

**Enhanced Aerobic
Bioremediation Remediates
Petroleum Hydrocarbons**

Philip Lowery – Next Environmental

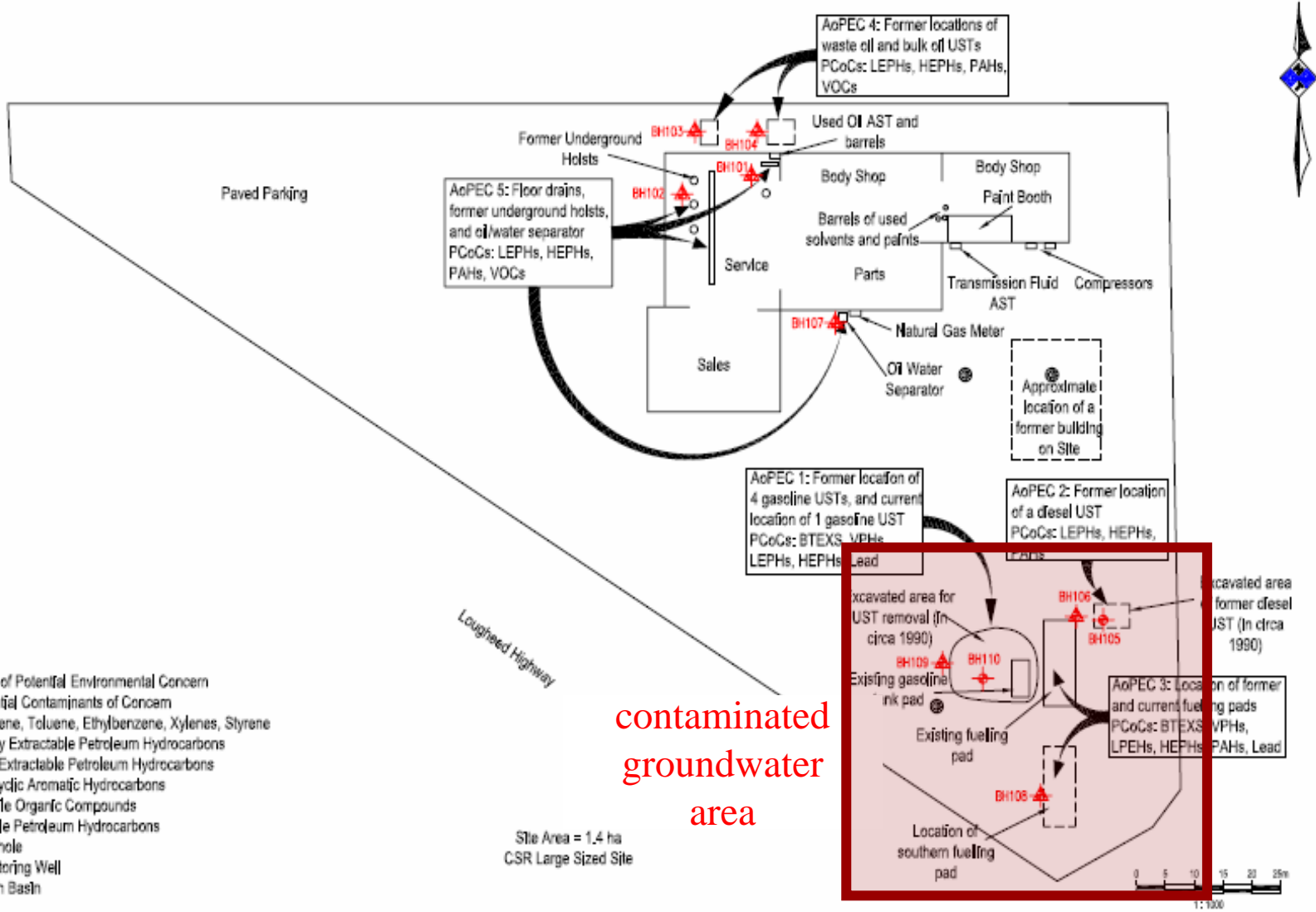
Jack Peabody – Regenesis

RemTech 2007



Site History

- 1990 former service station with 5 USTs (4 gasoline & 1 diesel) + accompanying dispensers
- 4 USTs removed (left 1 in place) in 1991 after VPH concentrations found above regulatory limits
- 1992 site purchased by auto dealership
- 2002 dealership transfer begins phase 1 & 2
- the Detailed Site Investigation discovers:
 - VPH: 13,000 ug/L
 - Naphthalene: 240 ug/L
 - LEPH: 2,600 ug/L



- LEGEND:**
- AoPEC - Area of Potential Environmental Concern
 - PCoCs - Potential Contaminants of Concern
 - BTEXS - Benzene, Toluene, Ethylbenzene, Xylenes, Styrene
 - HEPHs - Heavy Extractable Petroleum Hydrocarbons
 - LEPHs - Light Extractable Petroleum Hydrocarbons
 - PAHs - Polycyclic Aromatic Hydrocarbons
 - VOCs - Volatile Organic Compounds
 - VPHs - Volatile Petroleum Hydrocarbons
 - Borehole
 - Monitoring Well
 - Catch Basin

Site Area = 1.4 ha
CSR Large Sized Site

Detailed Site Investigation

NEXT ENVIRONMENTAL INC.



Project No.: POR040103.01
Date: October 22, 2002
Consultant: NC
Drawn By: JK

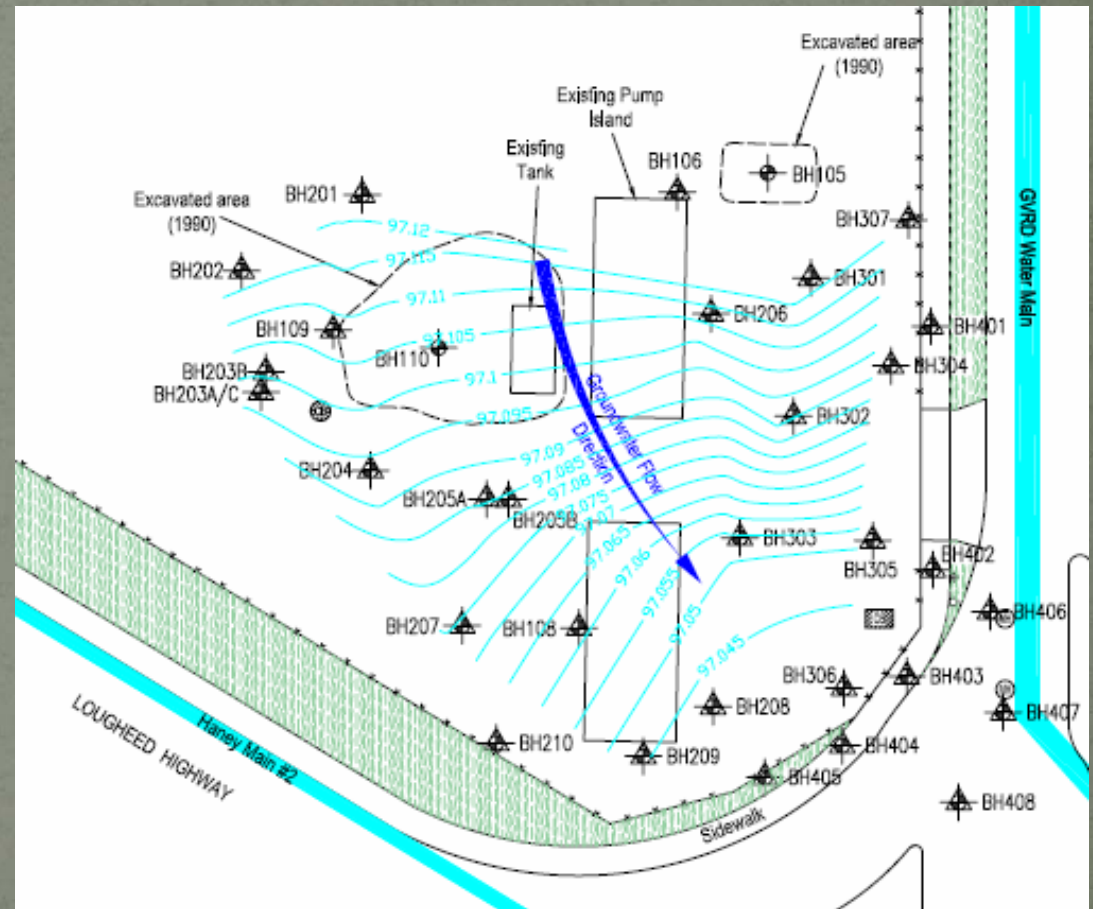
Site Plan with Stage 1
AoPECs & Stage 2 Borehole
& Monitoring Well Locations

