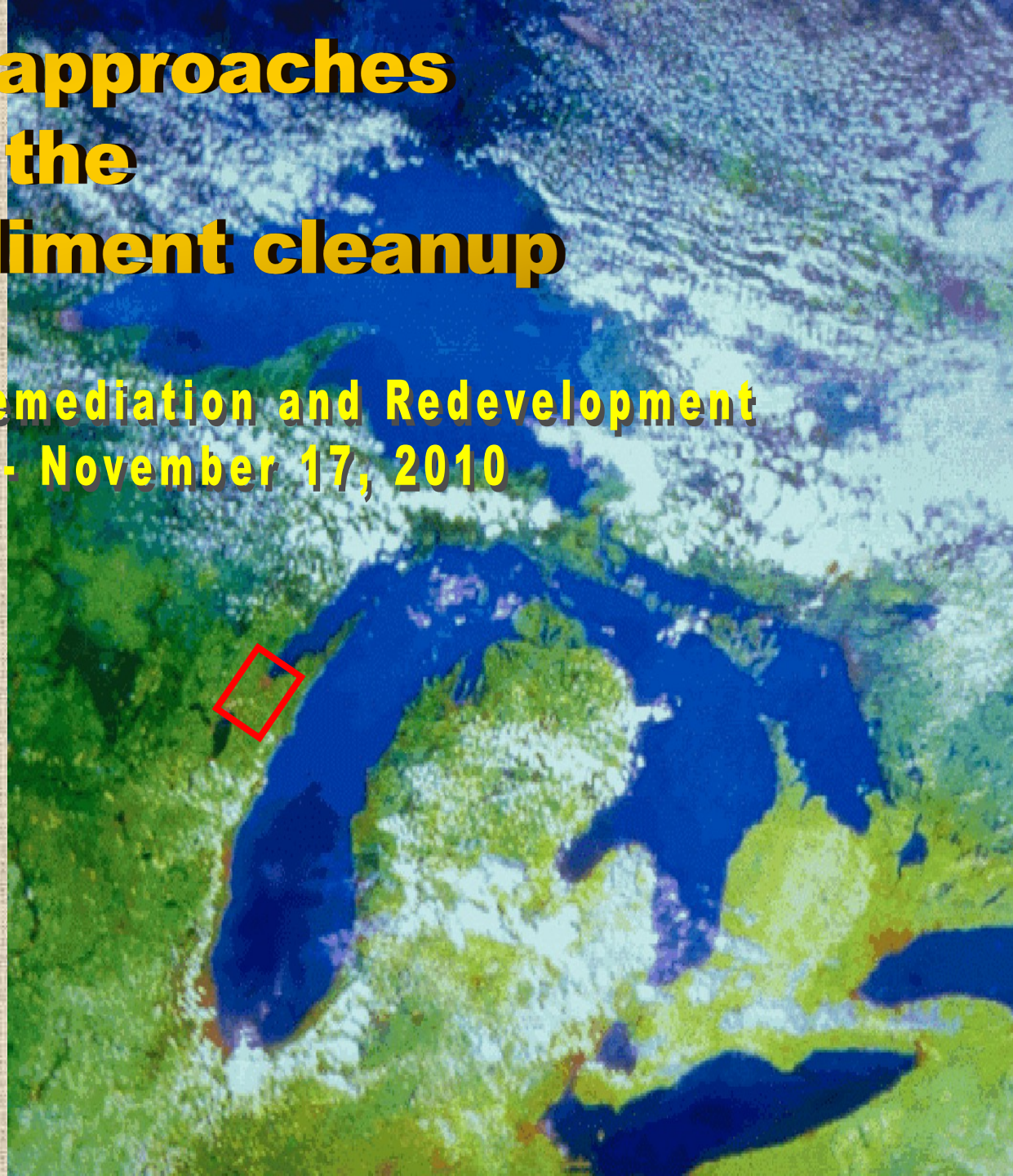
Innovative approaches on the Fox River sediment cleanup

WDNR Bureau for Remediation and Redevelopment
Statewide Training - November 17, 2010

James Hahnenberg
U.S. EPA
November 16, 2010



Today's topics

- Innovative & unique aspects of the Fox River project
- River cleanup
- Issues & controversies
- Results

Fox River
PCB cleanup

- Largest environmental sediment cleanup
- $800 million cleanup cost
- Collaborative team: Agencies & companies
- Agency oversight team: cleanup plan improvements
- Long-term monitoring plan

Innovations - Fox River

- Annual Work Plans
- Infill sampling of dredge areas - from 7 samples/acre to 28 samples/acre
- Dredge: GPS – RTK control system
- Neatline dredging

Innovations - Fox River

- Multiple hydraulic dredges
- Vic Vac® dredge
- Geotextile tubes for dewatering
- Beneficial sand re-use
- Cap placement method

Fox team

	Upper river	Lower river
Agencies	WDNR* & EPA	
Agencies oversight	Boldt, NRT, et al	
PRPs	Glatfelter WTMI Menasha	API NCR GP
PRP contractors	Brennan CH2MHILL Foth	Tetratech Brennan Boskalis-Dolman

* Technical lead

Agency oversight team

Photo courtesy of Boldt

Fox cleanup decisions

2002/2003 Decisions

Dredging/disposal
(with capping contingency)

