

Norwalk Tank Farm Update

Presented to the Norwalk Tank Farm
Restoration Advisory Board

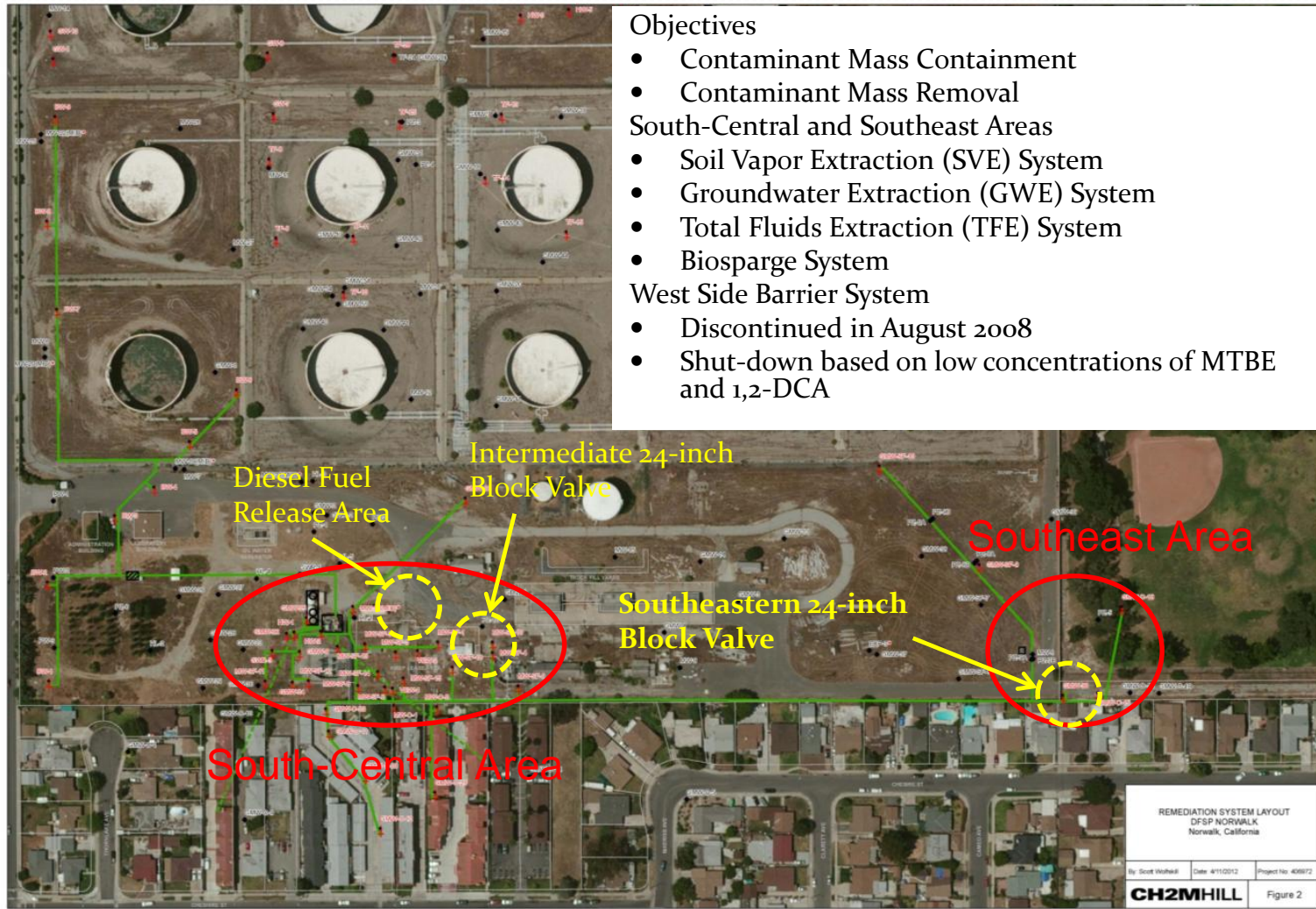
On behalf of KMEP

August 16, 2016

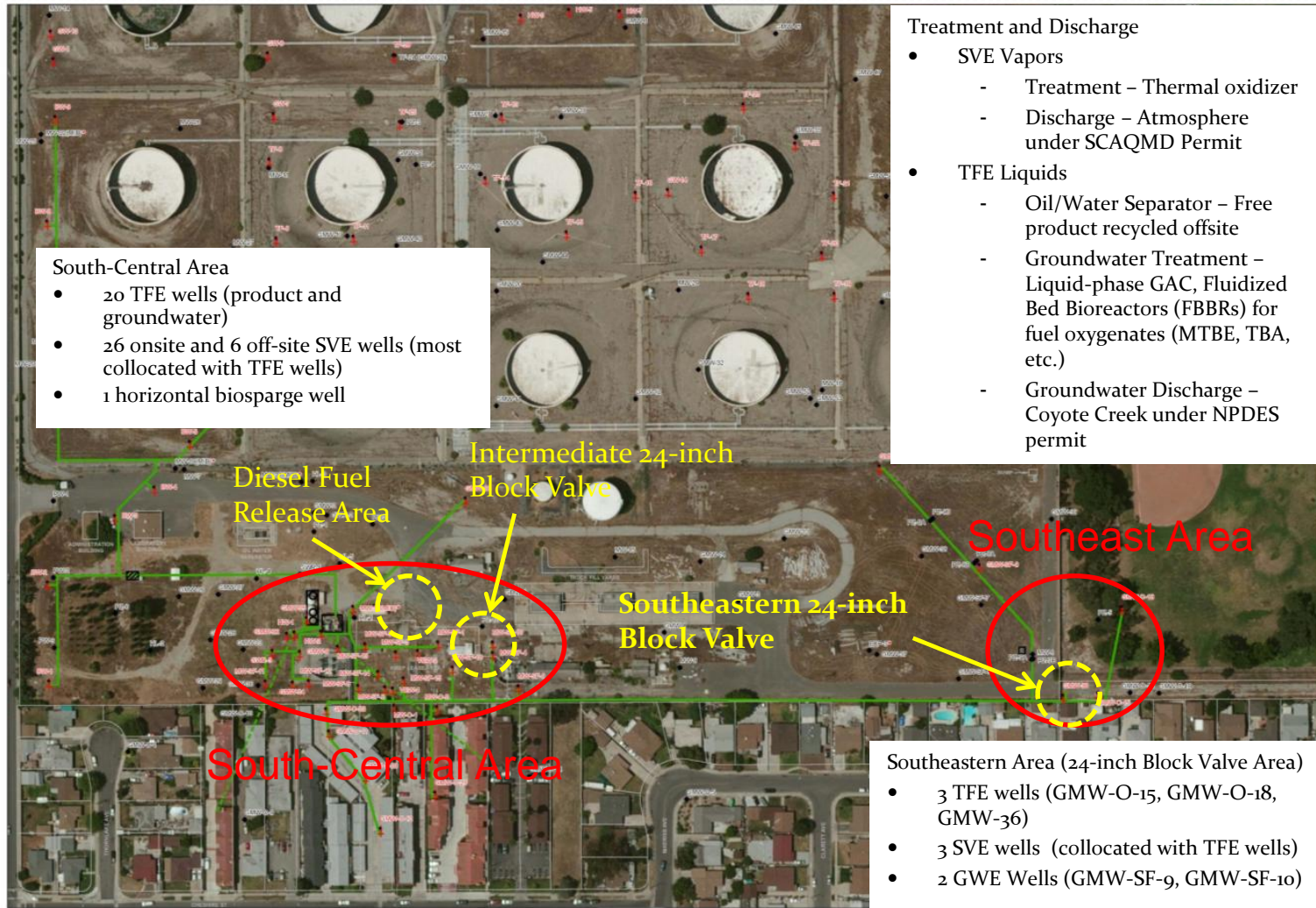
Presentation Overview

- KMEP Update
 - Remediation Operations Update
 - Biosparge Pilot Testing Update
 - Planned Remediation Activities
 - KMEP Operations Group Update (recently added)
- First Semiannual 2016 Groundwater Monitoring

SFPP Remediation Areas



SFPP Remediation Systems



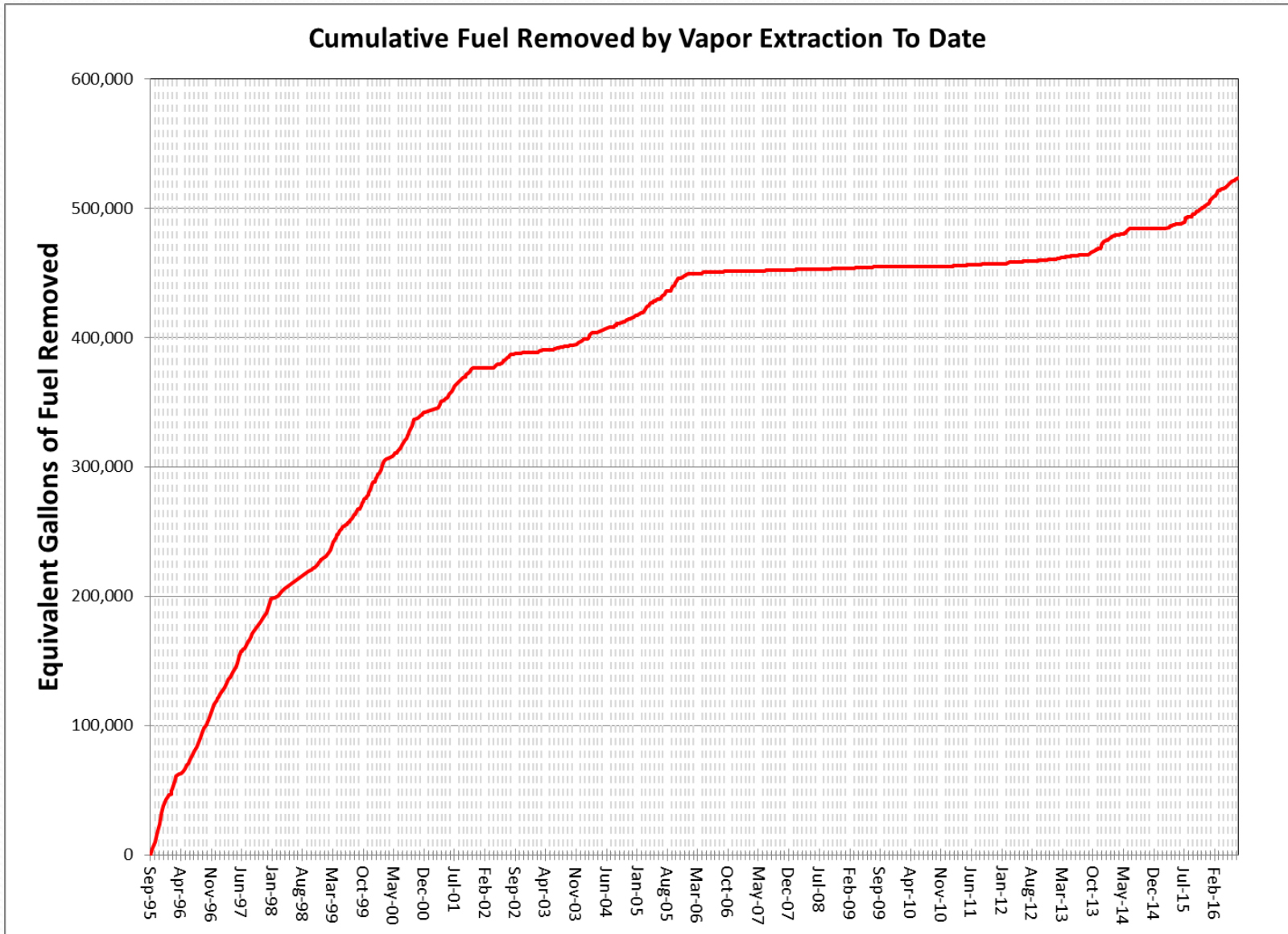
Remediation Systems

- 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 2016– 11,235 gallons (74,148 pounds)
 - Higher mass removal due to biosparge startup
- 2nd Quarter 2016– 7,184 gallons (47,416 pounds)
- Since 1995 – Approx. 515,100 gallons (3.4 million pounds)

SVE System Operations Summary



TFE/GWE System Operations Summary

- Groundwater Extracted

- 1st Quarter 2016

- South-Central and Southeast Areas – 767,657 gallons
- West Side Barrier – none (shutdown in third quarter 2008)

- 2nd Quarter 2016

- South-Central and Southeast Areas – 856,633 gallons
- West Side Barrier – none (shutdown in third quarter 2008)

