Norwalk Tank Farm Update

Presented to the Norwalk Tank Farm Restoration Advisory Board

On behalf of KMEP

August 27, 2015

Presentation Overview

- KMEP Update
  - Remediation Operations Update
  - Planned Activities
- First Semiannual 2015 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)
  - 1 horizontal biosparge well
- Southeastern Area (24-inch Block Valve Area)
  - 3 TFE wells (GMW-O-15, GMW-O-18, GMW-36)
  - 3 SVE wells (collocated with TFE wells)
  - 2 GWE Wells (GMW-SF-9, GMW-SF-10)
- Treatment and Discharge
  - SVE Vapors
    - Treatment – Thermal oxidizer
    - 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

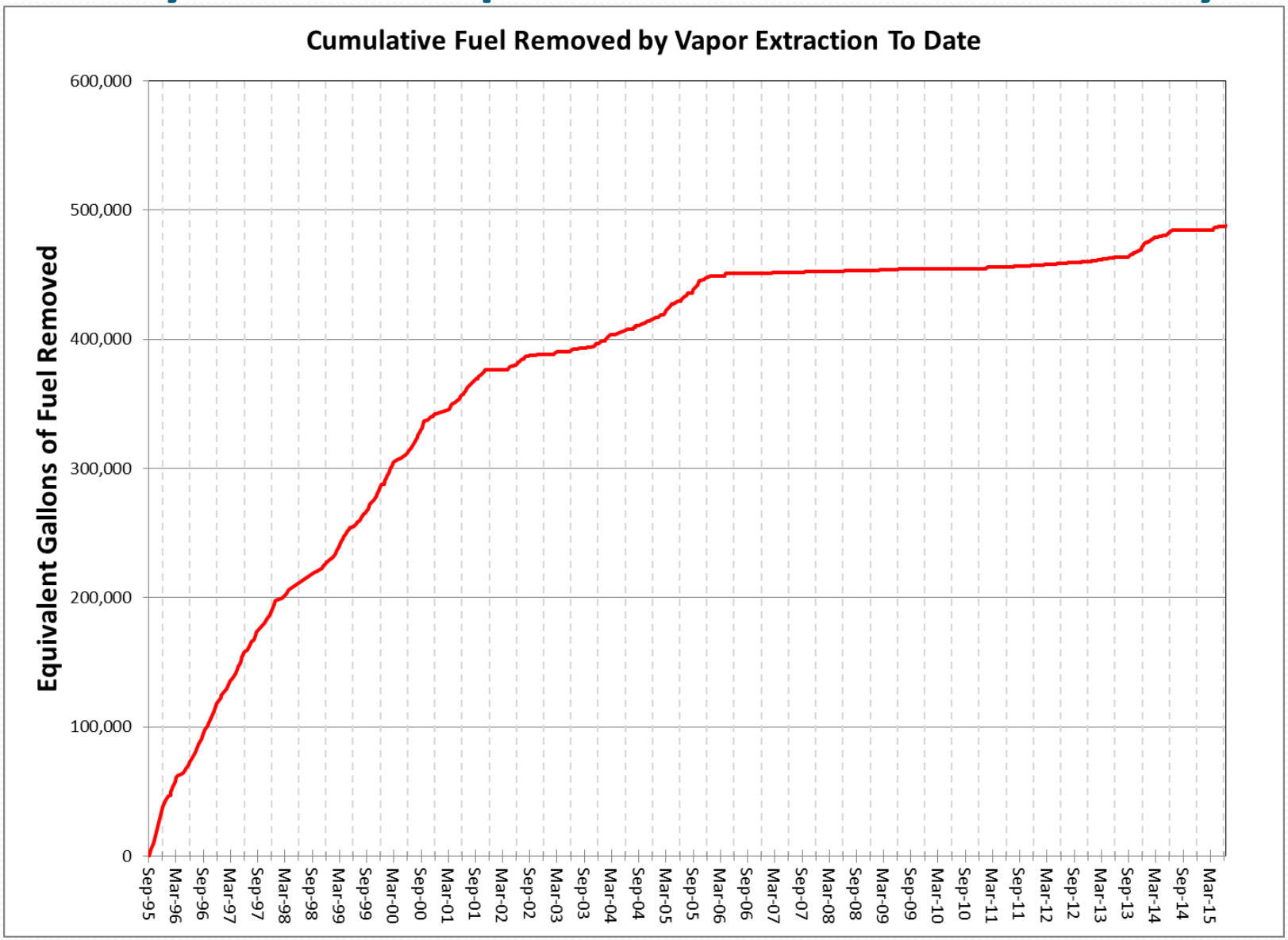
- Operations & Maintenance Activities
  - Weekly inspection and maintenance of SVE, TFE, and TBA treatment systems
  - Weekly data collection
    - Vapor flow rate, vacuum, groundwater extraction rates, hours of operations, and other system parameters
  - Monthly pump inspections
  - Measurement of individual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

SVE System Operations Summary

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

- 1st Quarter 2015– 651 gallons (4,299 pounds)
  - Shut down in January and February due to SCAQMD permit modifications
- 2nd Quarter 2015– 3,265 gallons (21,547 pounds)
- Since 1995 – Approx. 488,000 gallons (3.2 million pounds)

SVE System Operations Summary



TFE/GWE System Operations Summary

- Groundwater Extracted
  - 1st Quarter 2015
    - South-Central and Southeast Areas –936,119 gallons
    - West Side Barrier – none (shutdown in third quarter 2008)
  - 2nd Quarter 2015
    - South-Central and Southeast Areas – 1,001,354 gallons
    - West Side Barrier – none (shutdown in third quarter 2008)
  - Since 1995
    - South-Central and Southeast Areas– 67.4 million gallons
    - West Side Barrier – 26.9 million gallons

TFE/GWE System Operations Summary

- Equivalent Fuel Treated – TFE/GWE
  - Based on monthly monitoring of influent TPH concentration and volume of extracted groundwater.
  - Pounds / 6.6 lbs/gal = gallons