2007/2008 Decision Amendments

Dredging/disposal

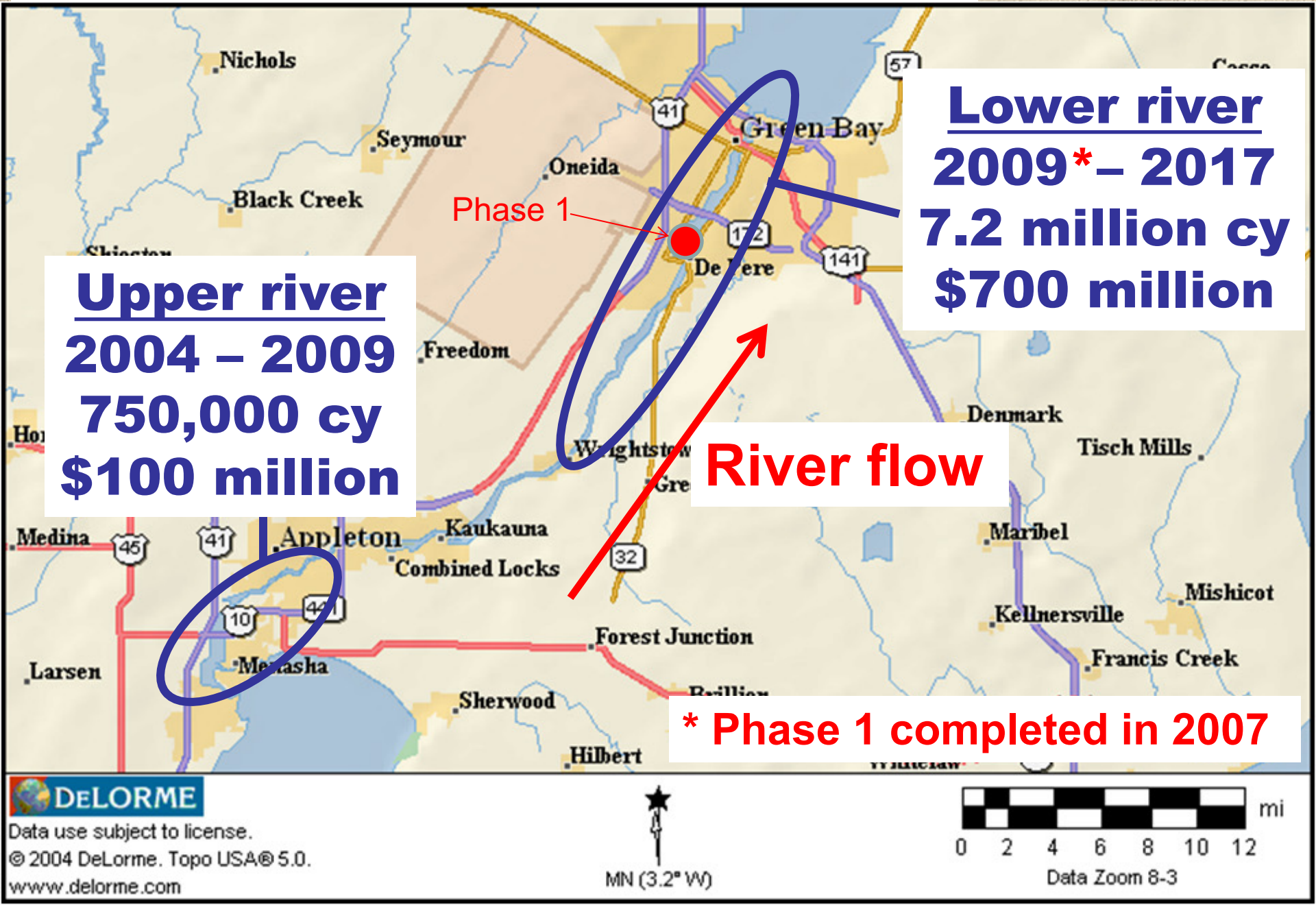
Engineered caps

Sand covers

Long-term cap monitoring & maintenance

PCB Action Level: 1 ppm

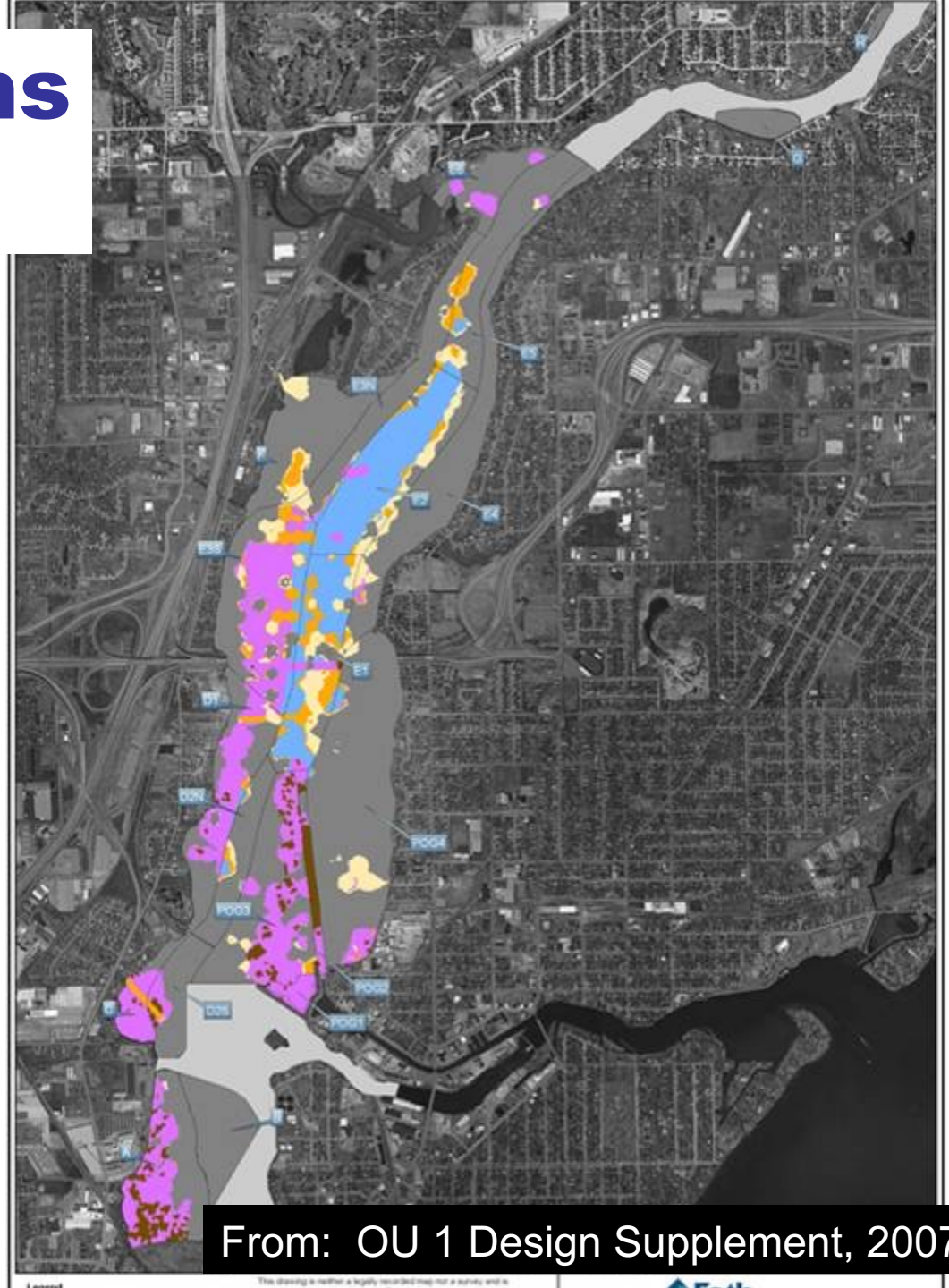
Fox River and Green Bay Site



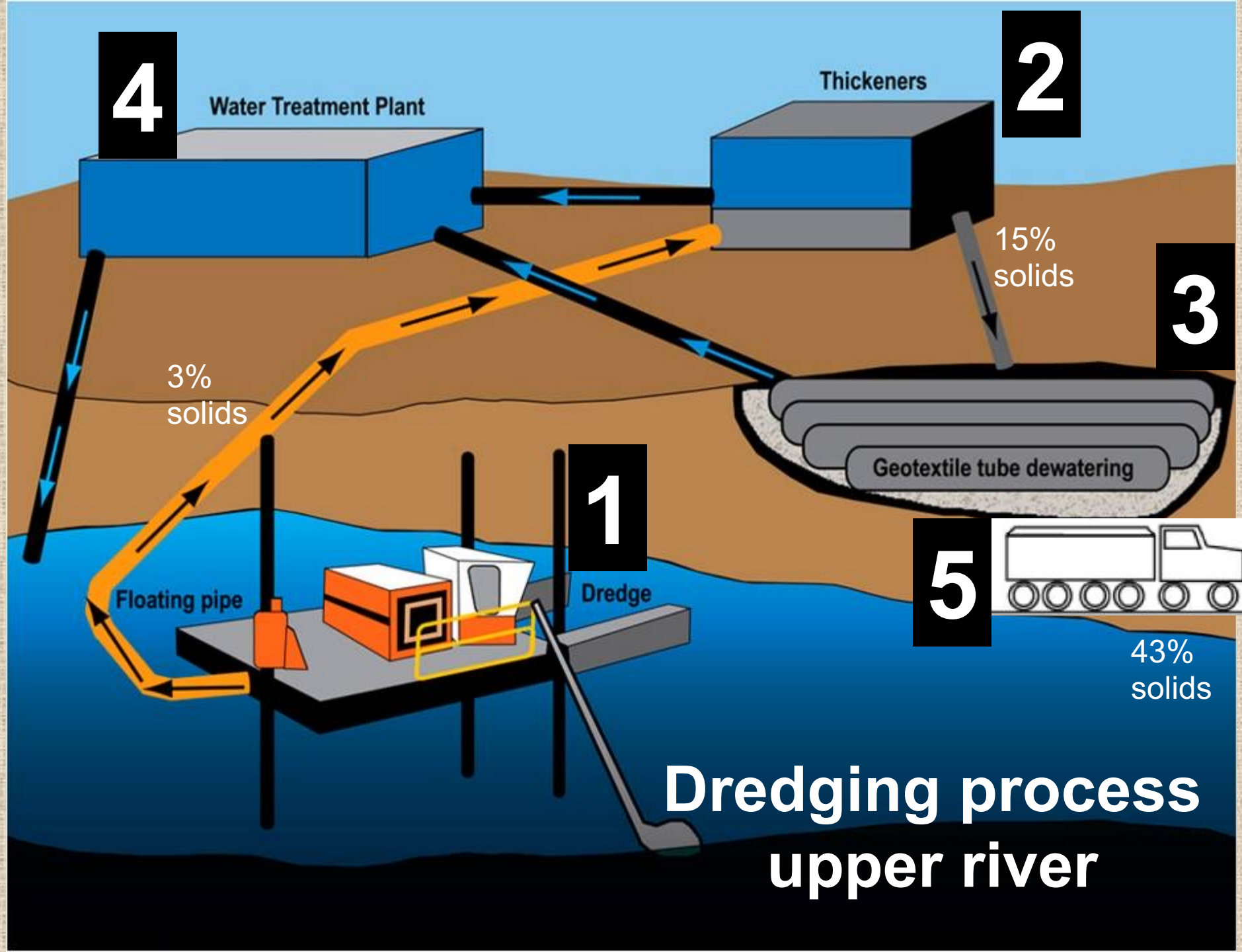
Cleanup actions upper river

Legend

- Dredging
- Capping
- 3” 6” Sand cover



From: OU 1 Design Supplement, 2007


4
Water Treatment Plant
Thickeners
2
15%
solids
3
3%
solids
Geotextile tube dewatering
1
Floating pipe
Dredge
5
43%
solids
Dredging process
upper river

