



# ROGERS WATER UTILITIES

"SERVING ROGERS - PROTECTING THE ENVIRONMENT"

January 6, 2010

Mr. John Bailey  
Arkansas Department of Environmental Quality  
ADDRESS  
CITY STATE ZIP

Re: Comments on the Draft Illinois River Phosphorus TMDL QAPP

Dear Mr. Bailey:

Rogers Water Utilities has retained Wright Water Engineers, Inc., (WWE) to review and comment on the December 15, 2009 version of the document entitled "Quality Assurance Project Plan Water Quality Modeling and TMDL Development for the Illinois River Watershed," (draft QAPP) prepared by Aqua Terra Consultants of Mountain View, California. WWE was joined in this review by Professor Marty Matlock, Ph.D., P.E., CSE, of the University Arkansas-Fayetteville, and Professor Larry Roesner, Ph.D., P.E., D.WRE of Colorado State University. The purpose of this letter is to summarize our major comments on the draft QAPP. Rogers Water Utilities would urge ADEQ to include these comments in its comments on the draft QAPP.

The draft QAPP is well written—the text is clear and logical. There are many valuable components of quality assurance proposed, and many EPA and Aqua Terra staff have been assigned to promoting quality in the overall project. Aqua Terra is highly qualified to perform the necessary modeling, and apparently has prior experience in the Illinois River watershed. The QAPP indicates that Aqua Terra may bring in additional consultants to assist them, which could be valuable. The four models that are currently under consideration for this TMDL are, in a general sense, appropriate, although our review team offers some comments (below) on potential model limitations. The QAPP appropriately emphasizes the importance of proper model calibration and validation, and specifies performance criteria. The QAPP indicates that wide-ranging data sources will be reviewed, which is essential.

We turn now to potential concerns and recommendations for the draft QAPP.

Page 1, 4th Paragraph—Is the scope of this effort limited to watershed model development or does it also include applying the model to determine any necessary point and nonpoint source phosphorus reductions?

Page 3, Section 2, provides four Project Quality Assurance/Quality Control Goals for the project. These goals are critical for legitimate policy development from complex modeling activities. However, the QAPP does not provide an explicit description of how each goal will be accomplished. For example, the goal of "Transparency" implies participation from stakeholders throughout the process.

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No mechanism has been proposed to engage stakeholders in this process, other than EPA and state agencies. The municipalities whose NPDES permits will be affected do not have a voice in this process. The Cherokee Nation, which has unambiguous jurisdiction over the Oklahoma portion of the Illinois River, does not have a voice in this process. The legitimacy of the analysis is dependent upon some level of direct participation and agreement to the process by the major stakeholders.

Page 3, Section 2—One of the stated goals for the work assignment is "Transparency." The text indicates that the documentation will make it clear which sources of data are used. It would be helpful if the documentation could also indicate which potential data sources were not used.

Page 8, Section 4.3, concerning "Dispute Resolution"—The QAPP notes that there will be "open and frank communication among members of the quality and technical staff." Although this will be important, what about open and frank communication with representatives of the state agencies and with outside parties who can offer important perspectives and data and who will be affected by the ultimate outcome of the TMDL?

Page 9, Section 5.0 "Project/Task Organization"—The first paragraph states that the objective "is to develop a scientifically robust and defensible watershed model to determine reductions in phosphorus loads needed to meet water quality standards in both states, Arkansas and Oklahoma." However, on page 14, the stated goal is limited to Oklahoma, without mention of Arkansas. Then, on page 18 in Section 7.1, the text again mentions both states. Can the draft QAPP authors please clarify?

Page 9, Section 5.0, the objective of Work Assignment (WA) 3-36 is "to develop a scientifically robust and defensible watershed model to determine reductions in phosphorus loads needed to meet water quality standards in both states, Arkansas and Oklahoma." The numeric criteria for Oklahoma are described, but not those for Arkansas. If the goal is to meet the Oklahoma standard at the Oklahoma state line, and to meet the narrative criteria of Arkansas, that should be explicitly stated. It would not be appropriate to apply Oklahoma's standard as the Arkansas standard, or to establish a daily load for both Arkansas and Oklahoma sources to meet Oklahoma's standard.