- Since 1995

- South-Central and Southeast Areas – 70.9 million gallons
- West Side Barrier – 26.9 million gallons

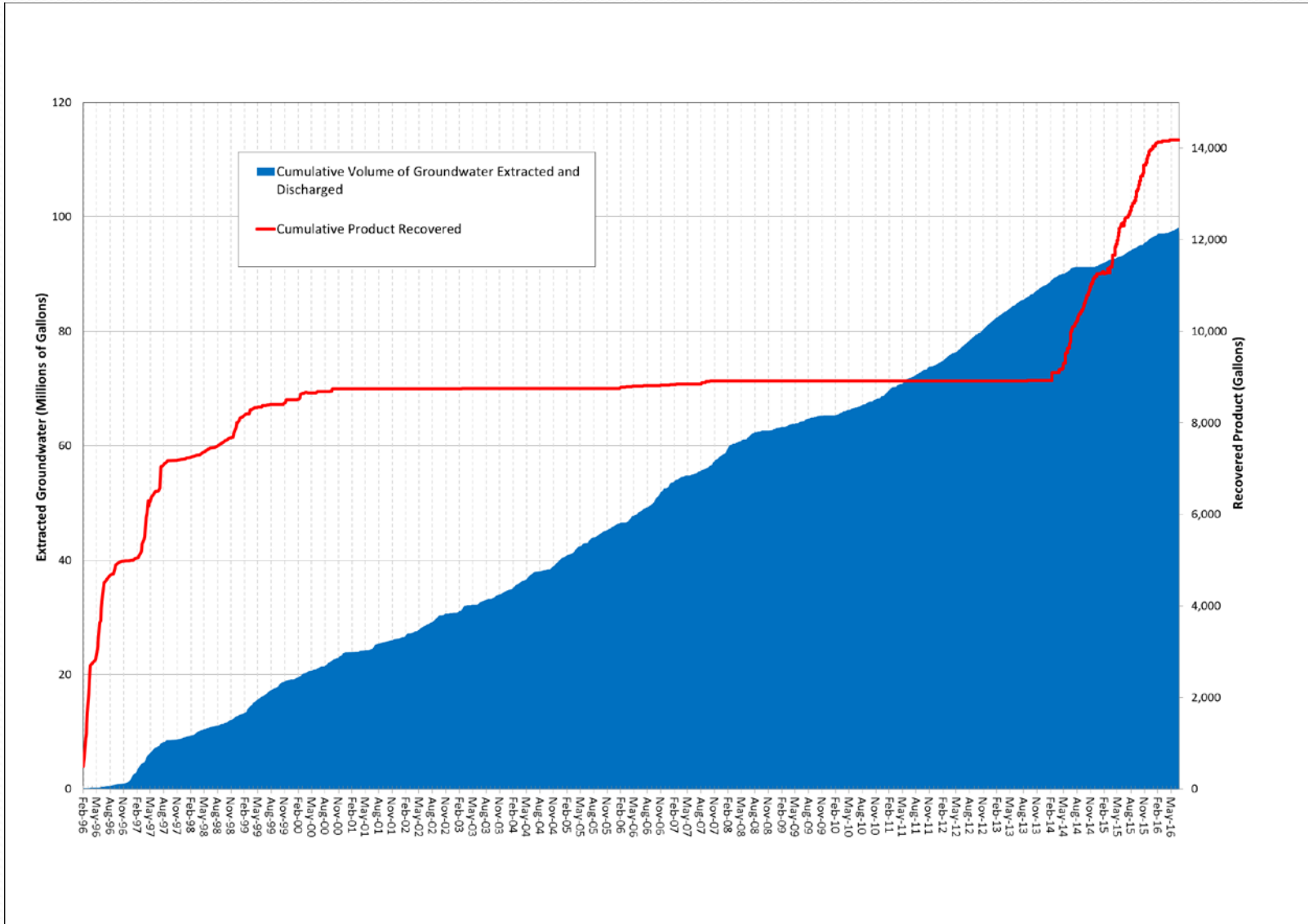
TFE/GWE System Operations Summary

- 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 2016– 196 gallons (4,203 pounds)
 - 2nd Quarter 2016– 38 gallons (253 pounds)
 - Lower mass removal during 2nd Quarter a result of decreased TPH concentration in groundwater influent (likely due to biosparge activities)

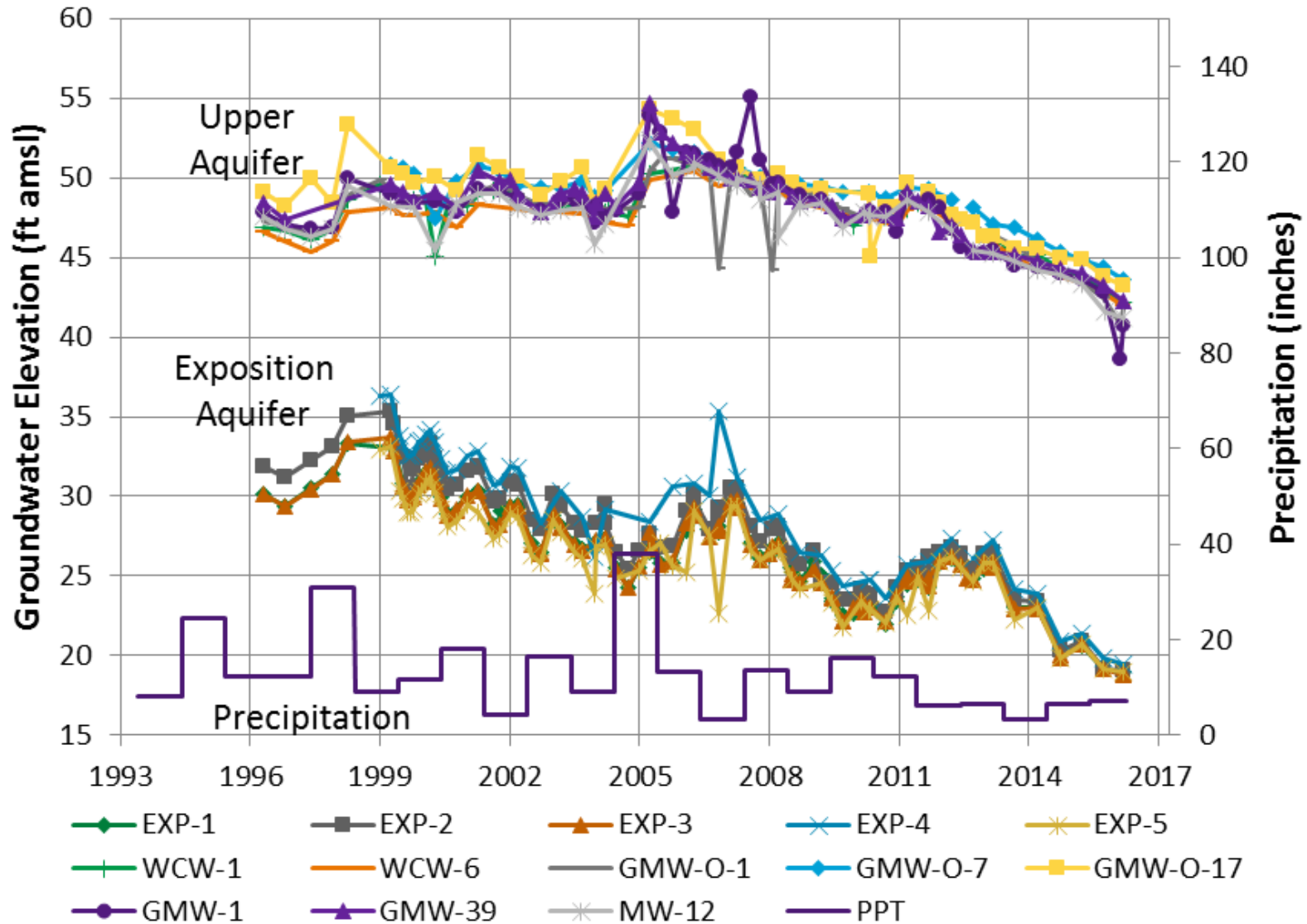
TFE System Operations Summary

- Free Product Extracted
 - 1st Quarter 2016
 - Approximately 194 gallons of free product observed to accumulate in the product holding tank
 - Approximately 7 gallons of free product was recovered by manual bailing wells without pumps
 - 2nd Quarter 2016
 - Approximately 22 gallons of free product observed to accumulate in the product holding tank
 - Less product recovered due to decline in measurable product in extraction wells as a result of biosparge activities
 - Approximately 10 gallons of free product was recovered by manual bailing wells without pumps
 - Since 1995 – 14,177 gallons

