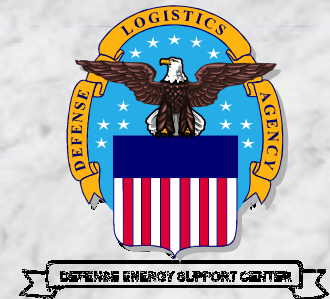


# *Norwalk Tank Farm Update*

*Defense Energy Support Center-  
Americas West  
Norwalk Tank Farm  
Restoration Advisory Board*

*January 22, 2009*



# Presentation Overview

- General Site Activities
- Remediation System Update
- Soil Vapor Assessment
- Pumping Test and Groundwater Capture Zone Analysis
- Holifield Park Investigation
- Conceptual Site Model Development
- Planned Activities
- Second Semiannual Groundwater Monitoring Event

# General Site Activities

- Weekly System Inspections - October 1 through December 31
- System Performance & Compliance Sampling - Nov 25; Dec 5, 12, & 8
- Absorbent Sock Monitoring/Change Out
- NPDES Discharge Monitoring Report (DMR) - November 13 Submitted for Q3 2008
- Aquifer Pump Test - Conducted in Wk 4 of Oct and Wk 1 of Nov
- Weed abatement and tree trimming – Began Wk 3 of Oct
- Second Semiannual groundwater monitoring – Wk 1 of Oct
- Second Semiannual GWM Report

# Remediation System Update

- Soil Vapor Assessment
  - Completed Wk 1 of Oct
- TBA Discharge Levels
  - Reaches earliest breakthrough on GAC
  - Controlled via process sampling/inspections & timely GAC replacement
  - Last of 4 Wkly Compliance Samples on Dec 5
- GWTS GAC Change Out(s)
  - Both (2) vessels completed on Dec 24

# **GWTS Operations Summary**

- Groundwater extracted and treated:
  - 41,360 gallons in Q4 2008
  - 43.5 million gallons, since April 1996

# **GWTS Operations Summary**

## **(continued)**

- **System Off Over Following Periods:**
  - Sep 15 – Oct 8: Soil gas monitoring and respiration testing
  - Oct 8 – Oct 15: Quarterly Ground Water Monitoring
  - Oct 15 – Nov 5: Aquifer Pump Test Preparation
  - Nov 5 – Nov 12: Aquifer Pump Test, Completed 11/14
  - Nov 15 – Nov 24: Electrical Transformer Malfunction
  - Dec 23 – Dec 24: GAC Change-out
  
- **System On Over Following Periods:**
  - Oct 8: operated ~4 hrs to check equipment
  - Nov 13 – Nov 14: Aquifer Pump Test (2-day)
  - Nov 25 – Dec 31: System restarted, continuous operation

# Remediation System Update Performance Summary

- Soil vapor extraction system
  - Q4 2008: Remained Out of Operation
  
- System Performance
  - Since April 1996 through December 2008
  - Total Hydrocarbons Mass Removed:  
428,722 gallons
    - Approx. 215,870 gallons recycled and destroyed
    - Estimated 212,851 gallons of hydrocarbons destroyed due to enhanced biodegradation

# Soil Vapor Assessment Objectives

1. Assess the vadose zone soil chemistry at its current state and compare to initial site conditions;
2. Estimate the performance of the SVE system; and
3. Determine if further vadose zone remediation is warranted.



# Soil Vapor Assessment Sampling Locations



# Soil Vapor Assessment Results

## Percent Reduction in Concentration

<i>Location</i>	<i>Sample Collection Dates</i>	<i>Benzene (ppbv)</i>	<i>Toluene (ppbv)</i>	<i>Ethylbenzene (ppbv)</i>	<i>Total Xylenes (ppbv)</i>	<i>MTBE (ppb)</i>
VMP-1-20	04/04 to 09/08	95%	97%	99.7%	99.7%	70%
VMP-2-19	04/04 to 09/08	100%	100%	99.1%	99.4%	100%
VMP-2-27	04/04 to 09/08	100%	100%	99.7%	100.0%	99%
VMP-3-7	04/04 to 09/08	100%	100%	100.0%	100.0%	99%
VMP-3-16	04/04 to 09/08	100%	100%	100.0%	100.0%	99%
VMP-4-8	11/04 to 09/08	99%	53%	96.0%	89.9%	95%
VMP-10-27	11/04 to 09/08	76%	81%	57.1%	37.5%	93%
Average %		96%	90%	93%	89%	94%

# Soil Vapor Assessment Conclusions

- In general, results obtained via EPA Method TO-15 and supported by PID readings clearly show a substantial decrease in VOC concentrations across the site.
- This suggests that the SVE system has helped reduce the quantities of on-site VOCs in the vadose zone.
- SVE will be re-initiated in target areas where soil vapor concentrations are still elevated.

# Pumping Test & Groundwater Capture Zone Analysis

- Pumping tests and analysis were conducted at extraction well GW-15 (located in the eastern portion of the site, bordering Holifield Park) and surrounding wells.
- A groundwater capture analysis was performed in the eastern portion of the site for the impacted groundwater extending from the site, to the east, under Holifield Park.

