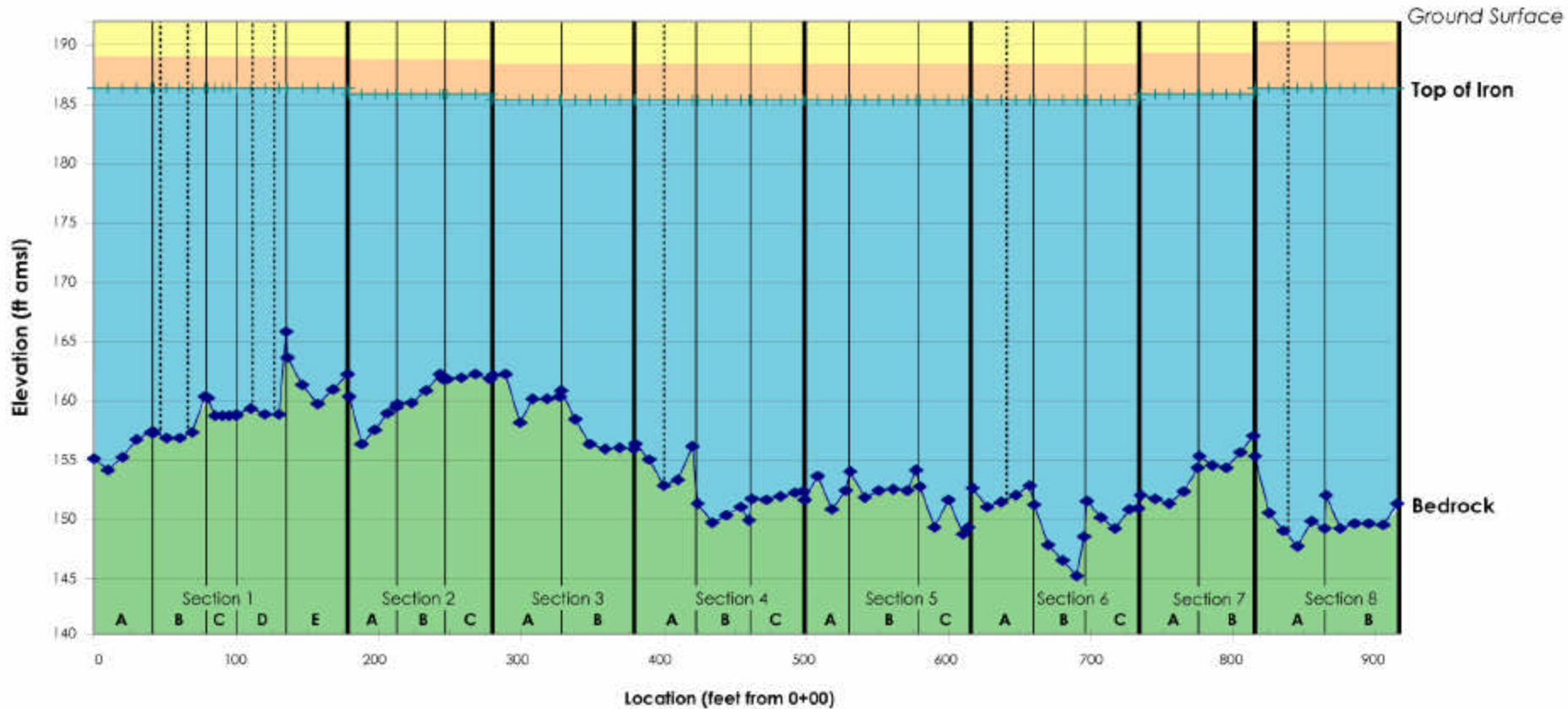







Post Construction Monitoring

- Post construction sampling of installed iron/sand mixture
- GW level monitoring
- Hydraulic testing
- GW chemistry monitoring

Cross-Section of Installed



Legend

- | | | |
|---|---|--|
|  Soil Backfill |  Zero-Valent Iron and Sand Mixture |  Soil Boring Location |
|  Clay Cap |  Bedrock | ft amsl feet above mean sea level |

Sample of Installed Iron

4.A-1
13' BGS



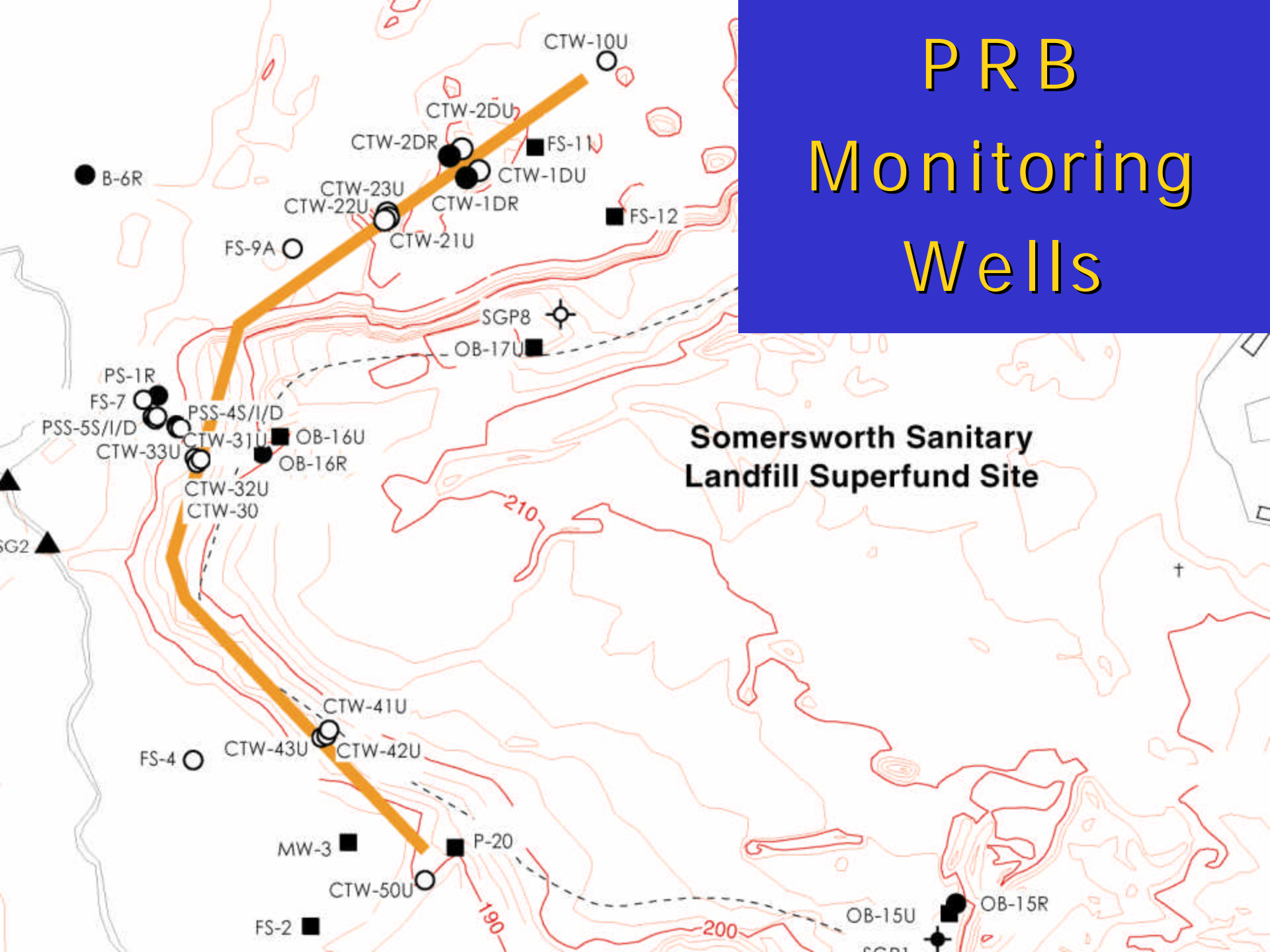
Sampling of Installed Iron

- Showed little separation of sand and iron
- Showed consistent iron content with depth
- Confirms several feet of silt/sand at bottom of 2 suspect panels