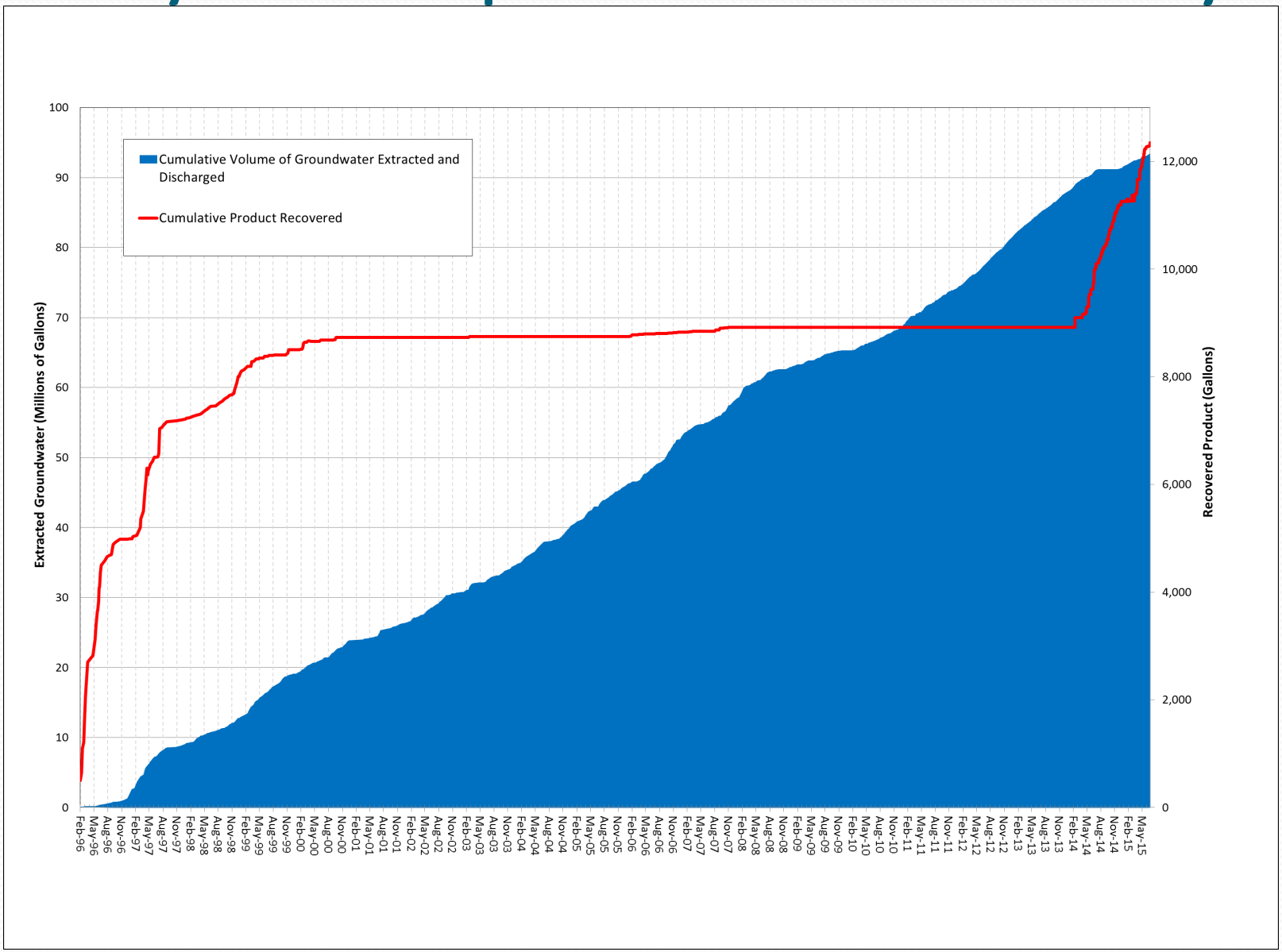
- 1st Quarter 2015– 200 gallons (1,321 pounds)
  - Shut down in January and February due to SCAQMD permit modifications

- 2nd Quarter 2015– 262 gallons (1,731 pounds)
  - Higher mass removal during 2015 a result of increased TPH concentration in groundwater influent; higher TPH concentration a result of free product emulsified in groundwater influent