# Pumping Tests & Objectives

## 1. Step-drawdown test

- to determine the optimal pumping rate of the constant rate test and estimate well loss

## 2. Constant rate test

- to determine hydraulic parameters (transmissivity, hydraulic conductivity, and storage coefficient)

## 3. Recovery test

- to support the calculations of constant rate test and provide redundancy

# Pumping Tests Results

- At an average pumping rate of 6.5 gpm the drawdown in the pumping well GW-15 was approx. 6.9 feet; the approx surrounding formation drawdown was 3.1 feet
- After pumping approx 48 hours a fairly uniform cone of depression developed. The associated drawdown at 70 to 100 feet away was approx 0.70 feet. Minor drawdown of 0.25 feet or less was observed up to 180 feet from GW-15.
- Results indicate the unit tested was fairly transmissive sand with good hydraulic connection laterally throughout the well network.

# Constant Rate Tests Results

- Transmissivity
  - ranged from approx 488 ft<sup>2</sup>/day to 893 ft<sup>2</sup>/day
- Hydraulic conductivity
  - ranged from approx 11 to 25 ft/day (estimated saturated thickness of 36 feet)
- Storage coefficient
  - ranged from 0.0004 to 0.01

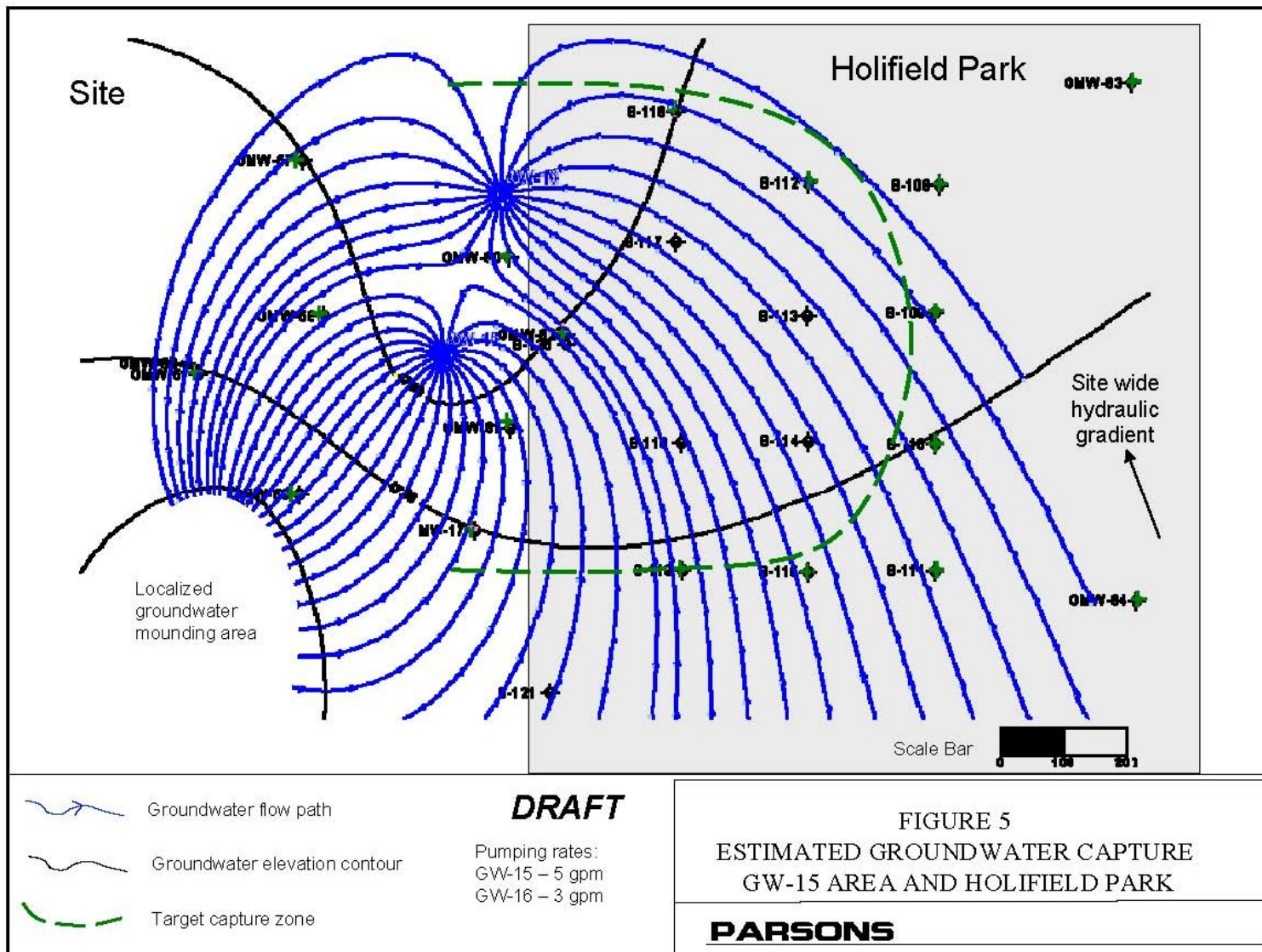
# Groundwater Capture Analysis

- Groundwater capture analysis was conducted using site information, results from pumping tests, and an analytical modeling application (WINFLOW) and included the following tasks:
  - Defining the target capture area
  - Identifying hydraulic heads and gradients
  - Developing an analytical groundwater model
  - Modifying the model to develop a groundwater extraction system that would capture the target area