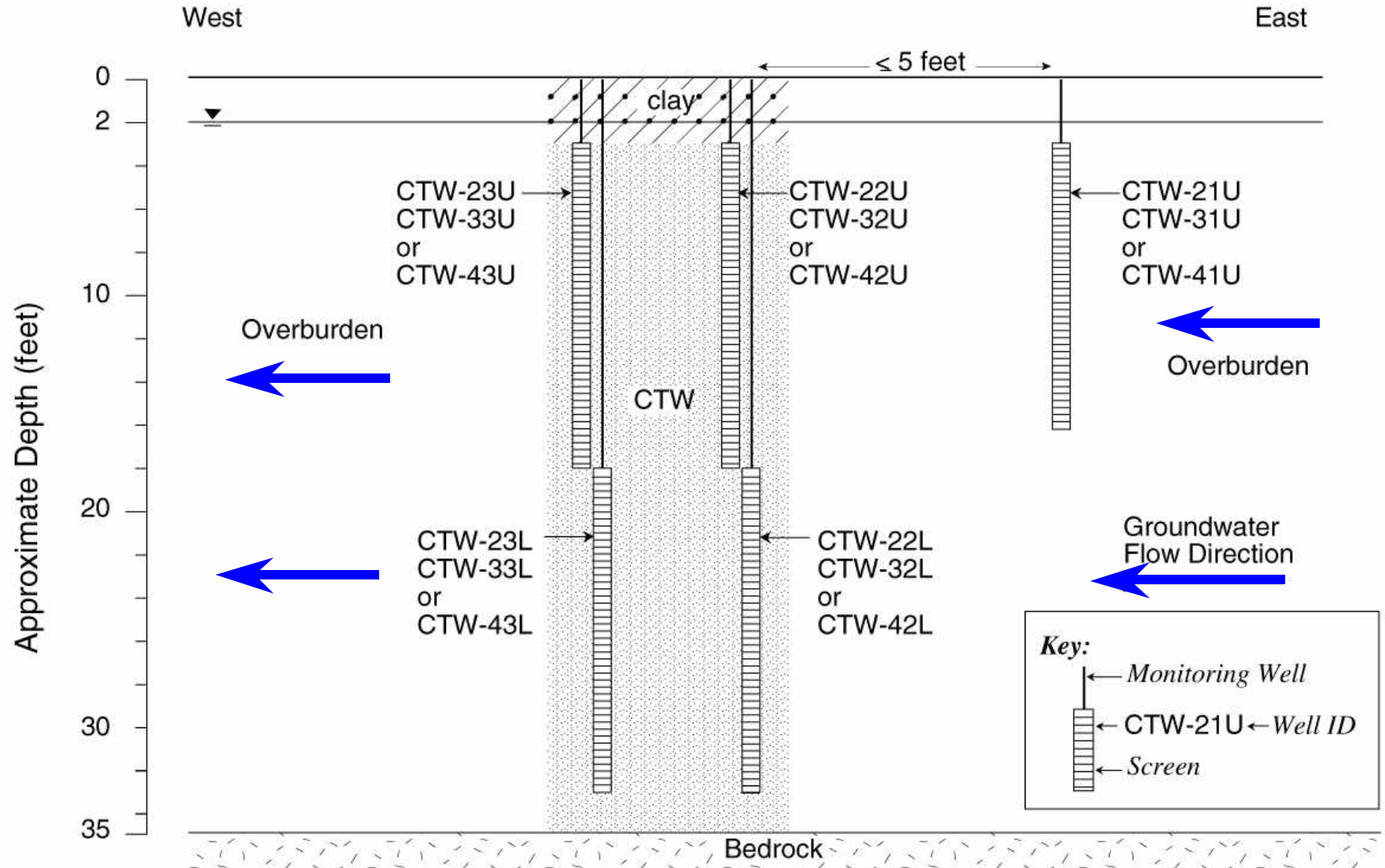
Water Level & Chemistry Data

- Monitoring Events:
 - April 2001
 - July 2001
 - September 2001
 - April 2002
 - July 2002

