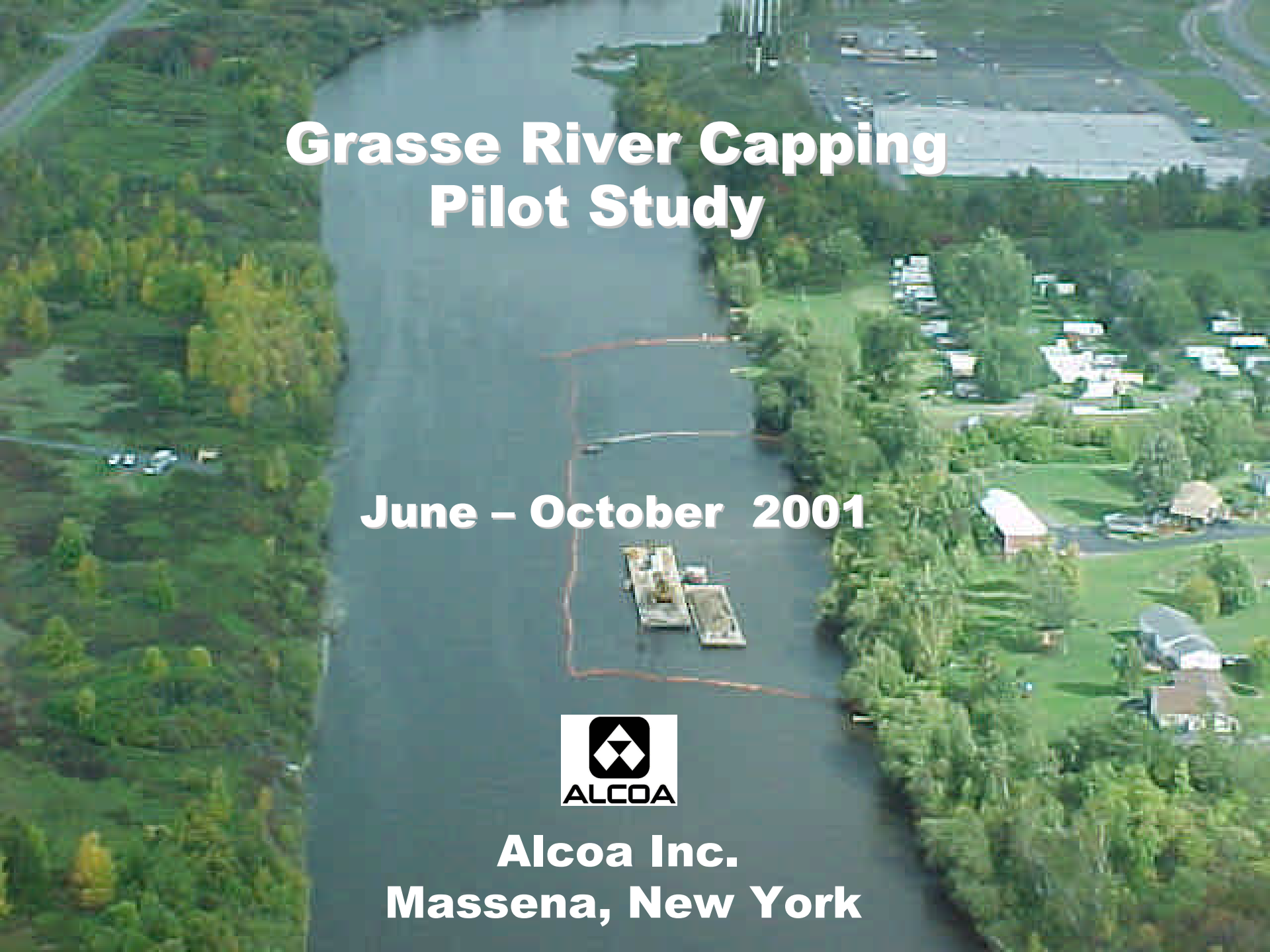
Grasse River Capping Pilot Study



June – October 2001

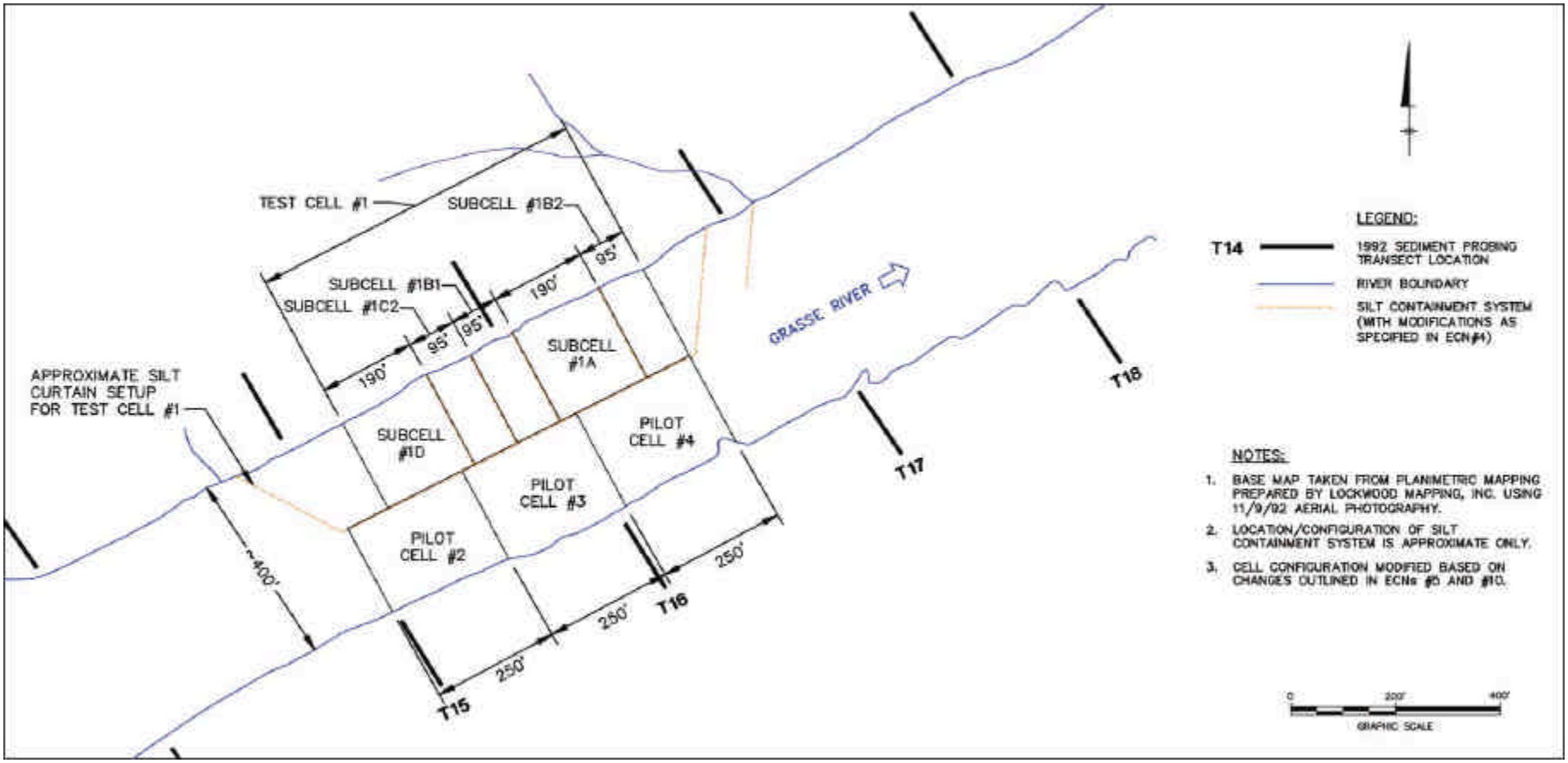
ALCOA

Alcoa Inc.
Massena, New York

Pilot Capping Study Objectives

- Evaluate Cap Placement Techniques
- Evaluate Cap Coverage Effectiveness
- Evaluate Extent of Potential Entrainment of Underlying Sediment Into Cap Material
- Evaluate Particle Size Fractionation
- Evaluate Water Column Impacts
- Obtain Cost Information
- Monitor Recolonization by Benthic Organisms

Capping Pilot Study Layout



Material Types and Application Methods Tested – Test Cells

Test Cell	Application Technique	Material Types	Target Thickness
1A	surface clamshell	1:1 sand/topsoil	12 inches