# Groundwater Capture Analysis Results

- In order to capture the targeted area two pumping wells were simulated: GW-15 and a second extraction well (GW-16) located approx 100 feet north of GW-15
- The simulated flow rates were 5 gpm at GW-15 and 3 gpm at GW-16



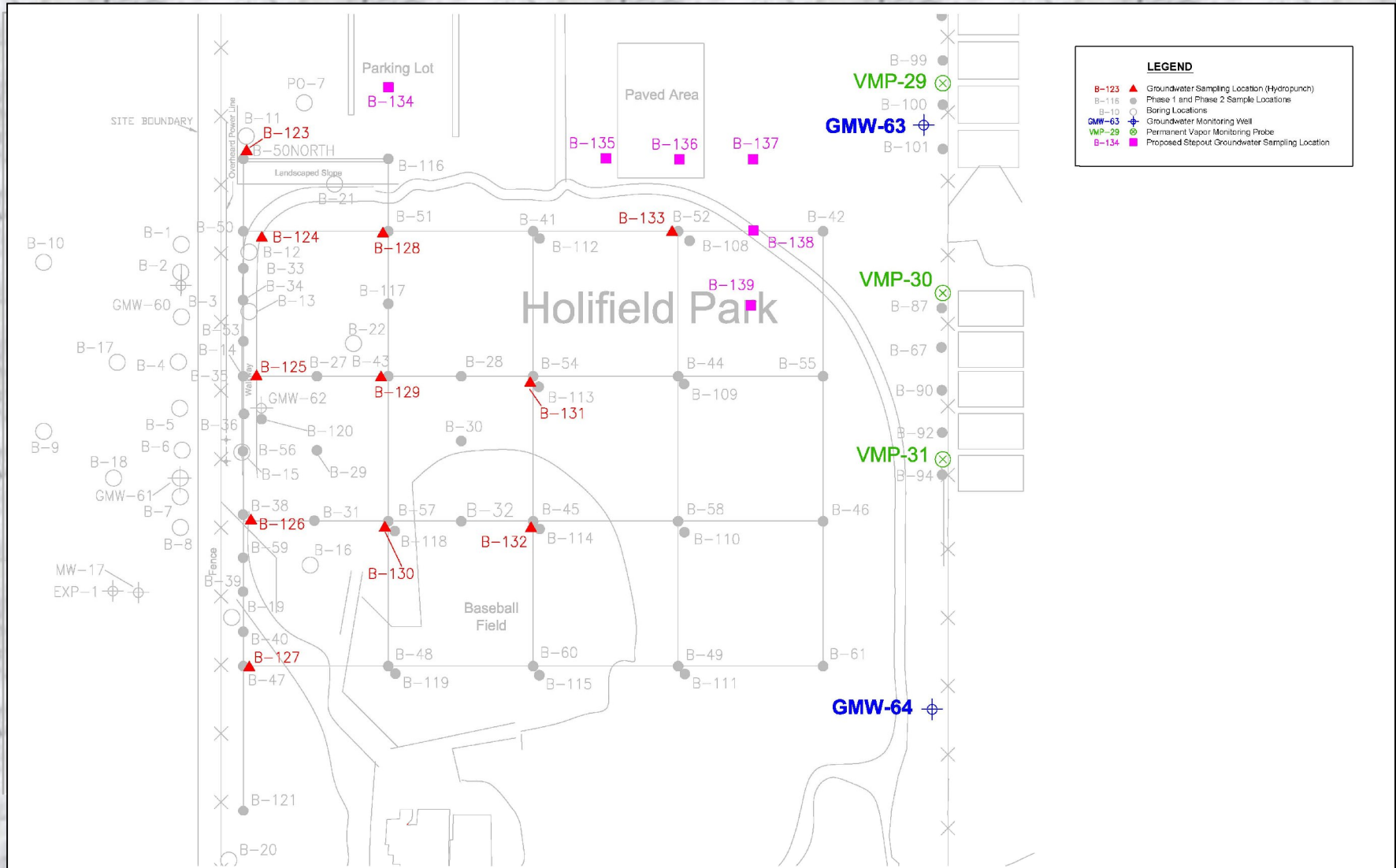
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# Holifield Park Investigation

- January 7, 2009 – began supplemental investigation
- 6 step-out hydropunch groundwater sampling locations to define the north/northeastern plume extent
- Groundwater samples to be collected from approximately 4 to 5 foot intervals spanning from 32-55 feet below ground surface at each location
- Samples to be analyzed for: TPH as gasoline, TPH as JP5, and volatile organic compounds

# Holifield Park

## Proposed Sampling Locations



# Conceptual Site Model Development

- The following activities were performed since the receipt of the CRWQCB directive to develop a conceptual site model (CSM) for DFSP Norwalk (letter dated 11/23/08) :
  - Reviewed and quality control checked the well information and analytical databases to identify data gaps and inconsistencies;
  - Reviewed previous reports to accumulate hydrogeologic cross-sections, geologic boring logs, electronic data tables of lithologic information, and CSMs;
  - Began preliminary CSM preparation with EVS software using subset of lithologic data; and
  - Coordinated with AMEC Geomatrix on strategy and schedule to complete a joint CSM.

