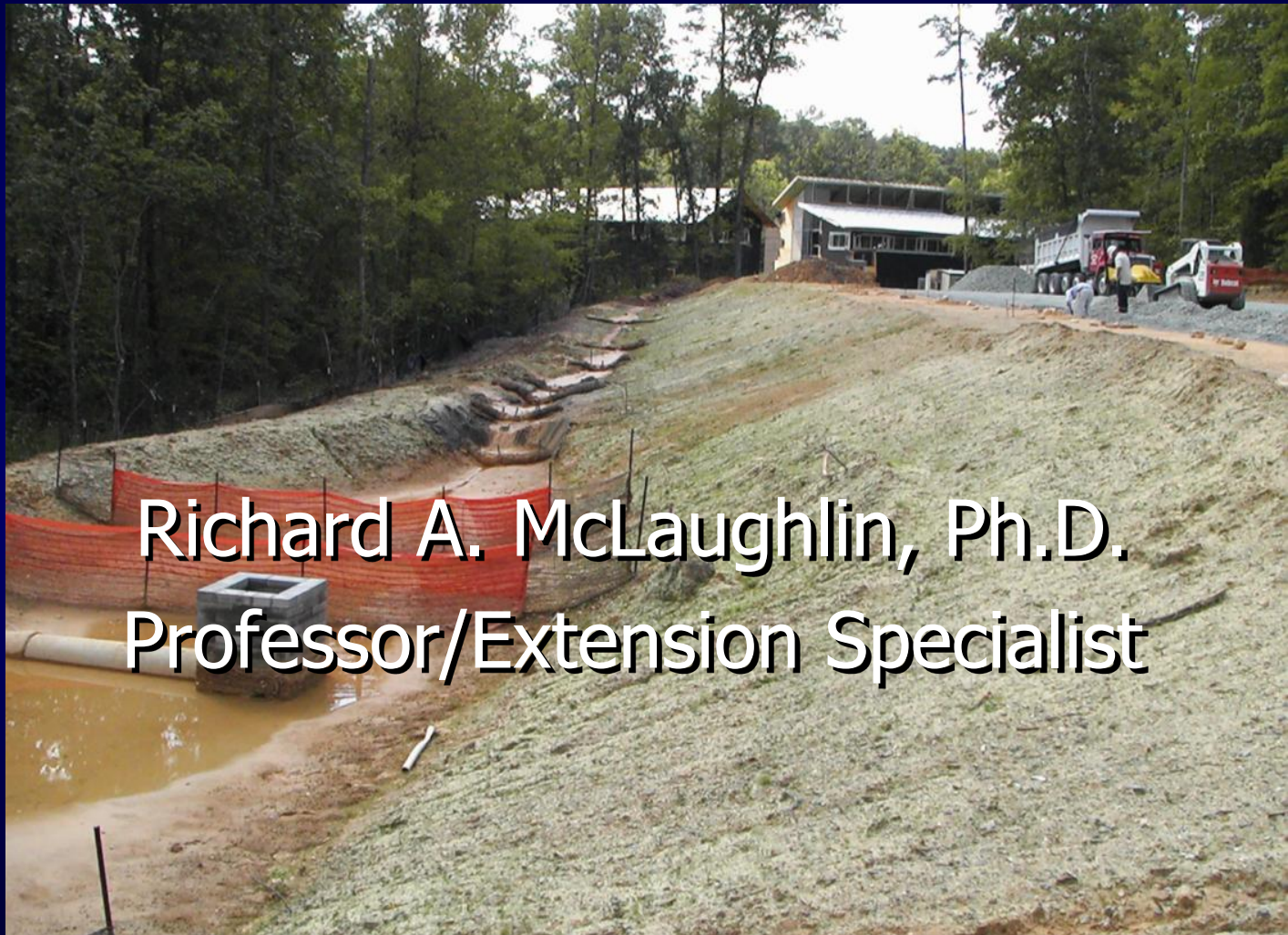
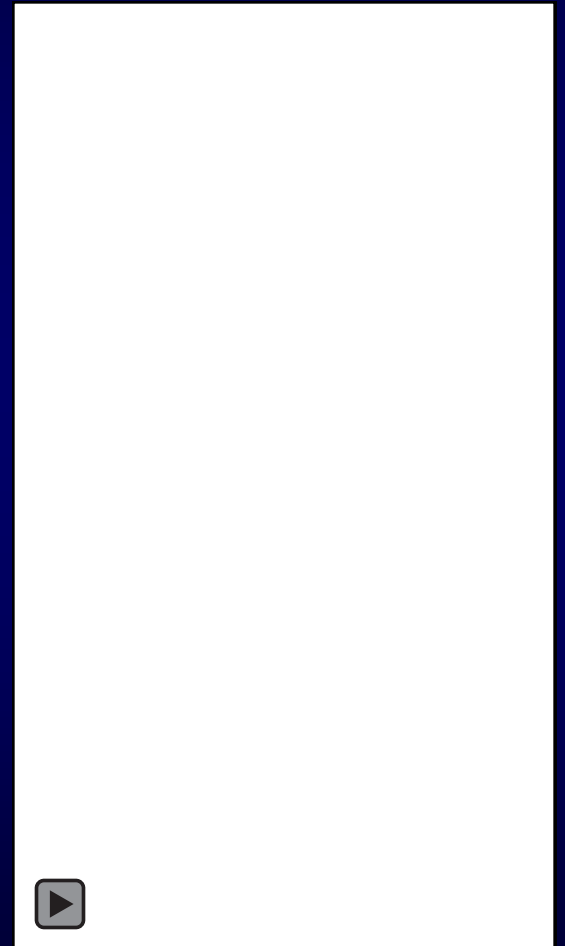


