

# ***Norwalk Tank Farm Update***

*Presented to the Norwalk Tank Farm  
Restoration Advisory Board*

*October 28, 2004*

# Presentation Overview

## Topics to be Covered

- HRA Update
- Remediation Operations Update
- Phytoremediation Update
- Groundwater Monitoring Data Review

## HRA Update

- In a letter dated October 31, 2003, the RWQCB requested that Kinder Morgan “conduct an additional human health risk assessment (HRA), including indoor air analysis, primarily for the southern portion of the facility.”
- KMEP reviewed the HRA conducted by the DESC for the DTSC in 1993 and evaluated it based on current site conditions.
- When elevated risk is predicted using soil or groundwater data, current environmental practice is to collect soil vapor data to better predict potential risks.

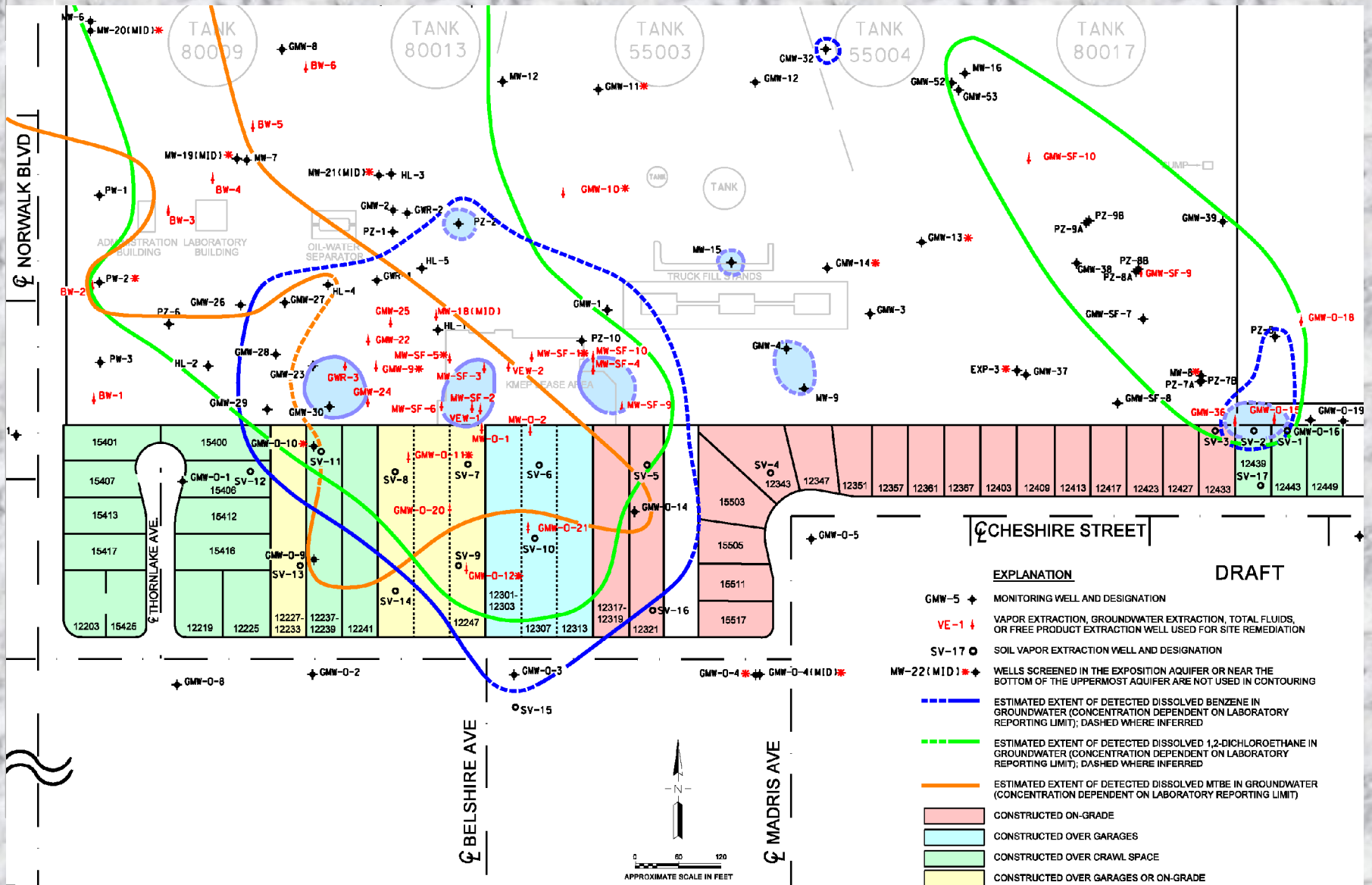
## **HRA Update (cont.)**

- KMEP surveyed southern off-site residential areas and identified three types of housing construction:
  - constructed on grade,
  - constructed over crawl space, or
  - constructed over garages.

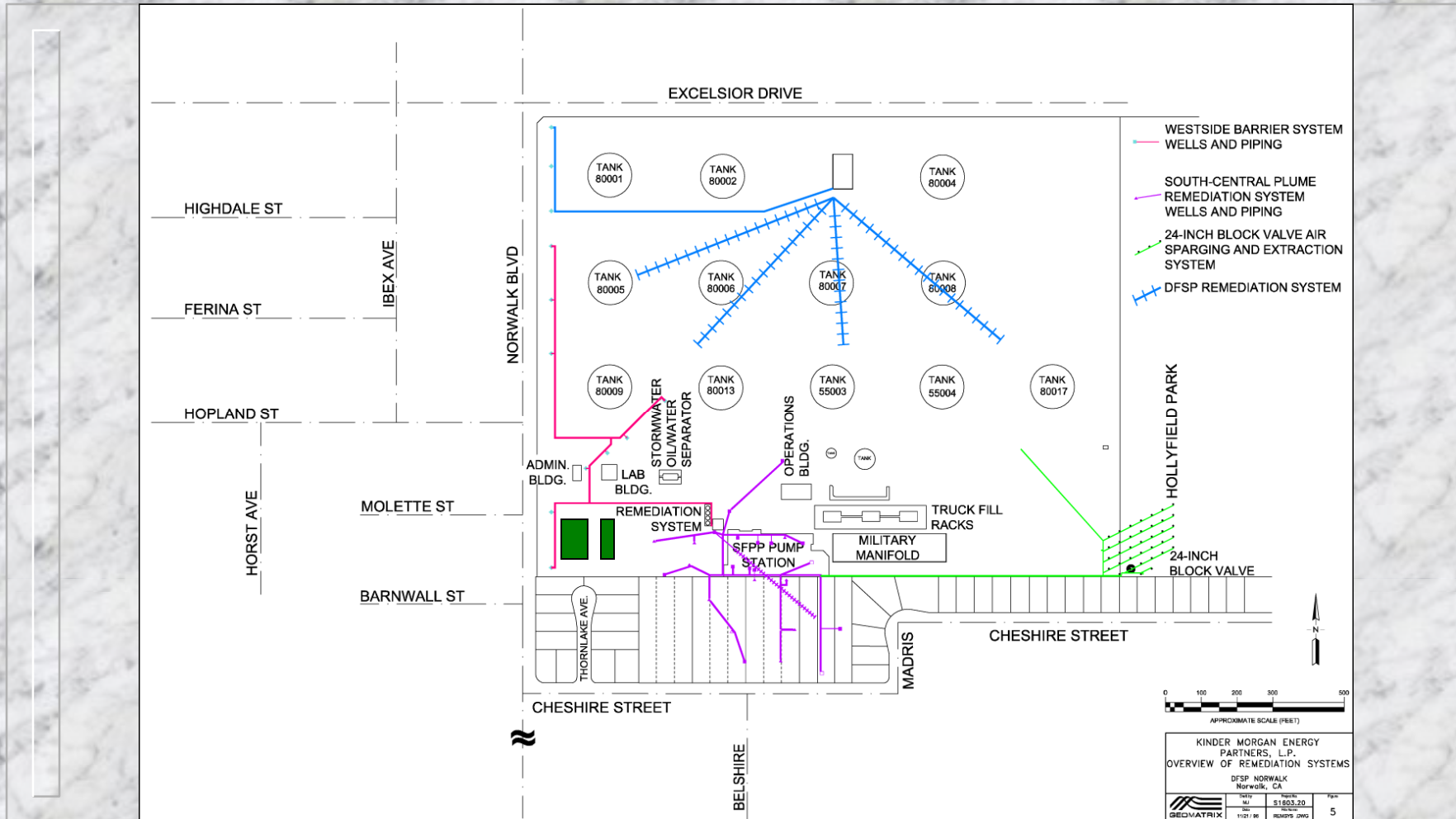
## **HRA Update (cont.)**

- KMEP identified potential soil gas sample locations based on the following criteria:
  - availability of existing groundwater data (i.e. proximity to existing well),
  - proximity to buildings of various construction types, and
  - relativity to free product and dissolved-phase plumes (i.e. over free product, within dissolved-phase plumes, or outside of dissolved-phase plumes)
  
- Need to confirm access with residents.

# HRA Update (cont.)



# Map of Current Remediation Systems



0 100 200 300 500  
 APPROXIMATE SCALE (FEET)

KINDER MORGAN ENERGY PARTNERS, L.P.  
 OVERVIEW OF REMEDIATION SYSTEMS  
 DFSP NORWALK  
 Norwalk, CA

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# Soil Vapor Extraction System

- 17 onsite and 6 off-site vapor extraction wells in the South-Central Plume area.
- 2 vapor extraction wells in the Southeastern 24-Inch Block Valve area.

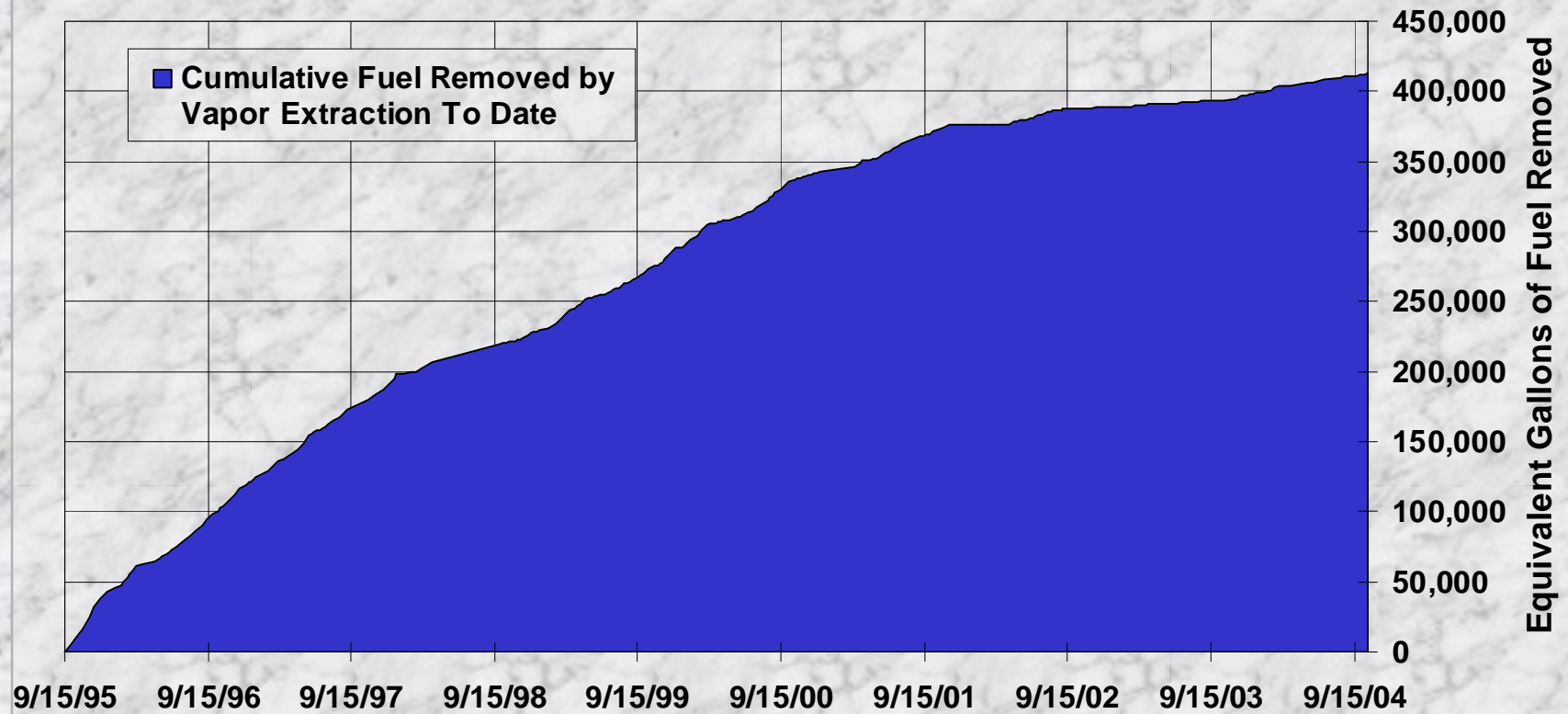


# Soil Vapor Extraction System Operations Summary

- Approximately 4,530 gallons equivalent of fuel removed from soil and destroyed by thermal oxidation since the July 2004 RAB meeting.
- Approximately 412,500 gallons equivalent of fuel removed from soil and destroyed by thermal oxidation since September 1995.