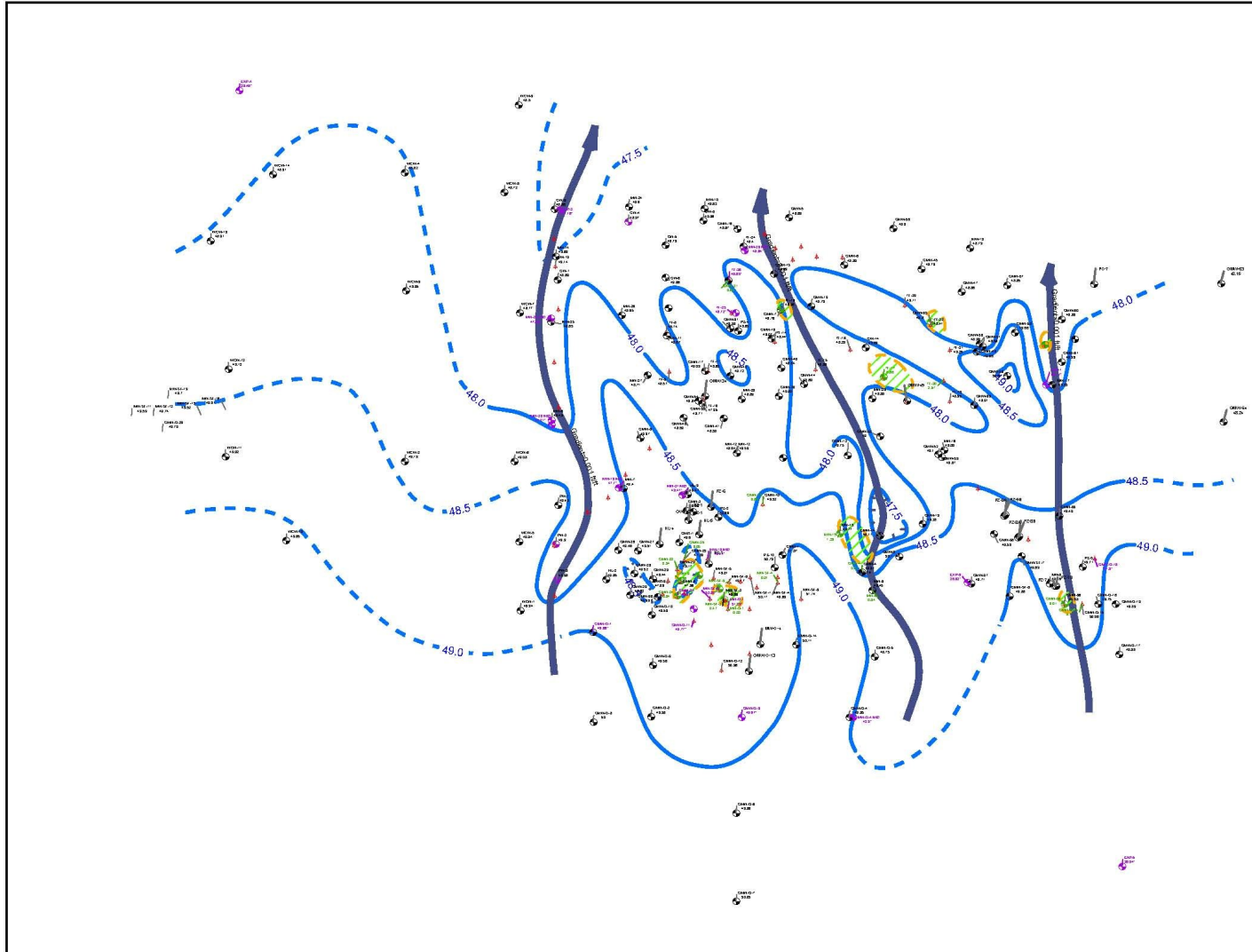
# Planned Activities for Next Quarter

- Continue weekly system inspections, required sampling, evaluation, and optimization
- Conducted step-out groundwater sampling (Wk 1 Jan) at Holifield Park and evaluation
- Finalize groundwater capture analysis and recommendations for expanded extraction system in the eastern site area
- Conduct 1<sup>st</sup> sentry groundwater monitoring event