“Small” cutterhead dredge

Dredge operator controls: GPS – RTK

Photo courtesy of Boldt

Monitor for dredge operator

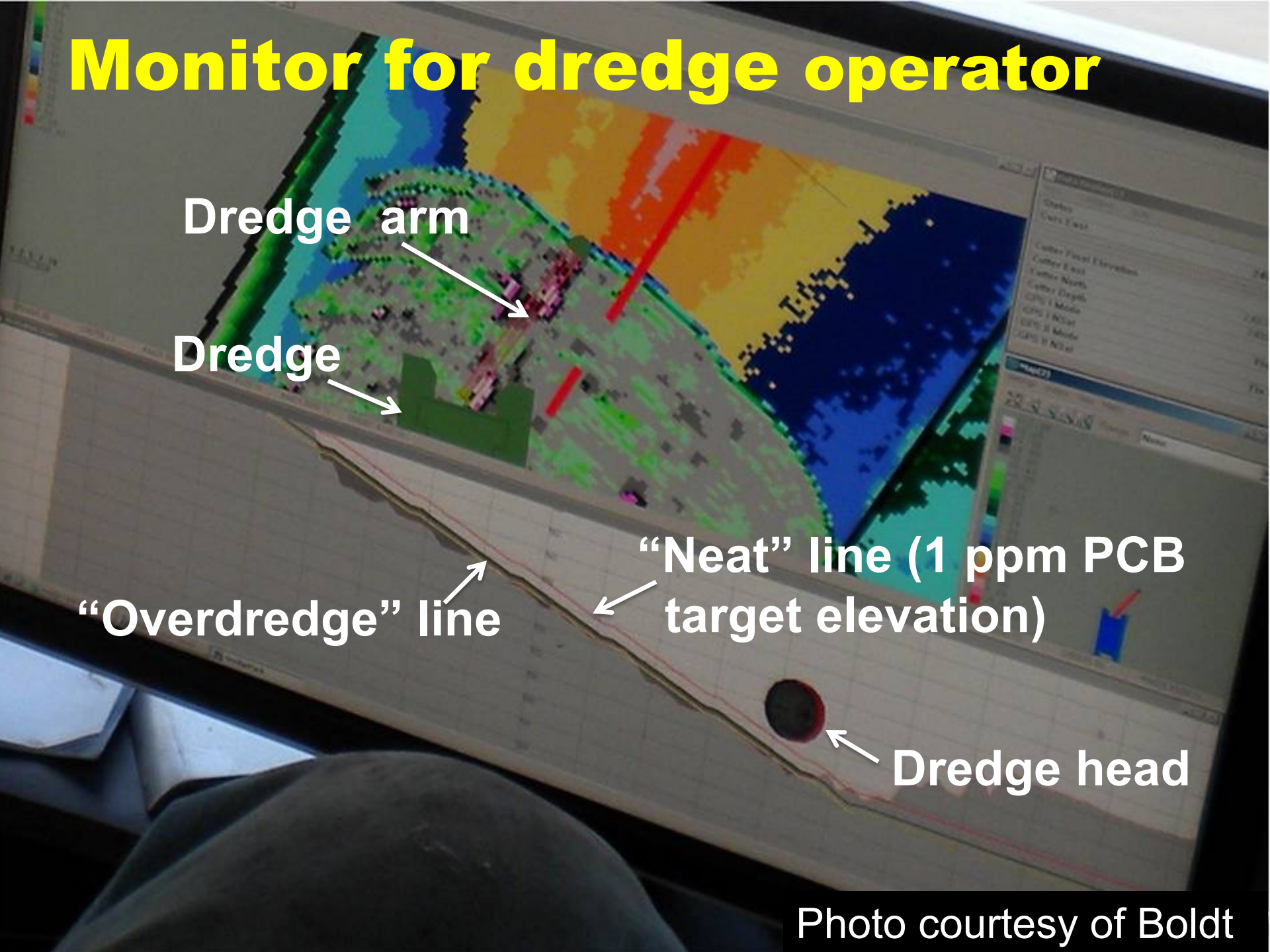
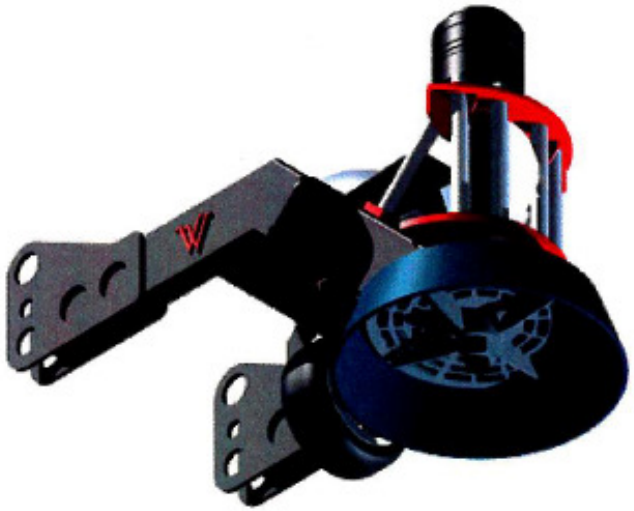


Photo courtesy of Boldt

Vic Vac® dredge

Isometric View From Top



Isometric View From Bottom

- For thin sediment over clay or bedrock
- Lower final PCB concentrations

Courtesy of Brennan

2004 – 2008 dredging upper river

Dredging

Dewatering (geotextile tubes)

