

Norwalk Tank Farm Update

Presented to the Norwalk Tank Farm
Restoration Advisory Board

On behalf of KMEP

August 9, 2012

Presentation Overview

- KMEP Update
 - Remediation Operations Update
 - Additional Assessment Update
 - Five -Year Action Plan Progress Report
 - Planned Activities
- First Semiannual 2012 Monitoring Update

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 Site 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
 - 18 TFE wells (product and groundwater)
 - 24 onsite and 6 off-site SVE wells (most collocated with TFE wells)
 - 2 GWE 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
 - Gauging of Select Remediation Wells

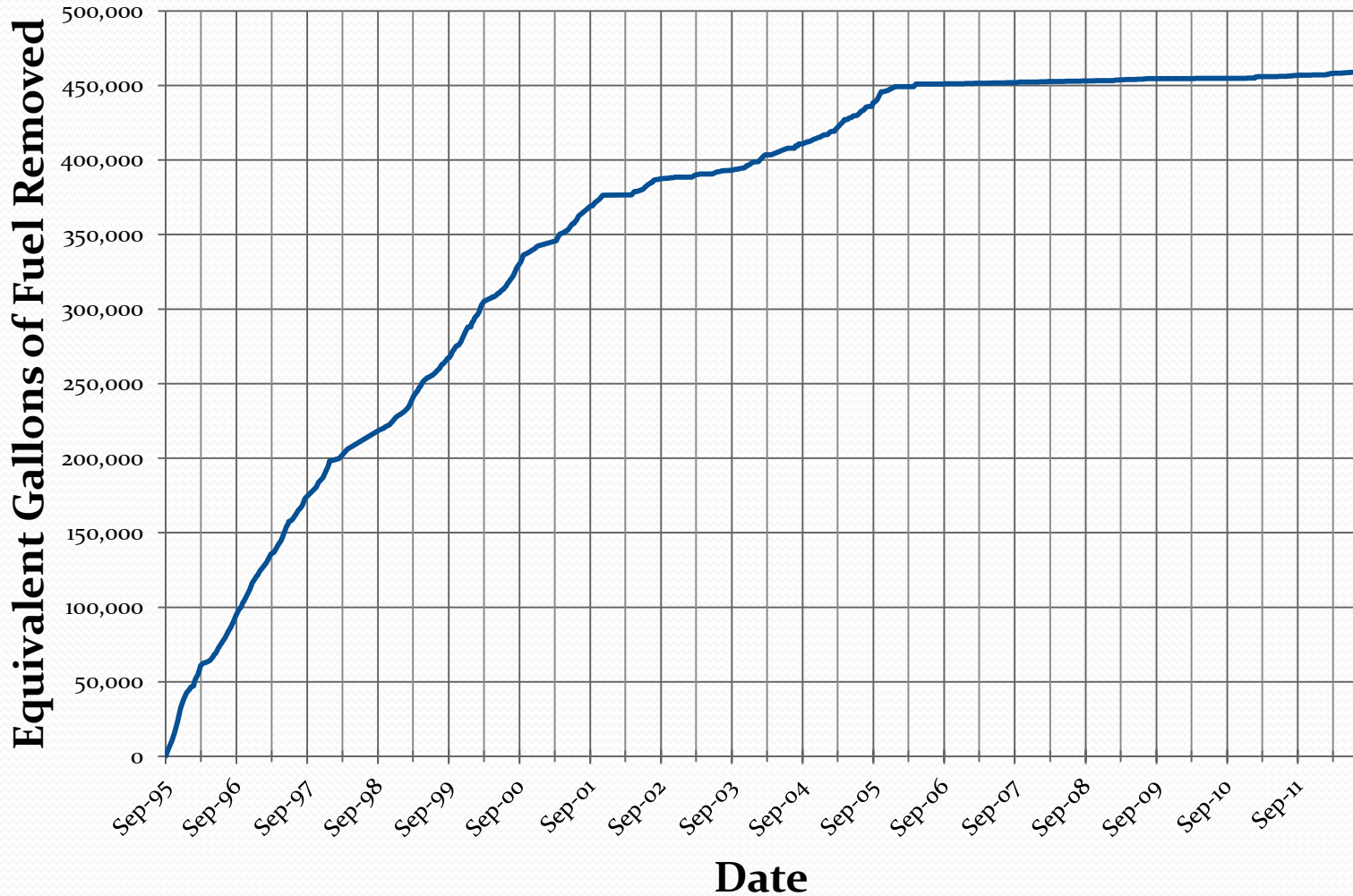
SVE System Operations Summary

- 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 2012 – 1,150 gallons (7,593 pounds)
- 2nd Quarter 2012 – 530 gallons (3,498 pounds)
- Since Second Addendum – 7,010 gallons (46,263 pounds)
- Since 1995 – Approx. 457,100 gallons (3 million pounds)

