

# ***Fecal Coliform Bacteria Testing in the Frank & Poet Creek: Southgate, Michigan***

## **I. Purpose:**

Fecal coliform bacteria are present in human waste and the waste of other animals. During rainstorms, the volume of effluents from sanitary and storm sewers may be too great for the Wayne County Waste Water Treatment Plant to handle. As a result, the flow of sewer waters to the treatment facility are slowed or halted, creating combined sewer overflows (CSOs) and the diversion of untreated raw sewage into local waterways. The Sutliff-Kenope Drain, with potentially many sewer connections Downriver, is a suspected source of CSOs emptying into the Frank & Poet Creek at the Southgate Anderson Nature Center. The purpose of these tests, therefore, is to check the Frank & Poet Creek for the presence of fecal coliform bacteria at the Sutliff-Kenope tie-in to the Frank & Poet Creek and immediately upstream and downstream from the site.

## **II. Hypothesis:**

The greatest density of fecal coliform bacteria will be found in samples taken from the opening of the Sutliff-Kenope Drain; lowest concentrations of bacteria will be measured in samples taken upstream from the drain; while, bacterial concentrations downstream will diminish as distance from the drain increases.

## **III. Materials:**

- |                                   |                                 |
|-----------------------------------|---------------------------------|
| -Sterile Petri Dishes             | -Frank and Poet Creek Samples   |
| -Graduated Cylinder               | -m-FC Growth Media              |
| -Pipettes                         | -Sterile Buffered Water         |
| -Incubator                        | -Deionizer Water (control)      |
| -Filter Funnel Manifold Apparatus | -Isospropyl Rubbing Alcohol     |
| -Tweezers                         | -Sterile .07mm Filter membranes |
| -Vacuum pump                      |                                 |

## **IV. Procedure:**

1. Using anti-bacterial soap, wash five 500-ml plastic sample bottles.
2. Wash sampling scoop with antibacterial soap.
3. Using latex gloves, collect water samples from the Outfall of the Sutliff-Kenope Drain flowing into the Frank and Poet Creek, two sites upstream from the drain, and two sites downstream from the drain.
4. Prepare 0.1, 0.01, 0.001 serial dilutions using 11-ml of collected sample and 3 bottles of 99-ml sterile-buffered water, making sure to shake samples vigorously (approx. 25 times) before each dilution.

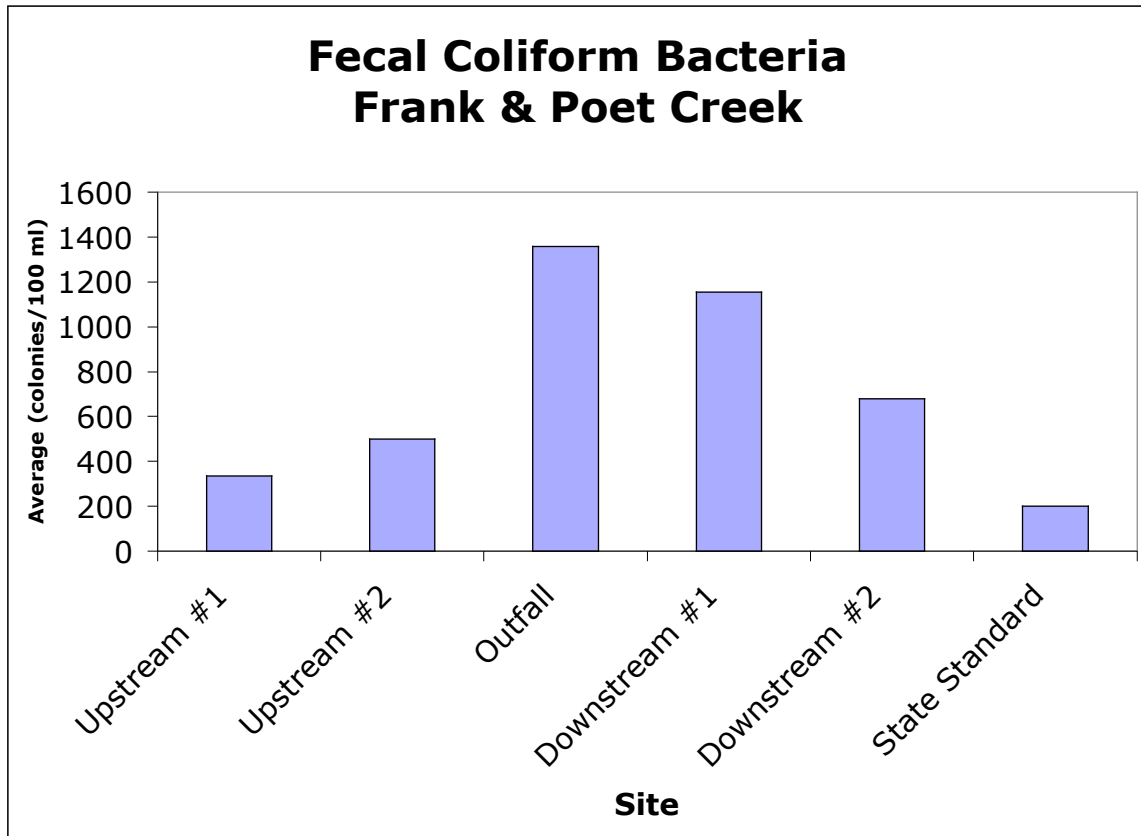
5. Prepare three sterile petri dishes by breaking open three separate m-FC growth media ampules and pouring them onto the absorbent pads in each of the three petri dishes. Swirl dishes to evenly distribute media.
6. Place a sterile filter membrane, using tweezers sterilized with rubbing alcohol, onto each of three filter funnels connected to the filter funnel manifold.
7. Pour 100-ml of the 0.001, 0.01, 0.1 dilution samples through the filter funnels and filter samples with the aid of a vacuum pump.
8. Remove filter membranes with sterilized tweezers and place on appropriately labeled petri dishes, making sure that each membrane lies flat on the absorbent pads saturated with m-FC growth medium.
9. Invert petri dishes and place in incubator and incubate at 44°C for 24 ± 2 hours.
10. Count all blue colonies; and, multiply result by correct dilution factor and average results for each site.
11. Repeat steps for all five samples, being sure to sterilize filter funnels with isopropyl alcohol prior to filtering each new sample.
12. Repeat steps for three 100-ml samples of deionized water.
13. Record and graph data.