TFE System Operations Summary



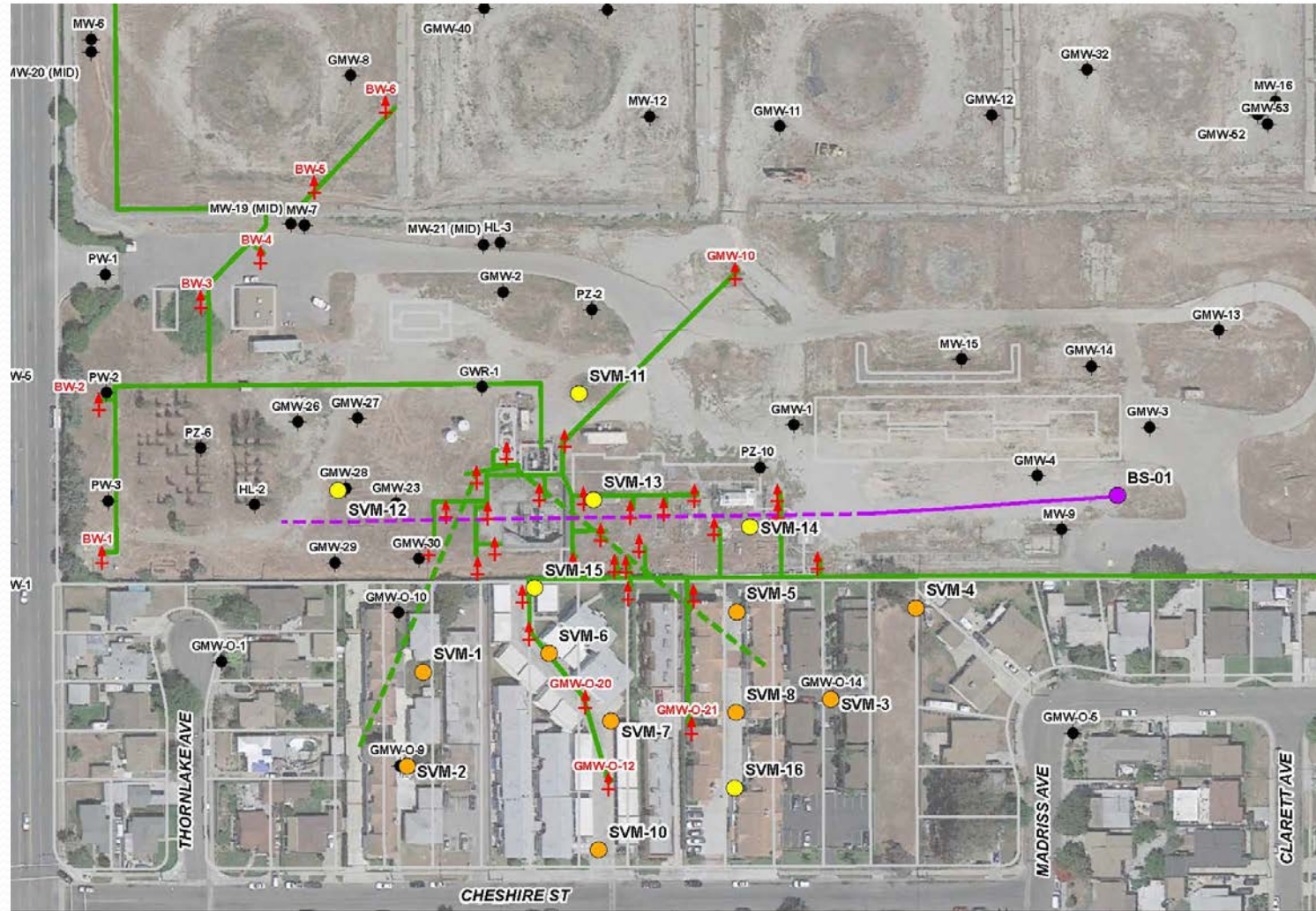
Historical Groundwater Elevations



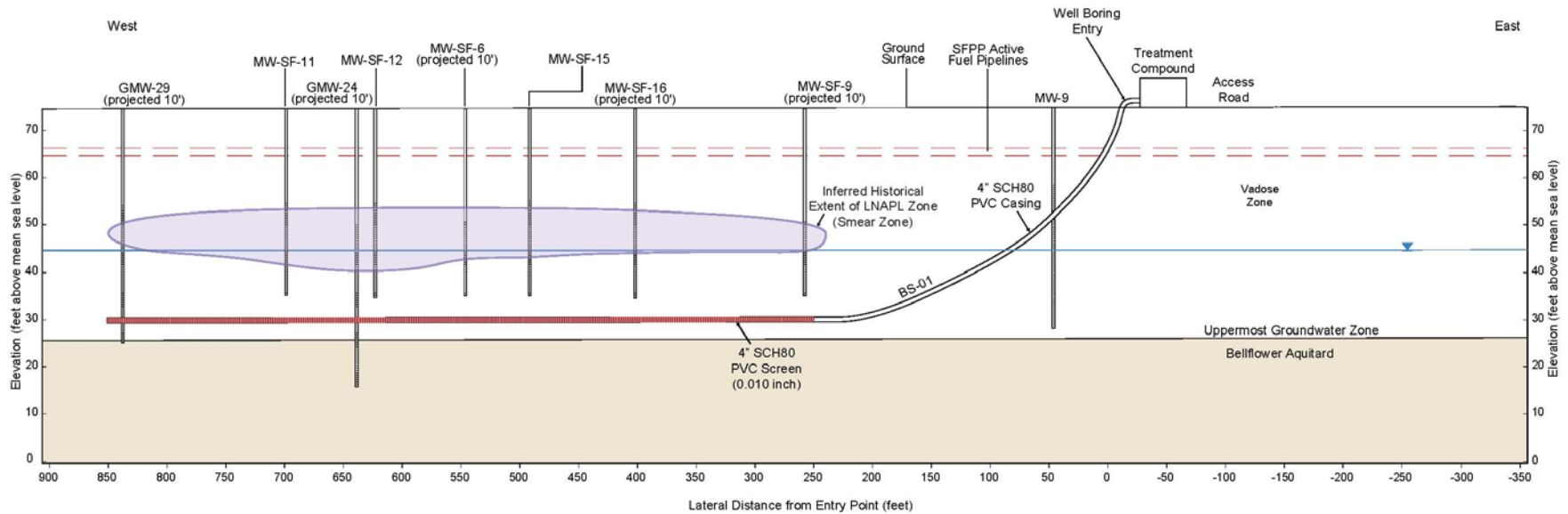
Remediation System Operations Summary

- SVE System
 - 1st Quarter 2016
 - Operated 78% of time (93% excluding planned shutdowns)
 - 2nd Quarter 2016
 - Operated 82% of time (97% excluding planned shutdowns)
- TFE/GWE System
 - 1st Quarter 2016
 - Operated 70% of time (96% excluding planned shutdowns)
 - 2nd Quarter 2016
 - Operated 78% of time (94% excluding planned shutdowns)
- Biosparge System
 - 1st Quarter 2016
 - Operated 74% of time (93% excluding planned shutdowns)
 - 2nd Quarter 2016
 - Operated 82% of time (97% excluding planned shutdowns)

Biosparge Well and Soil Vapor Probe Layout

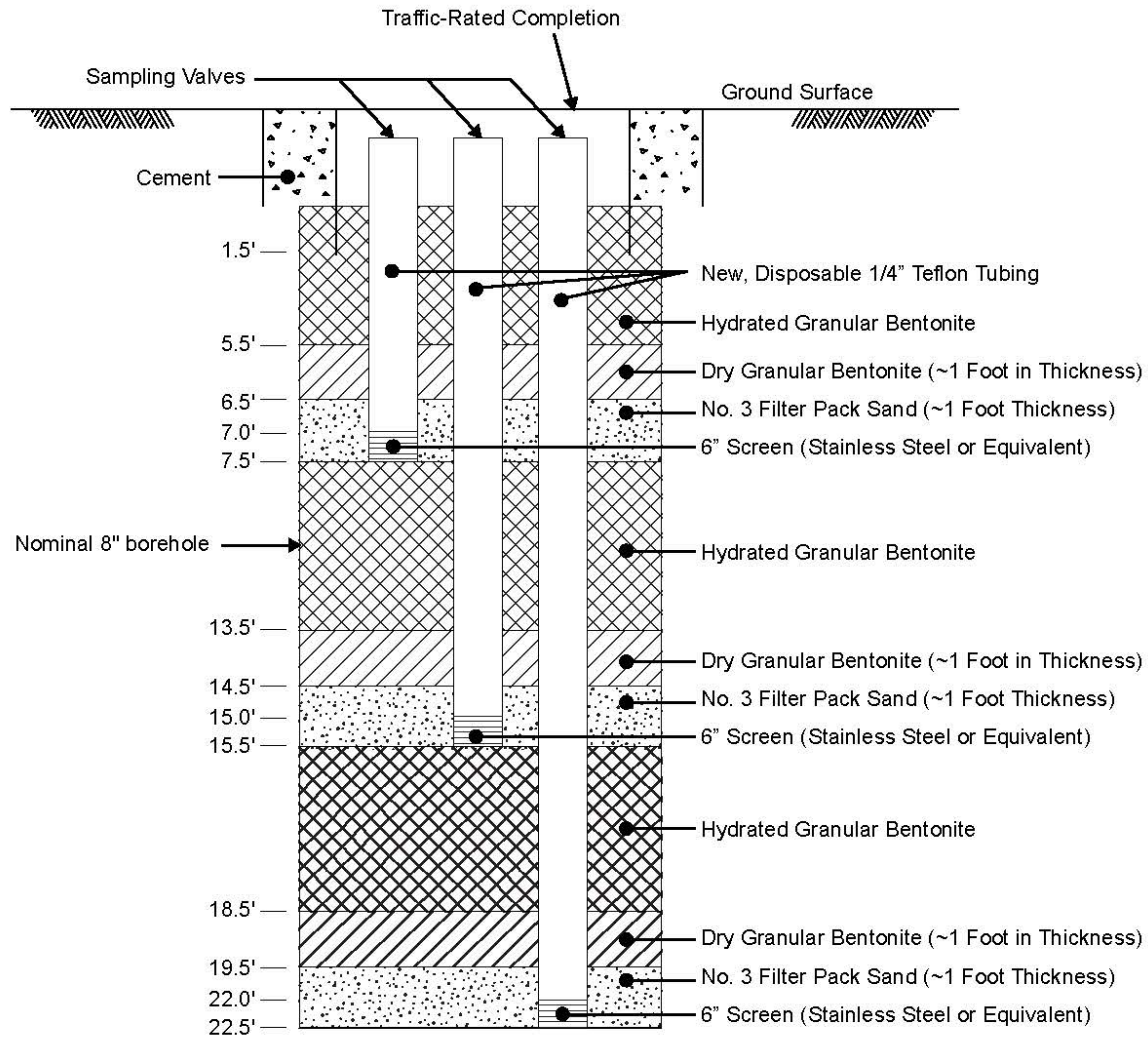


Horizontal Well Construction

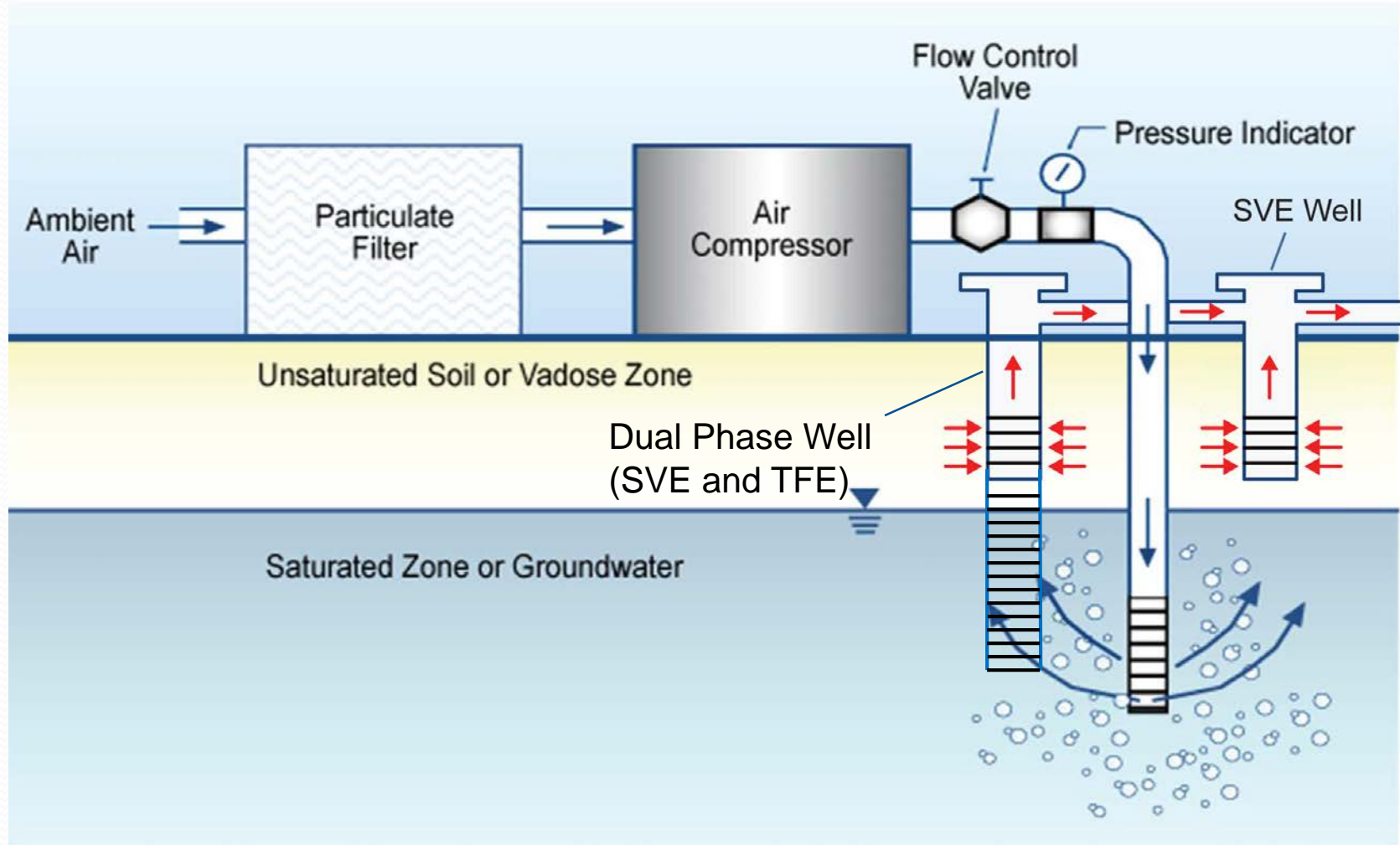


- Well Casing and Screen
 - SCH 80 PVC 4-inch diameter well
 - Open slot design (no sand pack required); slot width 0.010 inches, 11 slots per foot, 1.2 inches length; 0.28 to 0.30 % open area
 - Screen depth of 45 feet bgs
 - 250 feet of riser casing; 600 feet of screen