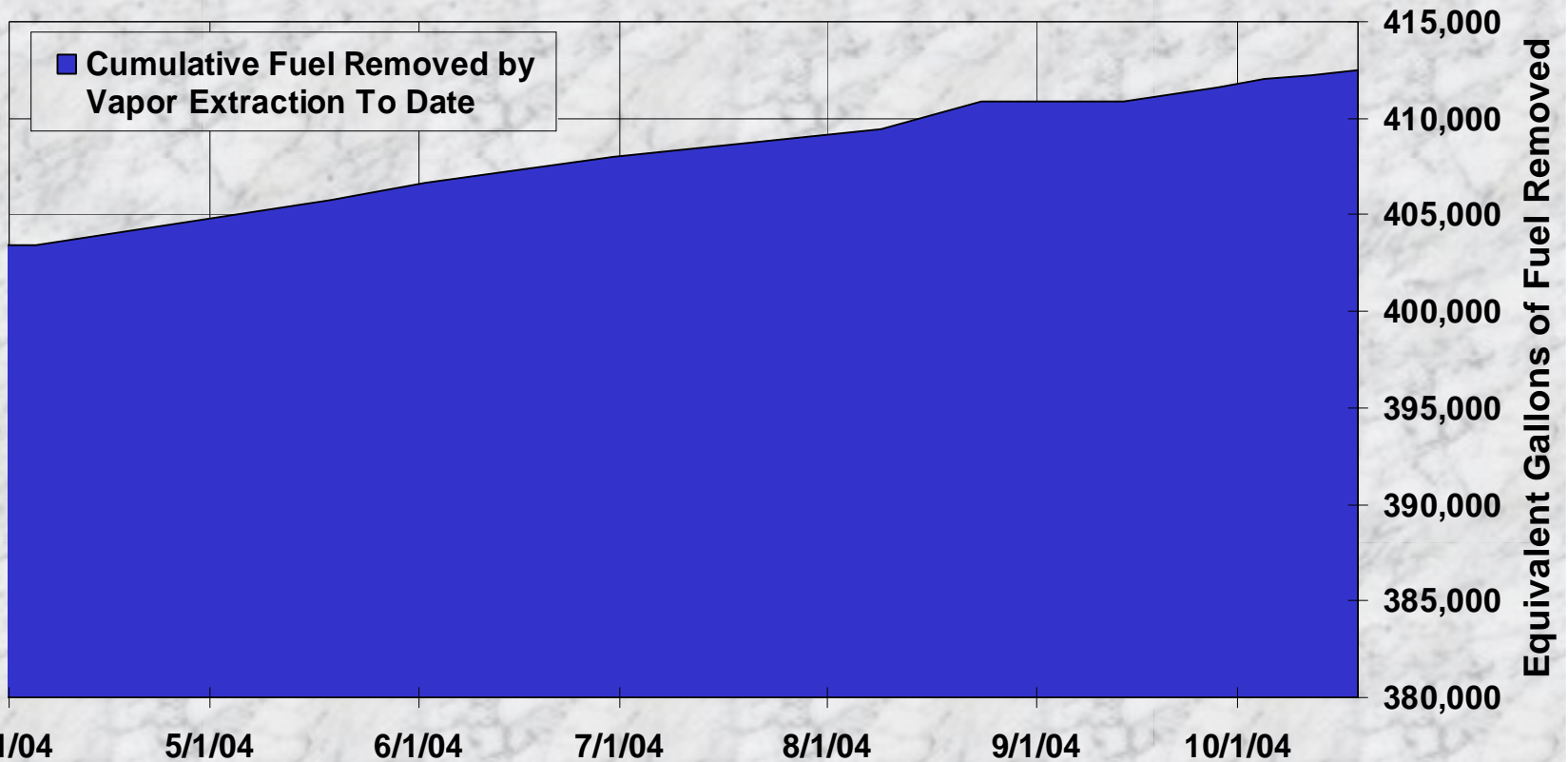
# Soil Vapor Extraction System Operations Summary

Cumulative Fuel Removed by Vapor Extraction To Date



# Soil Vapor Extraction System Operations Summary

Cumulative Fuel Removed by Vapor Extraction - Past Six Months



# Groundwater/Product Extraction System

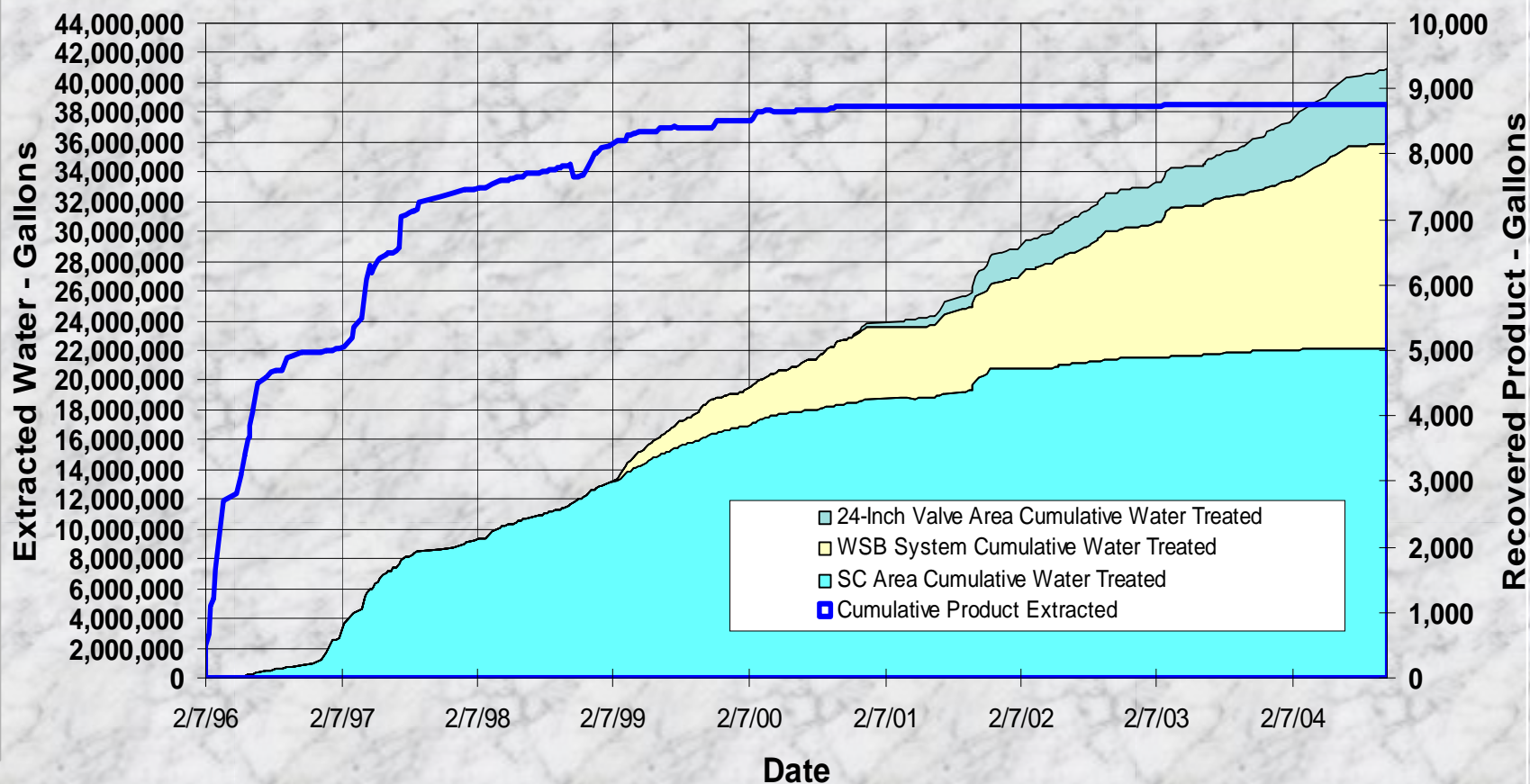
- 8 groundwater extraction wells in the West Side Barrier area
- 8 groundwater/product extraction wells in the South-Central Plume area
- 3 groundwater/product extraction wells and 2 groundwater extraction wells in the Southeastern 24-Inch Block Valve area

