Applied Polymer Systems, Inc.
519 Industrial Drive
Woodstock, GA 30189
www.siltstop.com

Removal Efficiencies of a Polymer Enhanced Dewatering System

W. Gowdy, S.R. Iwinski

9th Biennial Conference on Stormwater Research & Watershed Management May 2nd-3rd

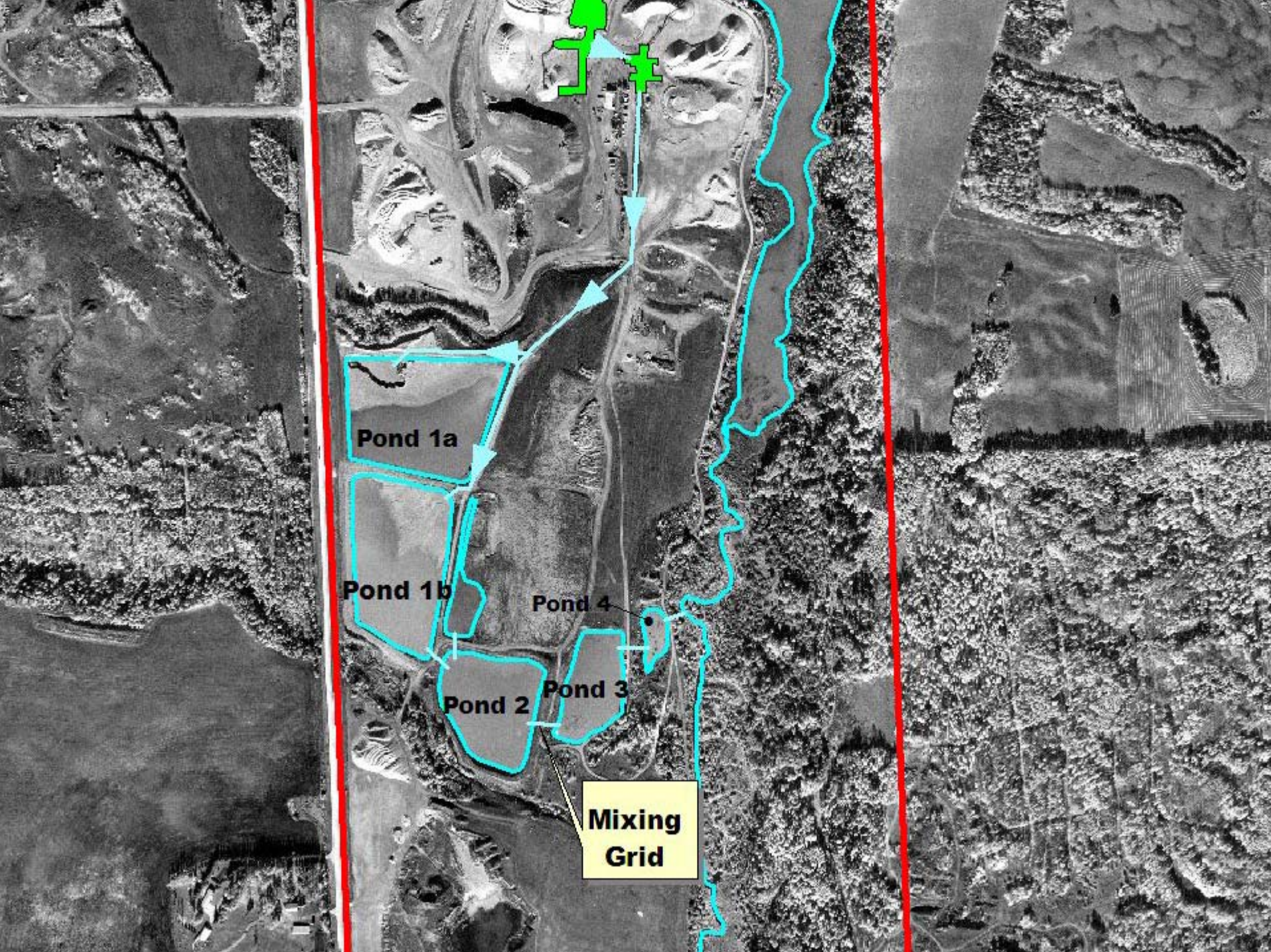
University of Central Florida

University of Central Florida Stormwater Management Academy "Managed Stormwater is Good Water"