# Turbidity and Dust Control Research



Richard A. McLaughlin, Ph.D.  
Professor/Extension Specialist

**Many Grand  
Canyon tourists  
powerless after  
Friday's snow;  
county declares  
emergency in  
Tusayan**





# Flashlight dinner...crackers, PB, and raman noodles.



# Slog to Rim...





# Next Hike...





# Worth The Hike



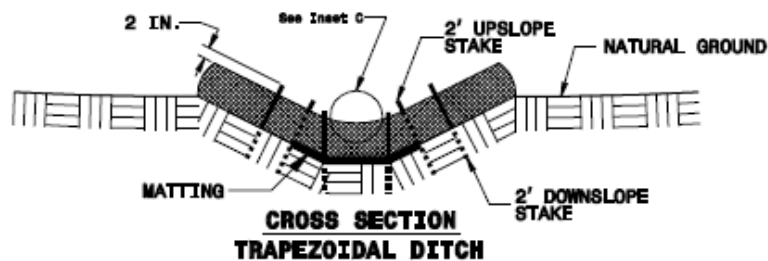
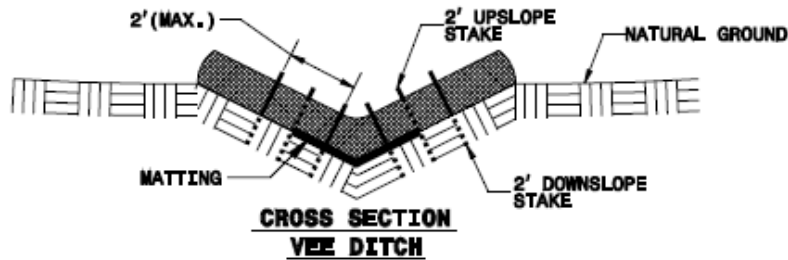
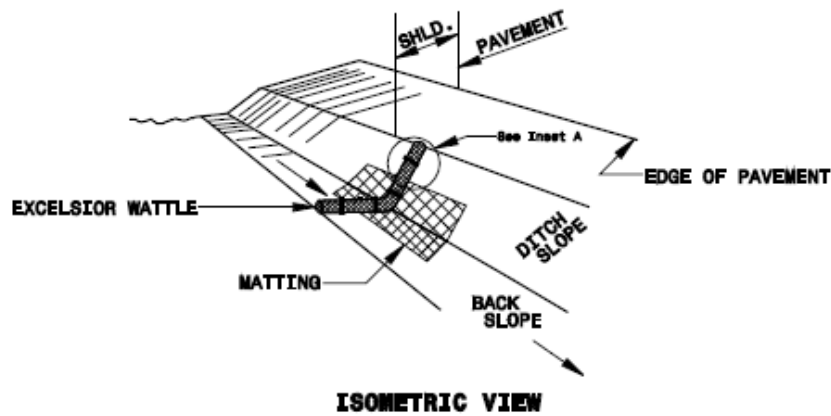
# Turbidity Reduction Approach

Passive dosing is any system that relies on gravity flow in a conveyance to achieve flocculation.

- Check dams with dry granular polymer
- Other granular polymer uses
- Polymer logs or socks (in pipes and other structures)

**Remember, polymer-treated water needs to be settled or filtered prior to discharge!**

# Wattle with Polyacrylamide (PAM)



## NOTES:

USE MINIMUM 12 IN. DIAMETER EXCELSIOR WATTLE.

USE 2 FT. WOODEN STAKES WITH A 2 IN. BY 2 IN. NOMINAL CROSS SECTION.

ONLY INSTALL WATTLE(S) TO A HEIGHT IN DITCH SO FLOW WILL NOT WATTLE AND SCOUR DITCH SLOPES AND AS DIRECTED.

INSTALL A MINIMUM OF 2 UPSLOPE STAKES AND 4 DOWNSLOPE STAKES AT TO WEDGE WATTLE TO BOTTOM OF DITCH.