SVE System Operations Summary

Cumulative Fuel Removed by Vapor Extraction To Date



TFE/GWE System Operations Summary

- Groundwater Extracted
 - 1st Quarter 2012
 - South-Central and Southeast Areas –1,600,698 gallons
 - West Side Barrier – none (shutdown in third quarter 2008)
 - 2nd Quarter 2012
 - South-Central and Southeast Areas 1,609,376 gallons
 - West Side Barrier – none (shutdown in third quarter 2008)
 - Since 1995
 - South-Central and Southeast Areas– 50.7 million gallons
 - West Side Barrier – 26.9 million gallons

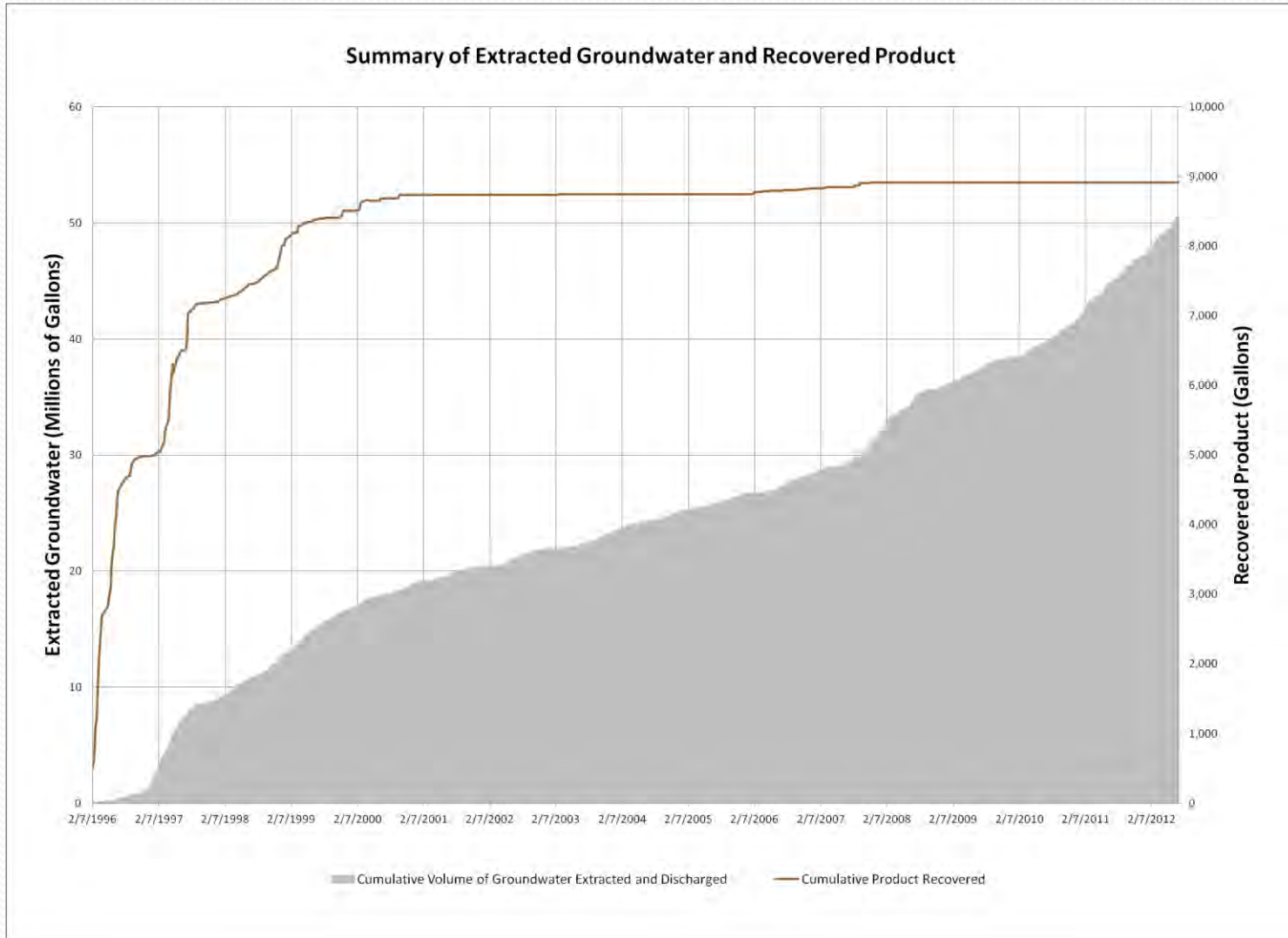
TFE/GWE System Operations Summary

- Mass of TPH removed in Groundwater Extracted
 - 1st Quarter 2012– 10 gallons (69 pounds)
 - 2nd Quarter 2012– 12 gallons (80 pounds)
 - Since implementing Second Addendum
 - 265 gallons (1,748 pounds)

TFE System Operations Summary

- Free Product Extracted
 - 1st and 2nd Quarter 2012
 - Free product has generally decreased since implementing the Second Addendum
 - Volume of free product recovered is small and emulsified
 - Free product not observed to accumulate in the product holding tank.
 - Free product not estimated for 1st and 2nd Quarter 2012
 - Since 1995 – 8,917 gallons

TFE System Operations Summary



Remediation System Operations Summary

- SVE System

- 1st Quarter 2012

- Operated 94% of time

- 2nd Quarter 2012

- Operated 74% of time

- Operated 90% of time (excluding planned shutdowns for groundwater monitoring and soil vapor sampling in offsite areas)

- TFE/GWE System

- 1st Quarter 2011

- Operated 80% of time

- 2nd Quarter 2011

- Operated 86% of time

- Operated 98% of time (excluding planned shutdowns for groundwater monitoring)

Remediation System Downtime

- SVE System
 - Groundwater monitoring activities
 - Routine maintenance activities
 - Drain water condensate from manifold
 - Replacement of memory card for the chart recorder
 - Reprogram temperature control
 - Site wide power outage and electrical issues (blown fuses)
 - Soil vapor sampling at southern offsite and southeastern areas
- TFE/GWE System
 - Groundwater monitoring activities
 - Replacement of memory card for the chart recorder
 - Carbon changeouts
 - High level alarms for transfer tank
 - Changed bag filters, cleaned bag filter housing, backwash LGAC vessels