Figure: 03



Site Hydrogeology

- Impacted Soil Area: 1,171 m²
- Soil Type: Sand
- Groundwater Flow : ~ 1 m/yr
- Groundwater Depth: 3m bgs
- Groundwater Direction: SE



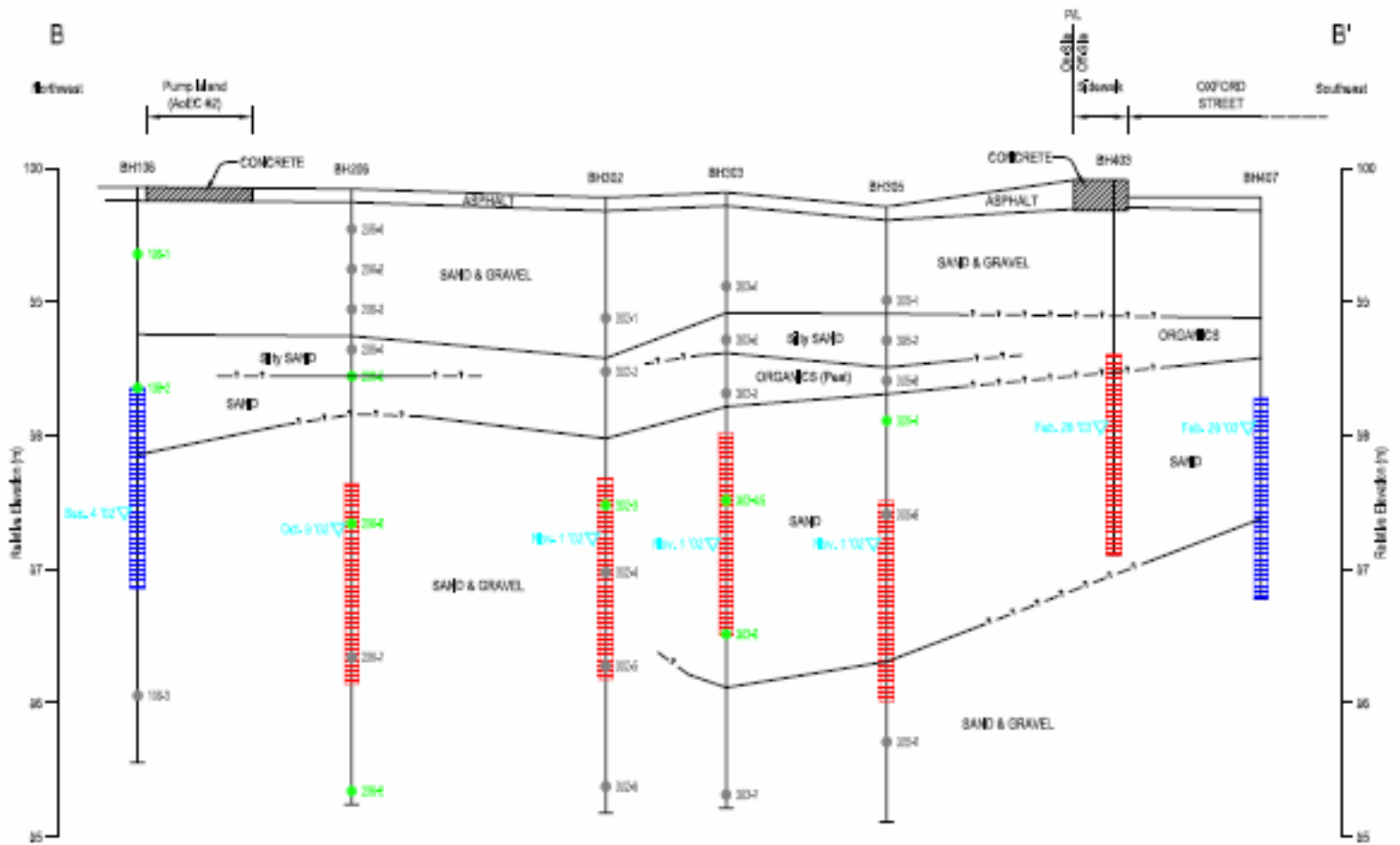


ACME
BODY SHOP
CLC CLAMP

ACME
BODY SHOP
CLC CLAMP

ACME
BODY SHOP
CLC CLAMP

Site Lithogeology

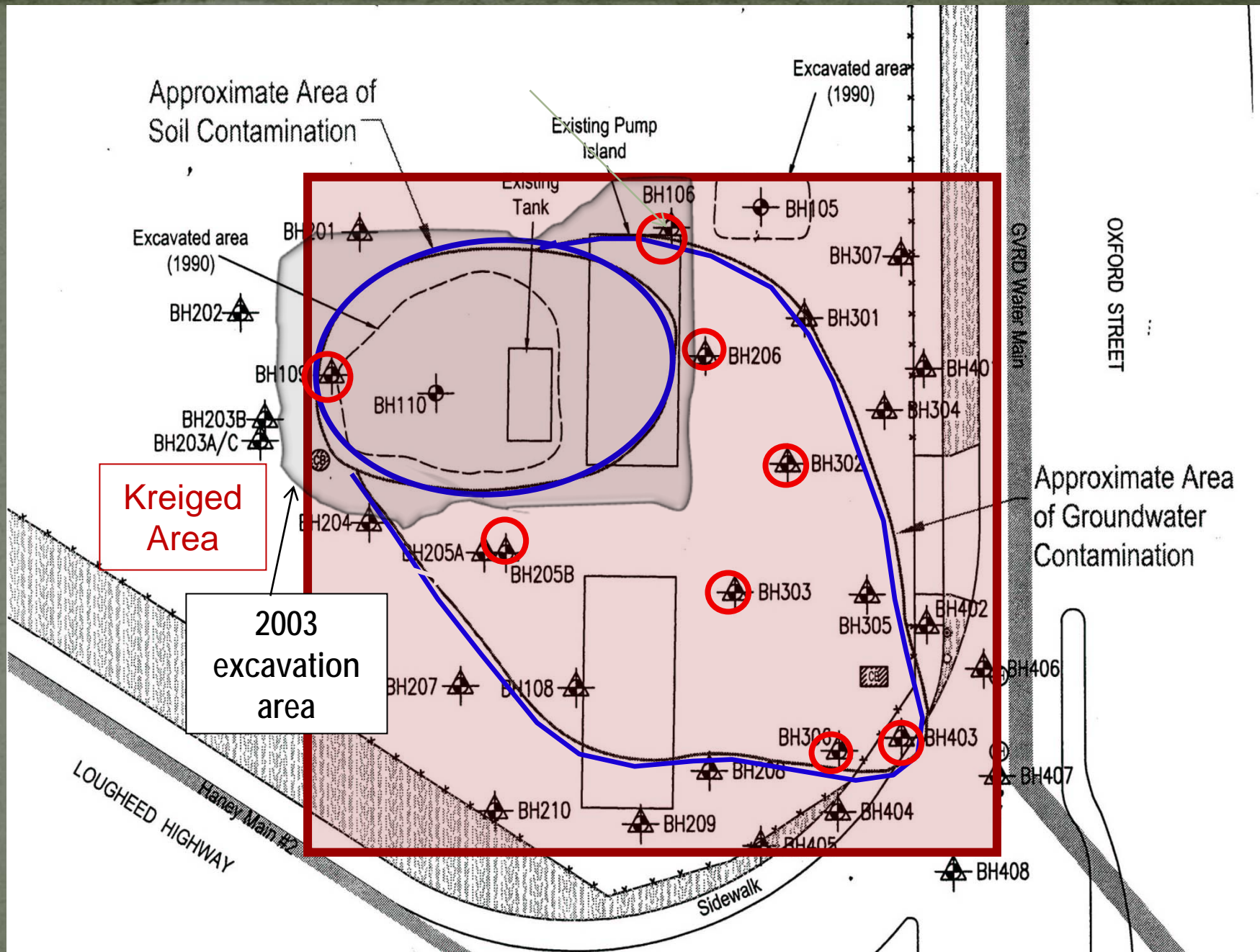


Groundwater Concentrations

Contaminant	BH206	BH302	BH303
VPH	13,000 ug/L	4,200 ug/L	5,600 ug/L
LEPH	2,600 ug/L	1,900 ug/L	2,000 ug/L
Naphthalene	240 ug/L	140 ug/L	160 ug/L