# Second Semiannual 2008 Groundwater Monitoring Event

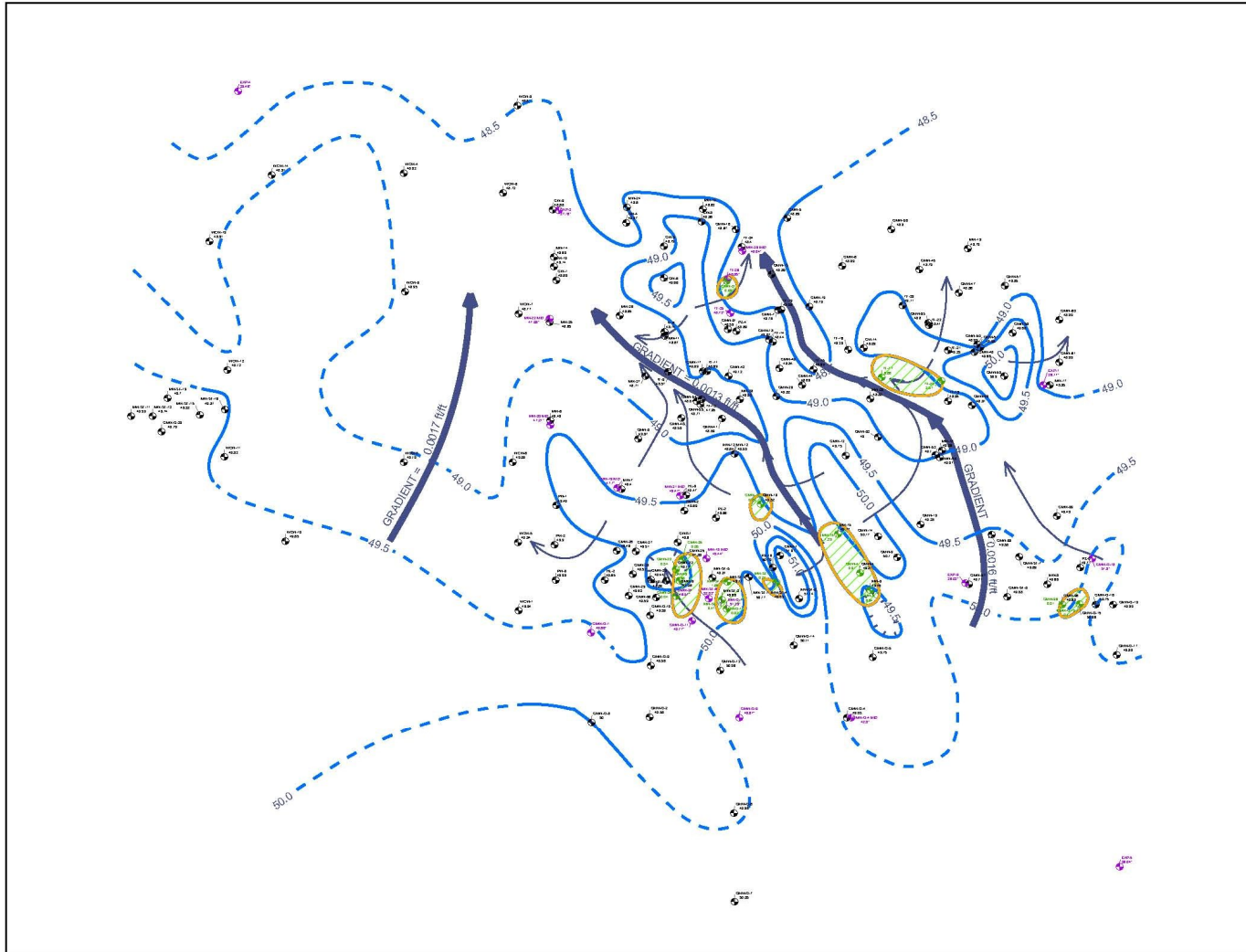
- 102 wells sampled, including 4 Exposition wells
- Groundwater elevations decreased by approximately 1.0 – 1.5 feet since April 2008.
- No VOCs were detected in Exposition wells.
- Free product was detected in 12 wells and ranged in thickness from 0.01 to 2.95 (MW-SF-13) feet.