1B1	Pneumatic surface clamshell subsurface clam	bentonite 1:1 sand/topsoil	2 inches Lift 1 - 6 inches Lift 2 - 6 inches
1B2	Subsurface clamshell	1:1 sand/topsoil	12 inches
1C2	Tremie	1:1 sand/topsoil w/ bentonite	12 inches
1D	Surface clamshell Subsurface clam	Aquablok 1:1 sand/topsoil	3 to 4 inches 6 inches

Pneumatic Broadcasting Application Process on Barge

Material Types and Application Methods Tested – Pilot Cells

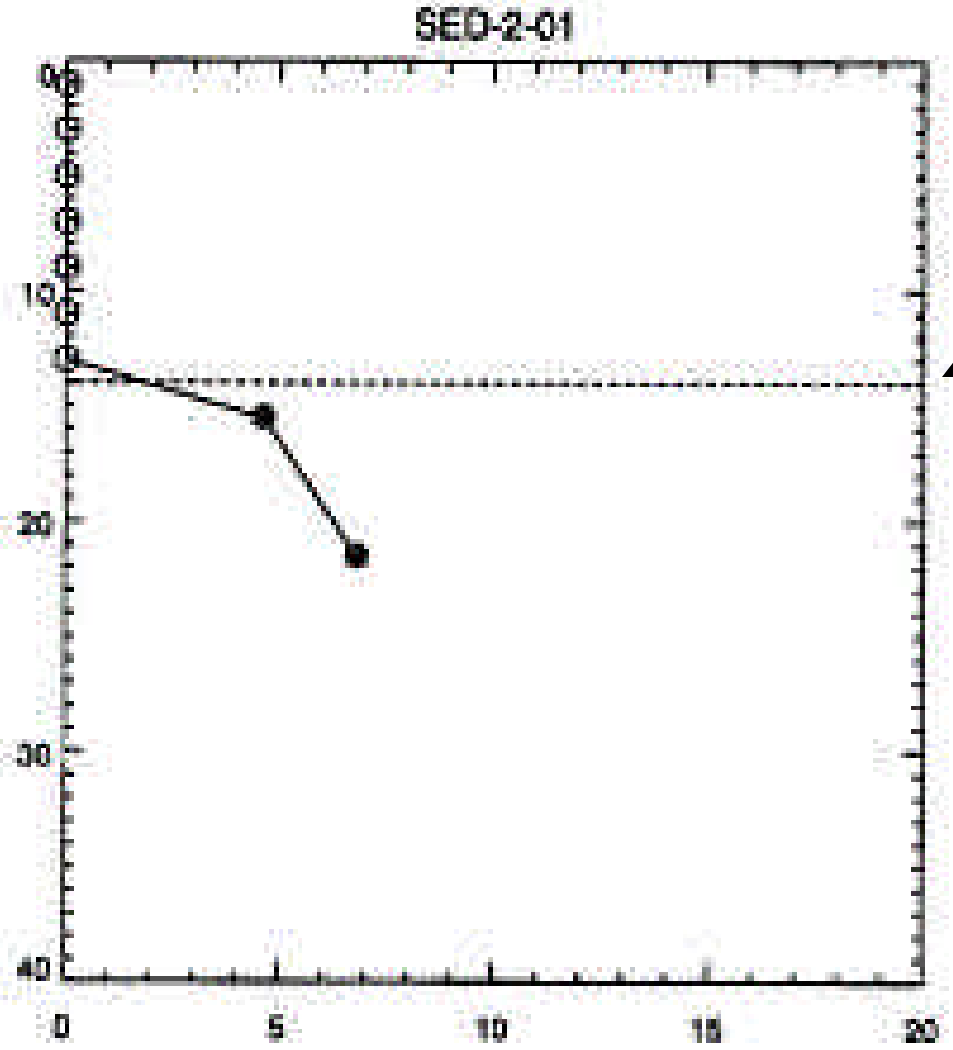
Pilot Cell	Application Technique	Material Types	Target Thickness
2	surface clamshell subsurface clam	1:1 sand/topsoil	Lift 1 - 6 inches Lift 2 – 6 inches
3	mid-depth clamshell	1:1 sand/topsoil	12 inches
4	surface clamshell subsurface clam	1:1 sand/topsoil	Lift 1 – 12 inches Lift 2 – 12 inches