Loading

Disposal

Photos courtesy of Boldt

Geotextile tubes

Cap example

7” stone

6” sand

PCB contaminated sediment

Sand cover

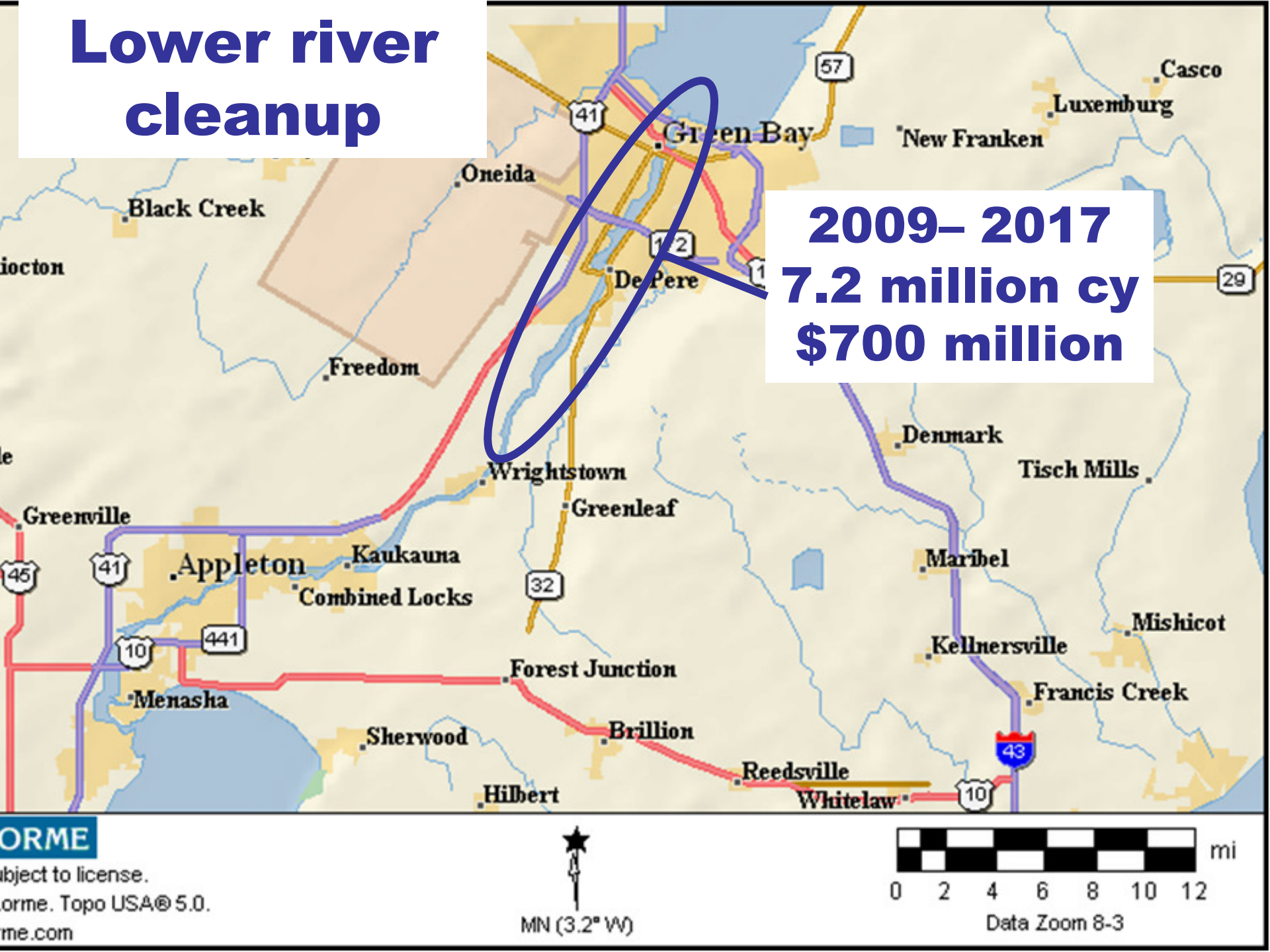
6-inch
sand cover

Mixing
zone

Contaminated
sediment


“Throwing stone”
(cap armor stone)
Photo courtesy of Boldt

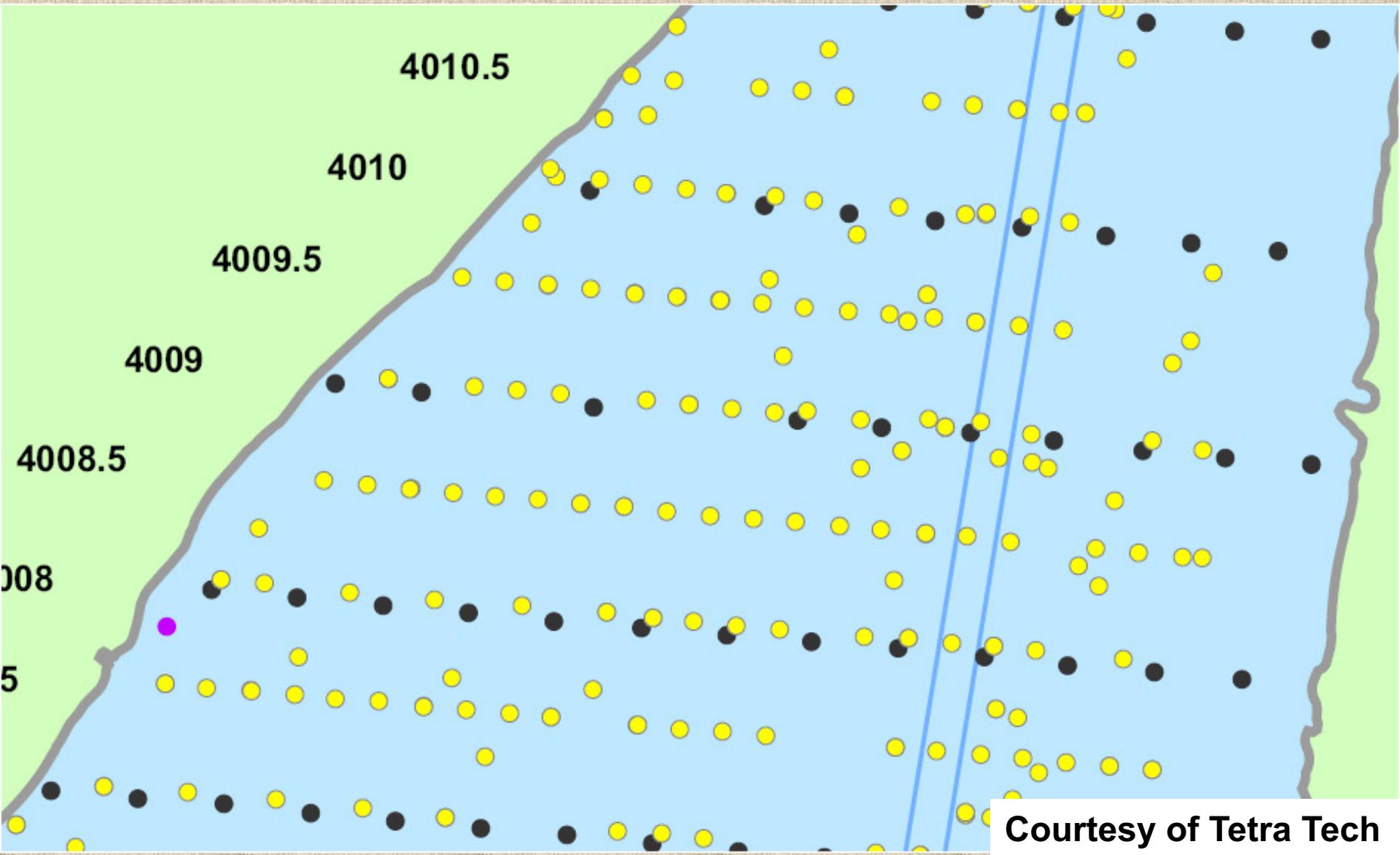
Lower river cleanup



Infill sampling lower river

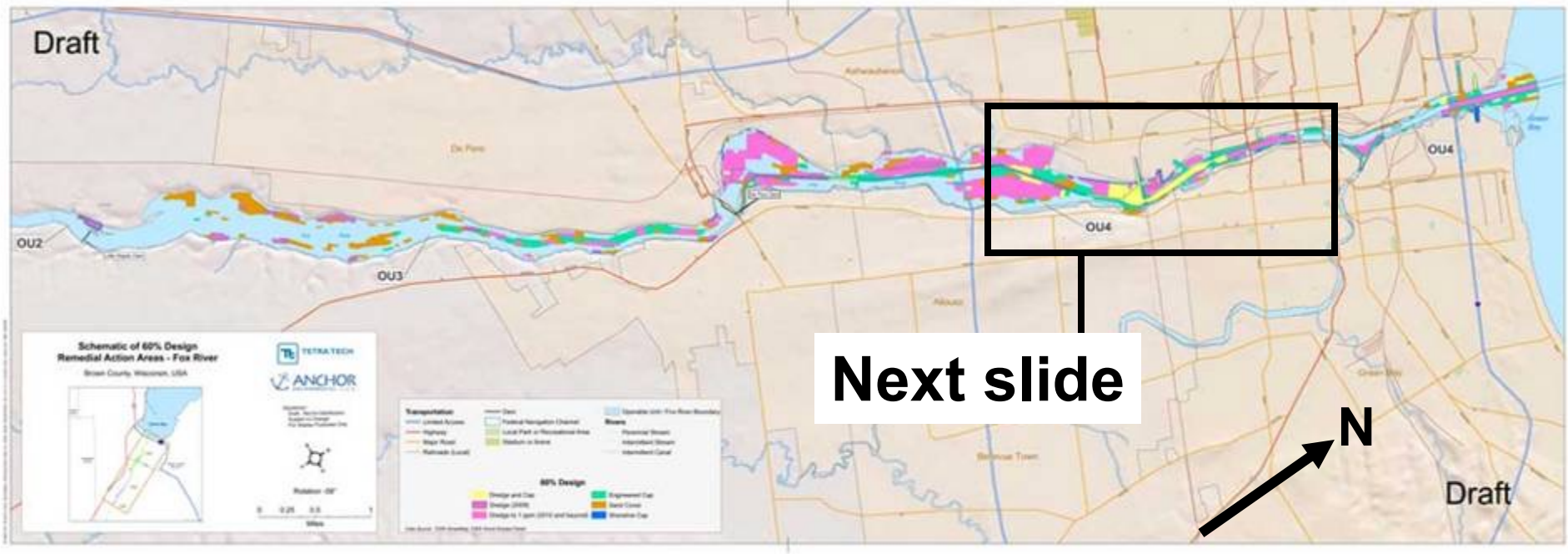
2010 sampling

2004 - 2006 sampling



Courtesy of Tetra Tech

Lower river cleanup actions



Dredging

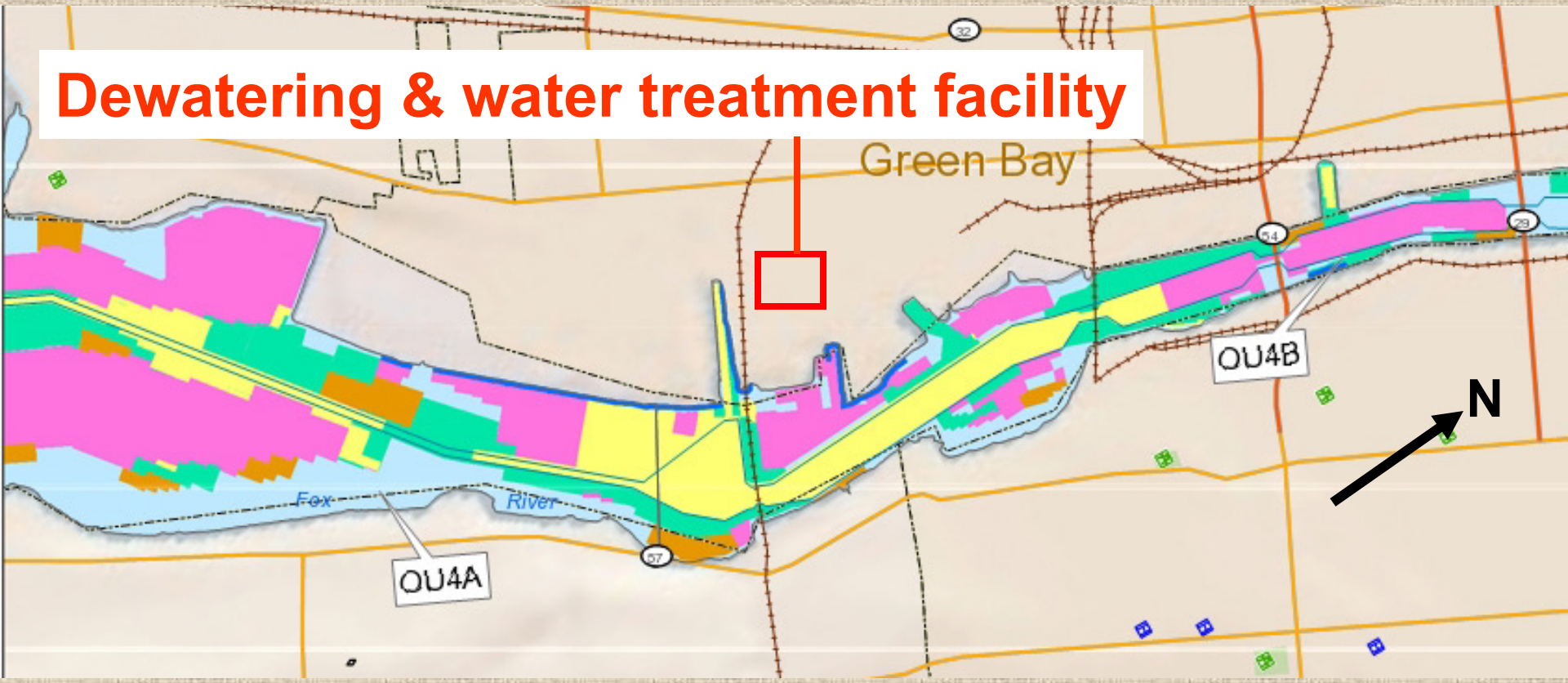
Cap (sand and gravel)

Dredge and Cap

Cover (sand only)

Courtesy of Tetra Tech

Lower river cleanup actions



Dredging

Cap (sand and gravel)

Dredge and cap

Cover (sand only)

Courtesy of Tetra Tech

Dewatering facility for lower river cleanup

From: TetraTech weekly QC report

Dewatering facility for lower river cleanup

Photo courtesy of TetraTech

Multiple hydraualic dredges

Output pipe size	Auger size	Contamination thickness	No. dredges
8” (“small”)	24”	2 - 3 feet	2
12” (“large”)	36”	3 - 12 feet	1

