

Bacteria Die-off Study

Prepared in cooperation with the

Houston-Galveston Area Council,
City of Houston -

Department of Health & Human Services
and the

Texas Commission on Environmental Quality

Why?

- Accepted Truth: *Escherichia coli* (*E. coli*) does NOT proliferate or replicate outside the body of warm-blooded animals
- Hypothesis: In warm, nutrient rich waters, such as in Houston bayous, bacteria levels are sustained and may initially increase over time

The Plan

- Part I

- Collect water on Monday: analyze samples for bacteria concentrations within 6-8 hours
 - Set up 5 flasks to hold under special conditions through Thursday
- Analyze aliquots of water from each flask on Tuesday, Wednesday, & Thursday

- Part II

- In addition to samples analyzed on Monday, collect and analyze new samples on Tuesday, Wednesday, & Thursday (after rain event only)

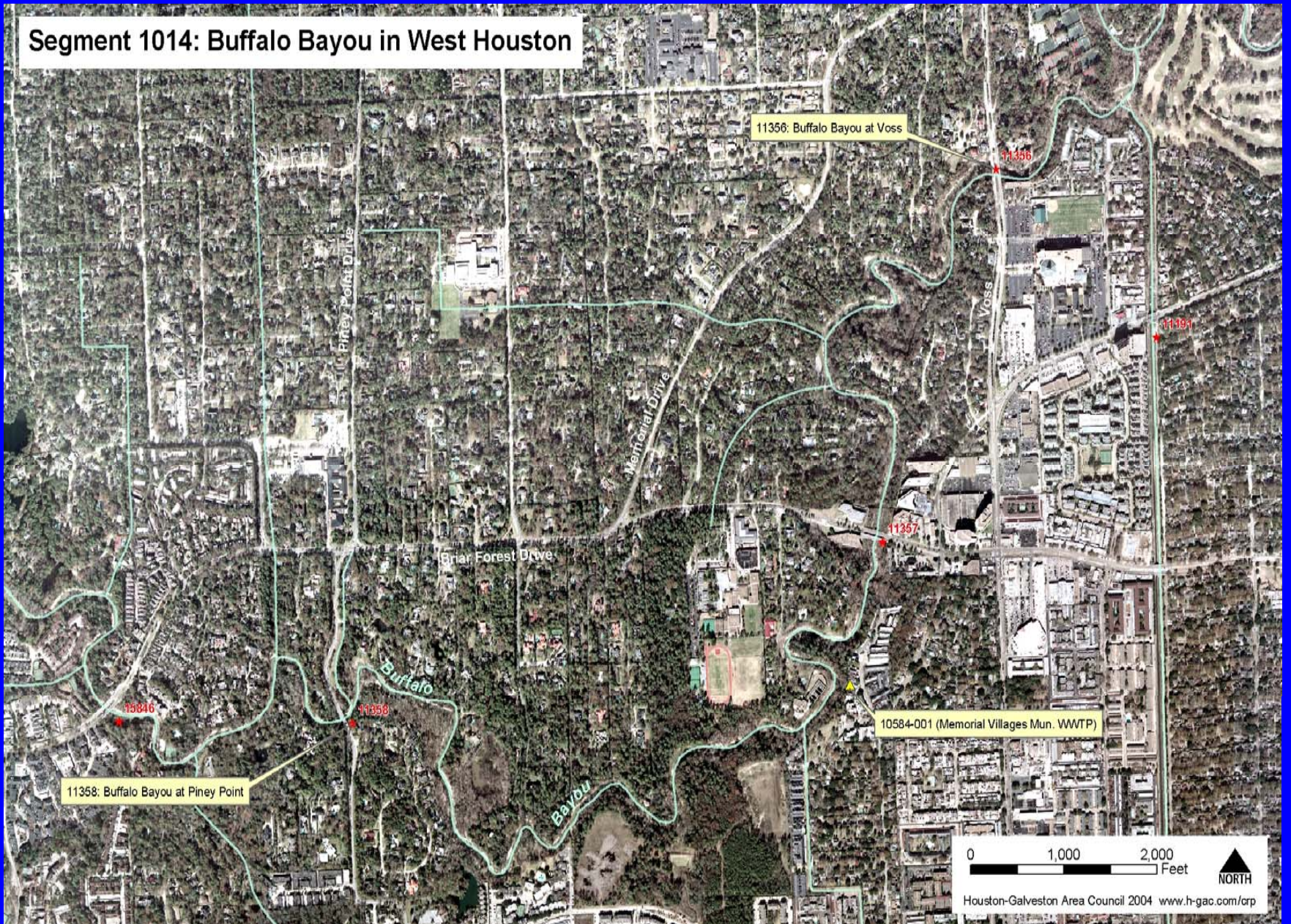
How?