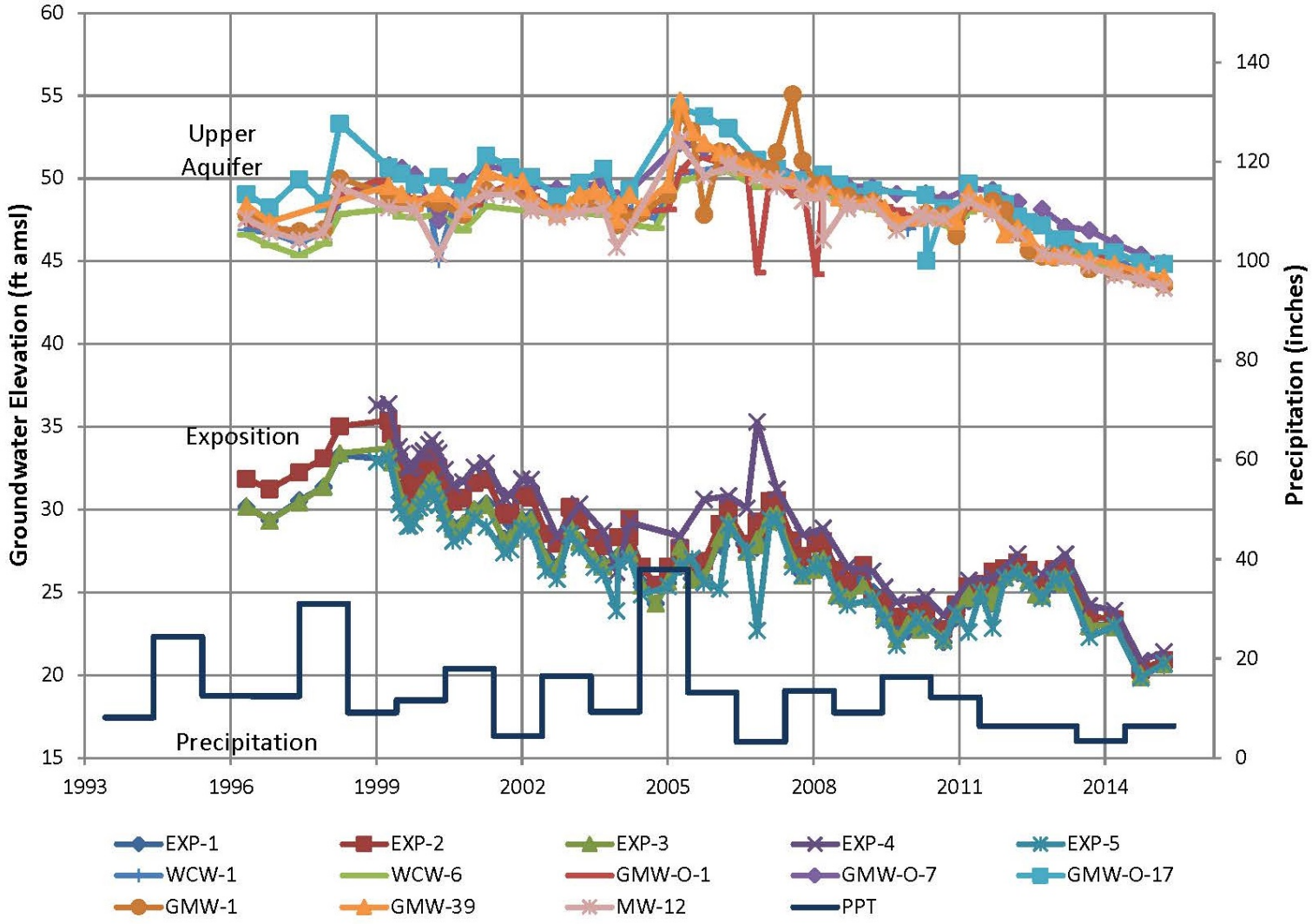
TFE System Operations Summary

- Free Product Extracted
  - 1st Quarter 2015
    - Approximately 66 gallons of free product observed to accumulate in the product holding tank
  - 2nd Quarter 2015
    - Approximately 813 gallons of free product observed to accumulate in the product holding tank
    - Recovered 107 gallons of free product using hand bailing
  - Since 1995 – 12,306 gallons

TFE System Operations Summary



Historical Groundwater Elevations



Remediation System Operations Summary

- SVE System
  - 1st Quarter 2015
    - Operated 3% of time; shut down all but 5 days in quarter due to SCAQMD permit modification
  - 2nd Quarter 2015
    - Operated 52% of time (52% excluding planned shutdowns); increased downtime a result of knockout pot demister repair
- TFE/GWE System
  - 1st Quarter 2015
    - Operated 86% of time (87% excluding planned shutdowns)
  - 2nd Quarter 2015
    - Operated 85% of time (95% excluding planned shutdowns)

Remediation System Upgrades

- SVE System
  - Installed new thermocouples
  - Cleaned knockout pot and replaced demister (filter) and housing
- TFE/GWE System
  - Installed new OWS transfer pump, and sump pump
  - Installed vapor-phase carbon treatment system for off-gas from product tank and OWS
  - Installed new Sensaphone alarm callouts
- Electrical
  - Installed new power drop for biosparge system
  - Began connection of electrical for KMEP remediation and operations systems, and new mobile office trailer

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
  - Horizontal well construction – Completed in August 2014
  - 6 triple nested soil vapor probes – Completed in September 2014
  - Pilot testing for 1 year – Planned start 3rd or 4th QTR 2015
    - Monitor for VOCs, CO2, O2, methane, electron acceptor chemistry

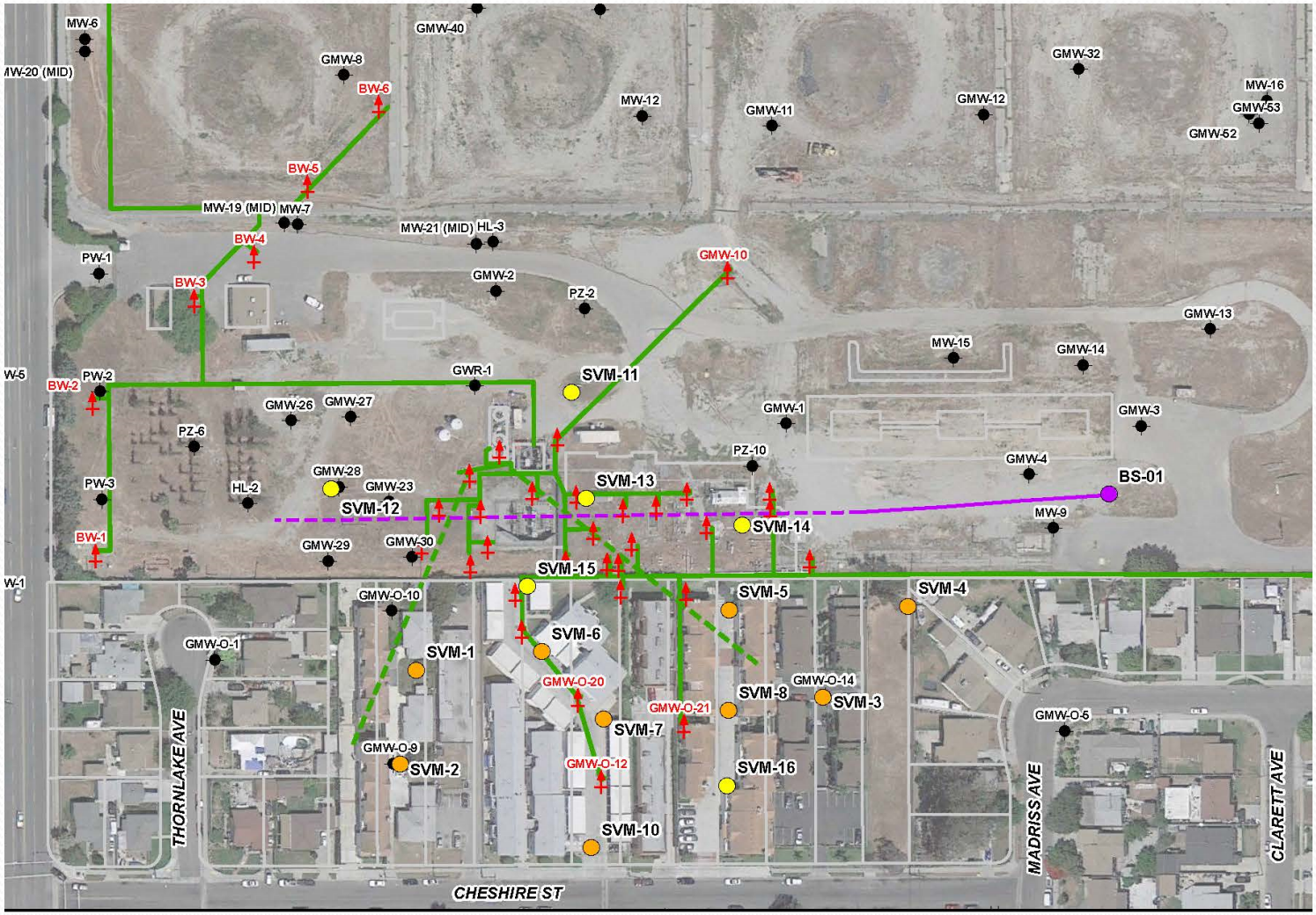
Planned Remediation Activities

- Continue SVE and TFE in south-central and southeastern areas
- Continue as-need hand bailing product from wells without TFE capabilities
- Complete electrical and conveyance work associated with biosparge and Operations SCADA system – 3rd QTR 2015
- Begin operation of biosparge well – 3rd or 4th QTR 2015
- Install new oil water separator and remediation pad for GWTS –4th QTR 2015

