Norwalk Tank Farm Update

Presented to the Norwalk Tank Farm Restoration Advisory Board

On behalf of KMEP

July 29, 2010

Presentation Overview

- KMEP Update
  - Remediation Operations Update
  - Selenium Management
  - Additional Assessment Update
  - Five -Year Action Plan Progress Report
  - Joint Capture Zone Analysis
  - Tracer Testing and Fuel Transported
- First Semi-Annual 2010 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

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)
  - 2 offsite SVE wells (both collocated with TFE wells)
  - 2 GWE Wells
- Treatment and Discharge
  - SVE Vapors
    - Treatment – Thermal catalytic oxidizer (catox)
    - Discharge – Atmosphere under SCAQMD Permit
  - TVE Liquids – Oil/Water Separator
    - Oil/Water Separator – Free product recycled offsite
    - Groundwater Treatment – Liquid-phase GAC
    - Groundwater Discharge – Coyote Creek under NPDES permit

Remediation Systems

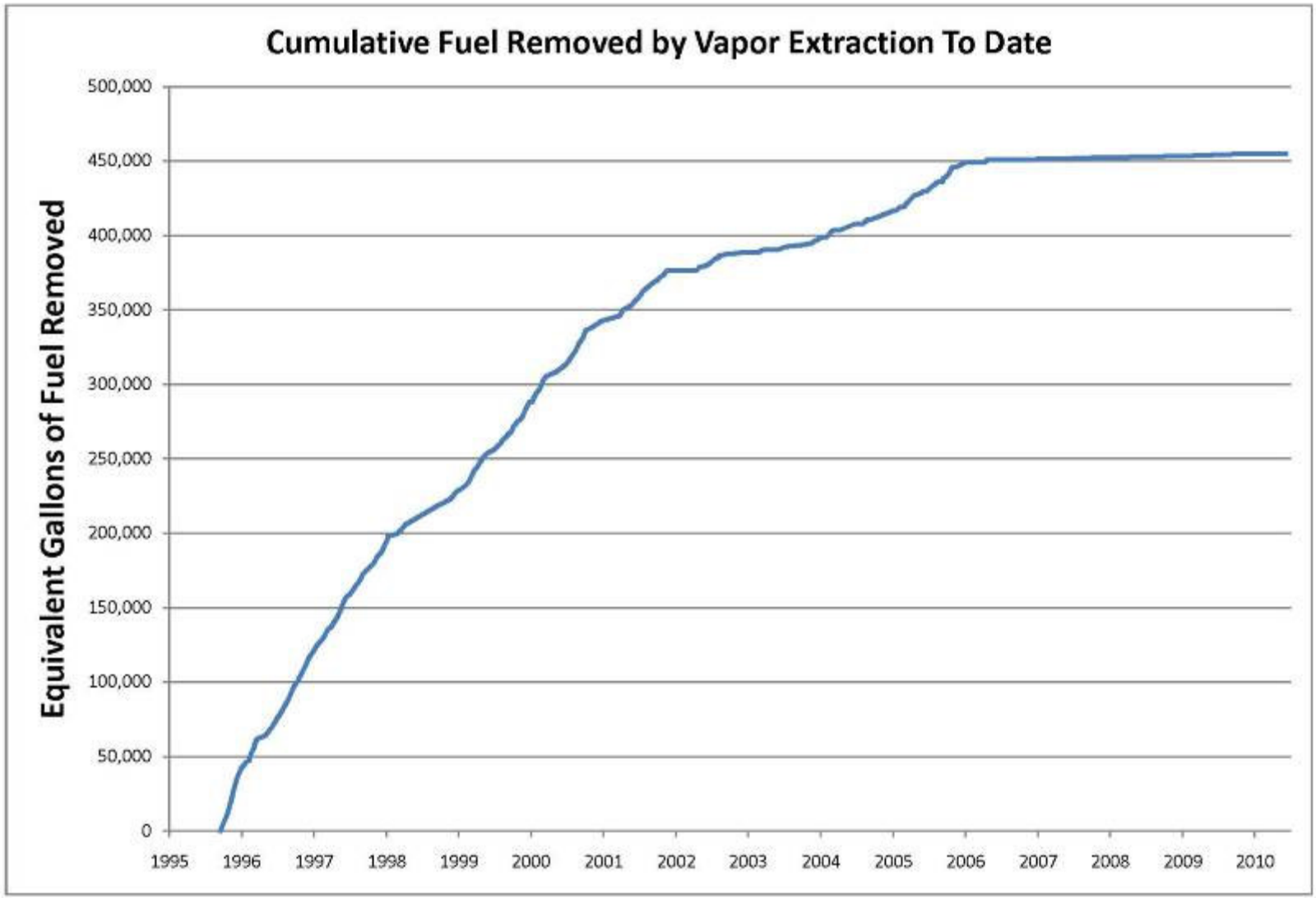
- Operations & Maintenance Activities
  - Weekly Inspection and Maintenance
  - Weekly Data Collection
    - Vapor flow rate, vacuum, groundwater extraction rates, hours of operations, and other system parameters
  - Monthly Pump Inspections
  - Measurement of Individual Well Vapor Concentrations
  - 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 2010 – 22 gallons (144 pounds)
- 2nd Quarter 2010 – 73 gallons (480 pounds)
- Since Second Addendum – 2,974 gallons (19,631 pounds)
- Since 1995 – Approx. 454,732 gallons (3 million pounds)

SVE System Operations Summary



TFE/GWE System Operations Summary

- Groundwater Extracted
  - 1st Quarter 2010
    - South-Central Area – 739,990 gallons
    - Southeast Area – 193,233 gallons
    - West Site Barrier – none (shutdown in third quarter 2008)
  - 2nd Quarter 2010
    - South-Central Area – 791,007 gallons
    - Southeast Area – 285,776 gallons
    - West Site Barrier – 2,244 gallons (for selenium evaluation)
  - Since 1995
    - South-Central Area – 41,407,316 gallons
    - Southeast Area – 10,280,357 gallons
    - West Site Barrier – 26,902,604 gallons

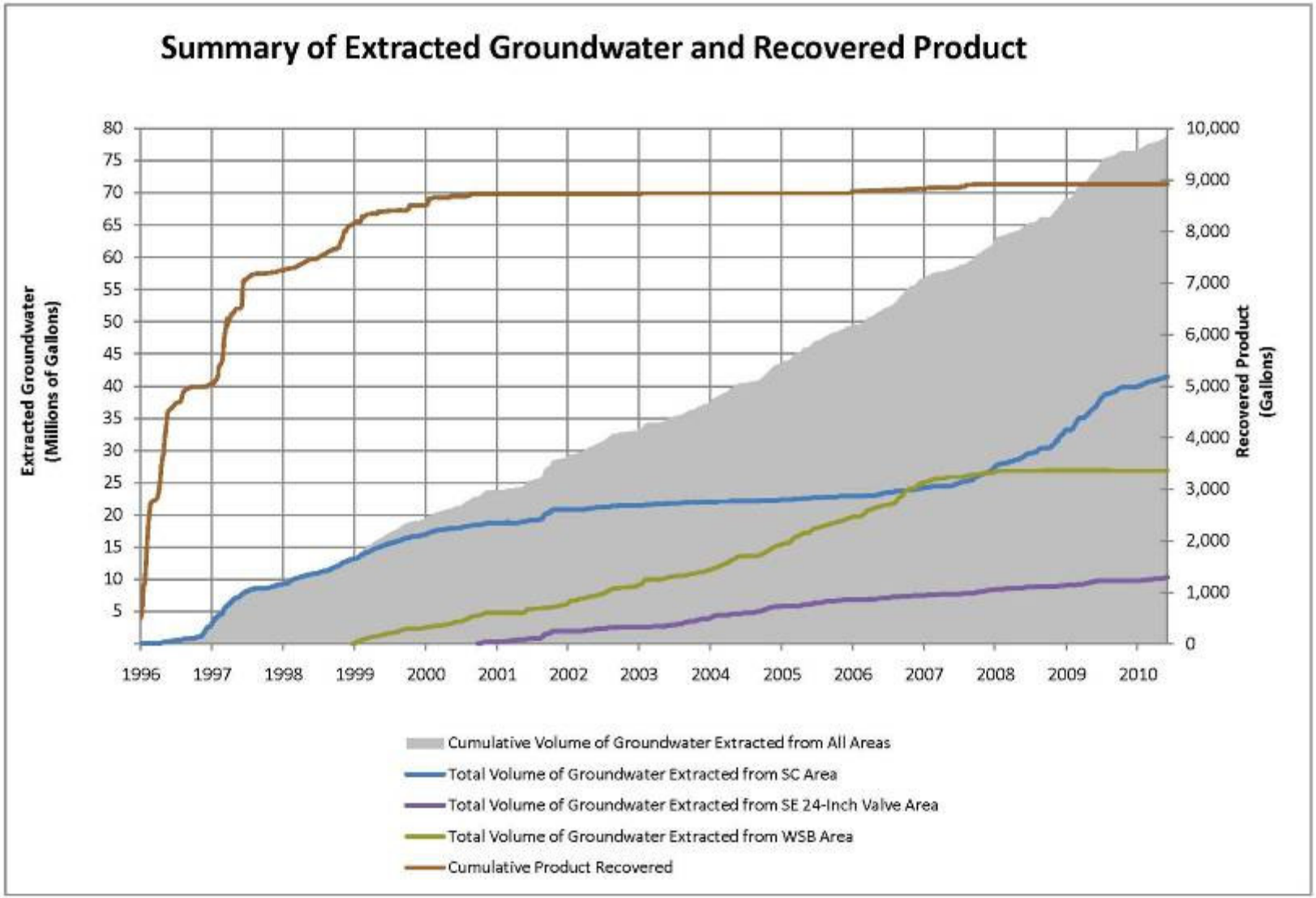
TFE/GWE System Operations Summary

- Mass of TPH removed in Groundwater Extracted
  - 1st Quarter 2010 – 9 gallons (58 pounds)
  - 2nd Quarter 2010 – 11 gallons (73 pounds)
  - Since implementing Second Addendum
    - 151 gallons (999 pounds)

TFE System Operations Summary

- Free Product Extracted
  - 1st and 2nd Quarters 2010
    - 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 Quarters 2010
  - Since 1995 – 8,917 gallons

TFE System Operations Summary



Remediation System Operations Summary

- SVE System
  - 1st Quarter 2010
    - Operated 56% of time
    - Operated 61% of time (excluding shutdown due to power loss)
  - 2nd Quarter 2010
    - Operated 56% of time
    - Operated 65% of time (excluding planned shutdowns for groundwater monitoring)
- TFE/GWE System
  - 1st Quarter 2010
    - Operated 40% of time
    - Operated 68% of time (excluding planned shutdowns for system maintenance, power loss, and selenium evaluation)
  - 2nd Quarter 2010
    - Operated 49% of time
    - Operated 58% of time (excluding shutdowns for selenium evaluation and groundwater monitoring)

Remediation System Downtime

- SVE System
  - Main breaker trips – January 2010
    - Replace blower motor
  - Main breaker trip – March 2010
    - Replace SVE breaker
  - High temp alarm – June / July 2010
    - Replaced dilution valves and continuing to trouble shoot
- TFE/GWE System
  - Maintenance activities
  - Groundwater monitoring activities
  - High level alarms for transfer tanks
    - Changed bag filters, cleaned bag filter housing, install new bag filter housing, replace high level switch
  - Pump Repairs at TFE/GWE wells – April / May 2010
  - Selenium concentrations exceeding NPDES limits
    - See next topic

Remediation System Downtime

- SVE and TFE/GWE Systems
  - Temporary Power Loss – March 2010
  - Main breaker trips – April / May / June
    - April 16, 2010
      - Electrical contractor began investigating circuit breakers. Contactor has made several trips to continue investigating and diagnosing circuit breaker issue
      - System has not gone down since beginning of July 2010
    - June 14, 2010 – Mobilized diesel-powered generator
      - temporarily shut-down due to fuel leak on June 22nd

Remediation System Maintenance

- Currently implementing several maintenance and upgrade activities to improve operation of the TFE/GWE system
  - Replaced conveyance lines
  - Pulled, cleaned, refurbished or replaced, and reinstalled extraction pumps
  - Redeveloped extraction wells
- These maintenance activities increased treatment system downtime, but will decrease future downtime and increase performance

Preventative Maintenance

- Flow totalizer maintenance – quarterly
  - Last inspected on June 8, 2010
- Check pump operation – monthly
- Pump inspection/cleaning/maintenance – semiannually
  - Currently being performed while pumps are off for selenium management
- Well development – As needed
  - GMW-36 and GMW-O-15 redeveloped on June 17, 2010
- Bag filter replacements – weekly
  - Bag filter housing on main system upsized on April 2010
  - Transfer high level switch also replaced on May 14, 2010
- Pre-catalyst back pressure monitoring – Weekly
  - Monitor for particulate buildup on catalyst cells
- Sampling between GAC vessels – bi-weekly
  - Monitor for breakthrough prior to last vessel
  - Carbon change out for lead vessel performed on July 9, 2010

Preventative Maintenance

- System-specific preventative maintenance schedule for each of the other components of the remediation system
  - South-Central System
  - Southeast System
  - West Side Barrier 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 catalyist
  - 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
  - Trouble shoot and restart SVE system (catalytic oxidizer)
  - Continue operating TFE, GWE, and SVE systems
  - Continue system maintenance, inspections, and data collection on weekly basis
  - Selenium
    - See next topic
- Monitor concentrations of 1,2-DCA and MTBE in western area and restart WSB if necessary

Selenium Management

- The groundwater treatment system has a limited capacity to treat selenium in groundwater
- Selenium is a naturally occurring constituent in groundwater at many sites and is not related to SFPP's or DESC's operations
- SFPP discharge limit under NPDES Permit
  - 4.1 ug/L – Average monthly effluent limitation (AMEL)
  - 8.2 ug/L – Maximum daily effluent limitation (MDEL)

Selenium Management

- Why seeing Selenium now?
  - Selenium transport is complex.
  - Depends on whether grounding is in a more oxidizing or reducing state
    - Oxidizing Conditions – Lower organics (e.g., hydrocarbon contaminants) in groundwater so less consumption of dissolved oxygen. The "oxic" conditions will result in "Selenate" which is less prone to adsorption (either onto the aquifer matrix or granular treatment media). Selenate is the more mobile form.
    - Reducing Conditions – Higher organics in groundwater so more consumption of dissolved oxygen. The "anoxic" conditions will result in "Selenite" which is more prone to adsorption. Selenite is the less mobile form and more tightly held onto the aquifer matrix than Selenate.
  - As hydrocarbons have been removed from the subsurface during remediation, groundwater has shifted from an "anoxic" to a more "oxic" state, which results in more selenium in extracted groundwater.
    - This is a sign of remediation progress.

