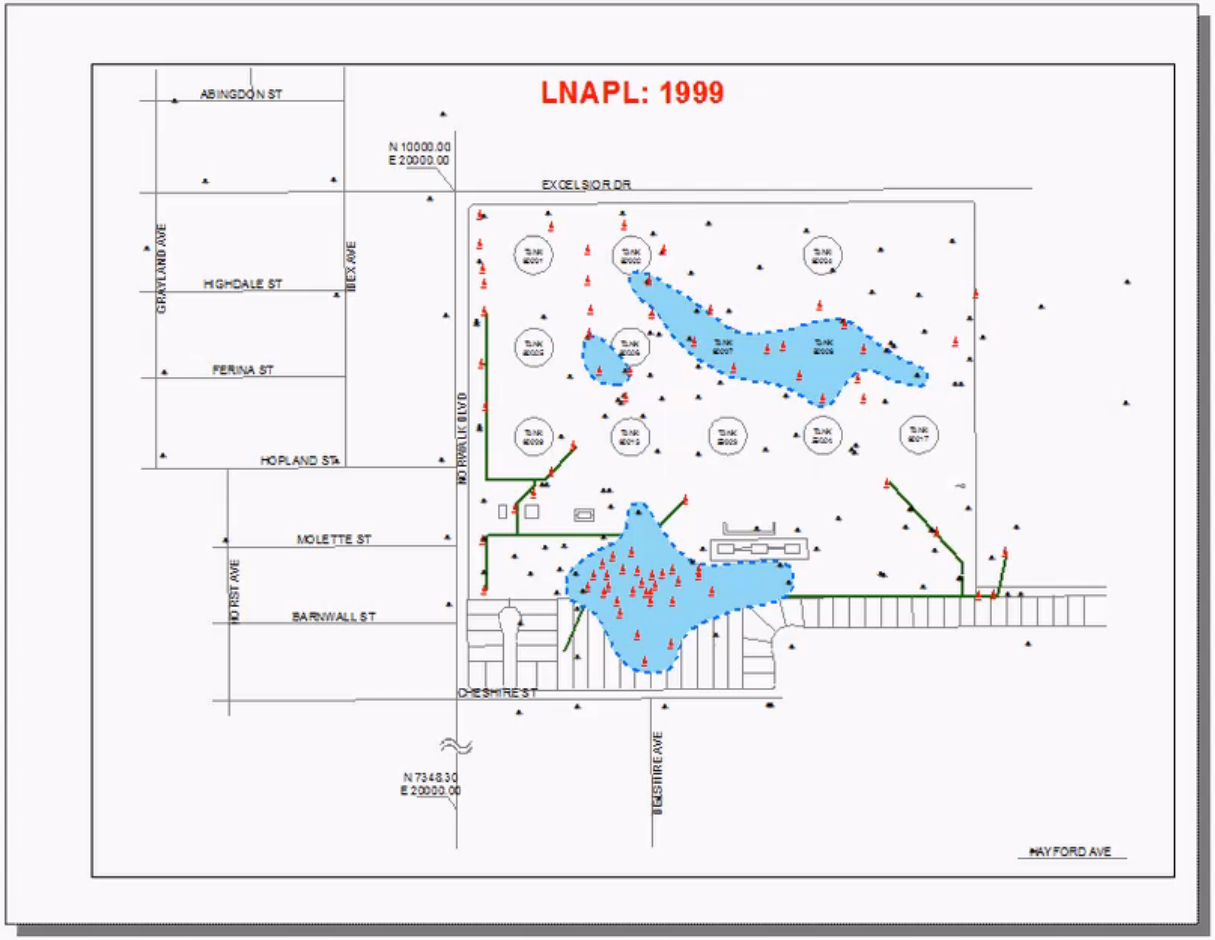
Groundwater Elevations - Exposition



First Semiannual 2014 Groundwater Monitoring Report

- Free product measured in in 47 of the 167 wells that were gauged.