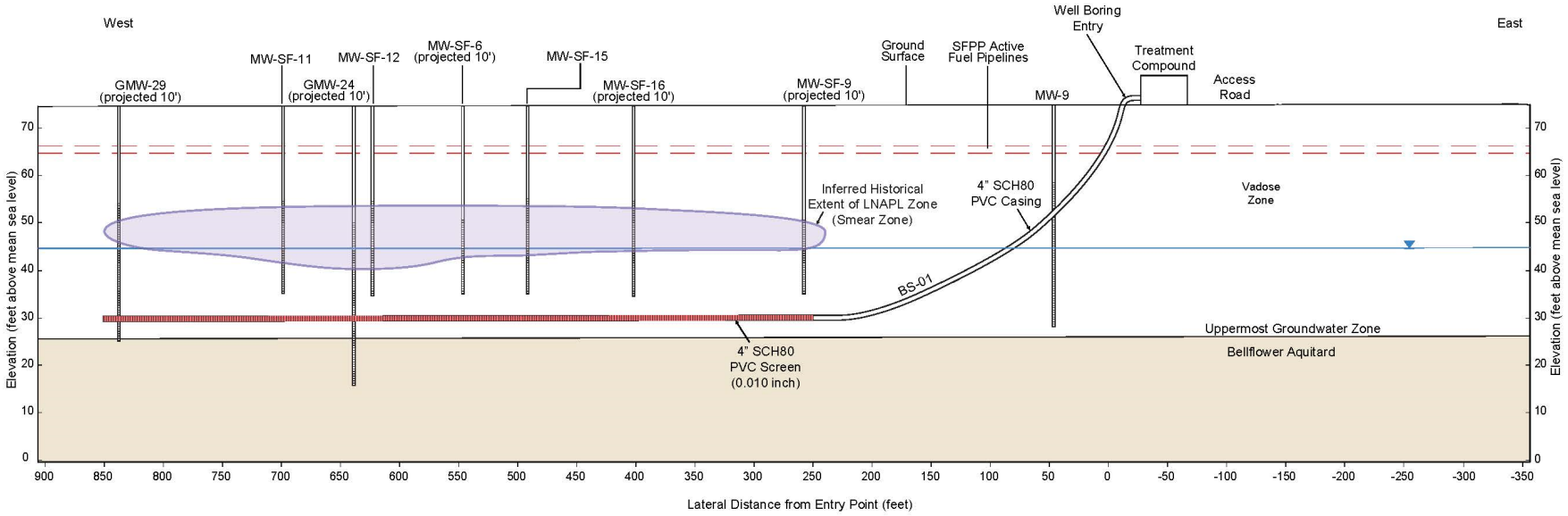
Pilot Testing Program

- Baseline Testing
  - Soil vapor and groundwater samples collected prior to start-up to establish baseline data
- Short Term Test
  - 2 to 3 day test for zone of influence evaluation
  - Operate system at 0.5 cfm/ft to 1.0 cfm/ft
  - Observe lateral and vertical zone of influence
    - Changes in water levels, groundwater DO and detection of SF6 tracer
    - Changes in vadose zone VOCs, O2, and CO2
- Long Term Test
  - Operate system up to 1 year and monitor soil vapor and groundwater conditions on monthly basis for first 6 months then quarterly thereafter

Biosparge Well and Soil Vapor Probe Layout

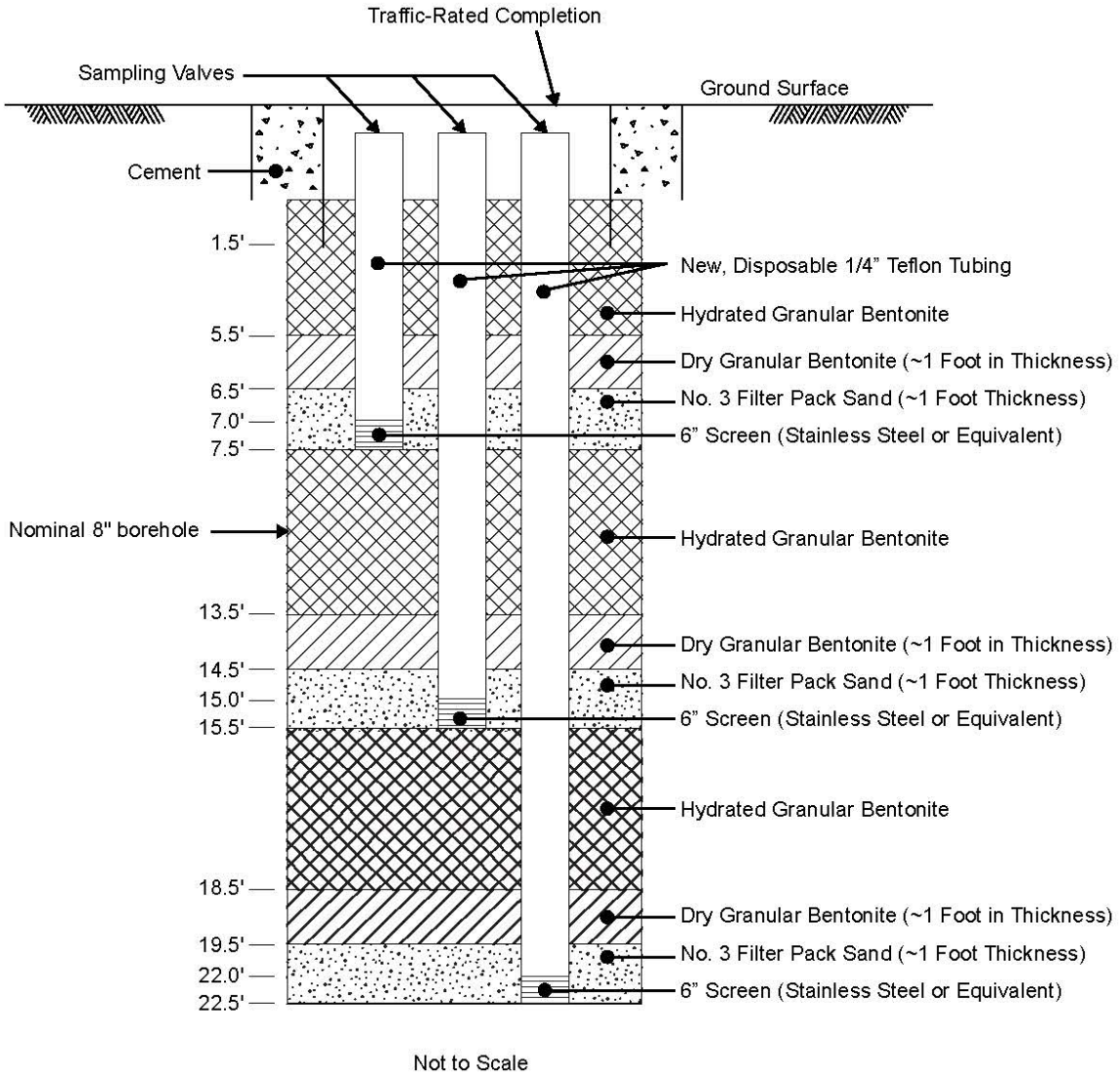


Horizontal Well Construction



- Well Casing and Screen
  - SCH 80 PVC 4-inch diameter well
  - Open slot design (no sand pack required); slot width 0.010 inches, 11 slots per foot, 1.2 inches length; 0.28 to 0.30 % open area
  - Screen depth of 45 feet bgs
  - 250 feet of riser casing; 600 feet of screen

