

Mobile Laboratories: An Innovative Approach in Bacteria Monitoring

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Why a Mobile Lab?

- Monitoring over large areas
- Six - hour hold time
- Analysis done on site
- Numerous samples
- The method is simple enough to perform numerous samples in a very small space
- Mobility provides easy access to the laboratory for various types of sampling crews

IDEM's Mobile *E. coli* Laboratory



- **Advantages of Mobile Laboratory:**
 - **Eliminates the necessity of transporting samples to lab within a 6-hour holding time**
 - **Can collect, prepare, incubate, read, and dispose of up to 40 samples per day**
 - **Complete analysis in field to increase the number of tests performed**

ORSANCO Mobile Lab



Analytical Method

- IDEXX Colilert[®] Quanti-Tray 2000
 - Standard Methods 20th Edition 9223 B
- US EPA has accepted this method for use in drinking water programs and ambient water

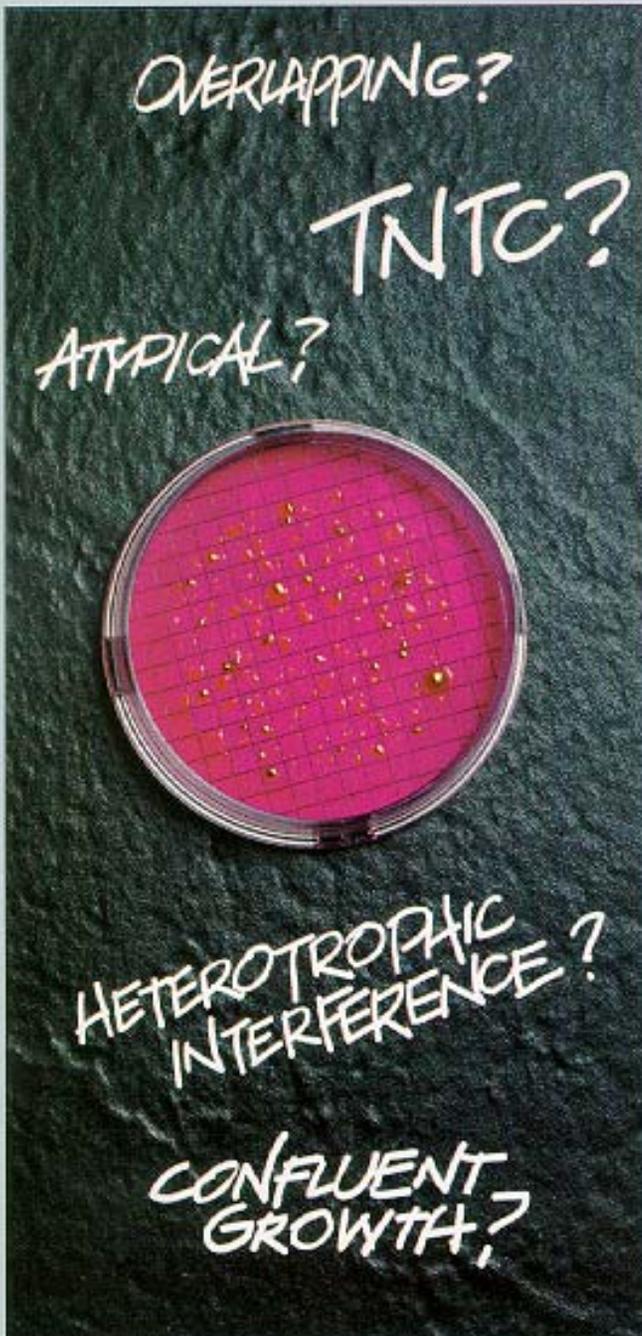
E. coli Method Comparison

Colilert[®] Method vs. Membrane Filtration

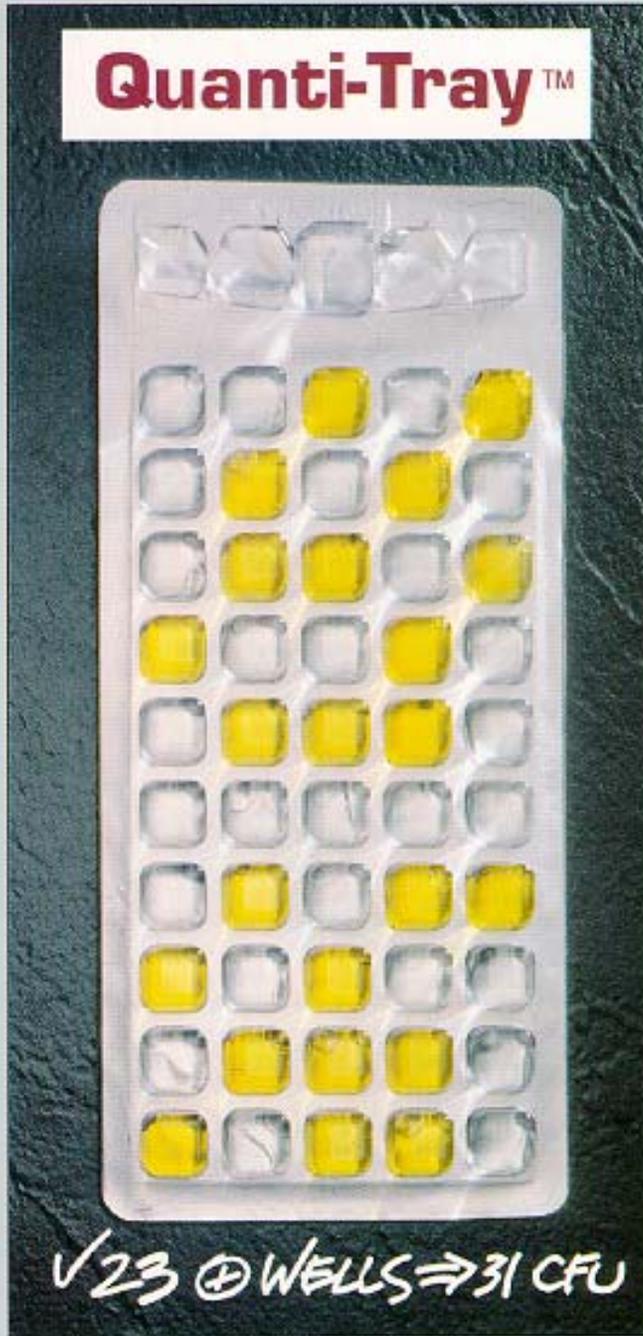
- IDEXX Colilert[®] Method
 - Standard Methods MPN Approach
 - Presence/Absence or Quantification
 - Test Methods
 - Colilert[®]
 - ☐ total coliforms & *E. coli*