# Groundwater/Product Extraction System Operations Summary

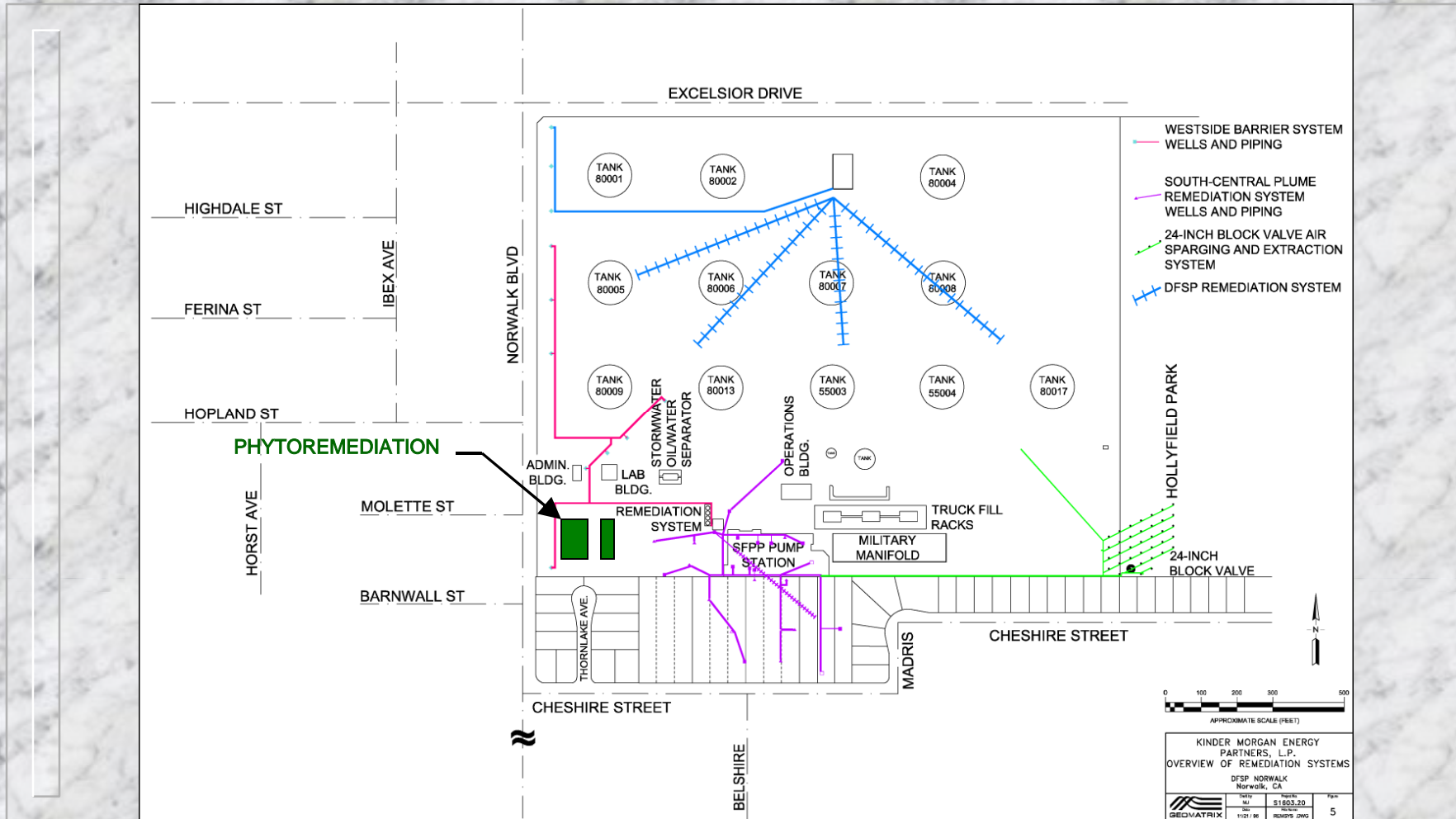
- Total groundwater extracted since July 2004 RAB meeting:
  - South-Central Plume area, 61,900 gallons
  - Southeastern 24-Inch Valve area, 344,500 gallons
  - West Side Barrier area, 197,200 gallons
  - No free product was recovered
- Total groundwater extracted since September 1995:
  - South-Central Plume area, 22.2 million gallons
  - Southeastern 24-Inch Valve area, 5.0 million gallons
  - West Side Barrier area, 13.8 million gallons
  - Total groundwater extracted, 41 million gallons
  - 8,745 gallons free product removed

# Groundwater/Product Extraction System Operations Summary

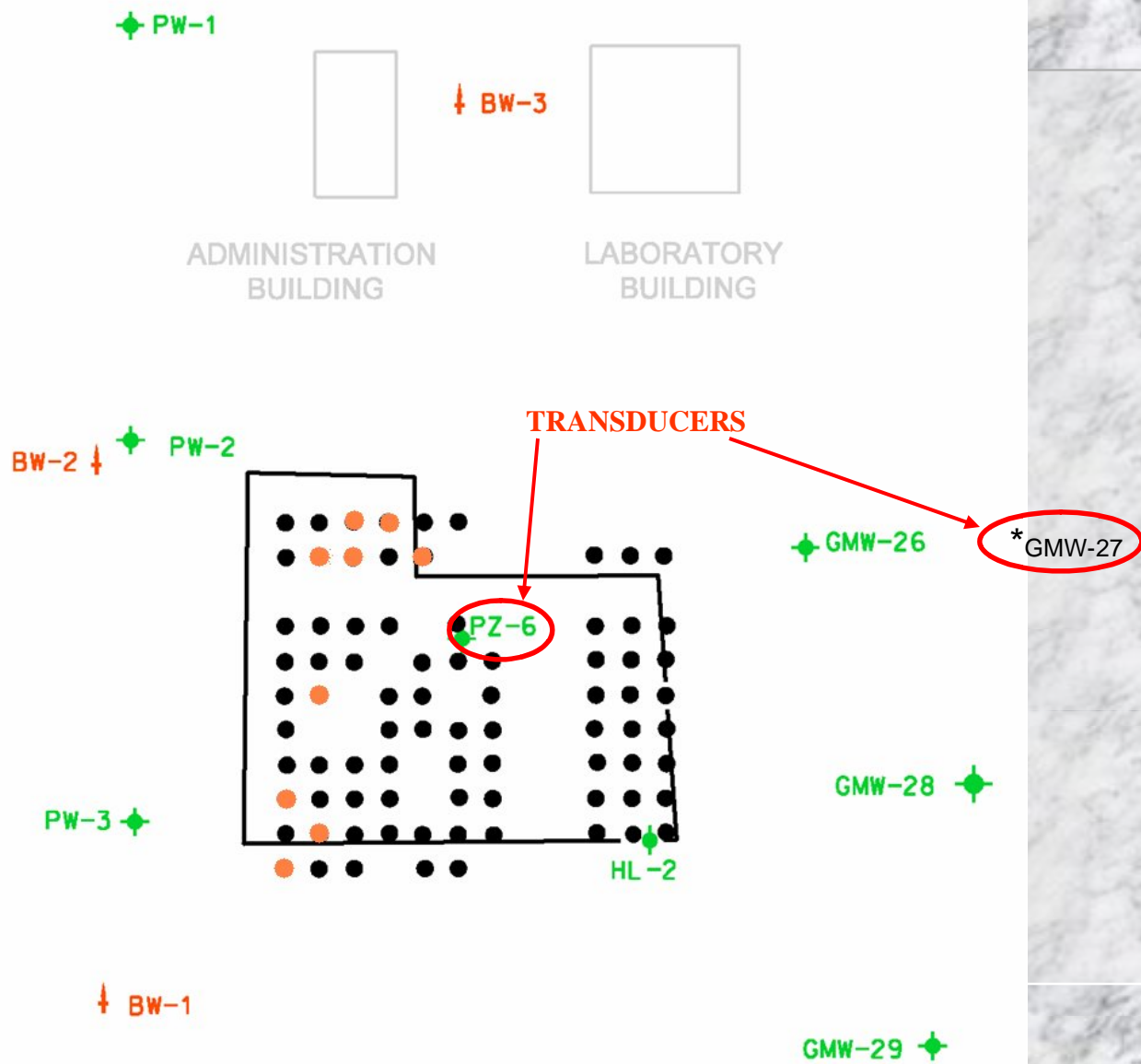
## Produced Extracted and Water Treated Summary