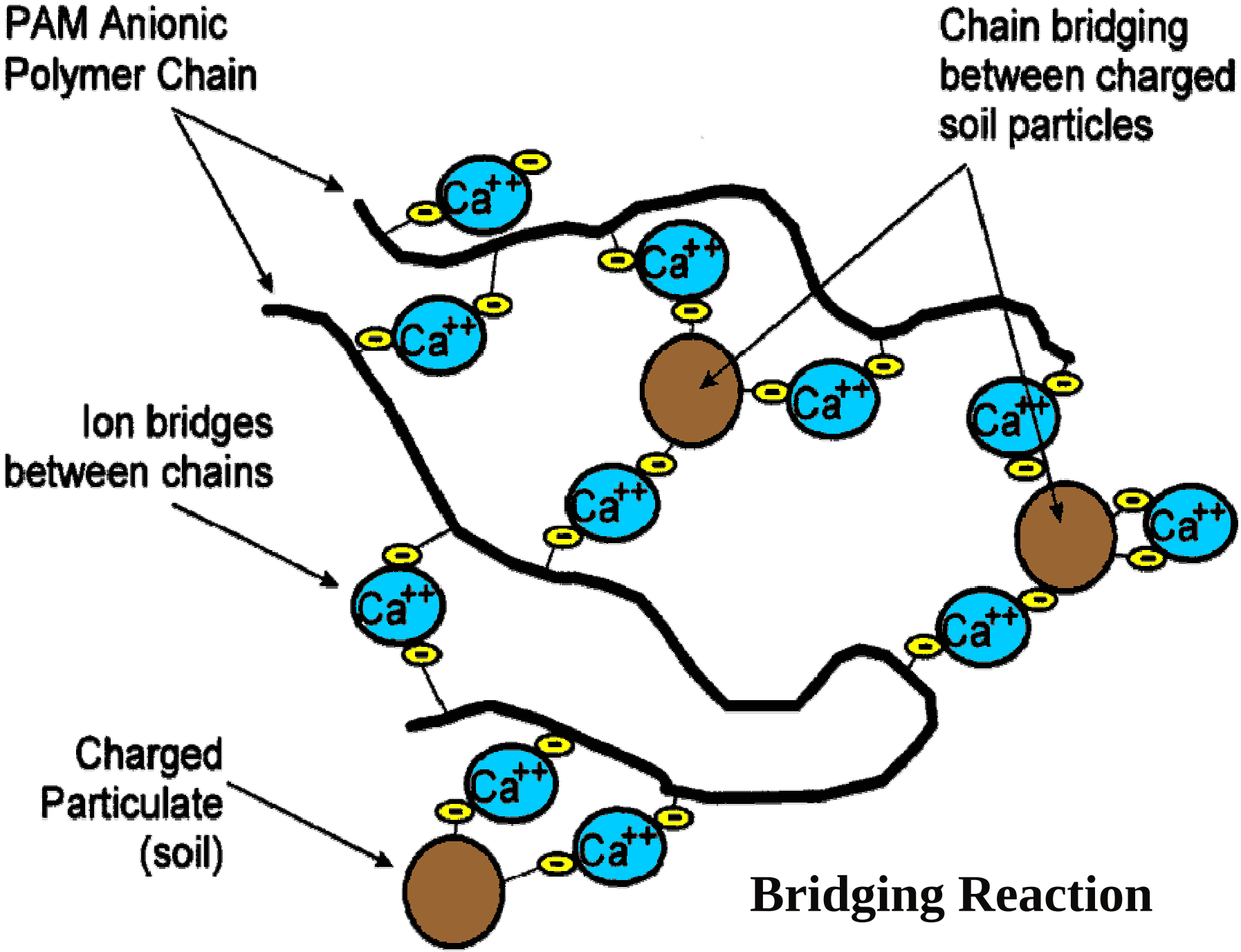
Senior Associate

H2O4U

Site terrain in Western Canada

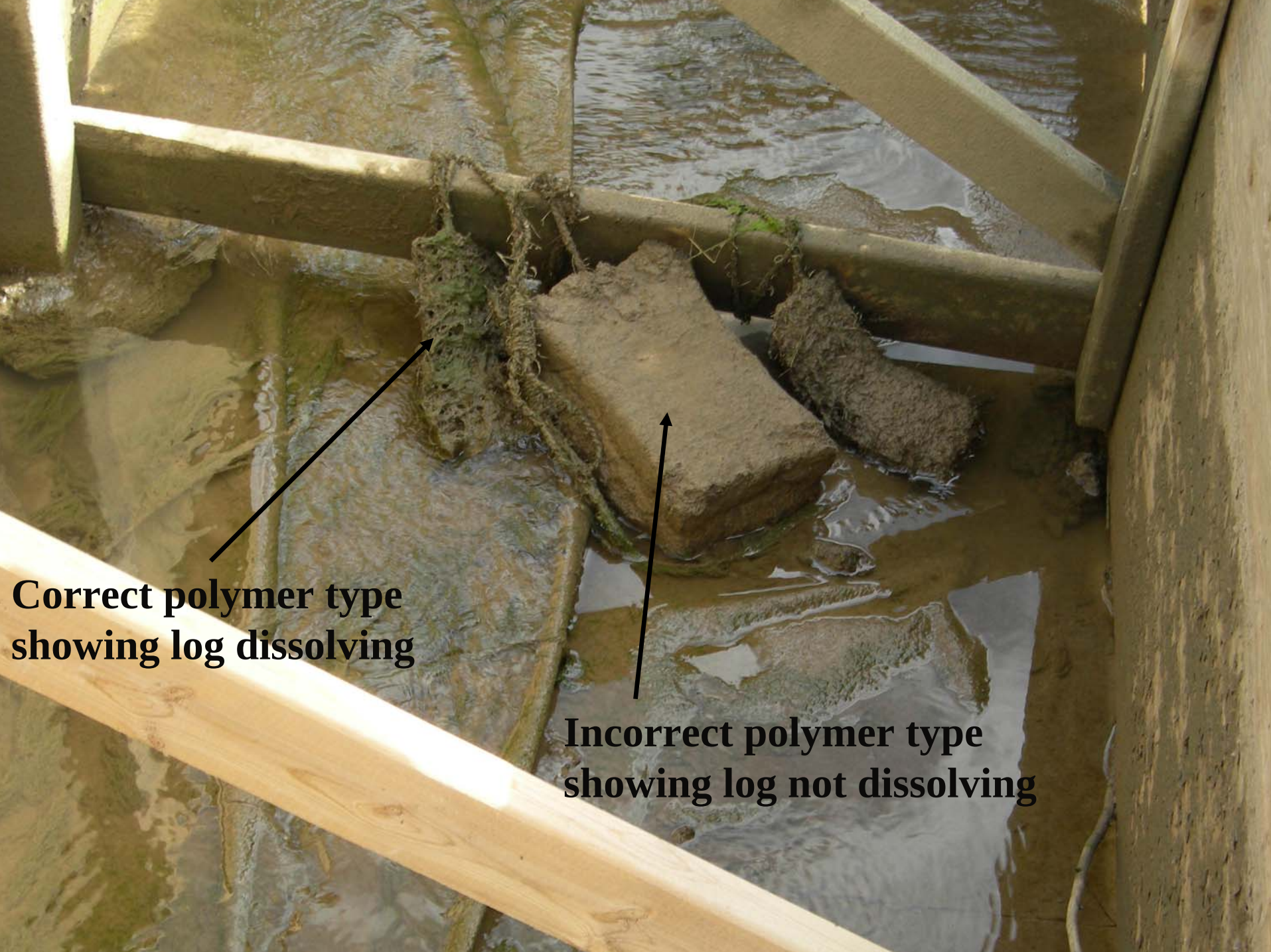

Pond 1a
Pond 1b
Pond 4
Pond 3
Pond 2
Mixing
Grid

Pond showing elevated colloidal clay content



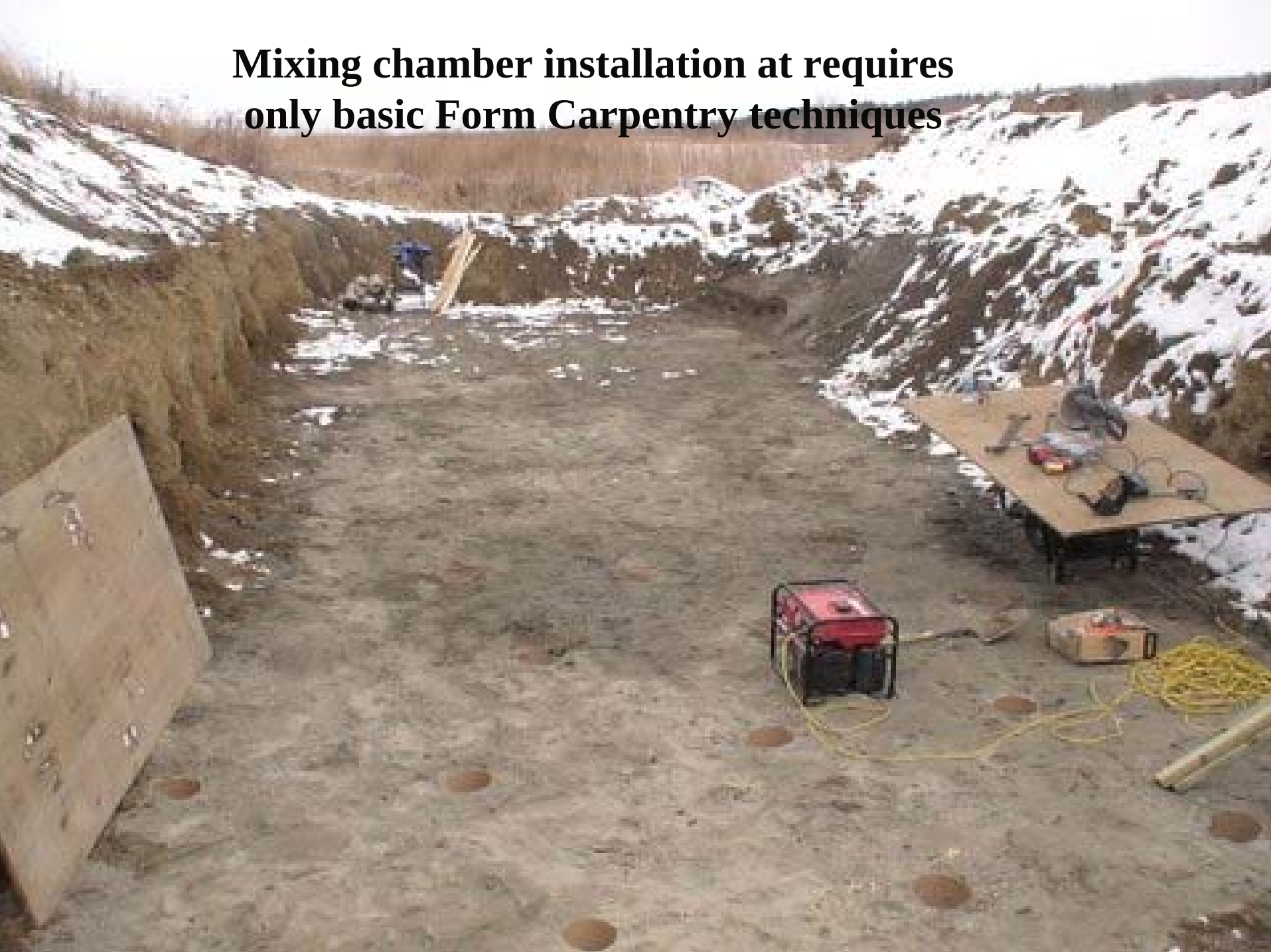
Bridging Reaction

Blinding of polymer log due to high CaCo3 concentration


Correct polymer type
showing log dissolving
Incorrect polymer type
showing log not dissolving