 - Site wide power outage
 - Plugging of polishing LGAC vessels due to formation of precipitates
 - Electrical upgrades to the control panel

Remediation System Upgrades

- SVE System
 - Replacement of the SVE flow sensor with a pitot tube to more accurately measure flow through the system
 - Retrofit of GMW-36 to extract both total fluids and soil vapor
- TFE/GWE system
 - Installation of a new transfer pump downstream of the OWS
 - Installation of oxygen booster for both FBBRs
 - Replacement of carbon from the lead LGAC vessel downstream of the OWS and from the lead polishing LGAC vessel
 - Replacement of solenoid valve for the proportional controller with an actuated ball valve
 - Replacing the groundwater conveyance line for wells GMW-SF-9 and GMW-SF-10 in the southeastern area
 - Rewiring and upgrading the electrical system in the TFE/GWE system control panel
 - Installing an acid addition system in the influent sumps and the effluent tanks of the two FBBRs

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 LGAC vessels
- Pre-catalyst back pressure monitoring – Weekly
 - Monitor for particulate buildup on catalyst cells
- Sampling between LGAC vessels – bi-weekly
 - Monitor for breakthrough between carbon vessels; concentrations alert technicians when a change out is required
 - Carbon in polishing LGAC vessels changed out on January 31 and February 1, 2012; carbon in LGAC vessels downstream of the OWS changed out on March 2, 2012

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 and sumps
 - Drain and/or pressure wash holding tanks

Planned Remediation Activities

- Continue focusing remedial efforts on South-central and Southeastern areas
 - Continue operating TFE, GWE, and SVE systems
 - Continue system maintenance, inspections, and data collection on weekly basis
 - Continue pumping onsite southeastern area extraction well GMW-SF-9 to hydraulically contain TBA in that area
- Monitor concentrations of 1,2-DCA, MTBE, and TBA in western area and restart WSB if necessary
- Installation of a 6-bag filter housing parallel to existing 6-bag filter housing to extend life of upstream bag filters
- Installation of 2-bag filter housing and backwash system near LGAC polishing vessels