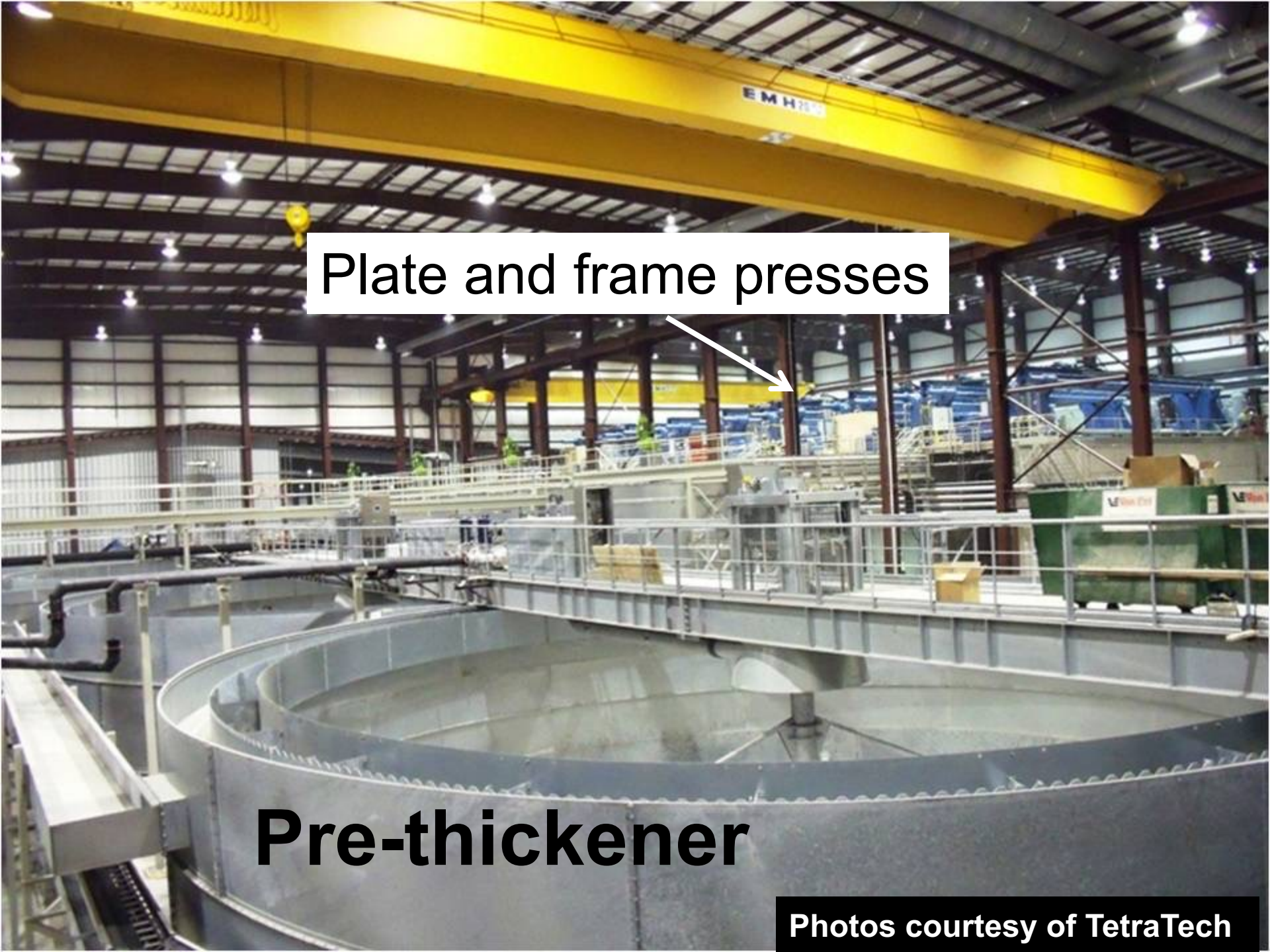


Plate and frame presses
Pre-thickener
Photos courtesy of TetraTech

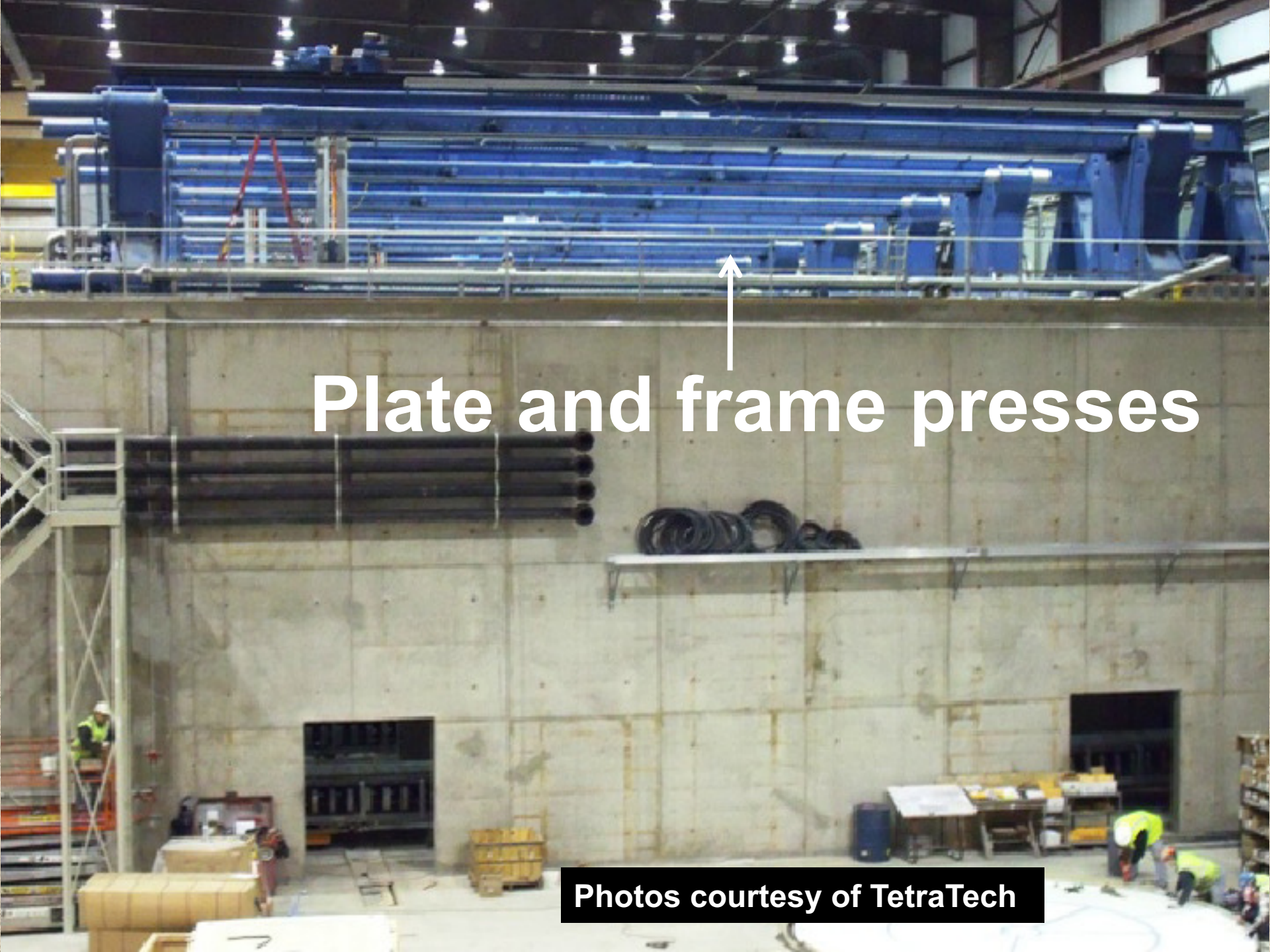


Plate and frame presses
Photos courtesy of TetraTech

Plate and frame presses

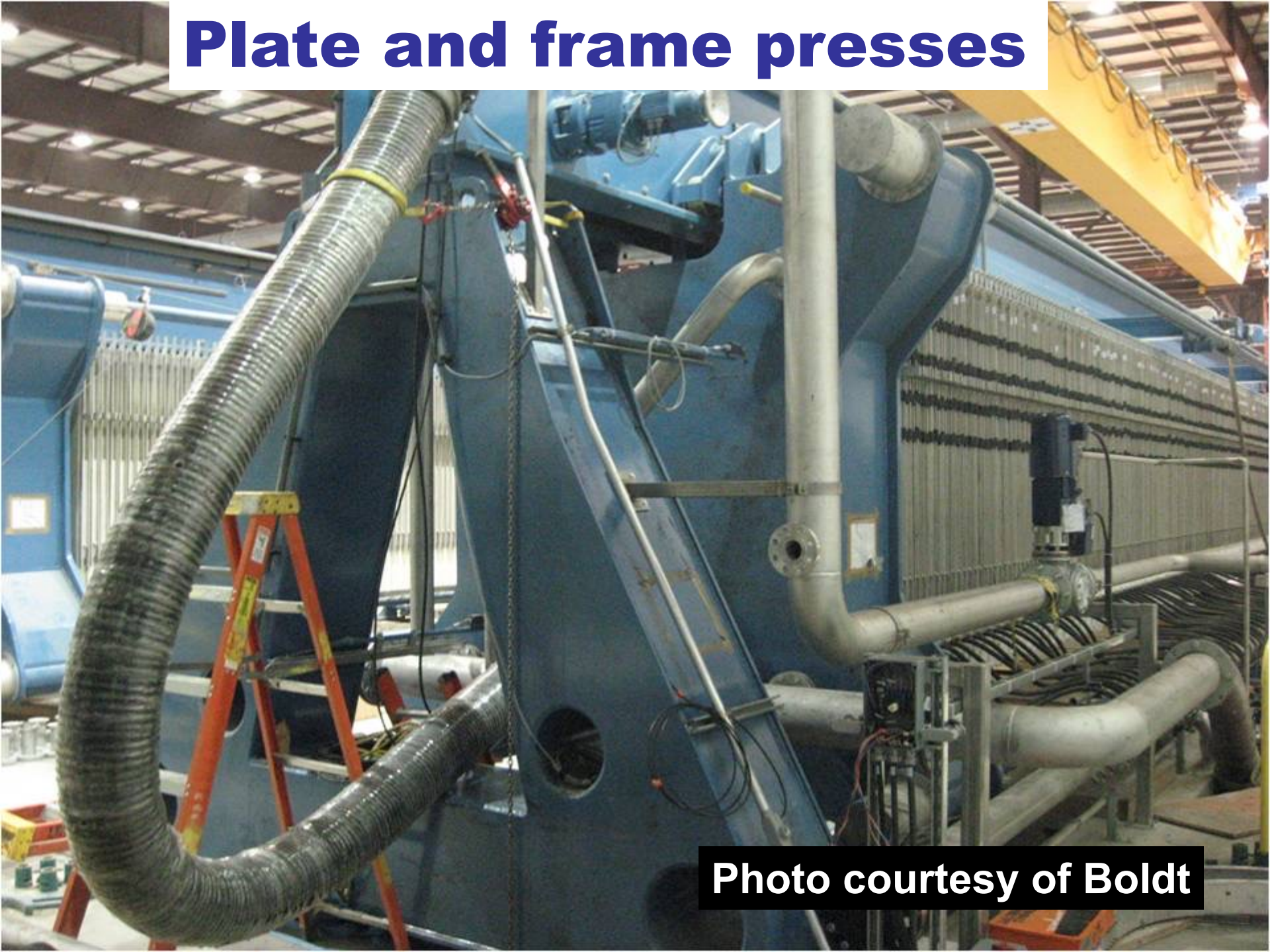


Photo courtesy of Boldt

Dewatering plant monitors

Photo courtesy of Boldt

Sediment storage area

Green Bay Press Gazette photo

Pipeline to river for treated water

Green Bay Press Gazette photo

Air filters

Photo courtesy of Boldt

Sediment disposal

Photo courtesy of Boldt

"Beneficial re-use" of sand