Mixing chamber installation at -15 Celsius

Mixing chamber installation at requires only basic Form Carpentry techniques



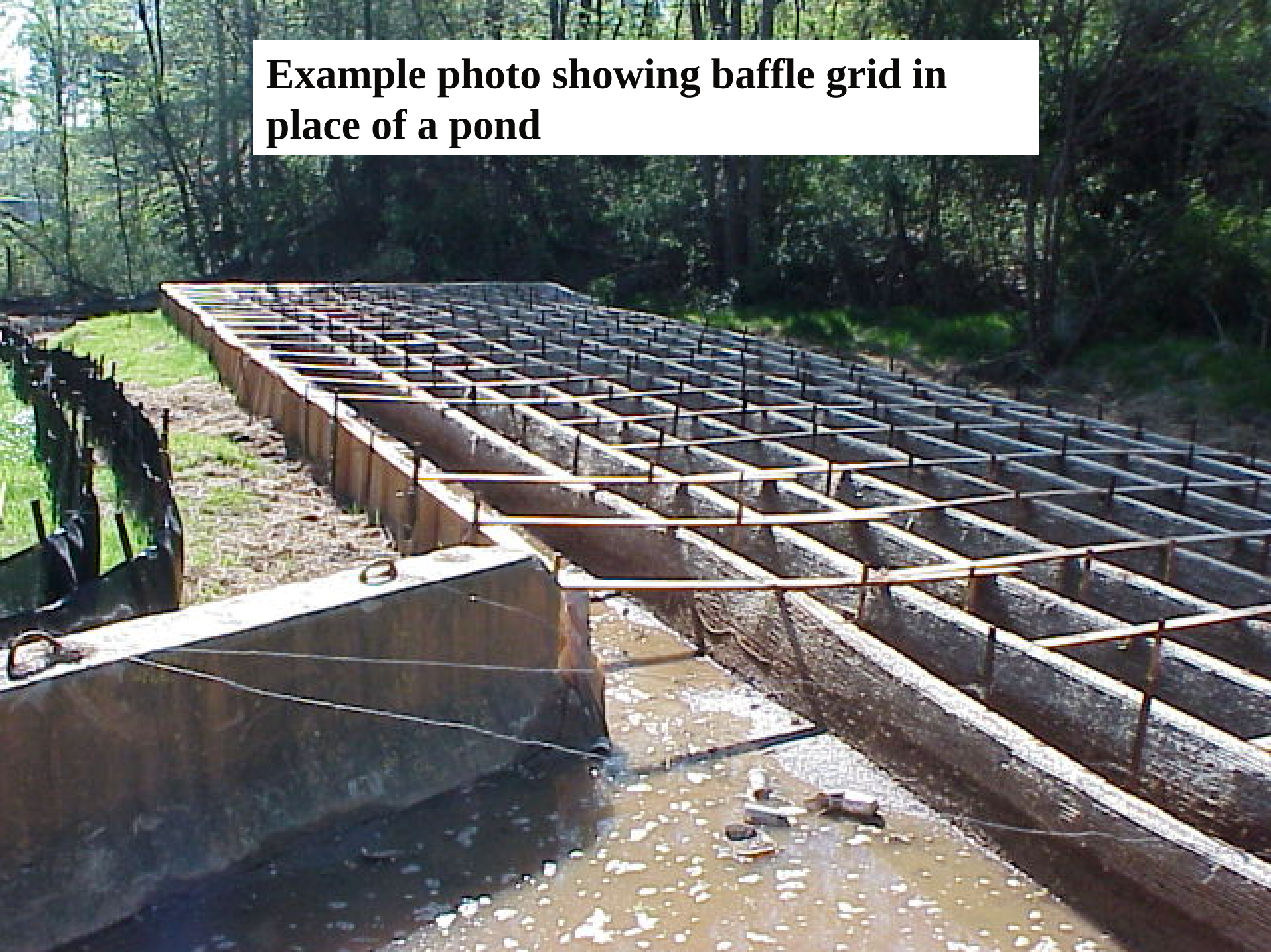
Mixing chamber must be installed level

Back fill can wait until spring


Installation was based on gravity flow


Example photo with polymer logs in place


Example photo showing mixer + plunge pool and Baffle grid for particle collection when ponds are not available


Example photo showing baffle grid in place of a pond

Applied Polymer Systems, Inc.
519 Industrial Drive
Woodstock, GA 30189
www.siltstop.com