Soil Vapor Probe Construction



Biosparge Process Flow



Pilot Testing Program

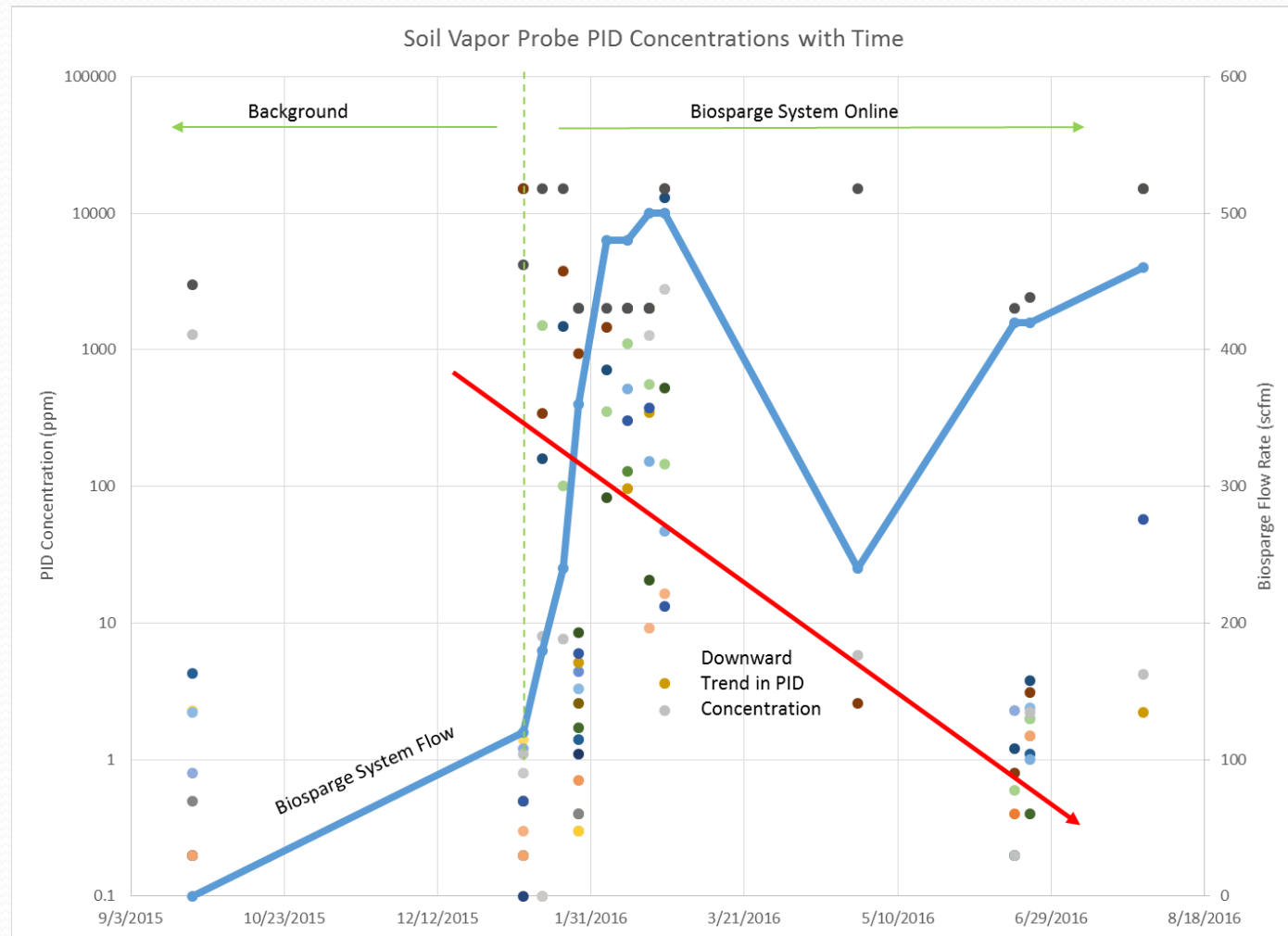
- Baseline Testing (complete)
 - Soil vapor and groundwater samples collected prior to start-up to establish baseline data
- Ramp-Up Period (complete)
 - Initiated start up in January 2016; increased air flow slowly and in stages
 - Monitored soil vapor probes weekly using PID
 - Installed In-Situ Trolls to continuously record water levels, pH, and DO
 - Collected and analyzed soil vapor samples on January 27, 28, and 29 using mobile lab
- Short Term Tracer Test (complete)
 - 2 day test for zone of influence evaluation
 - Operate system at 0.8 cfm/ft (max flow rate)
 - Observe lateral and vertical zone of influence
 - Changes in water levels, groundwater DO and detection of SF6 tracer
- Long Term Test (ongoing)
 - Operate system up to 1 year and monitor soil vapor and groundwater conditions

Safety Measures and Offsite Monitoring and Response

- 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
 - Collection of field PID measurements of offsite probes on weekly basis for initial month of operation
 - Sampling of offsite soil vapor probes monthly to assess potential offgassing
 - Initial “wave” of higher VOCs in some probes expected but should subside with continued biosparge and SVE operations
- Immediate response to odor complaints
 - Field team will respond to residents immediately and collect indoor air samples if odors are reported

Preliminary Results - Soil Vapor

- Mobile lab and field PID readings indicate modest increase in vapor phase VOCs during startup but overall decline in concentrations with time.
 - Mobile lab data for shallow offsite soil vapor probes have been below screening levels.
- Results currently presented to RWQCB and RAB as part of monthly reporting requirement



Preliminary Results – Groundwater and Free Product

- Gauging and sampling conducted in March and June 2016 at subset of wells in south-central area
 - Significant decline in product thickness and areal extent
 - In June 2016, only 4 wells in south-central area with measurable product; maximum product thickness of 3.32 feet.
 - Product thickness in offsite well GMW-O-12 decreased from 6.49 feet in April 2016 to 0.8 feet in June 2016.
 - Too early to identify trends in dissolved phase concentrations

Planned Remediation Activities

- Continue SVE and TFE in south-central and southeastern areas
- Continue as-need hand bailing product from wells without TFE capabilities
- Continue operation of biosparge well and groundwater/soil vapor monitoring
- Complete installation of new oil water separator and remediation pad for GWTS – 3rd Quarter 2016
- Install new SVE system – 4th Quarter 2016

New DAF System

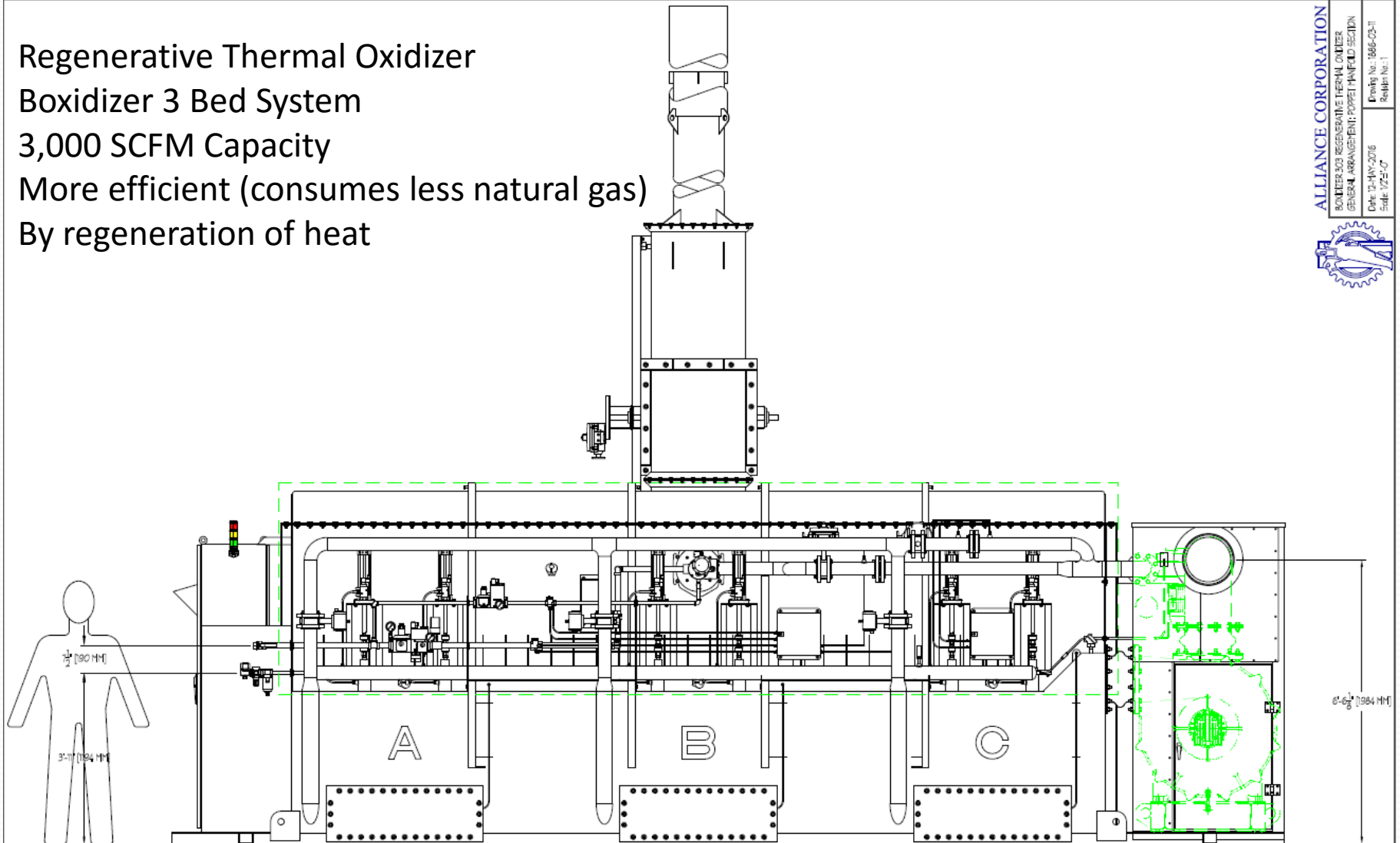
VLT-410 DAF by Ecologix
50 gpm Capacity



- Dissolved Air Flotation System
 - Separates fuel product and groundwater (similar to oil water separator)
 - Uses air bubble system to enhance separation of fluids and biodegradation of hydrocarbon constituents by increased DO
 - Easier maintenance and improved separation of fuel product and biosludge from groundwater

New RTO System

Regenerative Thermal Oxidizer
Boxidizer 3 Bed System
3,000 SCFM Capacity
More efficient (consumes less natural gas)
By regeneration of heat



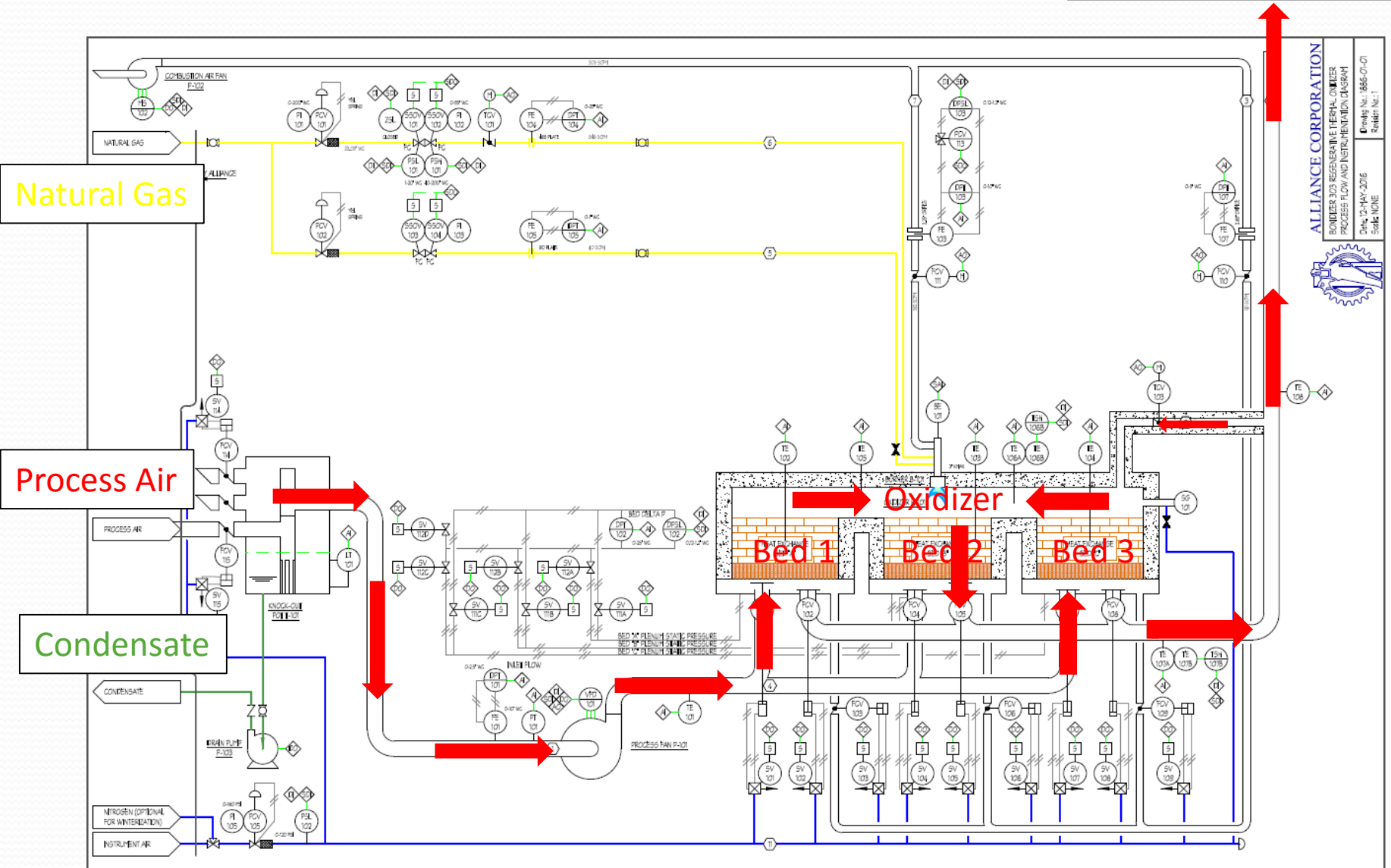
ALLIANCE CORPORATION
BOXIDIZER 3 BED REGENERATIVE THERMAL OXIDIZER
GENERAL ARRANGEMENT: POPPET HALF-CUT SECTION
Drawing No.: 1848-03-01
Date: 12-MAY-2016
Scale: 1/2"=1'-0"



NOTES:
KNOCK-OUT POT NOT SHOWN AND HOOD OUTLINE ONLY
SHOWN FOR DETAIL CLARITY.