Selenium Management

- Prior to January 2009
  - Selenium generally was not detect in effluent or was detected at low concentrations
- During 2009
  - January 2009 – Selenium in effluent exceeded MDEL of 8.2 ug/L
  - February 2009 – TFE/GWE temporarily shut down
    - Sample groundwater at individual extraction wells for selenium analysis
    - Evaluate and select wells that could be operated to maintain compliance
  - May 2009 – Resume extraction in selected wells
    - Maintained overall pumping capacity and selenium below limits
  - November 2009 – Selenium in effluent exceeded AMEL of 4.1 ug/L
  - TFE/GWE temporarily shut down again
    - Sample groundwater at individual extraction wells for selenium analysis
    - Perform well maintenance activities to improve well performance
  - February 2010 – Resume extraction in selected wells

Selenium Management

- Selenium Management Evaluation (AMEC, April 1, 2010)
  - Options considered in beginning of 2010
    - Option 1 – Adjust pumping configuration
    - Option 2 – Blend with water from another source
      - Option 2a – Westside Barrier Wells
      - Option 2b – Potable water from municipal supply
    - Option 3 – Add additional treatment equipment
    - Option 4 – Discharge to sanitary sewer (POTW)
    - Option 5 – Subsurface re-injection
  - Recommendations and path forward in beginning of 2010
    - Options 1, 2, and 4 considered feasible
    - Implement Option 1 for short-term
    - Evaluate Option 2a for short-term implementation

Selenium Management

- Selenium Management Update (AMEC, June 10, 2010)
  - Option 1 – Adjust pumping configuration
    - Currently implementing
    - Initially successful, but number of wells gradually decreasing
    - Current status of pumping:
      - South-Central Area – MW-SF-14, MW-SF-15, and GMW-O-11
      - Southeastern Area – GMW-15, GMW-O-18, GMW-36
  - Option 2a – Blend with Westside Barrier Wells
    - Performed significant maintenance of selected WSB well
    - Reconfigured main groundwater treatment system to receive extracted groundwater from WSB wells
    - Began implementing on June 4, 2010
    - Current status of WSB blending:
      - Selenium concentrations rose and WSB blending was discontinued

Selenium Management

- Subsurface Reinjection
  - Re inject groundwater into same zone
    - Injection wells or galleries
  - Subject to waste discharge requirements (WDRs)
    - WDRs issued by RWQCB
    - "Antidegradation" policy
  - May affect DESC or SFPP groundwater capture zones
    - May cause unwanted contaminant migration, would require thorough hydraulic analysis
  - May increase groundwater elevations
    - Trying to lower groundwater to expose smear zone
    - Extraction is easier than injection
  - Would result in increased O&M and potential downtime
    - Extraction is much easier than injection
    - Injection would be subject to aquifer clogging (just like conventional filters) and require ongoing maintenance and routine redevelopment

Selenium Management

- Additional Options and Evaluation Activities
  - Additional Onsite Treatment – Granular Ferric Hydroxide (GFH), Ion Resin Exchange (IRE), or Microfiltration
    - Selenium can potentially be treated using these alternate technologies
    - Effectiveness depends on state of selenium
      - Selenate – Less amenable to (GFH) treatment
      - Selenite – More amenable to (GFH) treatment
    - Recently collected groundwater, influent, and effluent samples to evaluate feasibility
    - If potentially feasible, may perform "isotherm" study to further assess feasibility
  - Reuse (Irrigation)
    - Subject to waste discharge requirements (WDRs)
    - WDRs issued by RWQCB

Selenium Management

- Path Forward
  - New NPDES Permit expected October 2010
    - May include revised (lower) selenium concentrations
  - Short-term – continue Option 1
    - Adjust pumping configuration
  - Simultaneously pursue multiple management options
    - Additional Onsite Treatment – see next slide
    - Discharge to sanitary sewer (POTW)
      - Already have made preliminary inquiries
      - Discharge pre-treated water to City of Norwalk sanitary sewer system, operated by Los Angeles County Sanitation Districts (LACSD)
      - LACSD does not have limit for selenium, which would eliminate need for selenium treatment
      - General prohibition against discharging groundwater to POTW, unless demonstration is made that it is infeasible to treat onsite

Selenium Management

- Path Forward
  - Additional Onsite Treatment – Granular Ferric Hydroxide (GFH), Ion Resin Exchange (IRE), or Microfiltration
    - 3rd Quarter 2010
      - Review recently collected feasibility evaluation samples
      - Identify which technologies are promising
      - Collect and send additional samples to vendors for "isotherm" studies (treatability, adsorption, service life)
    - 4th Quarter 2010
      - Design
      - Procurement and construction
    - Early 2011 – Startup
  - Discharge to POTW
    - 3rd Quarter 2010
      - Continue following-up with City of Norwalk and LACSD
      - Begin permitting process

Additional Assessment

- Southeastern 24-Inch Block Valve Area
- South-Central Residential Area Vapor Study
- Vertical Assessment of LNAPL in Soil
- Schedule
  - Work Plans submitted to RWQCB
  - Access initiated for Residential Vapor Study
  - Proceed upon approval by RWQCB

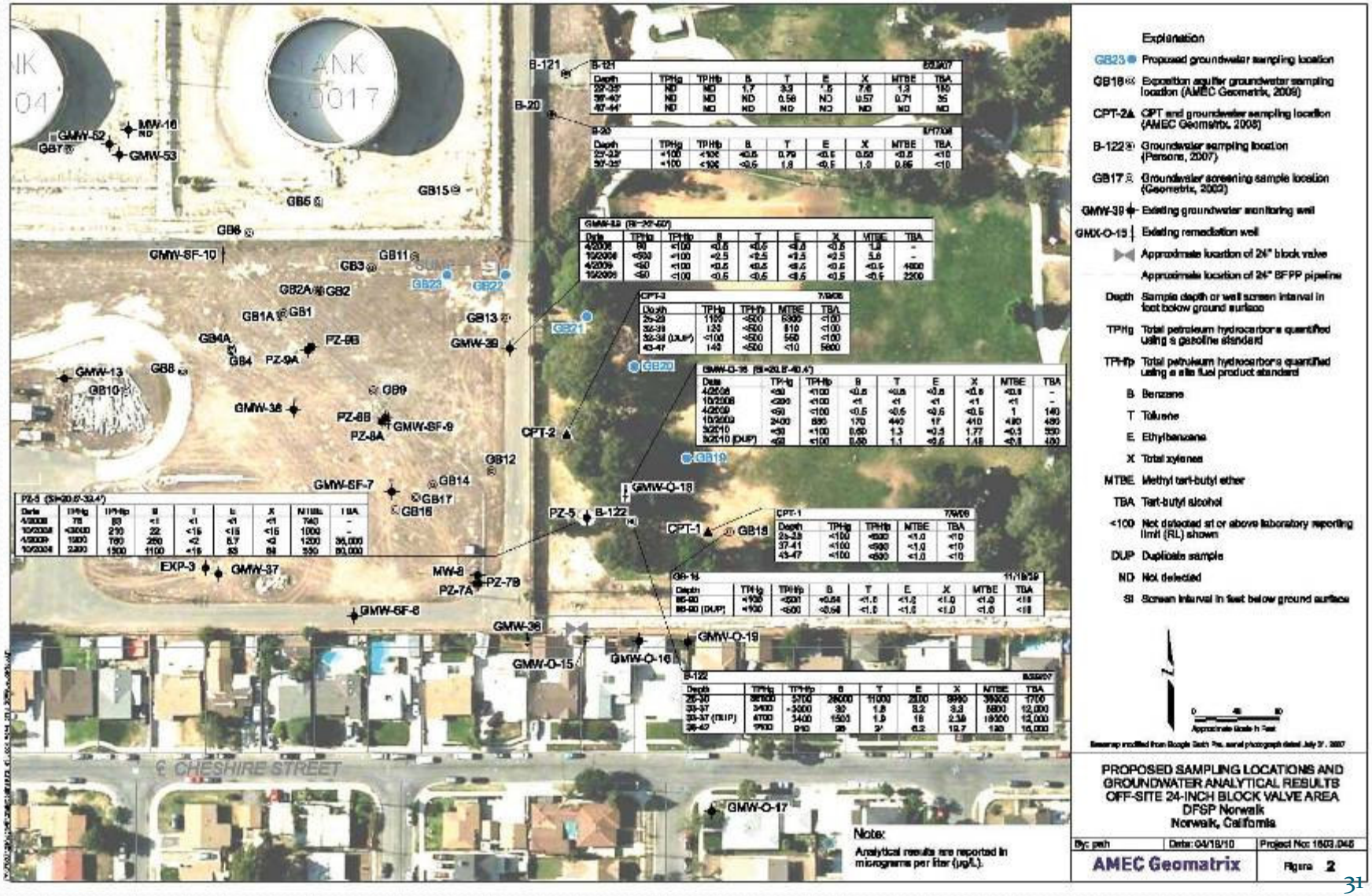
Southeastern 24-Inch Block Valve Area

- Additional Off-site Assessment– Complete
  - Field work conducted in July 2008
    - Soil gas sampling, lithologic profiling through aquitard (CPT), and discrete-depth GW sampling (CPT) in uppermost aquifer
  - Results documented in Report (AMEC, August 28, 2008)
- Supplemental Vertical Delineation – Complete
  - Field work conducted in November 2009
    - Continuous drilling, soil sampling and grab GW sampling in Exp Aquifer
  - Results presented at January 28, 2010 RAB Meeting
  - Results documented in Report (AMEC, April 23, 2010)
- Step-Out Investigation in Vicinity of Well GMW-O-18
  - Work Plan submitted to RWQCB (April 19, 2010)
  - Will perform upon approval by RWQCB

Southeastern 24-Inch Block Valve Area

- Step-Out Investigation in Vicinity of Well GMW-O-18
  - Objective
    - Delineate impacts in groundwater in southeastern area
  - Approach – investigate 5 x locations (GB-19 – GB-23):
    - Direct push field methods to top of aquitard (50 ft bgs)
    - Drilling, continuous coring, and lithologic logging
    - Discrete-depth soil and groundwater sampling
    - Soil and grab groundwater samples analyzed TPHg, TPH fp, BTEX, and Oxygenates

Southeastern 24-Inch Block Valve Area



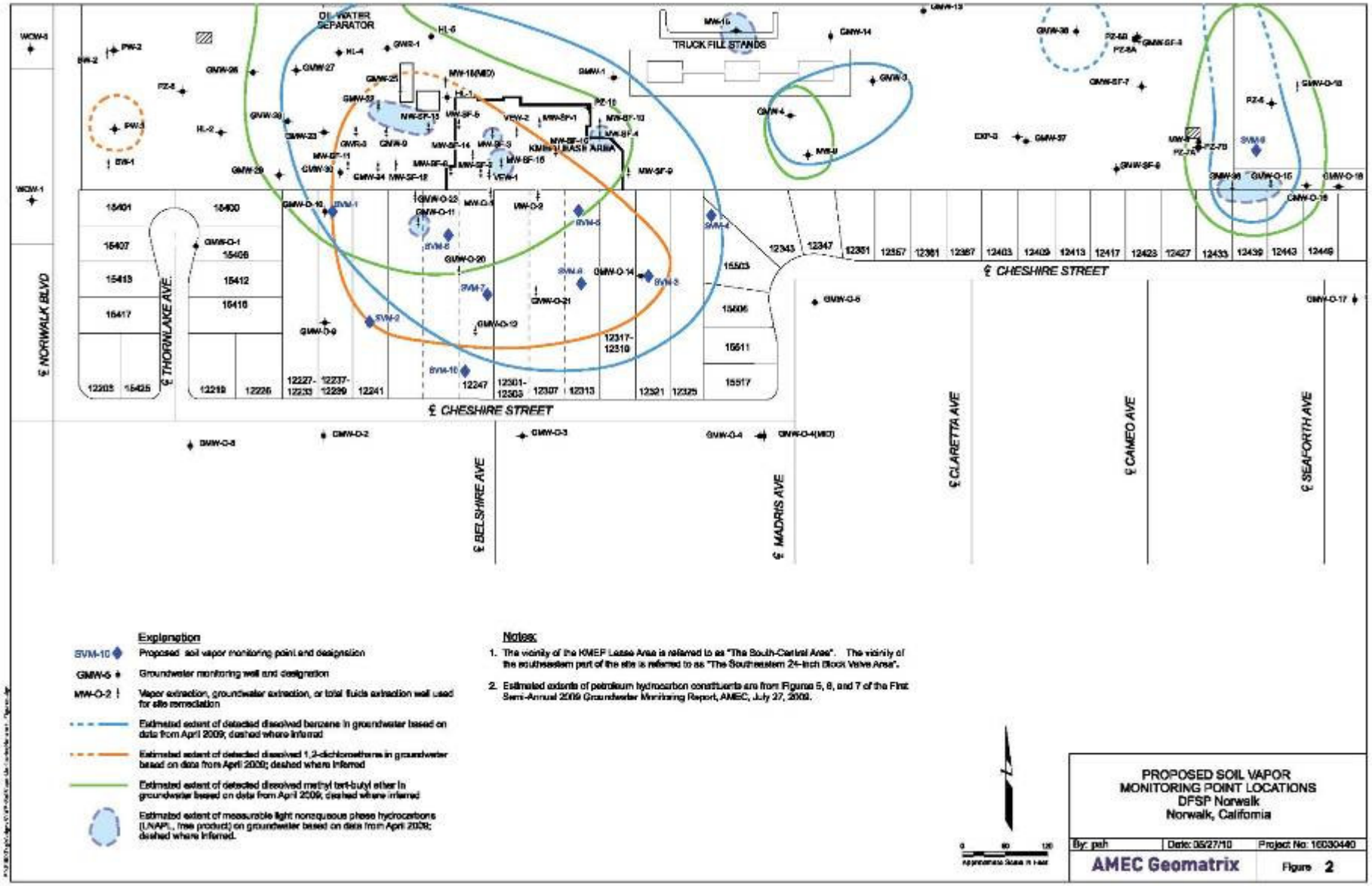
South-Central Residential Area Vapor Study