Pilot Cell #2 Core Sampling Results

Sample Date	Core ID	Sample Depth (inches)	Total PCBs (mg/kg)	TOC (%)	Sand Content[1] (%)	Silt+Clay Content[2] (%)
Pilot Cell 2						
September 28	SED-2-01	0-2	ND	1.17	76	24
		2-4	ND	1.11	76	24
		4-6	ND	1.25	73	27
		6-8	ND	0.79	64	36
		8-10	ND	1.77	67	33
		10-12	ND	1.45	67	33
		12-14	ND	0.59	87	13
		14-17	4.58 (4.69)	1.36 (0.80)	86 (86)	14 (14)
		17-26	6.81	0.33	95	5

(6 capping cores were collected in Pilot Cell #2. Typical core shown)

Pilot Cell #2 Cap PCB Concentrations



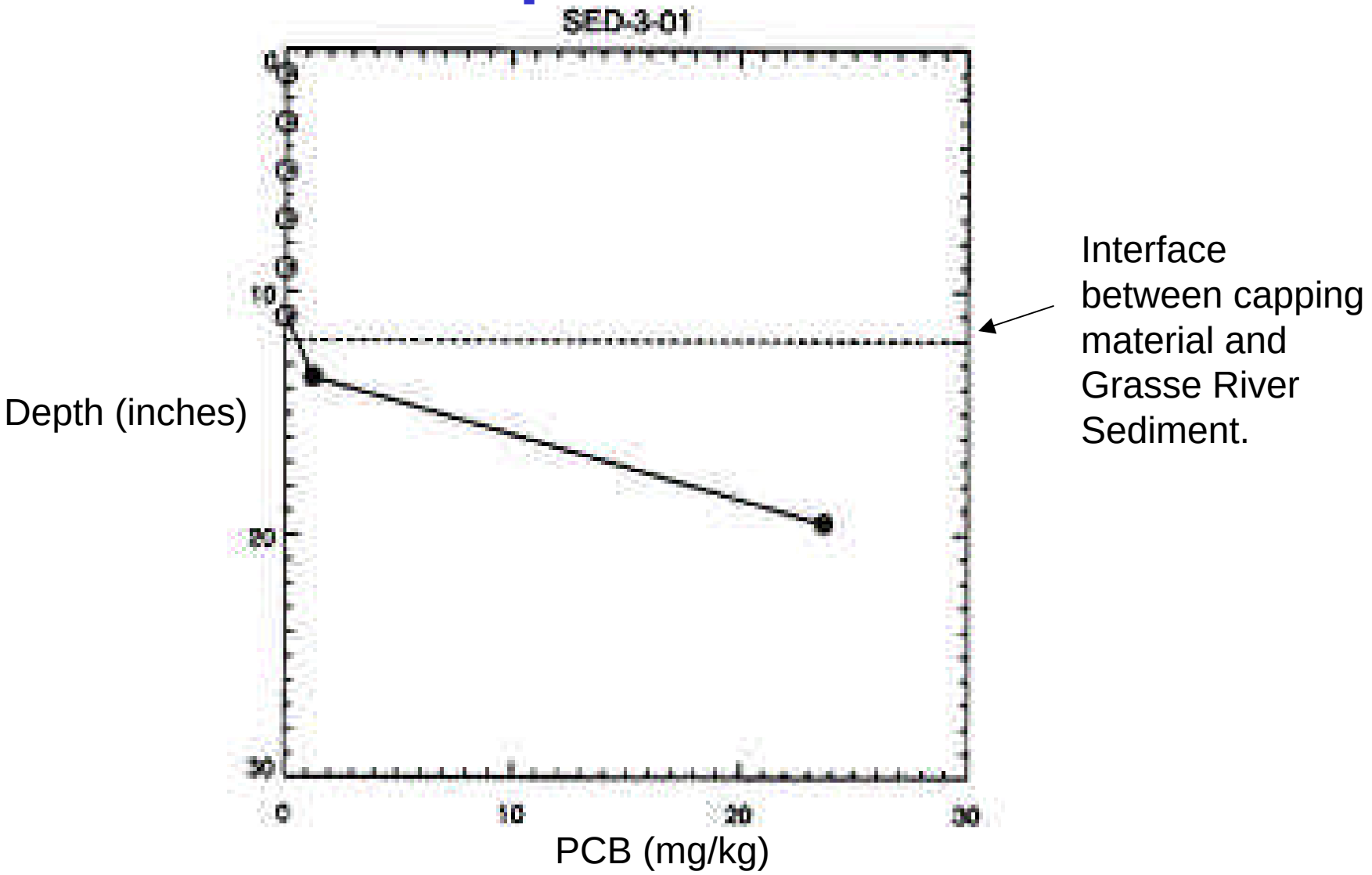
(6 capping cores were collected in Pilot Cell #2. Typical Vertical Profile of Total PCBs for Sediment Core Shown)

Pilot Cell #3 Core Sampling Results

Sample Date	Core ID	Sample Depth (inches)	Total PCBs (mg/kg)	TOC (%)	Sand Content[1] (%)	Silt+Clay Content[2] (%)
Pilot Cell 3						
October 4	SED-3-01	0-2	ND	1.17	6	6
		2-4	ND	0.84	6	6
		4-6	ND	1.06	6	6
		6-8	ND	1.24	6	6
		8-10	ND	1.38	6	6
		10-12	ND	1.26	6	6
		12-15	1.38 (1.16)	1.15 (1.04)	6	6
		15-24	23.68	1.14	6	6

(6 capping cores were collected in Pilot Cell #3. Typical core shown)