Metal Removal Data

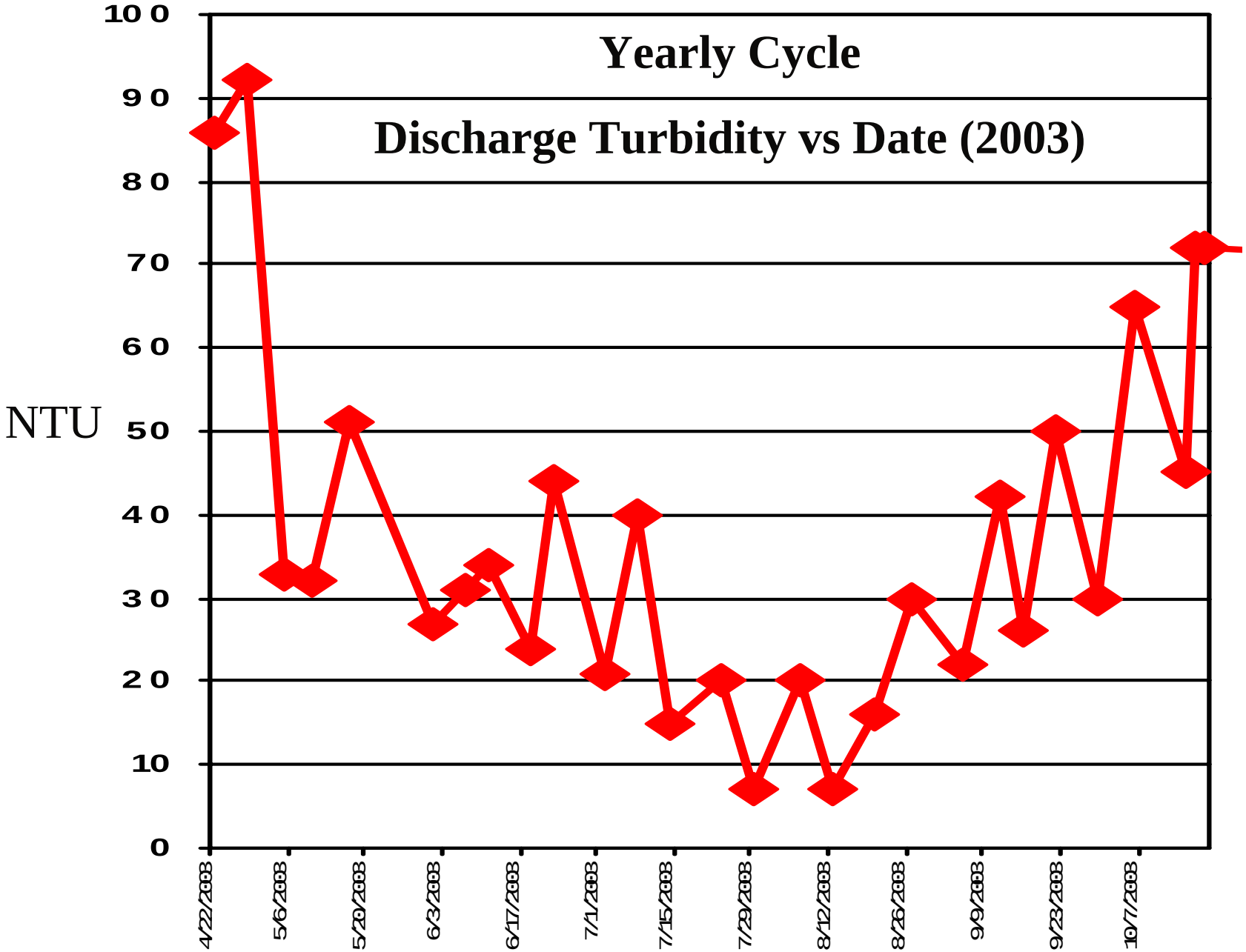
Floc Logs®

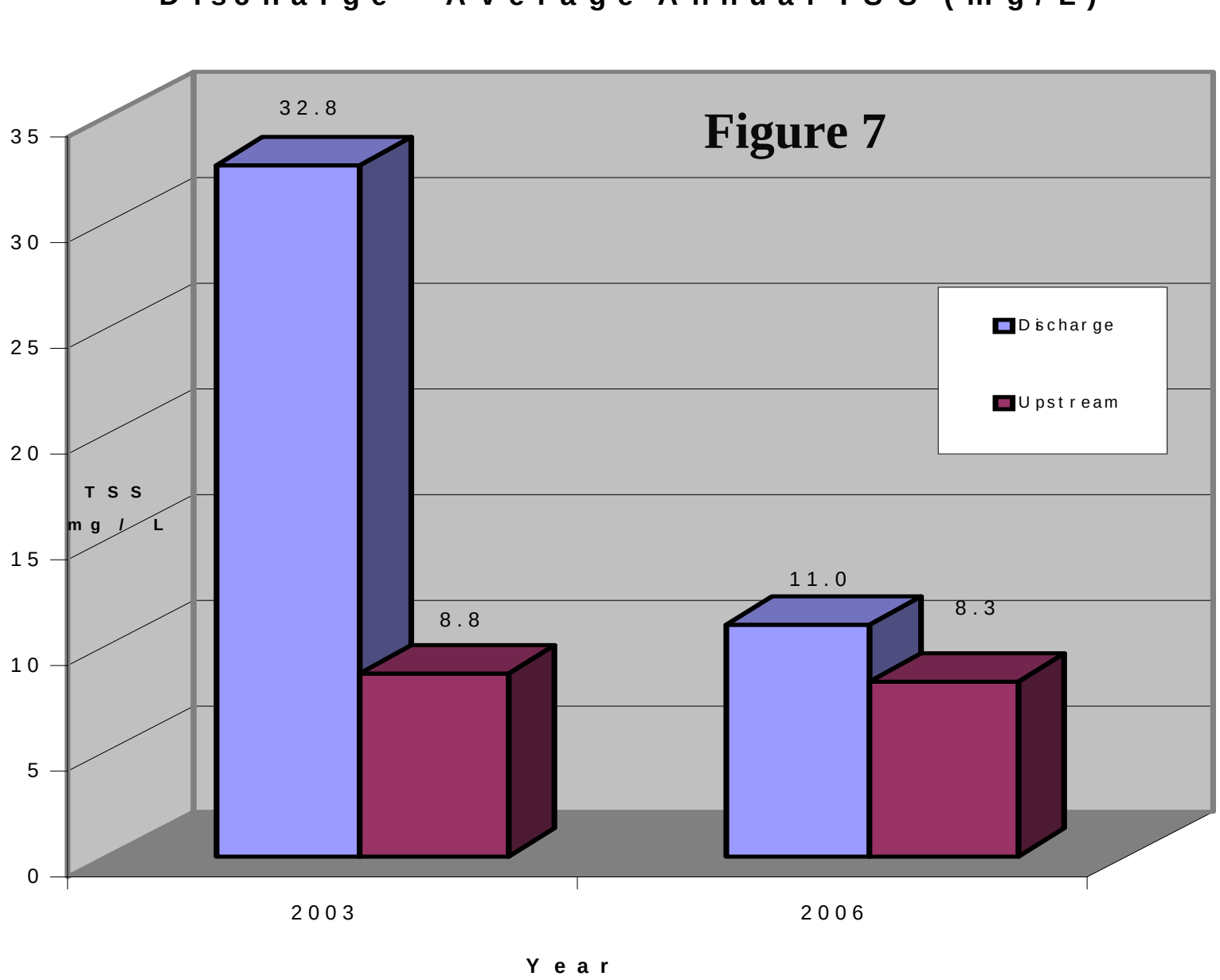
University of Central Florida

University of Central Florida
Stormwater Management Academy
"Managed Stormwater is Good Water"