Additional Assessments

- Southeastern 24-Inch Block Valve Area
 - Field investigation complete in January 2011
 - Results presented in August 11, 2011 RAB and report prepared by CH₂M HILL (CH₂M HILL, August 2011)
- Vertical Assessment of LNAPL in Soil
 - Field investigation complete in October 2011
 - Results presented in February 9, 2012 RAB and report prepared by CH₂M HILL (CH₂M HILL, February 2012)
- South-Central Residential Area Vapor Study
 - Soil vapor probes installed and sampled in June/July 2012
 - Report is in process
- Soil Boring Investigation
 - Revised work plan submitted to RWQCB on August 3, 2012
 - Field work pending approval by RWQCB but anticipated for September 2012

Soil Vapor Monitoring Investigation

- Objectives

- Evaluate soil vapor concentrations at depths of approximately 5 and 15 feet bgs in areas overlying the current extent of dissolved COPCs including the area near well GMW-O-14
 - COPCs determined during 2006 vapor investigation and HHRA
- Update the HHRA if the new soil vapor data exceed CHHSLs
- Provide facilities for future soil vapor monitoring in the project area

Soil Vapor Monitoring Investigation

- Approach
 - Advanced direct push borings to roughly 15 feet bgs
 - Log soil using USCS and screen headspace using PID
 - Installed 10 nested soil vapor monitoring probes in direct push borings (9 in southern offsite and 1 in southeastern area); probes screened at ~ 5 and 15 feet bgs
 - Shut down SVE for 3 weeks to allow vapor concentrations to rebound in vadose zone prior to sampling
 - Sampled vapor probes using onsite mobile lab and offsite fixed lab (for confirmation samples)
 - Mobile lab analysis for VOCs plus leak test compound (2-propanol)
 - Fixed lab analysis for VOCs, methane, CO₂, and O₂

Soil Vapor Monitoring Investigation



Soil Vapor Monitoring Investigation

- Leak Testing (2-propanol)
 - Not detected in mobile lab samples
 - Detected in fixed lab samples but at concentrations between RL and MDL
 - Trace or ND results indicate lack of breakthrough or leakage during purging and sampling probes
- Mobile Lab Results
 - All analytes were ND at the mobile laboratory reporting limits, and below human health risk screening levels
- Fixed Lab Results
 - Methane was ND in all samples
 - VOCs detected but at trace concentrations near the laboratory RL, and below human health risk screening levels

Soil Vapor Monitoring Investigation

Analyte - Units in ug/L	Mobile Lab (5 and 15 foot)	Fixed Lab SMV-5 (15 foot)	Fixed Lab SVM-9 (15 foot)	Future Residential Soil Gas Screening Level	Future Commercial Soil Gas Screening Level
Benzene	<0.03	0.0034 J	0.0033 J	0.08	0.28
Ethylbenzene	<0.03	0.0034 J	0.0050 J	0.97	3.27
m and p-xylene	<0.07	0.012	0.021	730	2,044
o-xylene	<0.06	0.0044 J	0.0077	730	2,044
Toluene	<0.04	0.0094	0.016	313	876
MTBE	<0.17	<0.0012	0.0025 J	9.4	31.4
tert-Butanol (TBA)	<1.7	<0.00082	0.010 J	---	---
1,2,4-Trimethylbenzene	<0.05	0.0053 J	0.0073 J	7.3	20.4
1,2-Dichlorethane	<0.06	<0.0018	<0.0019	0.12	0.39
1,3,5-Trimethylbenzene	<0.05	0.0016 J	0.0020 J	7.3	20.4
Isopropylbenzene	<0.06	0.0011	<0.0011	---	---
n-Butylbenzene	<0.35	<0.0012	0.0016 J	---	---
n-Propylbenzene	<0.04	<0.00094	<0.0011	1,043	2,920
sec-Butylbenzene	<0.08	<0.0012	<0.0012	---	---
2-Propanol (leak test compound)	<0.09	0.0020 J	0.0038 J	7,300	20,440

--- = not available

J = estimated value

Fixed lab confirmation samples collected at
SVM-5 and SVM-9 at 15 foot depth

Soil Vapor Monitoring Investigation

- Final HHRA is pending but preliminary data indicate no risk to human health in offsite areas
 - Mobile lab sample results are all non-detect for COPC s
 - Fixed lab confirmation sample results are all below screening levels for future residential and commercial use
- Planned follow up soil vapor sampling is scheduled for December 2012