Pilot Cell #3 Cap PCB Concentrations



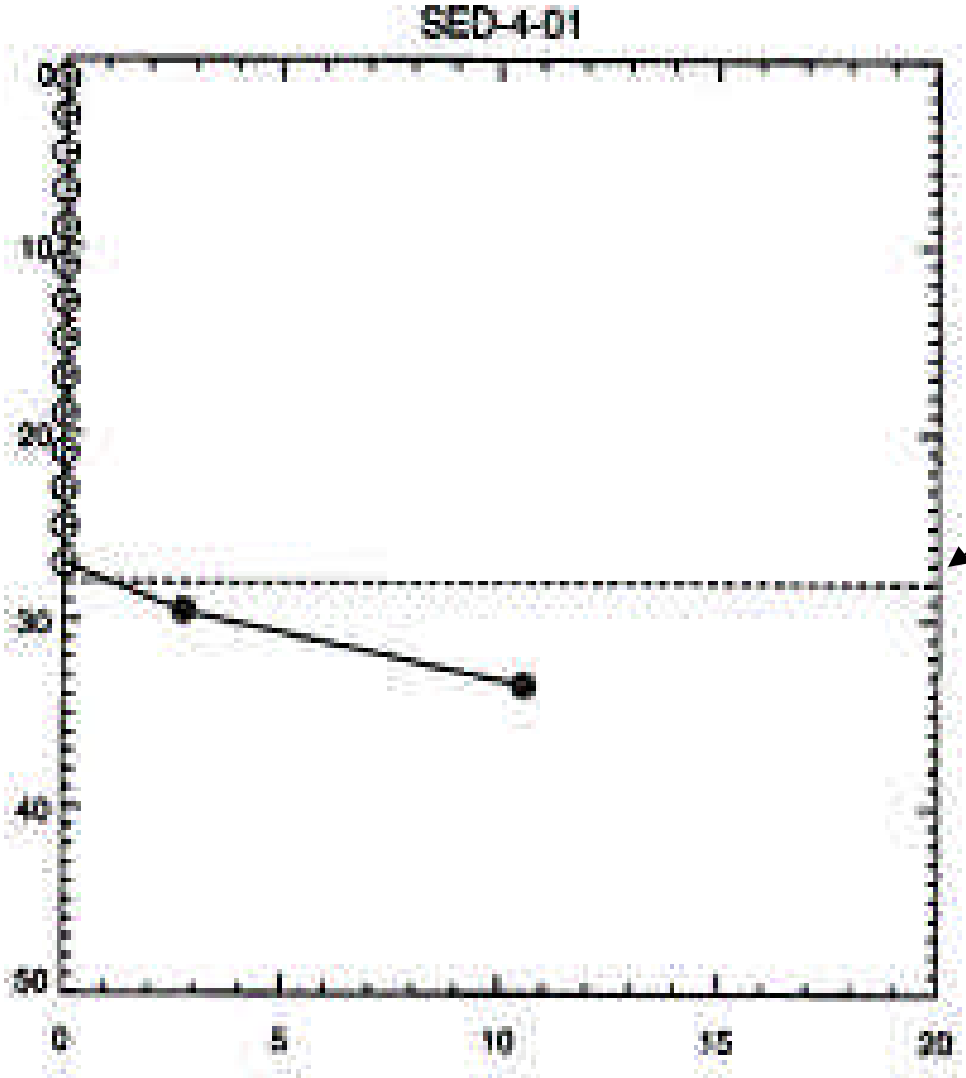
(6 capping cores were collected in Pilot Cell #3. Typical Vertical Profile of Total PCBs for Sediment Core Shown)

Pilot Cell #4 Core Sampling Results

Sample Date	Core ID	Sample Depth (inches)	Total PCBs (mg/kg)	TOC (%)	Sand Content[1] (%)	Silt+Clay Content[2] (%)
Pilot Cell 4						
September 21	SED-4-01	0-2	ND	0.31	85	15
		2-4	ND	0.54	83	17
		4-6	ND	0.81	79	21
		6-8	ND	0.62	79	21
		8-10	ND	1.25	75	25
		10-12	ND	0.93	76	24
		12-14	ND	0.56	79	21
		14-16	ND	1.71	71	29
		16-18	ND	1.05	80	20
		18-20	ND	0.86	77	23
		20-22	ND	1.02	72	28
		22-24	ND	0.82	79	21
		24-26	ND	1.19	69	31
		26-28	ND	0.78	80	20
		28-31	1.53 (4.00)	3.58 (3.21)	69 (75)	31 (25)
		31-36	10.57	2.78	70	30

(6 capping cores were collected in Pilot Cell #4. Typical core shown)

Pilot Cell #4 Cap PCB Concentrations



Depth (inches)

Interface between capping material and Grasse River Sediment.

(6 capping cores were collected in Pilot Cell #4. Typical Vertical Profile of Total PCBs for Sediment Core Shown)