Colilert[®] Benefits

- Test Procedure
 - 1 minute hands-on time
 - no media preparation
- Interpretation of Results
 - colony counting eliminated
 - no subjectivity (atypical, overlapping)
 - no confluent growth
- Cost
 - reduced labor

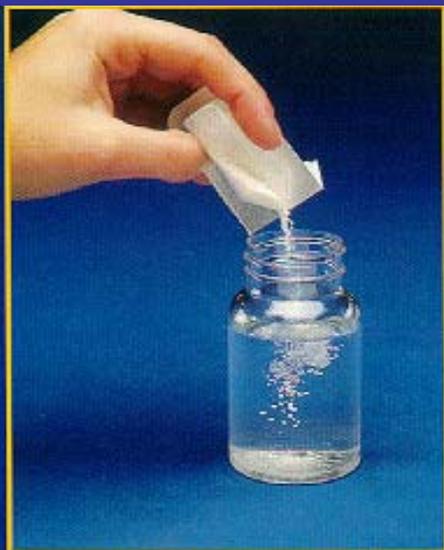


31 CFU Sample



23 wells corresponds to MPN of 31 CFU sample

Figure 3: IDEXX Colilert® Method for *E. coli* Analysis



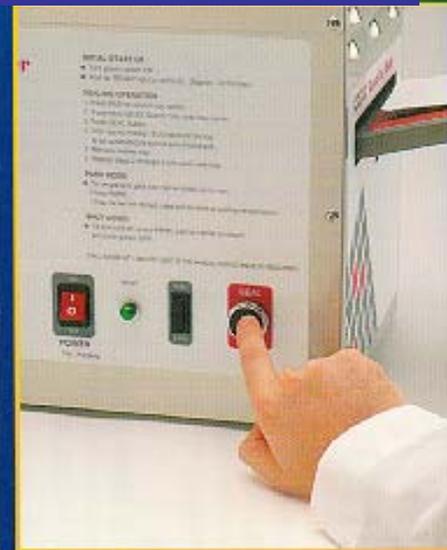
1. Add Colilert to 100ml sample and mix



2. Pour sample/Colilert mixture into Quanti-Tray