Soil Boring Investigation

- Objectives

- Confirm vertical extent of impacted soil in the vadose zone at known release areas and areas with elevated concentrations of dissolved phase hydrocarbons
- Provide permanent groundwater monitoring point approximately 100 feet northeast of monitoring well GMW-O-18 to better define downgradient extent of dissolved phase hydrocarbons in southeastern 24-inch block valve area
- Provide additional soil data for evaluation of risk-based clean-up goals for TPH, BTEX, and other VOCs

Soil Boring Investigation

- Scope of Work
 - Advancement of 9 direct-push soil borings (7 borings in south-central area, 2 borings in southeastern area) to top of water table (~30 feet)
 - Soil logging and PID screening
 - Discrete-depth soil sampling
 - Analyze for VOCs and TPH
 - Advancement of 1 soil boring to top of Bellflower aquitard (~ 50 feet) in southeastern area and convert to shallow monitoring well
 - Soil logging and PID screening
 - Discrete-depth soil sampling
 - Analyze for VOCs and TPH

Soil Boring Investigation



Five-Year Action Plan Progress Report

- Second Addendum to Remedial Action Plan
 - Submitted – November 2006
 - Approved – April 2007
 - Remediation system enhancements
 - Expanded the SVE and TFE system into onsite areas where residual LNAPL appeared to remain
 - 5-Year Schedule to Submitting Closure Request
 - August 2012
- Update provided in February 19, 2010 Letter to RAB
 - Revised Schedule to Submitting Closure Request
 - September 2013
- Remediation System Effectiveness Evaluation provided in Report by AMEC (May 14, 2010)

Five-Year Action Plan Progress Report

Status	Task	Date Completed or Projected	Second RAP Addendum
Completed	Receive Approval from RWQCB	April 2007	December 2006
	Begin Remediation System Expansion	May 2007	--
	Begin Upgrades to Groundwater Treatment System	August 2007	--
	Complete Remediation System Improvements	December 2007	February 2007
	Full-Scale Remediation Startup	January 2008	--
	Begin SVE Rebound Testing	December 2008	August 2008
	Submit First Annual Remediation Progress Report	January 2009	February 2008
	Submit Second Annual Remediation Progress Report	January 2010	--
	Complete SVE Rebound Testing	As conditions allow	February 2009
	Submit Third Annual Remediation Progress Report	January 2011	--
	Submit Fourth Annual Remediation Progress Report	January 2012	--
Future	Begin Bioventing Operation	After free product removal	March 2009
	Begin Bioventing Rebound Testing	TBD	December 2009
	Begin Verification Groundwater Monitoring	January 2010 (ongoing)	June 2010
	Complete Bioventing Testing	TBD	June 2010
	Submit Fifth Annual Remediation Progress Report	January 2013	--
	Complete Verification Groundwater Monitoring	When cleanup objectives are met	June 2010
	Submit Closure Request to RWQCB	When cleanup objectives are met	August 2012

Planned Activities 2012/2013

- Preparation of Feasibility Study by end of 2012 to identify best option to facilitate clean up
 - Air sparging
 - Biosparging (vertical or horizontal)
 - In-situ stripping
 - Injection of chemicals or oxygenated water
 - MNA
- Initiate construction and testing of pilot-scale remediation system in 2013 (to include southeastern area)



Questions?

First Semiannual 2012

Groundwater Monitoring Report

- Sentry Event
 - January 2012 – DLA Energy
 - January 2012 – SFPP
- Semiannual Event in April
 - April 2012 – DLA Energy
 - April 2012 – SFPP
- Monthly Events
 - February, March, May, and June 2012 – SFPP
 - 6 Southeastern Area Wells
 - GMW-36, GMW-O-15, GMW-O-16, GMW-O-18, GMW-O-19, and PZ-5