# Groundwater Elevation and Free Product Plumes Second Semiannual 2008 Event October 2008





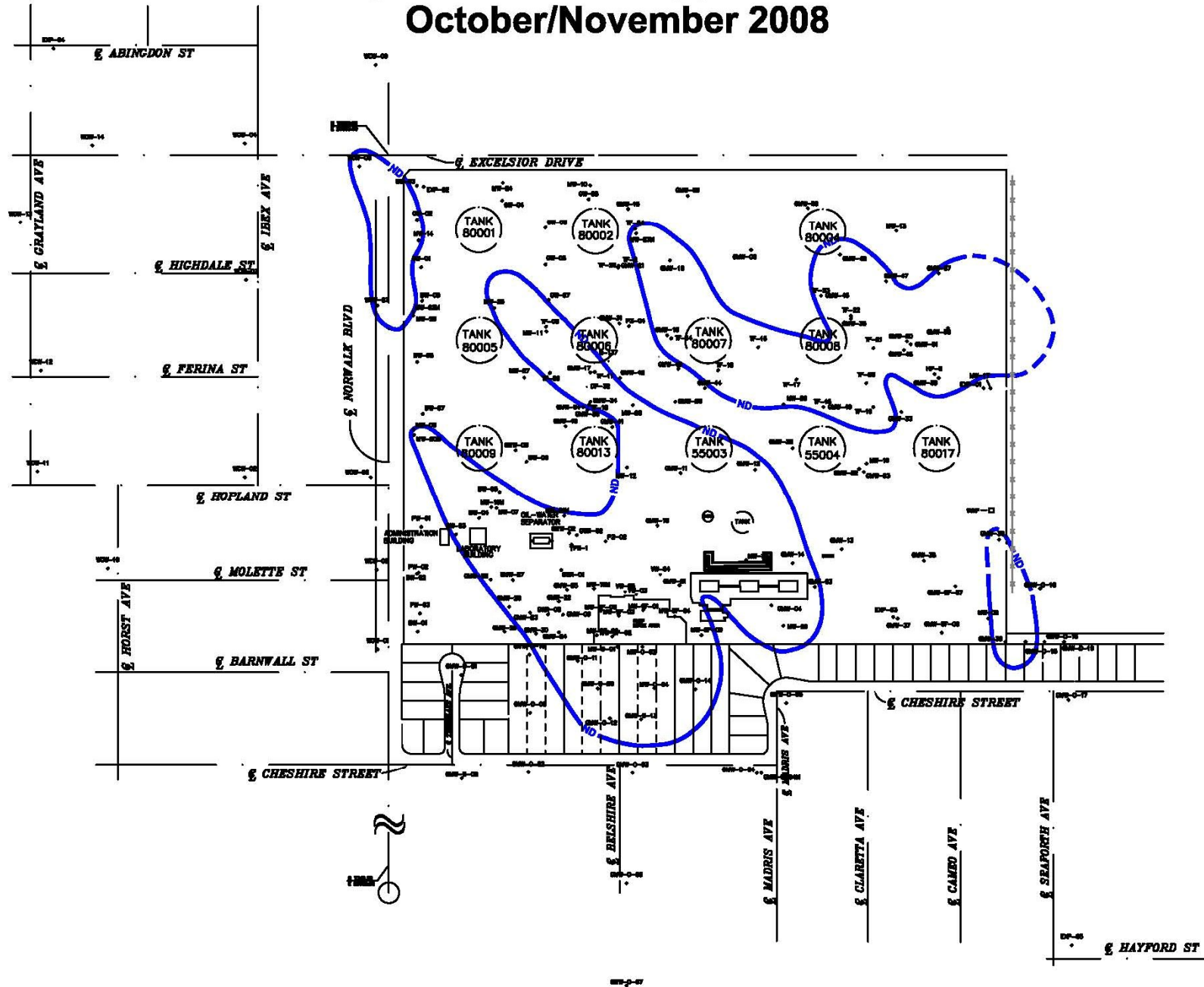
# Groundwater Elevation and Free Product Plumes Second Semiannual 2007 Event November 2007



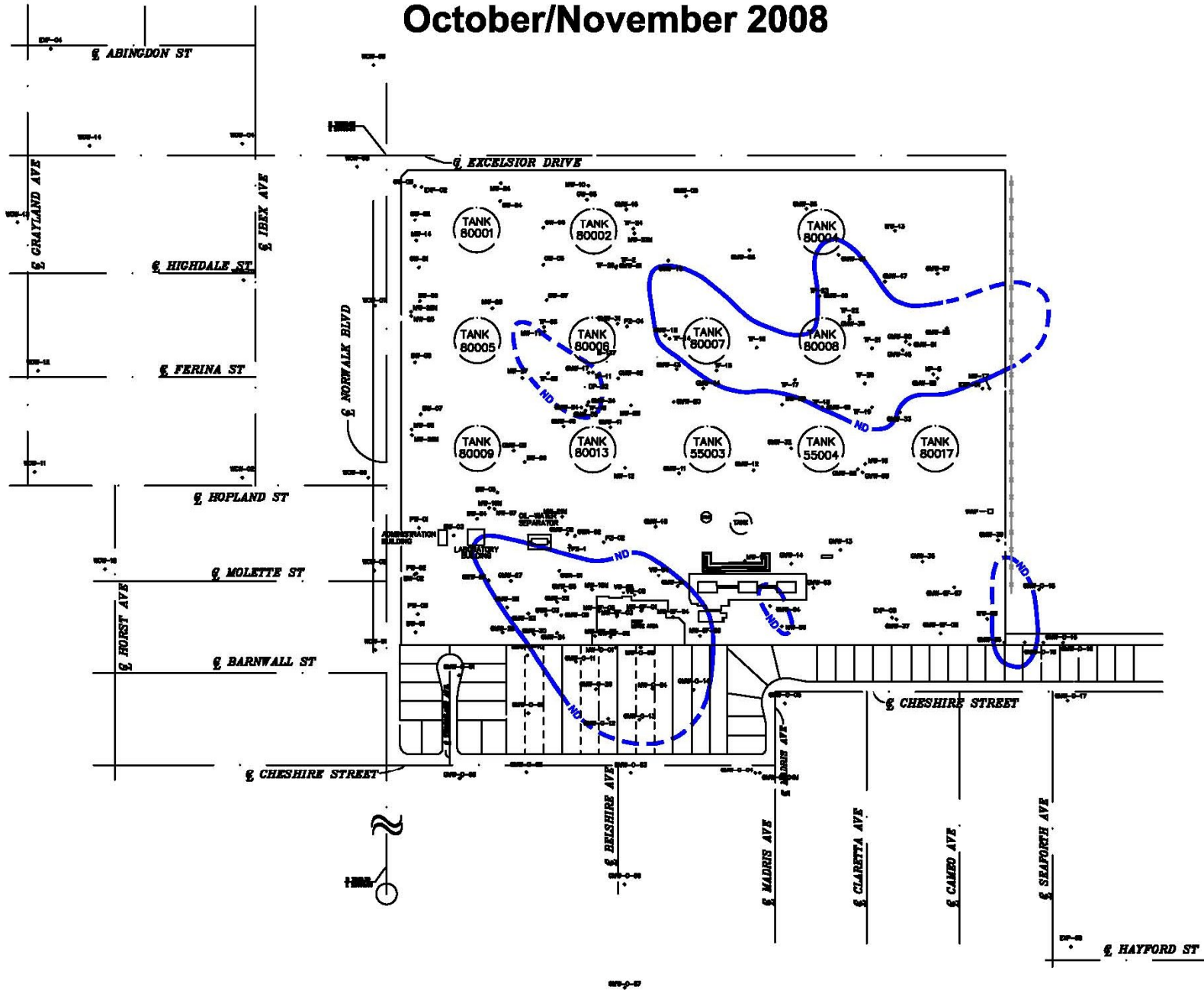
# Second Semiannual 2008 Groundwater Monitoring Event Summary