Soil Vapor Probe Construction



Contingency Planning

- SVE Interlock
  - Biosparging will only occur if the SVE system is online
  - Interlock installed so that biosparge system shuts off if SVE system goes down
- Soil Vapor Monitoring
  - Monitoring of offsite soil vapor probes monthly to assess potential offgassing
- Immediate response to odor complaints
  - Field team will respond to residents immediately and collect indoor air samples if odors are reported

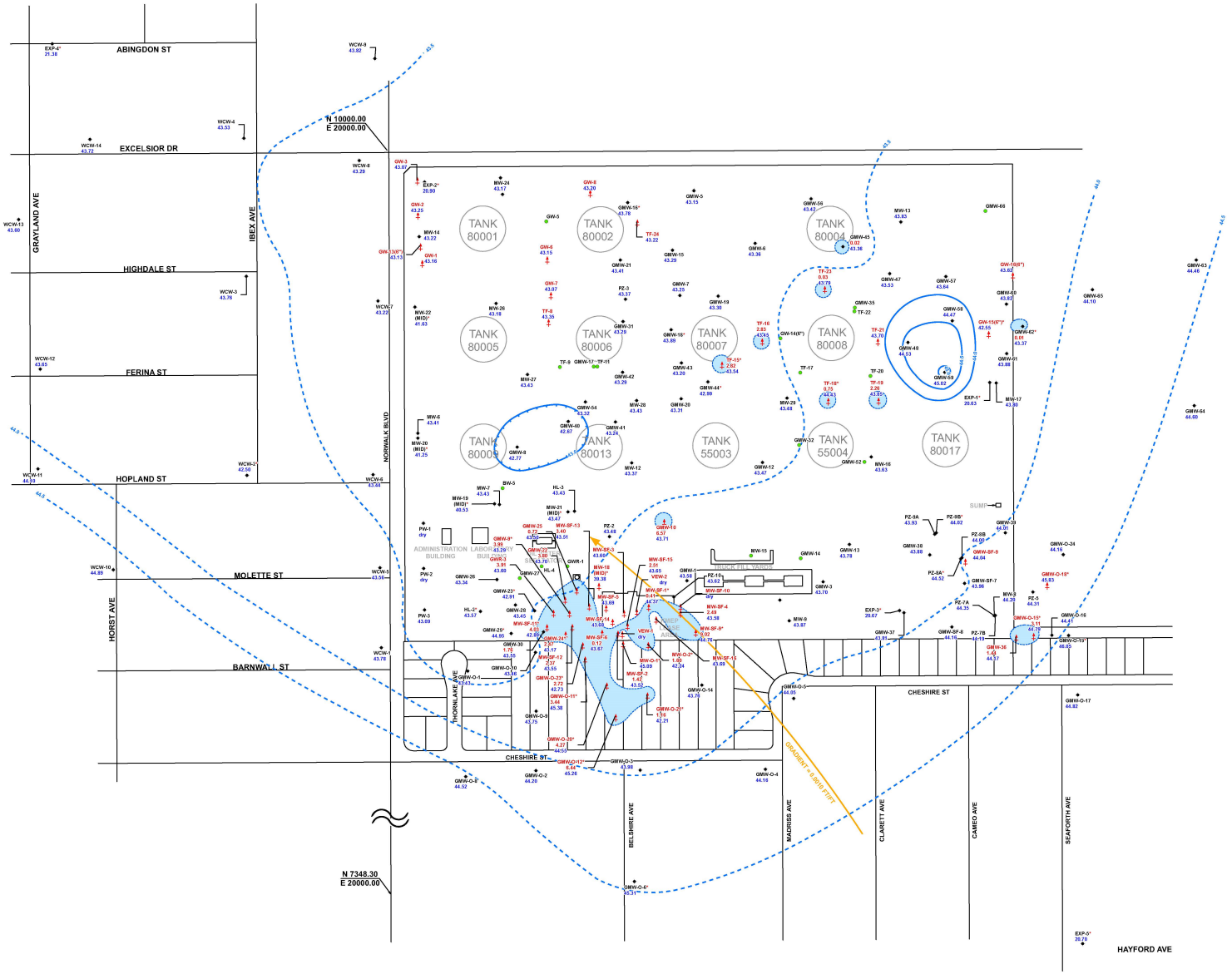
First Semiannual 2015 Groundwater Monitoring Report

- Site-wide monitoring in April 2015 – both KMEP and DLA Energy
- Well Gauging by Blaine Tech and SGI
  - 158 wells gauged in 162 wells (5 wells dry)
- Well Sampling by Blaine Tech and SGI
  - Low-flow sampling methods
  - 108 wells sampled
  - SFPP and DLA remediation systems remained offline during gauging activities