First Semiannual 2012

Groundwater Monitoring Report

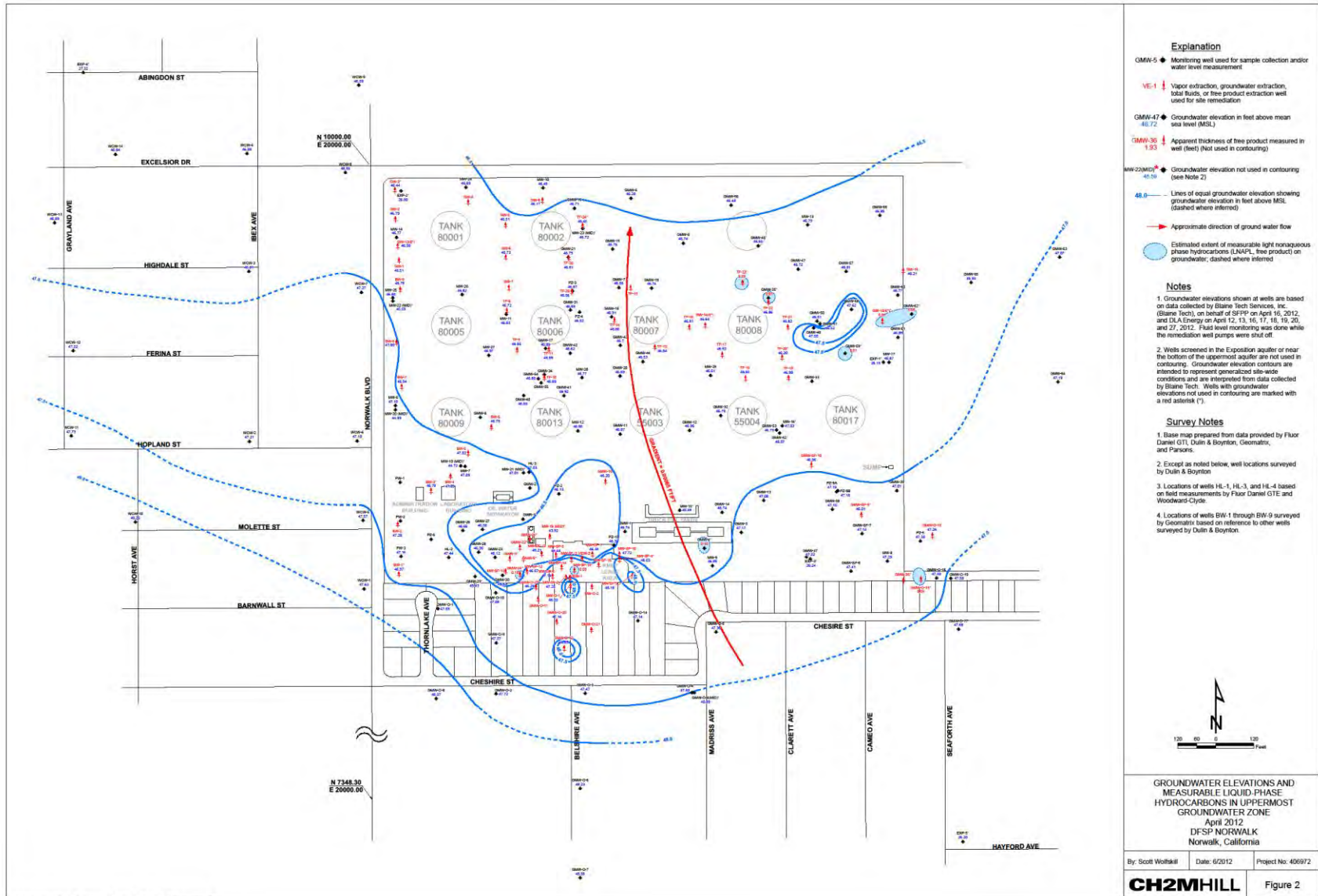
- Well Gauging and Sampling by Blaine Tech
 - Low-flow sampling methods
 - 161 wells gauged
 - 111 wells sampled
 - SVE/TFE/GWE turned off prior to gauging and sampling