3. Put filled tray into sealer



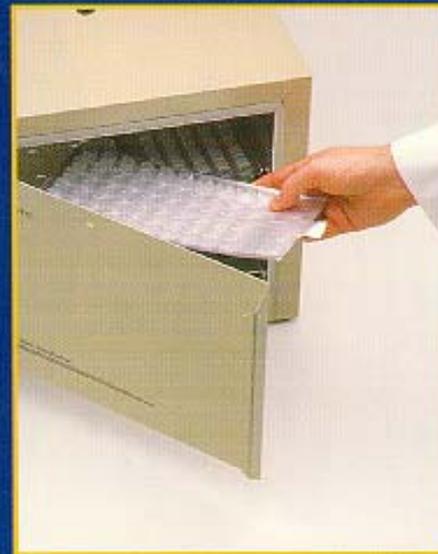
4. Press seal



5. Allow sealer to retract and eject tray



6. Remove sealed tray



7. Incubate



8. Read results and refer to MPN table

Sealing Quanti-trays





Counting Coliforms



Counting *E. coli*



Samples in Incubator

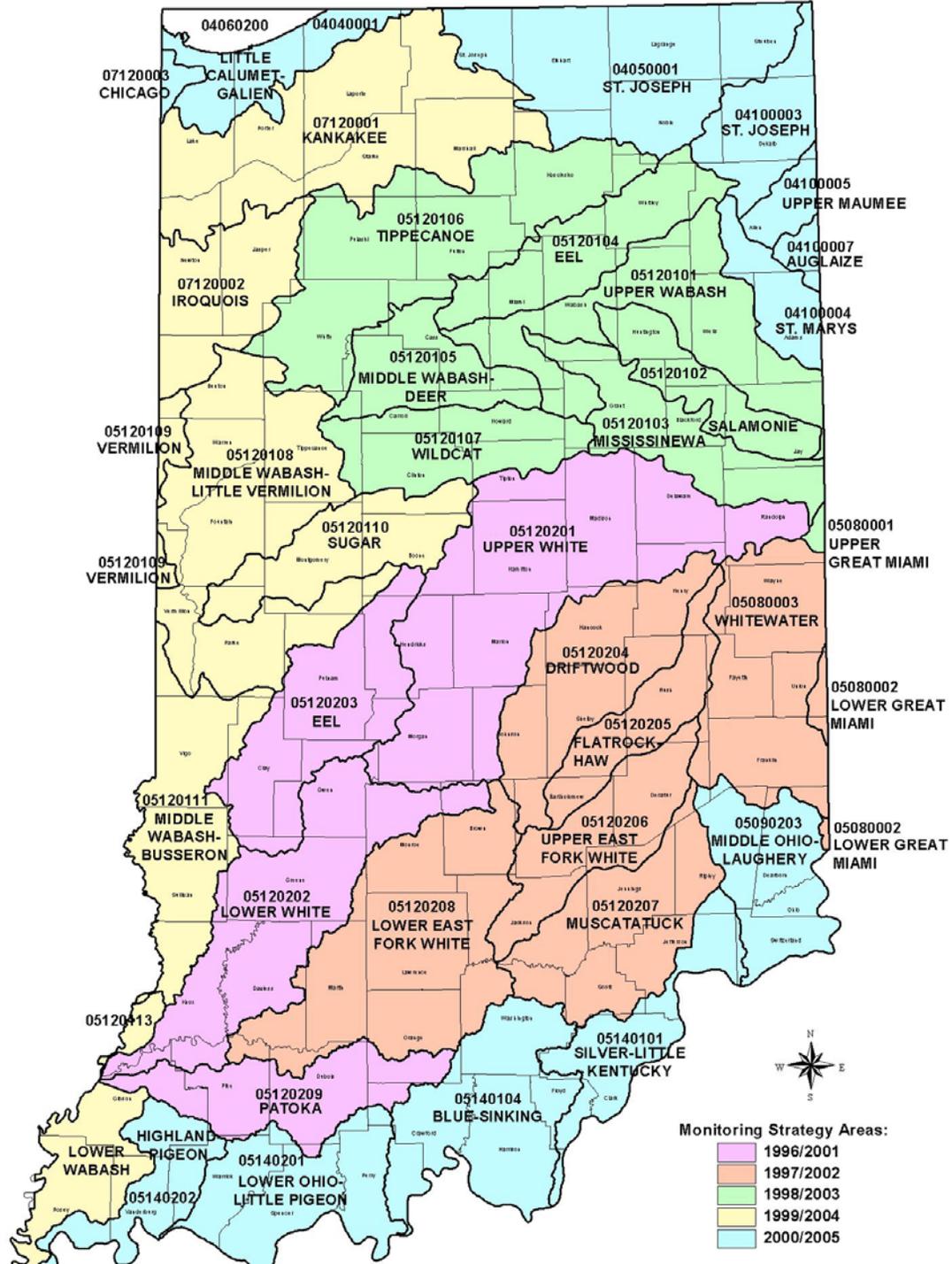


IDEM Budget

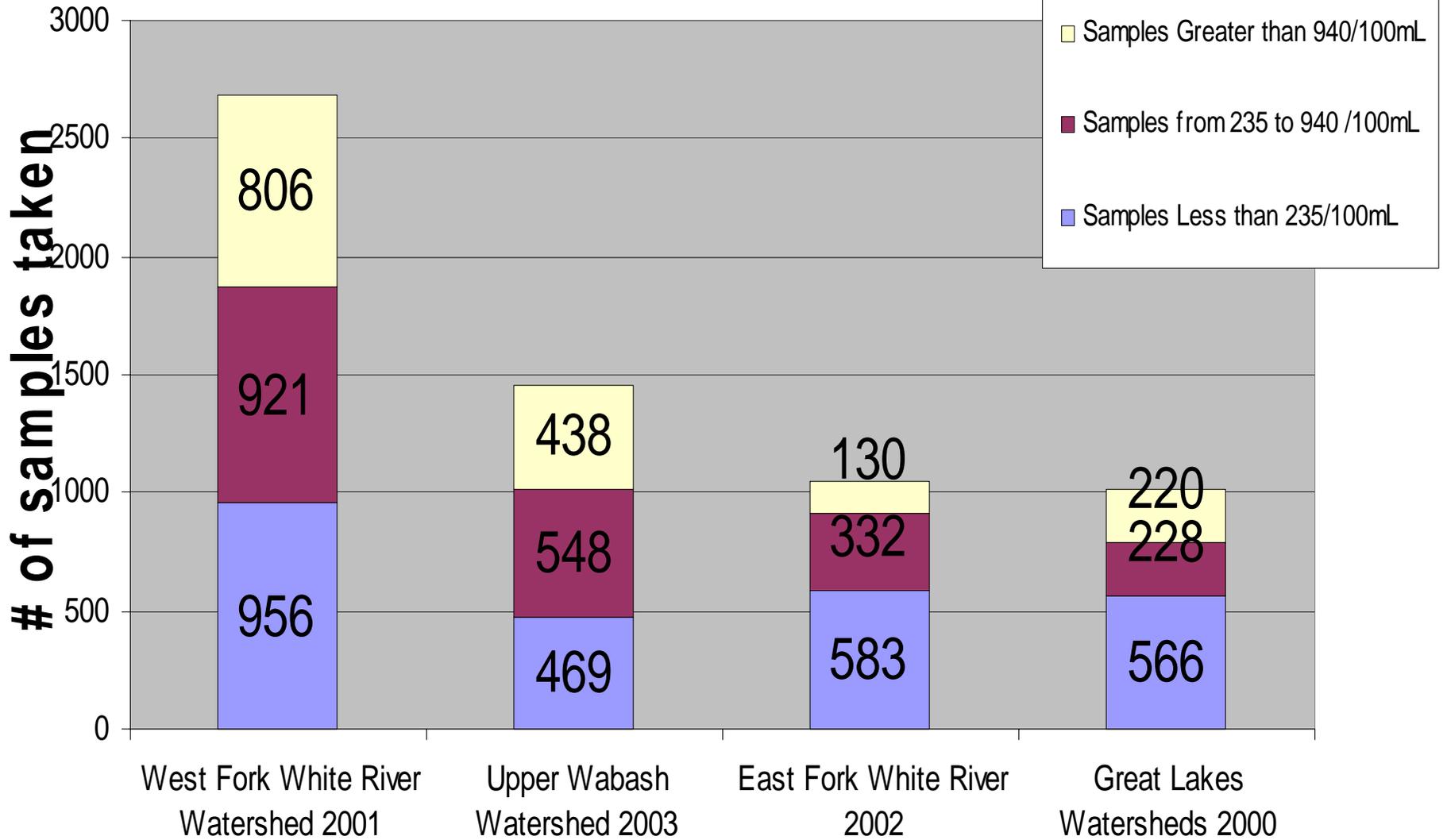
- 2000 Chevy Van w/Conversion = \$28,000
- Lab Equipment = \$10,000
- Supplies = \$7,000
- Grand Total = ~ \$45,000