- 2006 Vapor Intrusion Sampling and Human Health Risk Assessment
  - Collected and analyzed shallow soil gas, sub-slab soil gas, and crawl space air samples
  - Performed human health risk assessment (HHRA)
  - VOCs in subsurface environmental media are not expected to pose unacceptable health effects for current or future receptors
  - Results in Report by Geomatrix (December, 2006)

South-Central Residential Area Vapor Study

- Additional Soil Vapor Monitoring
  - Objectives
    - Evaluate offsite soil vapor concentrations, including near GMW-O-14
    - Update 2006 HHRA if new soil vapor data exceed California Human Health Screening Levels (CHHSLs)
    - Provide facilities for future soil vapor monitoring in offsite area
  - Approach
    - Install monitoring network – 10 locations, 2 depths (5' and 15' bgs)
    - Collect samples – Initial sampling event, then semiannual monitoring for 1 year
    - Analyze samples using mobile lab – BTEX, MTBE, TBA, 1,2-DCA, and other select VOCs
    - If new data from initial sampling event exceed CHHSLs, then update the 2006 HHRA using the new soil vapor data and relevant updates to toxicity criteria for detected chemicals.

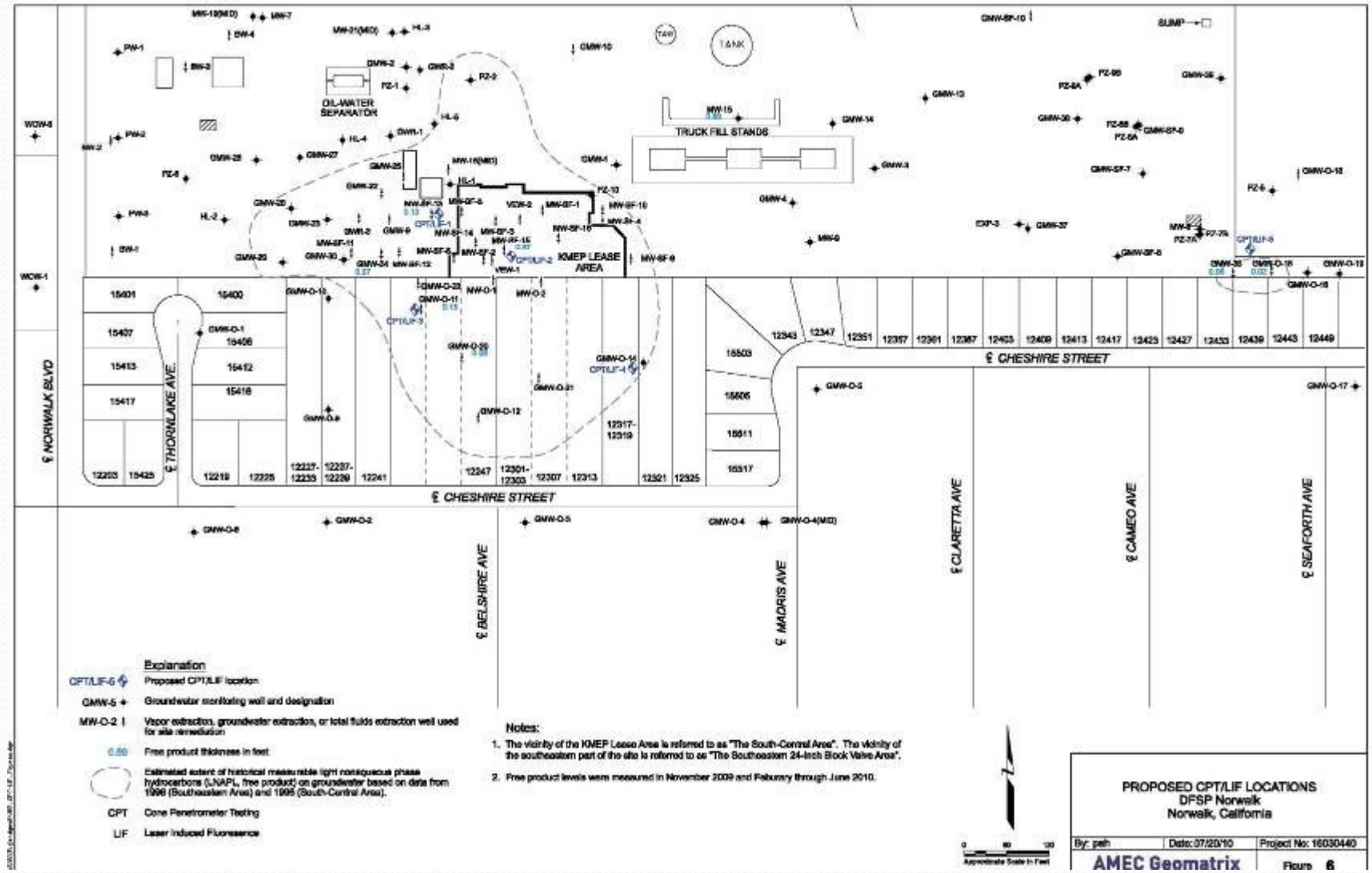
South-Central Residential Area Vapor Study



Vertical Assessment of LNAPL in Soil

- Objectives
  - Further evaluate vertical distribution of hydrocarbon product (LNAPL) in the south-central and south-eastern areas
  - Confirm presence of aquitard
  - Obtain additional information on LNAPL composition
- Approach – Perform investigations at 5 Locations:
  - Collect LNAPL Samples and Calibrate LIF tool to LNAPL
    - Calibrate LIF to known standard, check LIF response to site LNAPL
  - Push CPT/LIF tool up to maximum of 10-feet into aquitard
    - CPT – Cone Penetrometer Testing, measures soil physical properties
    - LIF – Laser Induced Fluorescence, measures LNAPL presence (use UVOST)
  - Collect soil cores from smear zone
  - Analyze soil cores and LNAPL in lab
    - Chemistry – TPHg, TPH fp, TPH fractionation and VOCs
    - Pore fluid saturation (percent of water or LNAPL in pore space)
    - Grain size distribution
  - Correlate Soil Core data with CPT/LIF data
  - Assess vertical LNAPL extent using LIF data
  - Assess oxygenates in LNAPL or adsorbed onto soil

Vertical Assessment of LNAPL in Soil



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*	--
Future	Complete SVE Rebound Testing	As Conditions Allow	February 2009
	Submit Third Annual Remediation Progress Report	*January 2011*	--
	Begin Bioventing Operation	January 2011	March 2009
	Submit Fourth Annual Remediation Progress Report	*January 2012*	--
	Begin Bioventing Rebound Testing	January 2012	December 2009
	Begin Verification Groundwater Monitoring	January 2012	June 2010
	Compete Bioventing Testing	July 2012	June 2010
	Submit Fifth Annual Remediation Progress Report	*January 2013*	--
	Complete Verification Groundwater Monitoring	July 2013	June 2010
	Submit Closure Request to RWQCB	September 2013	August 2012

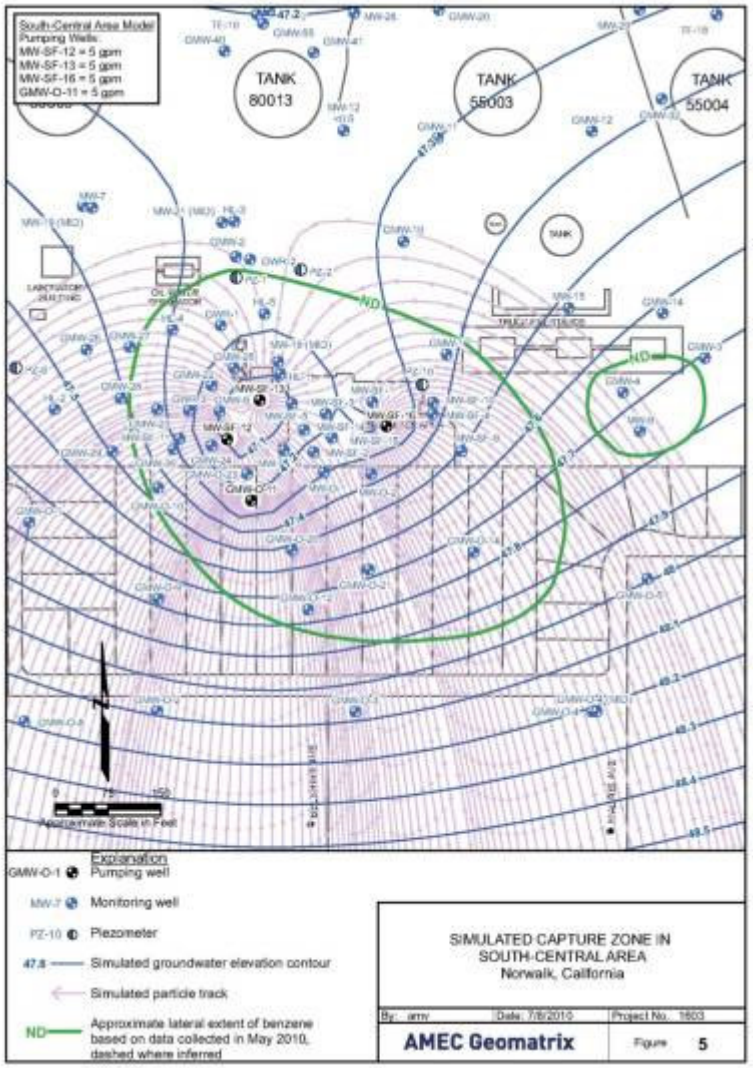
Joint Capture Zone Analysis

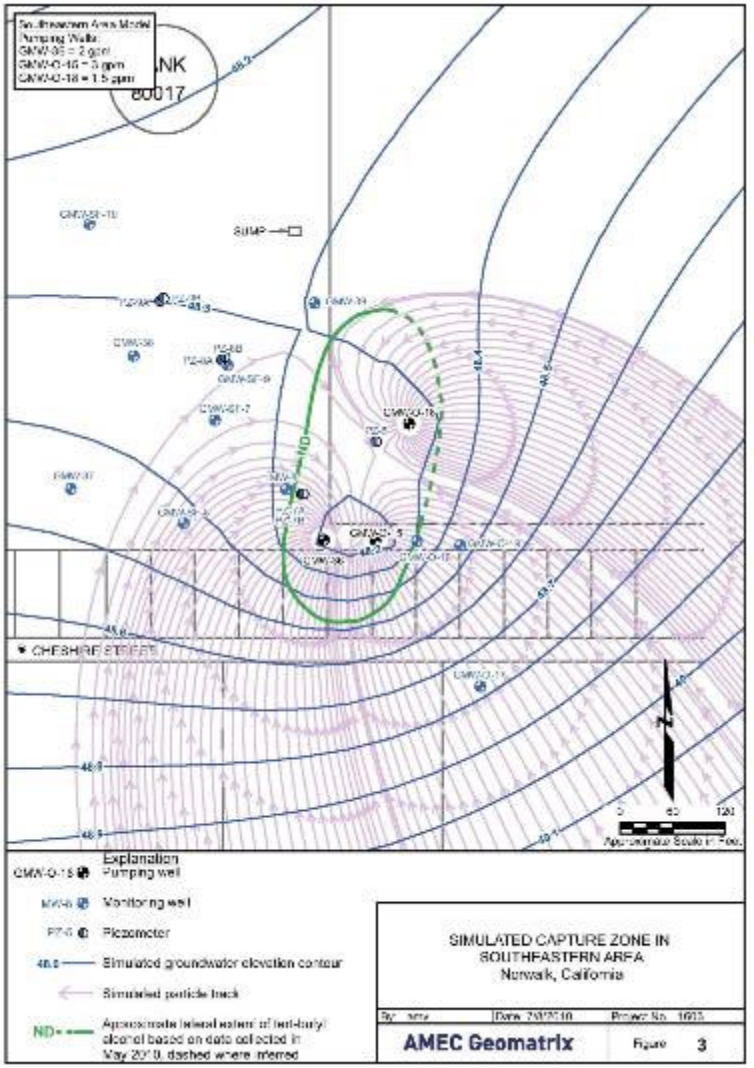
- Southeastern Area
  - Initial Groundwater Model, October 2000
  - Current Groundwater Model, updated
    - WinFlow, version 3.32
    - Northwestern regional gradient with magnitude of 0.001
    - Hydraulic conductivi9ty of 35 feet/day
    - Storativity of 0.02
    - Saturated thickness of 24 feet
  - Modeled Pumping Configuration – 3 wells (5.5 gpm total)
    - GMW-O-15 – 3 gpm (currently pumping)
    - GMW-O-18 – 1.5 gpm (currently pumping)
    - GMW-36 – 2 gpm (currently pumping)
  - Model predicts capture of the interpreted extent of TBA
    - TBA used as indicator of capture because it's interpreted extent is greater than other constituents