**V. Data:**

| Frank & Poet<br>Creek Site | Sample Serial Dilutions |      |       |
|----------------------------|-------------------------|------|-------|
|                            | 0.1                     | 0.01 | 0.001 |
| Upstream #1A               | 38                      | 0    | 0     |
| Upstream #1B               | 29                      | 2    | 0     |
| Upstream # 2A              | 54                      | 8    | 2     |
| Upstream # 2B              | 46                      | 6    | 0     |
| Outfall # 1A               | 148                     | 13   | 5     |
| Outfall # 1B               | 125                     | 14   | 3     |
| Downstream # 1A            | 95                      | 10   | 1     |
| Downstream # 1B            | 157                     | 11   | 0     |
| Downstream # 2A            | 70                      | 8    | 1     |
| Downstream # 2B            | 66                      | 7    | 0     |

| AVERAGE FECAL COLIFORM (Colonies/100 ml) |         |
|--|---------|
| Site                                     | Average |
| Upstream #1                              | 335     |
| Upstream #2                              | 500     |
| Outfall                                  | 1358    |
| Downstream #1                            | 1155    |
| Downstream #2                            | 680     |
| State Standard                           | 200     |
| Deionized water controls (3)             | 0       |

## VI. Results:



## VII. Discussion:

The results reveal unsafe levels of fecal coliform bacteria in the Frank & Poet Creek. The greatest concentration of coliform bacteria was at the outfall of the Sutliff-Kenope drain, as hypothesized. The data shows a trend that is also in agreement with the hypothesis that bacterial concentrations will be lowest in the upstream portion of the Frank & Poet Creek, while concentrations will diminish downstream dependent upon distance from the drain outfall. In fact, this trend holds for the upstream samples as well.

All sites tested exceeded state of Michigan standards for body contact (200 colonies/100 ml sample). The high levels of fecal coliform bacteria imply that there is a public health safety concern for this portion of the Frank & Poet Creek. It is recommended that the city of Southgate, Wayne County and state of Michigan (Department of Environmental Quality) do further testing on this drain to confirm testing results; and, if confirmed, to study means for addressing, in a timely manner, the excessive fecal coliform contamination into the Frank & Poet Creek ecosystem. Rectification of this matter would support the goal of creating and preserving a clean and healthy Southgate Anderson Nature Center.

**Submitted By: Southgate Anderson H.S. Environmental Science Classes (Hr. I & II)**  
**Testing Dates: 4/23/04-4/24/04**