New RTO System

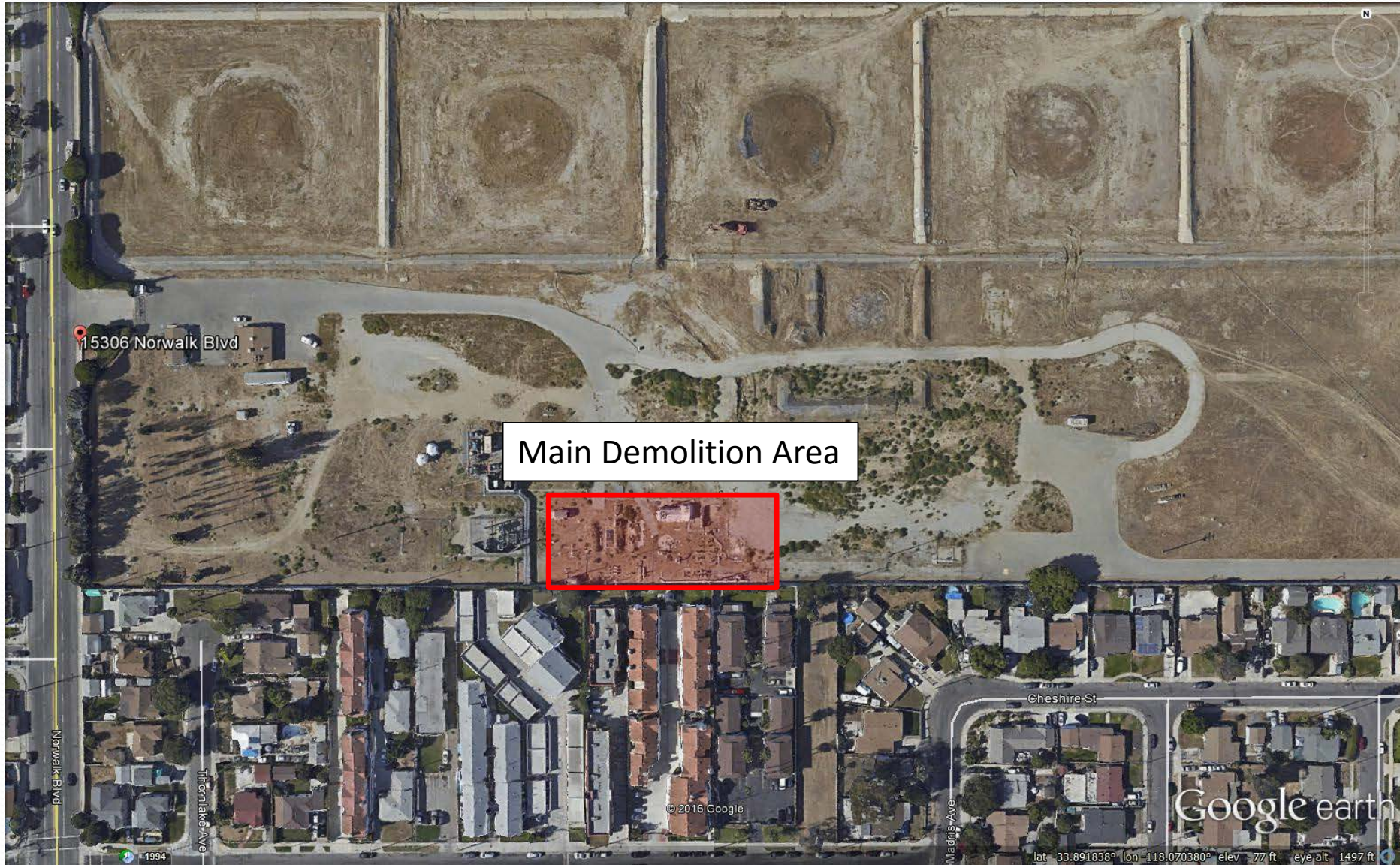
Treated Vapor
Emitted to Atmosphere
under SCAQMD Permit



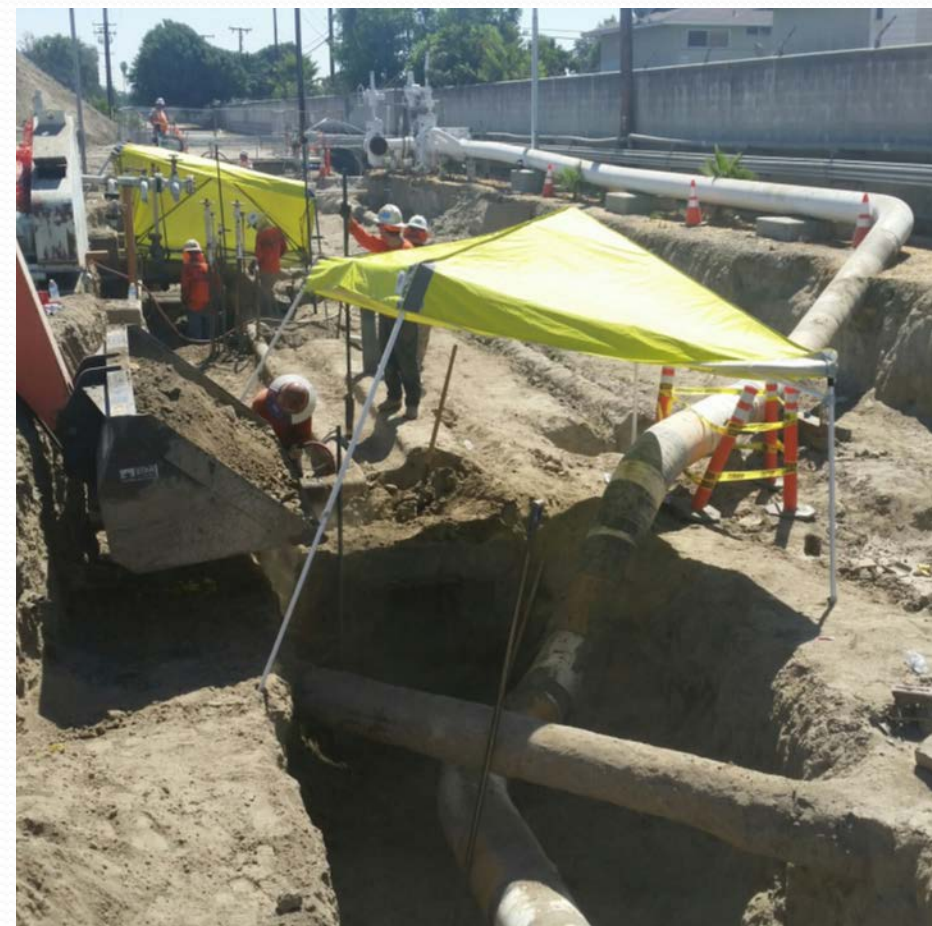
Kinder Morgan Operations Group Update

- Demolition
 - In July 2016, Kinder Morgan Operations Group began excavation (hand digging) and removal of legacy infrastructure in south-central manifold area.
- Pipeline Relocation
 - South-central area pipeline loop outside of KMEP easement will be decommissioned and removed.
 - Above-grade portion of pipeline further to the east will be installed below grade.