Joint Capture Zone Analysis

- South-Central Area
  - Current Groundwater Model, updated
    - WinFlow, version 3.32
    - Northward regional gradient with magnitude of 0.001
    - Hydraulic conductivi9ty of 50 feet/day
    - Storativity of 0.02
    - Saturated thickness of34 feet
  - Modeled Pumping Configuration – 4 wells (20 gpm total)
    - MW-SF-12 – 5 gpm
    - MW-SF-13 – 5 gpm
    - MW-SF-14 – 0 gpm (currently pumping)
    - MW-SF-15 – 0 gpm (currently pumping)
    - MW-SF-16 – 5 gpm
    - GMW-O-11 – 5 gpm (currently pumping)
  - Model predicts capture of the interpreted extent of TBA
    - TBA used as indicator of capture because it's interpreted extent is greater than other constituents

Joint Capture Zone Analysis





Tracer Testing and Fuel Transported

- Fuels Transported
  - Gasoline (various grades), marine diesel, diesel, jet fuels (various grades) – February 19, 2010 e-mail to RAB
- Tracer Gas Testing
  - 2003 – Identified release in south central area
  - 2005 – No tracer gas detections
  - 2006 – No tracer gas detections
- Automated Leak Detection System
  - Installed in 2007
  - One near each of five block valves

- Current Pipeline Integrity Testing – Feb. 19, 2010 e-mail to RAB
  - Performed every 5 years, as required by law
  - Law just requires static pressure testing
  - Run pigs in pipeline, exceeds requirements

First Semiannual 2010 Groundwater Monitoring Report

- Sentry Event
  - January 2010 – DESC
  - March 2010 – SFPP
- Semiannual Event in April and May 2010
  - April 2010 – DESC
  - May 2010 – SFPP
- Monthly Events
  - March, April, May, June 2010 – SFPP
  - 6 Southeast Area Wells
    - GMW-36, GMW-O-15, GMW-O-16, GMW-O-18, GMW-O-19, and PZ-5

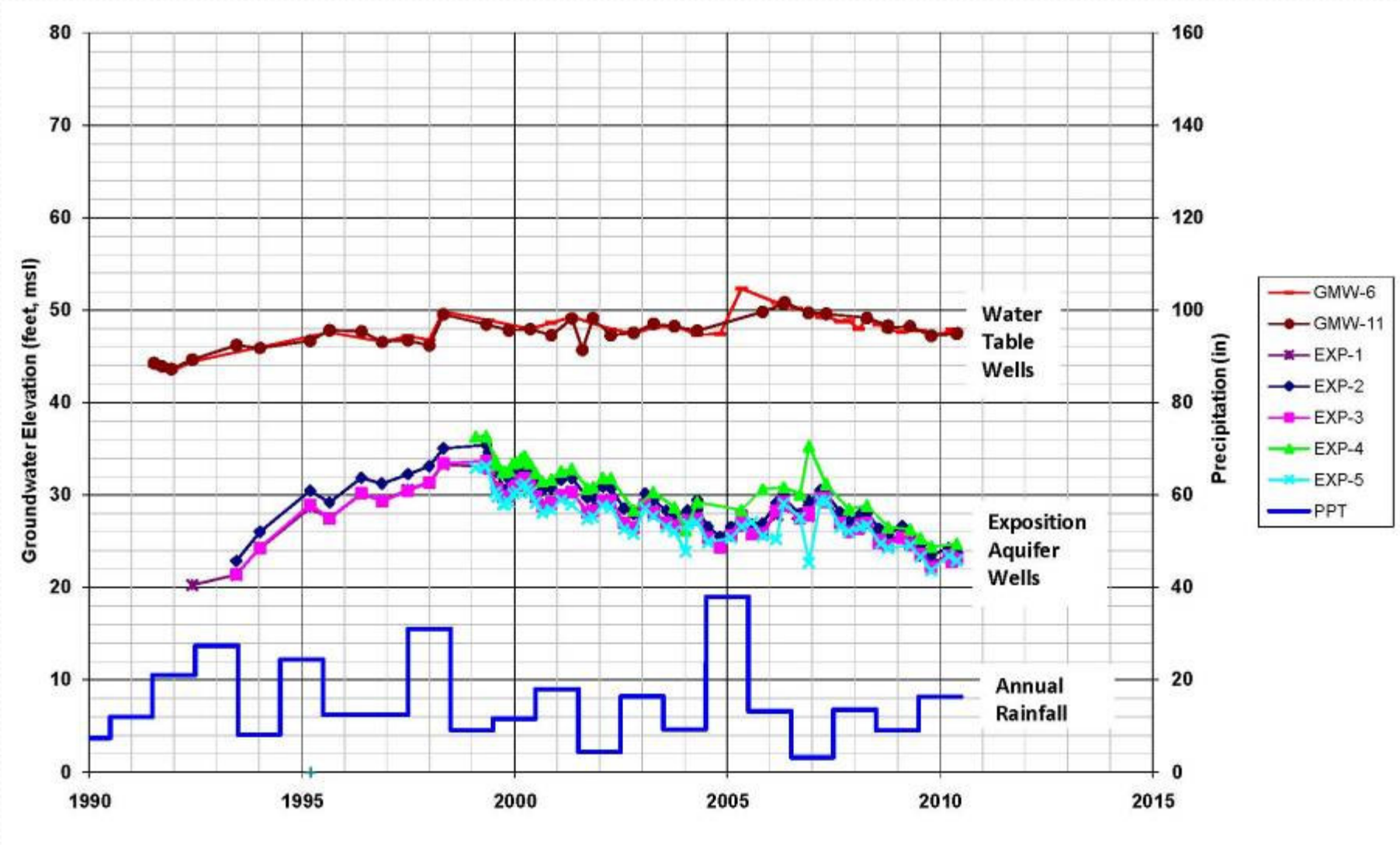
First Semiannual 2010 Groundwater Monitoring Event

- Well Gauging and Sampling by Blaine Tech
  - Low-flow sampling methods
  - SVE/TFE/GWE turn-off prior to gauging and sampling
- Wells Gauged – 135 wells total
  - April 2010 – DESC – 50 wells
    - Parsons also gauged 86 wells on April 7 and 8, 2010
  - May 2010 – SFPP – 85 wells (northern GWE system not shut off)
    - Blaine tech also gauged 85 wells on May 28, 2010
- Wells Sampled – 111 wells total
  - April 2010 – DESC – 49 wells
    - GW-15 not sampled due to product
  - May 2010 – SFPP – 62 wells
    - GMW-36 and MW-15 not sampled due to product

First Semiannual 2010 Groundwater Monitoring Event

- Groundwater levels during April/May 2010 generally similar to those encountered during previous monitoring events.
- Uppermost Aquifer Groundwater Elevations and Flow
  - Groundwater elevations approximately 0.4 feet higher than those reported for October 2009
  - Horizontal hydraulic gradient ranged from 0.001 ft/ft toward the northwest across the site and the eastern offsite area to 0.002 ft/ft toward the north-northeast across the western offsite area.
- Exposition Aquifer Groundwater Elevations and Flow
  - Groundwater elevations up to approximately 1-foot higher than those reported for October 2009
  - Horizontal groundwater gradient was approximately 0.001 ft/ft toward the southeast, substantially different than the uppermost groundwater zone

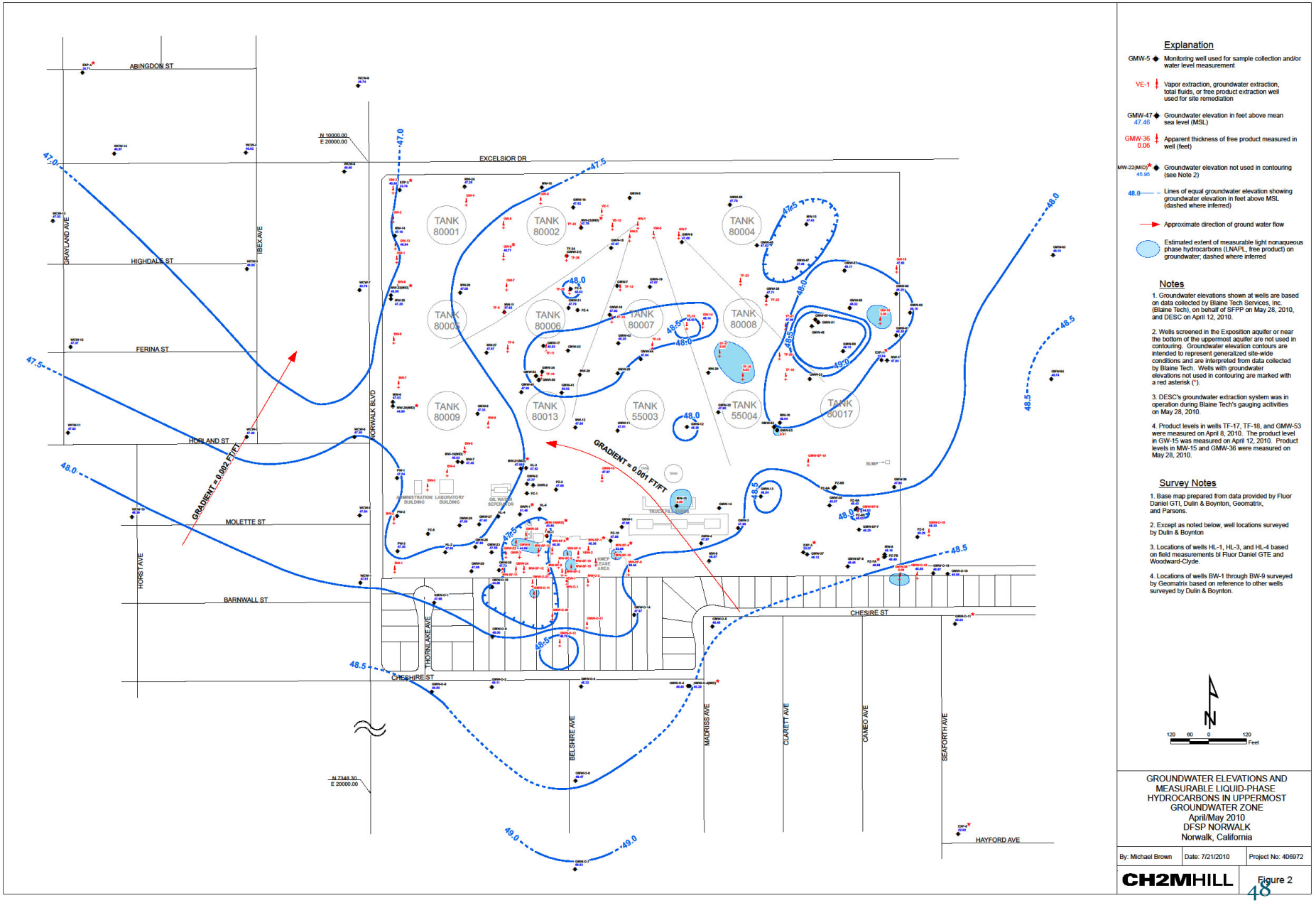
Groundwater Elevations



First Semiannual 2010 Groundwater Monitoring Event

- Free product observed in 3 of 135 wells gauged
  - GMW-36, MW-15, and GW-15 (0.06, 0.89, 2.05 feet)
- Free product also detected in 3 supplemental wells gauged by Parsons
  - GMW-53, TF-17, and TF-18 (0.01, 0.02, 0.03 feet)
- Free product present in the following areas, as interpreted from the current monitoring data, remediation system operations, and historical detections
  - Northern tank farm area (TF-17, TF-18, GMW-53)
  - Eastern area (GW-15)
  - Truck rack area (MW-15)
  - South-central area (not detected)
  - Southeastern 24-inch block valve area (GMW-36)

Groundwater Elevations – Water Table



Explanation

- GMW-5 ◆ Monitoring well used for sample collection and/or water level measurement
- VE-1 ‡ Vapor extraction, groundwater extraction, total fluids, or free product extraction well used for site remediation
- GMW-47 ◆ 47.46 Groundwater elevation in feet above mean sea level (MSL)
- GMW-36 ‡ 0.06 Apparent thickness of free product measured in well (feet)
- MW-22(MID)* ◆ 45.95 Groundwater elevation not used in contouring (see Note 2)
- 48.0 Lines of equal groundwater elevation showing groundwater elevation in feet above MSL (dashed where inferred)
- Approximate direction of ground water flow
- Estimated extent of measurable light nonaqueous phase hydrocarbons (LNAPL, free product) on groundwater; dashed where inferred

Notes

1. Groundwater elevations shown at wells are based on data collected by Blaine Tech Services, Inc. (Blaine Tech), on behalf of SFPP on May 28, 2010, and DESC on April 12, 2010.
2. 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 interpreted from data collected by Blaine Tech. Wells with groundwater elevations not used in contouring are marked with a red asterisk (*).
3. DESC's groundwater extraction system was in operation during Blaine Tech's gauging activities on May 28, 2010.
4. Product levels in wells TF-17, TF-18, and GMW-53 were measured on April 8, 2010. The product level in GW-15 was measured on April 12, 2010. Product levels in MW-15 and GMW-36 were measured on May 28, 2010.