Flask 1	Flask 2	Flask 3	Flask 4	Flask 5
Darkened refrigerator	Darkened fume hood	Darkened fume hood	Darkened fume hood	Darkened fume hood
2 - 4 °C	@ room temperature	@ room temperature	@ room temperature	@ room temperature
Settled	Settled	Settled	Slowly stirred continuously	Vigorously agitated / stirred continuously
Reshaken before pipetting & testing	Reshaken before pipetting & testing	NOT shaken or stirred before pipetting & testing	Pipetted & tested	Pipetted & tested

Where?

- Buffalo Bayou @ Piney Point (Site #11358)
(upstream site)
- Buffalo Bayou @ Voss Road (Site #11356)
(downstream site)

Segment 1014: Buffalo Bayou in West Houston



When?

- Dry Weather Sampling Events
 - October 2004
 - January 2005
 - March 2005
 - April 2005
- Wet Weather Sampling Events
 - May 2005

Figure 1. Bacteria Die-off results for Piney Point Rd sample held under five different lab scenarios beginning October 4, 2004.

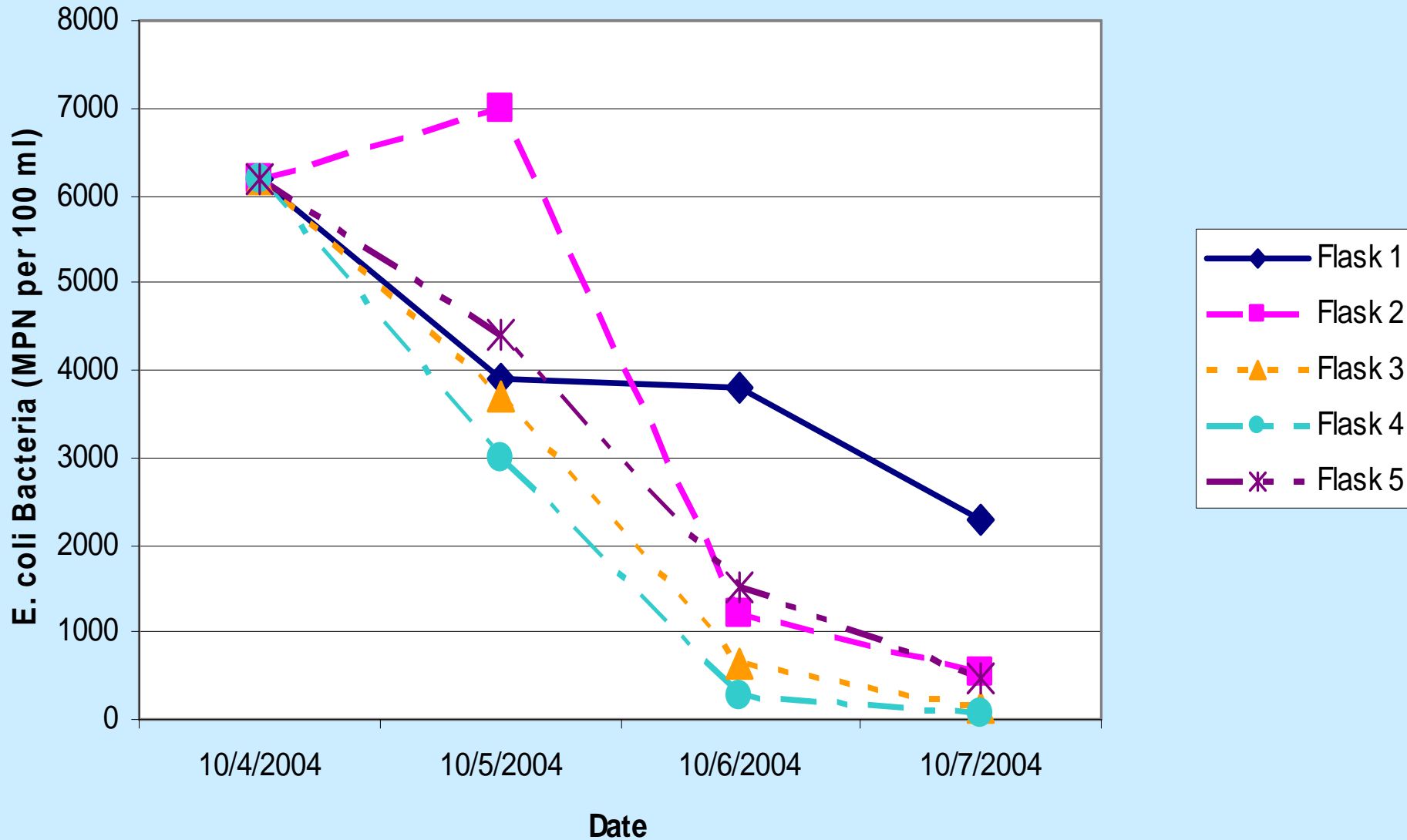


Figure 3. Bacteria Die-off results for Piney Point Rd sample held under five different lab scenarios beginning January 10, 2005.

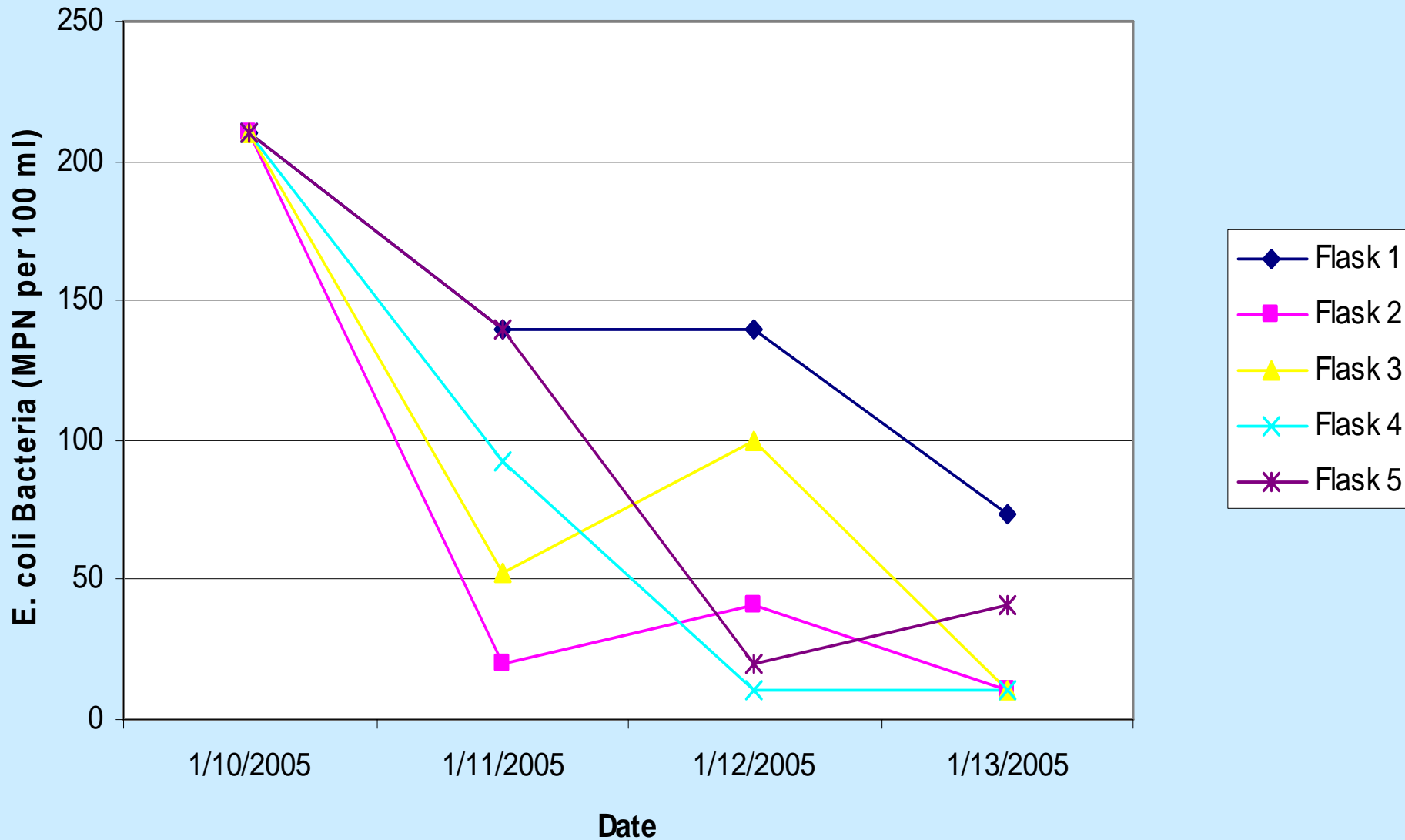


Figure 5. Bacteria Die-off results for Piney Point Rd sample held under five different lab scenarios beginning March 14, 2005.