- In most areas, the lateral extent and concentrations of dissolved TPH, benzene, 1,2-DCA, and MTBE plumes were similar to those detected during April 2008.
- In general, TPH concentrations in the southern and eastern areas have decreased since the April 2008 semiannual event.
- Detected concentrations of 1,2-DCA were below the conservative risk-based clean up goal for 1,2-DCA (70  $\mu\text{g/L}$ ).

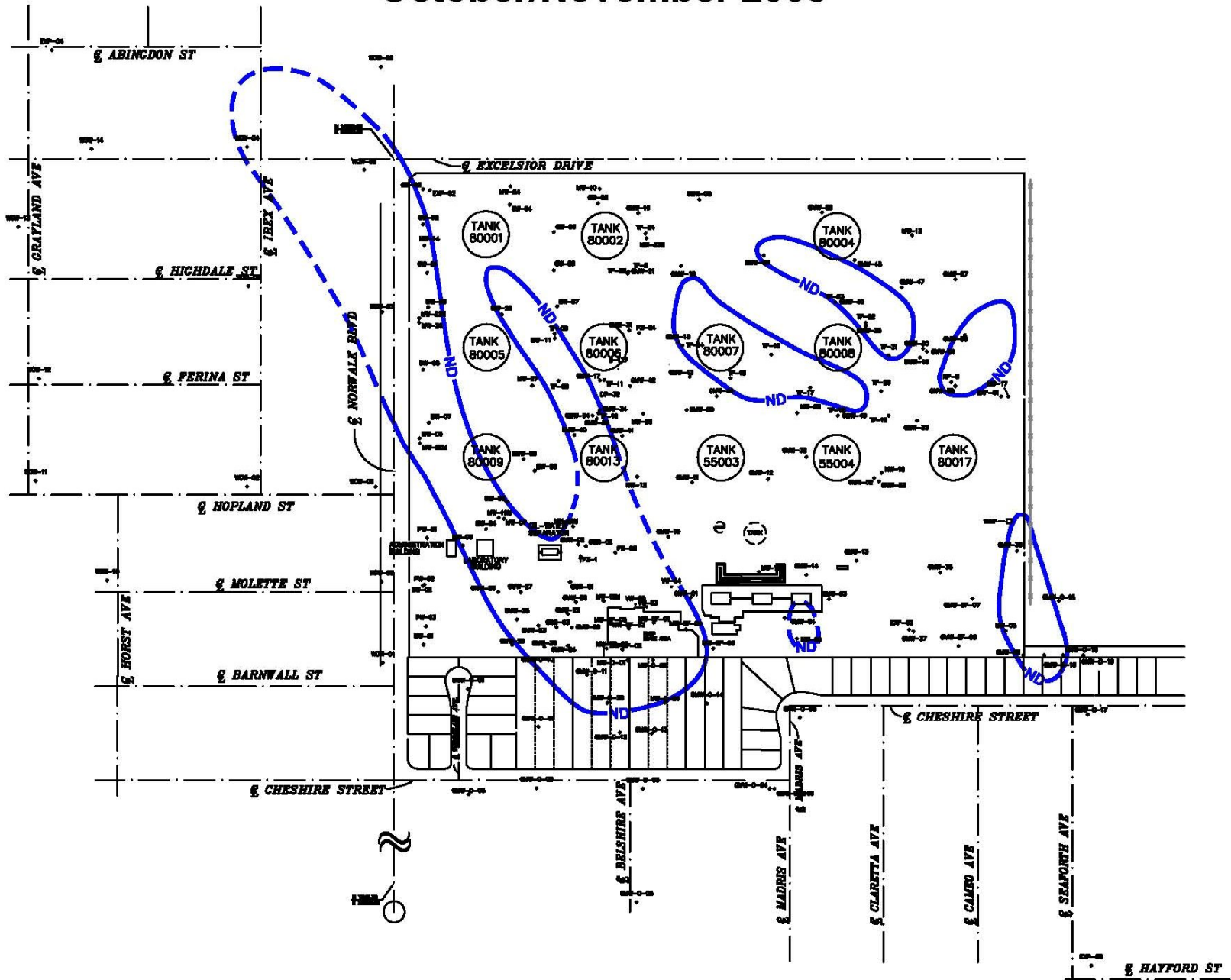
# Total Petroleum Hydrocarbons In Uppermost Groundwater Zone October/November 2008