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-1, HL-3, and HL-4 based on field measurements bt Fluor Daniel GTE 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.

N

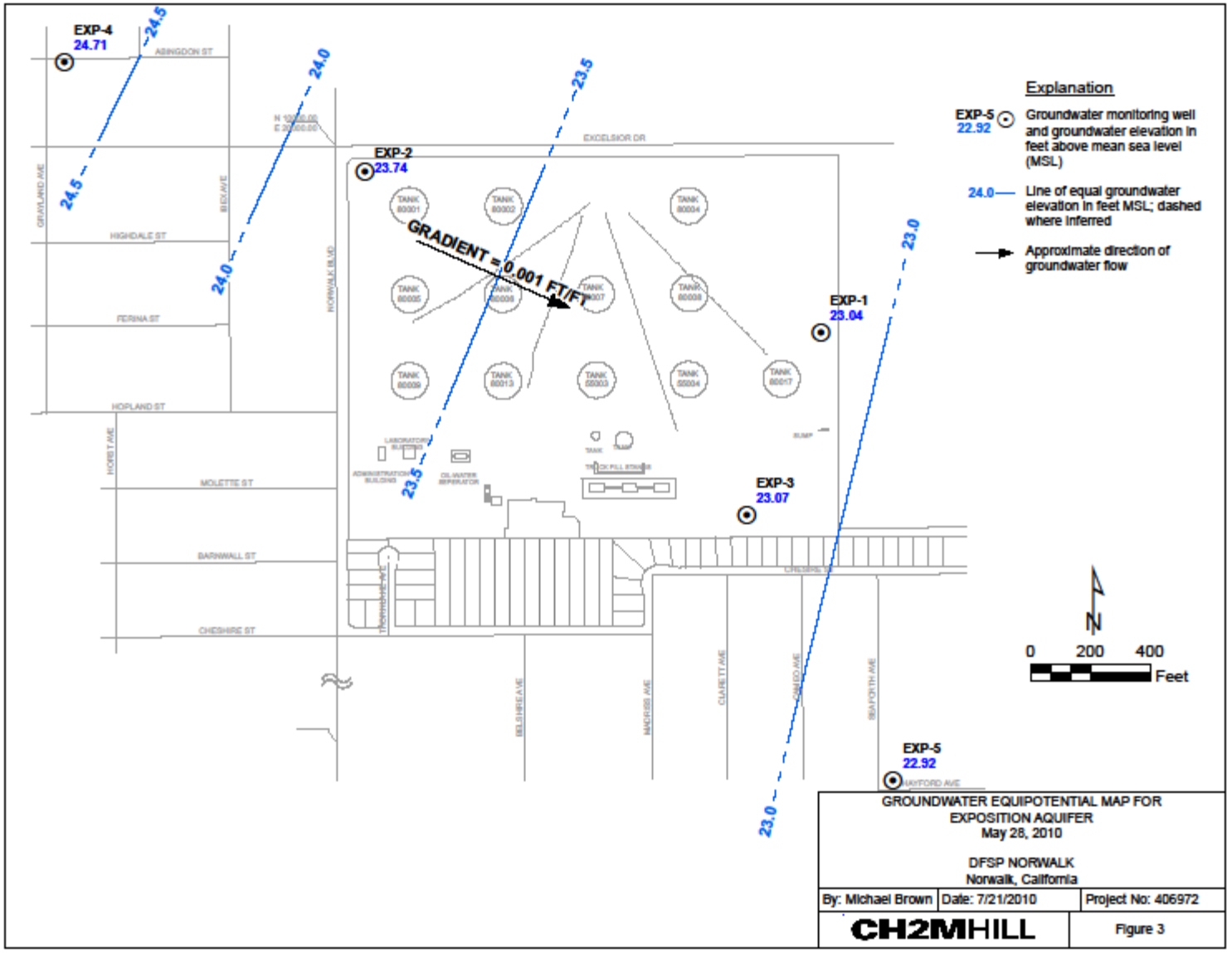
120 60 0 120 Feet

GROUNDWATER ELEVATIONS AND MEASURABLE LIQUID-PHASE HYDROCARBONS IN UPPERMOST GROUNDWATER ZONE
April/May 2010
DFSP NORWALK
Norwalk, California

By: Michael Brown	Date: 7/21/2010	Project No: 406972

CH2MHILL Figure 2

Groundwater Elevations - Exposition



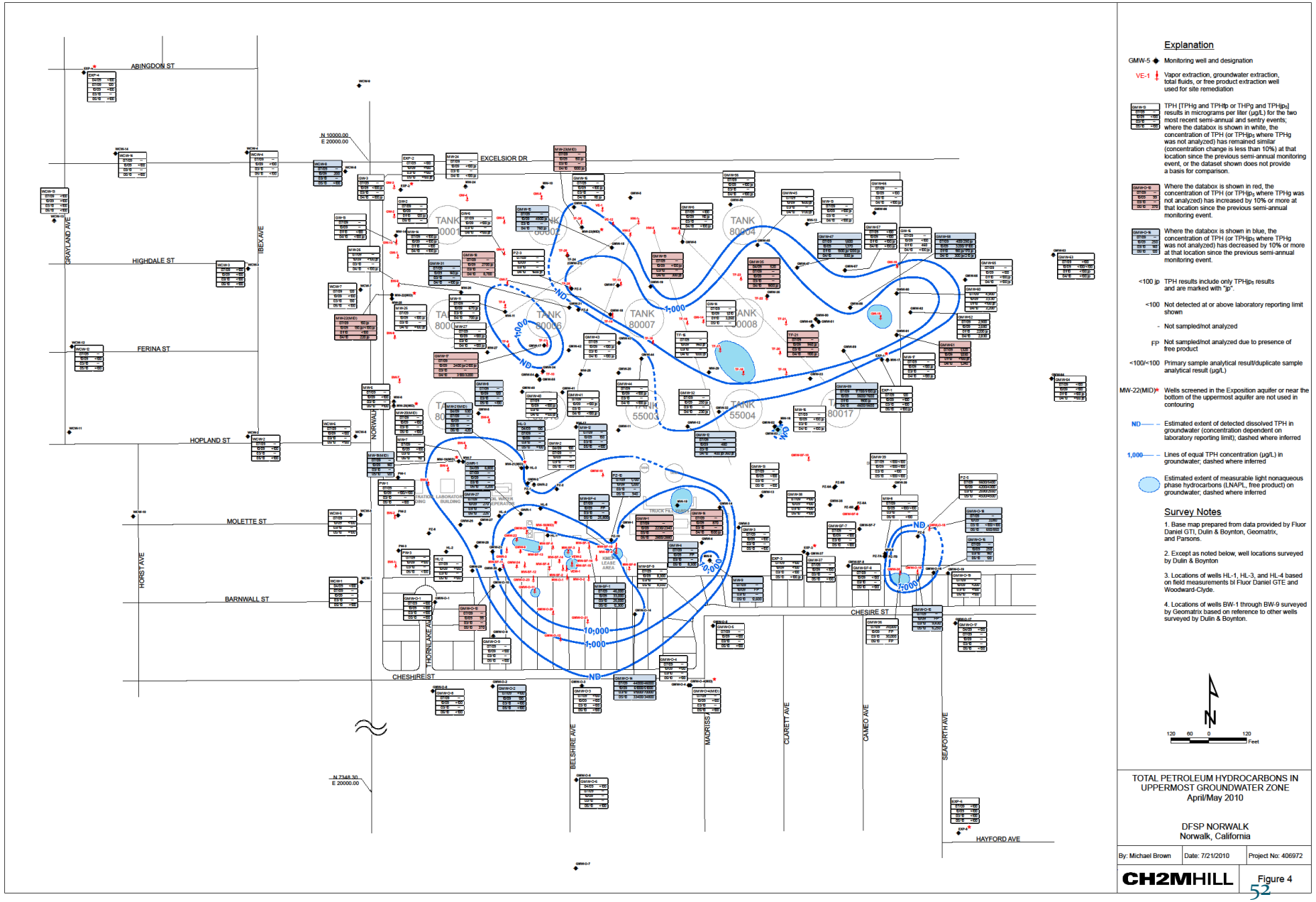
First Semiannual 2010 Groundwater Monitoring Event

- Exposition Aquifer wells sampled:
  - EXP-1, -2, and -3 sampled twice each by DESC and KMEP
  - EXP-4 sampled once by KMEP
  - EXP-5 sampled once by DESC and KMEP
- All analytical results were Non Detect (ND), except for the following:
  - MTBE was detected at 0.44 J ug/L for the EXP-1 sample collected on 4-12-10.
  - Benzene was detected at 0.31 J ug/L for the EXP-3 sample collected on 4-12-10
- The "J" flag means that each of these detections were at a concentration below the lab reporting limit (RL) and above the lab method detection limit (MDL). These reported J values are considered to be estimated due to their low concentration below the RL.
- These two J detections are considered anomalous because:
  - They only occurred in 1 of the 4 samples and are not repeatable
  - They are considered to be estimated values by the laboratory (below the RL)
  - None of the other approximately 70 VOCs were detected and no TPH was detected
- In addition, no VOCs were detected in the Exposition Aquifer grab groundwater samples collected in 11-19-09 from temporary direct push location GB-18 during recent supplemental vertical delineation
- These types of low-level anomalous detections occasionally (infrequently) occur in the EXP wells but are not repeatable. KMEP and DESC will continue to monitor the EXP wells and closely watch for any future potential detections.

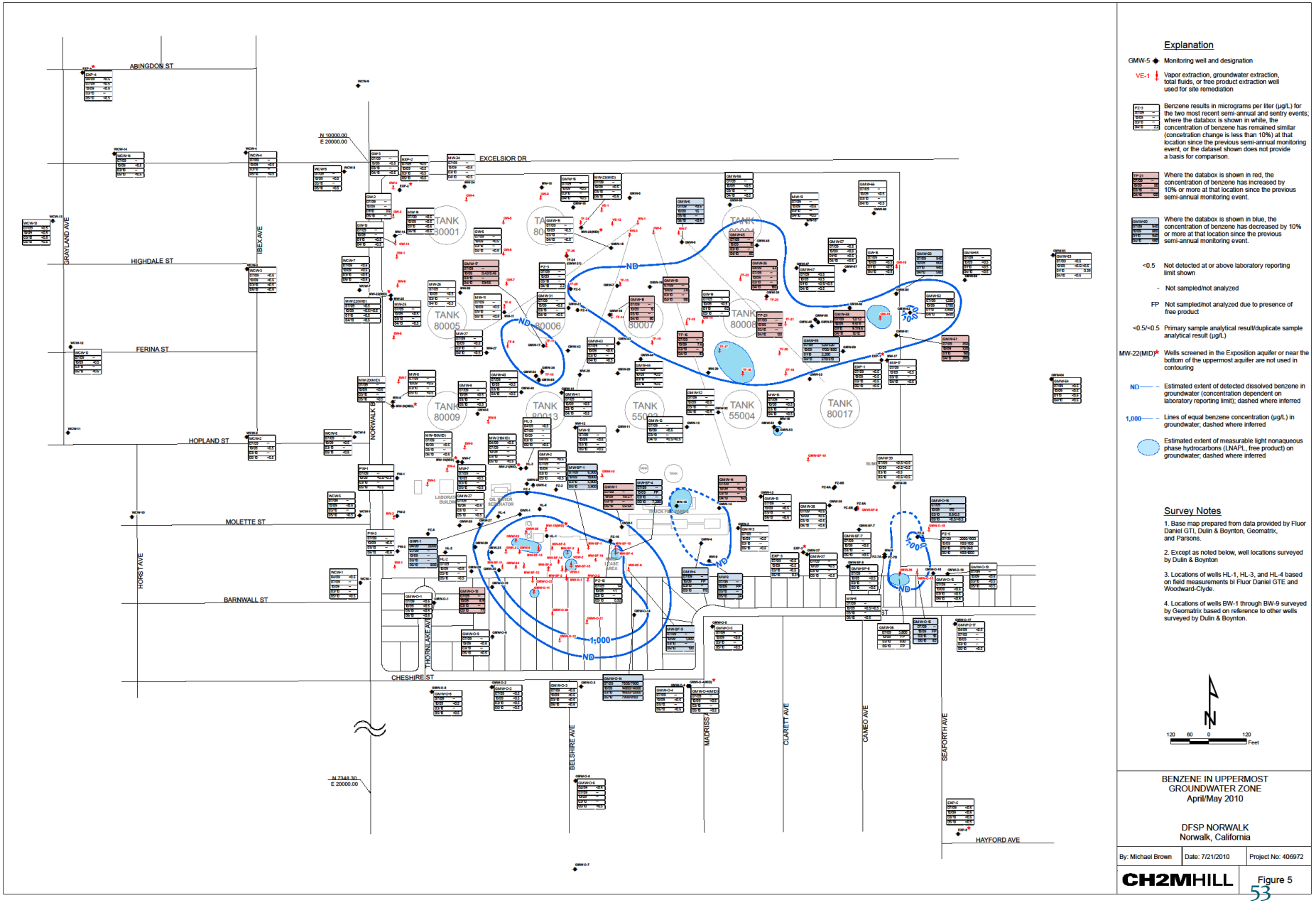
First Semiannual 2010 Groundwater Monitoring Event