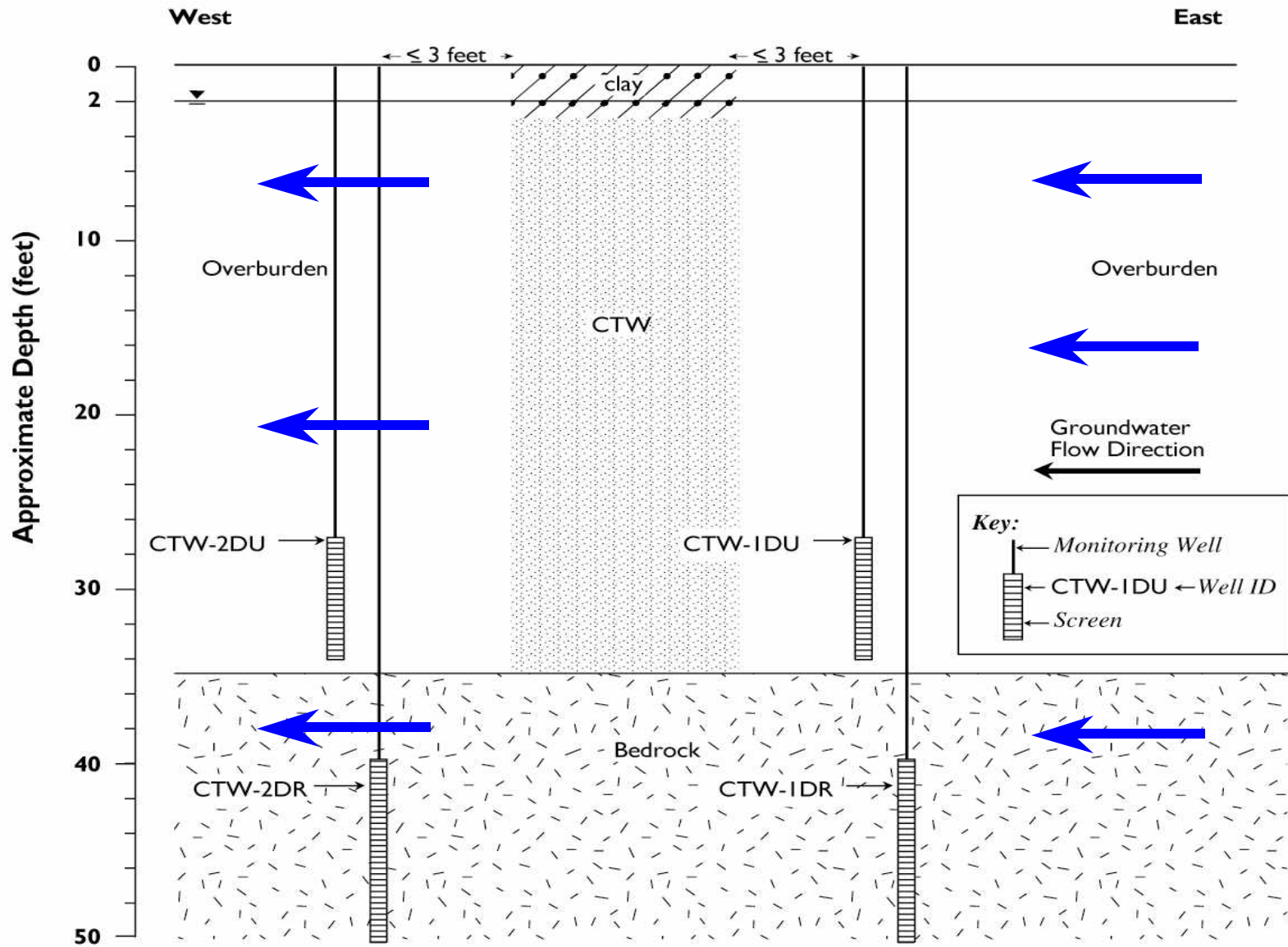
PRB Monitoring Wells



X-Section of Monitoring Well Transect

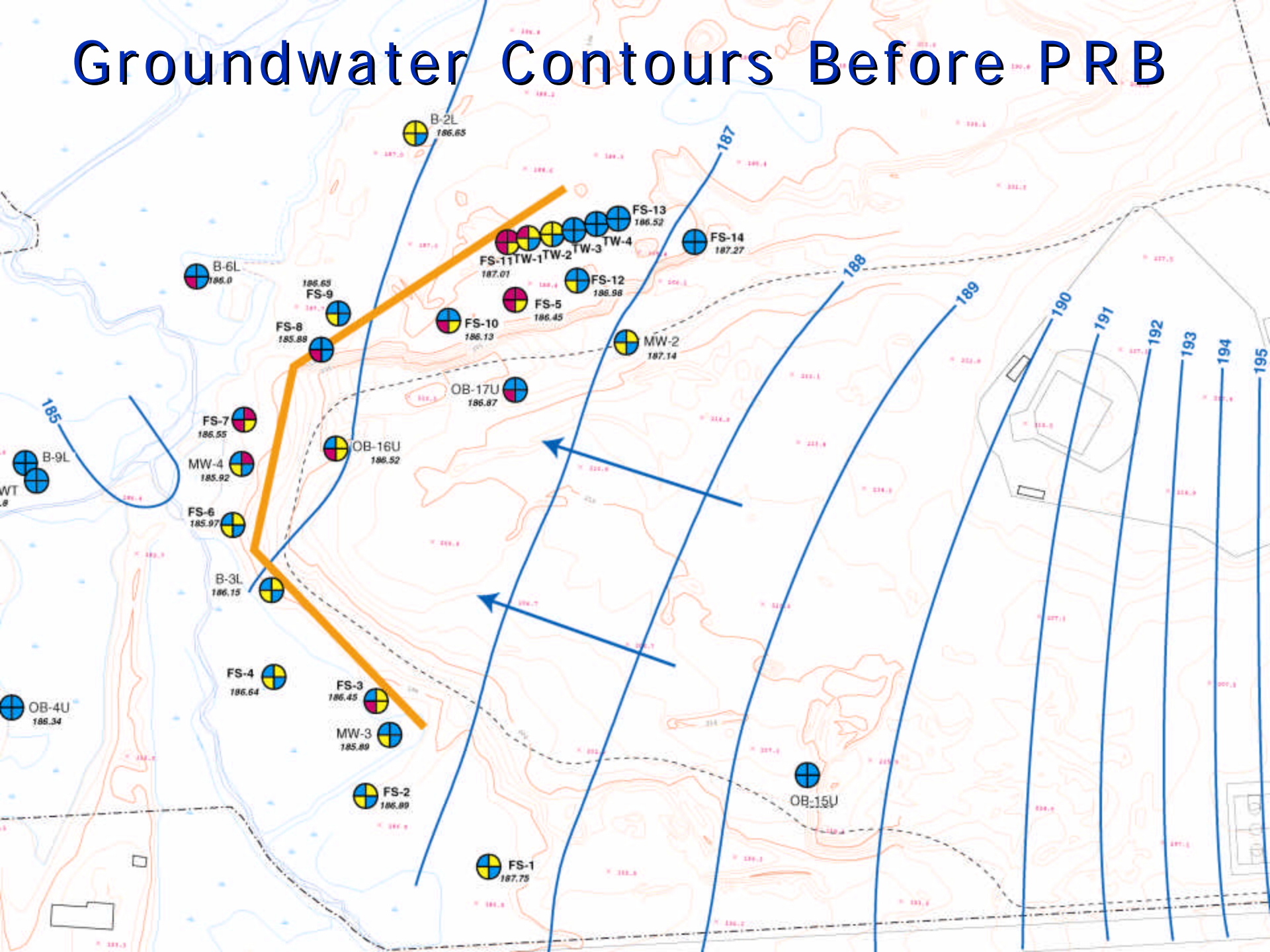


X-Section of Monitoring Wells in Panel 1D

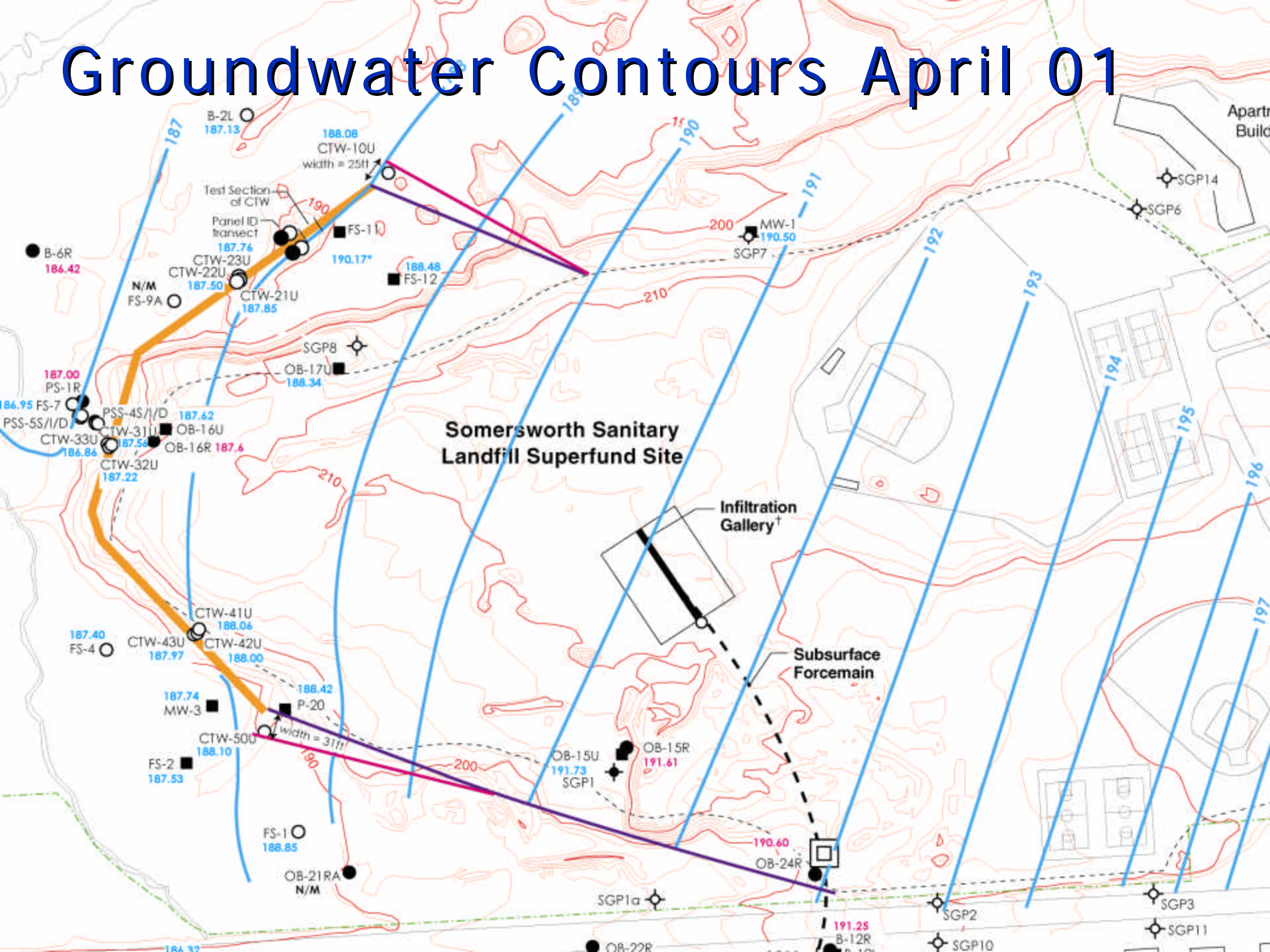


Schematic Cross-Section of CTW Monitoring Transect in Panel 1D

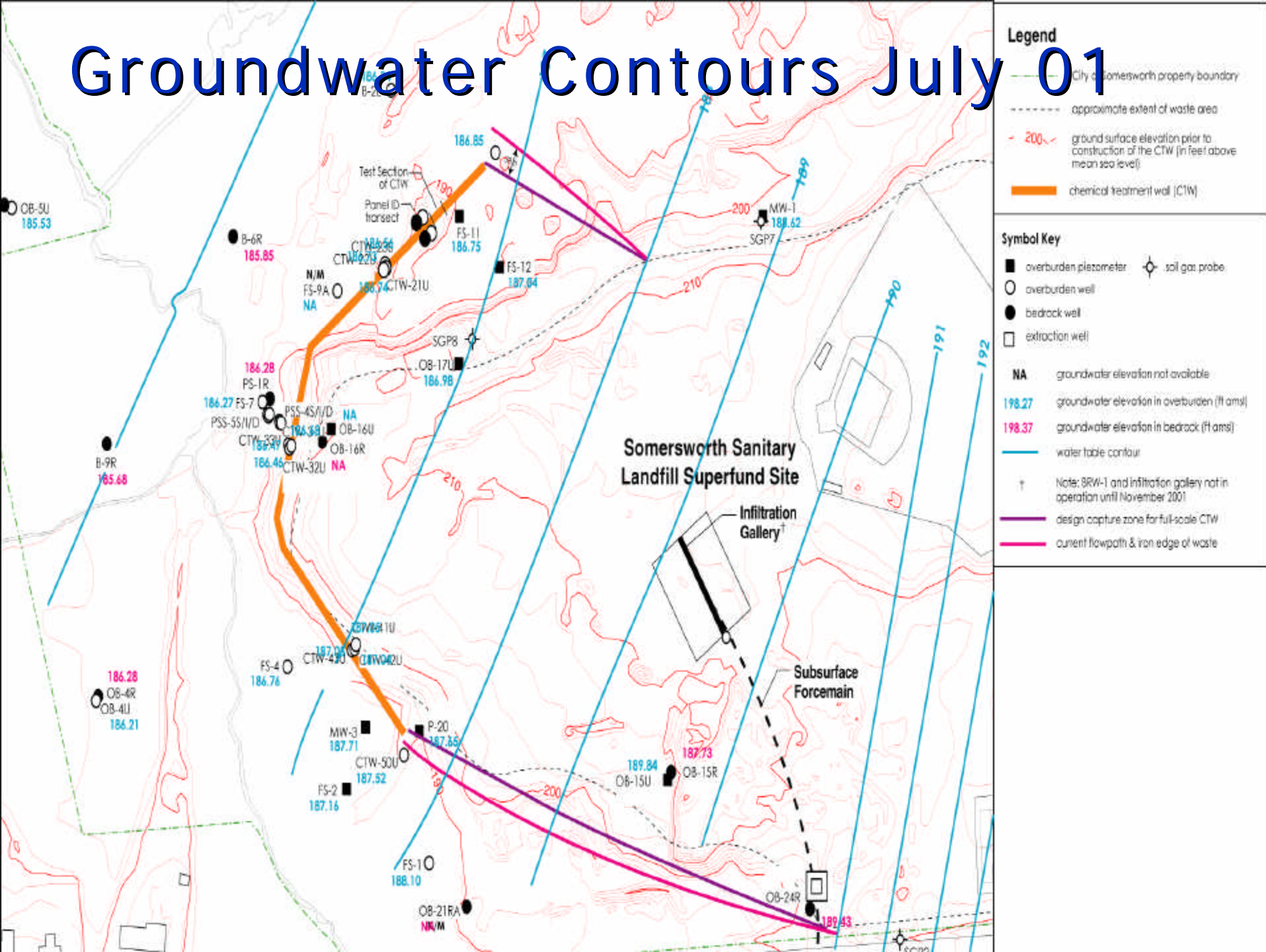
Groundwater Contours Before PRB



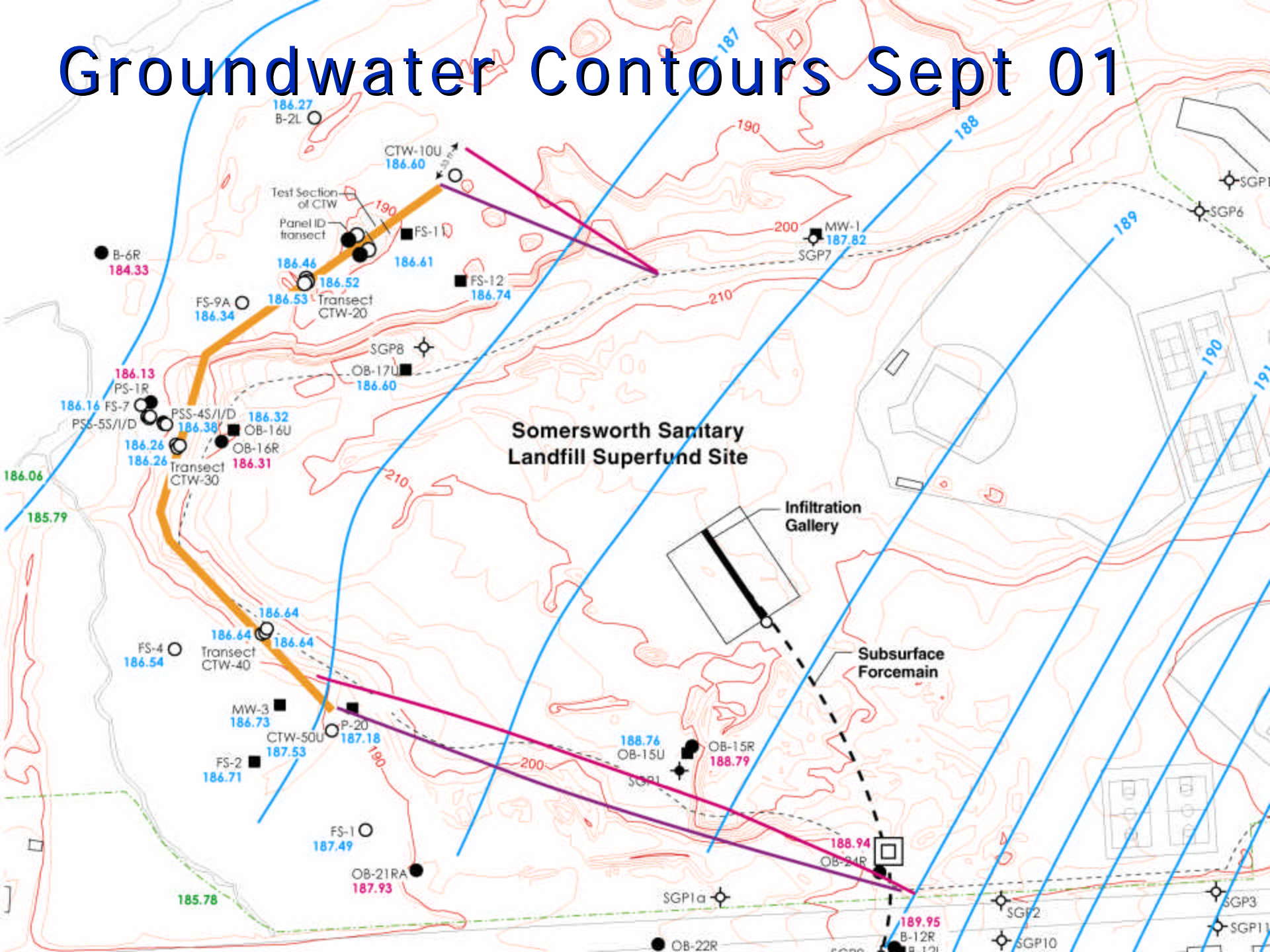
Groundwater Contours April 01



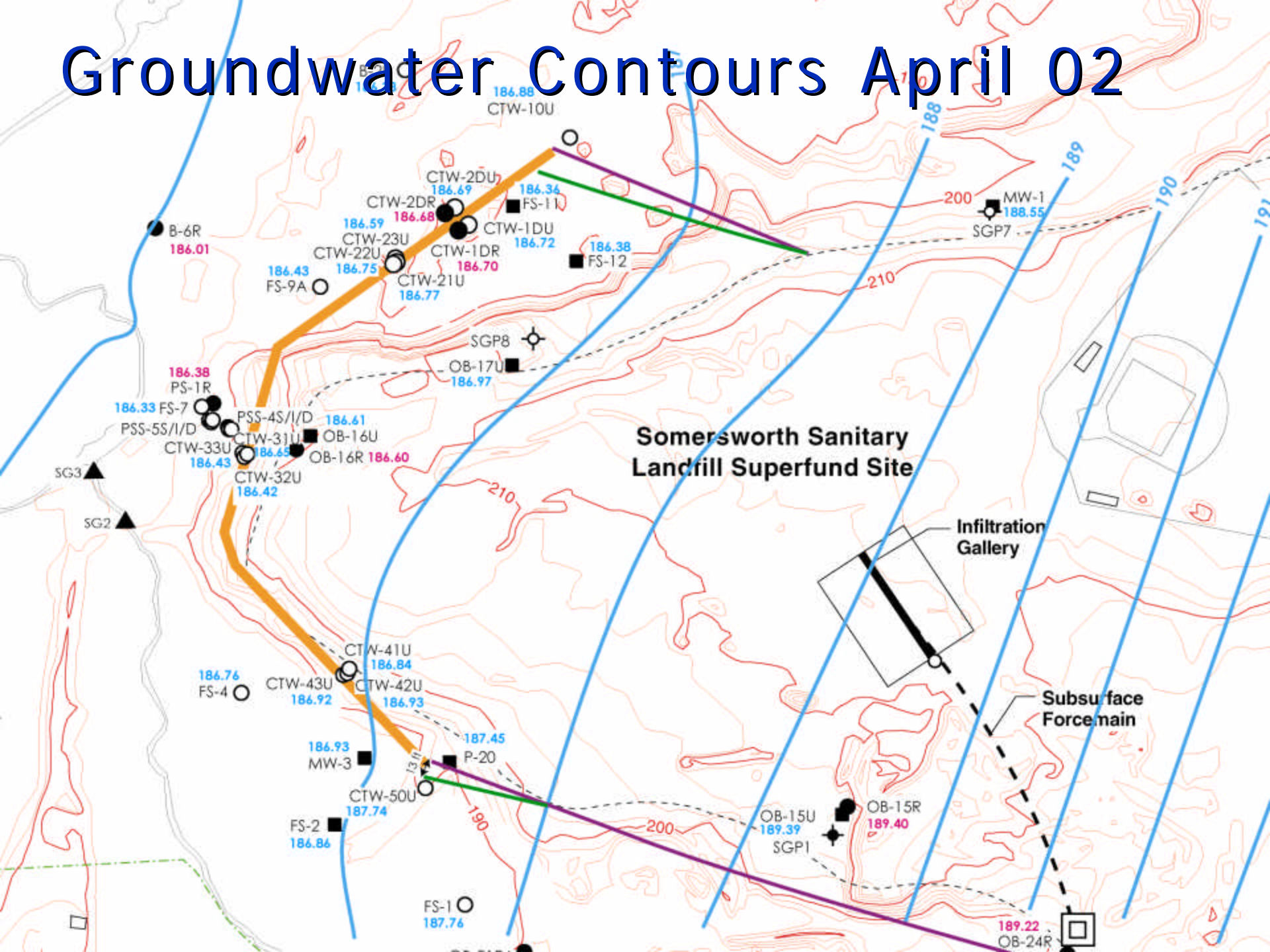
Groundwater Contours July 01