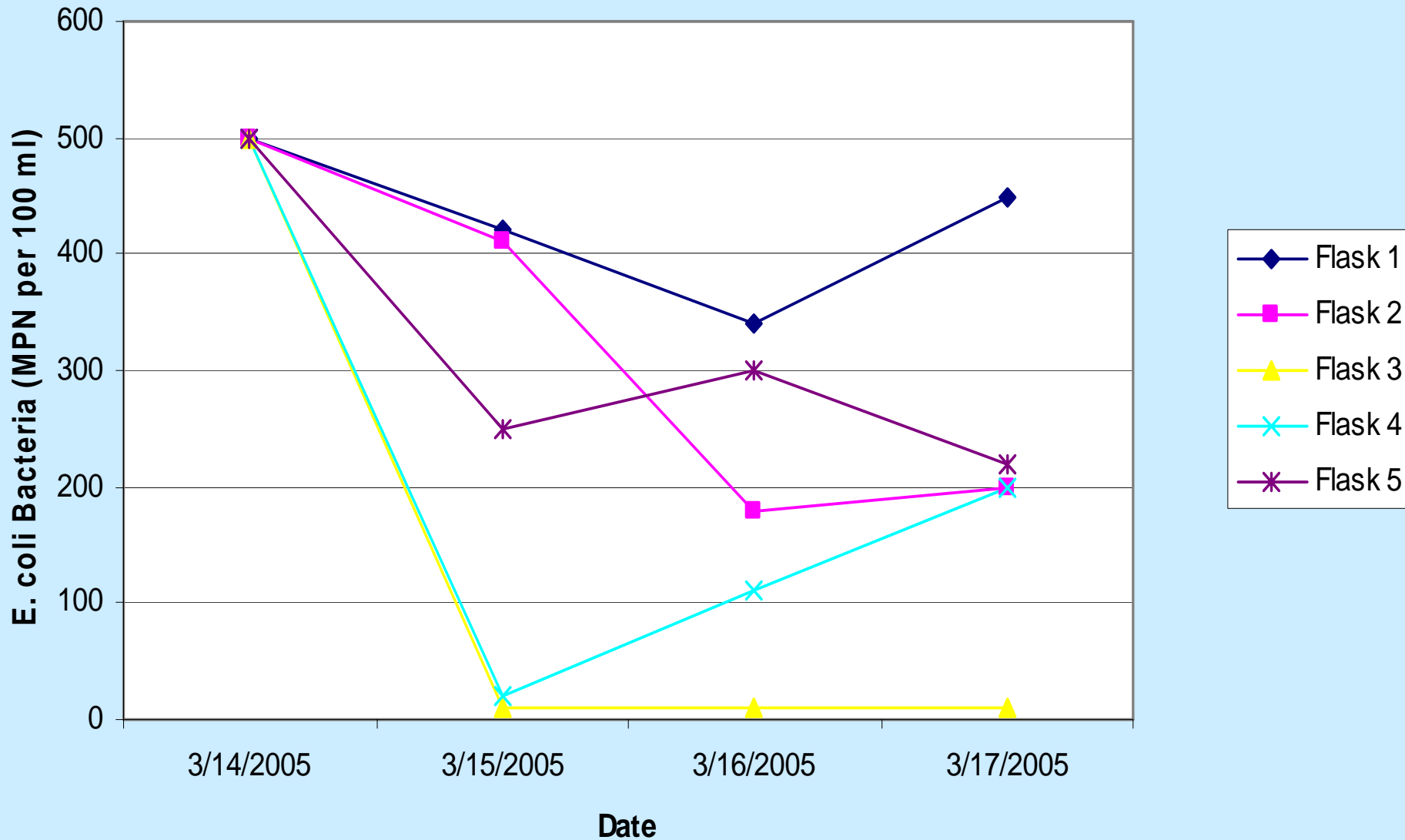


Figure 7. Bacteria Die-off results for Piney Point Rd sample held under five different lab scenarios beginning April 18, 2005.