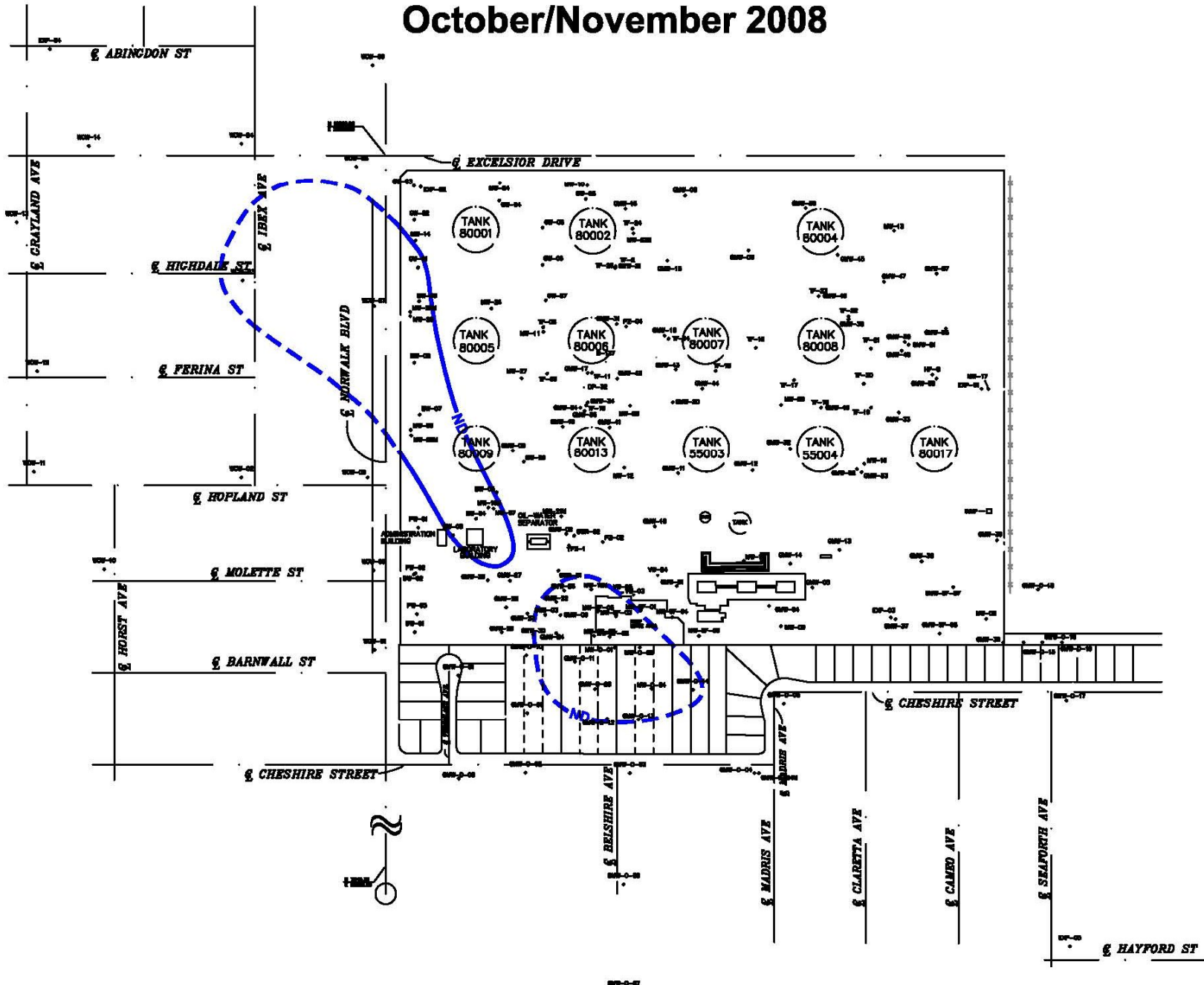
# Benzene In Uppermost Groundwater Zone October/November 2008



# Methyl tert-butyl ether In Uppermost Groundwater Zone October/November 2008



# 1,2-Dichloroethane In Uppermost Groundwater Zone October/November 2008



# Discussion