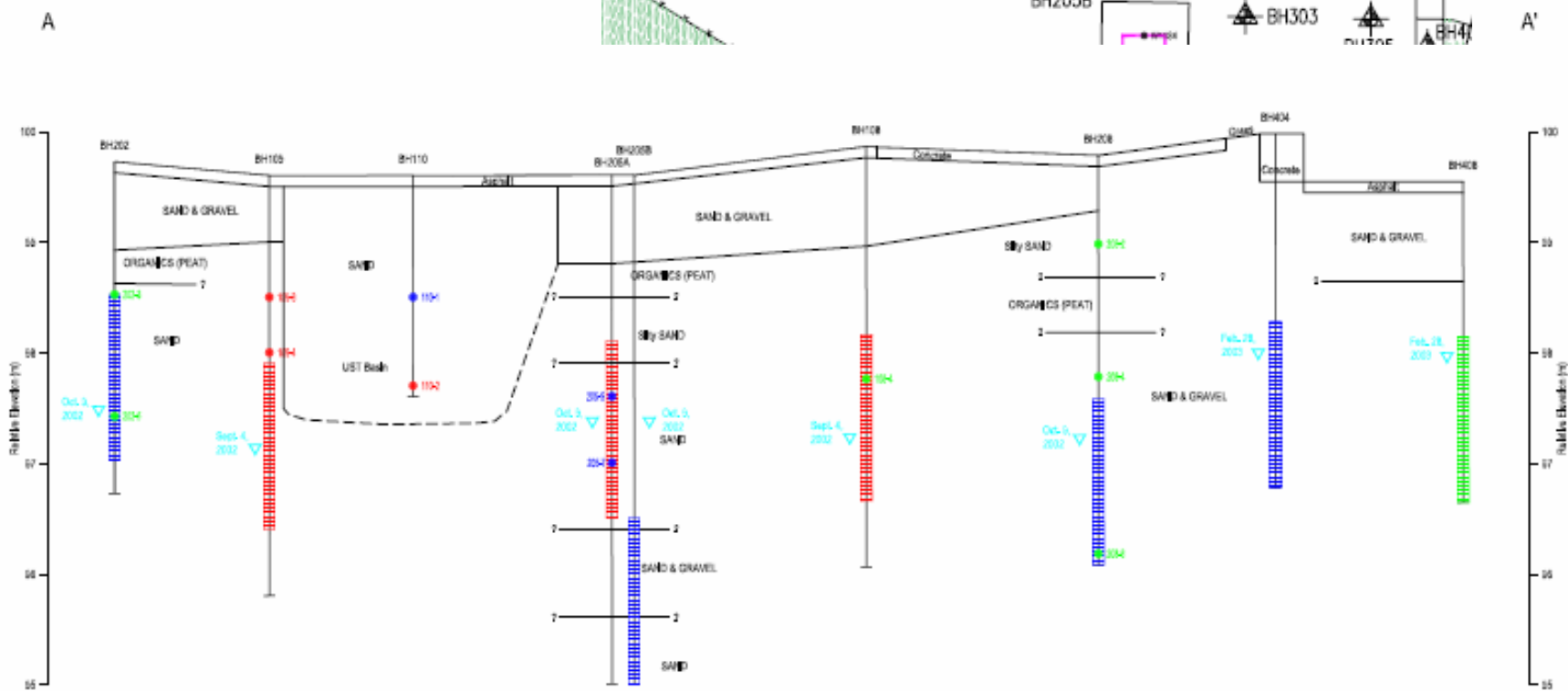
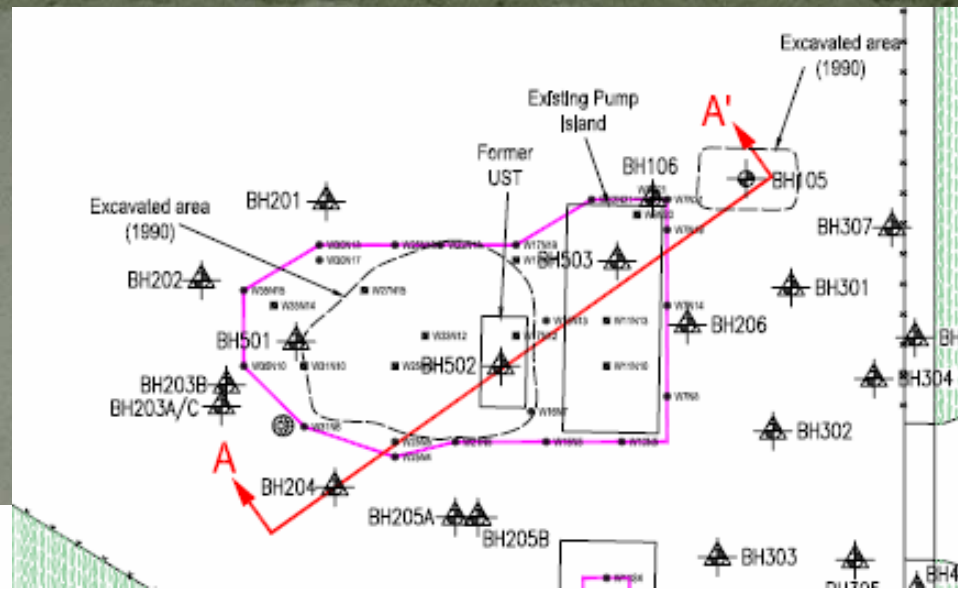
Cleanup Concentrations