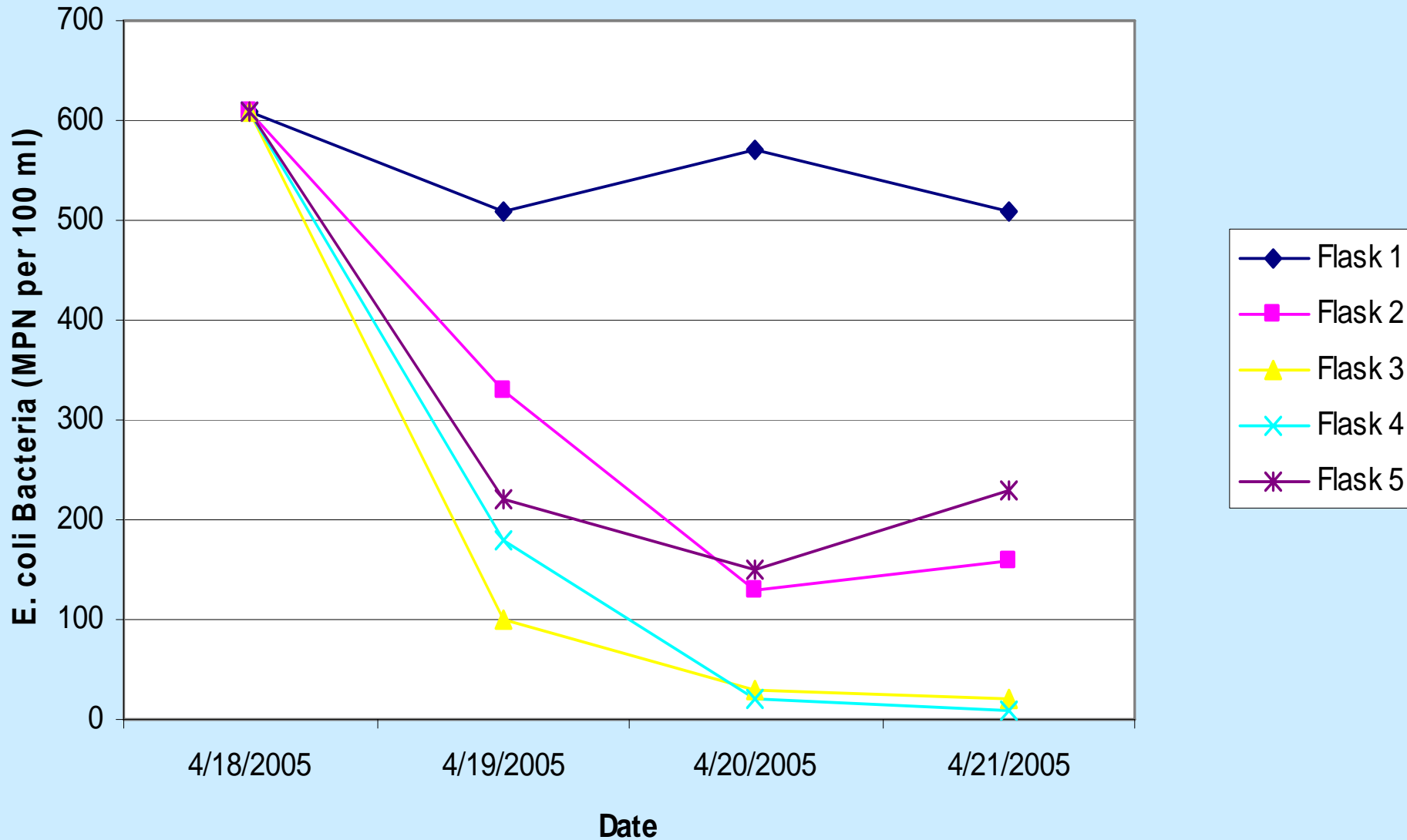