  - North-central area: GMW-7, GMW-18, GMW-21, GMW-35, GMW-41, GMW-45, TF-15, TF-18, TF-19, TF-20, TF-23, and TF-26
  - Eastern area: GW-15 and GMW-62
  - Truck rack area: GMW-4 and MW-15
  - South-central area: GMW-9, GMW-10, GMW-22, GMW-24, GMW-25, GMW-O-11, GMW-O-12, GMW-O-20, GMW-O-21, GMW-O-23, GWR-3, MW-SF-1, MW-SF-2, MW-SF-3, MW-SF-4, MW-SF-6, MW-SF-9, MW-SF-11, MW-SF-12, MW-SF-13, MW-SF-14, and MW-SF-16
  - Southeastern area: GMW-36, GMW-O-15, and GMW-O-18
- Thicknesses ranged from 0.01 foot to 6.80 feet
- Measurable free product observed in these areas was greater than past events, due to a continued decline in water levels across the site.

LNAPL Extent – 1998 to 2014



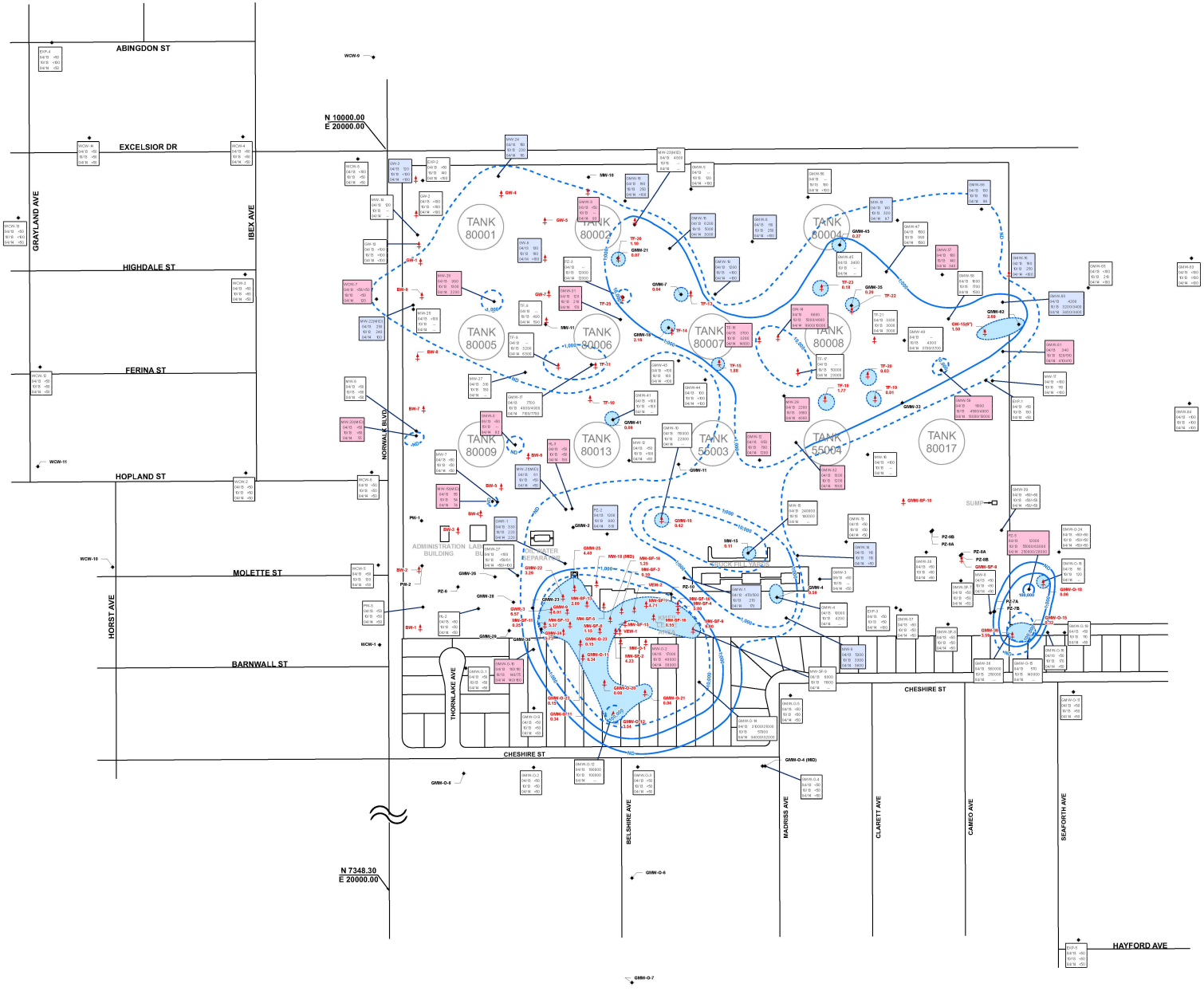
First Semiannual 2014 Groundwater Monitoring Report

- Exposition Aquifer wells sampled:
  - EXP-1, -2, and -3 sampled twice by DLA Energy and SFPP
  - EXP-4 sampled once by SFPP
  - EXP-5 sampled twice by SFPP
- All analytical results were Non Detect (ND), except for the following:
  - TBA was detected at EXP-2 in the DLA Energy split sample at a concentration of 8.5 J ug/L near the laboratory reporting limit
- These types of low-level detections occasionally occur in the EXP wells. SFPP and DLA Energy will continue to monitor the EXP wells and closely watch for any future potential detections.