Average PCB Concentrations Pilot Cell Cap Material

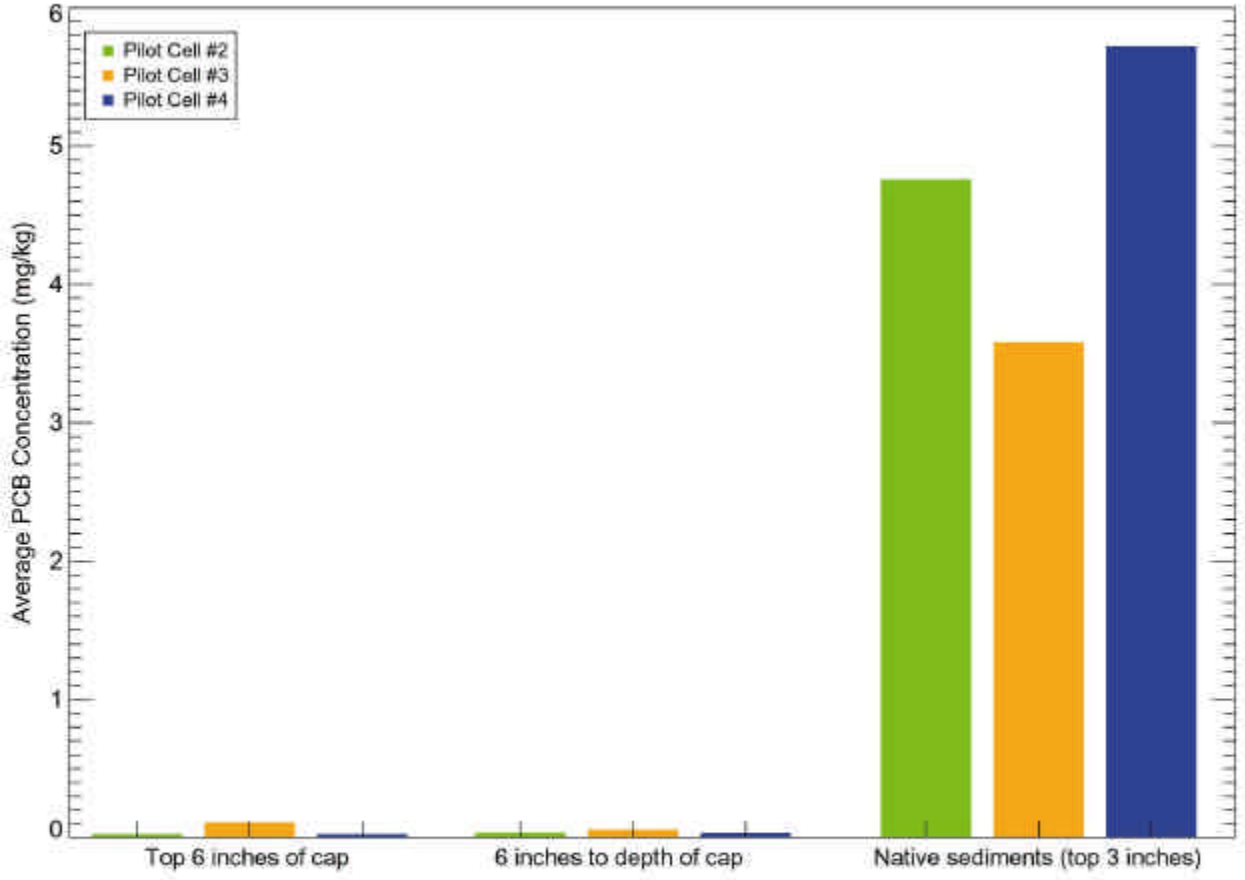
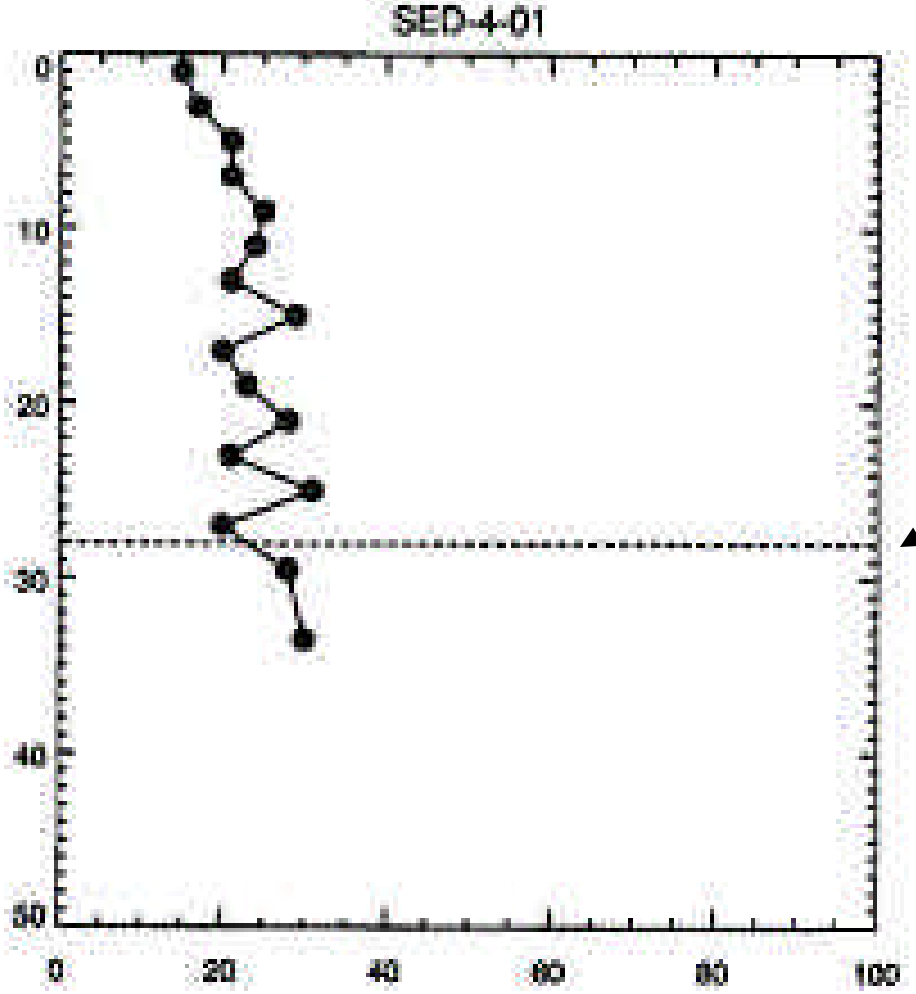


Figure 6-12. Average PCB Concentrations in Sediment Cores from Pilot Cells

Grasse River Capping Pilot 2001 - Cores collected on side slopes excluded.
Duplicate results averaged. Non-detects set to half the detection limit prior to averaging.
PCBs quantified on an Aroclor basis.

EC - D:\ALCgral\Documents\reports\capping_pilot\figures\PCB_cap_surf_sed_F19_ps_FIG6_12.pro
Wed Nov 28 09:00:09 2001

Percent Fines in Pilot Cell #4 Cap Material



Depth (inches)

Interface between capping material and Grasse River Sediment.

(6 capping cores were collected in Pilot Cell #4. Typical Vertical Profile of Percent Fines for Sediment Core Shown)