First Semiannual 2012

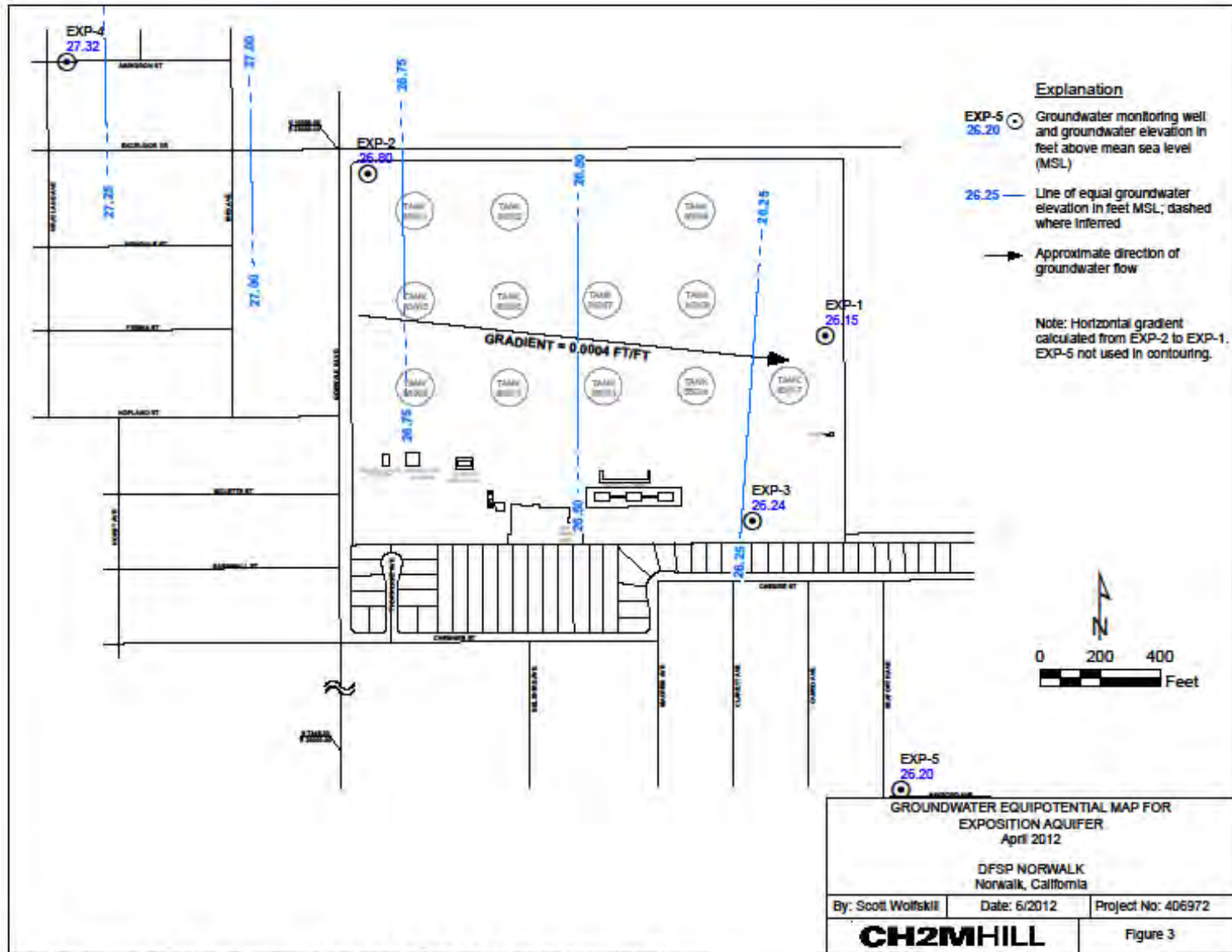
Groundwater Monitoring Report

- Groundwater levels during April 2012 generally similar to those encountered during previous monitoring events.
- Uppermost Aquifer Groundwater Elevations and Flow
 - Groundwater elevations approximately 1 foot lower than those reported for October 2011
 - Horizontal hydraulic gradient of 0.00065 ft/ft toward the north-northwest
- Exposition Aquifer Groundwater Elevations and Flow
 - Groundwater elevations up to approximately 2-foot higher than those reported for October 2011
 - Horizontal groundwater gradient was approximately 0.0004 ft/ft toward the east-southeast, substantially different than the uppermost groundwater zone

Groundwater Elevations - Water Table



Groundwater Elevations - Exposition



First Semiannual 2012

Groundwater Monitoring Report

- Free product measured in 9 of 161 wells gauged
 - (GMW-4, GMW-24, GMW-35, GMW-59, GMW-62, GMW-O-15, GW-15, MW-SF-15, and TF-23). Thicknesses ranged from 0.01 feet to 0.18 feet
 - Product sheen also observed in well MW-14 in the northwestern area
 - Free product present in the following areas, as interpreted from the current monitoring data, remediation system operations, and historical detections
 - Northern tank farm area (GMW-35, GMW-59, TF-23)
 - Eastern area (GW-15, GMW-62)
 - Truck rack area (GMW-4)
 - South-central area (GMW-24, MW-SF-15)
 - Southeastern 24-inch block valve area (GMW-o-15)