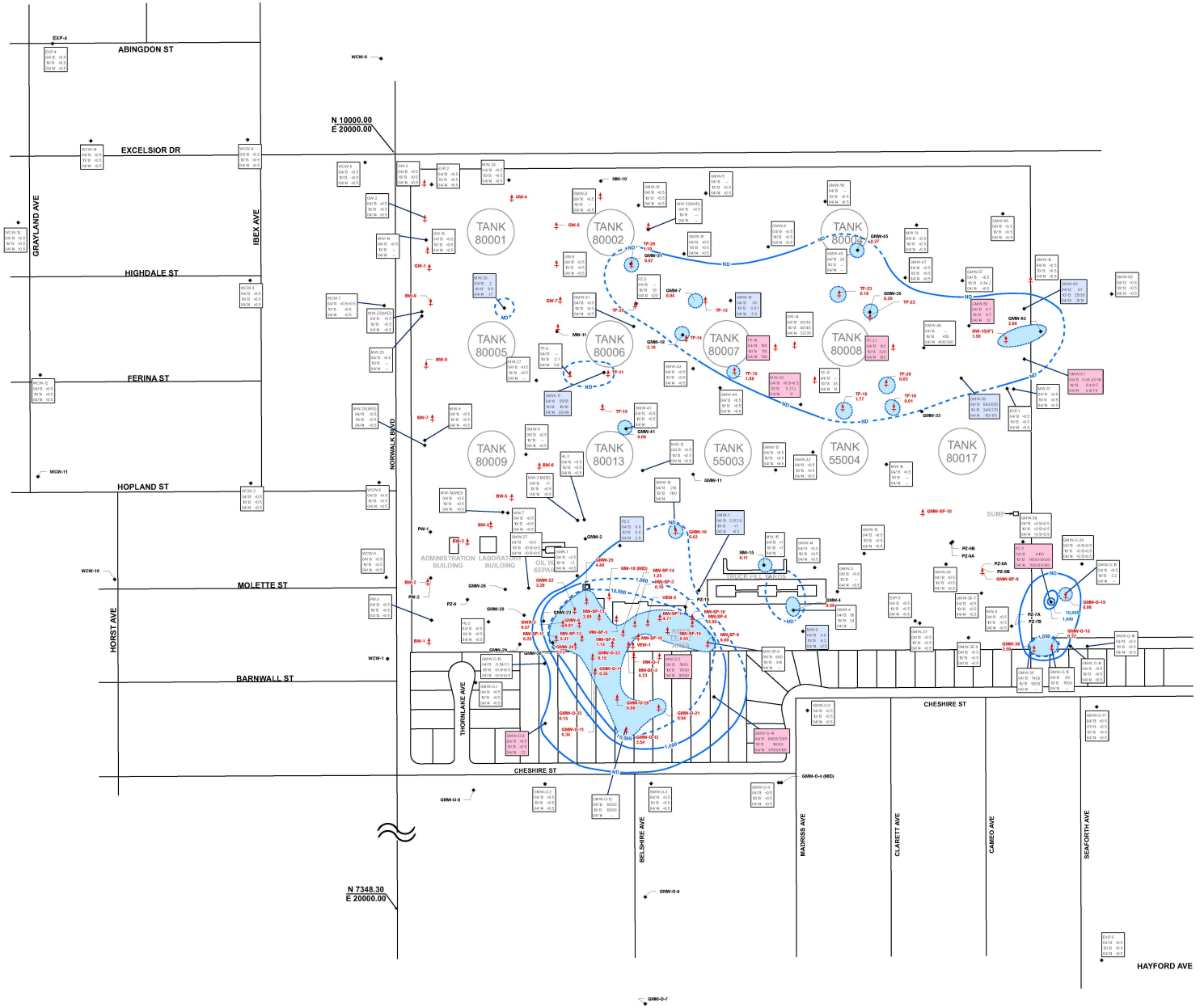
First Semiannual 2014 Groundwater Monitoring Report

- Uppermost Aquifer Wells
  - In most areas, the lateral extents of TPH, benzene, 1-2-DCA, MTBE, and TBA in groundwater remain similar to those interpreted during previous monitoring events
- Concentrations influenced by water level fluctuations
- Free product accumulation in several remediation and monitoring wells increased since previous semiannual events, due to continued declining and historically low water level elevations across the site.