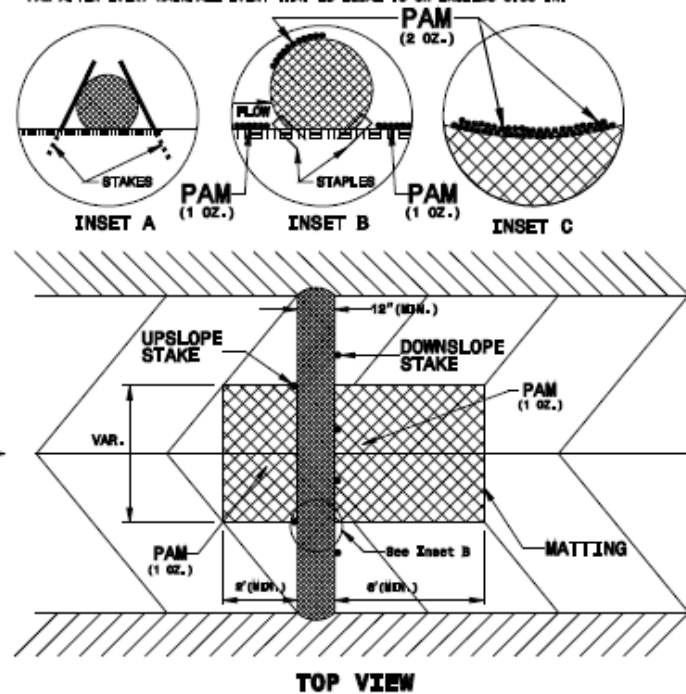
PROVIDE STAPLES MADE OF 0.125 IN. DIAMETER STEEL WIRE FORMED INTO A U SHAPE NOT LESS THAN 12" IN LENGTH.

INSTALL STAPLES APPROXIMATELY EVERY 1 LINEAR FOOT ON BOTH SIDES OF WATTLE AND AT EACH END TO SECURE IT TO THE SOIL.

INSTALL MATTING IN ACCORDANCE WITH SECTION 1601 OF THE STANDARD SPECIFICATIONS.

PRIOR TO POLYACRYLAMIDE (PAM) APPLICATION, OBTAIN A SOIL SAMPLE FROM PROJECT LOCATION, AND FROM OFFSITE MATERIAL, AND ANALYZE FOR APPROPRIATE PAM FLOCCULANT TO BE APPLIED TO EACH WATTLE.

INITIALLY APPLY 2 OUNCES OF ANIONIC OR NEUTRALLY CHARGED PAM OVER WATTLE WHERE WATER WILL FLOW AND 1 OUNCE OF PAM ON MATTING ON EACH SIDE OF WATTLE. REAPPLY PAM AFTER EVERY RAINFALL EVENT THAT IS EQUAL TO OR EXCEEDS 0.50 IN.





# Installation Guide



**Is there a gap at the upturned edge of the wattle?**



**Weave wire staples through mesh at an angle to the wattle-space every 1 ft.**



**Fill gaps with excess fabric**



# Check Dam Pooling





# Simple Check Dams





# Can use materials on hand...





**Sprinkle 100 grams ( $\frac{1}{2}$  cup) of PAM 705 on the lower, center portion of the wattle where water is going to flow over.**