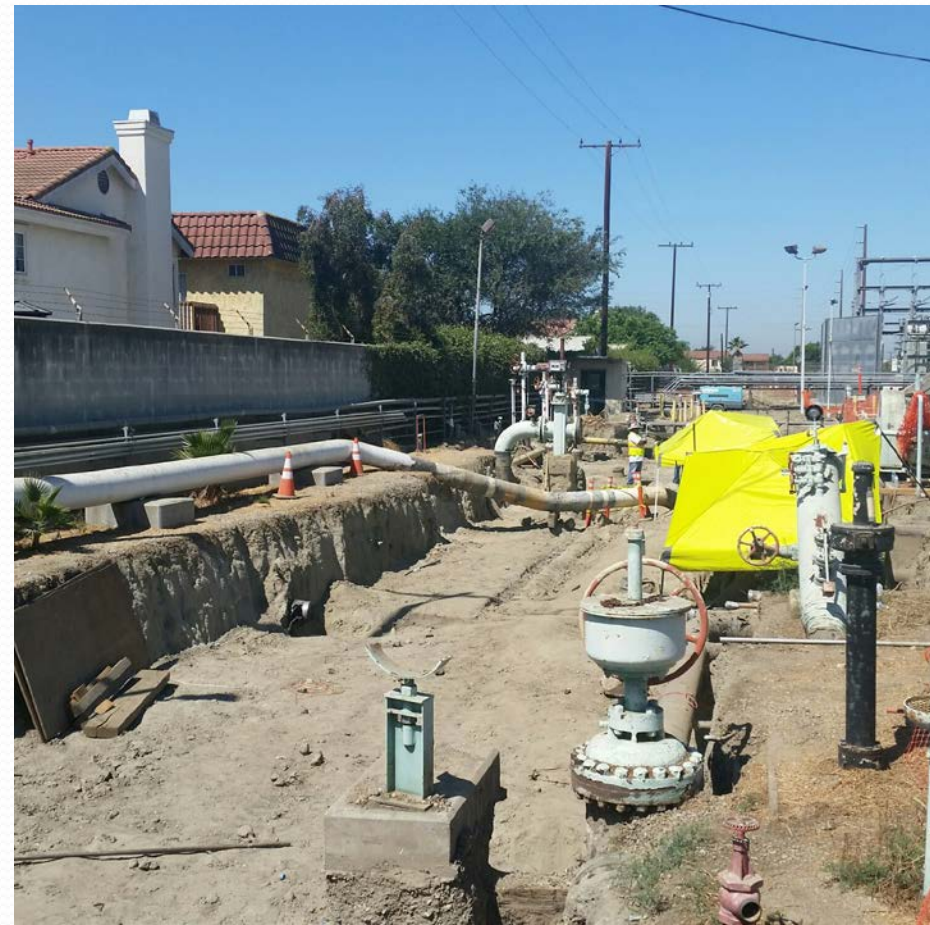
Site Map



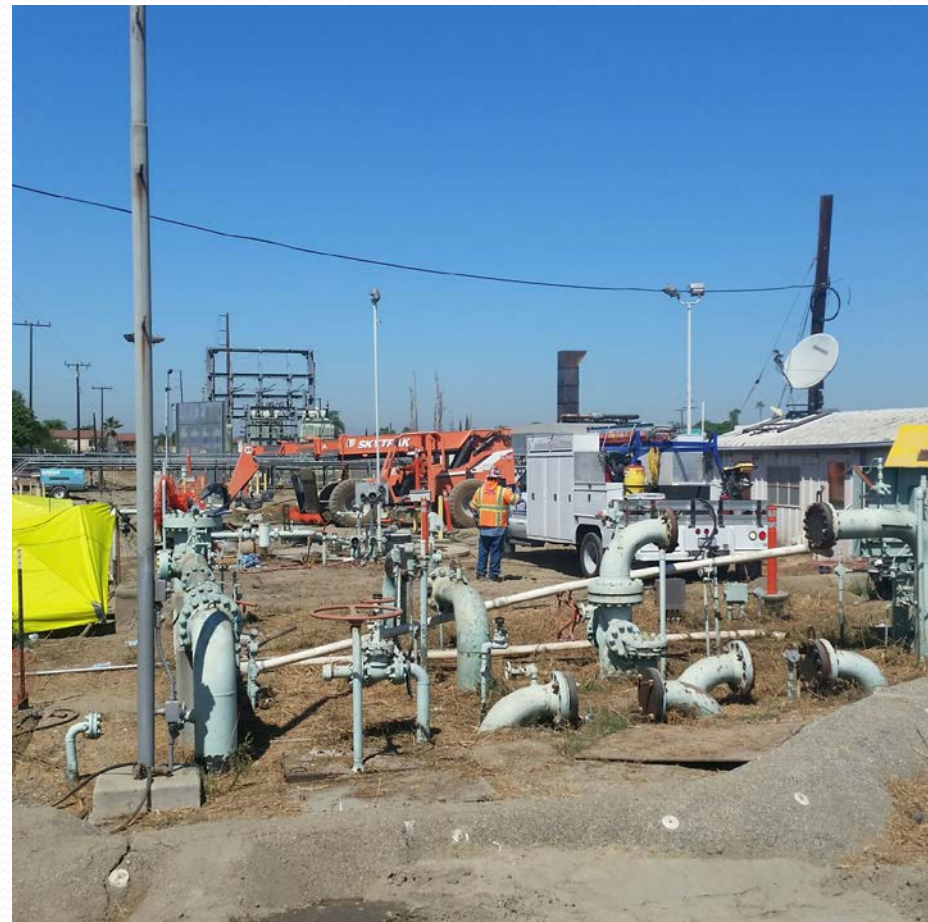
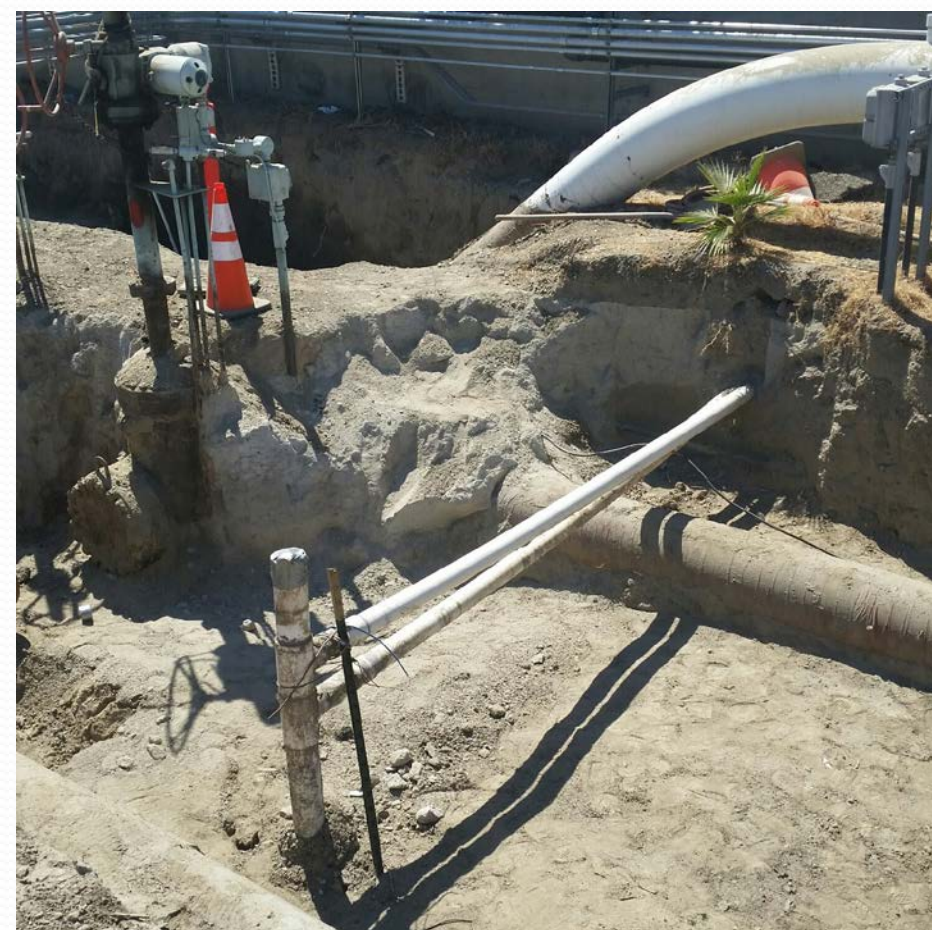
KMEP Demolition – 8/15/16



KMEP Demolition – 8/15/16



KMEP Demolition – 8/15/16



First Semiannual 2016

Groundwater Monitoring Report

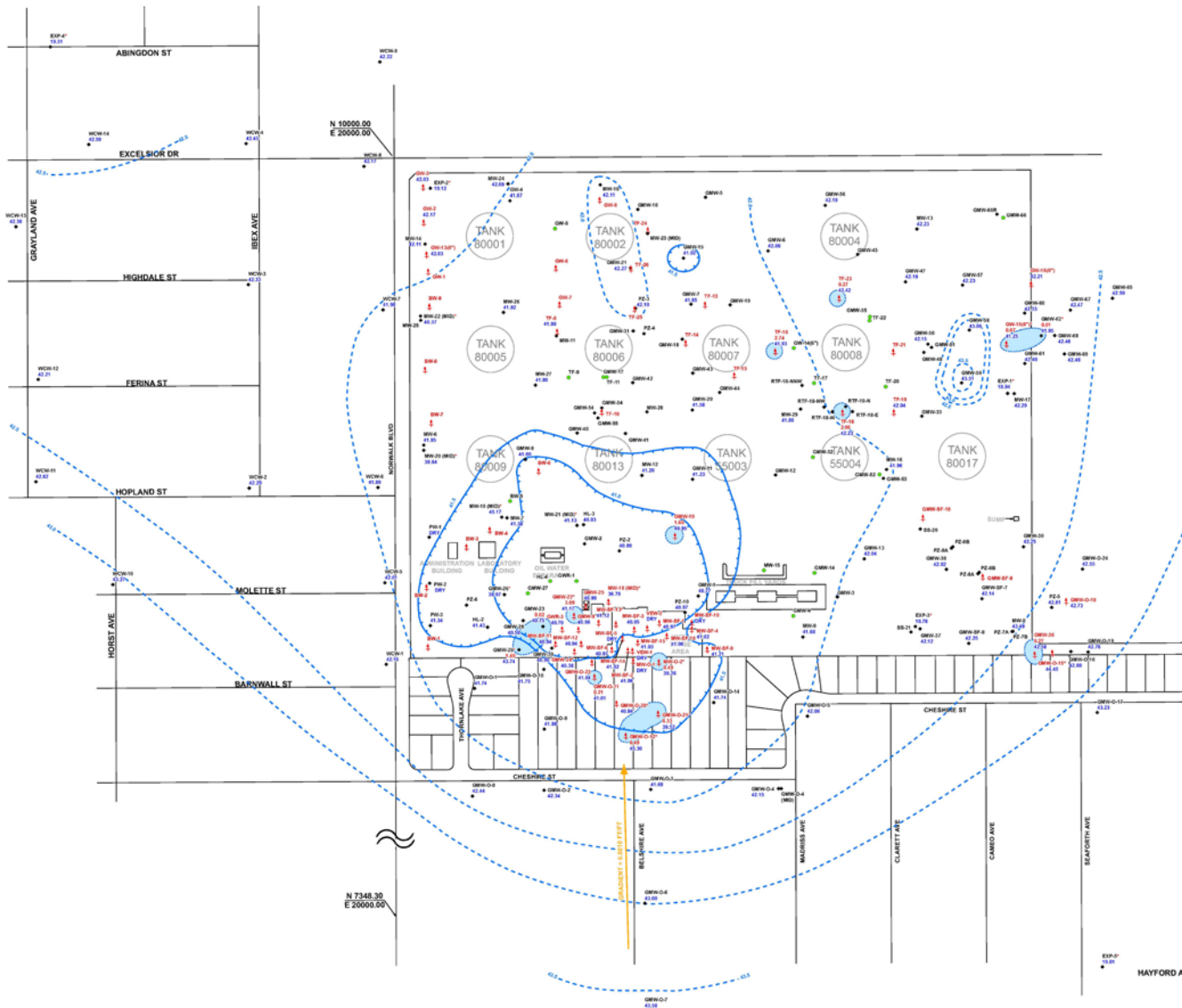
- Site-wide monitoring in April 2016 – both KMEP and DLA Energy
- Well Gauging by Blaine Tech and SGI
 - 139 wells gauged
- Well Sampling by Blaine Tech and SGI
 - Low-flow sampling methods
 - 91 wells sampled (split samples collected in EXP-1, EXP-2, and EXP-3)
 - SFPP and DLA remediation systems remained offline during gauging activities

First Semiannual 2016

Groundwater Monitoring Report

- Uppermost Aquifer Groundwater Elevations and Flow
 - Groundwater elevations approximately 1.5 feet lower than those reported for April 2015
 - 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 1.75 feet lower than those reported for April 2015
 - Horizontal groundwater gradient was approximately 0.0002 ft/ft toward the east-southeast, substantially different than the uppermost groundwater zone

Groundwater Elevations - Water Table



Explanation



- GMW-5 ● Monitoring well used for sample collection and/or water level measurement
- VIEW-1 ↓ Vapor extraction, groundwater extraction, total fluids, or free product extraction well used for site remediation
- GMW-47 ● Groundwater elevation in feet above mean sea level (MSL)
42.19
- GMW-36 ↓ Apparent thickness of free product measured in well (feet), groundwater elevations calculated by removing product head effect.
0.27
42.58
- GMW-23/MW-29 ● Groundwater elevation not used in contouring
42.37
- TF-17 ● Decommissioned Well
- 42.5 ● Lines of equal groundwater elevation showing groundwater elevation in feet above MSL (dashed where inferred)
- Estimated extent of measurable light nonaqueous phase liquid (LNAPL, free product) on groundwater, dashed where inferred

Notes

1. Groundwater elevations and product thicknesses shown at wells are based on data collected by SGI, Blaine Tech, and SFPF in April 2016.
2. SFPF and DLA Energy's remediation systems were shut down approximately 1 week prior to collecting fluid level measurements in April 2016.
3. Wells screened in the Exposition aquifer or near the bottom of the uppermost aquifer are not used in contouring. Groundwater elevation contours are intended to represent generalized site-wide conditions and are integrated from data collected by Blaine Tech. Wells with groundwater elevations not used in contouring are marked with a red asterisk (*).

Survey Notes

1. Base map prepared from data provided by Fluor Daniel GTI, Dulin & Boynton, Geomatrix, and Parsons.
2. Except as noted below, well locations surveyed by Dulin & Boynton.
3. Locations of wells HL-3, and HL-4 based on field measurements by Fluor Daniel GTI and Woodward-Clyde.
4. Locations of wells BW-1 through BW-9 surveyed by Geomatrix based on reference to other wells surveyed by Dulin & Boynton.

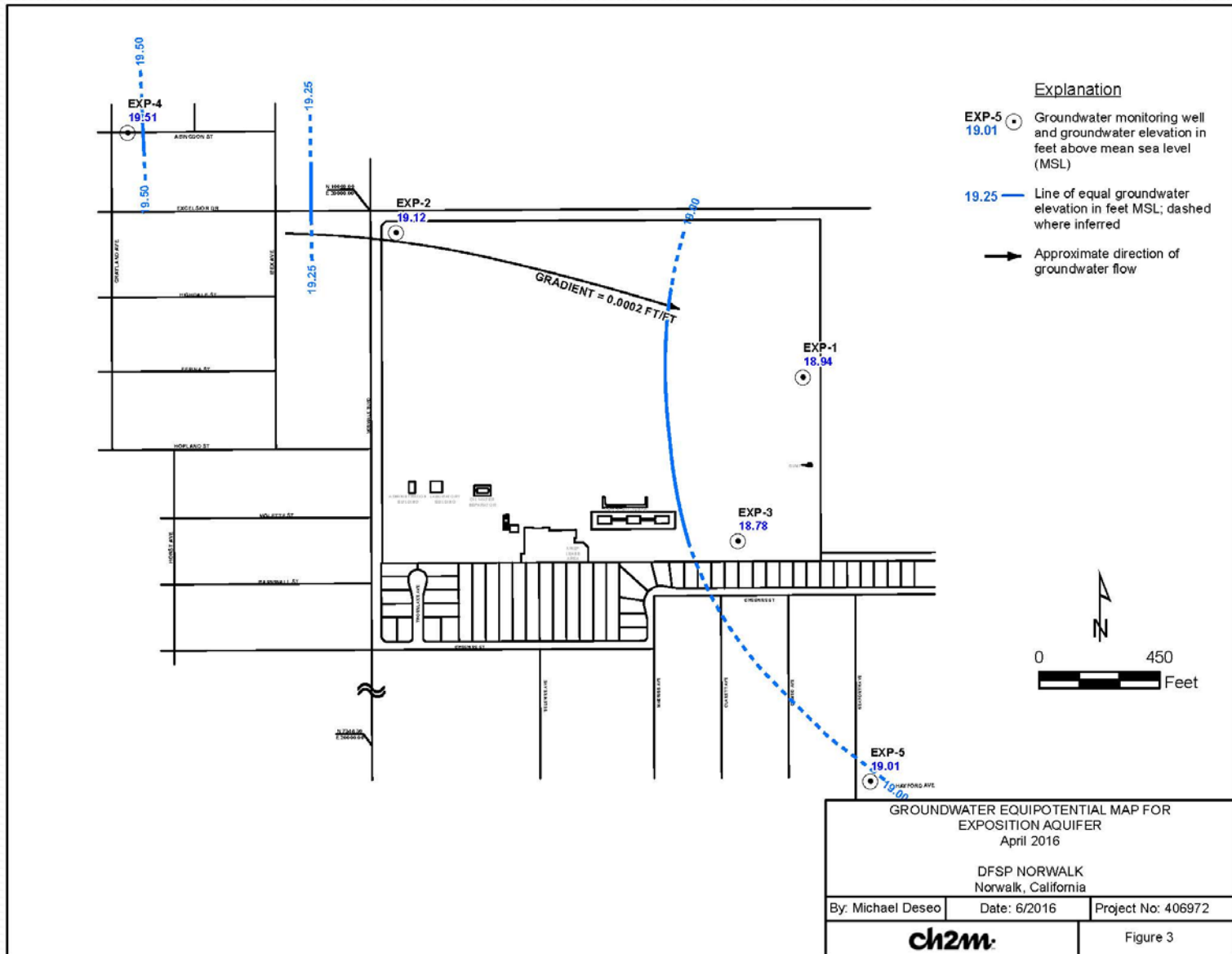



GROUNDWATER ELEVATIONS AND MEASURABLE LIQUID-PHASE HYDROCARBONS IN UPPERMOST GROUNDWATER ZONE
 April 2016
 DFSP NORWALK
 Norwalk, California