Total Petroleum Hydrocarbons



Benzene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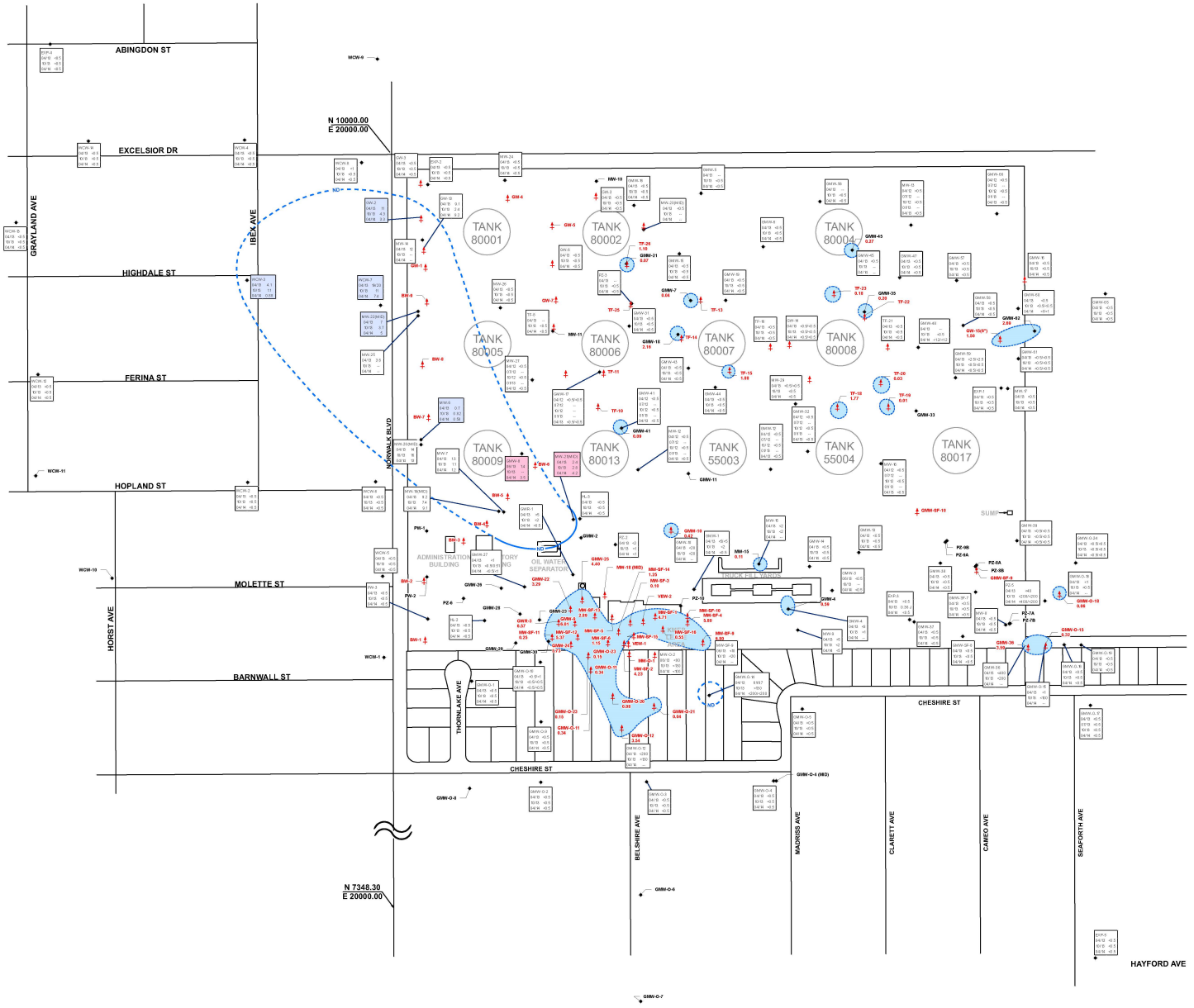