2010: 35,000 tons of sand of 300,000 tons sediment - roadway construction

Possible opportunity	Description of use	Estimated PCB concentrations
Bayport disposal facility	Construction	≤ 1 ppm
Landfill	Construction	≤ 5 ppm
Roadways	**Construction**	**≤ 1ppm**
Mines	Reclamation	≤ 0.25 ppm
Upland	Construction for non-residential uses	≤ 1ppm

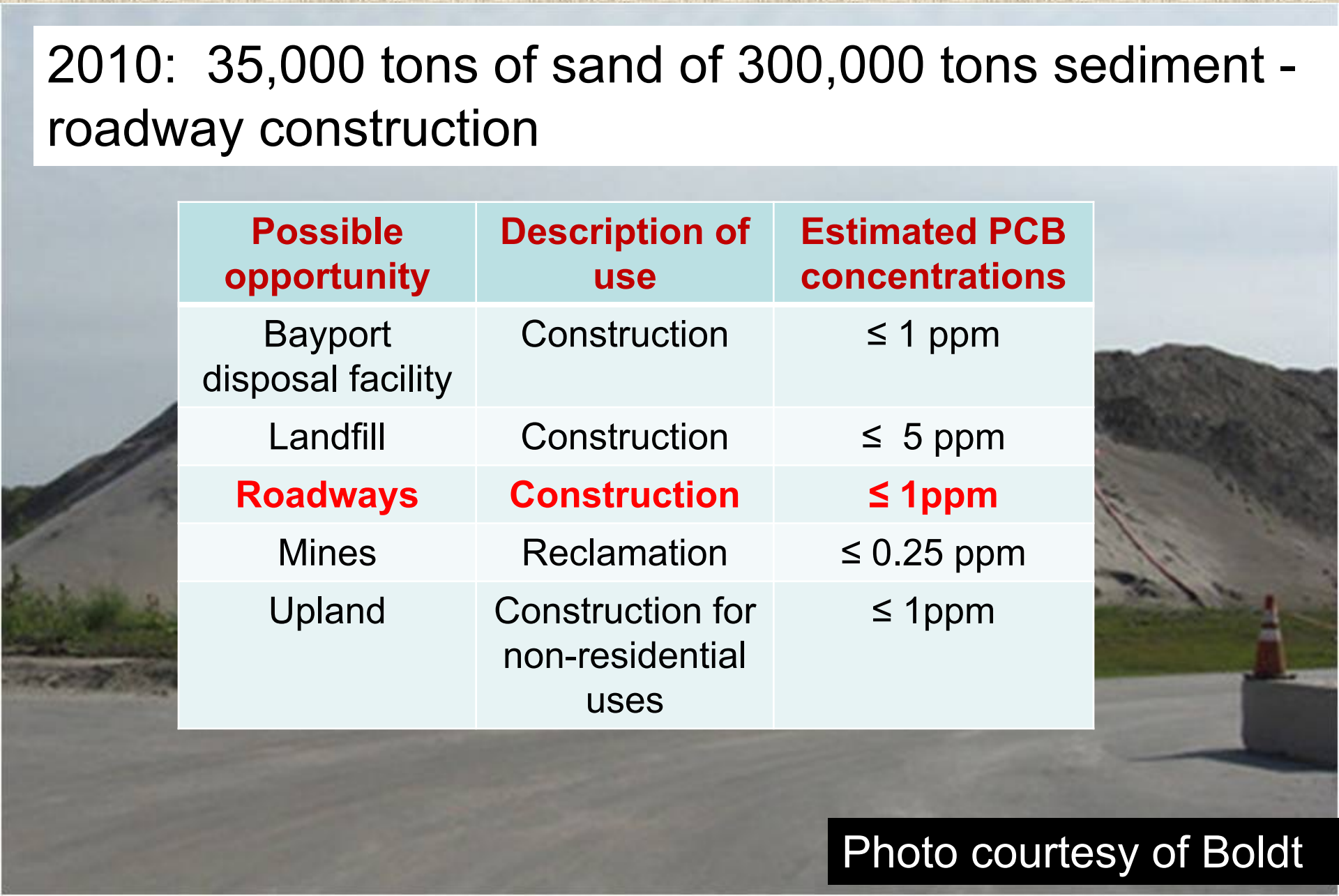


Photo courtesy of Boldt

Progress

River reach & Phase		Start date	Completion date	Volumes addressed (cubic yards)
Upper river		2004	May 2009	750,000
Lower river	Phase 1	2007	2011	160,000
	Phase 2	2009	2017	7,040,000
TOTAL				7,950,000