Furthermore, the decision of the U.S. Court of Appeals for the D.C. Circuit in *Friends of the Earth, Inc. v. EPA, et al.*, No. 05-5015, (April 25, 2006), and subsequent memorandum from EPA Assistant Administrator Benjamin Grumbles, the recommendation is that load allocations be made on a daily basis, unless explicitly justified otherwise. Thus, the time-step of the load allocation should be explicitly stated in the goals and justified (daily, monthly geometric mean, annual not-to-exceed, etc.).

Page 9, Section 5.1—Can Aqua Terra elaborate on the significance of its past modeling efforts in the Illinois River watershed, such as data limitations, important lessons learned from the modeling, anticipated limitations, etc.?

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On Page 9, Section 5.1—The data compilation section describes what data will be used in calibrating and validating the model(s) for load allocation. This dataset is incomplete and inadequate. No USGS sites in Arkansas are included in Figure 4, probably because this figure was the product of Storm et al., (2006). While we recognize that this does not mean that Arkansas USGS stations will not be used, it does raise questions regarding the scope and rigor of the effort for data compilation. The model cannot be calibrated effectively without the Arkansas sites.

Additional concerns are raised regarding the data temporal context for calibration and validation. For example, the City of Springdale AR completed upgrades to its wastewater treatment plant (WWTP) in 2004 that reduced TP in the outfall to Spring Creek from >5 mg/l to <1 mg/l. Only after 2005 did instream total phosphorus (TP) concentrations begin to reflect the total impact of Springdale's reductions because of stream channel sediment release of P. If the model selected for the TMDL is calibrated with pre-2004 data, it will not represent current conditions. In fact, calibrating the model under pre-2005 conditions could result in boundary condition failures for validation. Predicting what was will have little utility for developing the TMDL.

The QAPP goes on to describe nonpoint source (NPS) load estimates on Page 10. As with point source (PS), NPS loads and production activities have changed in the basin over the past 4 years. Dr. Storm's initial model was for 2005 land use. That dataset was incomplete at the time (as are almost all NPS model datasets) and is out of date now. It will not allow for contemporary assessment of loads from NPS activities. A new, recalibrated model of the entire system that incorporates the impact of the \$60 million Conservation Reserve Program (CRP) impact on riparian zone protection should be conducted. Failure to consider this and other land use management changes in the basin will undermine the legitimacy of the TMDL allocation.

Page 10, Section 5.1—How will Aqua Terra and EPA determine what assumptions will be made regarding poultry litter management practices?

Page 11, Section 5.1—Will Tenkiller Reservoir operational practices change in the future, and if so, how will this effect reservoir operations? This emphasizes the importance of the observation that the data relied upon must reflect contemporary point and nonpoint source management practices as well as anticipated (short term) management practices, such as operations of Tenkiller Reservoir.

Page 11, Section 5.1—The draft QAPP notes that, per the WA request, within 15 days following QAPP approval, Aqua Terra will complete and submit a data gaps analysis report. Is this a sufficient amount of time to develop a report of such great importance? In addition, what happens if additional data gaps emerge as the project proceeds? Will state representatives be able to comment on data gaps as the modeling effort unfolds?

Page 12, Section 5.3, provides a description of water quality model development. The goal as stated is to develop both watershed and reservoir models for this system, and to link them together. As stated, sediment fate and transport is a

key variable for watershed process modeling of TP, and is not addressed well by SWAT. HSPF has some improvements in sediment transport, but the hydrogeology of this region is Karst-dominated, with significant interflow and surface-groundwater interactions. These become particularly dominant during the critical flow period of July - September. HSPF does not simulate this complex mass balance well, but rather uses mass losses and returns as calibration points for flow. A more appropriate hydrologic model for this system could potentially be MIKE-SHE or similar complex hydrologic models; unfortunately, these are not public domain models and thus violate the transparency criterion for this TMDL. Reservoir modeling is similarly challenging. The EFDC might serve the purpose of complex flow balance, but the model was released in 2002, has not been updated (at least publicly) since, and the GIS preprocessor has still not been released. Calibration of hydrology in this system for daily flows is going to be a major challenge. AQUATOX was not recommended for use in TMDLs by the EPA peer review panel (Dr. Matlock served on the first two) because of complexity and difficulty with daily flows in case studies.