IDEM's *E.coli* Monitoring Program Description

- Statewide Study Area
 - Surface water: Rivers, streams and lakes
- Sites selected are known recreational and public access areas
- Each location is sampled five times equally spaced over a 30-day period



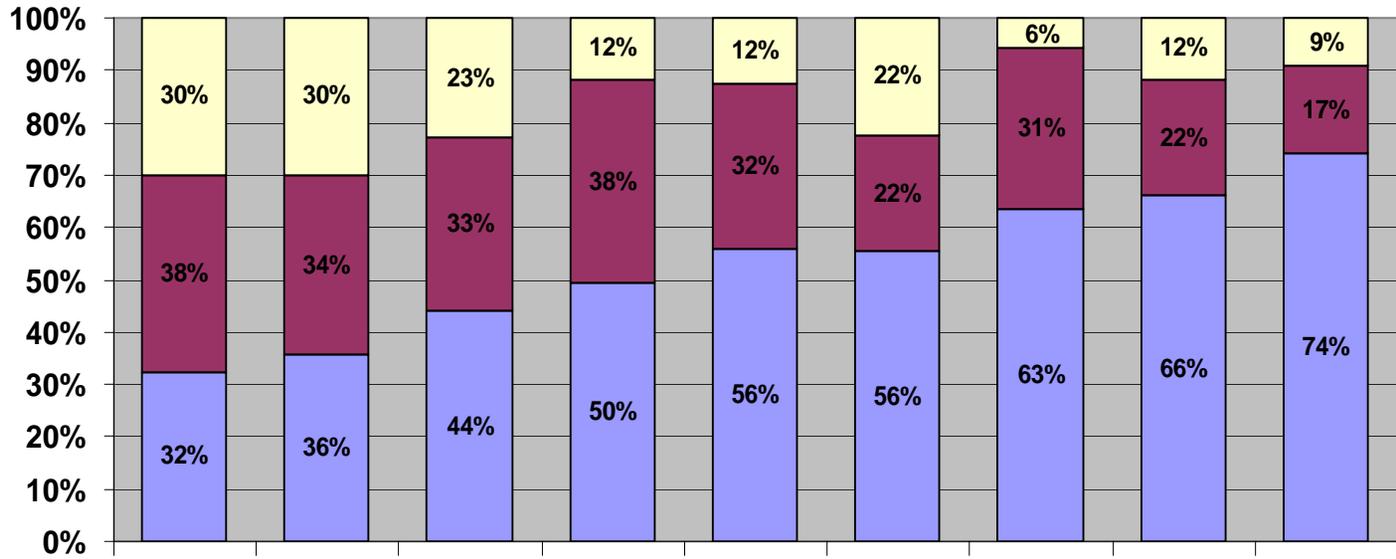
Single samples



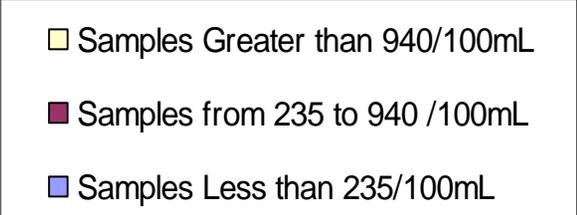
Watersheds



Single E. coli Sample Results for Indiana Watersheds 2000-2003



Upper Wabash Watershed 2003
 West Fork White River Watershed 2001
 Kankakee & Illinois Fixed Stations
 Great Miami Watershed 2002
 East Fork White River 2002
 Lower Wabash Watersheds 2000
 Ohio Tribes 2000
 Patoka Watershed 2001



ORSANCO's Sampling Plan

- Sampling the entire Ohio River (981 miles) in three surveys
- 3 point cross sections
 - Every 5 miles
 - On all major tribs (> 1000 sq. miles)
 - Downstream of all POTWs > 0.5 MGD
- Cover entire reach in 1 week
- Sample 5 consecutive weeks