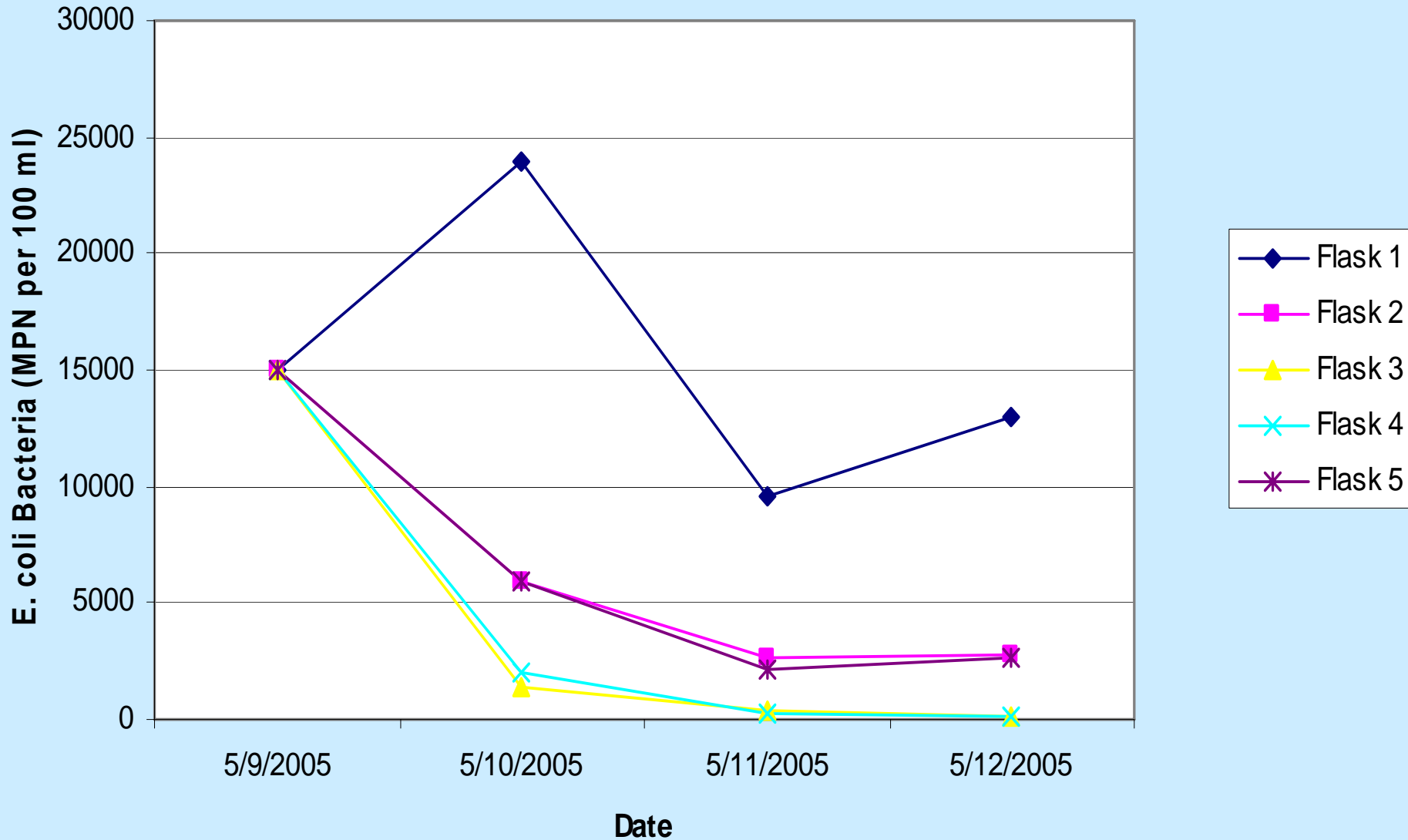


