

## **Request for Renewal of Funding for Operation of the Tributary Loading Station on the Scioto River in Calendar Year 2016 and Interpretation of Water Quality Data**

Submitted to  
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Department of Public Utilities  
Division of Sewerage and Drainage  
The City of Columbus, Ohio

by  
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**Period Covered by this Request: 1 January 2016 through 31 December 2016**

### **Work to be Accomplished:**

For the past two years, the City of Columbus has entered into agreements (contracts EL016292 and EL017003) with the National Center for Water Quality Research (NCWQR) of Heidelberg University whereby the City has funded the operation of a water quality monitoring station on the Scioto River at Chillicothe from 1 January 2014 through 31 December 2015 and has collaborated with the Division of Sewerage and Drainage (DSD) in computing nutrient loads in the Scioto River. The water quality information produced by our operation of this station and our analysis of NPDES data in the Scioto watershed through these agreements has proven to be highly valuable to DSD. Modification #1 of Contract Number EL016292 dated 29 April 2015 states that “the work for the years 2014 through 2016 is considered as the first phase. It will continue as an annual ongoing contract.” Therefore, we hereby request that the City of Columbus provide funds to support our ongoing work with regard to the Chillicothe station in calendar year 2016 in continued close collaboration with DSD personnel.

We request a total of \$46,100 in 2016. That level of funding will permit us to do the following:

- (1) Continue to produce water quality data through our intensive sampling protocol, analysis of suspended sediments and nutrients (including forms of phosphorus and nitrogen as well as other nutrients), computation and characterization of nutrient and suspended sediment concentrations and loads from the Scioto River to the Ohio River;
- (2) Upload the Scioto River data to our public data download website and interpret the data as part of an omnibus comparative report on all of the Ohio River and Lake Erie tributaries that comprise the Heidelberg Tributary Loading Program (HTLP);

(3) Analyze total dissolved solids, alkalinity and hardness in a subset of samples collected at the Chillicothe station during both base flow and storm runoff events as coordinated with DSD personnel;

(4) Calculate and compare point-source and nonpoint-source loads of total phosphorus and other nutrients of interest to DSD upstream of the sampling station at Chillicothe.

### **Progress to Date:**

During the first two years of this agreement (calendar years 2014 and 2015), we have accomplished the following:

(1) The suspended sediment and nutrient data generated from 1 January 2014 through 30 June 2015 have been uploaded onto the NCWQR data download web site. Data for the period July – September 2015 will be posted to the site in November 2015, and the data for the fourth quarter will be posted in February 2016. A comparative report on our Scioto River results in relation to the other tributaries in our program is presently in an advanced draft stage and will be submitted to you in January 2016.

(2) Our chemical laboratory staff coordinated with Melodi Clark in the DSD laboratories regarding the analytical methods the NCWQR has used to analyze total dissolved solids, alkalinity and hardness. Also, in coordination with Dr. Fang Cheng, we developed a schedule for collecting those samples in 2015.

(3) NCWQR staff members Dr. Rem Confesor and Jake Boehler and an advanced undergraduate student processed NPDES data for the Scioto watershed upstream of Chillicothe obtained from the Ohio EPA for 2012 (latest available). Data for the Jackson Pike and Southerly plants were later updated to 2014 by the DSD. Point-source load calculations of total phosphorus, total suspended solids, nitrate+nitrite, total Kjeldahl nitrogen, and dissolved phosphorus were then calculated from these two stations and were compared with NCWQR's measured total load. Relative contributions of these parameters between point and nonpoint sources were then determined. Dr. Confesor will submit a report of these results to DSD by December 31, 2015.

### **Rationale**

Measurements of pollutant export from watersheds are used to compare the amounts of pollutants derived from diffuse *nonpoint* sources, such as agricultural and urban storm runoff, with contributions from *point* sources, such as sewage treatment plants and factories. Detailed knowledge of concentrations and loads of nutrients and sediments exported through tributaries to the Ohio River and Lake Erie has added greatly to understanding the impacts of rural, largely agricultural land management practices on stream water quality and ultimately the quality of both the Ohio River and Lake Erie. This information has also permitted detection of trends in water quality, especially changes in dissolved phosphorus loads. Dissolved phosphorus greatly influences the development of harmful algal blooms in inland lakes and reservoirs, Lake Erie, and even the Ohio River. Forms of nitrogen along with phosphorus have a particularly large impact on the growth of algae and the yearly development of an oxygen-devoid "dead zone" in the Gulf of Mexico. Heidelberg's data enable direct assessment and evaluation of the watershed-scale effectiveness of BMP implementation programs aimed at nutrient load reductions from Ohio watersheds to the Ohio River, Grand Lake St. Marys, and Lake Erie. Scientists at numerous universities who are developing land use-water quality models for Lake Erie rely heavily on HTLP data to calibrate and validate their models. More information about findings of the HTLP and the use of HTLP data by others can be read in our most recent annual reports at [www.heidelberg.edu/ncwqr](http://www.heidelberg.edu/ncwqr) and in a series of documents in the "Focus on Phosphorus" menu at the same site.