By: Michael Desco Date: 6/2016 Project No: 406972

ch2m Figure 2

Groundwater Elevations - Exposition



First Semiannual 2016 Groundwater Monitoring Report

- Free product measured in 14 of the 139 wells that were gauged.
 - North-central area: TF-16, TF-18, and TF-23
 - South-central area: GMW-10, GMW-22, GMW-23, GMW-29, GMW-O-11, GMW-O-12, GMW-O-21 and MW-O-2
 - Southeastern area: GMW-36
 - Thicknesses ranged from 0.01 foot in GMW-62 to 6.49 feet in GMW-O-12
- Decrease in product thickness and areal extent is a result of biosparging in the south-central area.
 - Only 4 wells with measurable product in June 2016 (pilot test sample event); GMW-O-12 product thickness was 0.8 feet

LNAPL Extent – 1998 to 2016



First Semiannual 2016

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 and DLA Energy split samples at concentrations of 1.0 and 1.7 ug/L, respectively, 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.

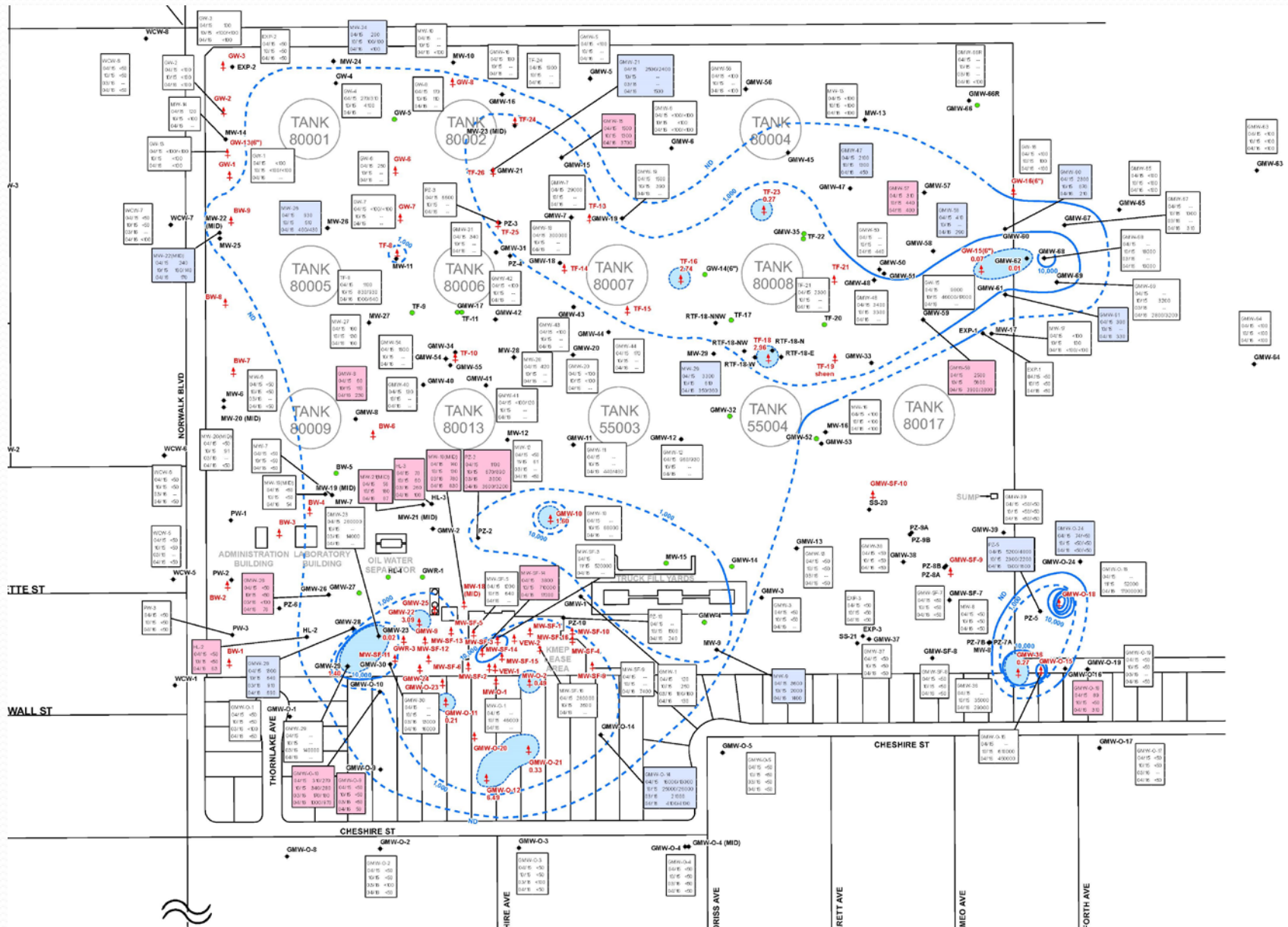
First Semiannual 2016

Groundwater Monitoring Report

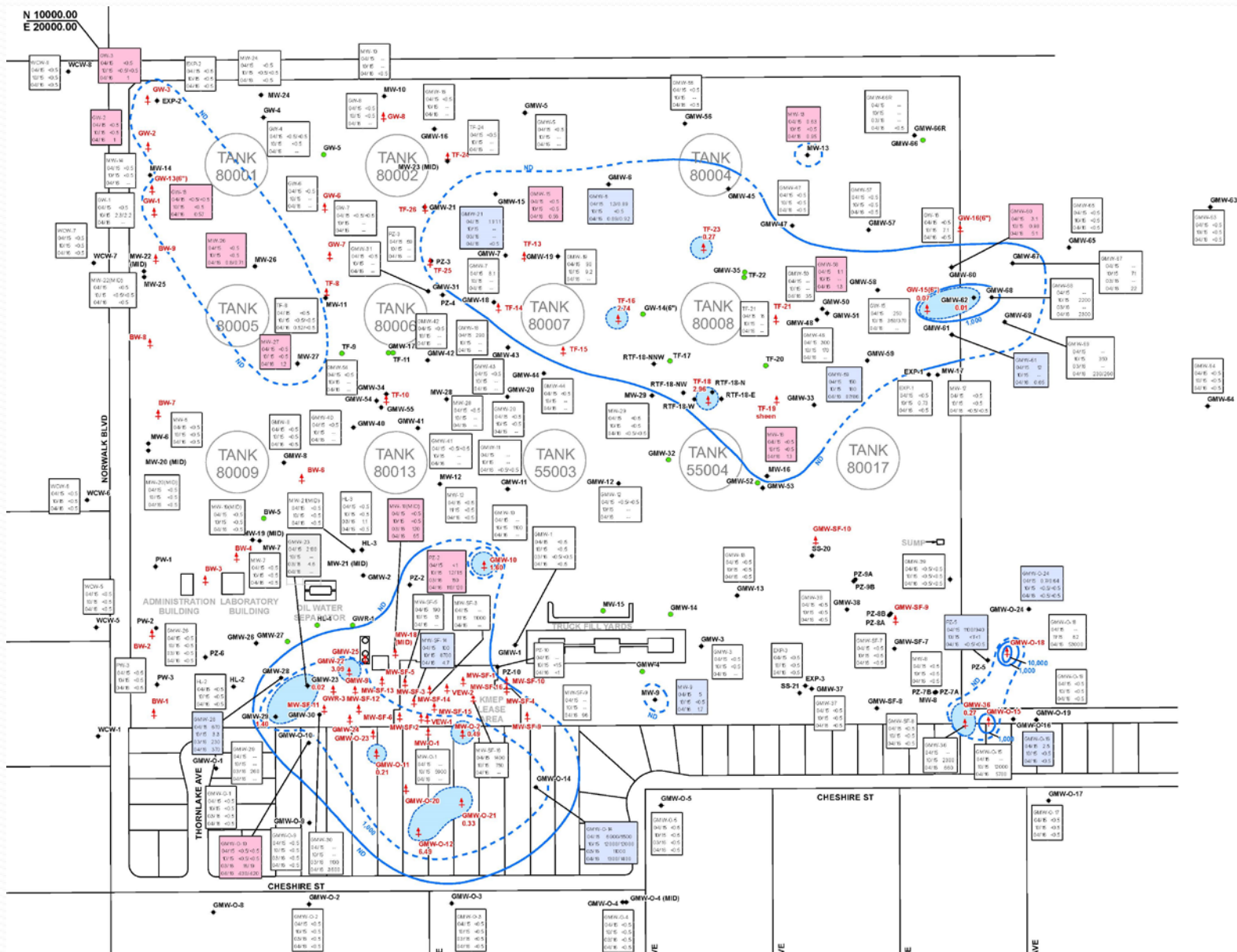
- Uppermost Aquifer Wells

- In most areas, the lateral extents of TPH, benzene, 1-2-DCA, MTBE, and TBA have been reduced from the historical maximum and currently appears to be stable and consistent with previous monitoring events
- Reduction and stability of plumes is a result of hydraulic containment by the treatment systems and attenuation mechanisms
- Free product accumulation in several remediation and monitoring wells declined in magnitude and extent due to biosparge operations in the south-central area
- Low level detections of MTBE and 1,2-DCA and plume extents in the western area do not warrant restarting the WSB treatment system.