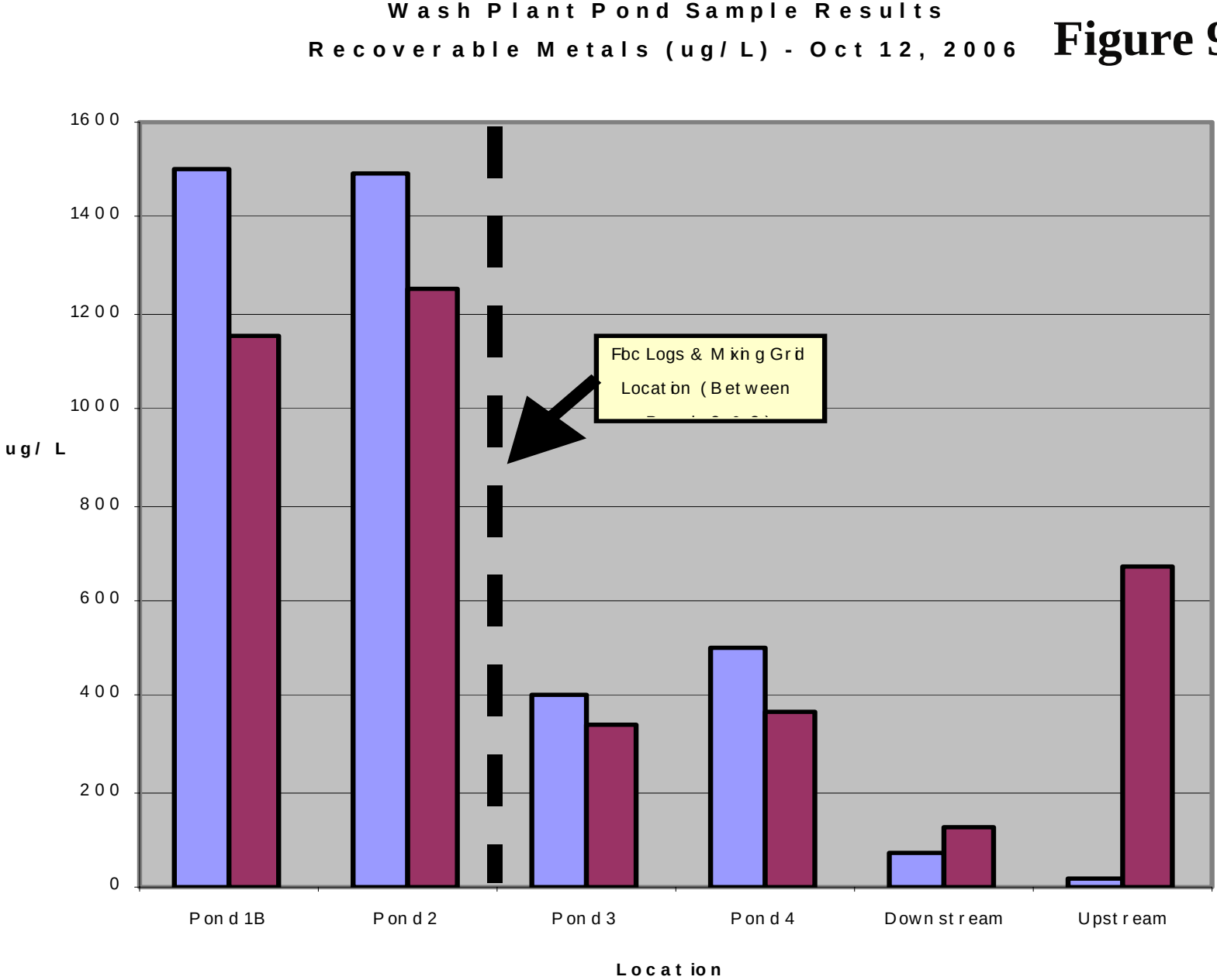
Senior Associate

H2O4U


Yearly Cycle
Discharge Turbidity vs Date (2003)
NTU
100
90
80
70
60
50
40
30
20
10
0
4/22/2003
5/6/2003
5/20/2003
6/3/2003
6/17/2003
7/1/2003
7/15/2003
7/29/2003