# Phytoremediation Update

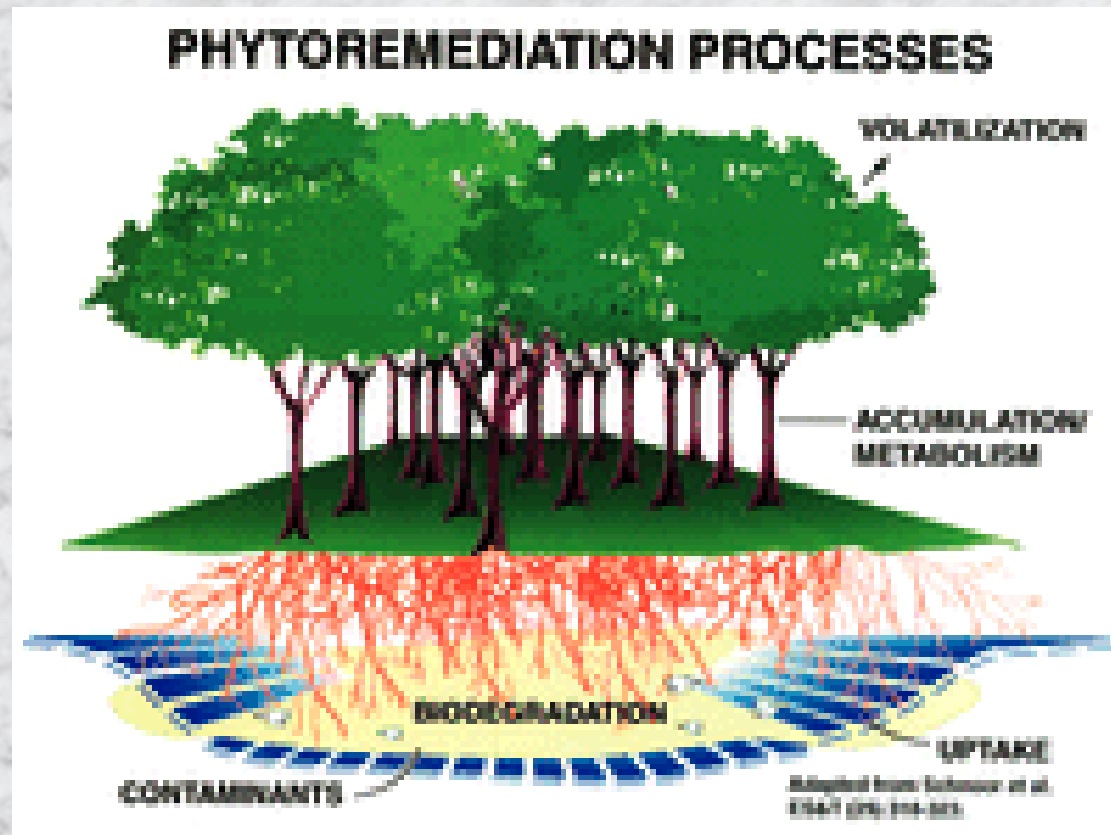


# Phytoremediation Area





# The Phytoremediation Process



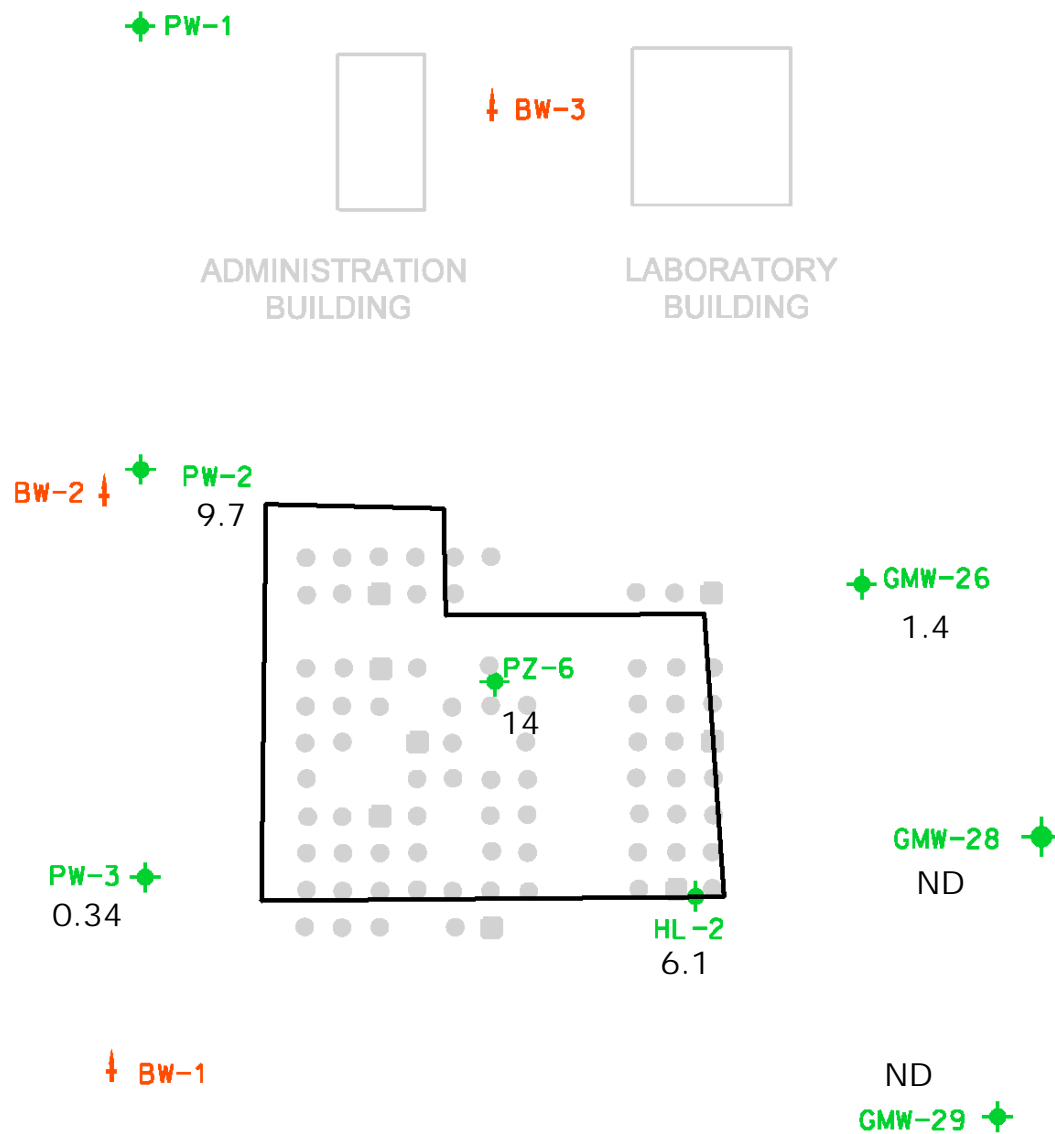
## **Phytoremediation cont.**

- Trees planted in July 1999.
- Performed groundwater sampling in phytoremediation area in July 2003, April 2004, and July 2004.
- Installed transducers in wells in phytoremediation area to gauge diurnal effects of poplars during July 2004.
- Gauged wells in phytoremediation area to observe effects of poplars on groundwater elevation.

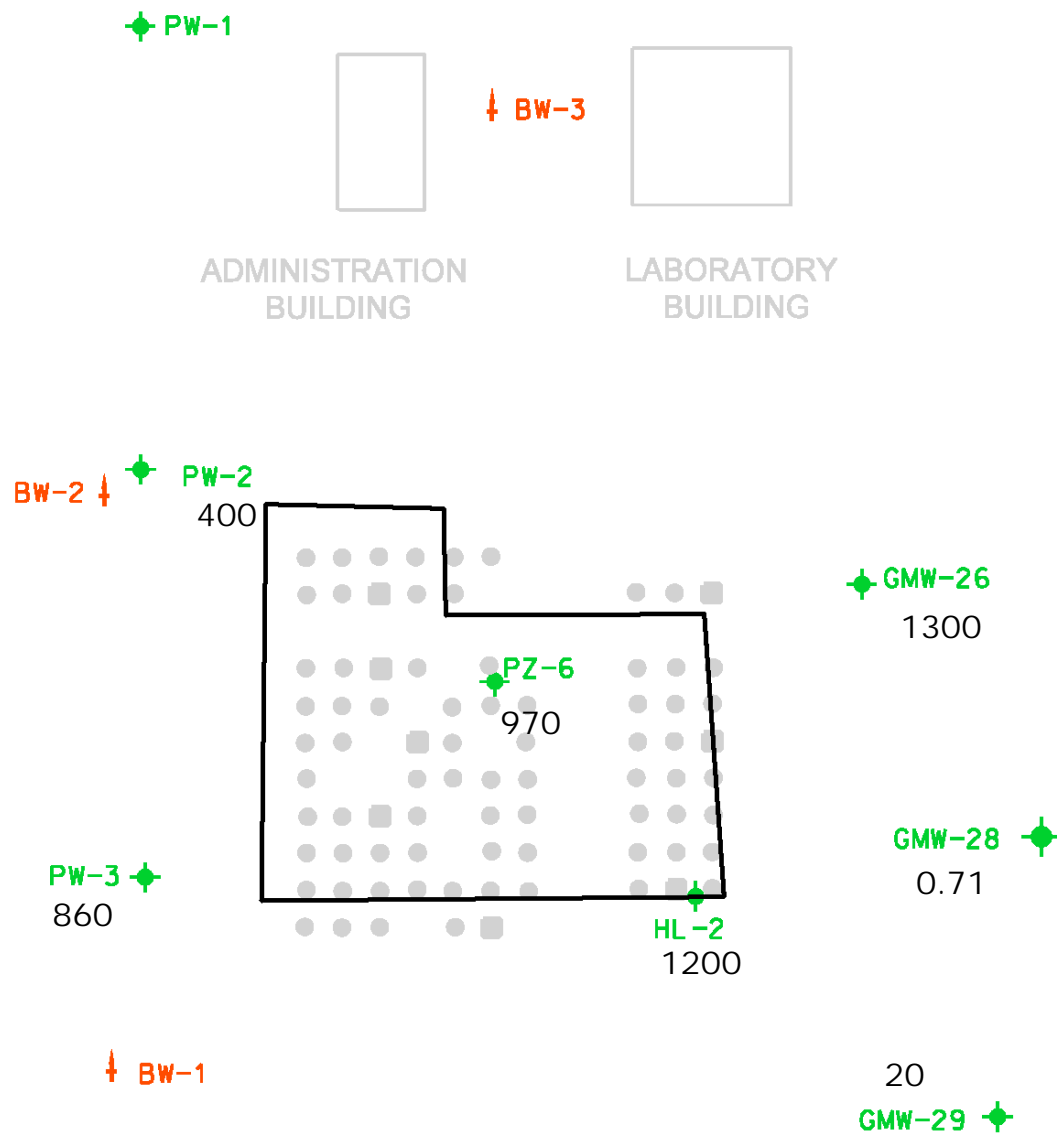
# Phytoremediation Results

- Evidence of enhanced biodegradation:
  - Higher nitrate concentrations within and downgradient of phytoremediation area.
  - Higher sulfate concentrations within and downgradient of phytoremediation area.
  - Higher (positive) ORP values within and downgradient of phytoremediation area.
  - Decreased or lower concentrations of benzene, 1,2-DCA, and MTBE within and downgradient of phytoremediation area since trees were planted in July 1999.