Contaminant	Concentration
VPH	1,500 ug/L
LEPH	500 ug/L
Naphthalene	10 ug/L

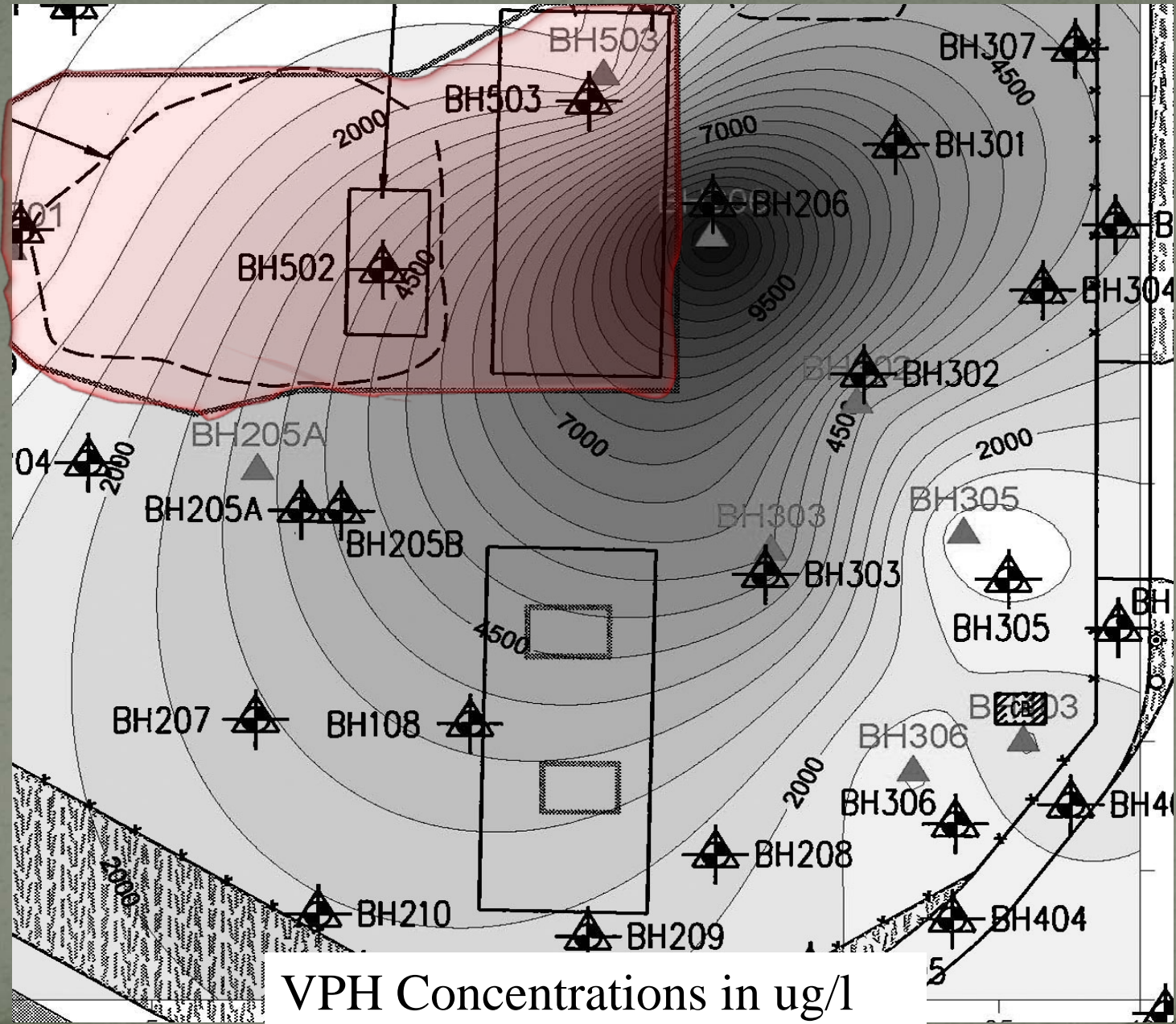




Excavation Cross-Section







VPH Concentrations in ug/l



Day 0: 1,350 lbs



- LEGEND:**
- Fence
 - Borehole
 - Monitoring Well
 - Manhole
 - Catch Basin
 - 100 series Boreholes - Stage 2
 - 200 series Boreholes - DSI
 - 300 series Boreholes - DSI
 - 400 series Boreholes - DSI
 - Excavation Limits
 - ORC Injection Point

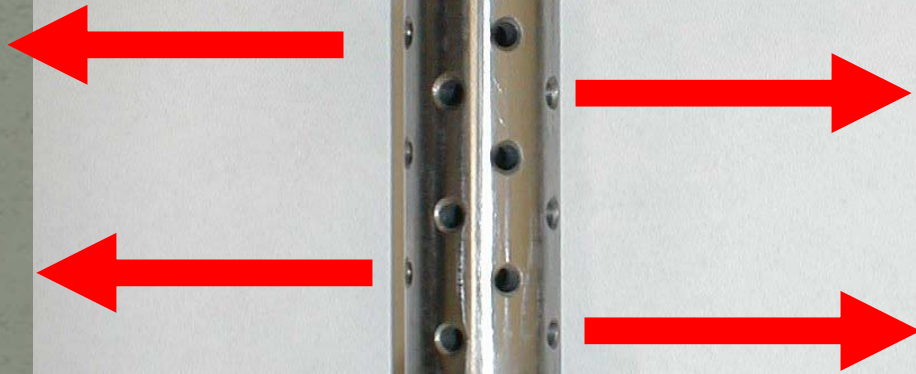


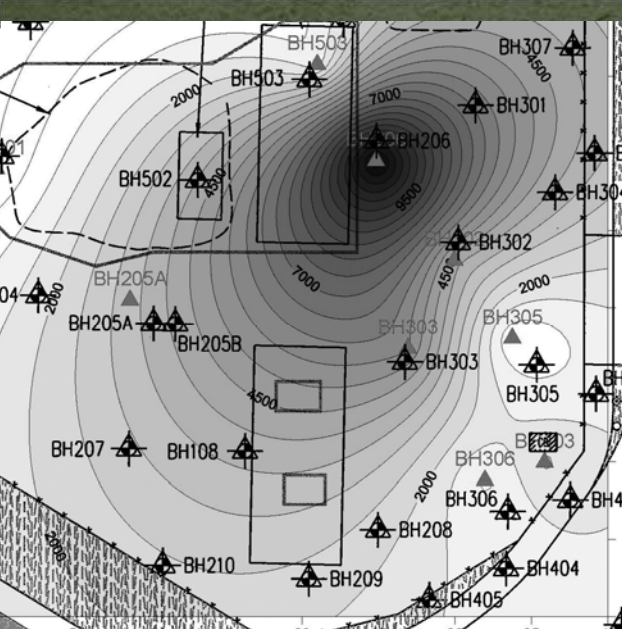
Target Injection Zones

“Preferential pathway effect” versus “packer effect”