## Work Plan

Our work plan for 2016 is identical to the work plan being accomplished in 2015:

1. We will maintain one refrigerated automated Isco sampler inside the monitoring building. The sampler will collect one discrete sample every eight hours year-round. Samples will be shipped to us by our cooperator at the Ross County Soil and Water Conservation District weekly (except the last week in December). Heidelberg technicians will visit the site as needed, usually one to two times a year, to perform required maintenance and repairs. We have an excellent rapport with the Ross SWCD, and they occasionally volunteer in ensuring that the station is operational and has minimal “down time”.
2. As we have done since 1996, we will analyze 500 ( $\pm$  about 50) samples in calendar year 2016, the exact number dependent on the number and duration of storm runoff events during the year. (We analyzed 475 samples in CY 2014 and 516 samples in FY 2015.) We will analyze daily samples and additional samples as needed to accurately characterize storm runoff loads of the analyzed compounds. All analyses conform to methods specified in our U.S. EPA-approved QAPP. Several of our laboratory technicians (J. Kramer, E. Ewing, B. Merryfield) and research scientists (A. Roerdink, L. Johnson) are certified by Ohio EPA as Level 3 Qualified Data Collectors for chemical water quality assessment. We will analyze all water samples for specific conductance and the concentrations of total phosphorus, dissolved (soluble) reactive phosphorus, nitrate nitrogen, nitrite nitrogen, total Kjeldahl nitrogen, ammonia, chloride, sulfate, dissolved silica, and total suspended solids.
3. We will continue to upload our concentration data and the corresponding flow data (provided by USGS) for each analyzed sample on our tributary data download website on a quarterly basis following QA/QC analysis, and we will make the data available more frequently upon special request. After the end of the water year (30 September 2016), we will calculate the annual loads, unit area loads, flow-weighted mean concentrations and time-weighted mean concentrations for each parameter. We will provide an interpretive summary of those results, with comparison to other stations in the HTLP, early in calendar year 2016 as part of our omnibus report on all of the stations in our water quality network.
4. We will continue to collaborate with DSD personnel in analyzing NPDES data and developing appropriate summaries and interpretive reports of the information.
5. In addition to the above tasks, the NCWQR will analyze a subset of samples collected at the Chillicothe station during 2016 for total dissolved solids, alkalinity and hardness. The number of samples, the timing of sample collections, and the specific analytical methods will be mutually agreed upon by NCWQR and DSD as before.

## Budget

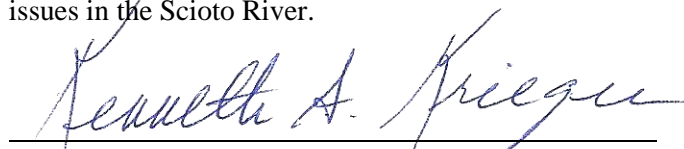
The operational costs to monitor water quality at the Chillicothe station in calendar year 2016 plus the estimated costs for the point-source load calculations and analysis of total dissolved solids, alkalinity and hardness are shown in the table below. Operational costs for the program have increased slightly above the 2015 costs, and we have increased our indirect cost charges from 28% to 35% of staff salaries and fringe benefits. Please see the table on the next page and the budget explanation that follows.

<b>1. Annual Operating Cost for the Scioto River at Chillicothe</b>	<b>Calendar Year 2016</b>
Station operation, sample collections, analyses, & data reporting (direct costs)	\$29,000
Indirect Costs (~35% of SW&B)	\$8,600
<b>Total City of Columbus Operational Costs</b>	<b>\$37,600</b>
Heidelberg match (approximate amount of indirect costs waived)	\$5,900
<b>2. Costs for Point/Nonpoint Source Load Calculations</b>	
Personnel Costs (Confesor, Boehler)	\$4,525
Indirect Costs (~35% of SW&B)	\$1,575
<b>Total City of Columbus Costs (direct costs only)</b>	<b>\$6,100</b>
Heidelberg match (waived indirect costs)	\$1,095
<b>3. Special TDS, Alkalinity and Hardness Analyses – As many as 30 samples @ \$80/sample</b>	
<b>City of Columbus – direct costs, not to exceed</b>	\$1,850
– Indirect Costs (~35% of SW&B), not to exceed	550
<b>City of Columbus Costs (direct and indirect), not to exceed</b>	<b>\$2,400</b>
Heidelberg match (amount of indirect costs waived)	375
<b>Total Request to City of Columbus, not to exceed</b>	<b>\$46,100</b>
Total Heidelberg University match	\$7,370

### Budget Explanation

1. The costs quoted in budget task 1 do not include any part of USGS program costs. The USGS operates and maintains the hydrological instrumentation that measures river stage and discharge. NCWQR does pay all electrical bills for the station, currently approximately \$100 per month.
2. Heidelberg University has an approved indirect cost rate set by the U.S. Department of Health and Human Services equal to 59.0% of salaries, wages and fringe benefits (SW&B). However, the NCWQR will charge indirect costs to the City of Columbus at the rate of 35% of SW&B. Therefore, the NCWQR will waive indirect costs equivalent to 24% of SW&B.
3. In budget task 3, we have quoted a “not to exceed” total dollar amount, as the number of samples to be analyzed is not exactly known at this time.

We look forward to further collaboration with you as we continue to address important water quality issues in the Scioto River.



Kenneth A. Krieger  
Director