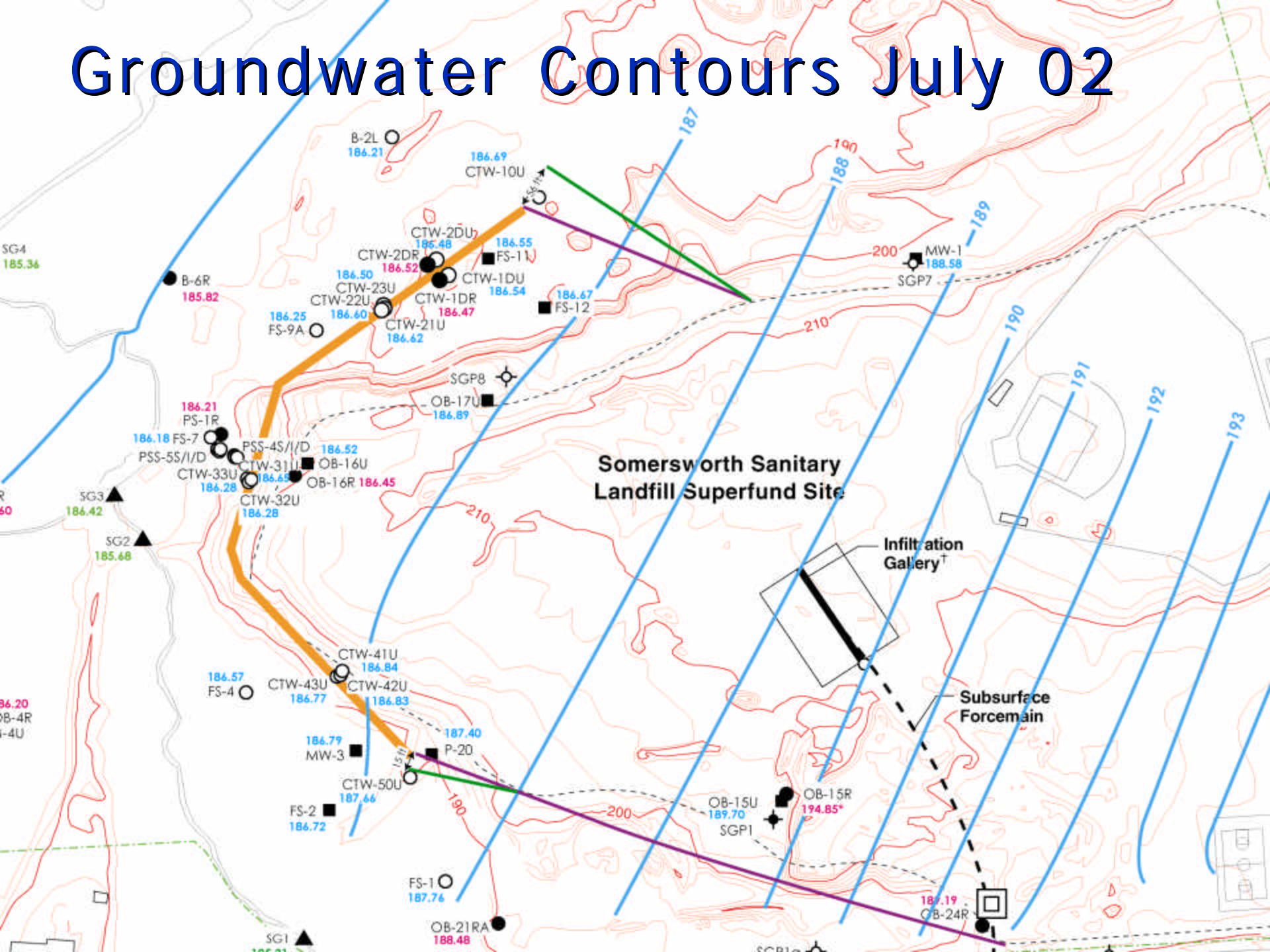
Groundwater Contours Sept 01



Groundwater Contours April 02



Groundwater Contours July 02



Vertical Gradients at CTW Well Nests

Well Nest	Apr-01	Jul-01	Sep-01	Apr-02	Jul-02
22U	187.76	186.73	186.53	186.75	186.60
22L	187.71	186.70	186.53	186.75	186.60
	0.006	0.004	0.000	0.000	0.000
32U	187.22	186.46	186.26	186.42	186.28
32L	187.24	186.47	186.26	186.45	186.29
	-0.001	-0.001	0.000	-0.002	-0.001
42U	188.00	187.04	186.64	186.93	186.83
42L	187.97	187.05	186.67	186.97	186.83
	0.002	-0.001	-0.002	-0.003	0.000