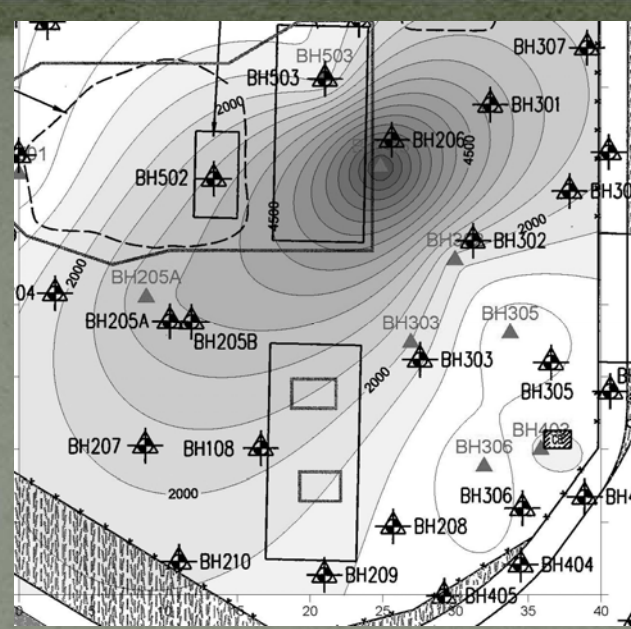


INJECTION TOOLING

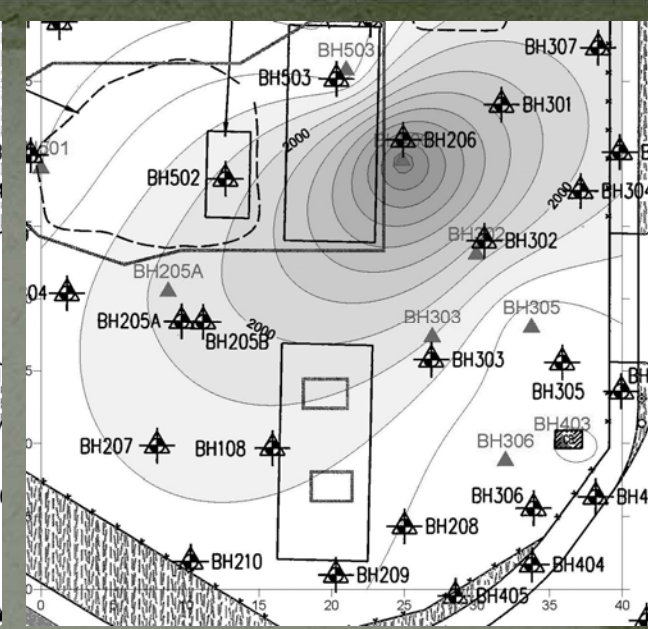




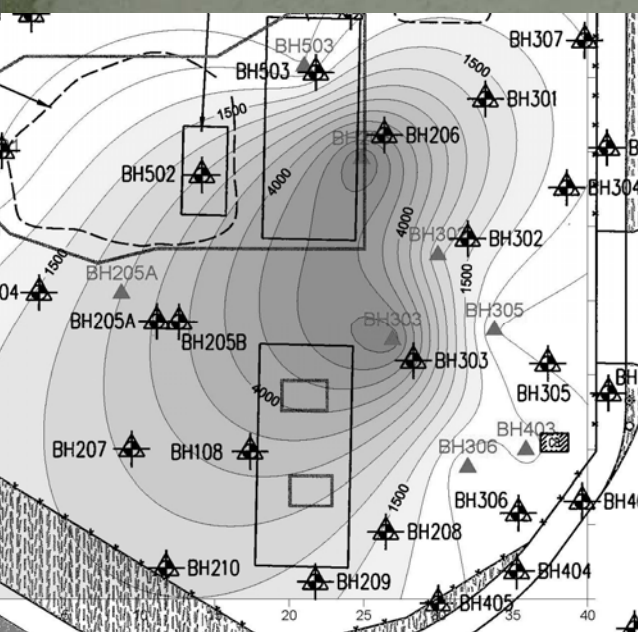
Day 0



Day 60



Day 180



Day 300

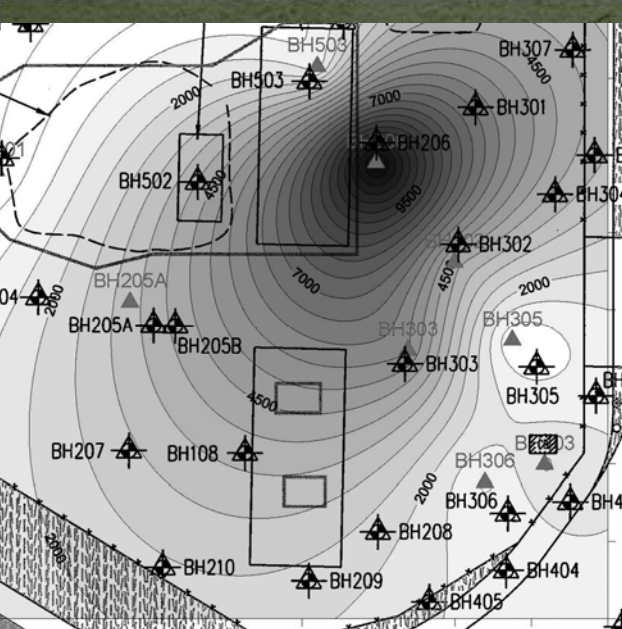
Day 0: 1350 lbs



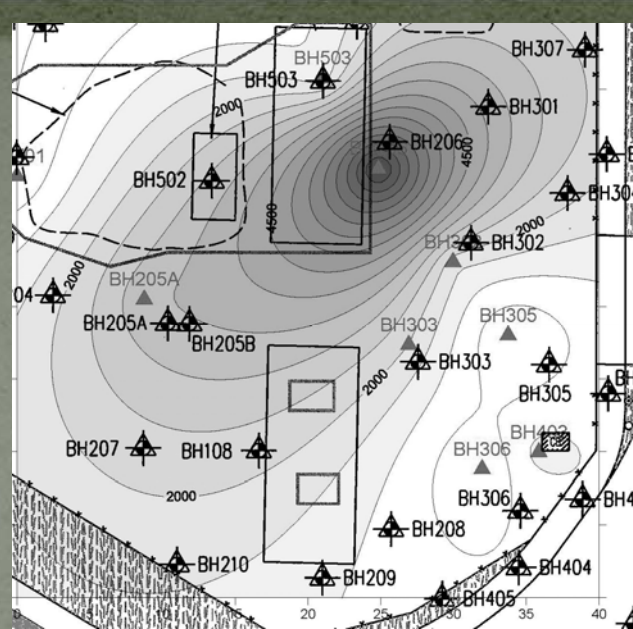
Day 390: 500 lbs



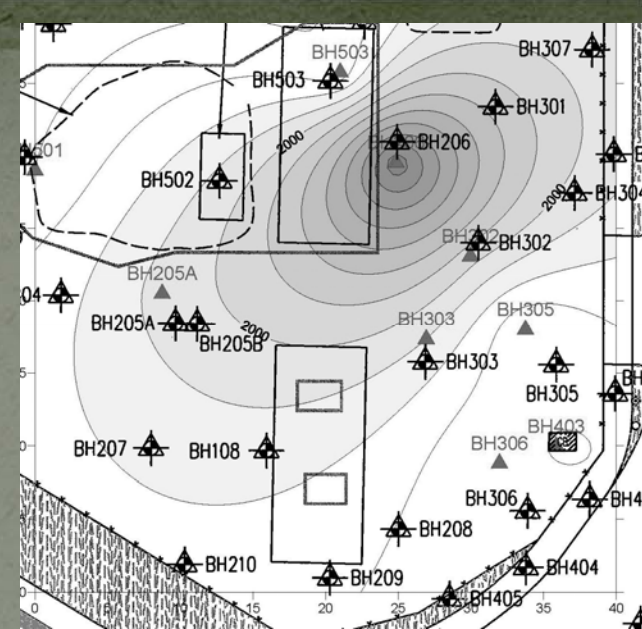
VPH Concentrations in ug/l



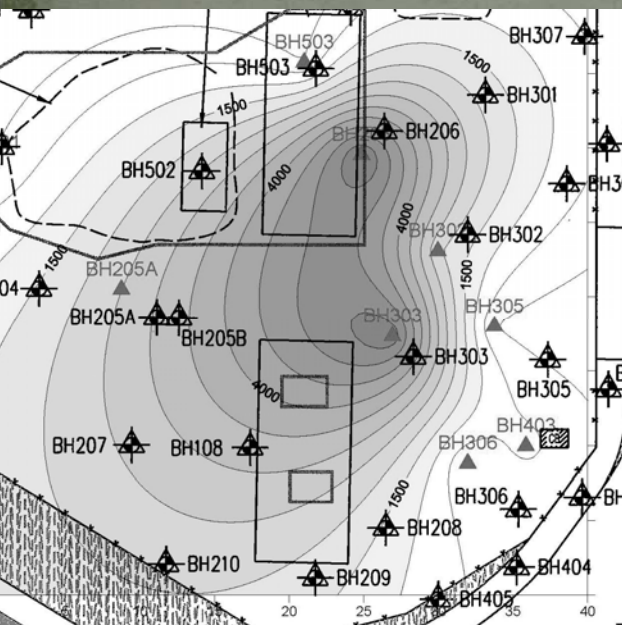
Day 0



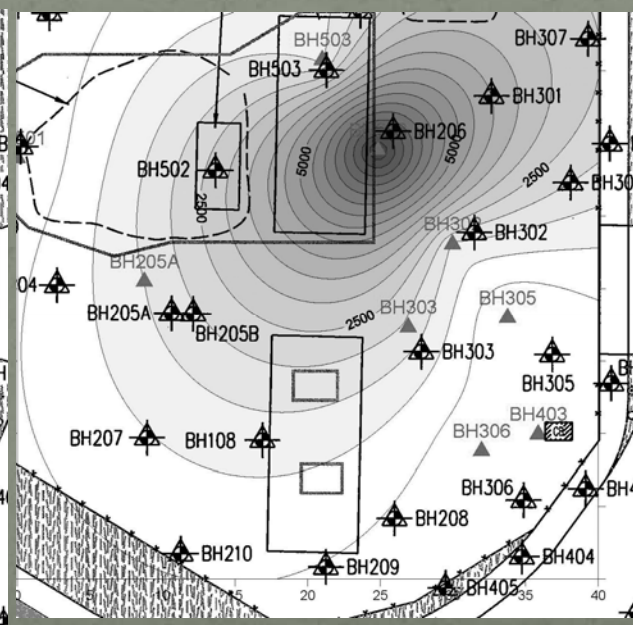