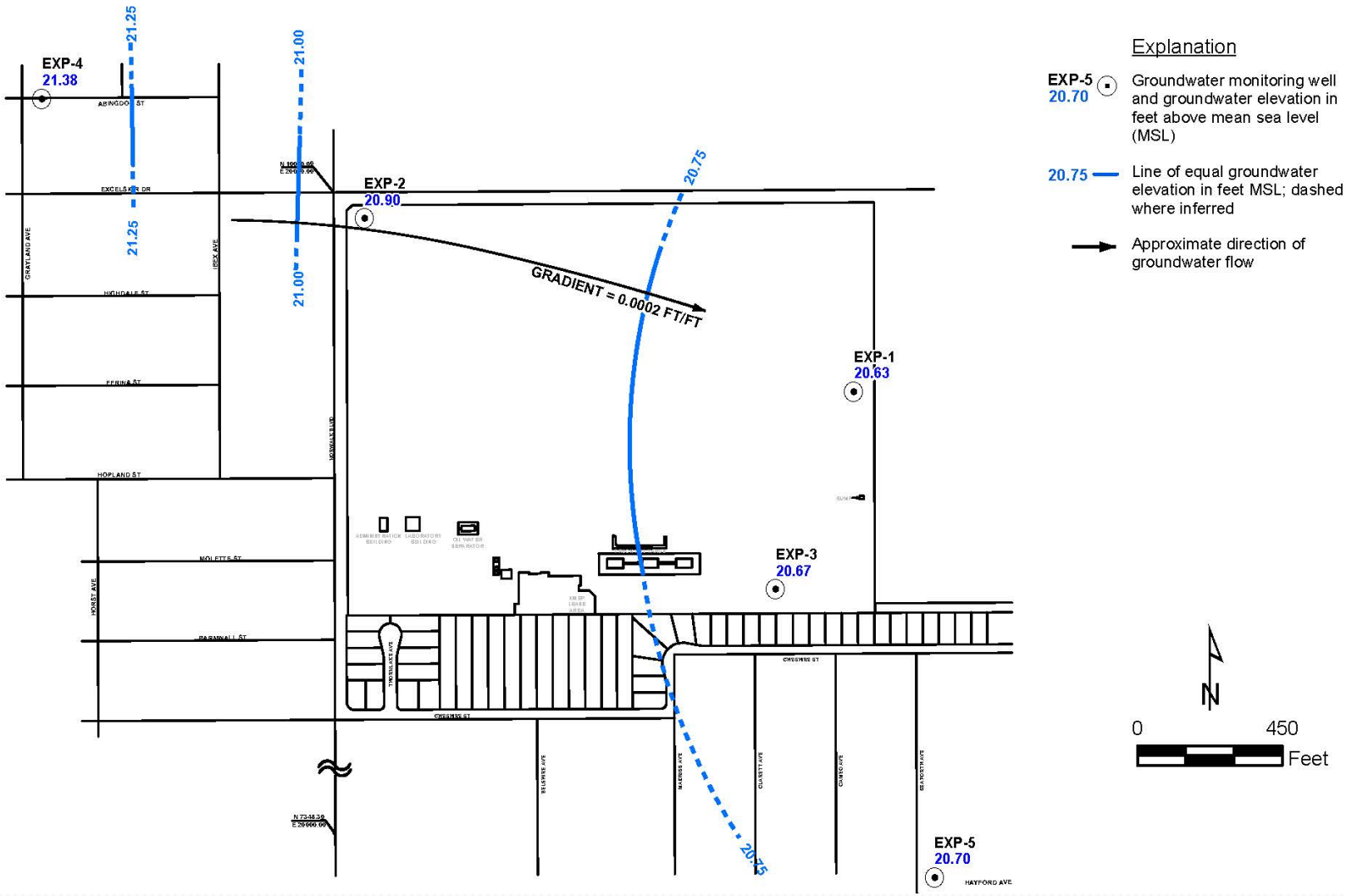
First Semiannual 2015 Groundwater Monitoring Report

- Uppermost Aquifer Groundwater Elevations and Flow
  - Groundwater elevations approximately 0.8 foot lower than those reported for April 2014
  - Groundwater elevations near historical lows since monitoring first began in 1990s
  - Horizontal hydraulic gradient of 0.0010 ft/ft toward the northwest
- Exposition Aquifer Groundwater Elevations and Flow
  - Groundwater elevations were approximately 2.4 feet lower than those reported for April 2014
  - Horizontal groundwater gradient was approximately 0.0002 ft/ft toward the east-southeast, substantially different than the uppermost groundwater zone