1DU				186.72	186.52
1DR				186.70	186.47
	na	na	na	0.001	0.003

Vertical gradients in ft/ft

All vertical gradients are considered un-resolvable

Negative values indicate upward gradient

Water Levels Along CTW Transects

Well Transect	Apr-01	Jul-01	Sep-01	Apr-02	Jul-02
21U	187.85	186.74	186.52	186.77	186.62
22U	187.76	186.73	186.53	186.75	186.60
23U	187.50	186.56	186.46	186.59	186.50
Δ head	0.35	0.18	0.06	0.18	0.12
31U	187.56	186.68	186.38	186.65	186.51
32U	187.22	186.46	186.26	186.42	186.28
33U	186.86	186.47	186.26	186.43	186.28
Δ head	0.70	0.21	0.12	0.22	0.23
41U	187.20	187.05	186.64	186.97	186.84
42U	188.00	187.04	186.64	186.93	186.83
43U	187.97	187.05	186.64	186.92	186.77
Δ head	-0.77	0.00	0.00	0.05	0.07

Water Levels in ft amsl

Δ head between transect well 1 and 3 (8 ft apart)

Water Level Monitoring

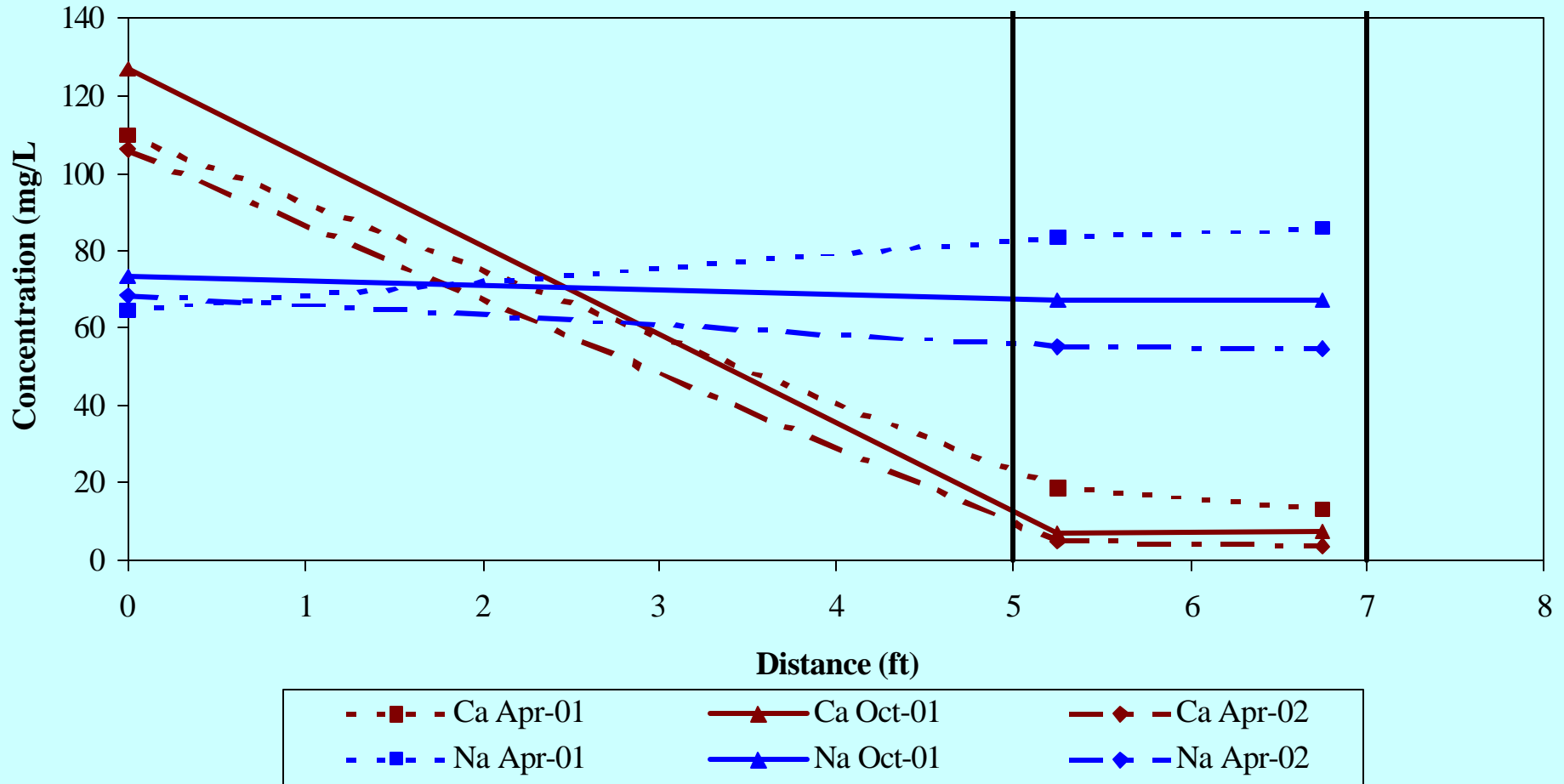
- Shows little mounding on upgradient side of PRB
- No significant downward gradient on upgradient side of PRB
- Demonstrates that PRB does not significantly alter GW flow pattern