1,2-DCA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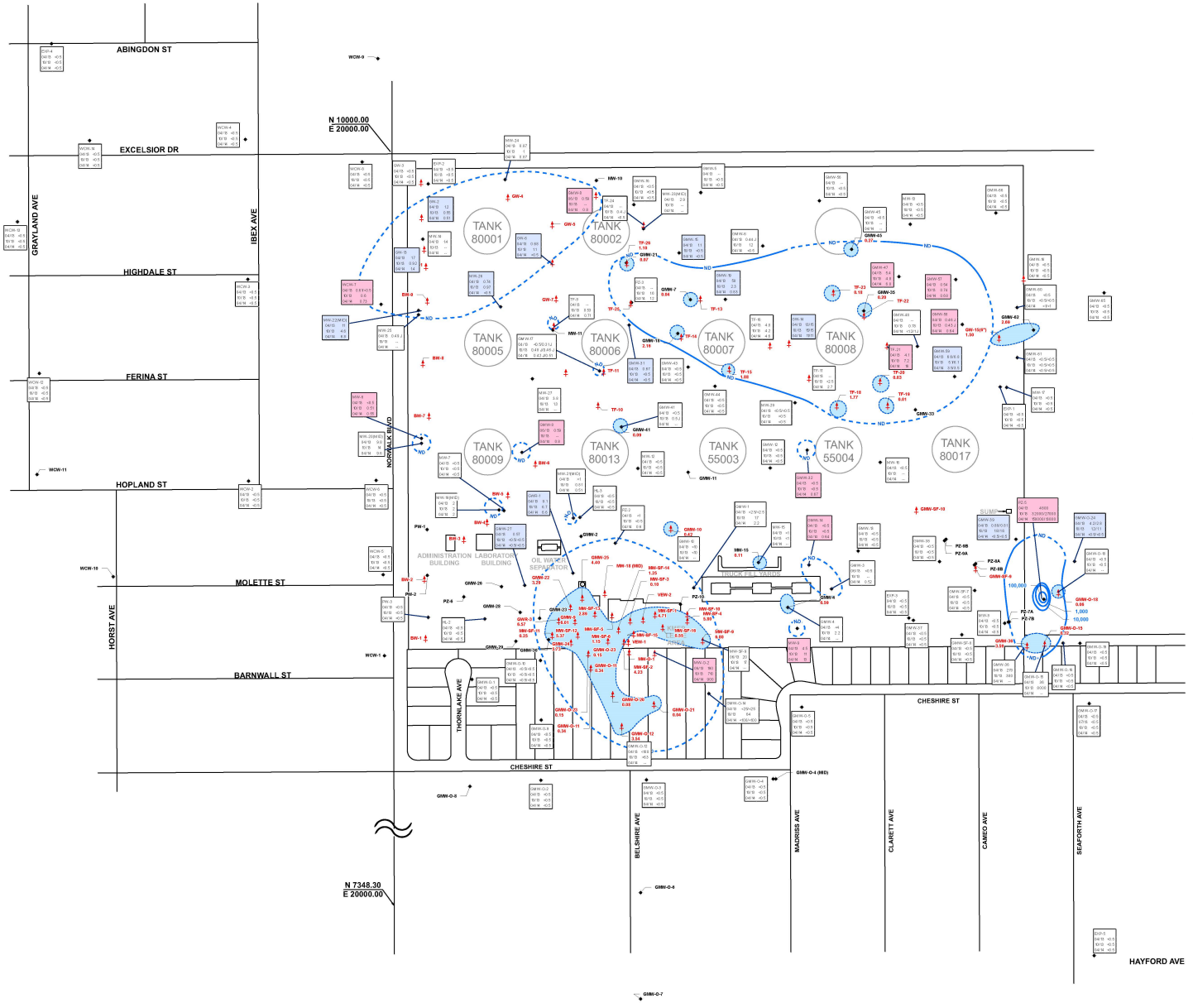
MTBE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