**A thin, wide band is ideal**



**Must replace with new PAM every so often as the weather dictates  
Maintenance is always important!**





# Examples of Poor Installation

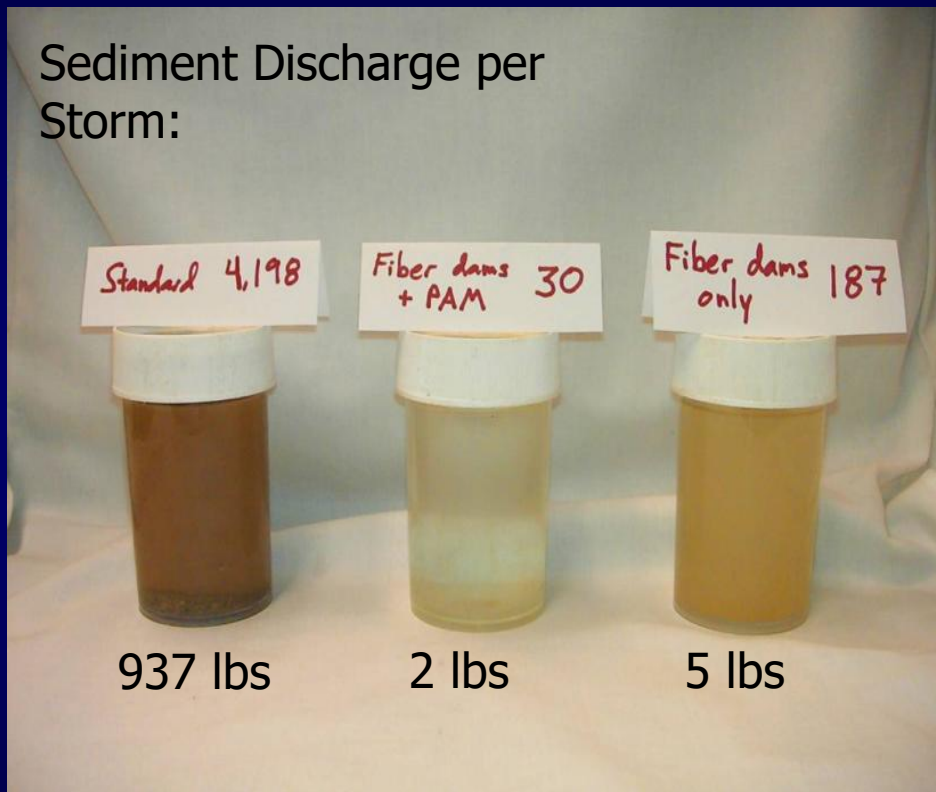


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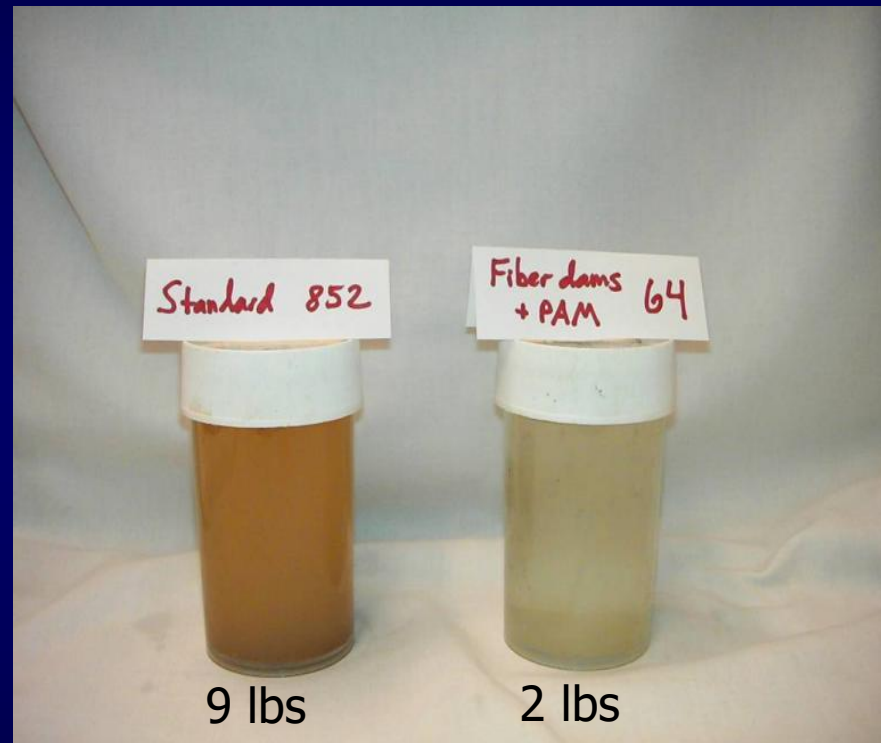


# Very good results most of the time!

Sediment Discharge per Storm:



**Site 1**



**Site 2**

# Cost Estimate Comparison

## Site 1:

<b>450' Standard section</b>	<b>\$1.98 / foot</b>
<b>668' Fiber check dams + PAM</b>	<b>\$1.32 / foot</b>
<b>461' Fiber check dams only</b>	<b>\$1.70 / foot (spacing closer)</b>

## Site 2:

<b>508' Standard section</b>	<b>\$1.75 / foot</b>
<b>489' Fiber check dams + PAM</b>	<b>\$1.63 / foot</b>

**The logs and wattles do not have to be removed either, they can decompose in place.**



# Flume Testing of Check Dams

soil



Storms simulated and water samples collected:

- 4 minutes at 0.5, 1.0, 2.0, 1.0, and 0.5 cfs
- Soil added at 6,000 mg/L
- 4 samples were collected in each bottle, 5 bottles total
- 3 consecutive "storms" run
- Sediment depth and length was measured and a LIDAR scan was taken