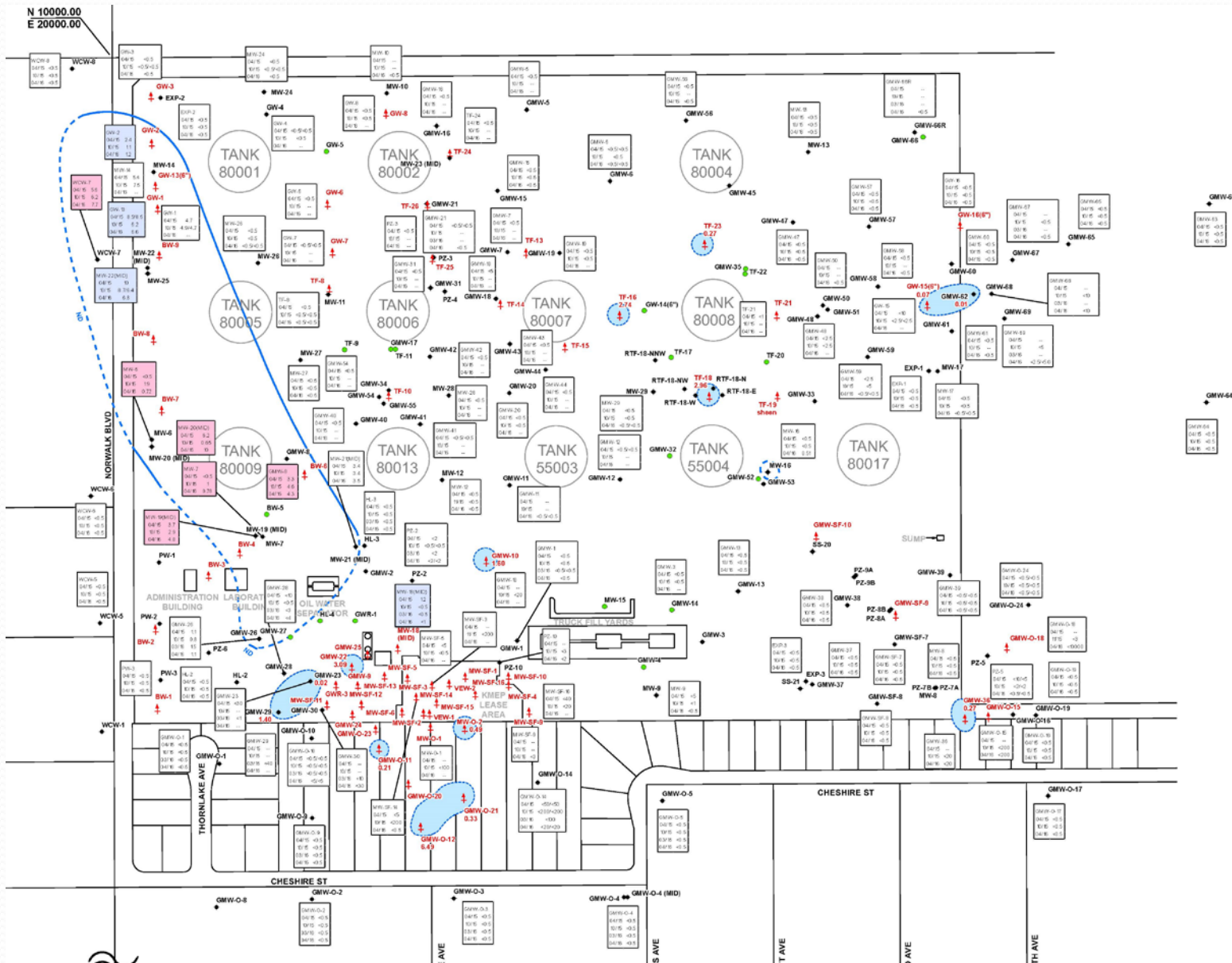
TPH



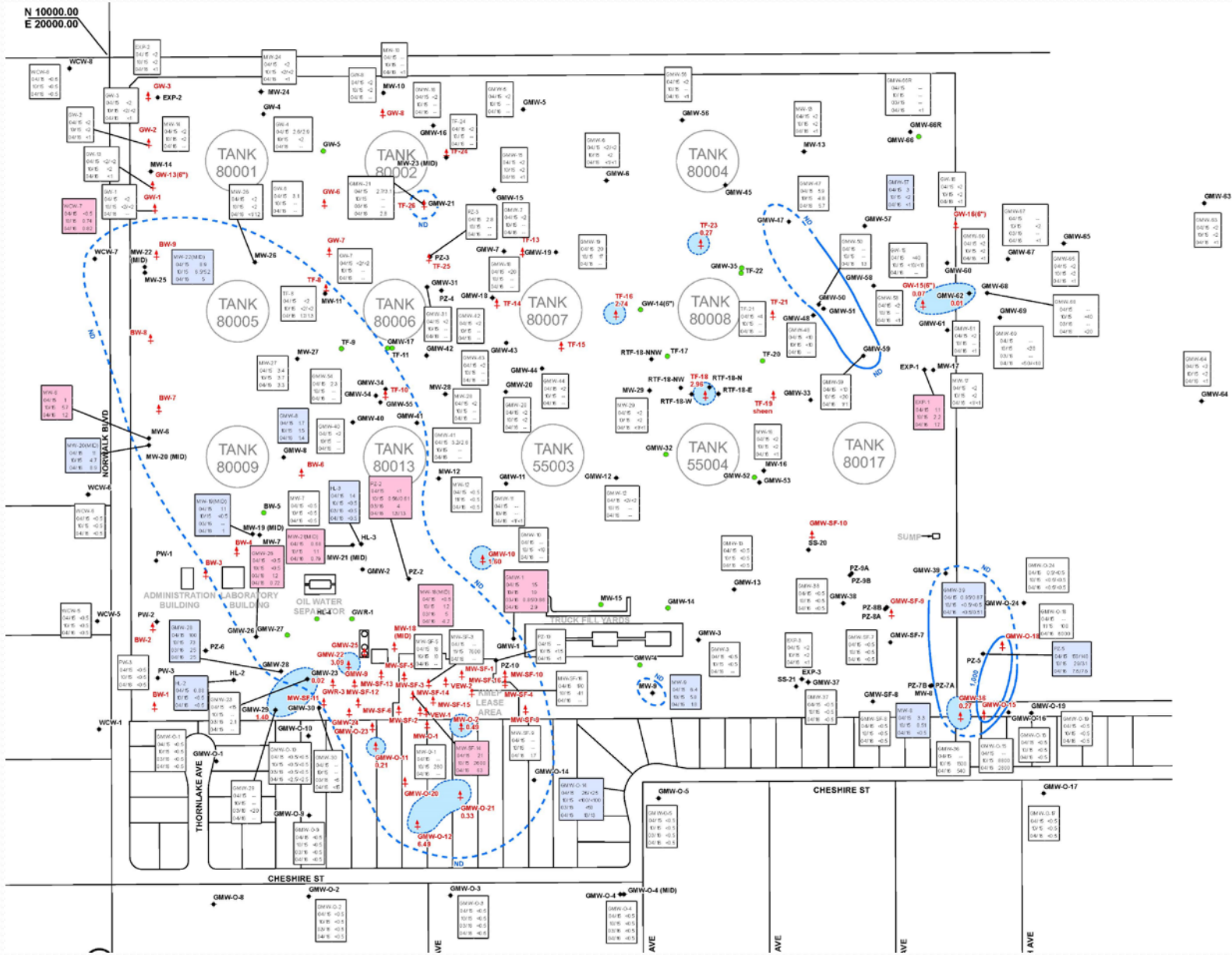
Benzene



1,2-DCA

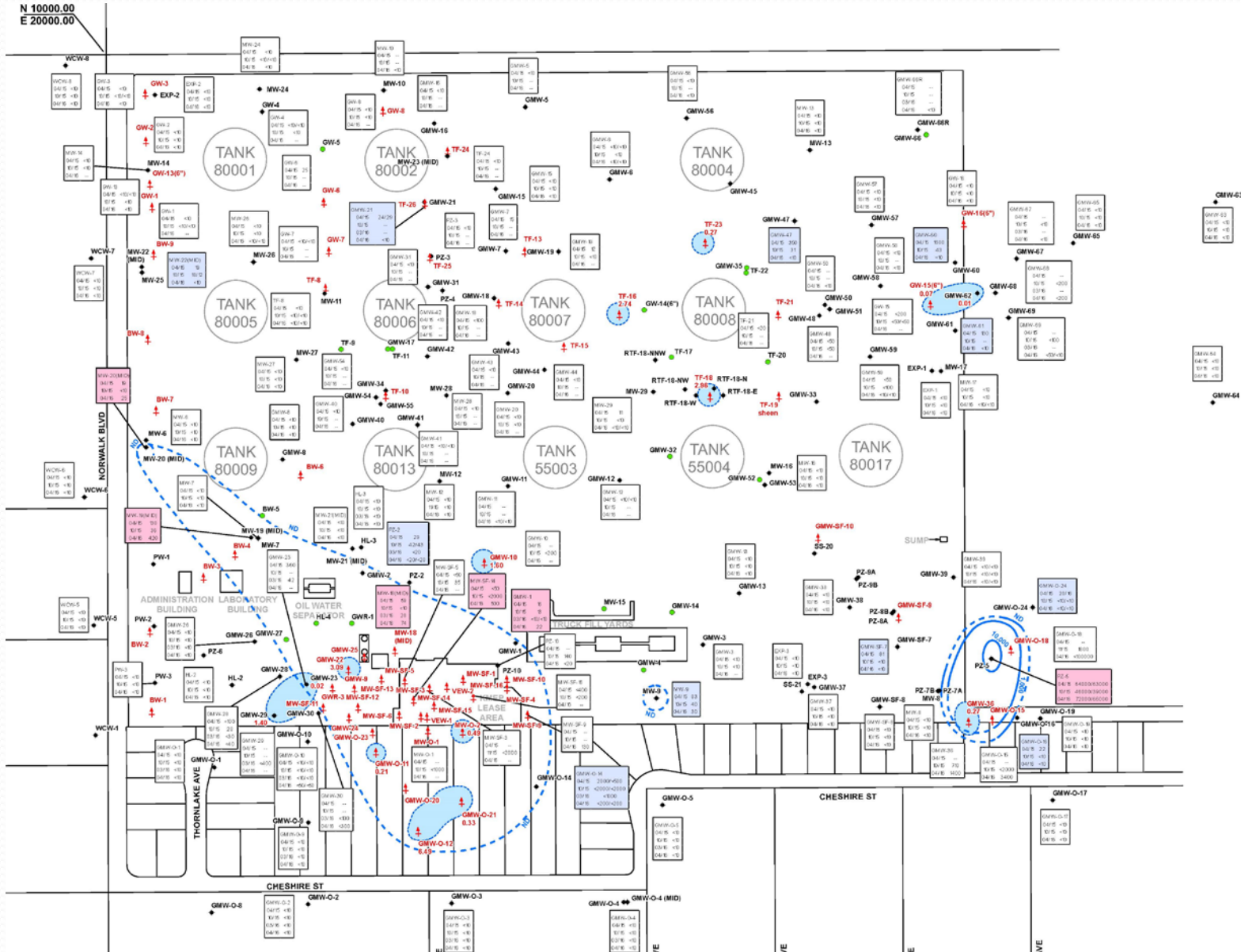


MTBE



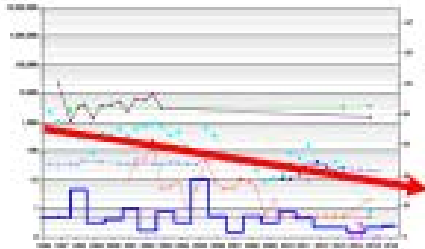
TBA

N 10000.00
E 20000.00

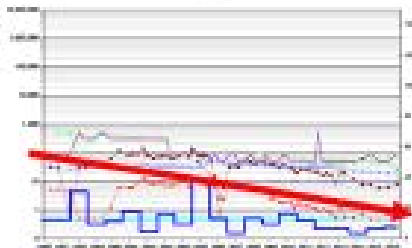


Time Series

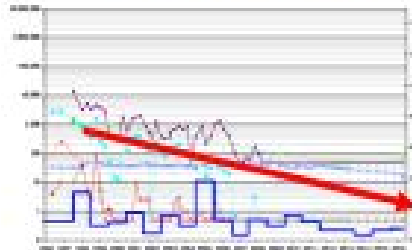
Tank Farm – GMW-45



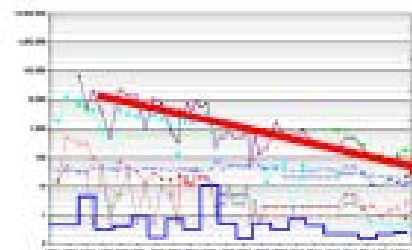
West – WCW-7



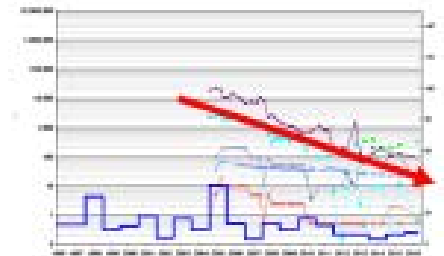
South Central –
GMW-O-3



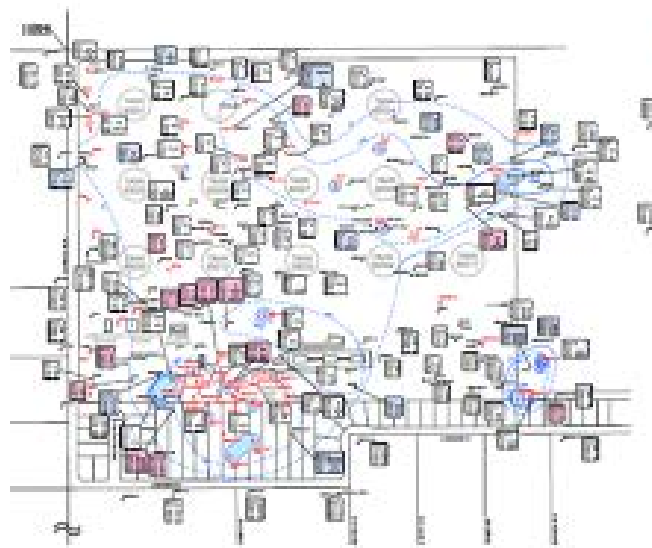
Truck Rack –
GMW-1



Northeast – GMW-61



Southeast – GMW-O-18





Questions?