2009 - 2010: 1,200,000 cy dredged

Fox Cleanup Timeline

Lower river cap/cover

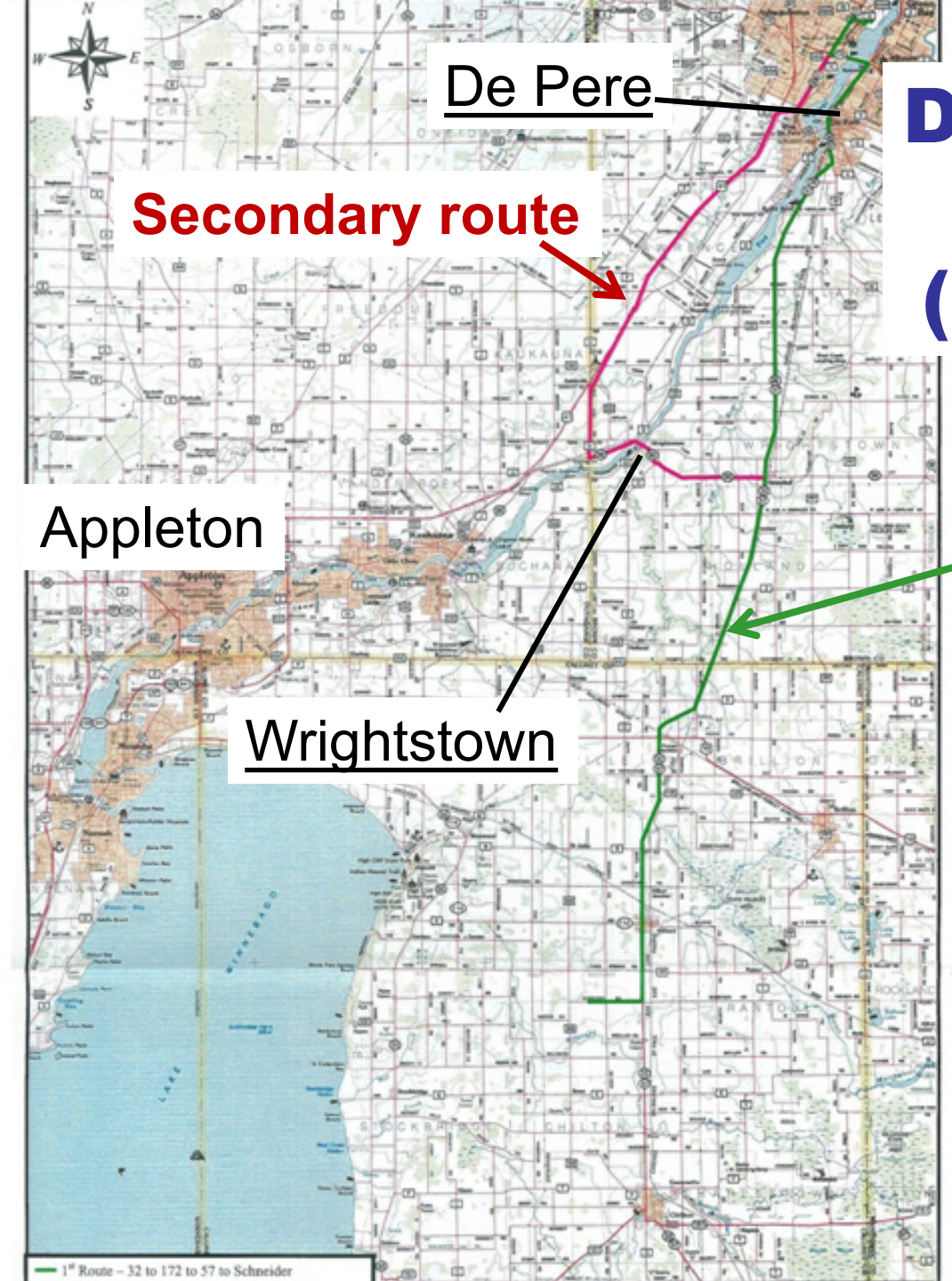
Lower river dredging

Upper river

Issues & Controversies

- Transportation & Disposal
- Corps navigation dredging coordination
- Long-term cap stability & monitoring

Dewatering facility to disposal site (550 trucks/week)



Map courtesy of STS/AECOM

Radar monitoring of trucks

Navigation dredging news coverage

Port of Green Bay concerned that order to halt dredging of PCBs on Fox River will harm shipping

BY TONY WALTER • TWALTER@GREENBAYPRESSGAZETTE.COM • OCTOBER 14, 2009

The U.S. Department of Justice has ordered the Army Corps of Engineers to halt dredging in the 3.3-mile Fox River navigational channel through downtown Green Bay, a move it says will prevent the spread of PCB sediment, but that port officials say could seriously hurt the shipping business.

- More stories, photos on the Fox River cleanup
- Special section: More stories and columns on the environment, plus a daily tip
- Sign up for news, weather, Green Bay Packers and high school sports text alerts.

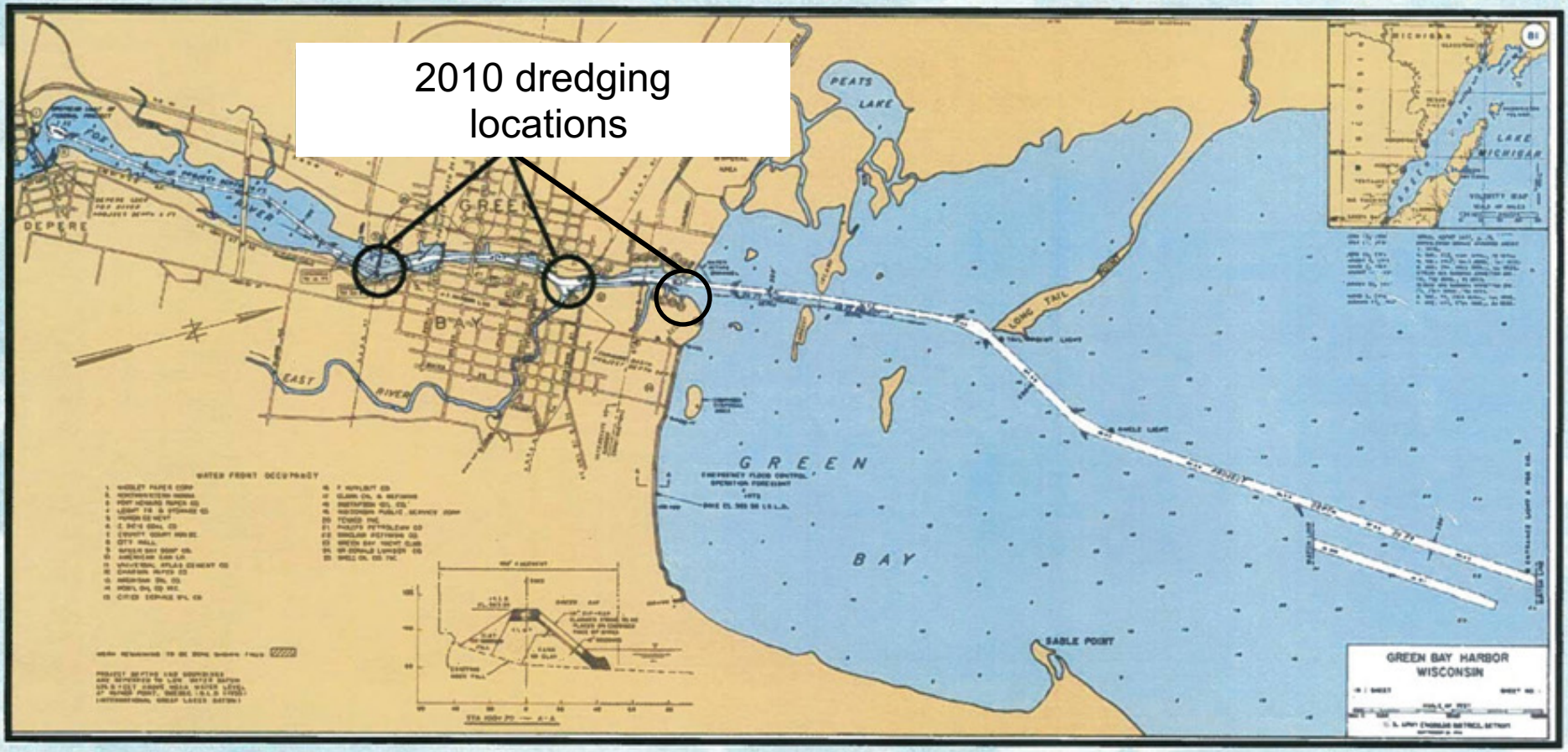
County officials say they also are concerned that the Fox River cleanup project's final design plan, expected to be completed in early 2010, might include placing sand and gravel over contaminated river bottom in the two places where large ships need to turn around, which could hinder their movements.

But Bruce Baker, deputy administrator of the DNR's water division, said

The lakes carrier Arthur M. Anderson unloads coal Thursday at the C. Reiss Coal Co. in Green Bay. H. Marc Larson/Press-Gazette