- 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

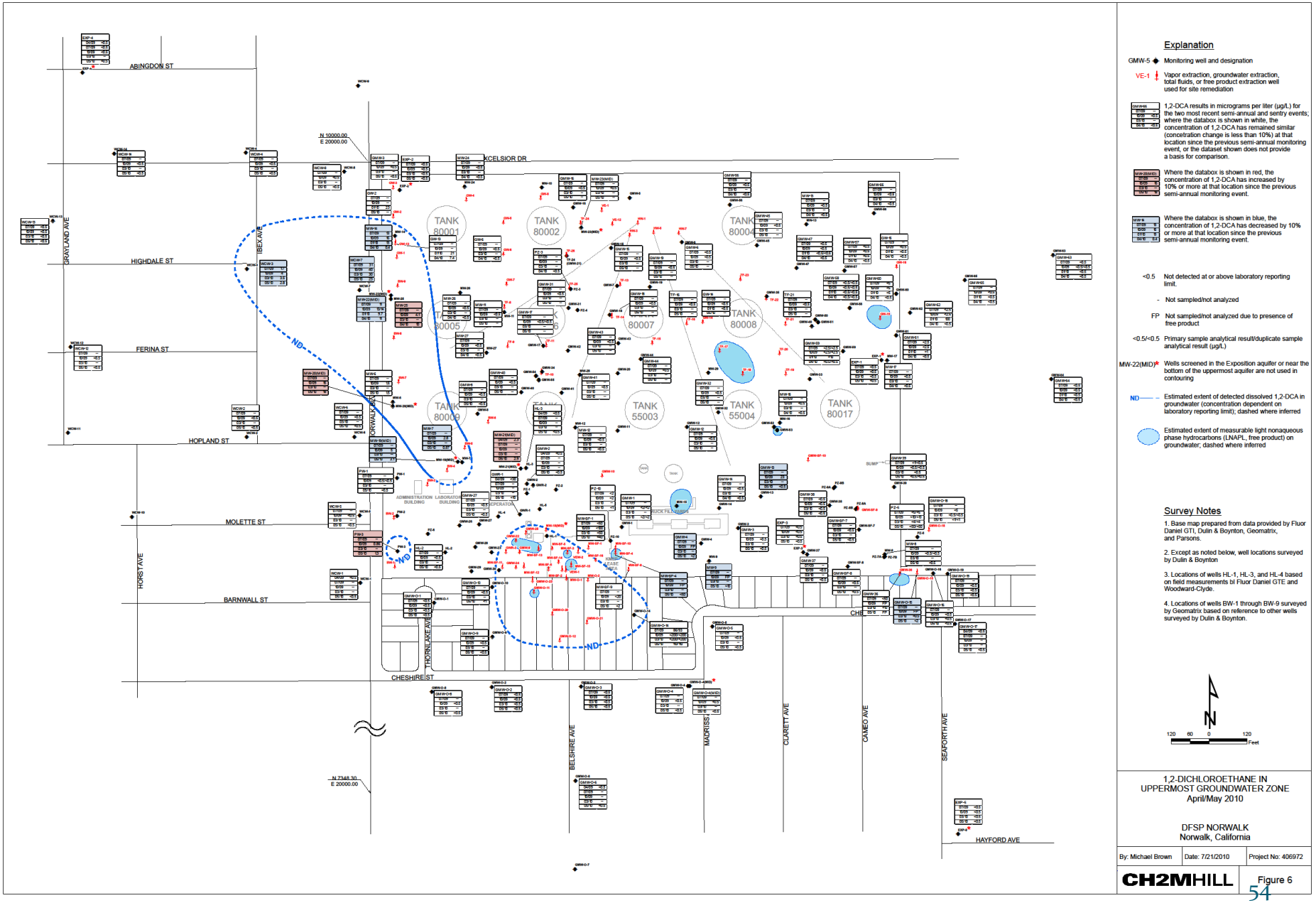
Total Petroleum Hydrocarbons



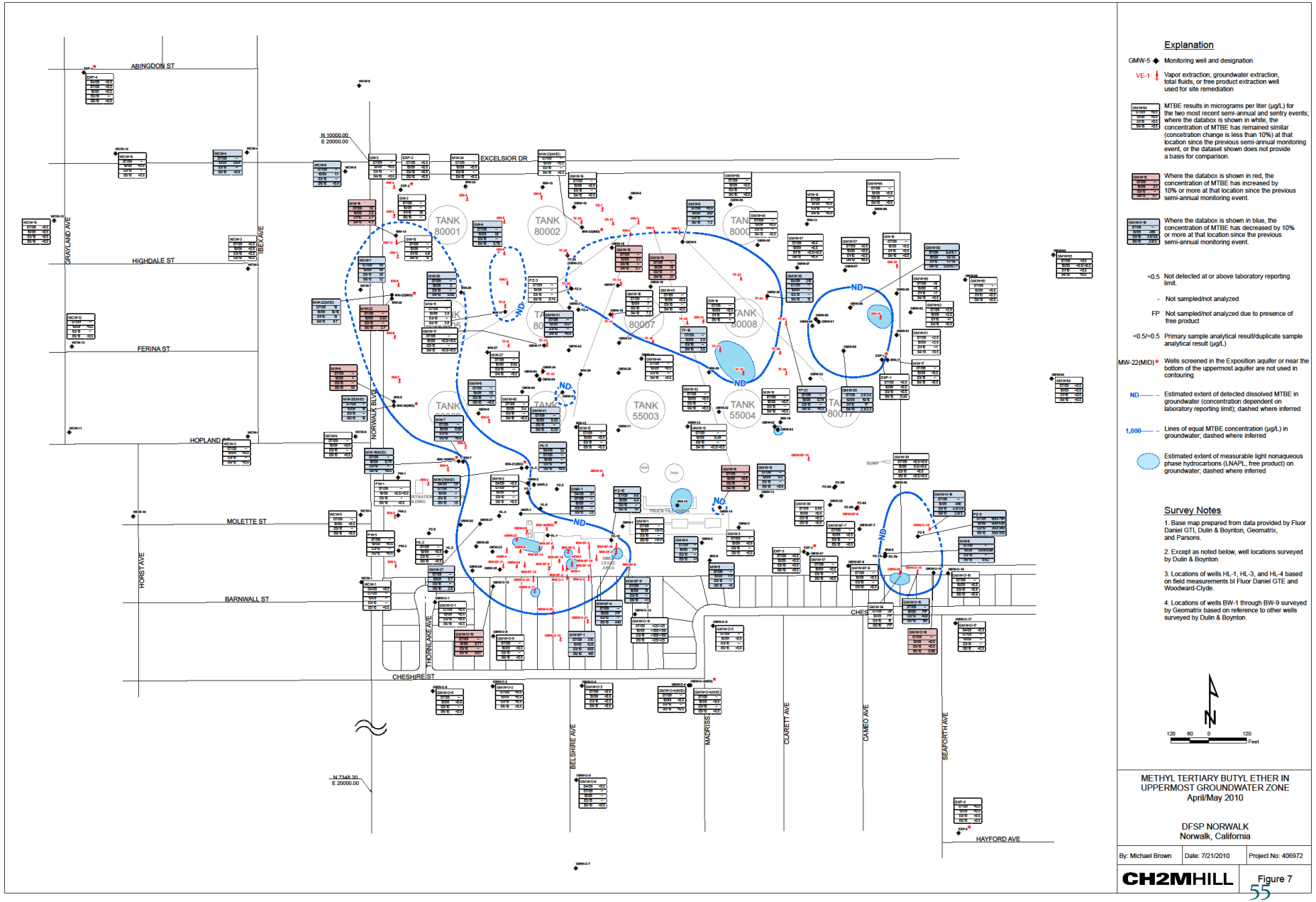
Benzene


ABINGDON ST
EXCELSIOR DR
HIGHDALE ST
FERINA ST
HOPLAND ST
MOLETTE ST
BARNWALL ST
CHESHIRE ST
HAYFORD AVE
GRAYLAND AVE
IBEX AVE
NORWALK
HORST AVE
THORNLAKE AVE
BELSHIRE AVE
MADRISS
CLARETT AVE
CAMEO AVE
SEAFORTH AVE
N 10000.00
E 20000.00
N 7348.30
E 20000.00
TANK 30001
TANK 80005
TANK 80006
TANK 80009
TANK 80013
TANK 55003
TANK 55004
TANK 80017
TANK 80007
TANK 80008
ND
1,000
700
Explanation
GMW-5 Monitoring well and designation
VE-1 Vapor extraction, groundwater extraction, total fluids, or free product extraction well used for site remediation
Benzene results in micrograms per liter (µg/L) for the two most recent semi-annual and sentry events; where the databox is shown in white, the concentration of benzene has remained similar (concetration change is less than 10%) at that location since the previous semi-annual monitoring event, or the dataset shown does not provide a basis for comparison.
Where the databox is shown in red, the concentration of benzene has increased by 10% or more at that location since the previous semi-annual monitoring event.
Where the databox is shown in blue, the concentration of benzene has decreased by 10% or more at that location since the previous semi-annual monitoring event.
<0.5 Not detected at or above laboratory reporting limit shown
- Not sampled/not analyzed
FP Not sampled/not analyzed due to presence of free product
<0.5/<0.5 Primary sample analytical result/duplicate sample analytical result (µg/L)
MW-22(MID) Wells screened in the Exposition aquifer or near the bottom of the uppermost aquifer are not used in contouring
ND Estimated extent of detected dissolved benzene in groundwater (concentration dependent on laboratory reporting limit); dashed where inferred
1,000 Lines of equal benzene concentration (µg/L) in groundwater; dashed where inferred
Estimated extent of measurable light nonaqueous phase hydrocarbons (LNAPL, free product) on groundwater; dashed where inferred
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-1, HL-3, and HL-4 based on field measurements bl Fluor Daniel GTE 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.
N
120 60 0 120
Feet
BENZENE IN UPPERMOST GROUNDWATER ZONE
April/May 2010
DFSP NORWALK
Norwalk, California
By: Michael Brown
Date: 7/21/2010
Project No: 406972
CH2MHILL
Figure 5

1,2-Dichloroethane



MTBE


ABINGDON ST
EXCELSIOR DR
HIGHDALE ST
FERINA ST
HOPLAND
MOLETTE ST
BARNWALL ST
CHESHIRE ST
HAYFORD AVE
GRAYLAND AVE
IBEX AVE
NORWALK BLVD
HORST AVE
THORNLAKE AVE
BELSHIRE AVE
MADRISS
CLARETT AVE
CAMEO AVE
SEAFORTH AVE
N 10000.00
E 20000.00
N 7348.30
E 20000.00
TANK 80001
TANK 80002
TANK 80007
TANK 80008
TANK 55003
TANK 55004
ND
Explanation
GMW-5 Monitoring well and designation
VE-1 Vapor extraction, groundwater extraction, total fluids, or free product extraction well used for site remediation
MTBE results in micrograms per liter (µg/L) for the two most recent semi-annual and sentry events; where the databox is shown in white, the concentration of MTBE has remained similar (concetration change is less than 10%) at that location since the previous semi-annual monitoring event, or the dataset shown does not provide a basis for comparison.
Where the databox is shown in red, the concentration of MTBE has increased by 10% or more at that location since the previous semi-annual monitoring event.
Where the databox is shown in blue, the concentration of MTBE has decreased by 10% or more at that location since the previous semi-annual monitoring event.
<0.5 Not detected at or above laboratory reporting limit.
- Not sampled/not analyzed
FP Not sampled/not analyzed due to presence of free product
<0.5/<0.5 Primary sample analytical result/duplicate sample analytical result (µg/L)
MW-22(MID)* Wells screened in the Exposition aquifer or near the bottom of the uppermost aquifer are not used in contouring
ND Estimated extent of detected dissolved MTBE in groundwater (concentration dependent on laboratory reporting limit); dashed where inferred
1,000 Lines of equal MTBE concentration (µg/L) in groundwater, dashed where inferred
Estimated extent of measurable light nonaqueous phase hydrocarbons (LNAPL, free product) on groundwater; dashed where inferred
Survey Notes
1. Base map prepared from data provided by Fluor Daniel GTI, Dulin & Boynton, Geomatrix, and Parsons.
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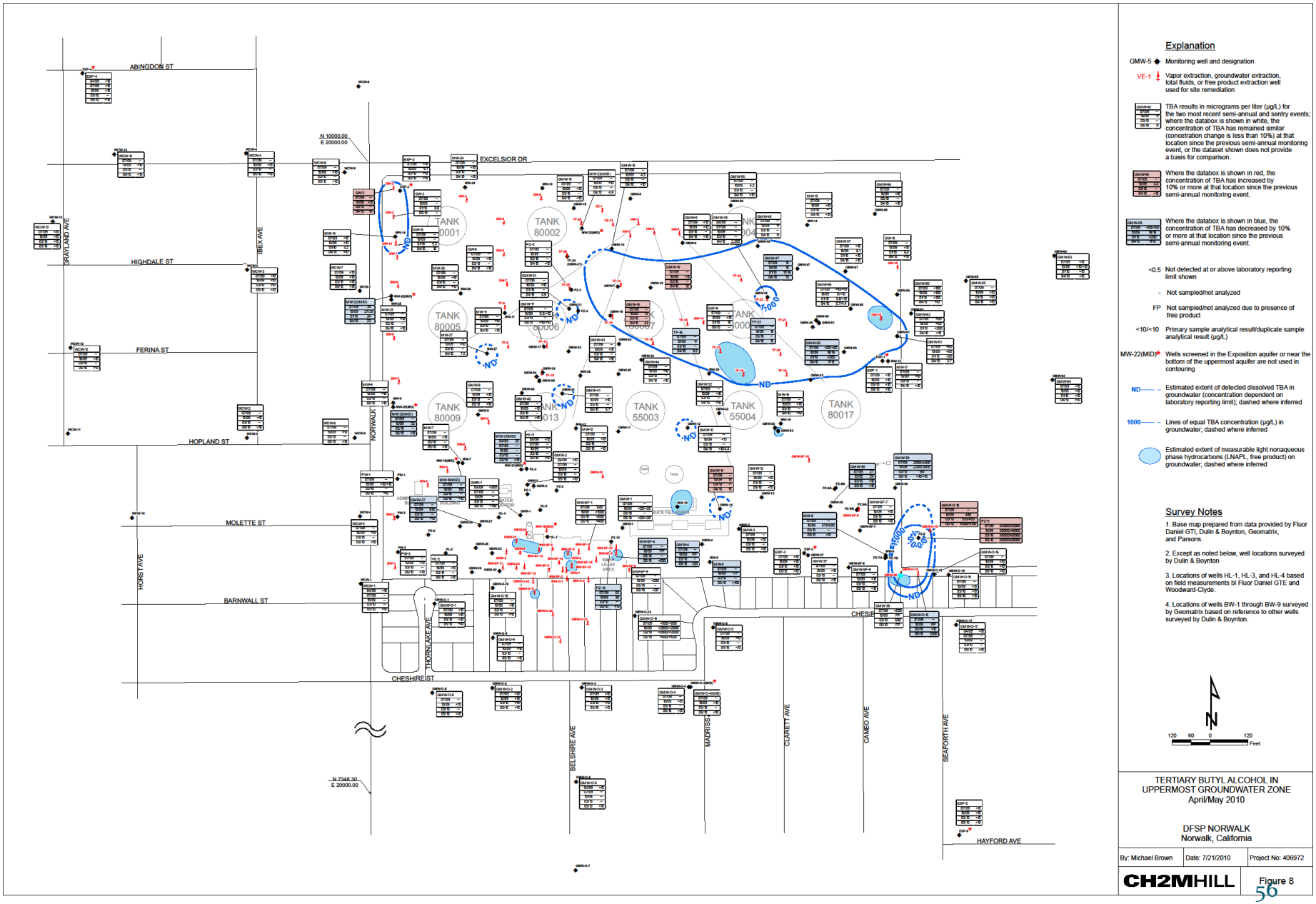
4. Locations of wells BW-1 through BW-9 surveyed by Geomatrix based on reference to other wells surveyed by Dulin & Boynton.
N
120 60 0 120
Feet
METHYL TERTIARY BUTYL ETHER IN UPPERMOST GROUNDWATER ZONE
April/May 2010
DFSP NORWALK
Norwalk, California
By: Michael Brown
Date: 7/21/2010
Project No: 406972
CH2MHILL
Figure 7