Water Column TSS During Test Cells

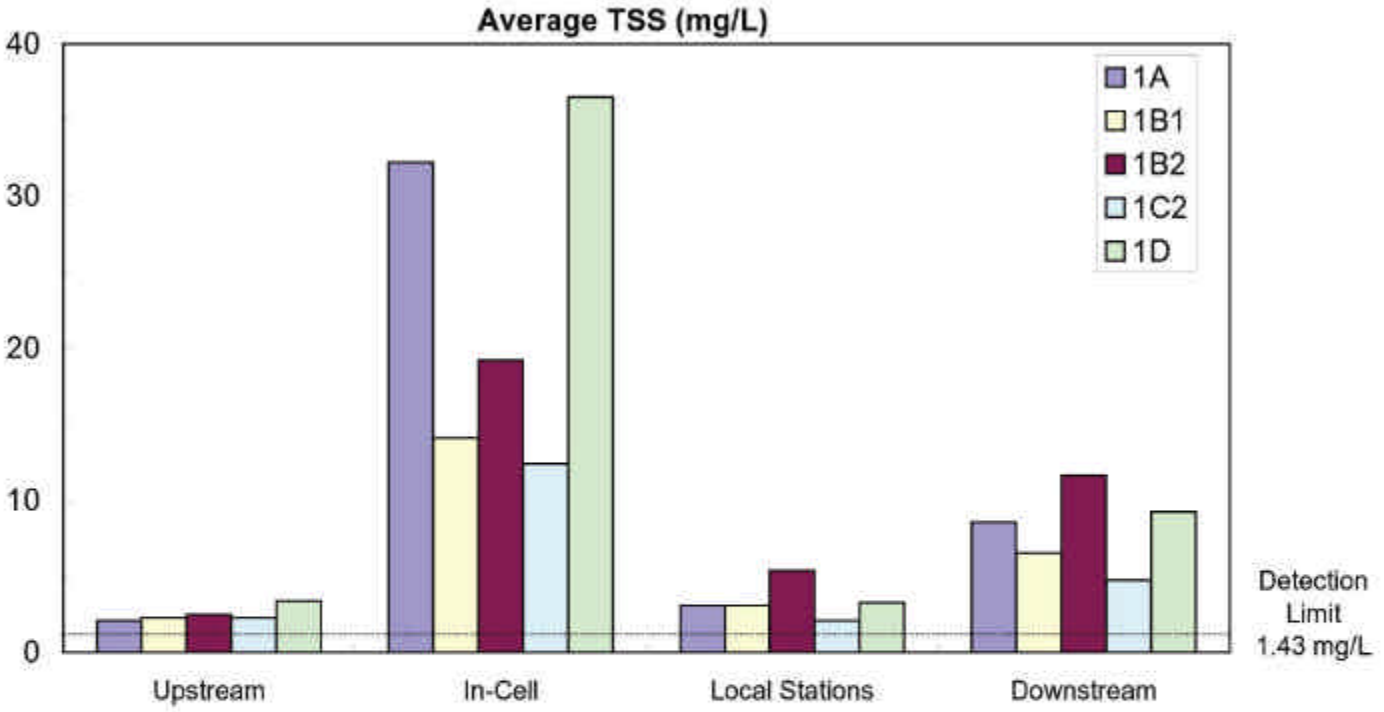


Figure 5-17. Average Water Column TSS During Test Cell Capping

Grasse River Capping Pilot 2001

Values reported below detection limit set to the half detection limit prior to averaging.

Composite samples collected on August 16th and August 30th were not included in averages due to the application of cap materials in multiple subcells on these days.

EC - D:\ALCgrp\Documents\Reports\Capping_Pilot\Figures\testpot_water_F13_F10_F11_F12.xls QEA:F11_WCtss
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Water Column PCBs During Test Cells

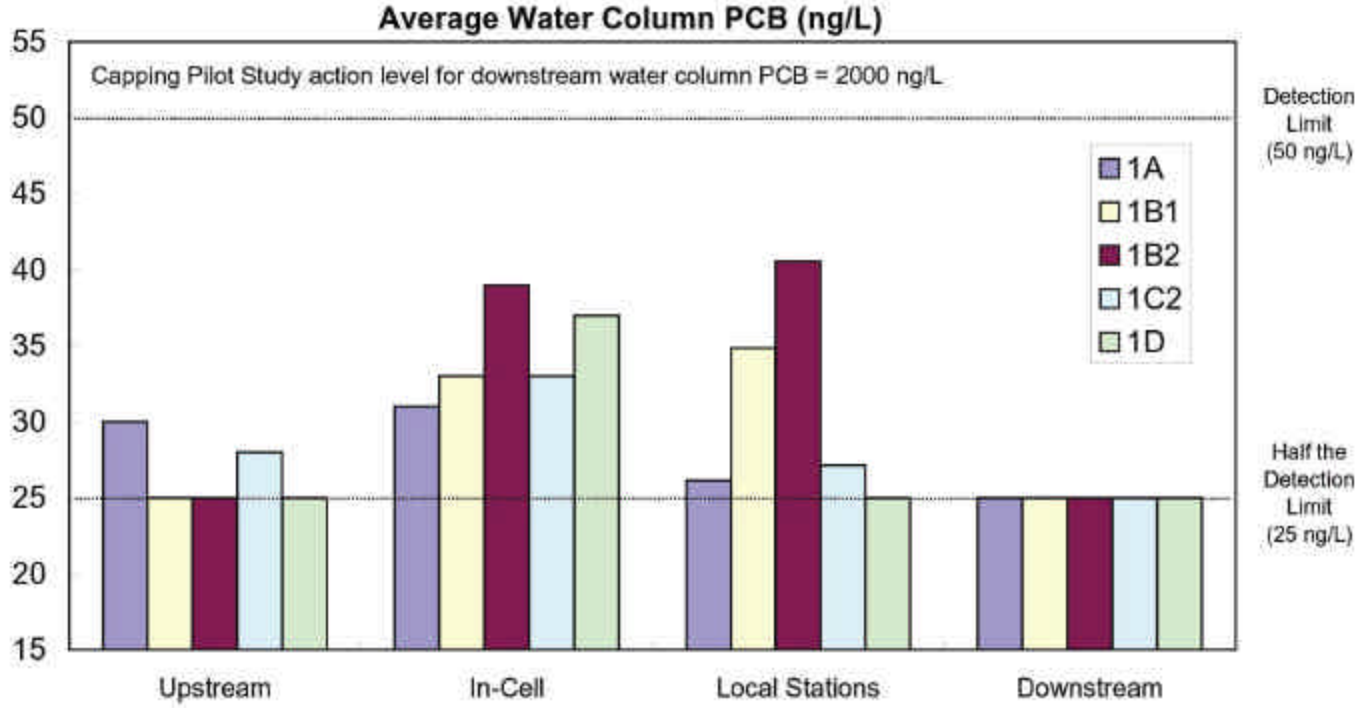

Figure 5-16. Average Water Column PCB During Test Cell Capping

Grasse River Capping Pilot 2001

Values reported below detection limit set to the half detection limit prior to averaging.

Composite samples collected on August 16th and August 30th were not included in averages due to the application of cap materials in multiple subells on these days.