8/12/2003
8/26/2003
9/9/2003
9/23/2003
10/7/2003



Average Annual TSS before and after Polacrylamide



Aluminum & Iron Ponds 1-4 Downstream / Upstream

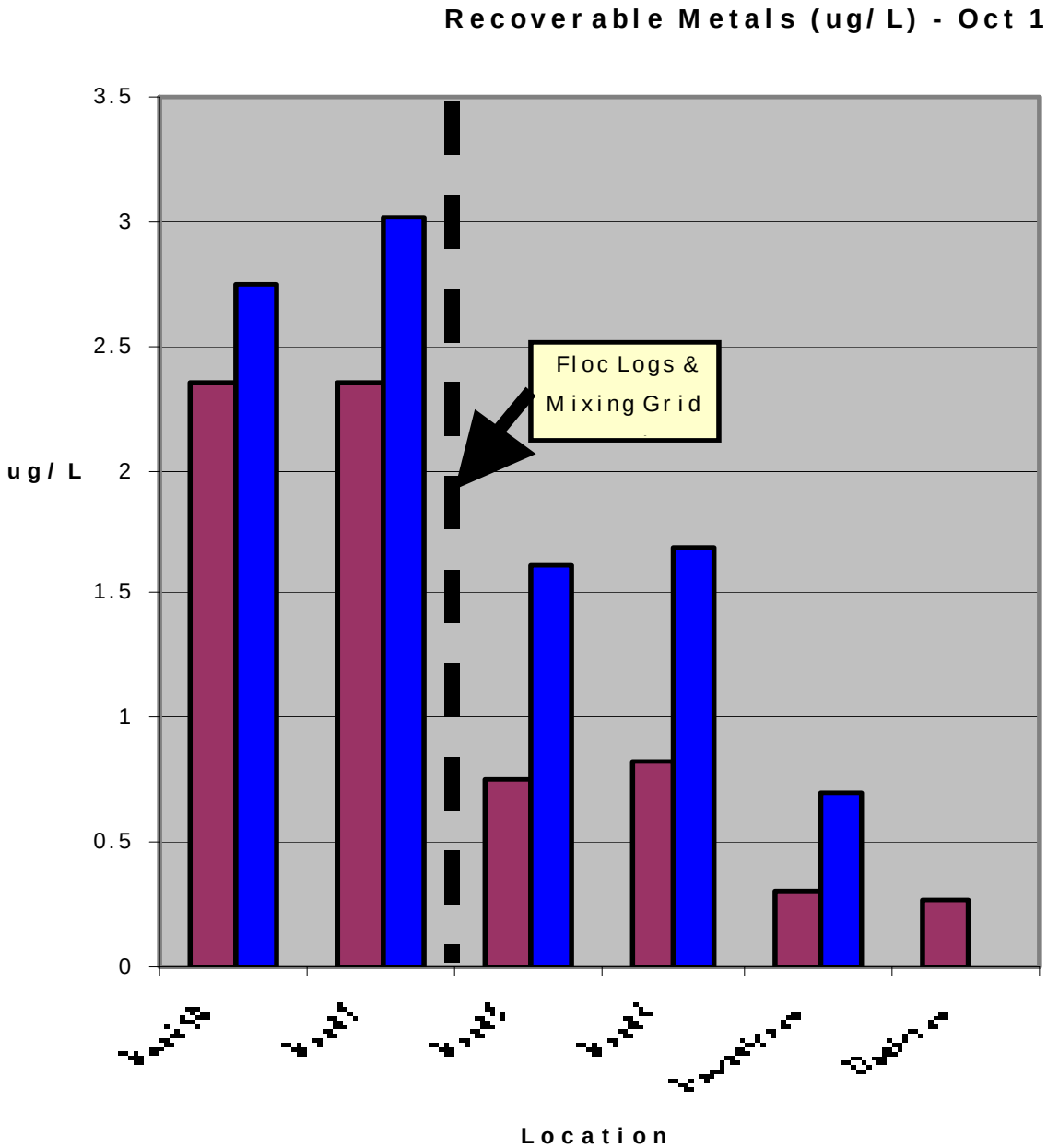
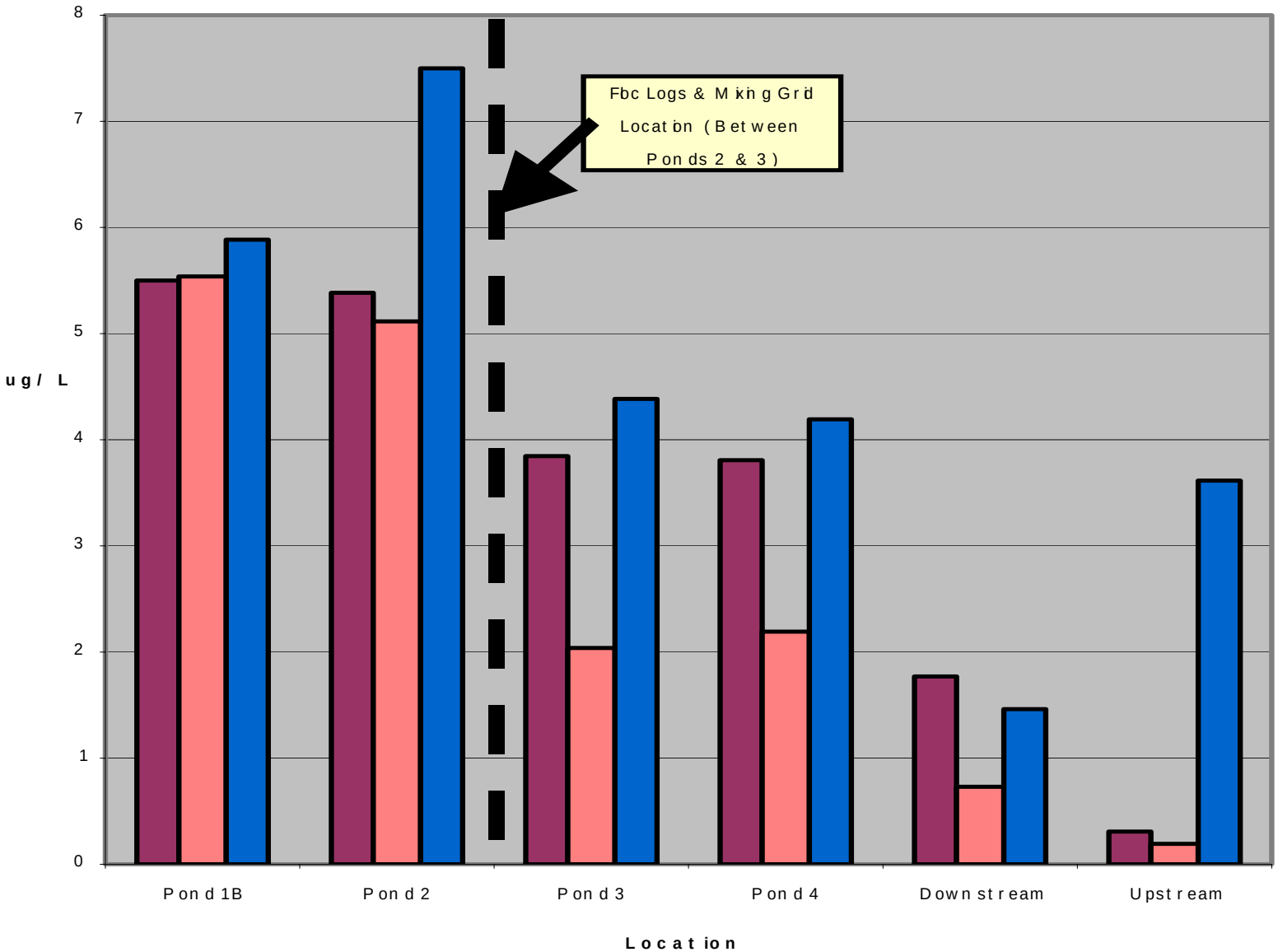