# Wattle, Liner (jute), Polyacrylamide Form Effects



Wattle with jute netting



Wattle without jute netting



PAM on the weir of wattle



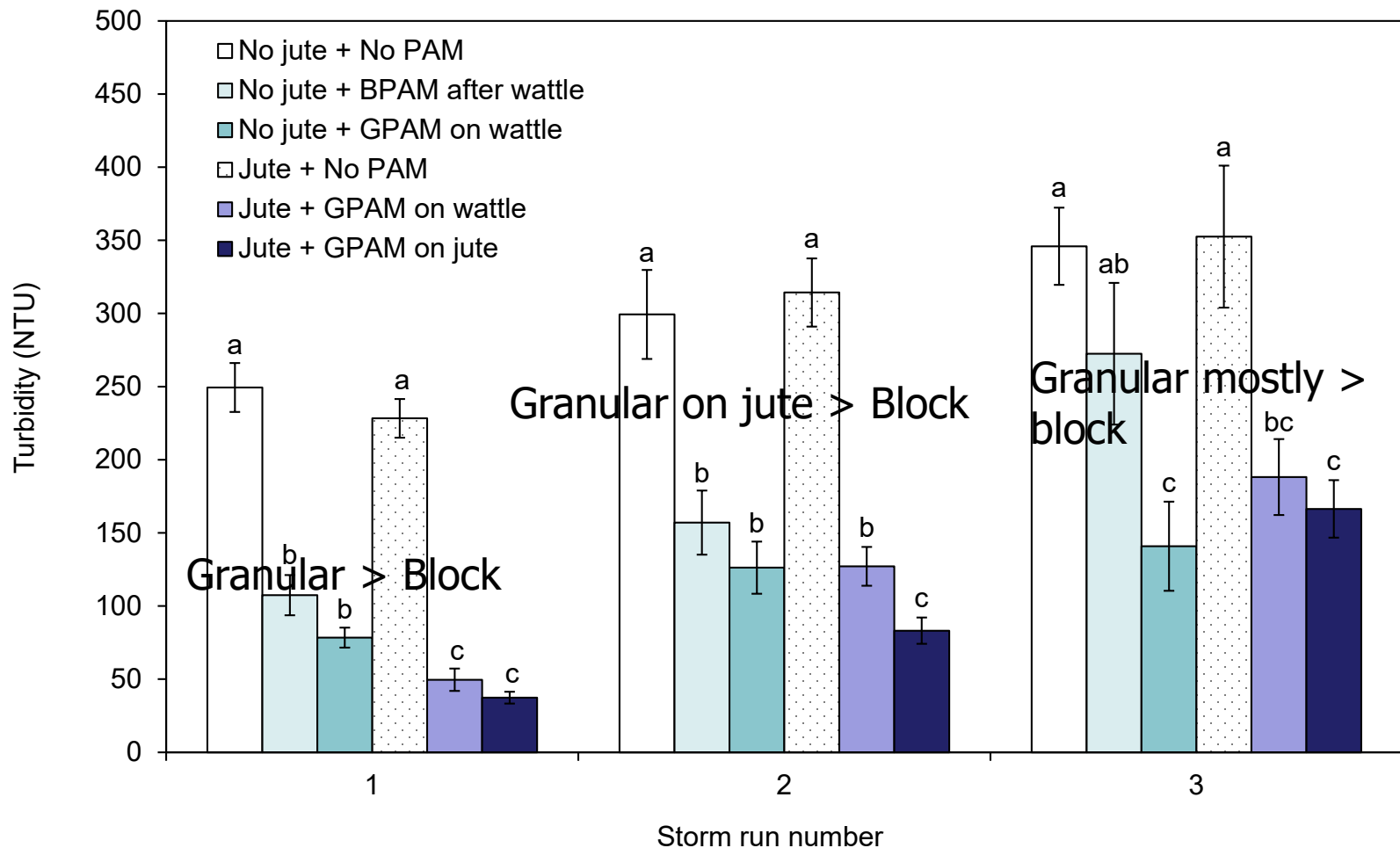
PAM on jute netting



Solid block PAM



# Results



# Need a Ditch or Swale for the Wattles!





# New Alternative: Compressed Berm



# Passive Treatment #2: Rock+Fabric

- Modified Type A Silt Check with addition of excelsior (or coir) matting on top of Sediment Control Stone



- Sprinkle lower, center portion of fabric lined weir with 4 oz ( $\frac{1}{2}$  cup) of PAM-705
- Reapply PAM after 0.5 inch rainfall or greater



# Channel into Corrugated Pipe



Pipe provides extra mixing, protects polymer



# Other Passive Approaches using Granular PAM



PAM sprinkled on coir baffle in basin (maybe)