# Phytoremediation – Nitrate (mg/l)

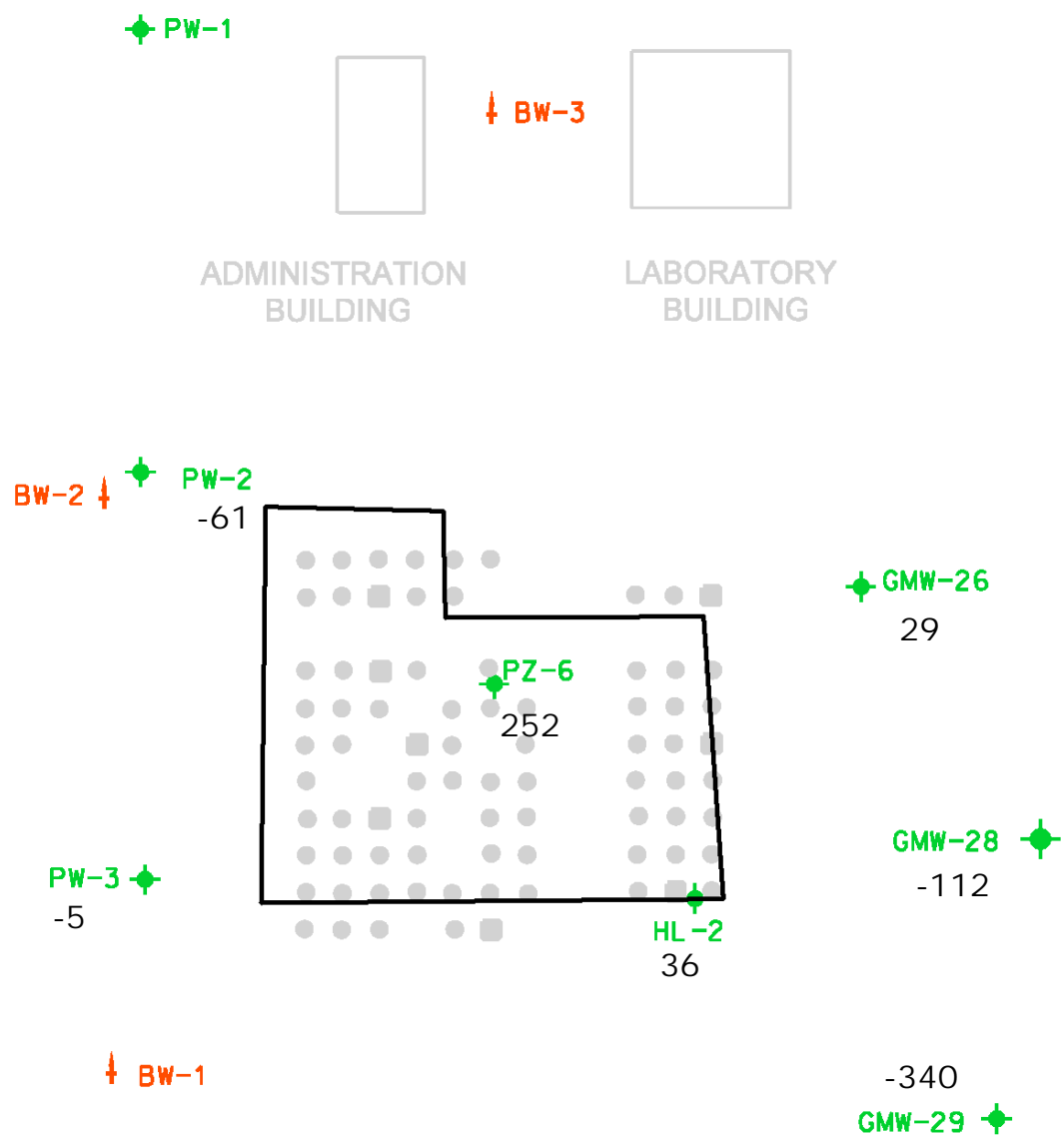


# Phytoremediation – Sulfate (mg/l)



April 2004

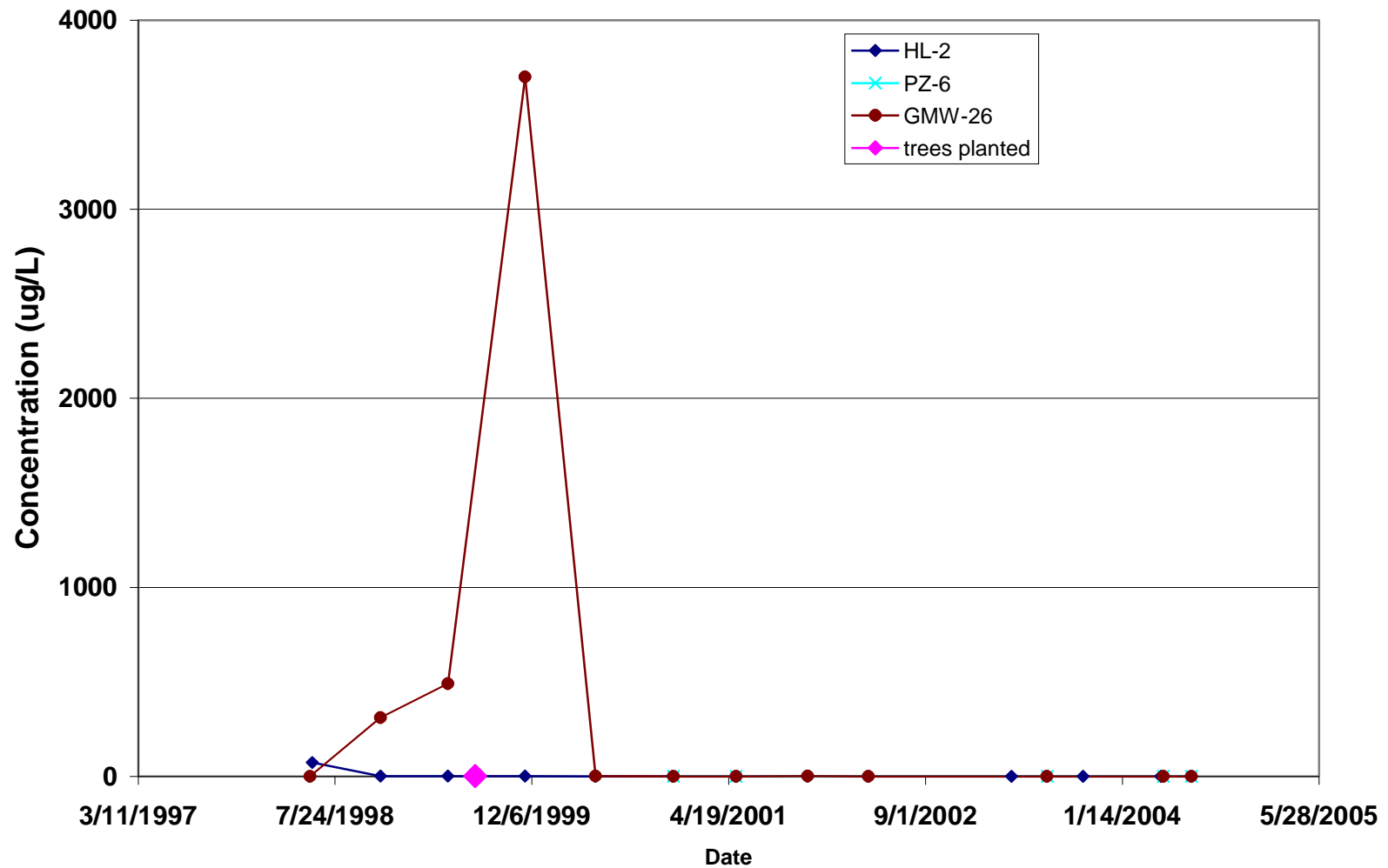
# Phytoremediation – ORP (mV)



April 2004

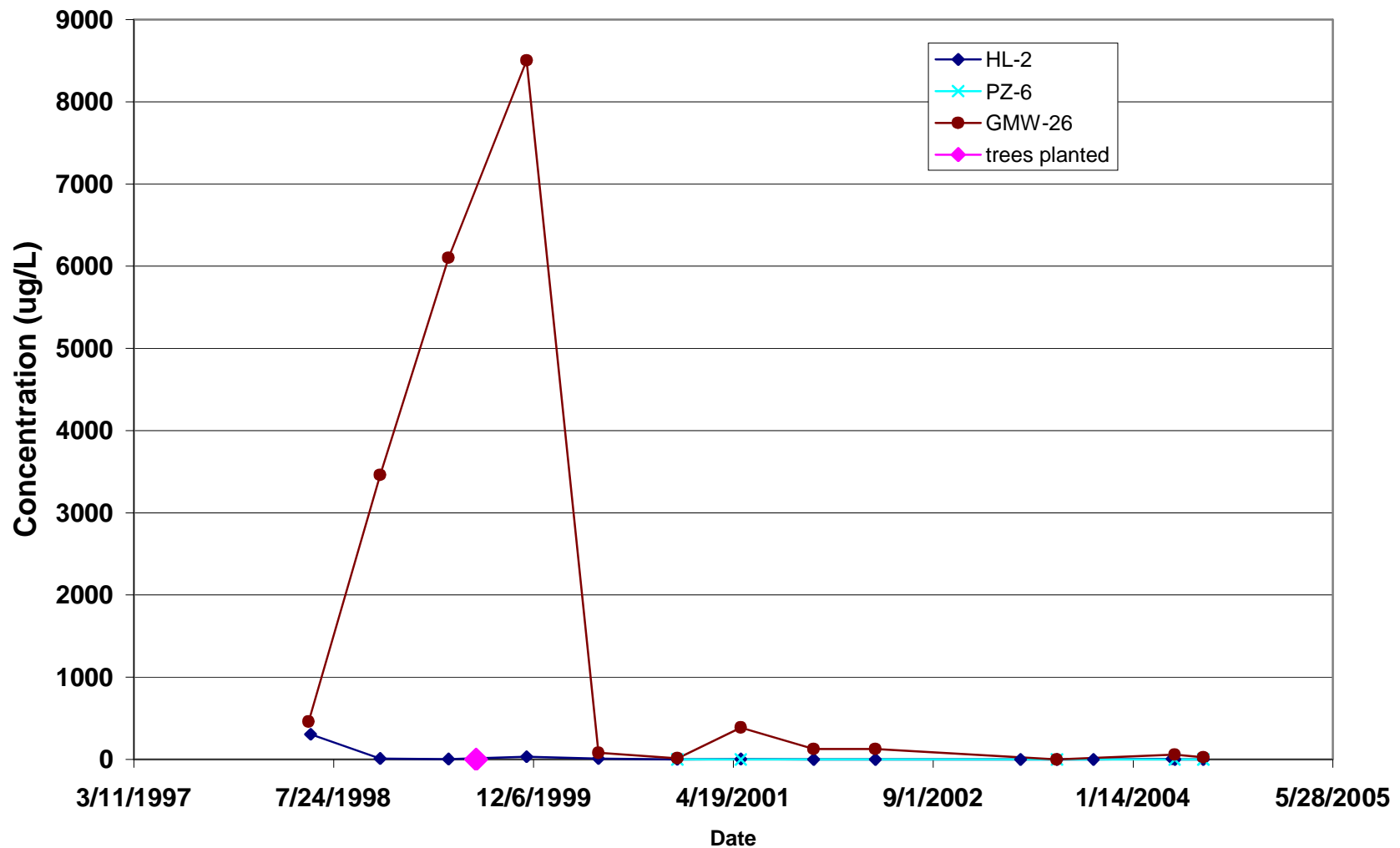
# Phytoremediation cont.

Change in Benzene Concentration Reported in Wells Near Phyto Area



# Phytoremediation cont.

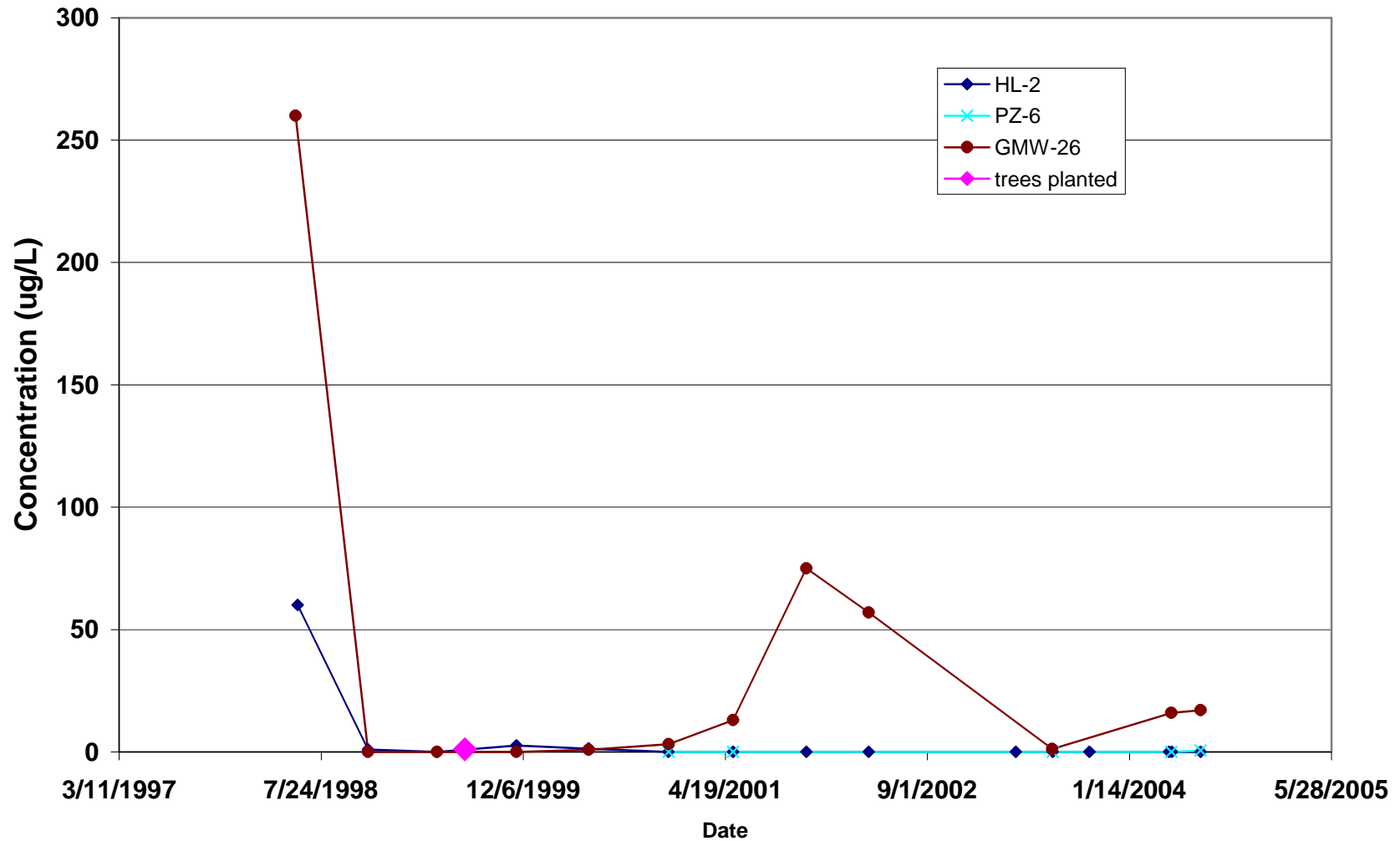
Change in MTBE Concentration Reported in Wells Near Phyto Area