Day 60



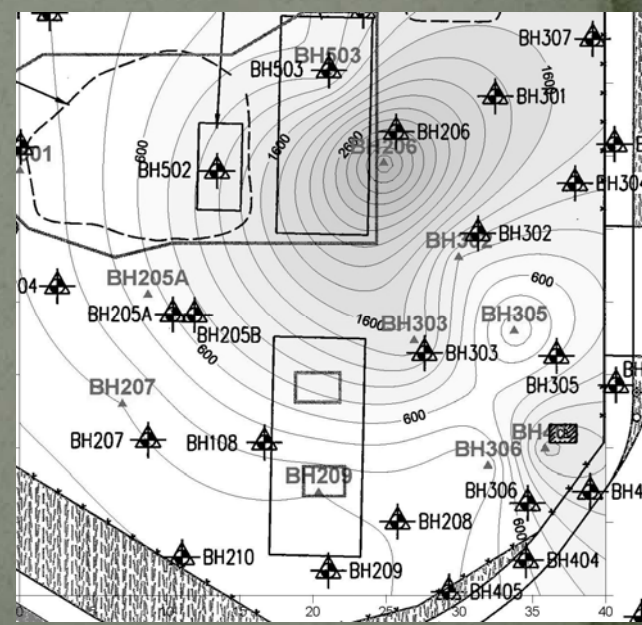
Day 180



Day 300

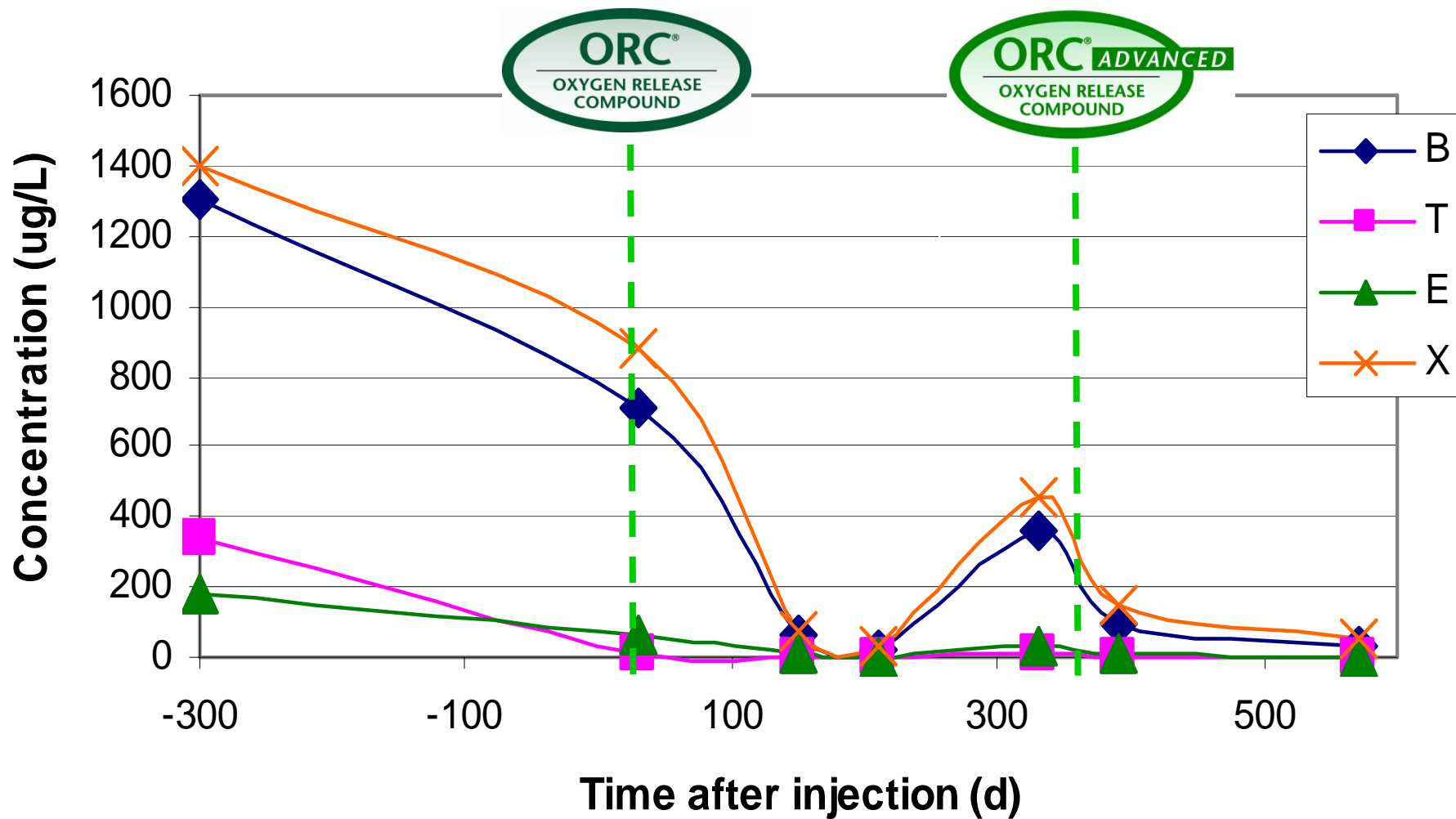


Day 510



Day 780

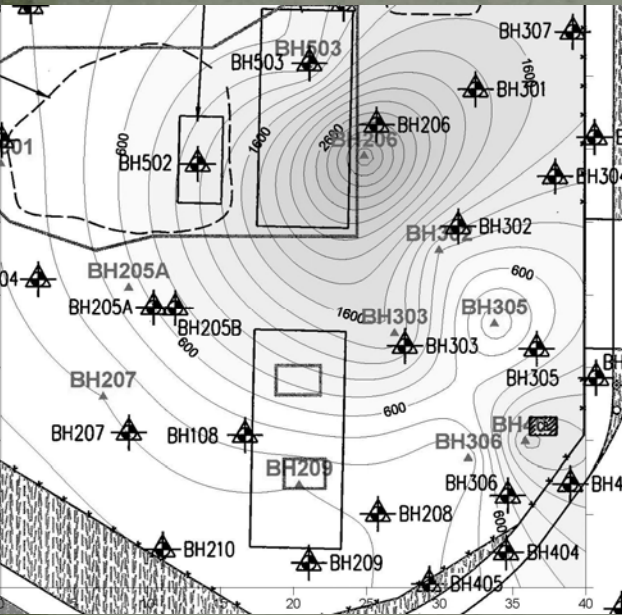
Concentrations in downgradient well BH 306



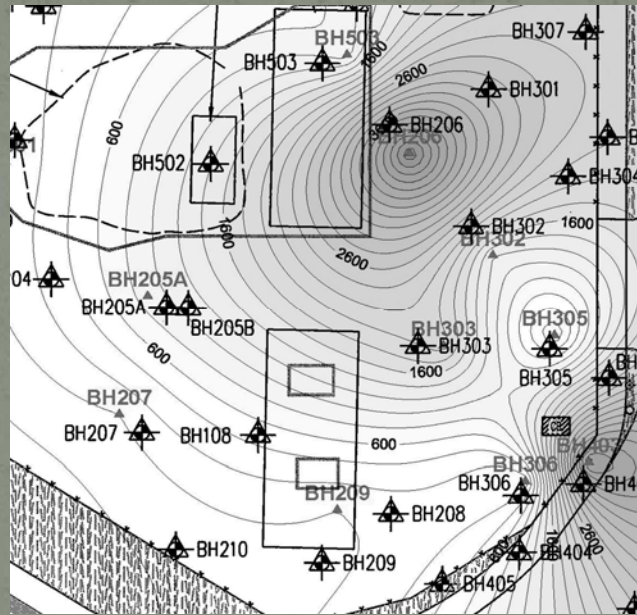
Naphthalene Concentrations

Naphthalene	Baseline (ug/L)	Day 510 (ug/L)
BH 206	240	120
BH 302	140	42
BH 303	160	110
BH 305	12	ND
BH 306	35	2
BH 403	49	83
BH 503	69	ND
BH 108	86	24