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Wat
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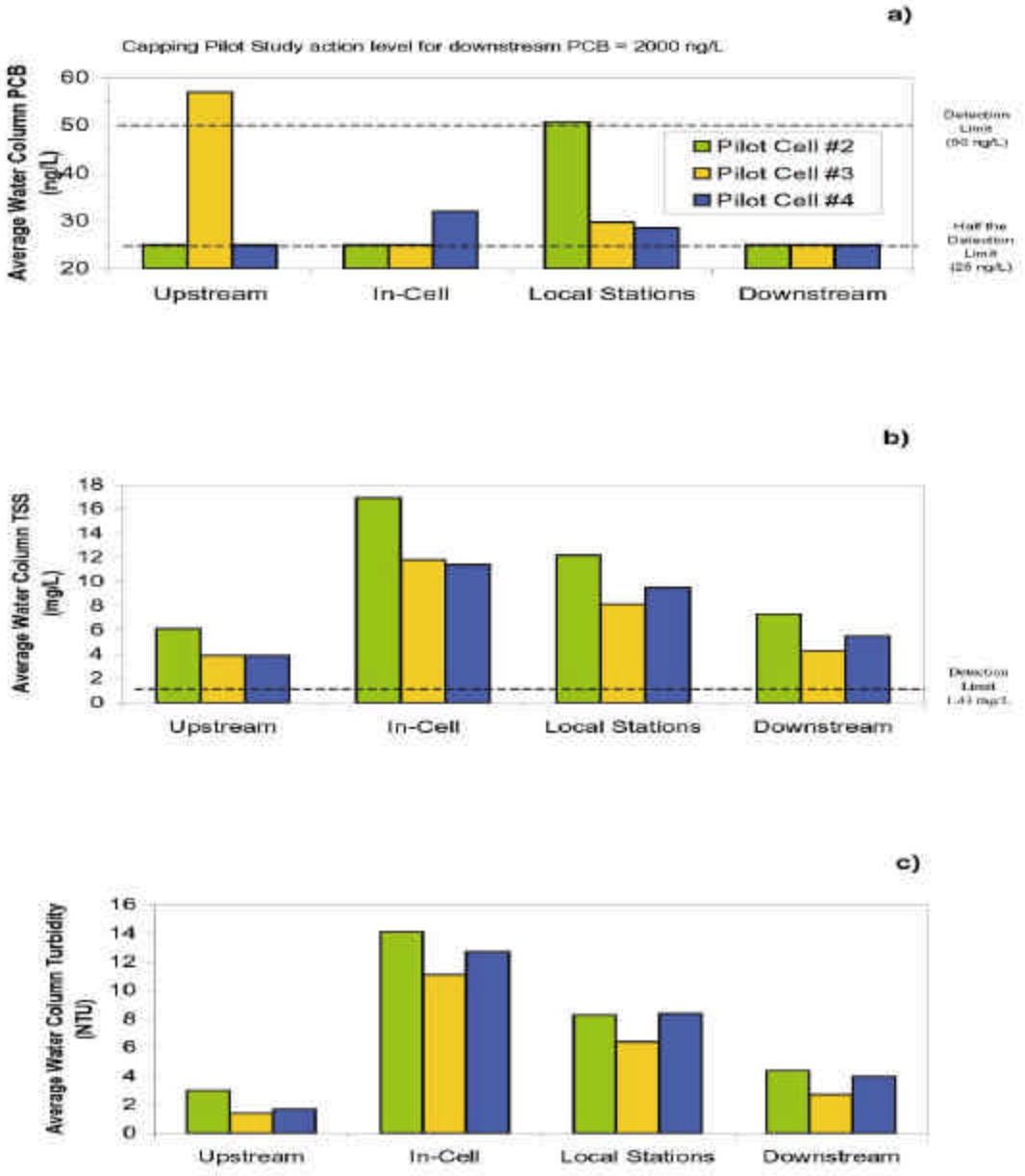
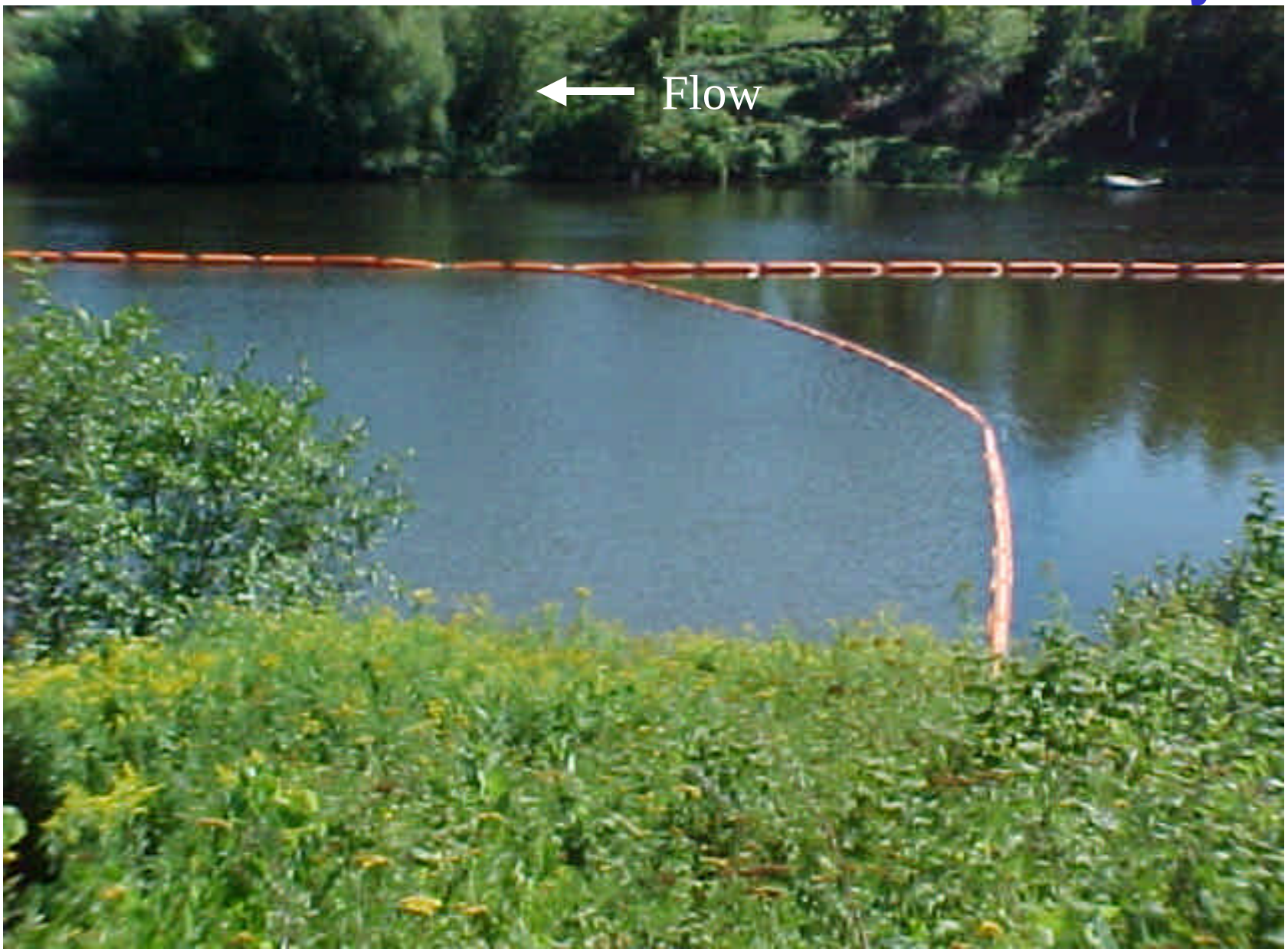


Figure 6-13. Average Water Column PCB, TSS, and Turbidity During Pilot Cell Capping
Grasse River Capping Pilot 2001
Values reported below the detection limit set to half the detection limit prior to averaging.