The criteria for selection of the models are not clearly stated; only that the team will perform "further evaluation of the previous applications..." and give "consideration of the specific modeling needs of EPA Region 6." This raises a number of concerns that should be addressed in the QAPP. The stated objective of the project is "to develop a scientifically robust and defensible watershed model to determine reductions in phosphorus loads needed to meet water quality standards in both states, Arkansas and Oklahoma. This watershed model will serve as a tool for sound technical decisions on appropriate point and nonpoint source controls to meet those standards." This should be the criterion for selection.

Page 14, Section 5.3, says "Following the model calibration and validation, and in consultation with the EPA WAM, we will develop various point and nonpoint source reduction scenarios to meet the State of Oklahoma's TP water quality criterion." There is no discussion in the QAPP as to how this will be accomplished. There is no acknowledgement that there will be wastewater treatment plant flow and quality data that will need to be integrated into the calibration.

Page 15, Section 6, describes data acquisition. The distinction between primary data, secondary data, and supplemental data is not clear. The use of each class of data is not clear. The presumption is that secondary data are those that were not collected for this TMDL; thus all data used in this analysis will be secondary or supplemental data. How will the Team ensure that all relevant data are inventoried, categorized, and utilized appropriately? How will data usage be documented? How will data use be attributed? How will the Team integrate data across studies and over time? Each of these questions should be explicitly addressed in the QAPP.

Page 15, Section 6—The authors state, "To a large extent, the quality of a modeling study is determined by the expertise of the modeling and quality assessment teams." Although we agree with the importance of the expertise of the modeling study team, we also believe that the quality of the underlying data that the model relies upon is extremely important. We believe that the draft QAPP

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should note the importance of comprehensive and contemporary data upon which the model was based.

Page 16, Section 6.1—The draft QAPP talks about the need to "maintain a continuing dialog with the EPA WAM on technical data issues." Can this statement be broadened to include continuing dialog with the relevant state agencies?

Page 18, Section 7, describes model setup and calibration. As indicated earlier, TP concentrations in this system due to point source contributions are on a temporal trajectory downward. Calibration and validation using temporal data that do not correct for or account for this trajectory will introduce significant bias. The purpose of the model is to be able to predict loads of TP from PS and NPS in the basin. The criteria for calibration are reasonable IF the data are representative of the system being modeled. How will this change over time be accounted for in modeling the system?

Page 19, Section 7.1—This section includes a quotation, in italics, regarding the 30-day geometric mean of 0.037 mg/L adopted by the State of Oklahoma. Can the draft QAPP please clarify the distinction between meeting this concentration versus managing phosphorus loads, which is frequently listed as an objective in the draft QAPP?

Page 19—The following statement is made: "The overarching objective is to identify/evaluate phosphorus management scenario(s) that achieve (in the waters of the Illinois River at the border between the States) the numerical water quality standard that the State of Oklahoma adopted in 2002 for phosphorus. . . While the stated purpose of this study is as stated above, EPA recognizes the value of performing holistic modeling of the Illinois River Watershed that includes consideration of Tenkiller Lake." Please clarify what value is recognized in doing this additional holistic modeling.

Page 20, Table 2—A monthly and annual time-step is too long to accomplish the stated objectives of the draft QAPP. For example, wet weather issues will probably need to be addressed on a daily time-step.

Beginning on Page 23, Section 8 describes assessment and oversight. On pages 24 and 25 of this section, the team acknowledges the need to consider sensitivity analysis and uncertainty analysis, but qualifies this with "Subject to the concurrence of the EPA WAM, and subject to budget limitations..." The seven tasks indicated on page 25 (data acquisition assessments, model calibration studies, sensitivity analyses, uncertainty analyses, data quality assessments, model evaluations, and internal peer reviews) are not optional for competent TMDL assessment. The costs to stakeholders resulting from implementation of this TMDL could potentially be measured in millions of dollars. Consequently, the effort should not be shorted due to "budget limitations."