Hydraulic Testing

- Slug test not possible due to very quick response of water levels
- Pump outside PRB & monitor response in PRB at each of 3 transects
- Testing conducted in 2001 and 2002

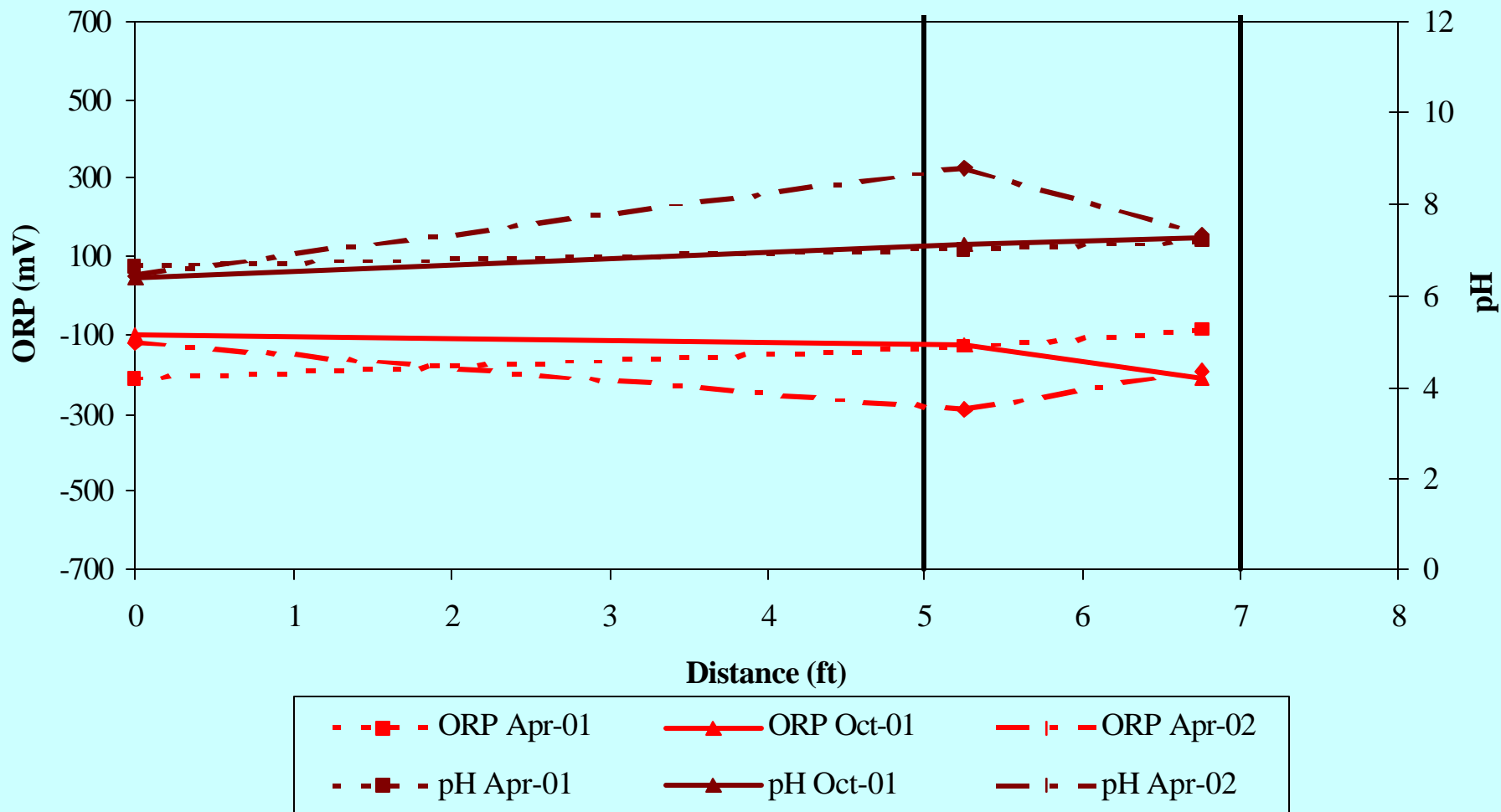
Ca and Na Along Transect 30

30 Transect

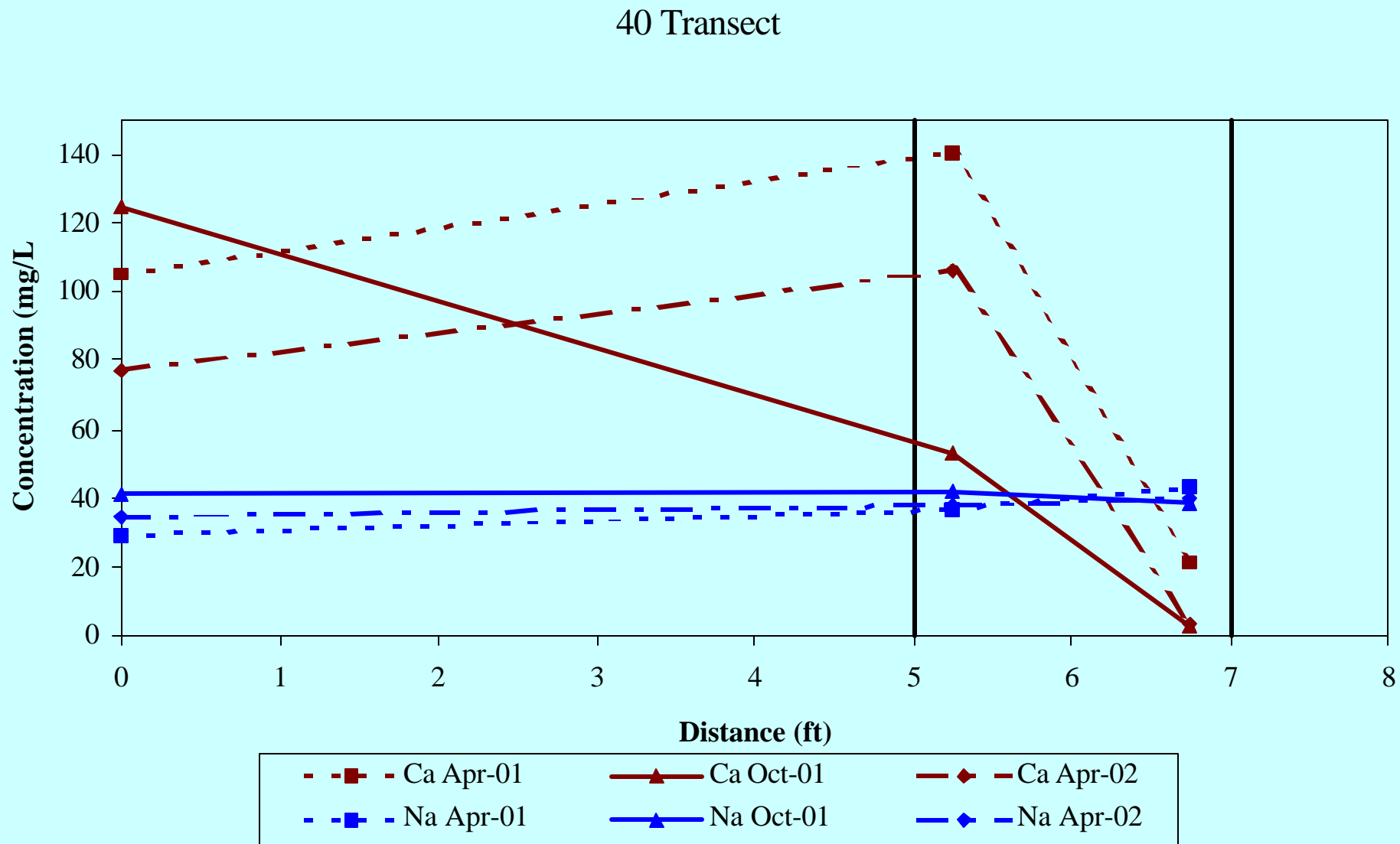


ORP and pH Along Transect 30

30 Transect

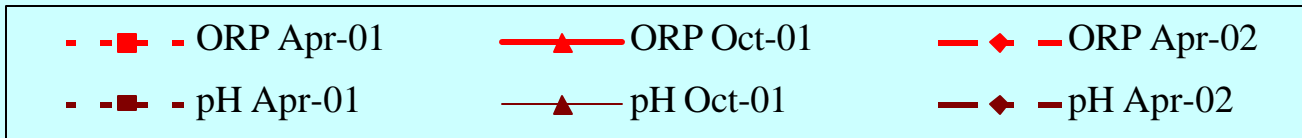
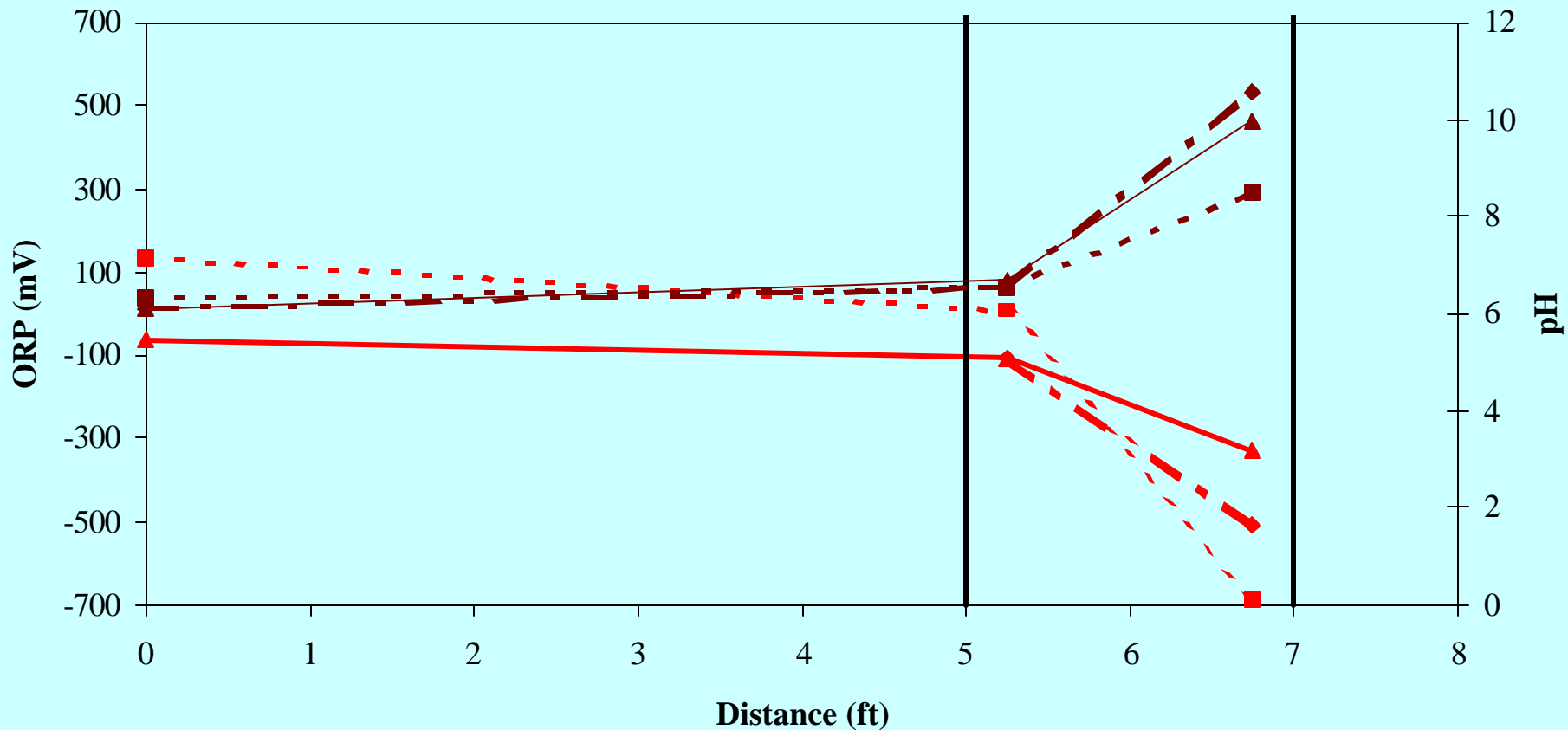


Ca and Na Along Transect 40



ORP and pH Along Transect 40

40 Transect



VOCs in Transect 30

	Upgradient			Downgradient			
	TCE	c-DCE		TCE	c-DCE		
Feb-01	< 5	43	21	< 5	4.5	< 2	Shallow
Apr-01	< 5	23	15	< 5	< 5	4.8	
Jul-01	< 5	87	40	< 5	< 5	< 2	
Oct-01	< 5	57	23	< 5	< 5	< 2	
Apr-02	< 5	28	15	< 5	< 5	< 2	
Jul-02	< 5	22	12	< 5	< 5	< 2	
Mar-01				< 5	8.8	8.7	Deep
Apr-01				< 5	< 5	2.5	
Jul-01				< 5	< 5	2.1	
Oct-01				< 5	< 5	< 2	
Apr-02				< 5	< 5	< 2	
Jul-02				< 5	< 5	< 2	

concentrations in
micrograms / liter

groundwater flow



VOCs in Panel 1D Wells

	Upgradient				Downgradient			