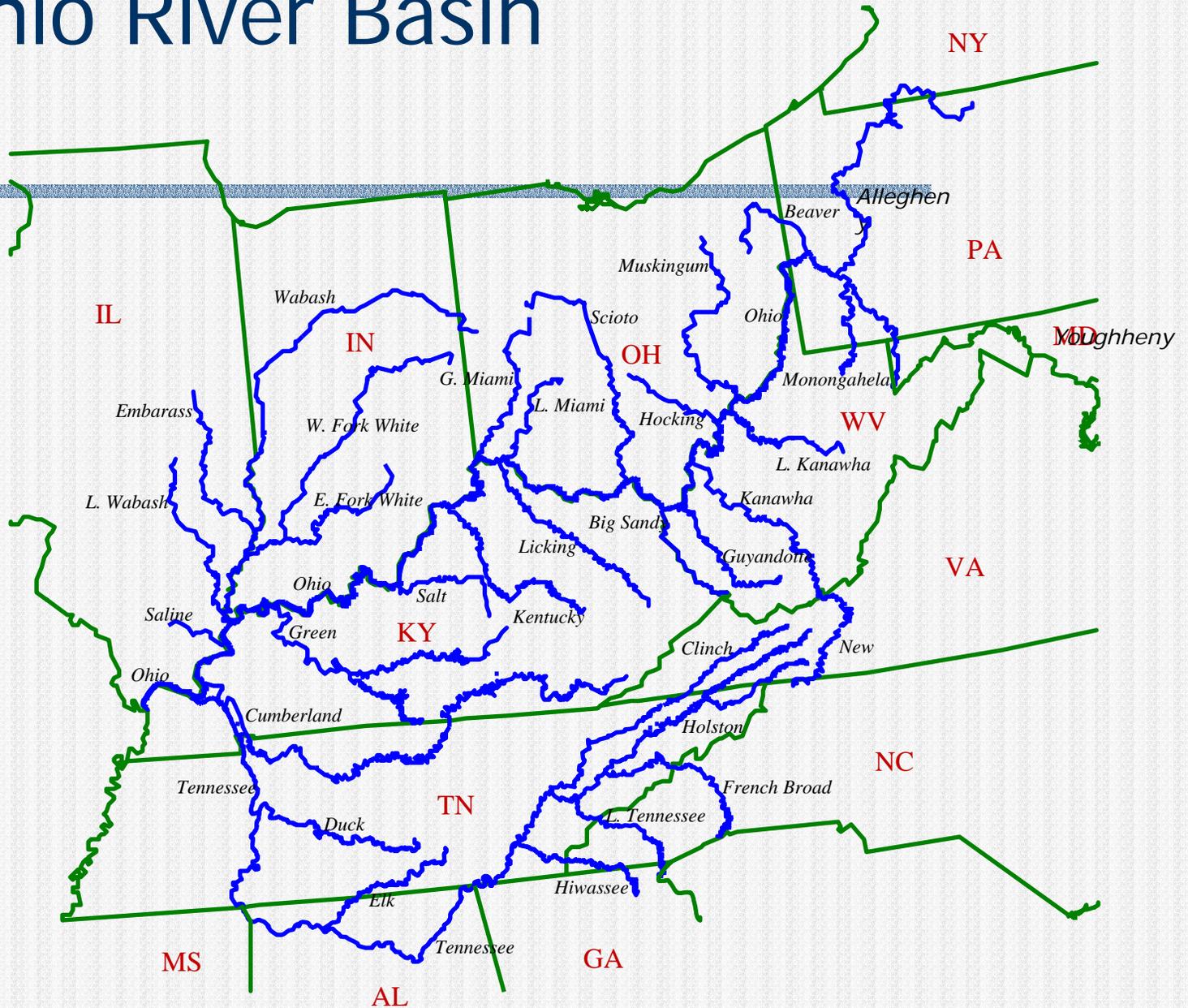
ORSANCO's Budget

- Mobile Lab – Ford E-450 Cutaway Van Cab with 17' box = \$94,000
- Equipment = \$15,000
- Supplies for 4600 samples w/ two dilutions per sample = \$55,000
- Grand Total = ~ \$164,000

ORSANCO's Sampling Plan

- Two surveys have been completed:
 - Pittsburgh to R.C. Byrd L&D (280 river miles)
 - R.C. Byrd L&D to Salt River (350 river miles)
- Third survey began May 3rd 2004
 - Salt River to Mississippi River