All data points have some uncertainty about them. The higher the uncertainty associated with an input variable, the less certain any results derived from that variable. Sources of uncertainty are a function of many facets of data, including reliability of measurements, sample size relative to total populations, representativeness of the sample, geographic variability, and many other

characteristics. Sources of uncertainty can generally be categorized as (1) variability and (2) knowledge uncertainty. Variability is the inherent noisiness of a system, the stochastic nature of a process. An example would be rainfall intensity; no matter how much you measure rainfall intensity, it will still vary over time and space because rainfall is inherently variable, though the characterization of the distribution of probable outcomes can be enhanced. Knowledge uncertainty is a measure of our ignorance of a system; it could be defined, given knowledge about the system (data), but those data are often not available for the given analysis. Each type of uncertainty exists in any complex analysis, especially in TMDLs. The major sources of uncertainty are knowledge uncertainty associated with water quality data. Honest assessment and development of a TMDL requires quantifying both types of uncertainty in the output. Failure to consider uncertainty in complex system modeling is simply intellectually dishonest.

Page 24, Section 8.0—This section speaks of "limitations in scope and/or budget." At this stage in the process, does EPA and/or Aqua Terra anticipate that there will be significant limitations in the scope and/or budget? If so, these should be disclosed to relevant parties and the implications should be defined. How will any such limitations be addressed?

Page 25, Section 8.0—This section notes "internal peer reviews." Can this be broadened to include external peer reviews?

On Page 27, Section 10.0—"Project breakpoints" are listed. Will draft deliverables of each of the listed items be made available to state representatives for review?

Page 27, Section 10 describes seven project breakpoints. However, no clear timelines are provided, no critical path analysis is presented, and no deadlines for completion are provided. The QAPP should have each of these elements.

In closing, our review team has a few general questions, as follows:

1. A number of important major issues were raised in the draft QAPP, but there was no follow-up discussion. These issues include POTWs, poultry farm runoff, blue-green algae and turbidity. It would be helpful for the final QAPP to elaborate on each of these topics.
2. We did not find discussion regarding background water quality. Are there adequate data to determine what the background phosphorus concentrations in this watershed would be in the absence of man-caused point and nonpoint sources? Will the watershed model be utilized to determine whether the Oklahoma standard of 0.037 mg/L would be attainable if there were no anthropogenic point and nonpoint sources? This is an essential element and the final product should include this information.
3. Additional discussion of how wet weather issues will be addressed is merited, such as the process to define the broad categories of nonpoint sources, how event mean concentrations for each land use category will be

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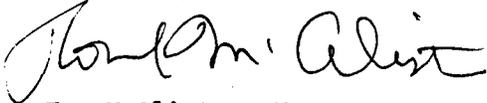
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assigned, what approach will be used for establishing BMP performance, assumed effectiveness of hydrologic controls in urban areas, etc. The model simulation period must be long enough to include large storms that will have associated high sediment loads (and phosphorus concentrations).

4. The draft QAPP does not appear to discuss whether and how the model will be updated in the future in response to new data, new regulations or other changing factors. This would be helpful.
5. How do Tenkiller Reservoir water quality standards interface with the 0.037 mg/L total phosphorus goal (at the state line)? If point and nonpoint discharges in Arkansas are going to have to meet a 0.037 mg/L standard at the state line, why is the model being extended downstream into Tenkiller Reservoir?
6. We are curious to learn what, specifically, the 0.037 mg/l standard represents and how that will relate to the constituent, "TP," as simulated in the model. Does this geometric mean apply to nonsettleable phosphorus (dissolved plus colloidal material) that would be measured in a sample taken during normal flow regimes when bottom sediment has not been scoured and entrained into the water column, or does it also include the high flow regimes when bottom sediment that contains attached phosphorus has been entrained into the water column and would be captured in a water sample taken under those conditions? Depending on the answer, it is important to know whether the collected samples data were filtered during high flow events and, if so, the size filter opening. Are the modelers optimistic that they will be able to reasonably track the fate and transport of TP in river sediment in light of potential model and data limitations?

On behalf of Wright Water Engineers, Inc., Prof. Marty Matlock, P.E., and Prof. Larry Roesner, P.E., the Rogers Water Utility sincerely appreciates the opportunity to offer these comments for your consideration. In the event you have any questions or need additional information to assist in forwarding these comments to EPA, please do not hesitate to contact me.

Very truly yours,



Tom McAlister, Manager  
Rogers Water utilities

cc EPA  
Aqua Terra  
Chuck Nestrud  
File: Comment letter to ADEQ re QAPP for Illinois River Watershed TMDL, 1-6-10