First Semiannual 2012

Groundwater Monitoring Report

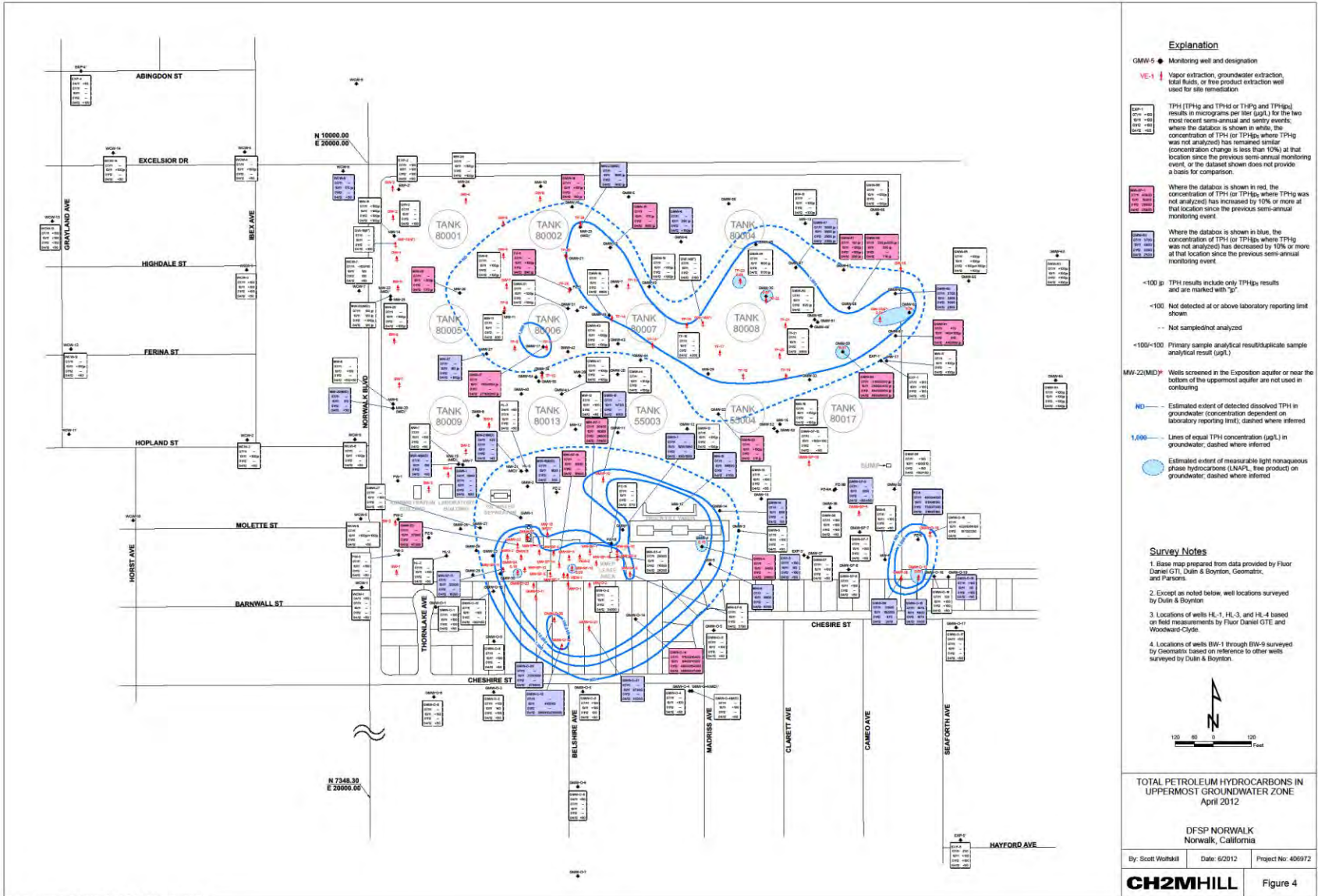
- Exposition Aquifer wells sampled:
 - EXP-1, -2, and -3 sampled twice by DLA Energy and SFPP
 - EXP-4 sampled once by SFPP
 - EXP-5 sampled twice by SFPP
- All analytical results were Non Detect (ND), except for the following:
 - MTBE and 1,2-DCA was detected at EXP-3 in either SFPP or DLA Energy split samples in January 2011, at concentrations below 1.0 ug/L near the laboratory reporting limit
 - MTBE and 1,-2 DCA were detected at EXP-3 in either SFPP or DLA Energy split samples in April 2011, at concentrations below 1.0 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 2012

Groundwater Monitoring Report

- Uppermost Aquifer Wells
 - In most areas, the lateral extents of TPH, benzene, MTBE, and 1-2-DCA in groundwater remain similar to those interpreted during recent previous monitoring events
 - Concentrations are influenced by water level fluctuations

Total Petroleum Hydrocarbons



Benzene



1,2-DCA