Aerial View of Capping Activities in Subcell #1B1

(Placement via Subsurface Clamshell)

Intermediate Curtain Being Pushed Upstream by a Pressure Wave from St. Lawrence Seaway



Pilot Cell Cost Information

Table 6-6
Direct Construction Costs for Pilot Cells

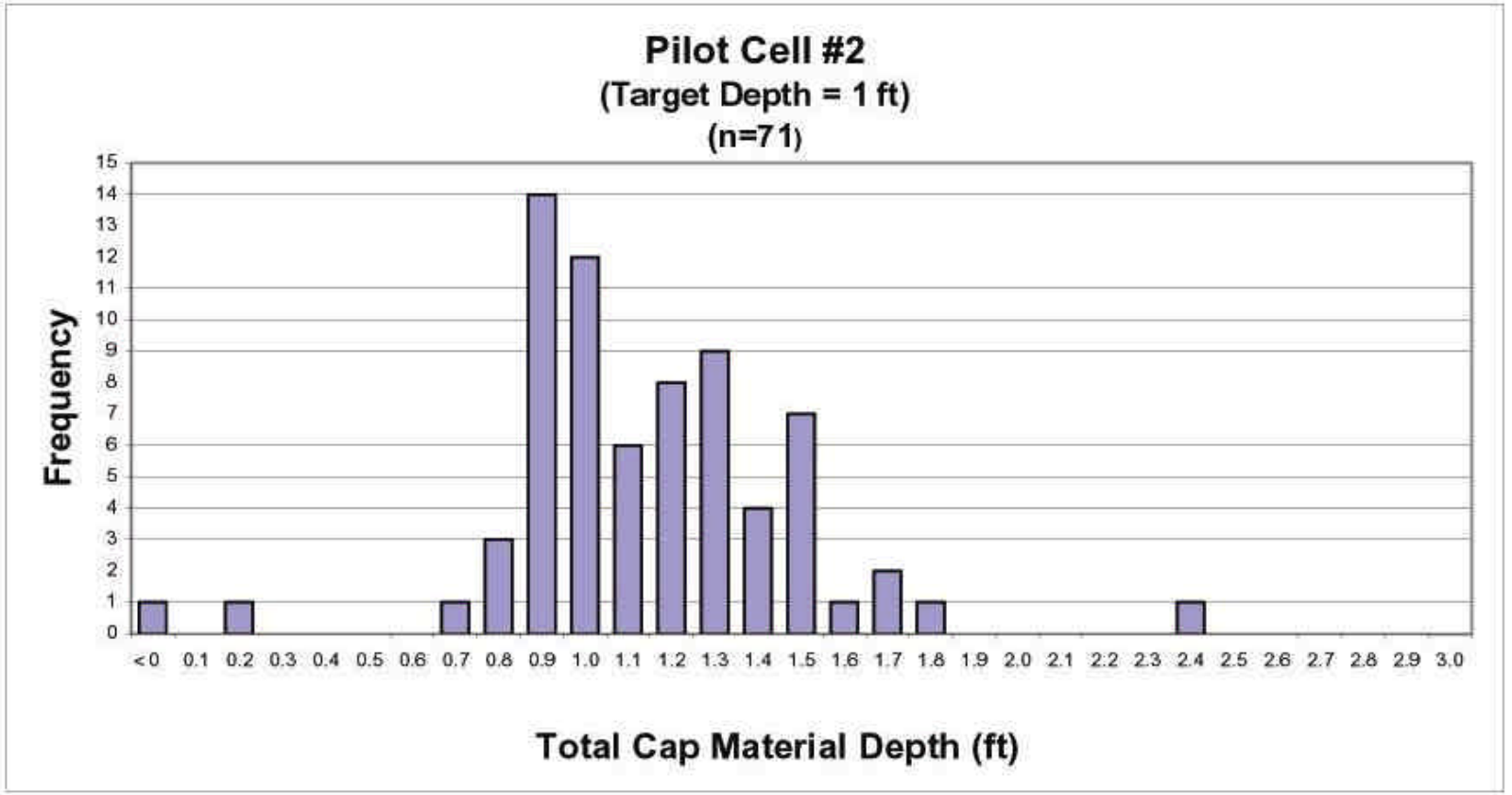
Area	Approximate Capped Area[2] (sqft)	Lift Identification	Cap Material	Target Lift Thickness (feet)	Application Technique	Volume of Material Placed (cy)	Total Costs[1] ($)	Unit Cost ($ / sqft)
Pilot Cell #2	41,500	Lift 1 Lift 2	1:1 sand/topsoil 1:1 sand/topsoil	0.5 0.5	Surface via clamshell Subsurface via clamshell	2,858	81,259	2.00
Pilot Cell #3	44,500	Lift 1	1:1 sand/topsoil	1	Mid-depth via clamshell	2,463	102,177	2.30
Pilot Cell #4	43,000	Lift 1 Lift 2	1:1 sand/topsoil 1:1 sand/topsoil	1 1	Surface via clamshell Subsurface via clamshell	4,405	132,894	3.10

Cap Thickness Summary

Cell	Design Thickness (ft)	Range of Depths (ft)	Average Depth (ft)
Test Cell			
1A	1.0	0.3 - 2.0	1.1
1B1	1.0	0.4 - 2.1	1.3
1B2	1.0	0.5 - 1.6	1.0
1C2	1.0	0.3 - 2.5	1.0
1D	Lift 1 - 0.25 Lift 2 - 0.5	0.0 - 1.5	0.5
Pilot Cell			
2	Lift 1 - 0.5 Lift 2 - 0.5	0.2 - 2.4	1.1
3	1.0	0.3 - 2.0	1.1
4	Lift 1 - 1.0 Lift 2 - 1.0	0.6 - 3.0	2.1

Figure 6-5

Frequencies of Total Cap Material Depth for Pilot Cells #2 through #4 and the Centerline Wedge Area



Notes:

1. Total cap material depths obtained from the 25' x 25' grid and sediment core collection as described in Section 2.8 (locations provided on Figures 6-1 through 6-4).
2. For grid node locations where total depth of material from survey methods and cores were available, depths were averaged to represent the measurement at that location.
3. Sediment cores collected from the side slopes have not been included.

2002 Monitoring Plan Elements

- Core sampling with PCB analysis
- Cap thickness measurements
- Shaker studies for cap stability testing
- Visual observation
- Groundwater seepage monitoring
- Benthic recolonization
- Bed load transport study