Figure 9. Bacteria Die-off results for Piney Point Rd sample held under five different lab scenarios beginning May 9, 2005.

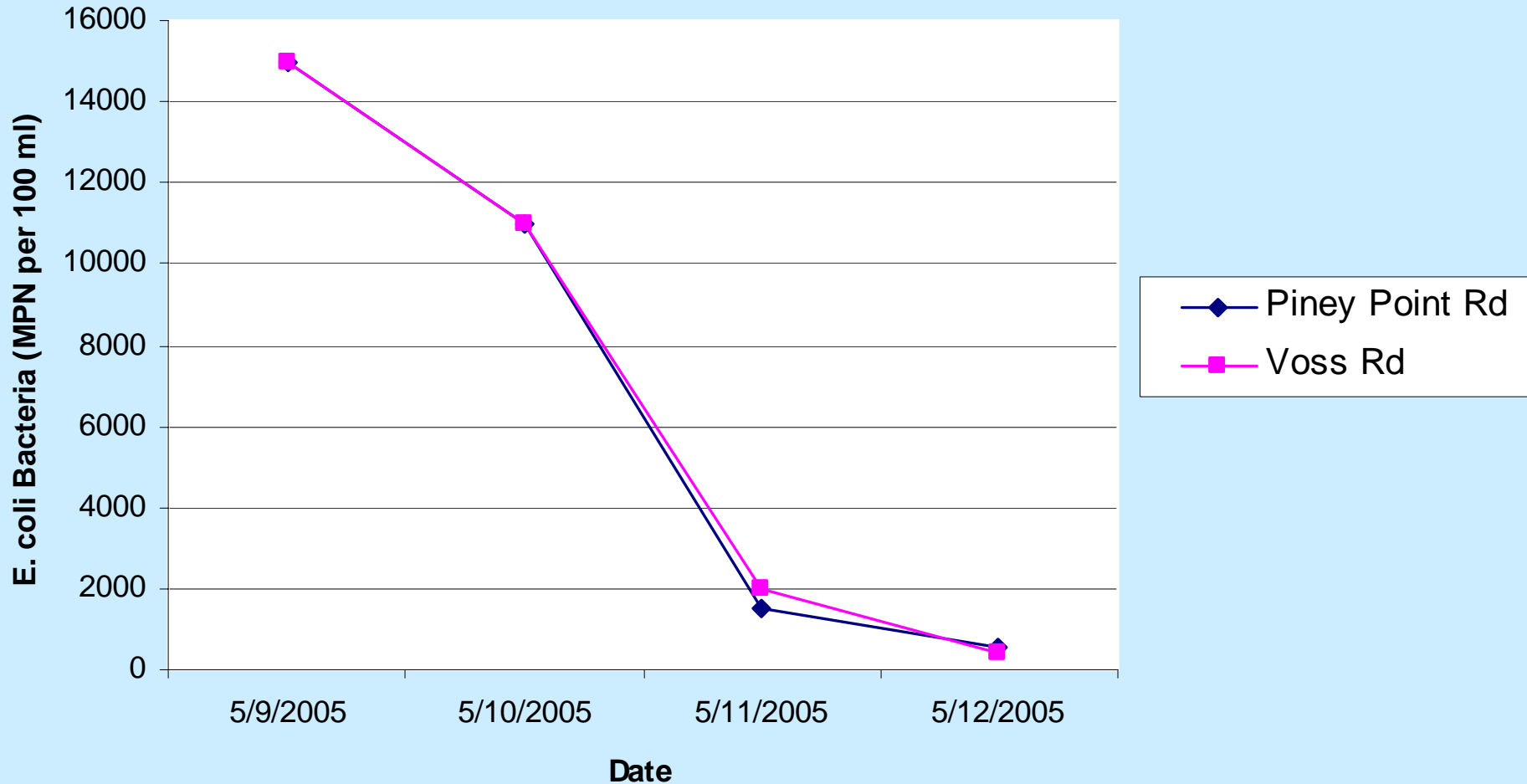


Part I Conclusions

- Bacteria concentrations in refrigerated samples decreased at significantly slower rates than those kept at room temperature
- Bacteria concentrations decreased in samples allowed to settle
- Bacteria concentrations remained high (or decreased at a slower rate) IF the sample was reshaken or vigorously stirred on a continuous basis

Wet Weather Results

Figure 11. Bacteria results over time for Buffalo Bayou at two locations following a significant rainfall event.



Bayou TSS & bacteria AFTER rain event

Date	Piney Point (upstream)			Voss (downstream)	
	Flow (cfs)	E. Coli (MPN)	TSS (mg/L)	E. Coli (MPN)	TSS (mg/L)
5/9/05	1,240	15,000	458	15,000	252
5/10/05	1,520	11,000	167	11,000	192
5/11/05	1,910	1,500	69	2,000	111
5/12/05	1,880	560	47	400	60

Part II Conclusions

- After a one day significant rainfall event, bacteria concentrations remain elevated at both locations beyond four days
- There was a relationship between total suspended solids and bacteria concentrations:

higher sediment load = higher bacteria concentration

Full Report available at:

<http://www.h-gac.com>

Questions:

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