ON THE WEB

Green Bay Harbor
2010 navigation dredging



BUILDING STRONG®

Environmental cutterhead dredge

Environmental navigation dredge

Photos courtesy of Boldt

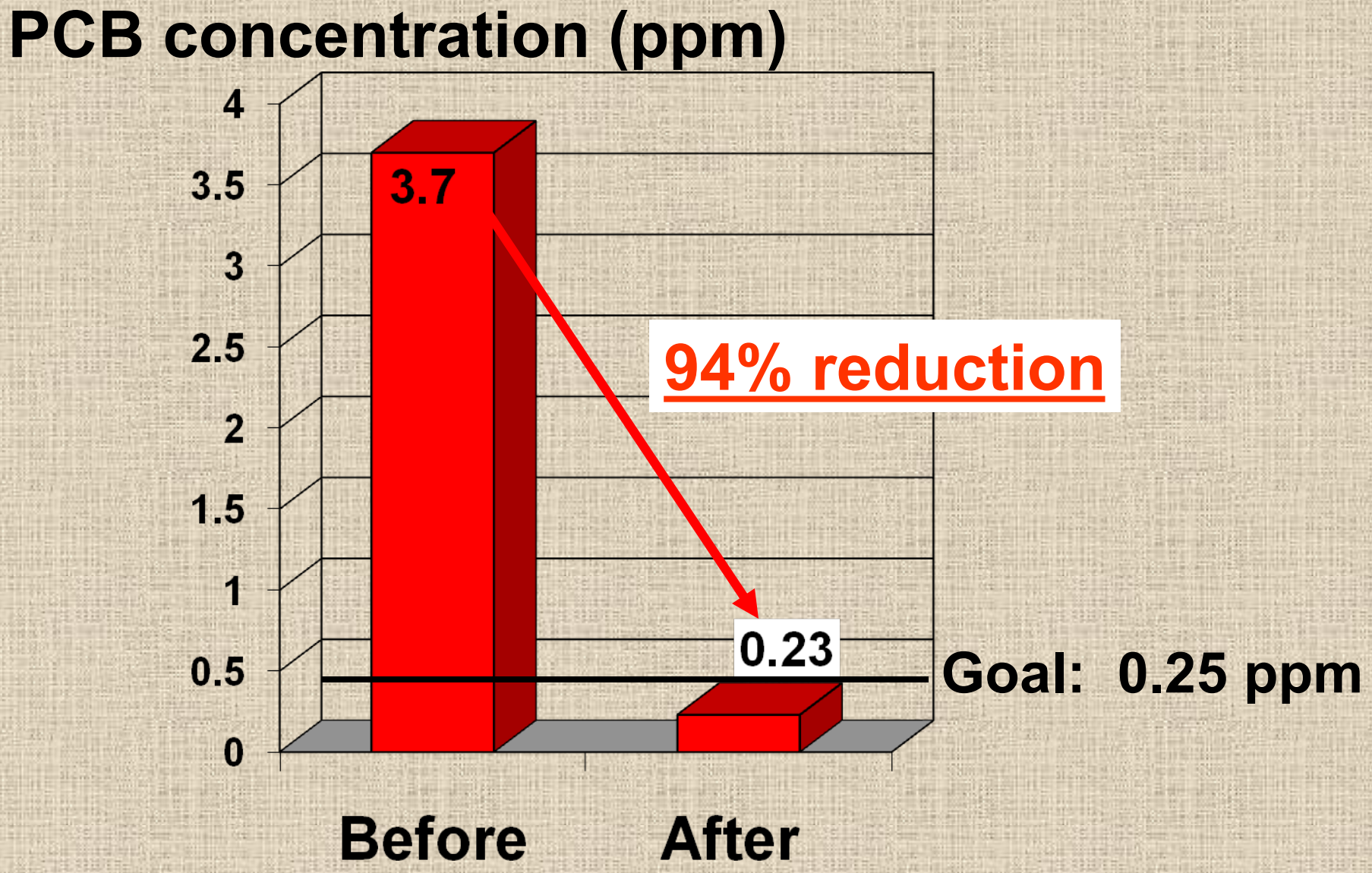
Cap Stability

- Erosion protection: stone and gravel
- No caps in areas of possible ice effects
- Bioturbator effects considered
- Experience on capping projects
- Monitoring and maintenance

Cap Monitoring

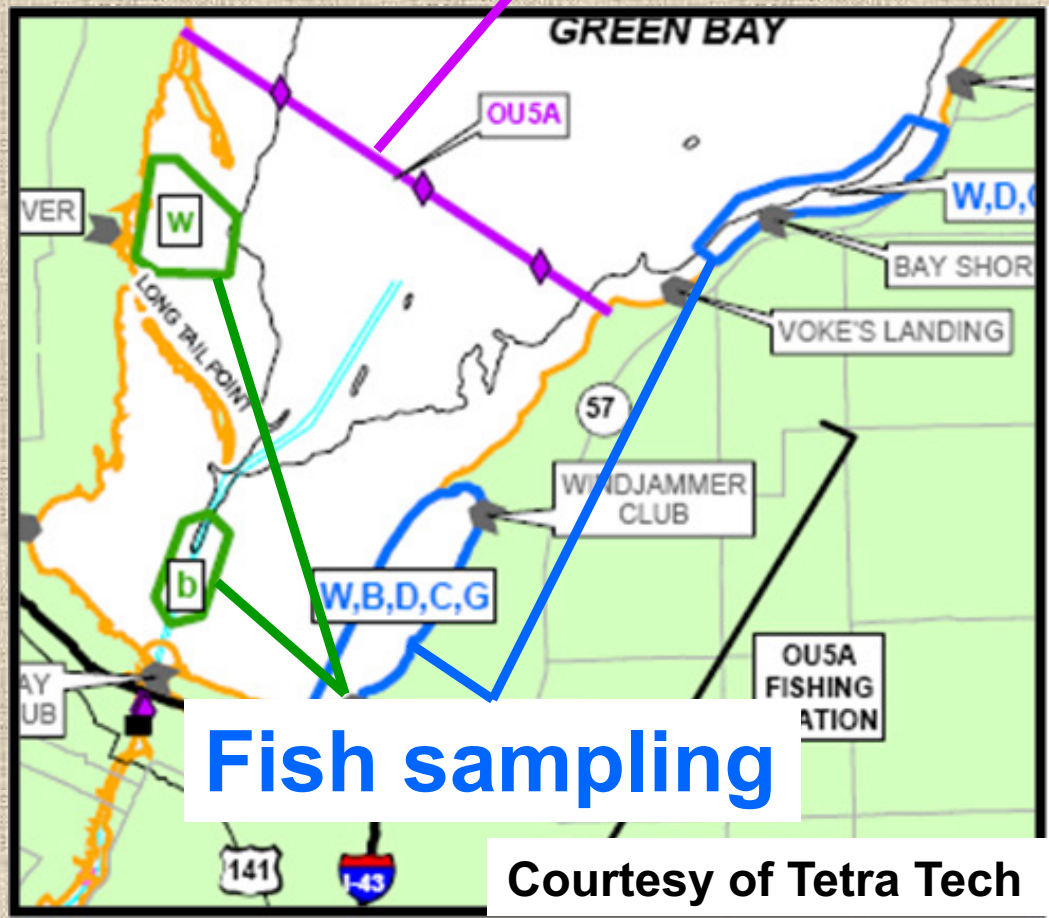
- Geophysical (e.g., bathymetry)
- Cap coring and analysis: ~ 20 locations
- Years 2, 4 and every 5 years
- Trigger events – additional monitoring

Upper river results (SWAC)



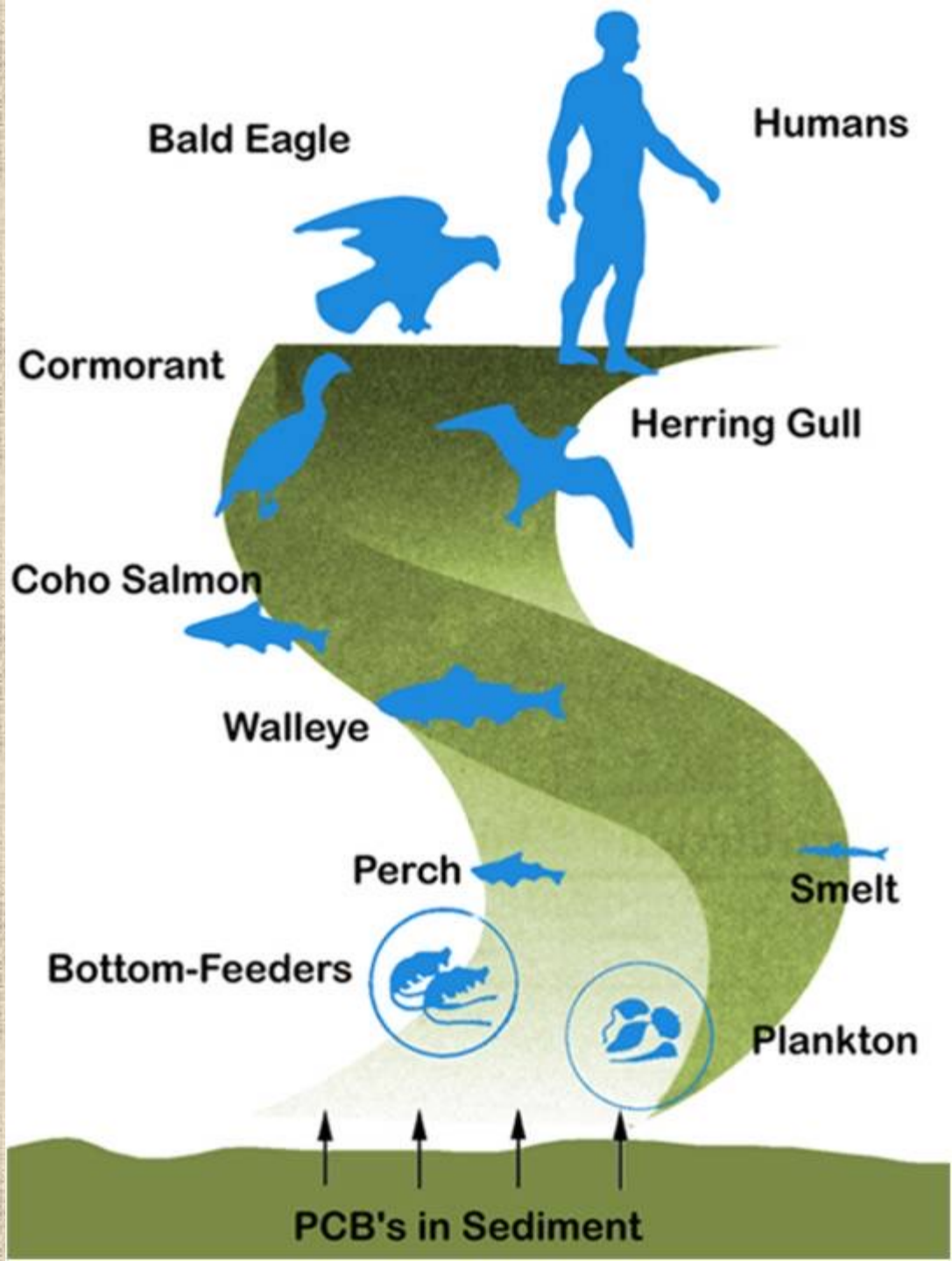
Long-term Environmental Monitoring

- Sediments
- Surface water
- Fish
  - Walleye or Bass
  - Carp or Drum
  - Gizzard Shad



PCBs in foodchain

- Human health
  - Cancer
  - Non-cancer
- Ecosystem




Questions, discussion