VPH Concentrations in ug/l



Day 780

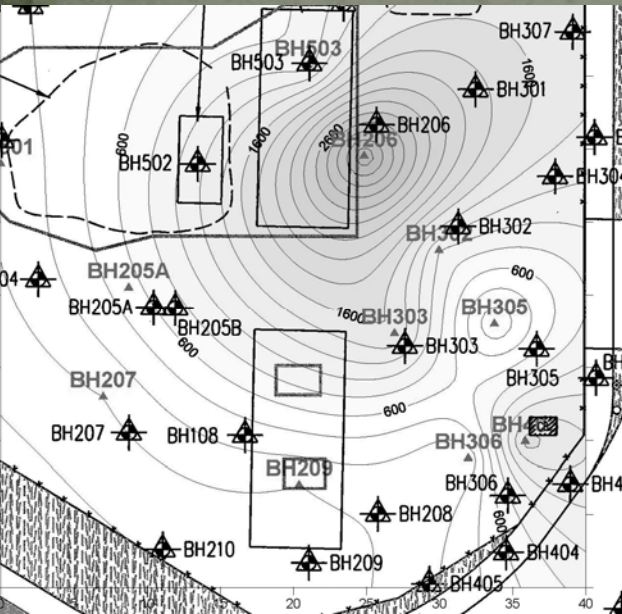


Day 870

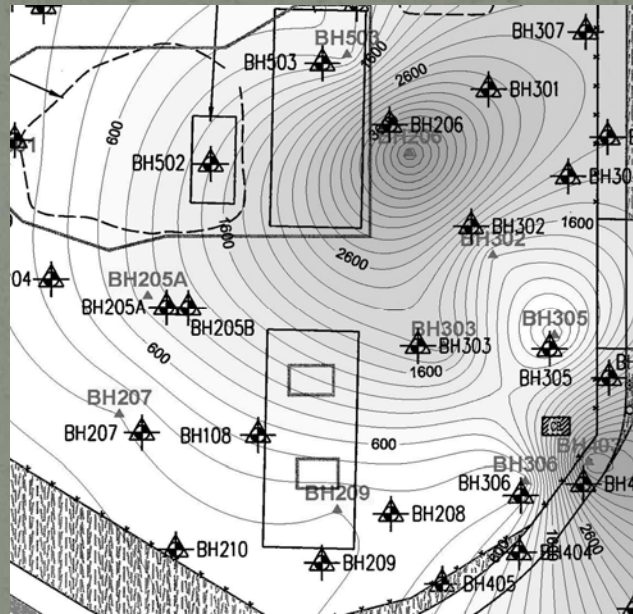
Day 871: 1,620 lbs



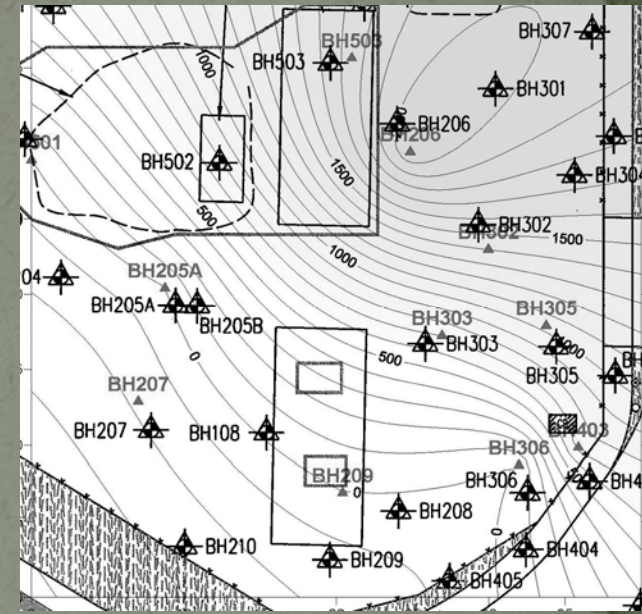
VPH Concentrations in ug/l



Day 780



Day 870

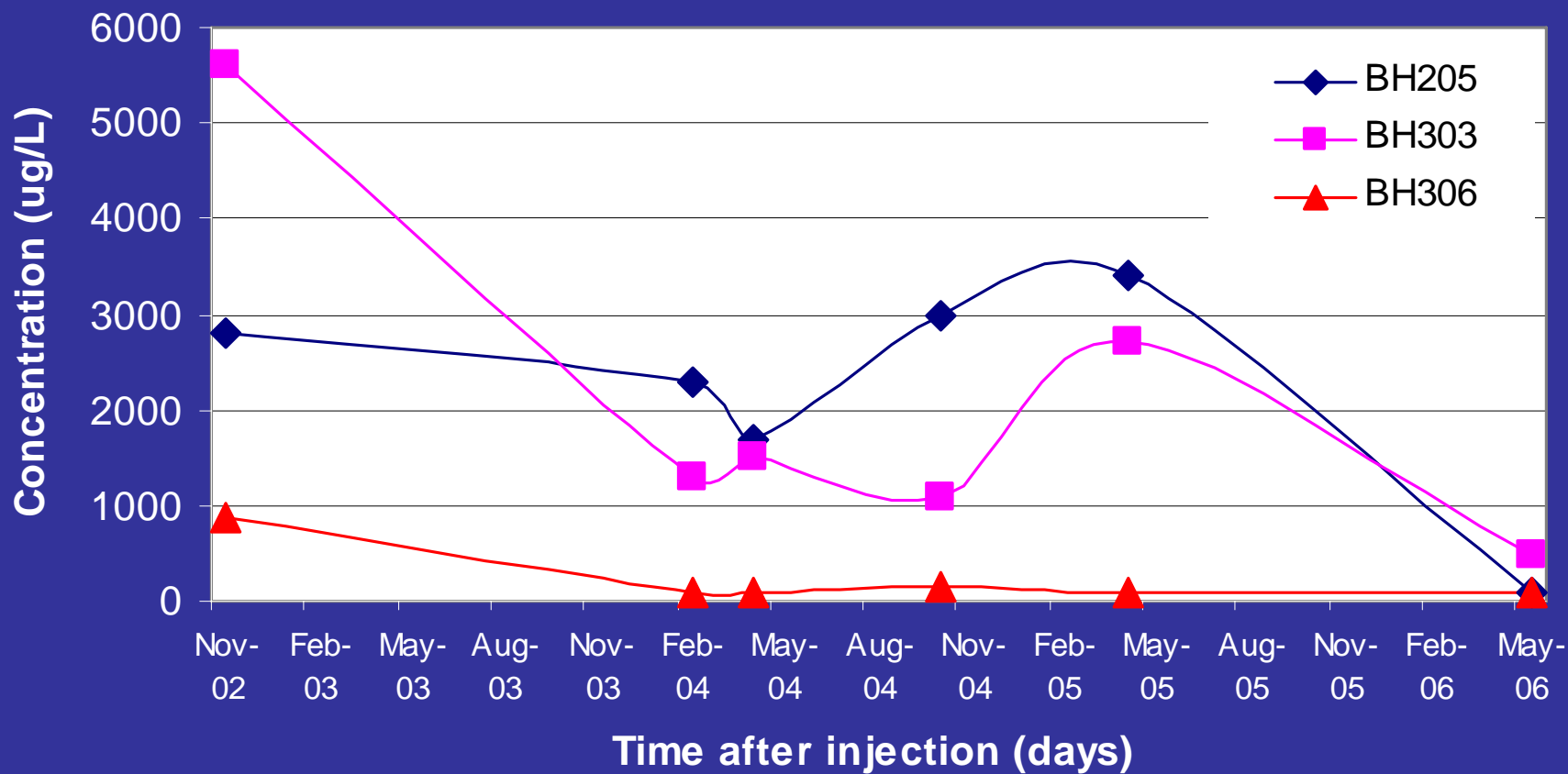


Day 930