Groundwater Elevations - Water Table



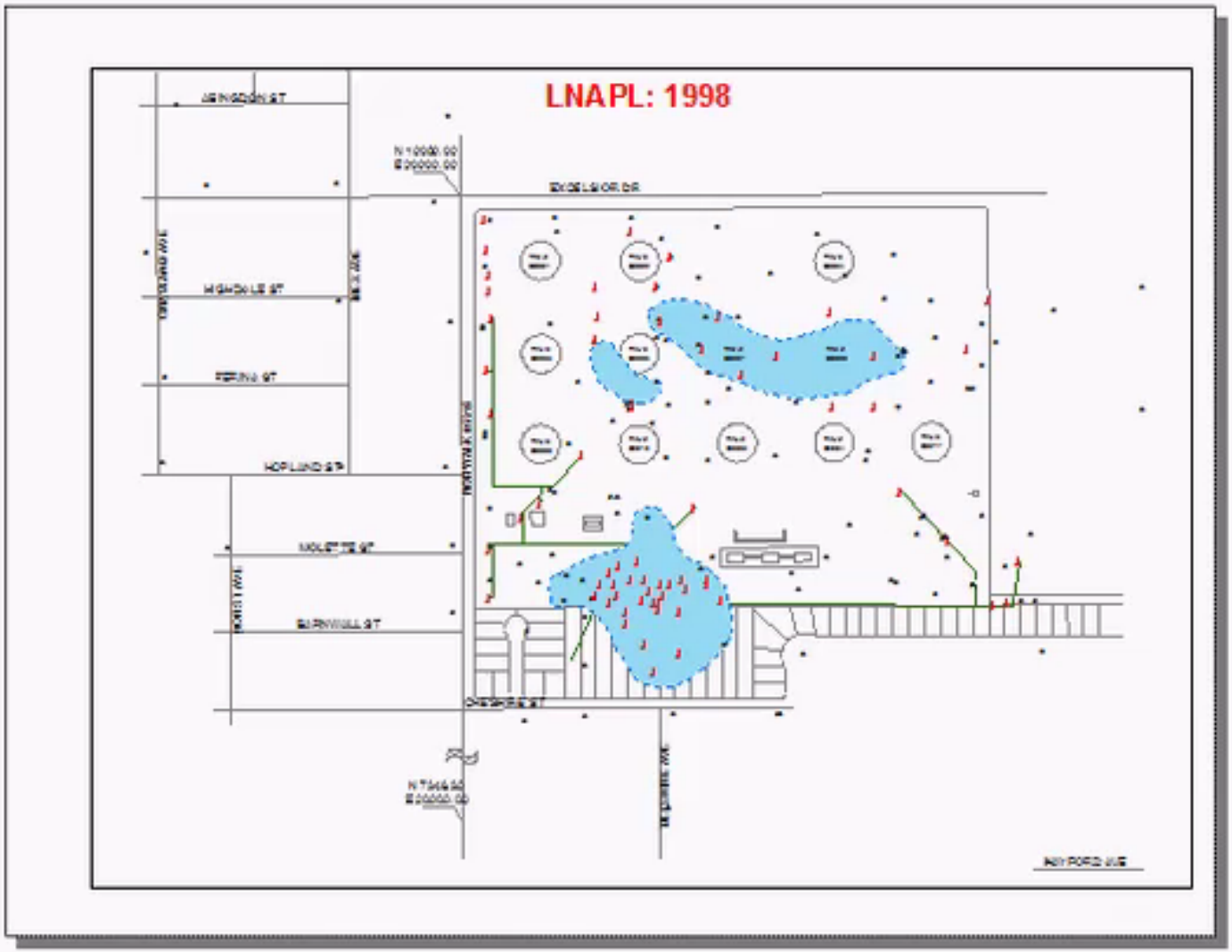
Groundwater Elevations - Exposition



First Semiannual 2015 Groundwater Monitoring Report

- Free product measured in in 31 of the 162 wells that were gauged.
  - North-central area: GMW-45, TF-15, TF-16, TF-18, TF-19, and TF-23
  - Eastern area: GMW-62
  - South-central area: GMW-9, GMW-10, GMW-22, GMW-24, GMW-25, GMW-30, GMW-O-11, GMW-O-12, GMW-O-20, GMW-O-21, GMW-O-23, GWR-3, MW-O-2, MW-SF-1, MW-SF-2, MW-SF-4, MW-SF-6, MW-SF-9, MW-SF-11, MW-SF-12, MW-SF-13, and MW-SF-15
  - Southeastern area: GMW-36 and GMW-O-15
- Thicknesses ranged from 0.01 foot to 9.02 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 2015