Ohio River Basin



ORSANCO

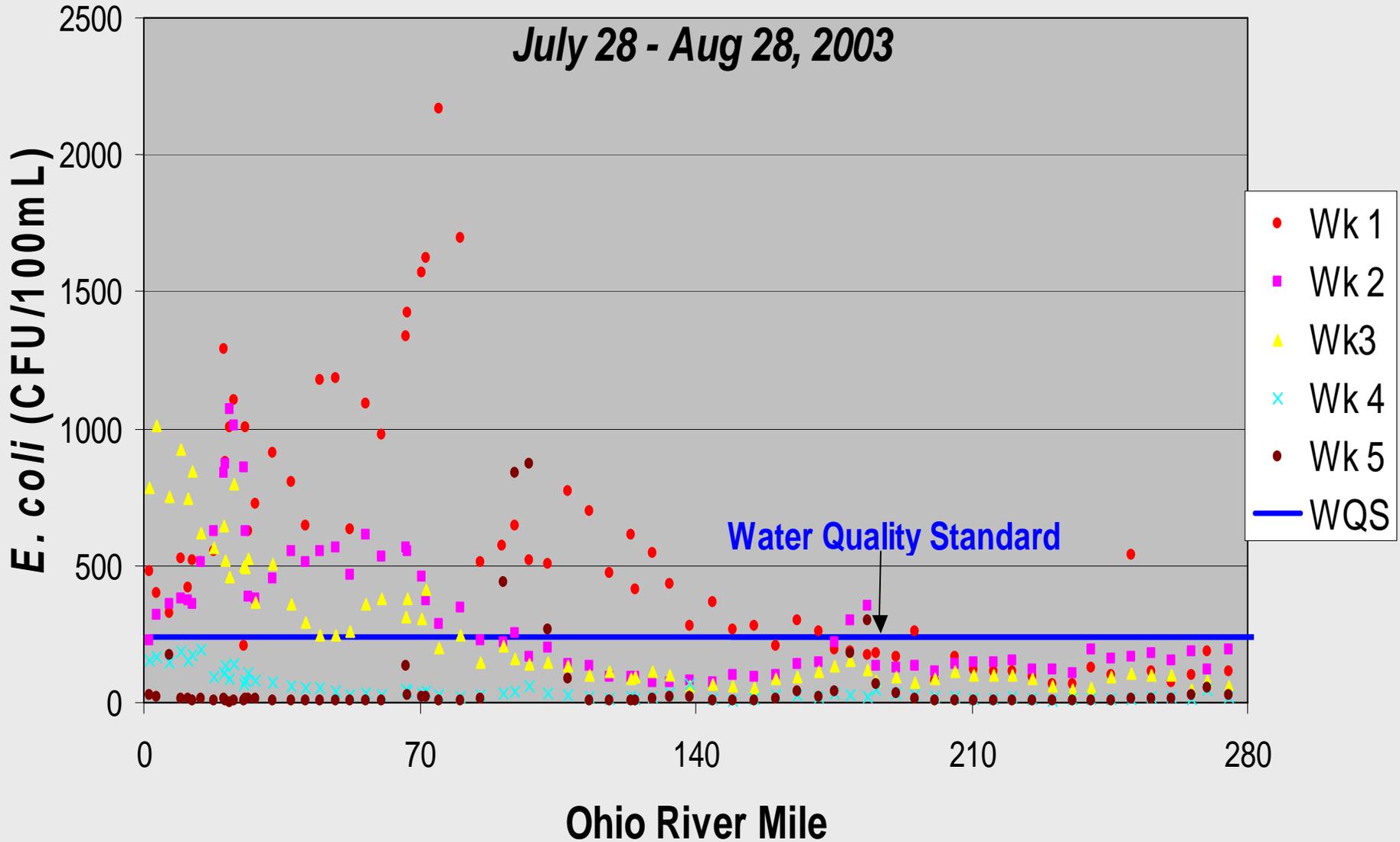
Survey Stats

- 825 cross sections completed
- 2950 samples collected
 - Includes duplicates
- 5800 samples analyzed
 - Includes dilutions + quality controls
- Contract lab samples analyzed for E. coli and fecal coliform (~ 20%)