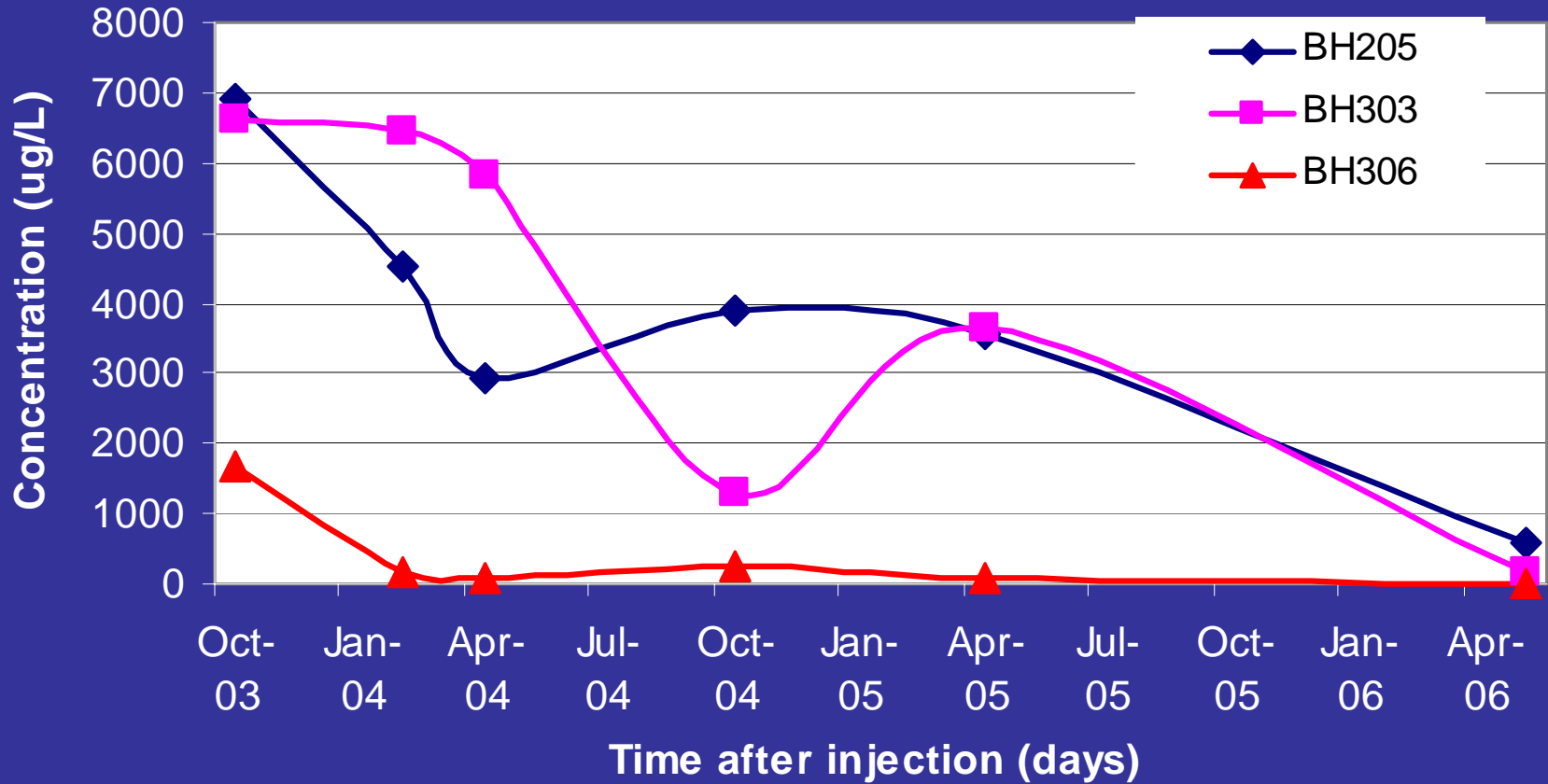
Day 871: 1,620 lbs



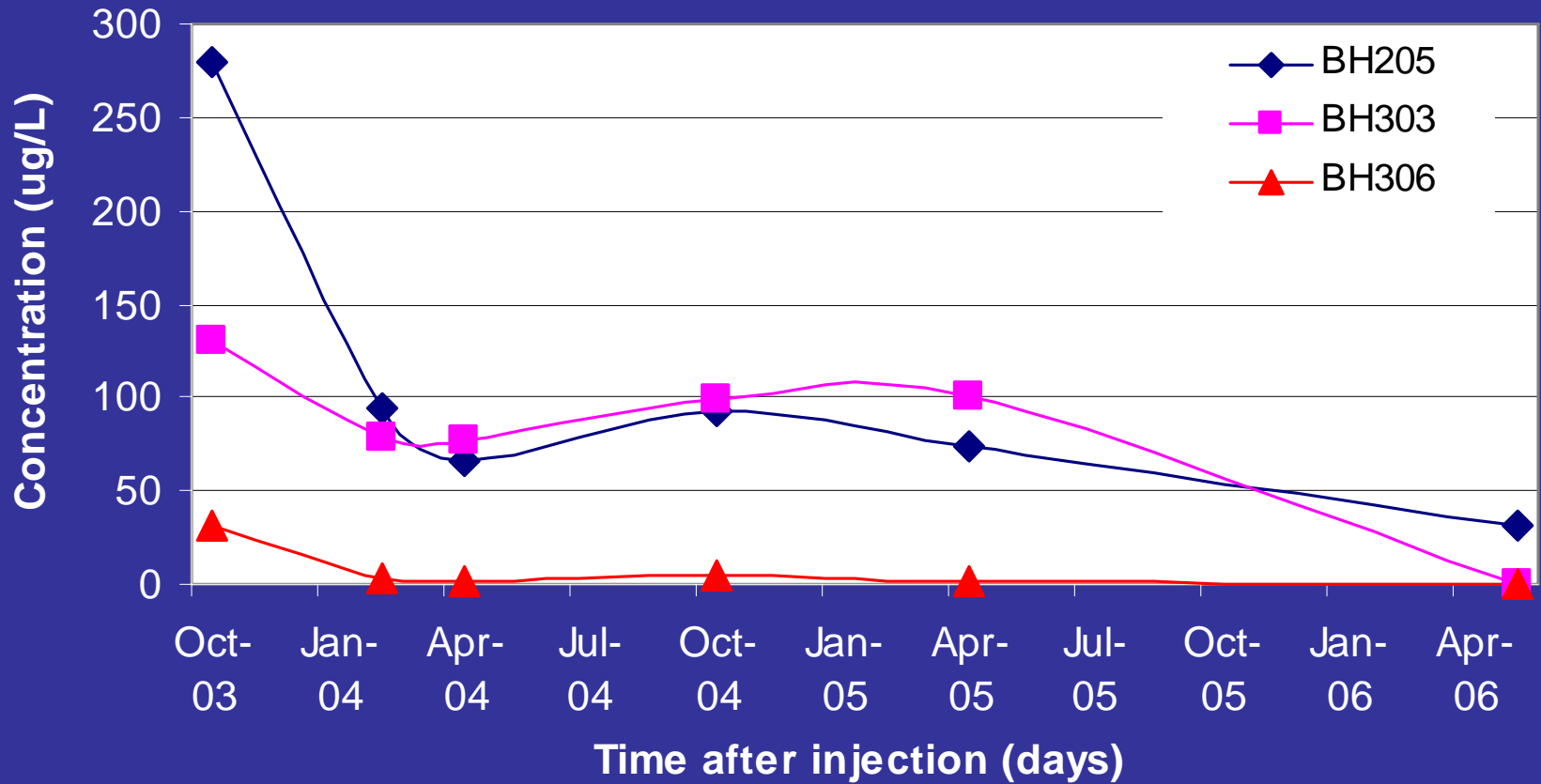
VPH Concentrations



Total BTEX Concentrations



Naphthalene Concentrations



Questions ?

Regenesis: Jack Peabody

(925) 944 – 5566

jpeabody@regenesis.com



Consultant: Philip Lowery

Next Environmental

plowery@next.bc.ca