	PCE	TCE	c-DCE		PCE	TCE	c-DCE	
Nov-01	55	110	280	79	5	<5	<5	<2
Apr-02	44	100	300	110	<5	<5	<5	<2
Jul-02	33	87	290	110	<5	<5	<5	<2

groundwater flow



concentrations in micrograms /
liter

VOCs in End Wells

PCE TCE c-DCE

Jan-01	<5	<5	<5	<2
Apr-01	<5	<5	<5	<2
Aug-01	<5	<5	<5	<2
Oct-01	<5	<5	<5	<2
Apr-02	<5	<5	<5	<2
Jul-02	<5	<5	<5	<2

**North End
Monitoring Well
(CTW-10U)**

PCE TCE c-DCE

Jan-01	VC <5	<5	<5	<2
Apr-01	<5	<5	<5	<2
Jul-01	<5	<5	<5	<2
Oct-01	<5	<5	<5	1.3 J
Apr-02	<5	<5	<5	2.4
Jul-02	<5	<5	<5	2.5

**South End
Monitoring Well
(CTW-50U)**

concentrations in micrograms /
liter

Groundwater VOC Monitoring

- Shows groundwater passing through the PRB is being treated
- No significant concentrations of VOCs moving around PRB

Conclusions

- successful application of innovative technology at a Superfund Site
- demonstrated use of the BP slurry construction method with considerable cost savings over alternative methods
- Water levels show mounding upgradient of PRB in not significant
- Continued reduction of VOC after 2 years