# Phytoremediation cont.

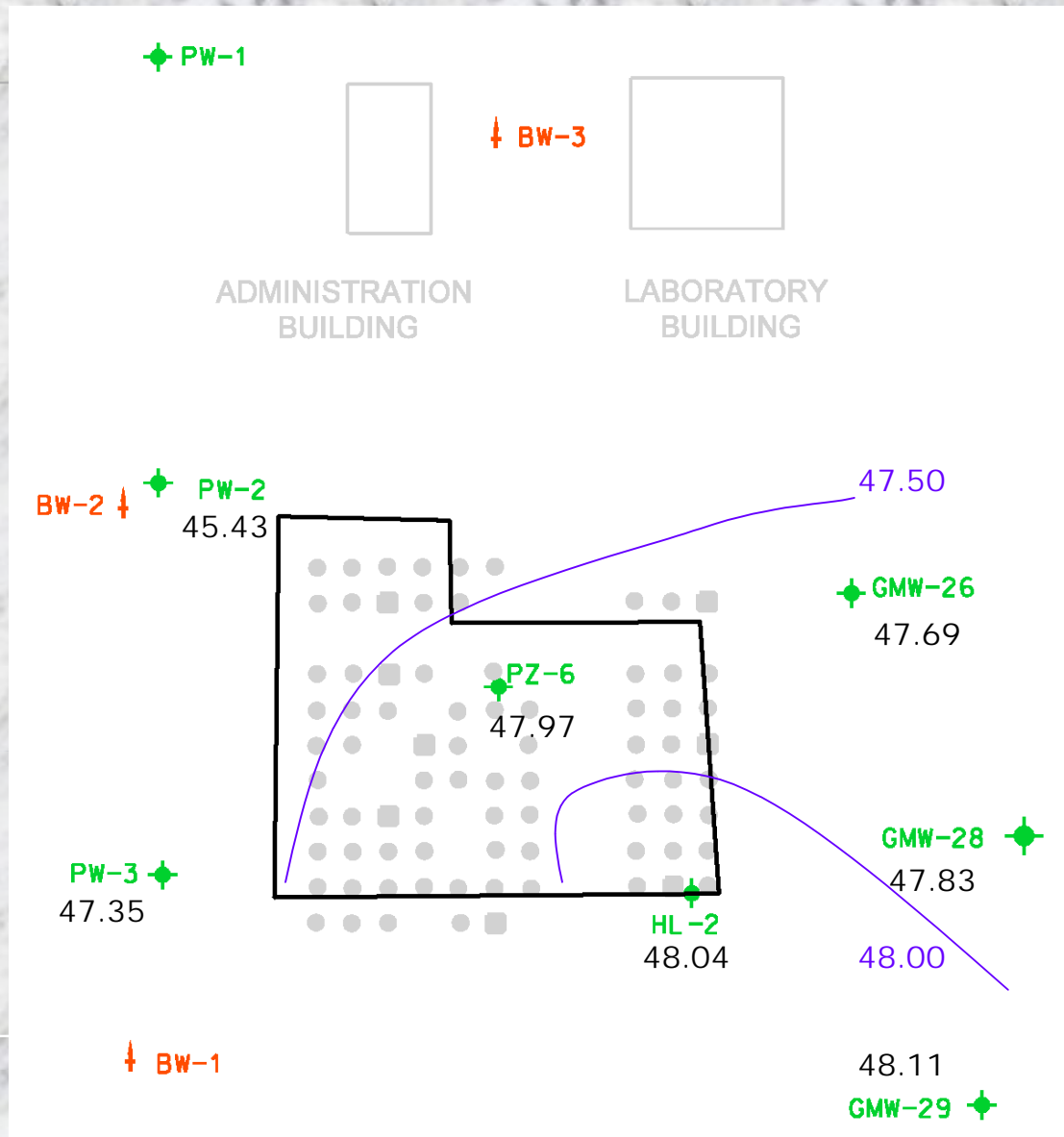
Change in 1,2-DCA Concentration Reported in Wells Near Phyto Area



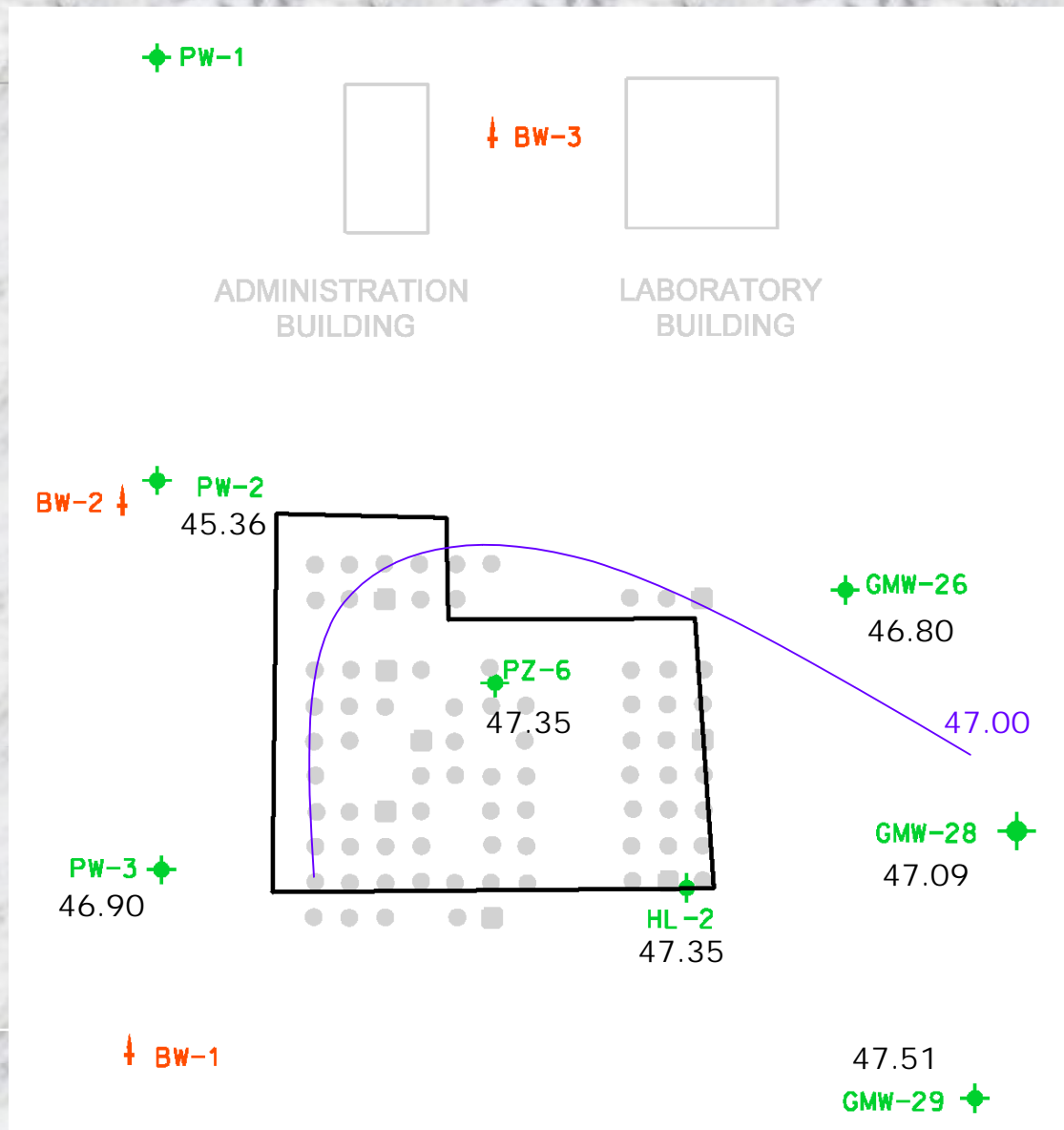
# Phytoremediation Results

- Effects of trees on groundwater elevation:
  - Seasonal variations.
  - Observed a mound within phytoremediation area due to capillary action of roots.
  - Diurnal effects observed in wells PZ-6 (within phytoremediation area) and GMW-27 (outside of phytoremediation area).