Upper River Bacteria Survey

Cross-Sectional Mean

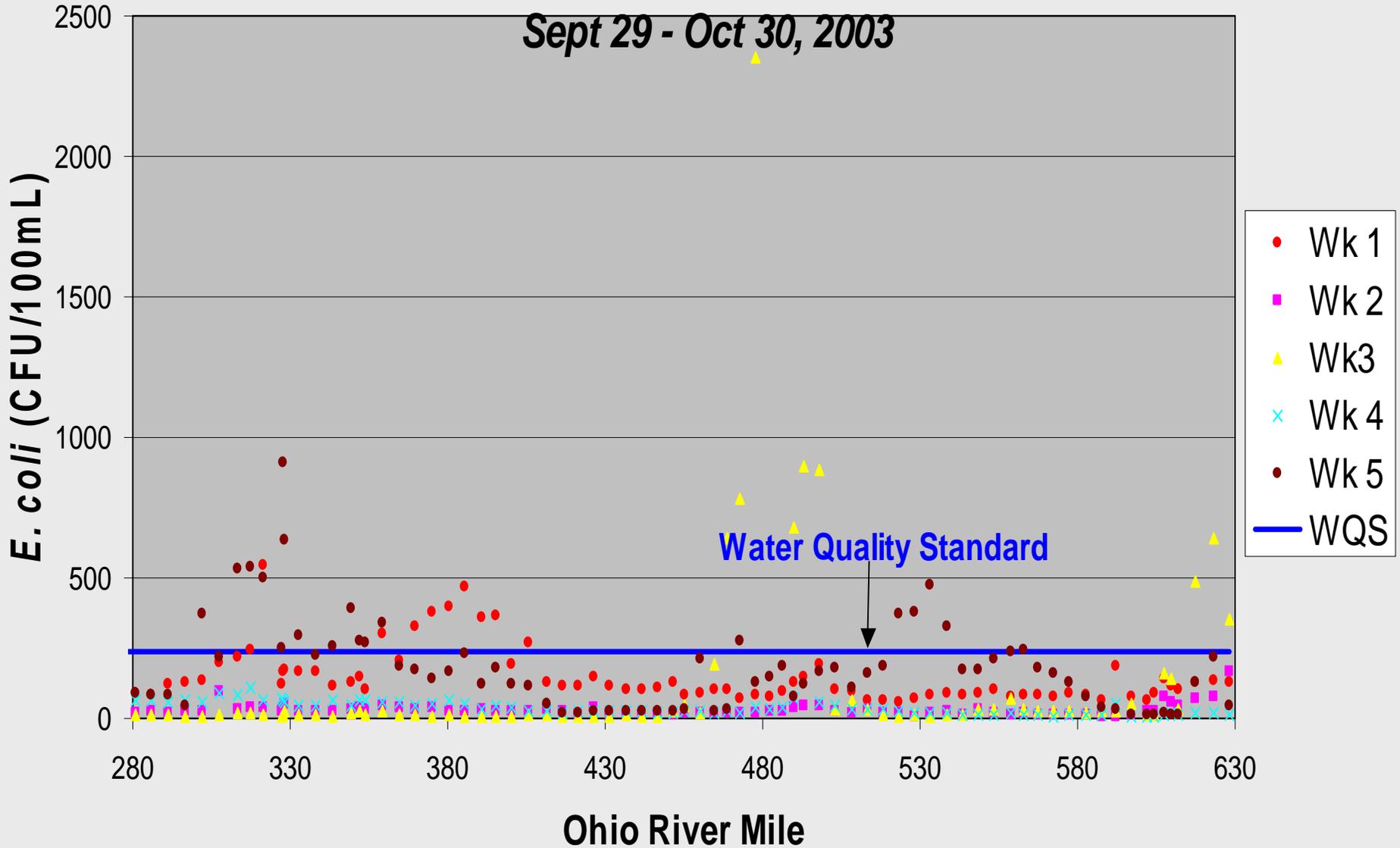
July 28 - Aug 28, 2003



Middle River Bacteria Survey

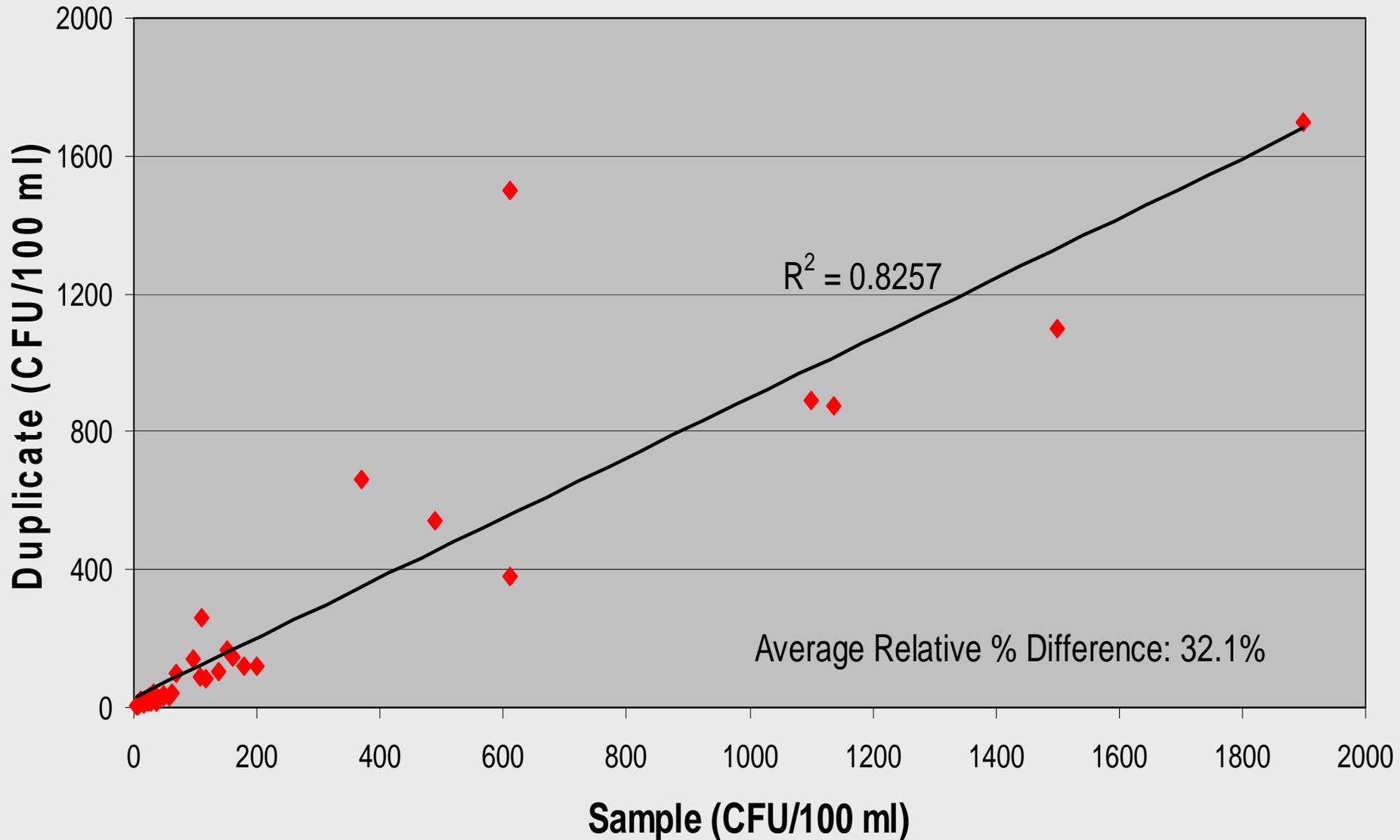
Cross-Sectional Mean

Sept 29 - Oct 30, 2003



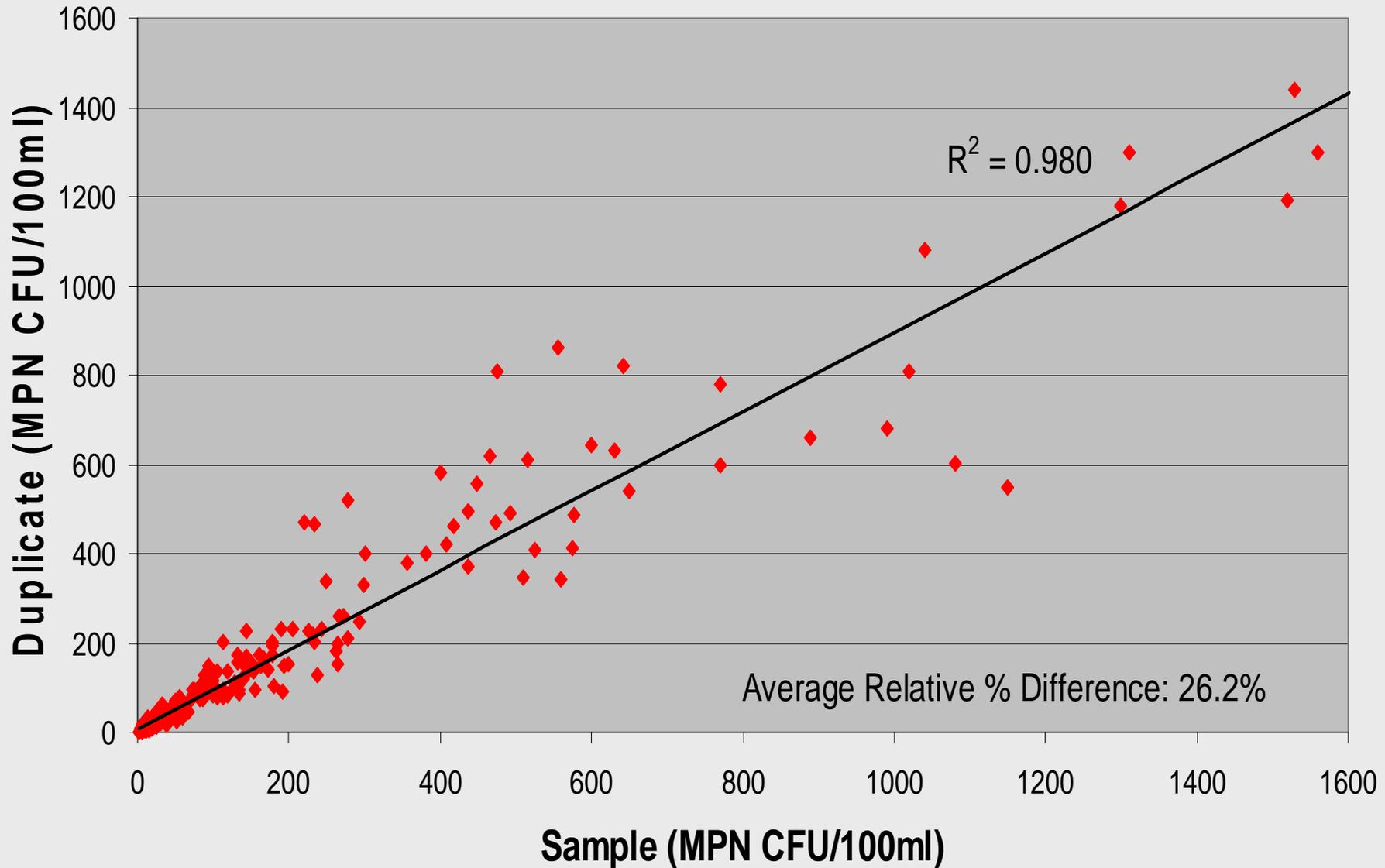
Contract Lab Duplicate Analysis

E. coli by Membrane Filtration