PAM sprinkled on erosion control matting down a slope



# Tiered Basin Design: Perfect for Turbidity Treatment

**Upper/Forebay Basin**

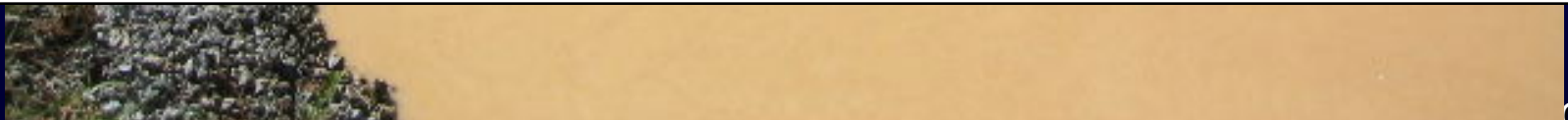


**Lower/Skimmer Basin**



**PAM in all pipes**

# Drop Inlets – Another Good Option for PAM Logs





# Keys to Making PTS Work for You

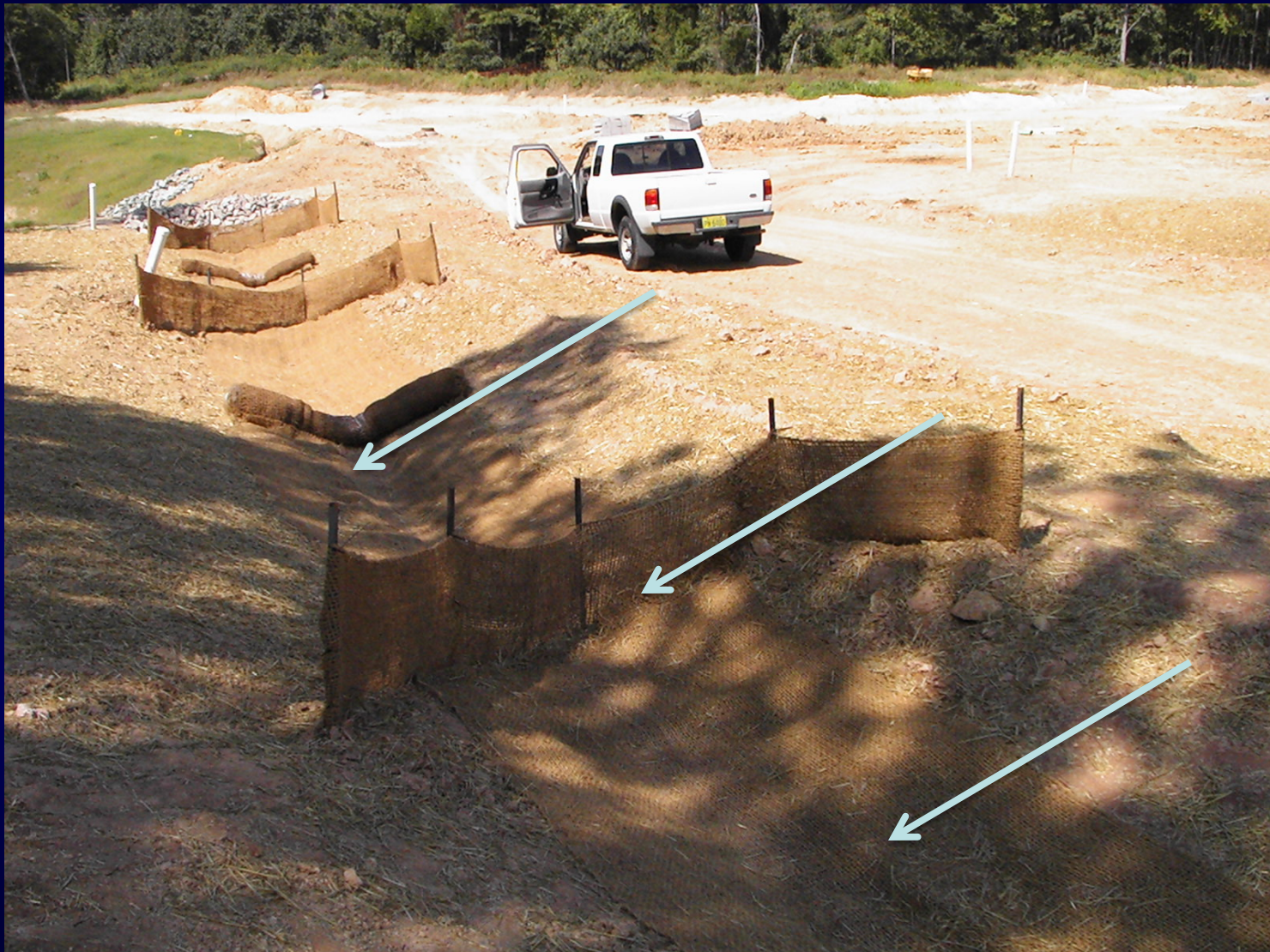
- Match flocculant to your soil or suspended sediment and water chemistry.
- Reduce sediment load prior to flocculant treatment.
- Keep the flocculant moist.
- Create high flow onto flocculant.
- Create high mixing (turbulence) after flocculant.
- Allow for settling post-treatment.