First Semiannual 2015 Groundwater Monitoring Report

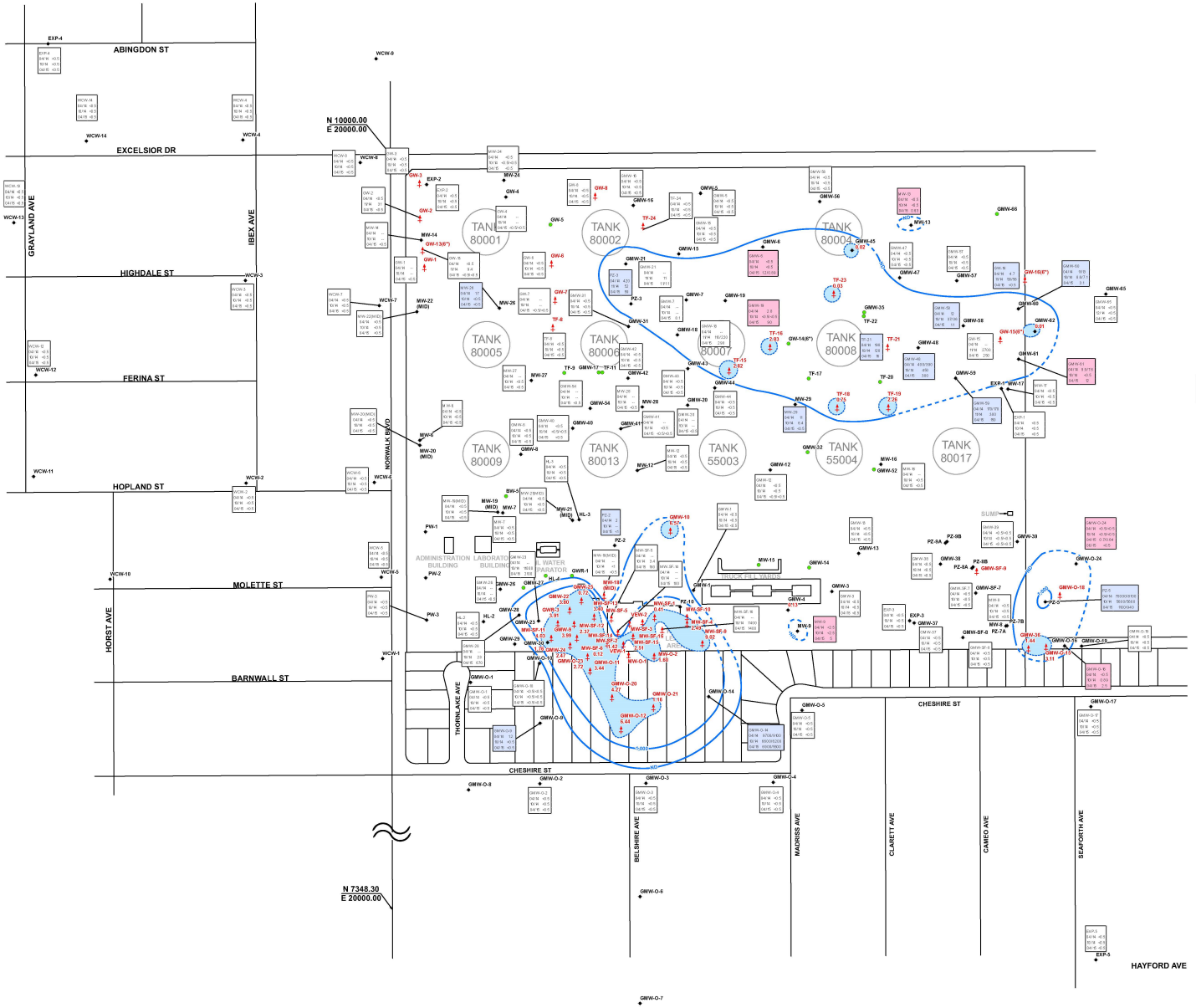
- Exposition Aquifer wells sampled:
  - EXP-1, -2, and -3 sampled twice by DLA Energy and SFPP
  - EXP-4 sampled once by SFPP
  - EXP-5 sampled once by SFPP
- All analytical results were Non Detect (ND), except for the following:
  - MTBE was detected at EXP-1 in the SFPP split sample at a concentration of 1.1 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 2015 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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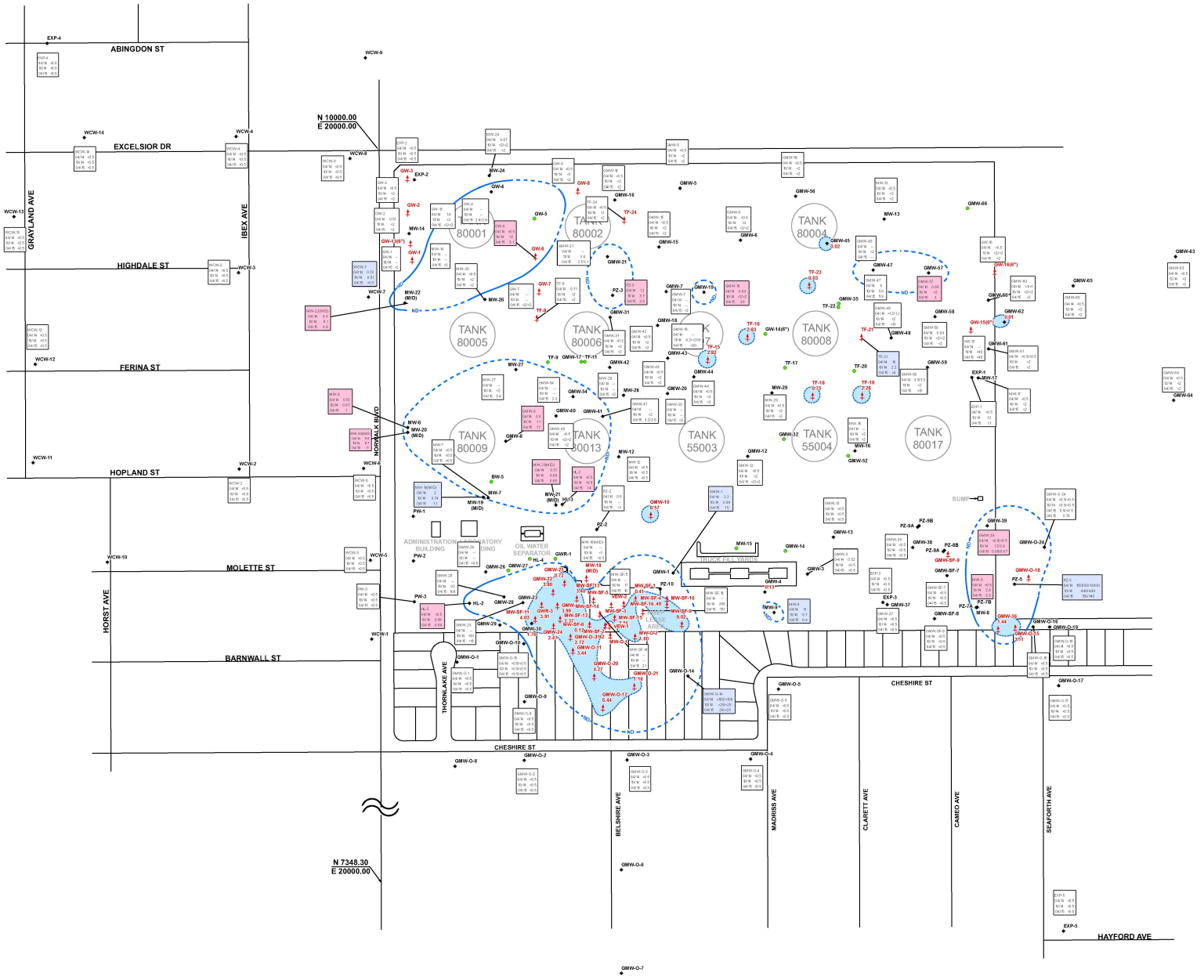
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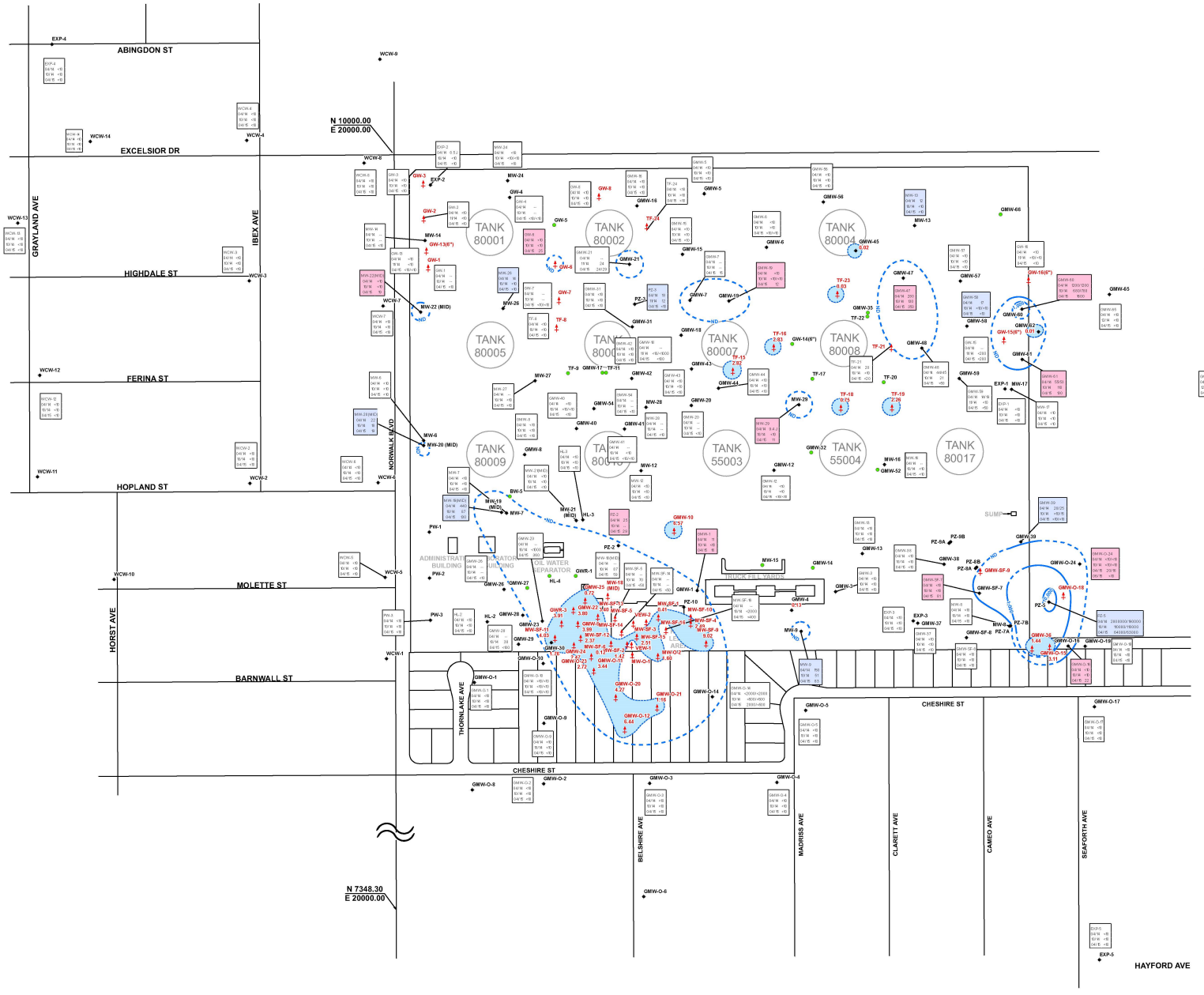
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Questions?