Figure 11

Chromium & Nickel Ponds 1-4 Downstream / Upstream

Wash Plant Pond Sample Results
Recoverable Metals (ug/L) - Oct 12, 2006

Figure 10



Copper, Vanadium & Zinc Ponds 1-4 Downstream / Upstream

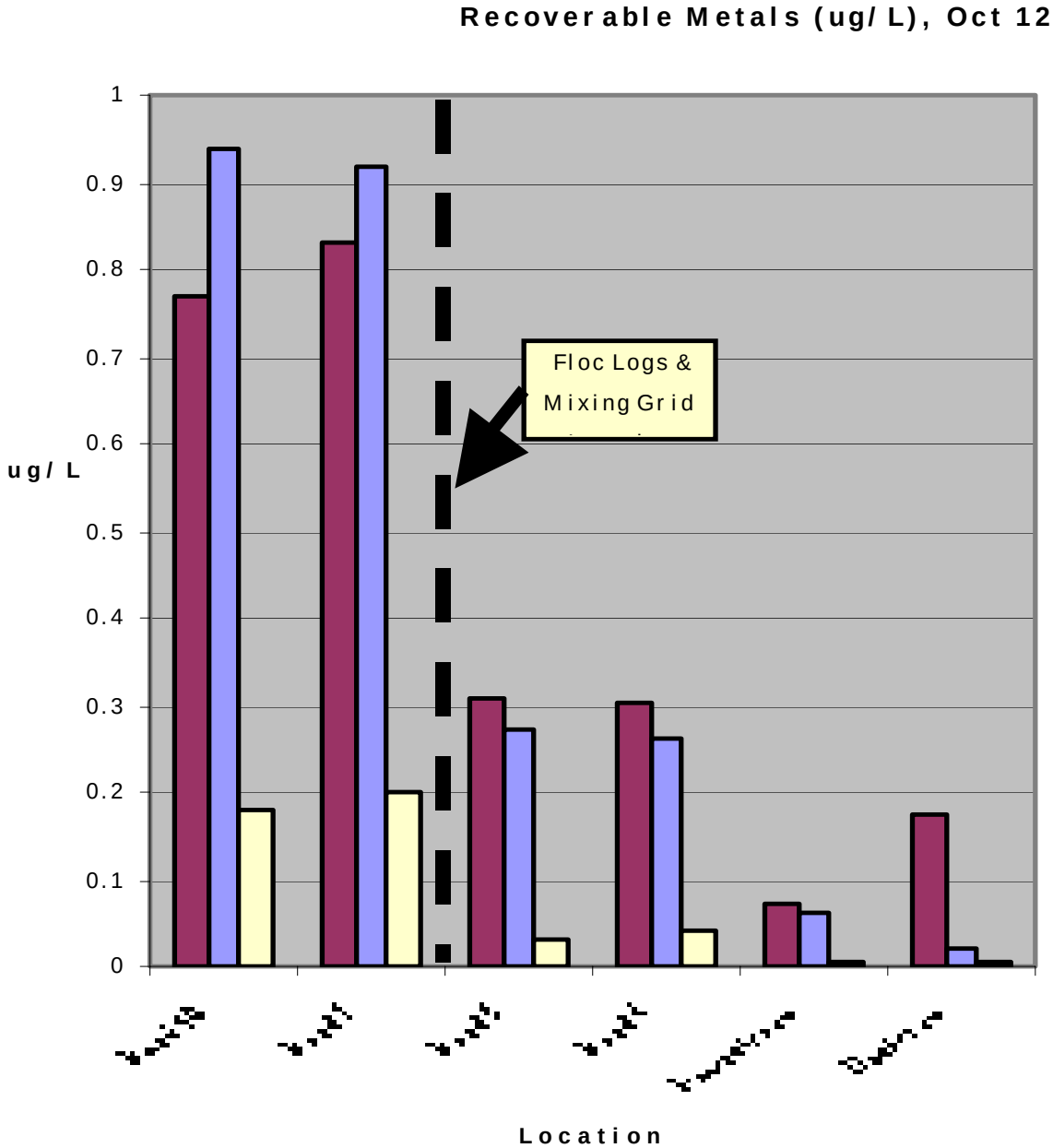
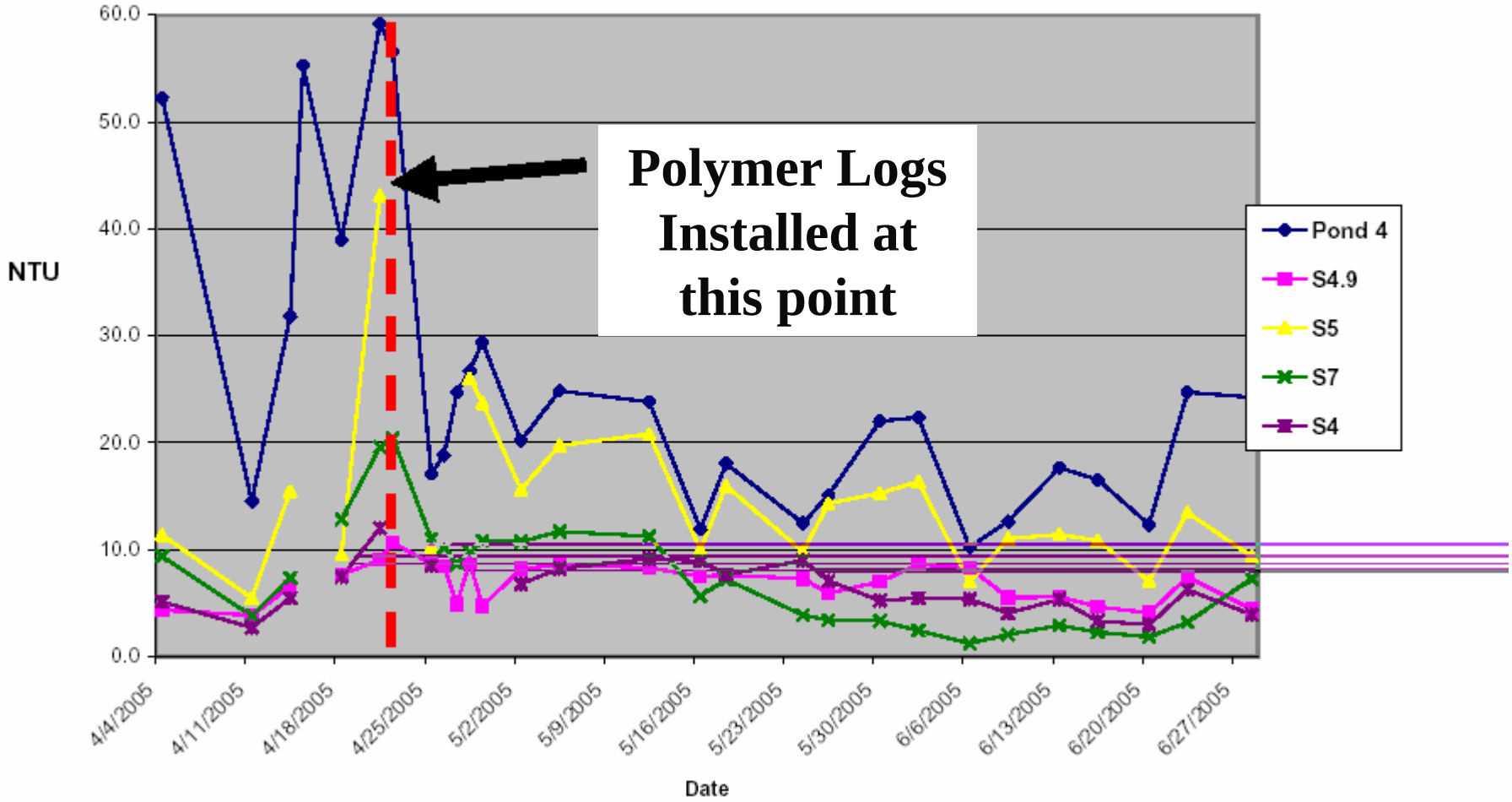
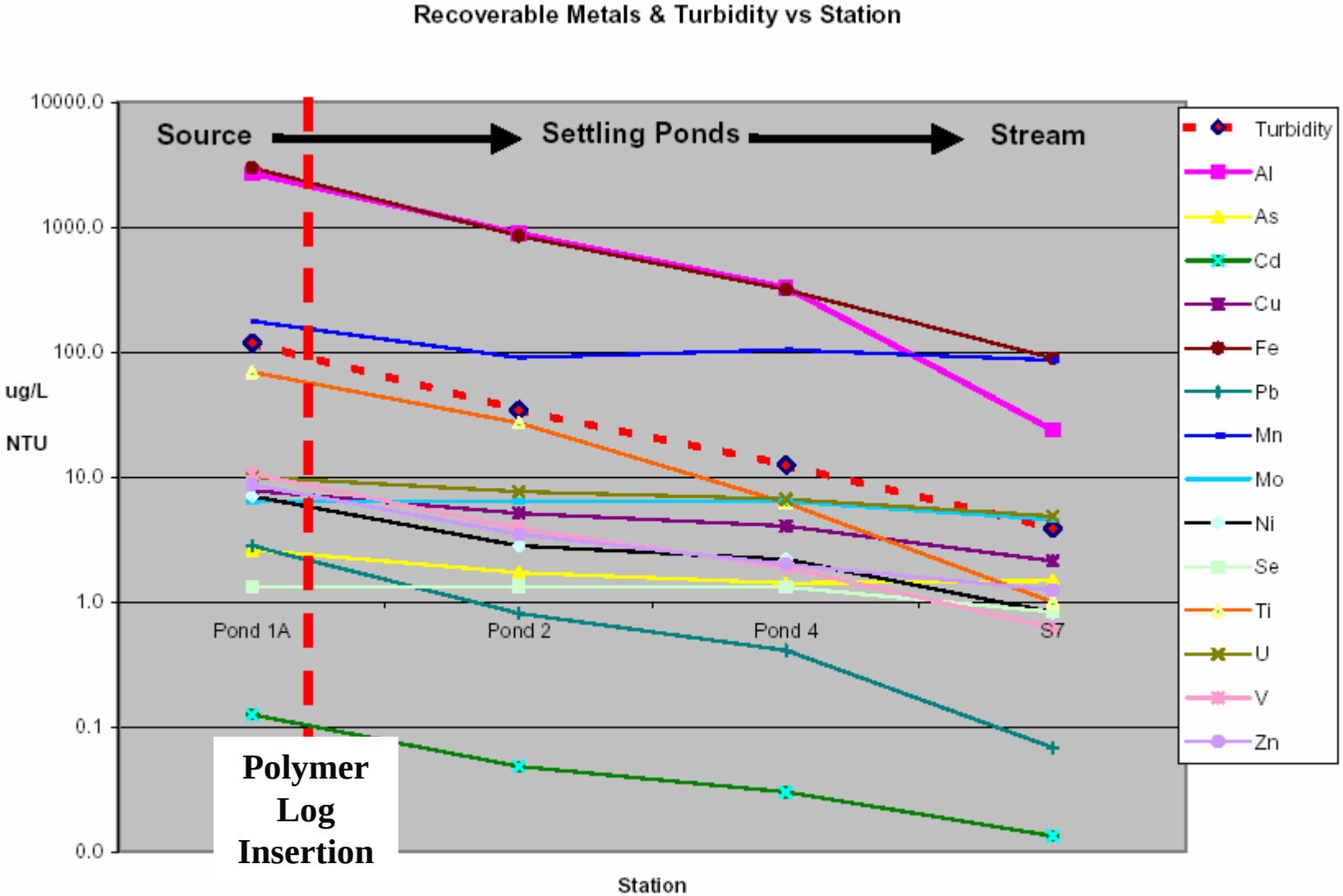