# Ideal Passive Treatment Zone!





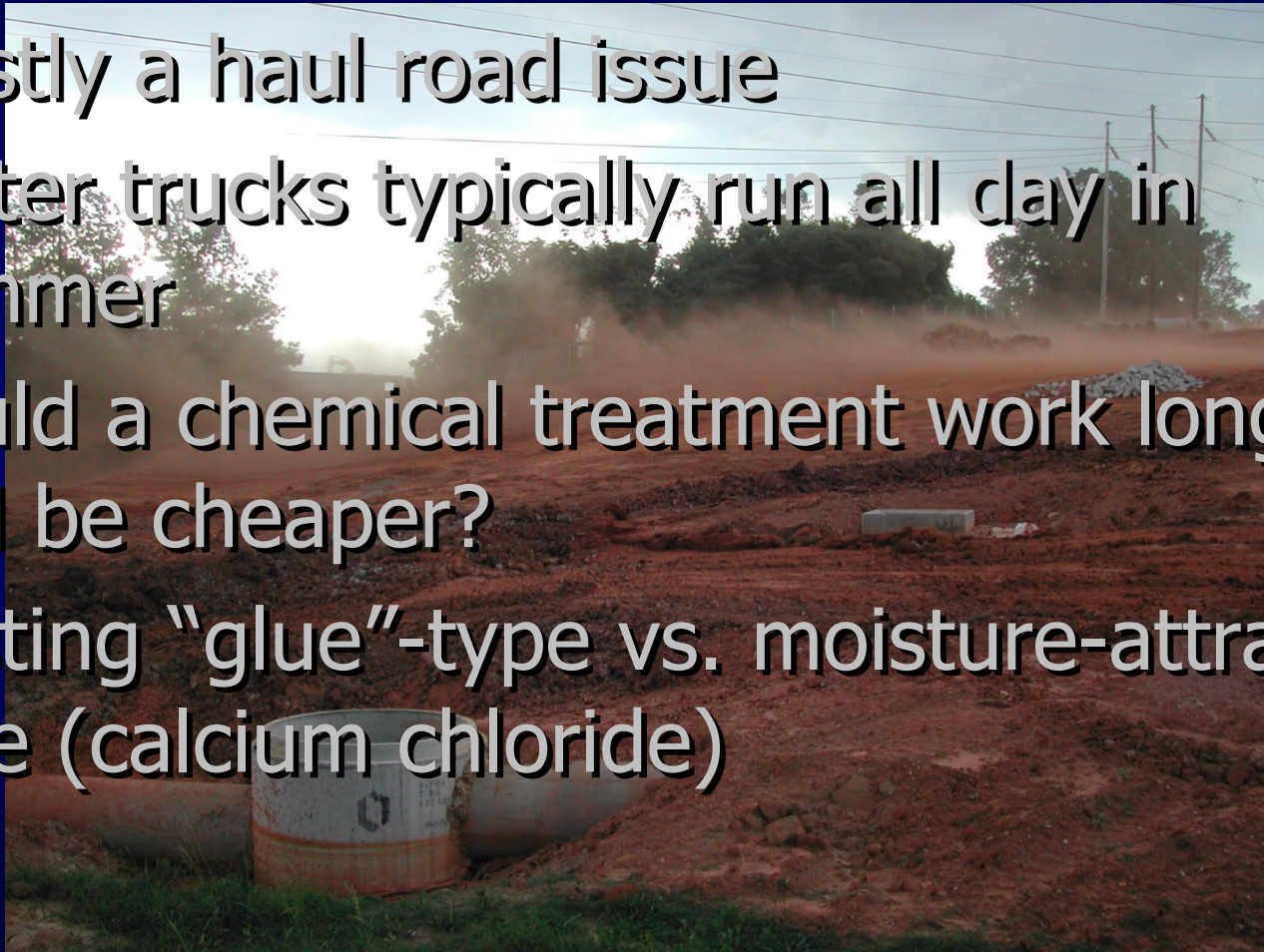
# Innovative Treatment





# Dust Control on Construction Sites

- Mostly a haul road issue
- Water trucks typically run all day in summer
- Could a chemical treatment work longer and be cheaper?
- Testing “glue”-type vs. moisture-attracting type (calcium chloride)





# Polyvinyl Acetate Application



# Dust Collectors





# Truck Traffic – 20 Runs x 3

- Road divided into 4 sections, 2 samplers each
- Control (nothing), water, sodium chloride\*, and polyvinyl acetate applied



\*Supposed to be calcium chloride – both had same product name.

# Dust Collection

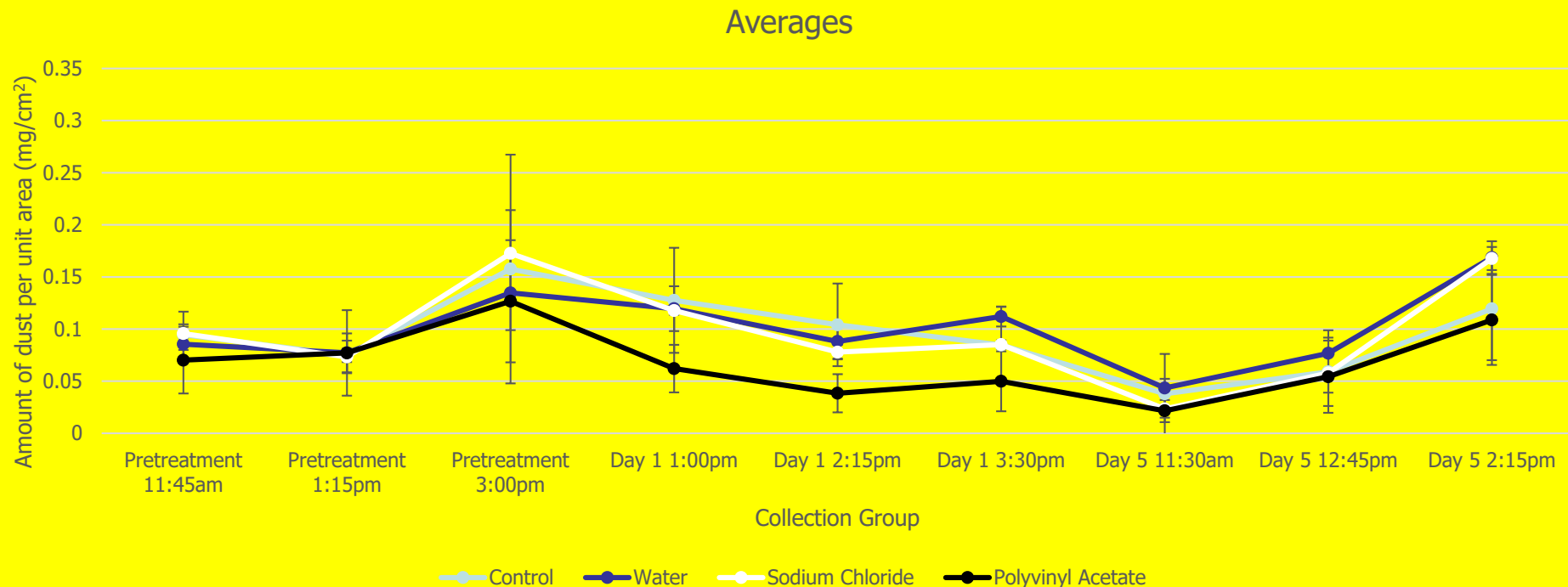
Funnel and paint can rinsed into bottle, rinsate was filtered in the lab to collect dust.