TBA



TERTIARY BUTYL ALCOHOL IN UPPERMOST GROUNDWATER ZONE
April/May 2010

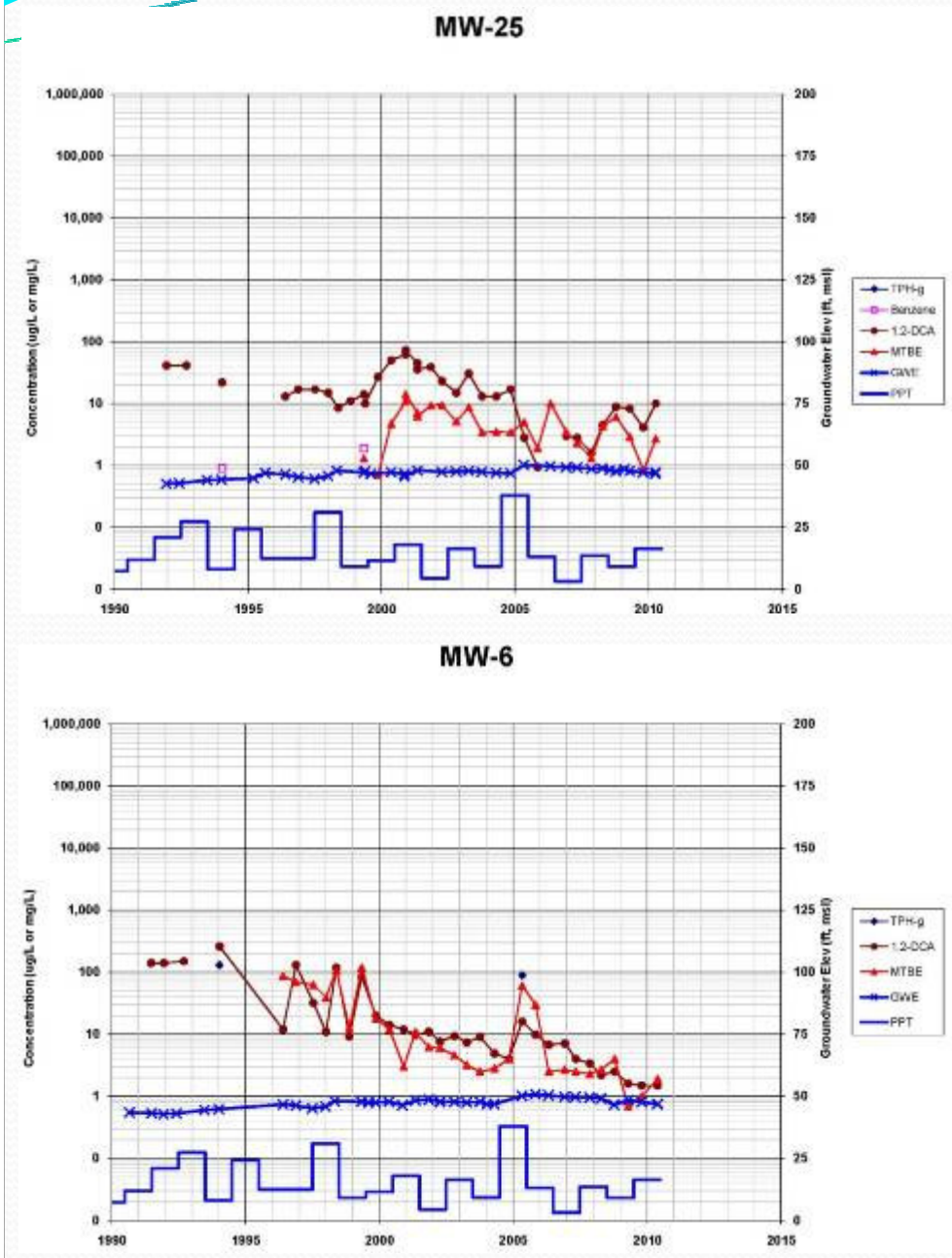
DFSP NORWALK
Norwalk, California

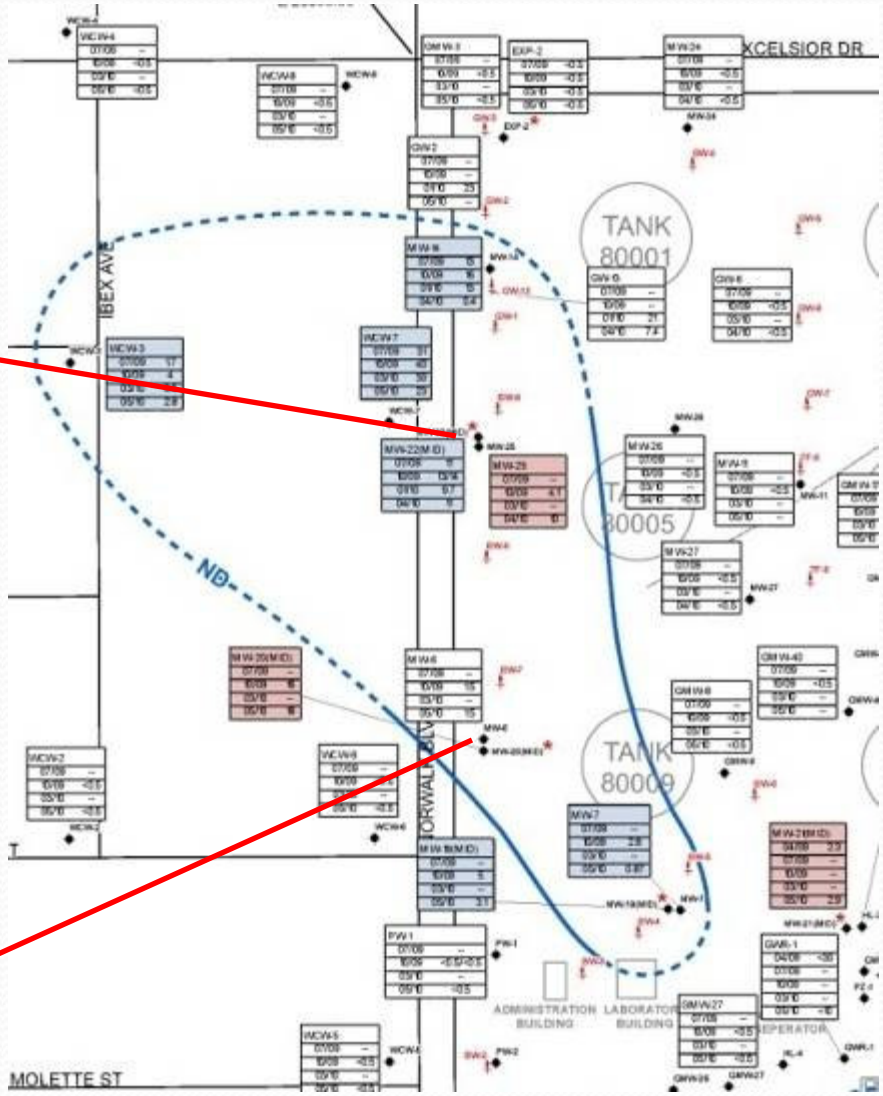
By: Michael Brown	Date: 7/21/2010	Project No: 406972