# Phytoremediation – Groundwater Elevation (ft msl)

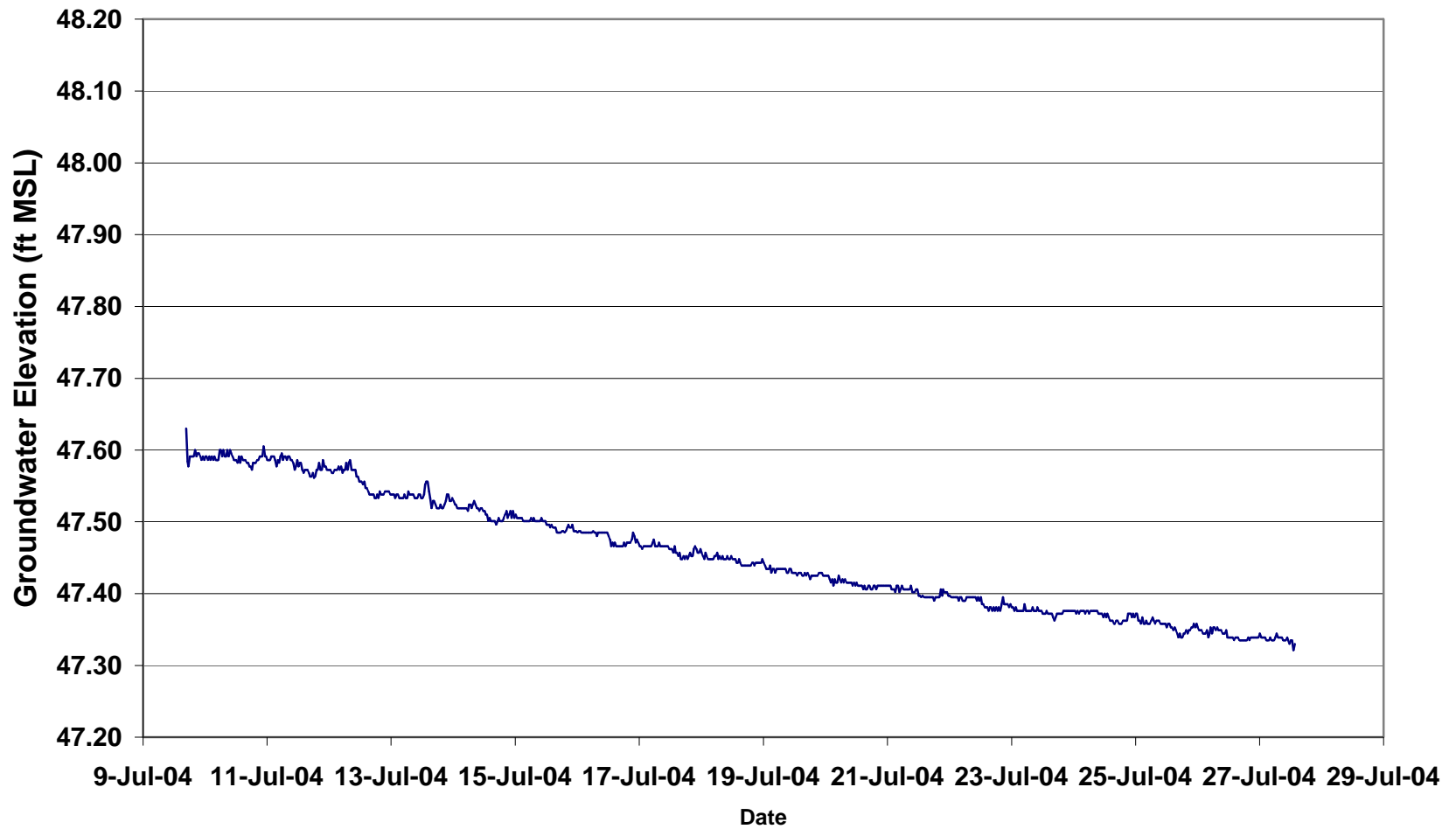


# Phytoremediation – Groundwater Elevation (ft msl)



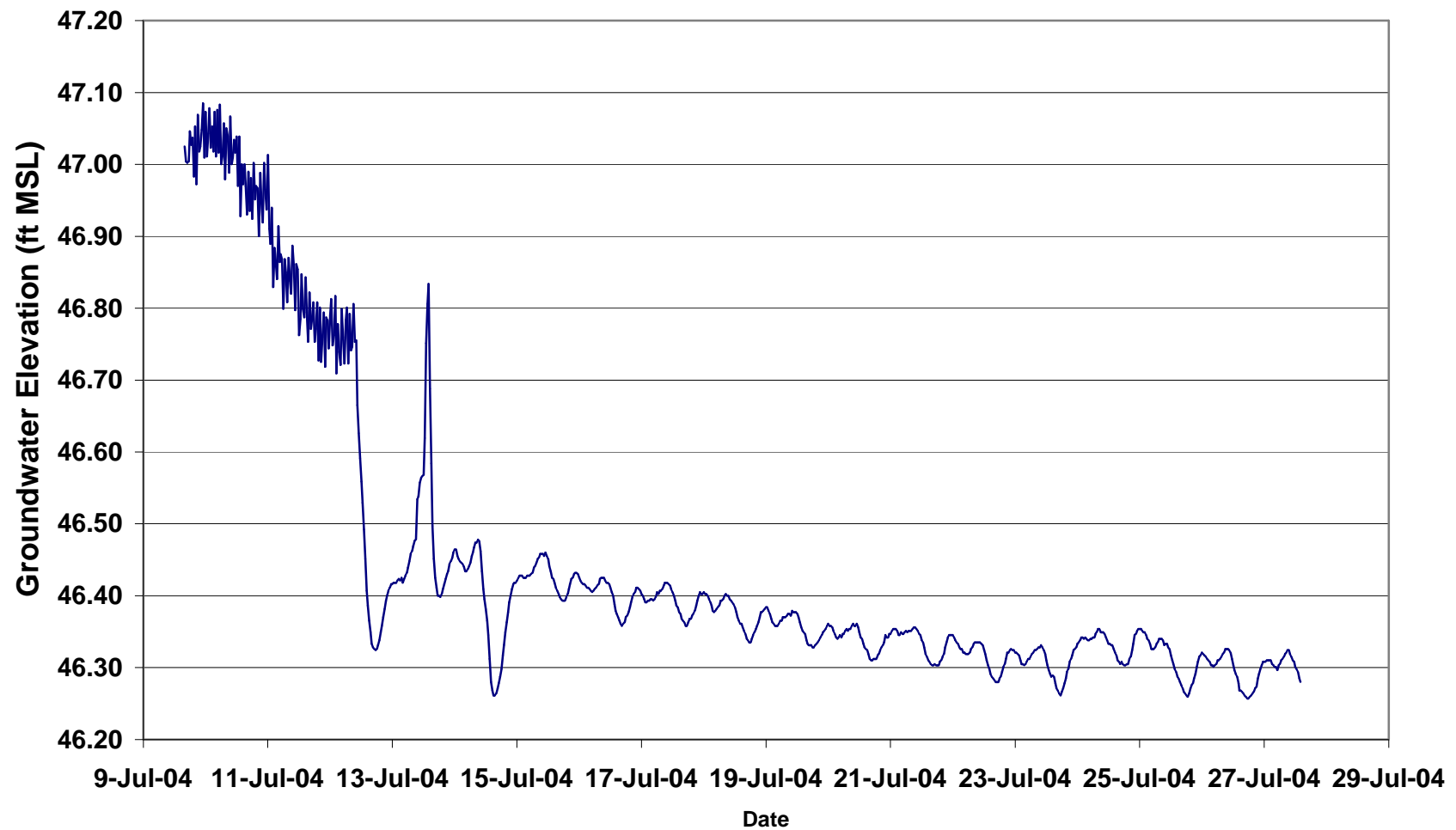
# Phytoremediation cont.

Change in Groundwater Elevation in Well PZ-6 (Inside Phyto Area) Measured in July 2004



# Phytoremediation cont.

Change in Groundwater Elevation in Well GMW-27 (Outside Phyto Area)  
Measured in July 2004



# Groundwater Monitoring Data Review

- Results of resampling during July 2004:
  - TPHfp in EXP-5: ND (160 ppb in April 2004)
  - TPHfp in GMW-O-16: ND (3600 ppb in April 2004)
  - TPHfp in GMW-O-19: ND (1400 ppb in April 2004)

# Groundwater Monitoring Data Review

- Review of TPH results in WCW-4 and WCW-7:
  - TPHfp in WCW-4 was 120 ppb in April 2004
    - Detection limit for TPHfp = 100 ppb
    - TPHfp has previously been detected in this well at concentrations between 110 ppb and 280 ppb in past 5 years
  - TPHfp in WCW-7 was 170 ppb in April 2004
    - Detection limit for TPHfp = 100 ppb
    - TPHfp has previously been detected in this well at concentrations between 110 ppb and 420 ppb in past 5 years

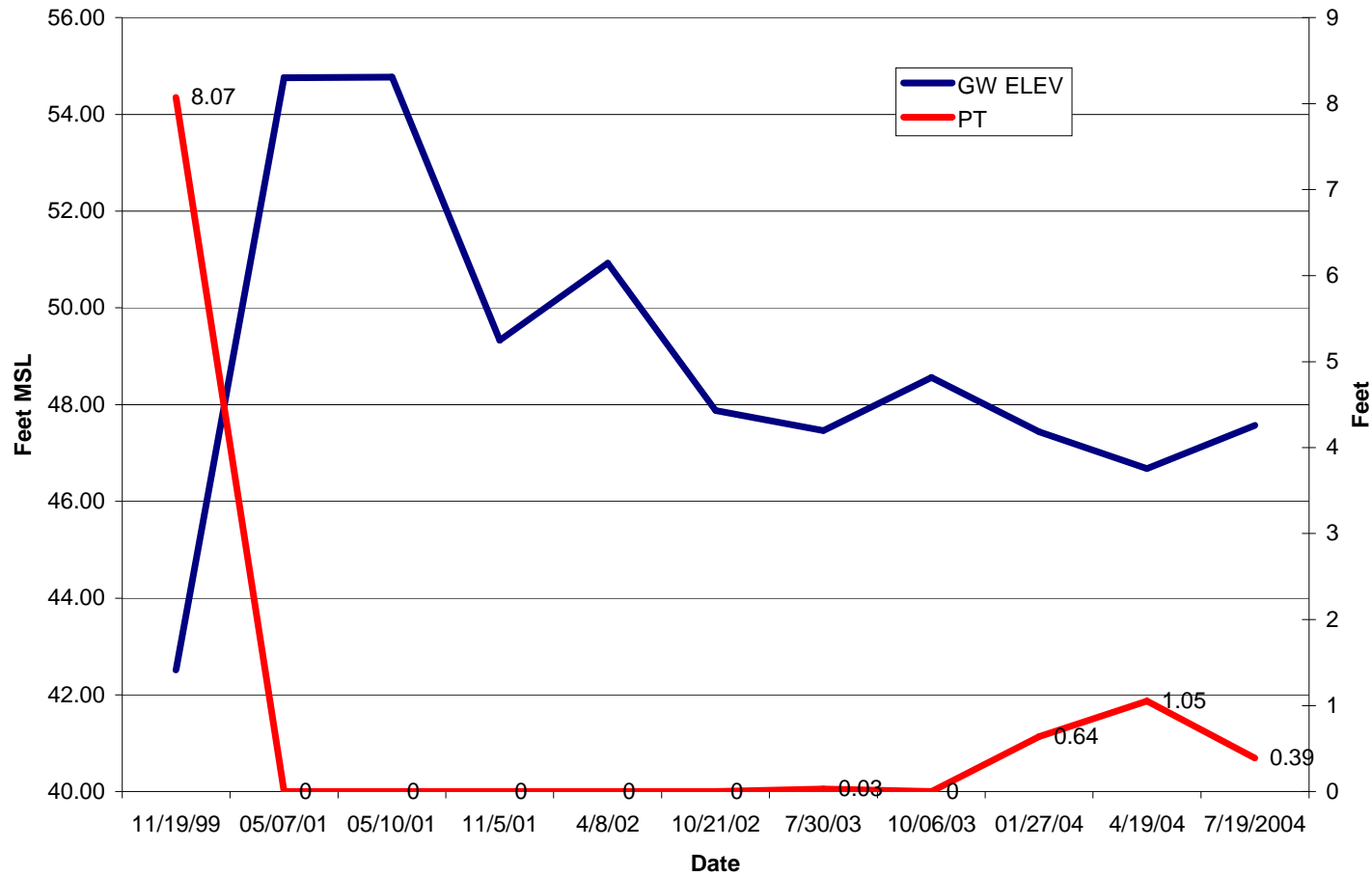


# Groundwater Monitoring Data Review

- Historical data for well GMW-4 during past 5 years:
  - Product thickness has varied between 0.00 and 0.08 feet.
  - TPH has decreased from 5800 ppb (11/99) to 1600 ppb (4/03).
  - Benzene has decreased from 67 ppb (11/99) to 8 ppb (4/03).
  - 1,2-DCA and MTBE remained ND.
  - Will attempt to purge and sample this well in November 2004.
- Historical data for well MW-9 during past 5 years:
  - Product thickness has varied between 0.00 and 0.09 feet.
  - TPH detected at 6300 ppb (11/99) and 5200 ppb (5/00).
  - Benzene detected at 24 ppb (11/99) and 12 ppb (5/00).
  - MTBE detected at 1.8 ppb (5/00).
  - 1,2-DCA ND.
  - Will attempt to purge and sample this well in November 2004.