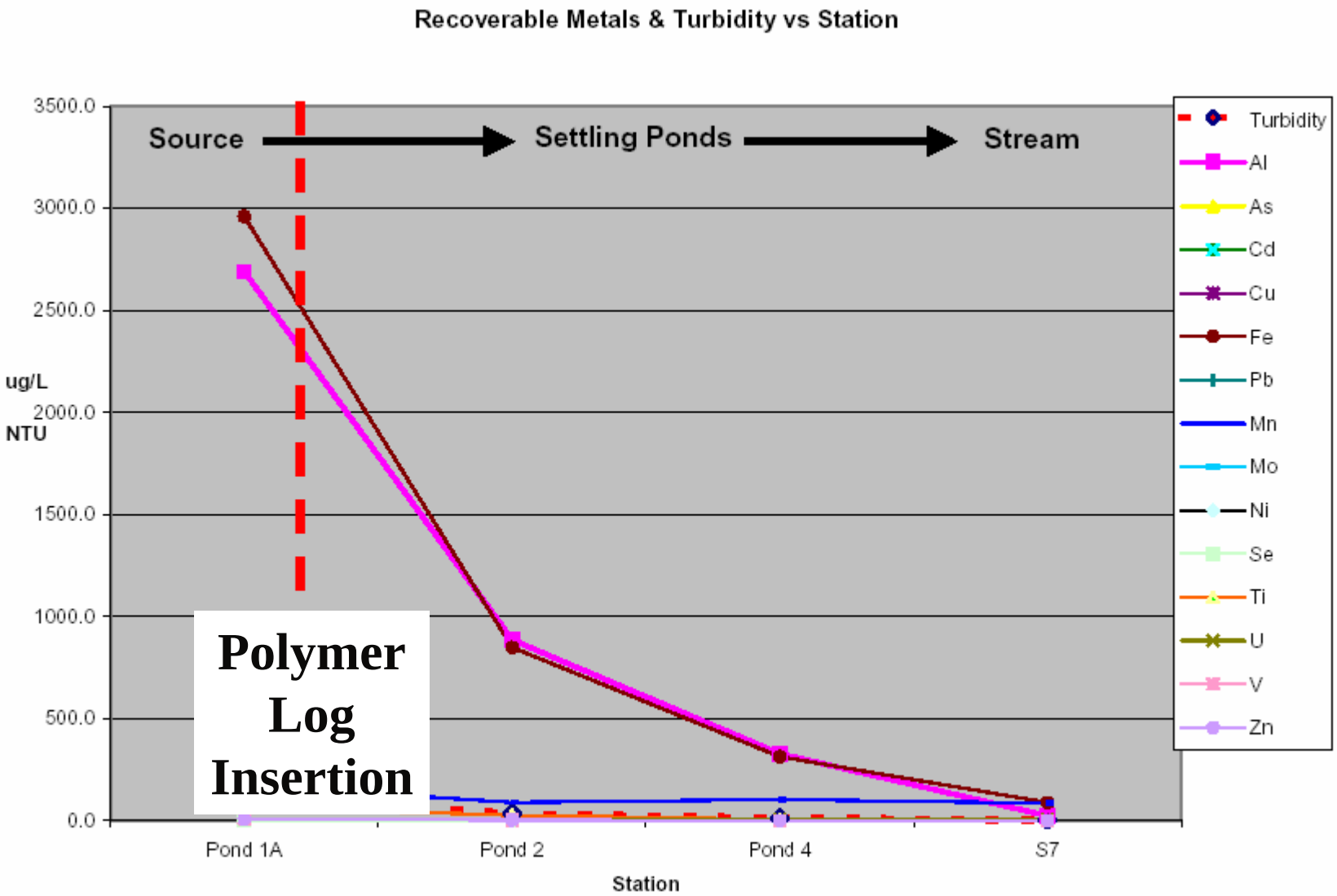
Figure 12

Cobalt, Lead & Thorium Ponds 1-4 Downstream / Upstream

Wash Plant - Turbidity 2005




Recoverable Metals & Turbidity vs Station
Source
Settling Ponds
Stream
10000.0
1000.0
100.0
10.0
1.0
0.1
0.0
ug/L
NTU
Pond 1A
Pond 2
Pond 4
S7
Polymer Log Insertion
Station
Turbidity
Al
As
Cd
Cu
Fe
Pb
Mn
Mo
Ni
Se
Ti
U
V
Zn


Recoverable Metals & Turbidity vs Station
Source
Settling Ponds
Stream
Polymer Log Insertion
3500.0
3000.0
2500.0
2000.0
1500.0
1000.0
500.0
0.0
ug/L
NTU
Pond 1A
Pond 2
Pond 4
S7
Station
Turbidity
Al
As
Cd
Cu
Fe
Pb
Mn
Mo
Ni
Se
Ti
U
V
Zn

Element	% Change in metals Pond 1 - 2	% Change in metals Pond 2 - 3 (Polymers Inserted)	% Change in metals Pond 3 - 4
Th	12%	-86%	39%
Ti	-1%	-74%	67%
Al	-1%	-73%	25%
Fe	9%	-73%	8%
Be	-4%	-71%	-14%
Pb	-3%	-70%	-3%
Cr	0%	-68%	9%
Bi	-14%	-65%	-15%
Co	8%	-63%	-2%
V	-7%	-61%	9%
Ag	-8%	-58%	23%
Ni	9%	-46%	4%
Zn	27%	-41%	-5%
Cd	-8%	-37%	-9%
Cu	-2%	-28%	-2%
As	10%	-25%	-2%
Mn	-4%	-22%	5%
Tl	-3%	-21%	-1%
Sn	-3%	-18%	-5%
Sb	-11%	-12%	-1%

Represents Increase in Metals Values

Figure 5: Percentage Reduction/Increase in metals in settling ponds, sample date Oct 6, 2006

Ponds 1&2 show metal increases likely due to pond soil contamination.

Polymer log installations feeding to ponds 3&4 show an overall decrease of metals.

Rules of Polyacrylamide Use

- Variations of polymer length, electrostatic charge, type of polyacrylamide and additives all effect the performance of the polymer
- Each soil chemistry is unique and requires adjustment to the polymer mix to assure best performance
- Greater application rates do not result in better performance
- Correct BMP combinations with polymer use result in best performance
- Each polymer mix requires EPA certified toxicity reports to assure absence of aquatic toxicity
- Performance testing before use or application must show 95% or better attachment to the soil to assure correct polymer

Cobb County Soil & Water Conservation District

Applied Polymer Systems, Inc.
519 Industrial Drive
Woodstock, GA 30189
www.siltstop.com

Rules of Polymer Use

1) Polymer must be non-toxic to aquatic organisms having EPA certified toxicity reports (whole product WET tests using ASTM guidelines)

2) Each site application must demonstrate 95% or better NTU reduction test reports

3) Each polymer can be unique for each application. One polymer does not work on all soils

University of Central Florida

University of Central Florida Stormwater Management Academy
"Managed Stormwater is Good Water"

Senior Associate

H2O4U

Cobb County Soil & Water Conservation District

Applied Polymer Systems, Inc.
519 Industrial Drive
Woodstock, GA 30189
www.siltstop.com

Questions you should be asking

Do you have the acute and chronic ASTM-EPA aquatic toxicity reports for the intended polymer?

Have you performed site specific jar testing, or lithology testing achieving 95% or better results to show that the polymer will work on the particular site where application is intended?

If so, please proceed and help keep our environment clean.

Senior Associate

University of Central Florida

H2O4U

Applied Polymer Systems, Inc.
519 Industrial Drive
Woodstock, GA 30189
www.siltstop.com

Summary

BMPs must be used in combinations

One BMP will usually not produce compliance results

Jute matting or equal should be used with all types of polymer applications

University of Central Florida

Senior Associate

H2O4U

Applied Polymer Systems, Inc.
519 Industrial Drive
Woodstock, GA 30189
www.siltstop.com

REFERENCE WEB SITES

http://kimberly.ars.usda.gov/pampage.shtml

http://kimberly.ars.usda.gov/Pamprim.shtml

www.siltstop.com

www.stormwater.ucf.edu

Other information available on request

University of Central Florida

University of Central Florida Stormwater Management Academy "Managed Stormwater is Good Water"

Senior Associate

H2O4U