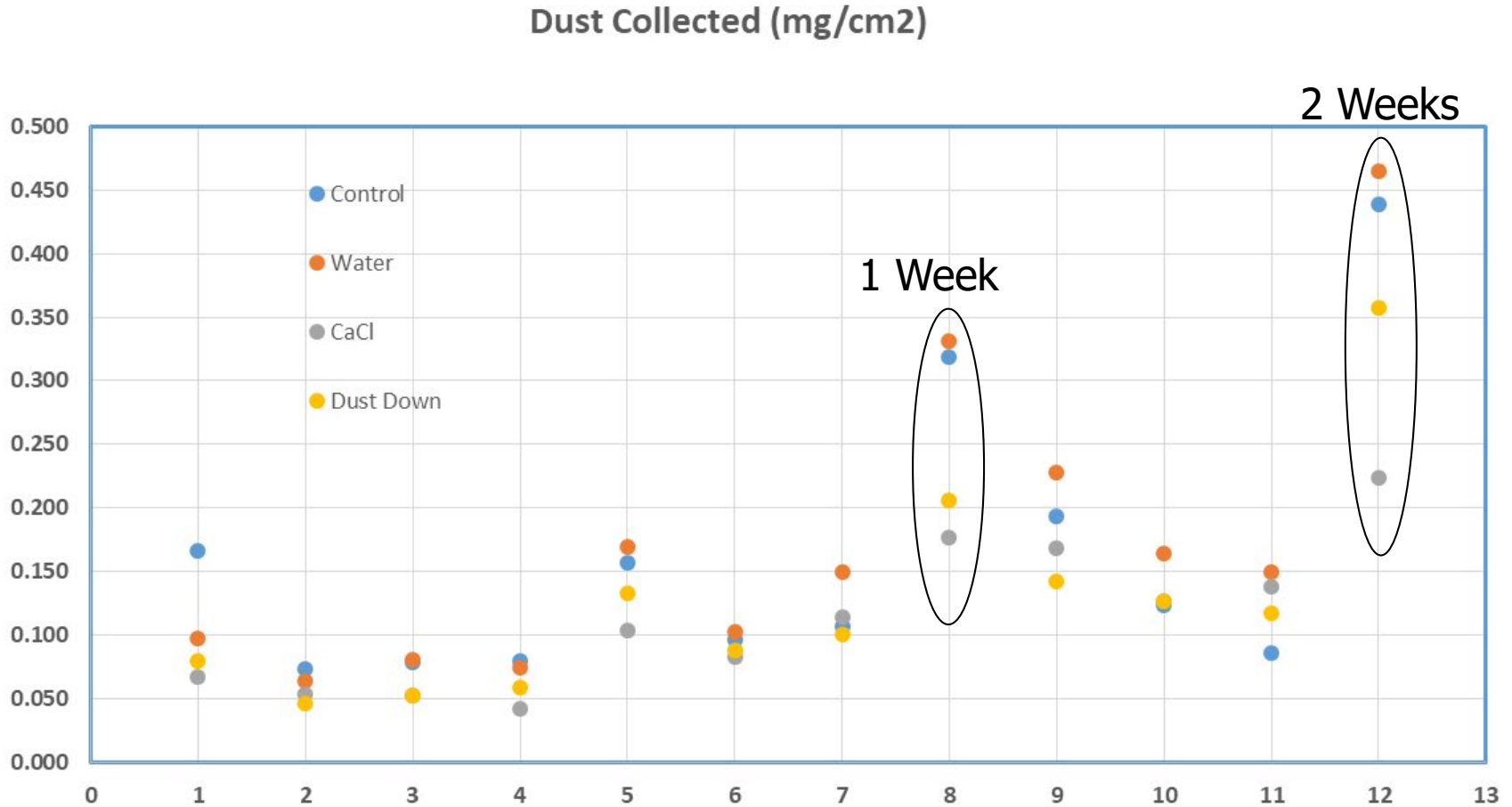


# Test 1: 5 Day Test

- Polyvinyl acetate appeared to best on first day after application, no effect day 5.



# Test 2: Two Week Test





# Preliminary Dust Control Results

- Water effect disappears very quickly
- Polyvinyl acetate and calcium chloride appeared to have an effect.
- Cost Estimates: for ¼ mile, 20' wide
  - Polyvinyl acetate (Dust Down): \$2,000
  - Calcium Chloride (Sno Jo Melt): \$1,000
- Effect of heavy truck traffic not tested yet.

# The Construction Site Dream

- Virtually no exposed soil during rain events
- Lined ditches, plenty of check dams with polyacrylamide
- Sediment basins with inlet protection, baffles, stable sides, surface outlet
- Inspectors, contractors, owners working together!



# ...and all our streams run clear!



# International Conference in Raleigh Next February!



The banner features a background image of a forest. At the top left is the IECA logo with the text "International Erosion Control Association", "REGION ONE", and "Protecting Soil and Water Resources". To the right are links for "Sign In", "Create Account", "Cart", "About IECA", and social media icons for Facebook, Twitter, and LinkedIn. Further right are buttons for "Join IECA" and a search icon. Below this is a navigation bar with links for "Membership", "Education", "Events", "Get Involved", "Resources", and "Corporate Partnership". The main content area has a green background. On the left is an image of a globe on a mossy surface with the text "IECA ANNUAL CONFERENCE and Expo". On the right, the text reads "Join Peers at the 2020 IECA Annual Conference" followed by "February 23-26, 2020 | Raleigh, NC". At the bottom right is a smaller IECA logo. Below the green section, the text "2020 IECA Annual Conference and Expo" is displayed, followed by "February, 23-26, 2020 | Raleigh Convention Center | Raleigh, North Carolina" and a descriptive sentence: "The IECA Annual Conference and Expo brings together the industry's most innovative minds in the erosion and sediment control and storm water".

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# Questions?