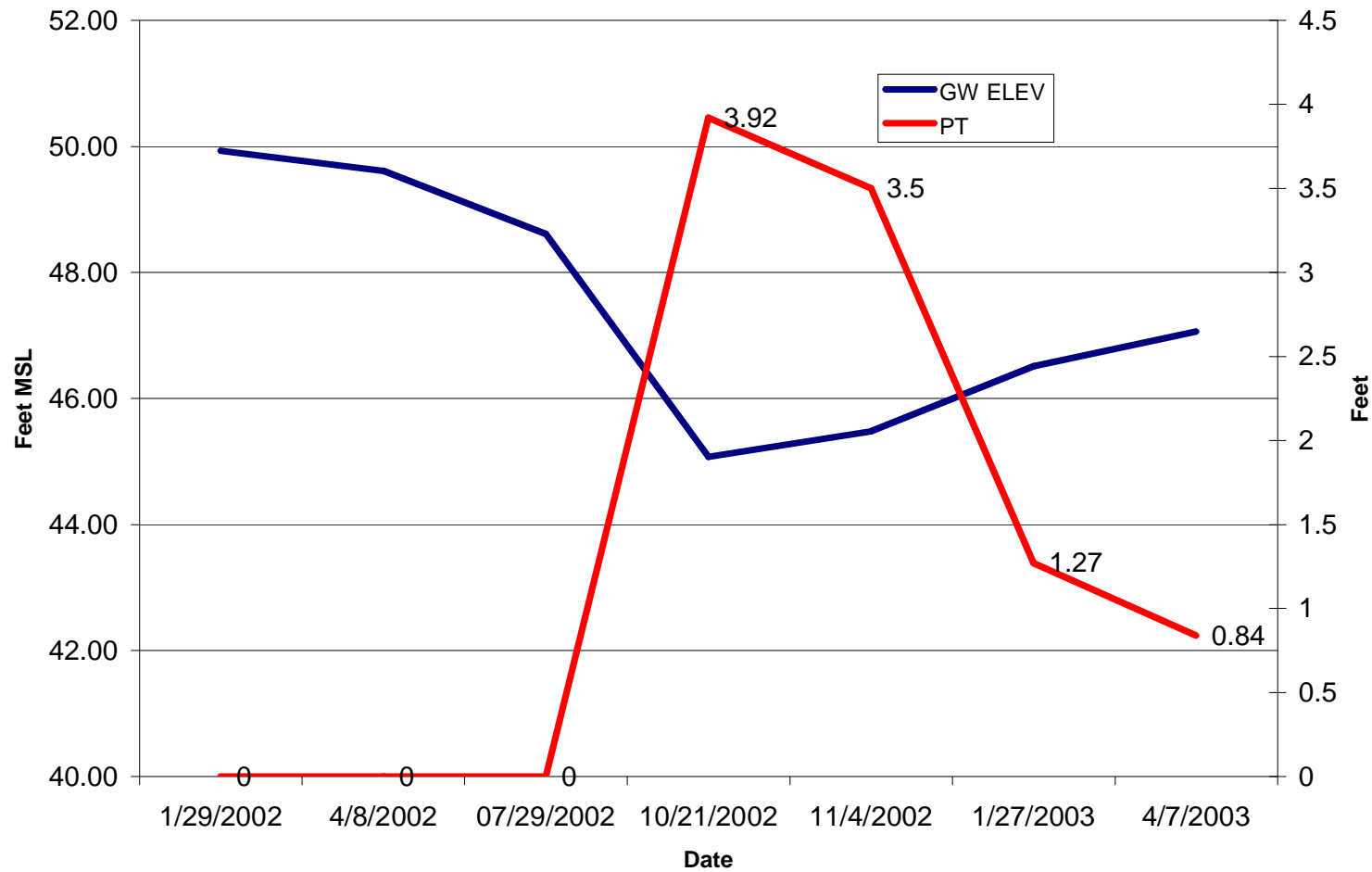
# Groundwater Monitoring Data Review

MW-SF-4

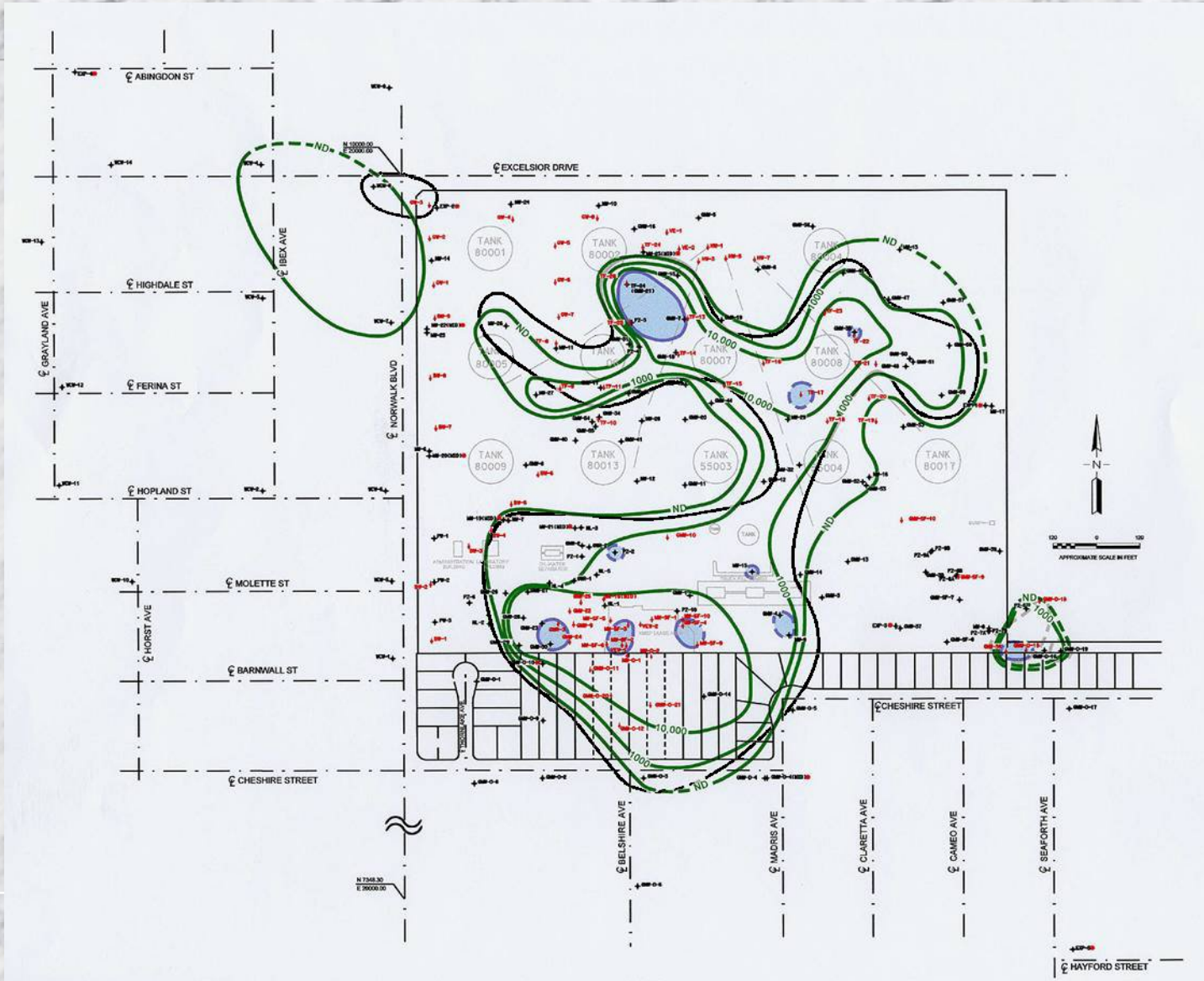


# Groundwater Monitoring Data Review

GMW-36

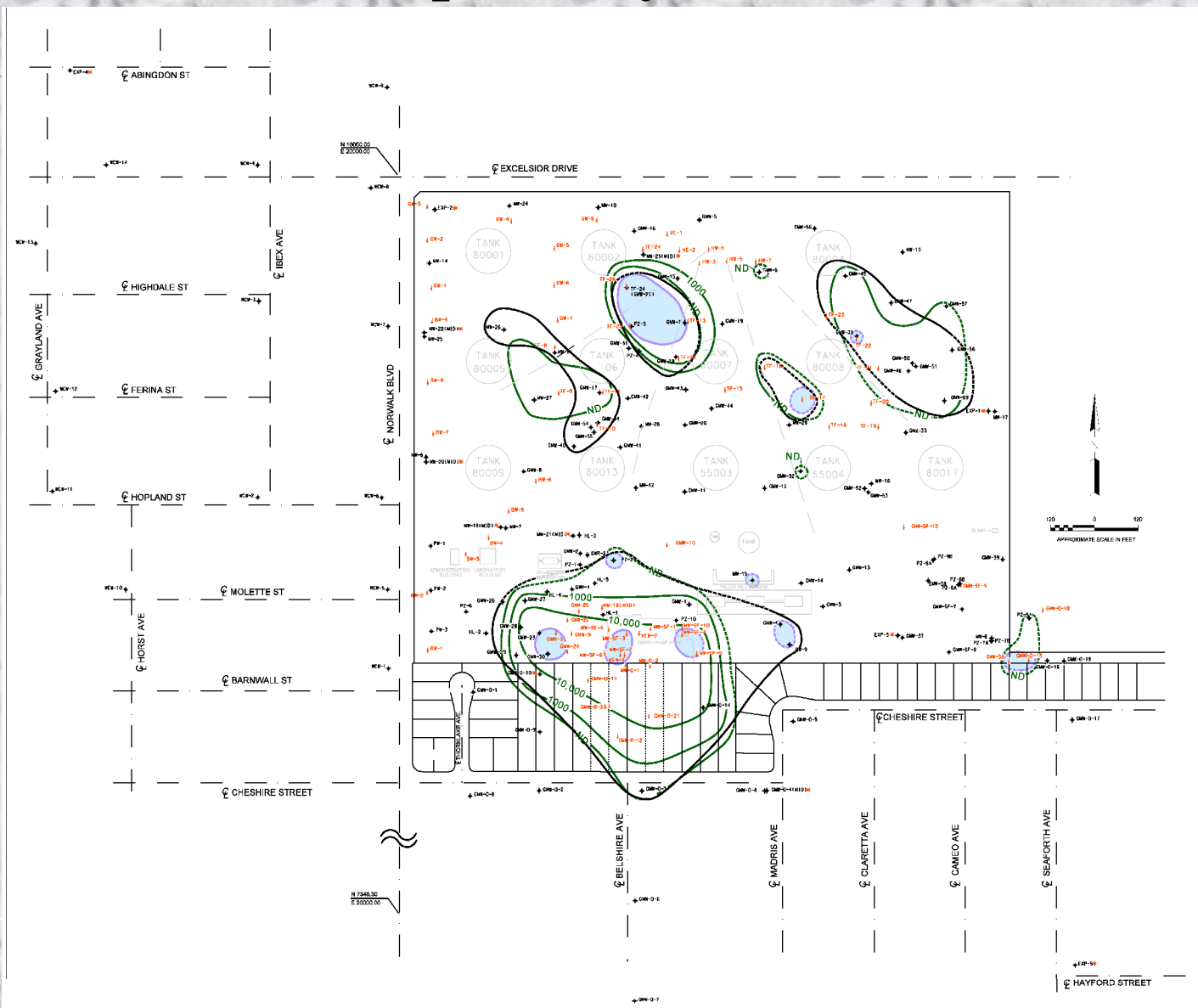


# Total Petroleum Hydrocarbons April/May 2004

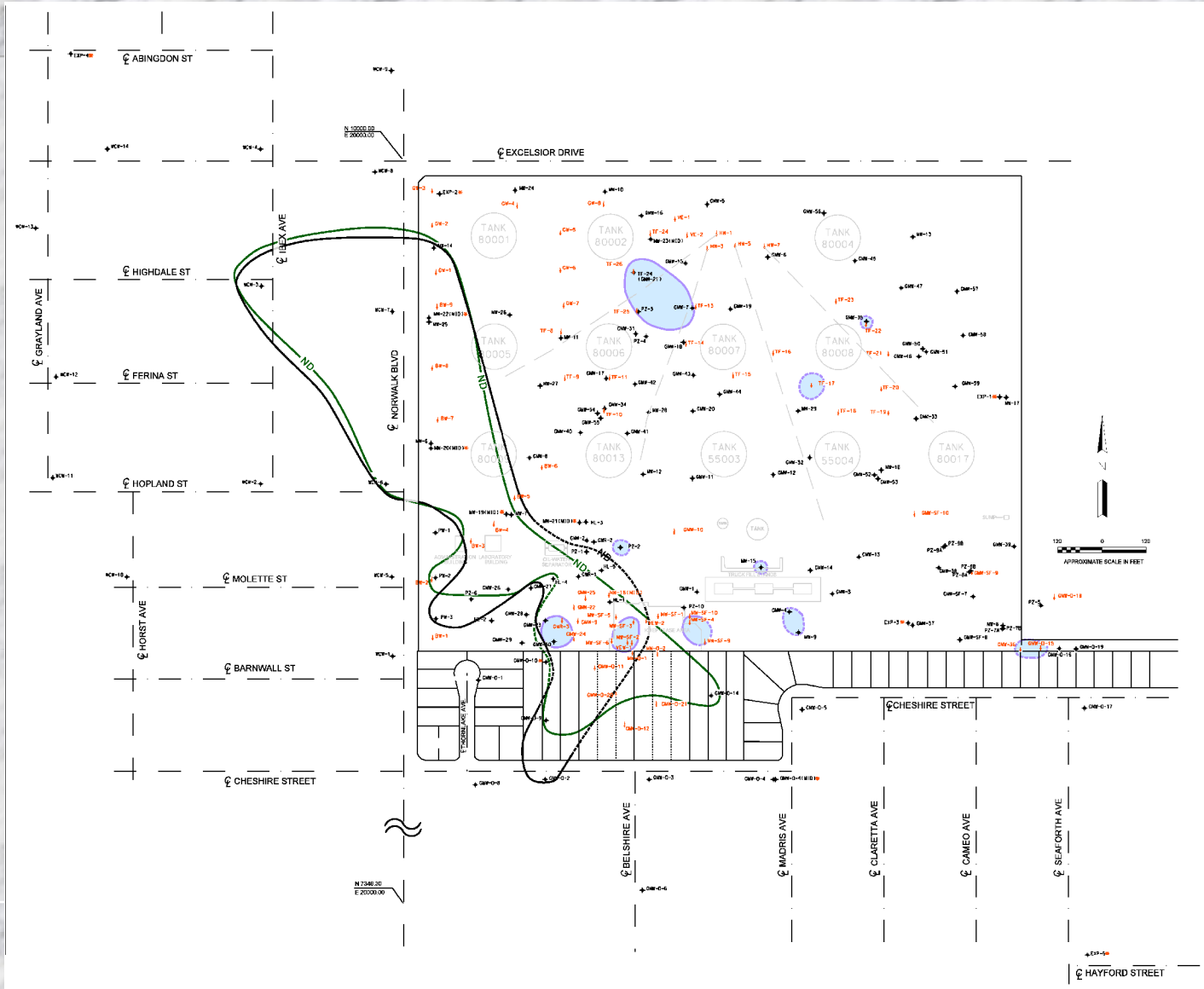


# Benzene

## April/May 2004



# 1,2-Dichloroethane April/May 2004



# Methyl tert-butyl ether

## April/May 2004