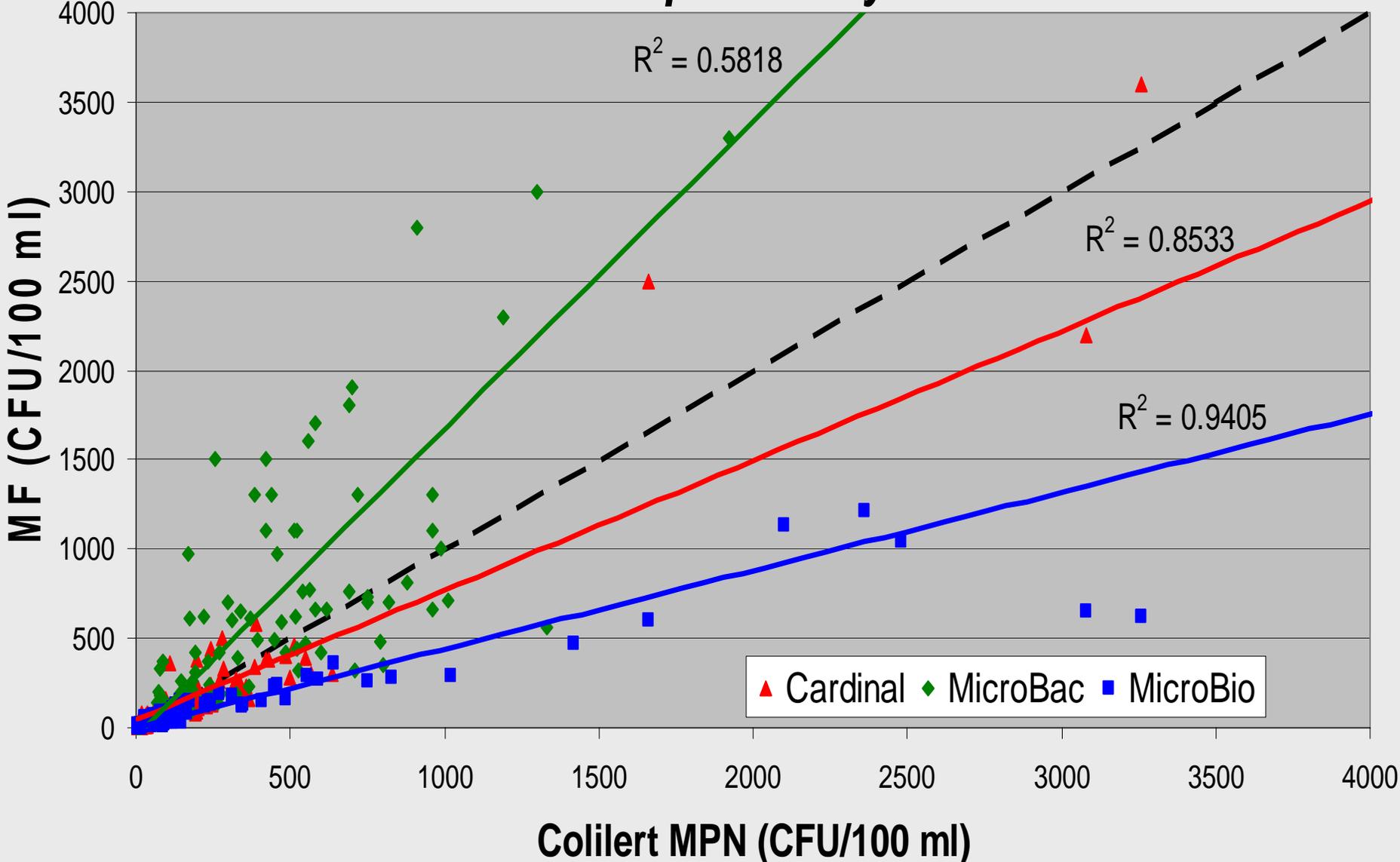
Mobile Lab Duplicate Analysis

E. coli by Colilert



Colilert vs Membrane Filtration

E. coli Comparison by Lab



Membrane Filtration vs. Colilert Comparison to *E. coli* Standard

	MF Exceed	MF No Exceed
Colilert Exceed	91 19.4%	25 5.3%
Colilert No Exceed	13 2.8%	340 72.5%