

**TO:** Michael C. Van Milligen, City Manager  
**FROM:** Gus Psihoyos, City Engineer  
**DATE:** December 3, 2015  
**SUBJECT:** US EPA Urban Waters Small Grant for Bee Branch Creek

### **INTRODUCTION**

The purpose of this memorandum is to seek authorization to apply for the US EPA Urban Waters Small Grant in order to expand the City's E. coli bacteria monitoring in the Bee Branch Creek.

### **BACKGROUND**

Bacteria are single-celled organisms that are the most numerous organisms on earth. They are microscopic in size; over five million could be placed on the head of a pin. Escherichia coli (E. coli) is one subgroup of fecal coliform bacteria which is bacteria that lives in the intestinal tract of warm-blooded animals and originates from animal and human waste.

The EPA considers E. coli testing as one of the best indicators for the presence of potentially harmful bacteria. While the presence of E. coli does not establish if there are harmful bacteria, it has proven to be an easy and economical method for assessing the likelihood of human health risks due to bacterial in surface waters. Measuring the presence and the levels of E. coli in a stream do not give an indication of the source of the bacteria. But it is the first step in investigating the watershed for potential sources.

Common sources of E. coli Bacteria in water can originate from the intestinal tracts of both humans and other warm-blooded animals, i.e. pets, livestock, and wildlife. Animal sources of fecal coliform bacteria include manure spread on land, livestock in runoff or in streams, improperly disposed farm animal wastes, pet wastes (dogs and cats), wildlife (deer, elk, raccoons, etc.), and birds (geese, pigeons, ducks, gulls, etc.). Human sources include failing septic tanks, leaking sewer lines, and urban storm water runoff.

The USEPA recommended standards for E. coli in fresh water bodies for various uses is shown below. The statewide standard in Iowa was set to match the acceptable limits for swimming.

	Designated Swimming Area	Moderate Swimming Area	Light Swimming Area	Infrequent Swimming Area
E. coli (CFU/100mL)	235	298	410	576

Even with good watershed management measures, there will always be fecal material in the environment and the presence of E. coli in surface waters.

## **DISCUSSION**

### **Bee Branch E.coli Monitoring**

Bee Branch E.coli monitoring was done back in 2012 and 2013 as part of the City's effort to understand the water quality of creeks within the City potentially impacted by stormwater runoff as required by the City's NPDES permit. The monitoring followed the Iowa Department of Natural Resources (IDNR) IOWATER protocol which involves a rudimentary but effective means to determine the presence of E.coli and roughly to what extent. A similar effort was undertaken in the Catfish Creek. But in contrast, the E.coli monitoring done on the Catfish Creek was funded through a partnership with the Soil and Water Conservation District that allowed more sophisticated, more expensive testing such as utilizing a State of Iowa certified hygienic lab following a Quality Assurance Project Plan. As a result, the Catfish Creek results can be thought to be more reliable. In the case of the Catfish Creek, a mostly rural watershed and as reported in the Catfish Creek Watershed Management Plan, some E. coli counts at the Mines of Spain exceeded 24,000 CFU/100mL, 100 times over the statewide standard of 235 CFU/100mL.

The E. coli monitoring in the Bee Branch consisted of collecting grab samples at four locations along the Bee Branch: just downstream of the Carter Road Detention Basin (1), at the Carter Road and W. 32<sup>nd</sup> Street intersection (2), at the W. 32<sup>nd</sup> Street Detention Basin (3), and at the 16<sup>th</sup> Street Detention Basin (4). See Attachment A. The samples were then kept in a Styrofoam box in an attempt to keep them at a constant temperature of around 90 degrees for 48 hours. E. coli were then placed in a petri dish and counted. The results are shown in Attachment B.

The presence of E. coli was not unexpected. According to the IDNR, E. coli has been detected across the state in 75% of all water quality samples they have collected since 2000 with counts as high as 920,000 CFU/100mL. Due to the nature of the test, the variability of the results was also expected. Some samples showed E. coli in excess of the statewide standard while others collected at the same location tested below the statewide standard.

Because of the variability inherent in the testing, each sample is tested three times and an average is reported. Some samples (see samples 5, 7, 11, 13, etc.) tested both above and below the statewide standard. While the average E. coli was found above the 235 CFU/100mL for eleven of the sixteen samples, more than half (nine of the sixteen) showed average counts below the limits recommended by the EPA for "infrequent swimming area".

In the case of the samples collected at the Carter Rd Detention Basin, further testing indicated that the elevated E. coli counts could have been caused by a leaking sanitary sewer which was subsequently lined eliminating it as a potential source. All of the samples collected and tested were downstream of the lined sanitary sewer. Three of the

four samples taken at the W. 32<sup>nd</sup> Street Detention Basin were below the limits recommended by the EPA for an “infrequent swimming area.” Two of the four samples taken from the Lower Bee Branch Creek at the 16<sup>th</sup> Street Detention Basin were below the limits recommended by the EPA for “infrequent swimming area.” Additional E. coli monitoring planned for 2016 will help verify if the sewer was the source or if the E. coli is from wildlife living within the wooded detention basin.

### **US EPA Urban Waters Small Grant Application**

Sophisticated tests have been developed that use DNA markers to determine the source of bacteria (i.e. bird, raccoon, deer, human, etc.). The US EPA Urban Waters Small Grant is an excellent opportunity to secure funding for the testing. The grant also focuses on underserved communities, which ties in to the location of the Bee Branch Creek day-lighting project.

The testing effort proposed is \$50,198. This includes a cost share match of \$9,868 which can be in-kind labor costs, including volunteers. Federal dollars for this project include only material items, such as shipping samples to the lab, lab costs for analysis, and public educational flyers. Costs for lab have been determined to be the lowest available. The one in-person conference will be paid for as part of the cost share match. The cost breakdown is as follows:

	EPA Funding	Cost Share / Match
3 Volunteer Staff @ 80 hrs. (major activities)		\$2,400.00
8 Volunteer Staff @ 40 hrs. (monitoring + mtg)		\$3,200.00
Project Manager @ 80 hrs.		\$2,360.00
Project Manager Fringe Benefits		\$708.00
Bacteria Source Testing	\$36,750.00	
Sample Shipping	\$1,080.00	
Public Educational Materials	\$2,500.00	
Travel Expenses for In-Person Conference		\$1,200.00
<b>Totals</b>	<b>\$40,330.00</b>	<b>\$9,868.00</b>
<b>Total Grant Amount Including Cost Share</b>	<b>\$50,198.00</b>	

If successful, the timeline of the grant would be as follows:

- September 2016 - assemble for a kickoff meeting ;
- September 2016 to April 2017 –attend the Learning Network conference call;
- October 2016 to April 2017 –attend two online training webinars;
- May / June 2017 – attend the in-person Urban Waters Learning Network training session;
- May 2017 to August 2017 –collect samples and send to lab for analysis; and
- August 2017 to October 2017 – assemble to discuss lab results and identify the potential need for future projects to address bacteria reduction.

**REQUESTED ACTION**

I respectfully request adoption of the attached Resolution approving an application for a US EPA Urban Waters Small Grant in order to secure funding to identify the source of the *E. coli* bacteria found in the Bee Branch Creek and establishing the City Manager as an authorized representative of the City regarding the grant.

Attach.

Prepared by Deron Muehring

Cc: Denise Ihrig, Environmental Engineer  
Deron Muehring, Civil Engineer  
Dean Mattoon, Engineering Technician