CH2MHILL

Figure 8

West Side Area

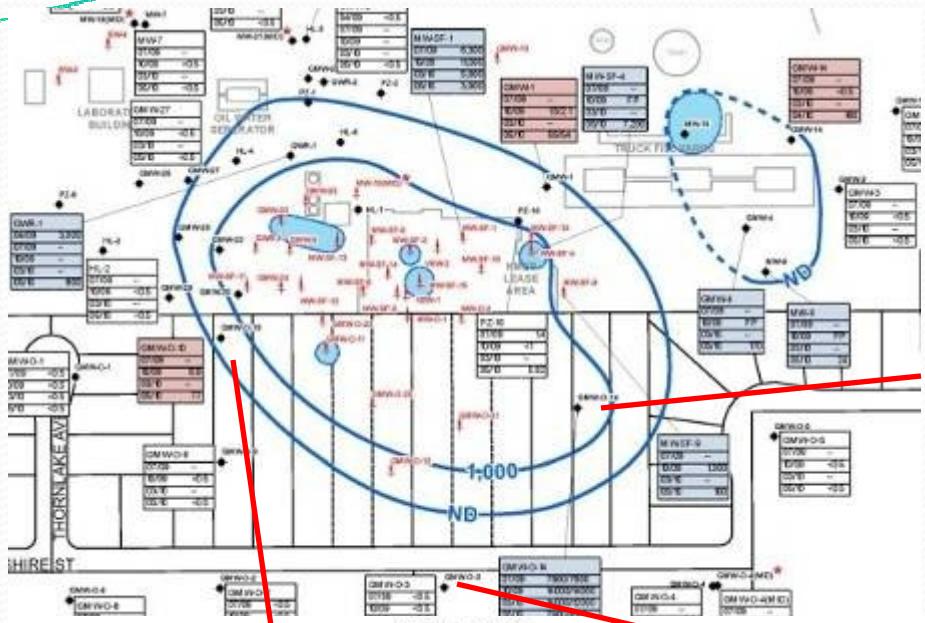


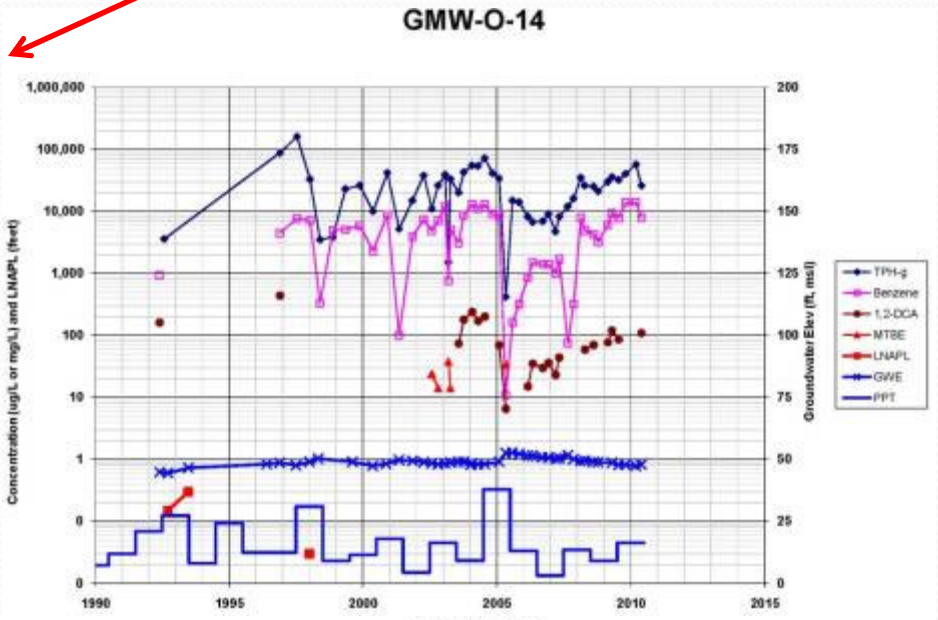


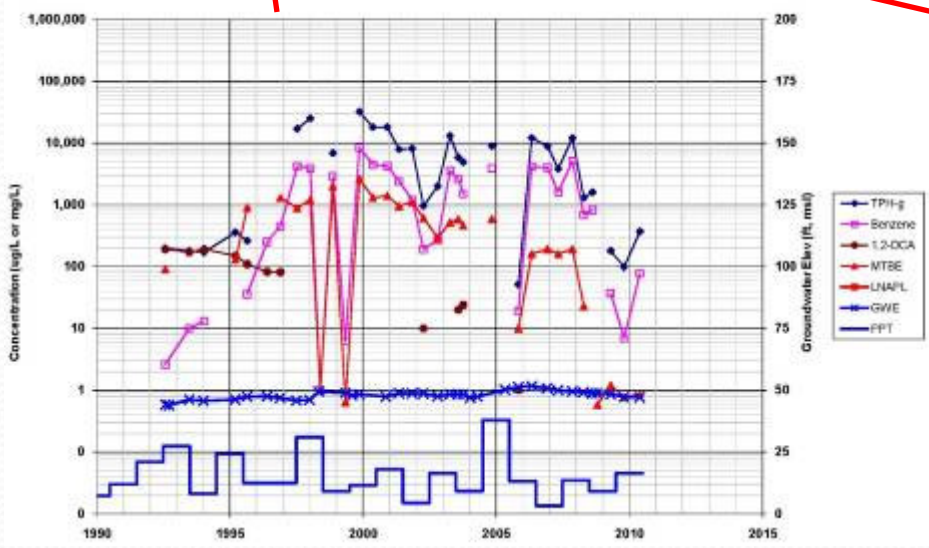
1,2-DCA Concentrations

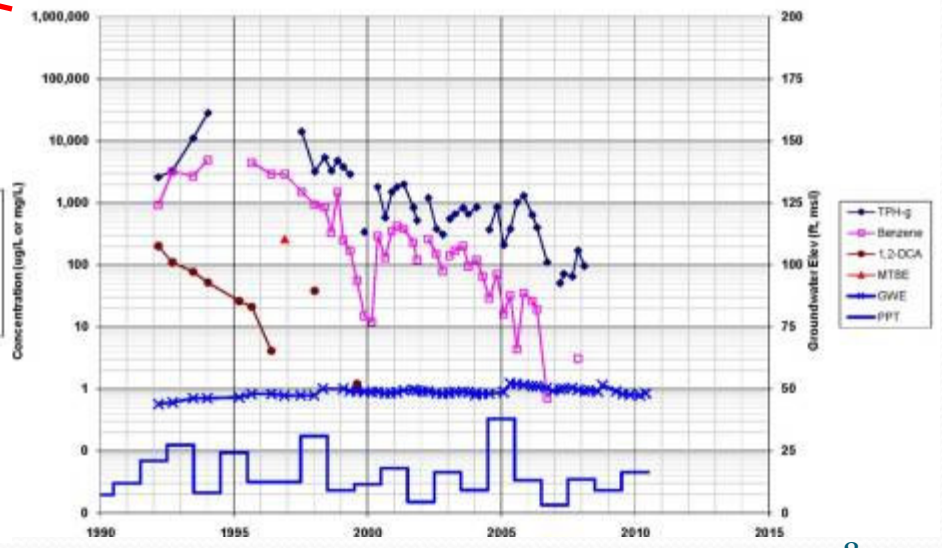
South-Central Area

Benzene Concentrations

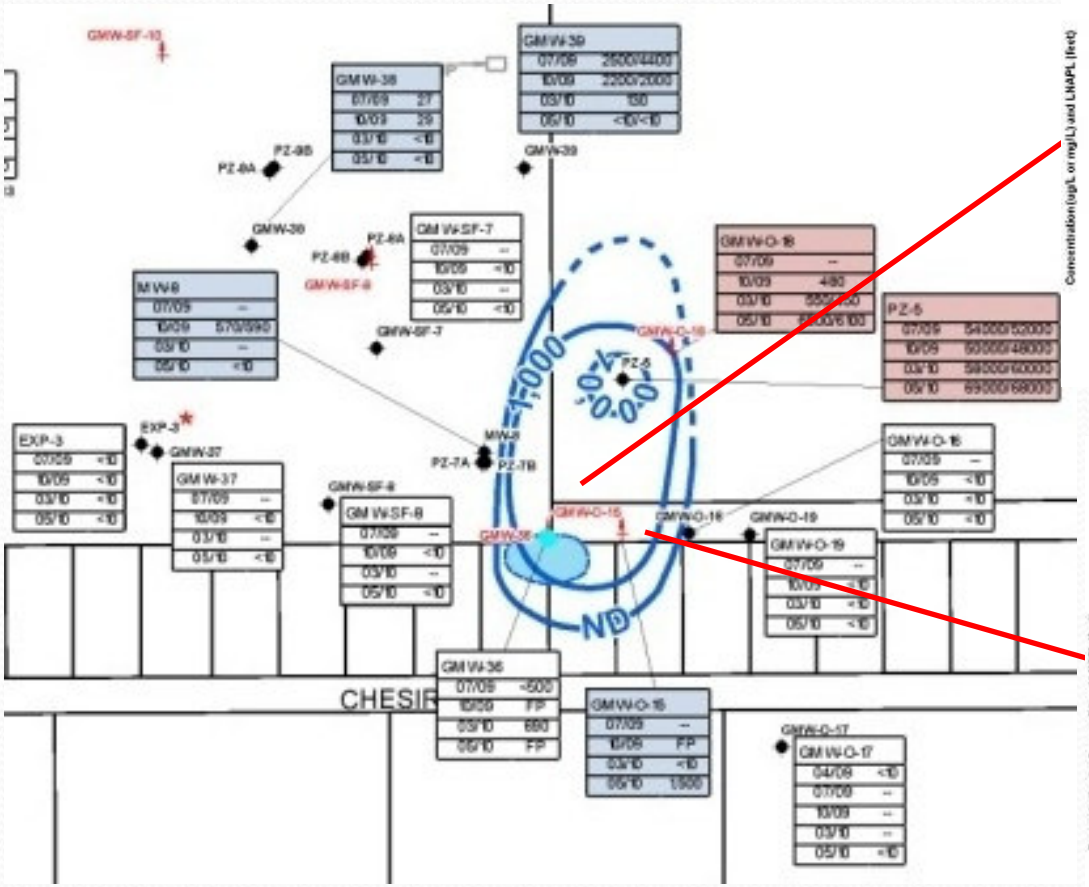


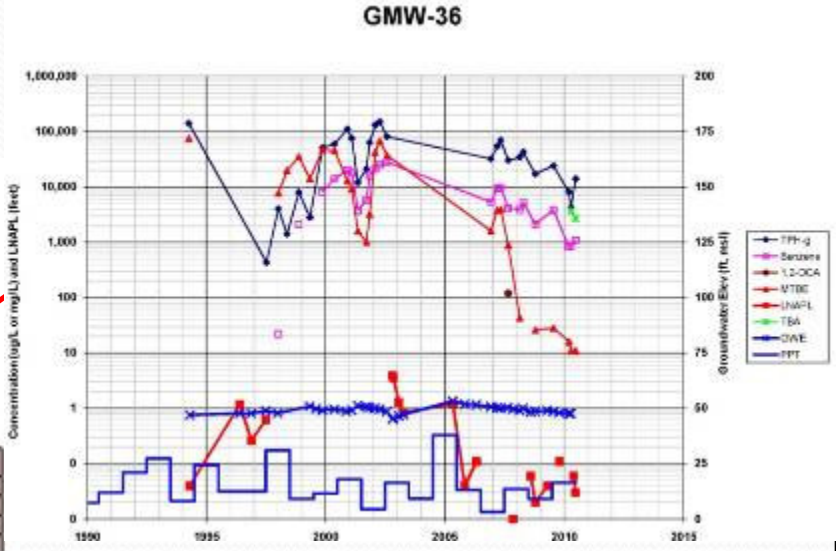


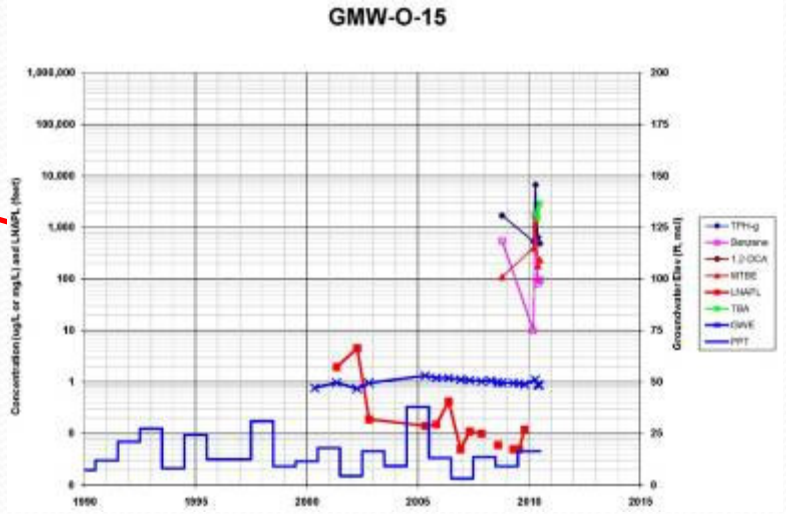




Southeast Area

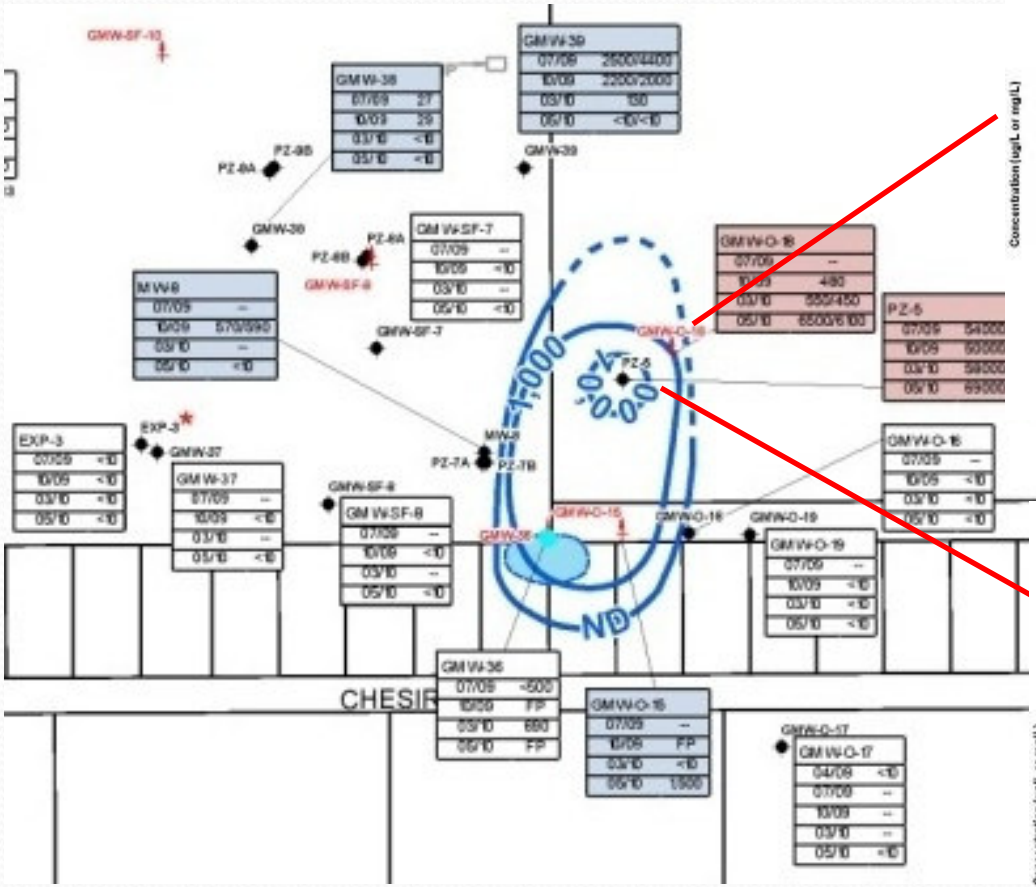


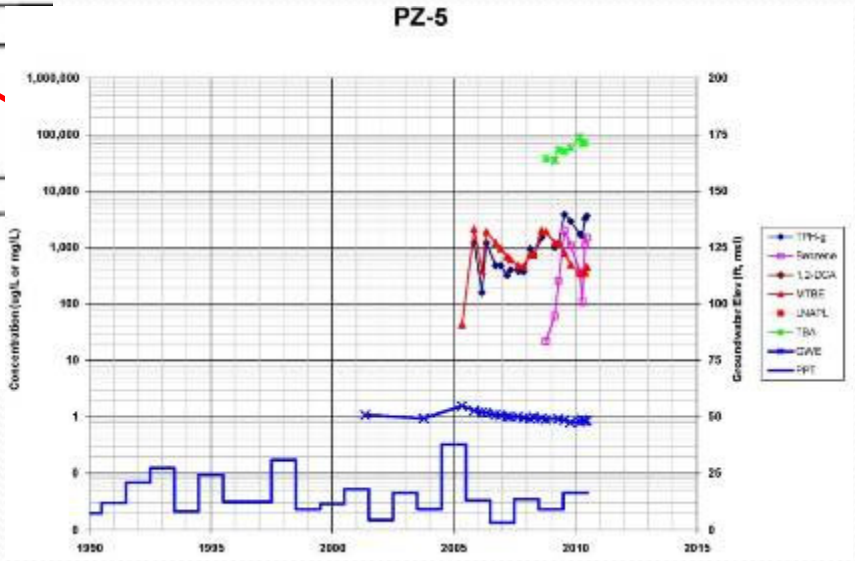




TBA Concentrations

Southeast Area





TBA Concentrations

Discussion