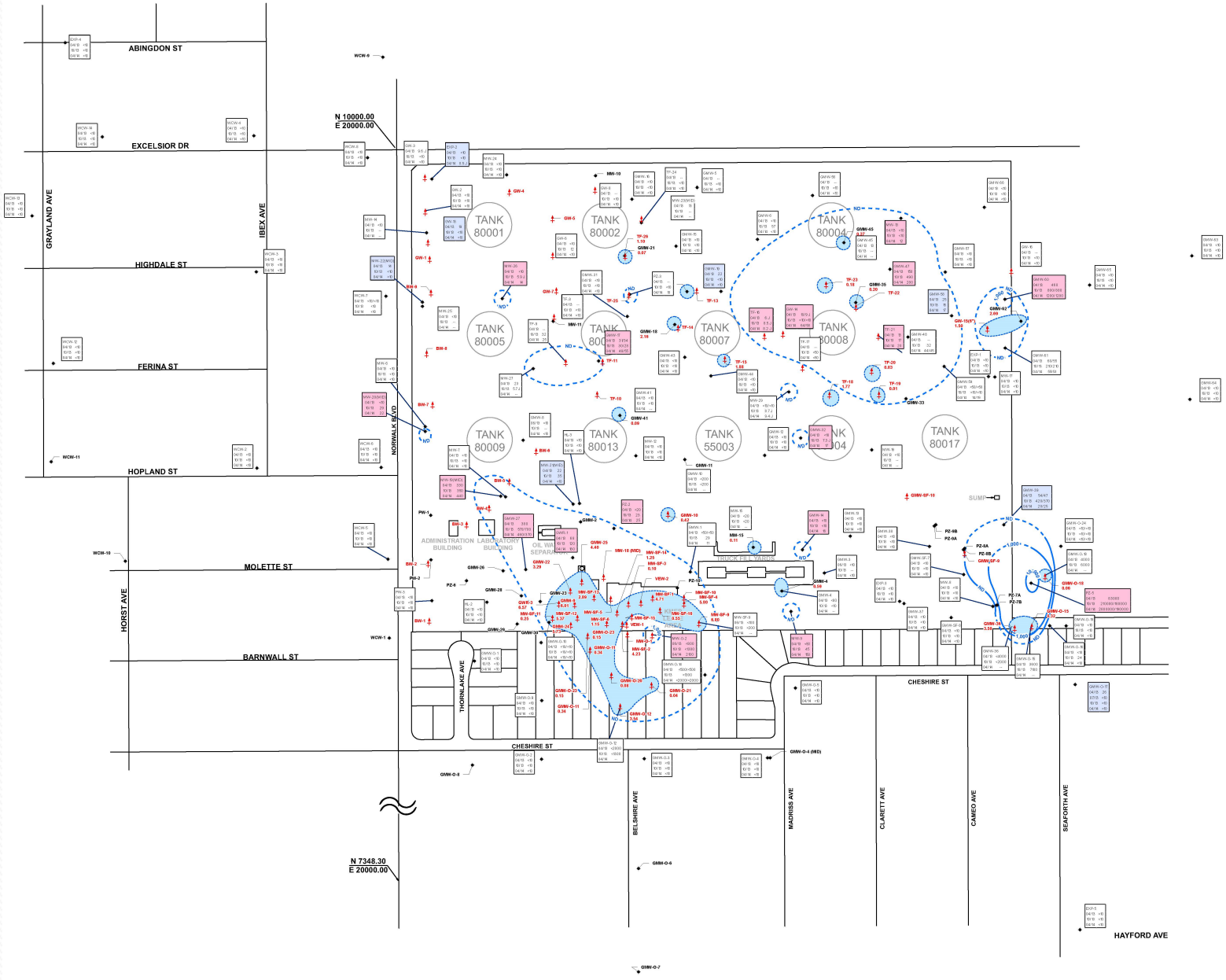
TBA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Questions?