NATIONAL CENTER FOR WATER QUALITY RESEARCH

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Request for Renewal of Funding for Operation of the Tributary Loading Station on the Scioto River in Calendar Year 2015 and Computation of Point-Source and Nonpoint-Source Loads

Submitted to
Dr. Fang Cheng and Mr. Dax J. Blake
Department of Public Utilities
Division of Sewerage and Drainage
The City of Columbus, Ohio

by
Kenneth A. Krieger, Ph.D., Director

12 November 2014

Period Covered by this Request: 1 January 2015 through 31 December 2015

Work to be Accomplished

This year the City of Columbus entered into an agreement (contract EL016292) with the National Center for Water Quality Research (NCWQR) of Heidelberg University whereby the City is funding the operation of our water quality monitoring station on the Scioto River at Chillicothe from 1 January 2014 through 31 December 2014. For many years operation of this station by the NCWQR was funded through the Ohio Department of Natural Resources. However, a shift in ODNR's funding priorities in 2013 left us without support for the Chillicothe station, and the City of Columbus agreed to support the station in place of the state funding this year. This letter constitutes our request for your continued support for the 2015 calendar year, as provided for in Paragraph 1, Contract Term, of the signed agreement.

The requested amounts represent the same annual funding level for the Chillicothe station as in 2014. That level of funding will permit:

(1) continued operation of 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, and production of a report on our findings in comparison with the other tributaries included in the Heidelberg Tributary Loading Program (HTLP);

(2) comparison of point-source and nonpoint-source loads of total phosphorus and other nutrients of interest to DSD upstream of the sampling station at Chillicothe;

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

Progress to Date

During the first year of this agreement (calendar year 2014), we have accomplished the following:

(1) The suspended sediment and nutrient data generated from 1 January 2014 through 30 June 2014 have been uploaded onto the NCWQR data download web site. Data for the period July – September will be posted to the site in November 2014, and the data for the fourth quarter will be posted in February 2015. 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 2015.

(2) Our chemical laboratory staff have coordinated with Melodi Clark in the DSD laboratories regarding the analytical methods the NCWQR will use to analyze total dissolved solids, alkalinity and hardness; and in coordination with Dr. Fang Cheng, we have developed a sampling protocol for the remainder of 2014 which entails collecting one low-flow sample weekly for at least four consecutive weeks in November and December 2014. Together we are in the process of developing a sampling protocol for 2015.

(3) NCWQR staff members Dr. Rem Confesor and Jake Boehler have begun to process NPDES data for the Scioto watershed upstream of Chillicothe obtained from the Ohio EPA for 2012 (latest available). That step will be followed by computation of point-source loads of total phosphorus, which they will then compare with our measured total load to determine the relative contributions of total phosphorus from point and nonpoint sources. Dr. Confesor will submit a report on the results to DSD in early 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. Detailed knowledge of concentrations and loads of nutrients and sediments exported through tributaries to the Ohio River and Lake Erie has added greatly to our understanding of 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. Data generated by the HTLP have been critical to developing and updating the lake-wide total phosphorus budget for Lake Erie. HTLP data have also permitted detection of long-term trends in water quality. For example, our program has detected a decline in the total phosphorus load from point sources associated with WWTP upgrades in the Cuyahoga River watershed since the 1980s. Dissolved phosphorus greatly influences the development of harmful algal blooms in inland lakes and reservoirs and Lake Erie; and forms of nitrogen along with phosphorus have a particularly large impact on the growth of algae and the development of an oxygen-devoid "dead zone" in the Gulf of Mexico. HTLP 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 and in a series of documents in the "Focus on Phosphorus" menu at the same site.

Work Plan

Our work plan for 2015 is identical to the work plan being accomplished in 2014:

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 (± about 50) samples in calendar year 2015, the exact number dependent on the number and duration of storm runoff events during the year. 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 sooner upon special request. After the end of the water year (30 September 2015), 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.

4. As requested by the Division of Sewerage and Drainage (DSD), we will, in addition to our usual data analysis, obtain the best available data on point source loads to the Scioto River upstream of the monitoring station at Chillicothe and will compute the proportional contributions of point-source and non-point source loads of total phosphorus and other nutrients of interest to DSD. The point versus nonpoint load comparison may be included in the interpretive summary or may be submitted as a separate report. We expect that the process, once developed in calendar year 2014 (for 2012 data), will be straightforward in future years; therefore, we have included a lower cost in the 2015 budget than for 2014.

5. In addition to the above tasks, the NCWQR will analyze a subset of samples collected at the Chillicothe station during the 2015 calendar year 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.

Budget

The operational costs to monitor water quality at the Chillicothe station in calendar year 2015 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. Please also see the budget explanation that follows.

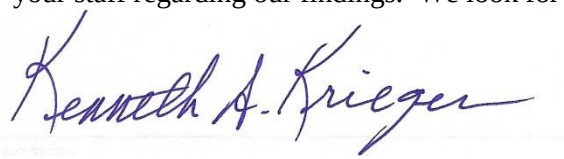
1. Annual Operating Cost for the Scioto River at Chillicothe	**Calendar Year 2015**
Station operation, sample collections, analyses, & data reporting (direct costs)	$28,000
Indirect Costs (~28% of SW&B)	$6,000
Total City of Columbus Operational Costs	**$34,000**

Heidelberg match (approximate amount of indirect costs waived)	$6,640
2. Costs for Point/Nonpoint Source Load Calculations	$2,000
Indirect Costs (~28% of SW&B)	$550
Total City of Columbus Costs (direct costs only)	**$2,550**
Heidelberg match (direct costs and waived indirect costs)	$620
3. Special TDS, Alkalinity and Hardness Analyses – As many as 20 samples @ $80/sample	
City of Columbus – direct costs, not to exceed	$1,300
– Indirect Costs (~28% of SW&B), not to exceed	300
City of Columbus Costs (direct and indirect), not to exceed	**$1,600**
Heidelberg match (amount of indirect costs waived)	330
Total Request to City of Columbus, not to exceed	**$38,150**

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 creek stage and discharge. NCWQR does pay all electrical bills for the station, currently approximately $93 per month.
2. Of the operational costs (budget task 1), the NCWQR will waive approximately $6,640 of the total calculated annual indirect costs of $12,640, which are based on a rate approved by the U.S. Department of Health and Human Services equal to 59.0% of salaries, wages and fringe benefits (SW&B). Indirect costs charged to the City of Columbus will be $6,000 (28%) of SW&B, or only 47.5% of our approved indirect costs.
3. The above quote for budget task 1 is based on an economy of scale that our present monitoring network of 16 stations provides. Were the number of stations to be reduced, per-station costs would increase because of various fixed operational costs.
4. In budget task 3, the quoted cost per sample is based on a Web survey of representative commercial laboratory charges for TDS, alkalinity and hardness, and we have quoted the lower end of the range. After analyzing the samples collected in 2014, we may find that we can reduce the cost per sample. Note that we also have quoted a "not to exceed" total dollar amount for task 3, as the number of samples to be analyzed is not exactly known at this time.

We would be happy to visit you again in early 2015, when we would make a PowerPoint presentation to your staff regarding our findings. We look forward to continued collaboration.



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