

Via email

Mr. John Bailey
Arkansas Department of Environmental Quality
5301 North Shore Drive
North Little Rock, AR 72118

Re: Comments on Draft *Preliminary Data Review and Analysis for Water Quality Modeling and TMDL Development for the Illinois River Watershed* (Prepared August 3, 2010 by Aqua Terra Consultants, Mountain View, CA, for the U.S. EPA)

Dear Mr. Bailey:

Rogers Water Utilities sincerely appreciates the opportunity to comment on the draft document noted above, which we will subsequently refer to as the —Data Review Report.¶ As you may recall, Rogers Water Utilities commented on the Draft Illinois River Phosphorus TMDL QAPP in a letter on January 6, 2010, and we continue to maintain considerable interest in the development of this TMDL. To assist us with reviewing the Data Review Report, we have again engaged Wright Water Engineers, Inc. (WWE)¹ to assist in preparation of the comments provided in this letter. As was the case in our January 6, 2010, letter, we have many positive comments regarding the draft Data Review Report; for example: The report is well written—it is comprehensive, understandable, with helpful supporting graphics, well referenced and professional.

Aqua Terra has obtained data from many different sources, in both Arkansas and Oklahoma, and listed many of the data gaps they have uncovered to date. Aqua Terra staff demonstrate familiarity with the Illinois River watershed from past modeling experience.

Aqua Terra has acknowledged the importance of the karst geology that characterizes a significant part of the watershed and has stated that they are currently determining how to best represent karst characteristics in the model that will be selected for the Simulation Report.

¹ These comments also include review and input from WWE’s peer reviewers/advisors for this project, Dr. Larry Roesner, P.E., of Colorado State University, and Dr. Marty Matlock, P.E., of the University of Arkansas.

For the available hydrologic, water quality, land use and other data that they will be drawing upon, Aqua Terra has clearly indicated the time period during which the data were collected. This will be very helpful when weighing the comparative value of the various datasets as the model is developed. For example, older data will not represent upgrades in municipal and industrial wastewater treatment facility performance or current land use.

The Data Review Report indicates that the best available land use dataset, collected during 2001, is old, and they will attempt to address this shortcoming.

The Data Review Report correctly indicates that channel sediments can be an important sink/source of phosphorus, and duly notes the limitations of the currently available data of this kind.

The authors refer to not only model calibration but to validation as well, which causes us to be optimistic that the final models will do a reasonable job of reflecting —real world conditions.

We concur with the important language at the bottom of page 37 which emphasizes the importance of modeling —all significant sources of phosphorus. Given the great regulatory and financial significance of this phosphorus TMDL, particularly in light of historic interactions between Oklahoma and Arkansas, it will be essential for the models to properly represent all significant phosphorus sources as well as the behavior of phosphorus in the Illinois River, its tributaries and Tenkiller Reservoir.

The remainder of this letter provides specific questions and comments on the Data Review Report. Attachment 1 provides Dr. Marty Matlock's comments, which focus primarily on additional data sources that should be included in the report.

Addressing Identified Data Gaps: The report identifies much available data that will be considered for use in the model as well as various data gaps and relative adequacies of the data. A summary list of data that will be pursued due to the identified data gaps and inadequacies would be helpful and important in ensuring that these data gaps are appropriately addressed. The —Data Deficiencies for GIS Coverages provides a good start on such a list, noting the following data deficiencies:

NRCS Hydrologic Soil Groups (*WWE Note: GIS soil group coverage should be available through the NRCS, located in Field 18 of the table "muaggatt."*)

More recent land use/land cover data

Location of known karst formations

Animal populations and distribution

Fertilizer and manure applications

Soil nutrient concentrations

What steps will be taken to address these and other data deficiencies between now and the modeling effort? Will targeted data collection occur, and if so, can the way that this will occur please be explained?

Baseline Dataset: A number of the datasets that Aqua Terra includes in the data summary are pre-2004 data. However, as explained on page 3 of our January 6 letter, utilizing pre-2004 data will not represent current conditions. Calibrating the model under pre-2005 conditions could result in boundary condition failures for validation. Timeframe is an important factor in assessing adequacy of the existing dataset.

Relationship to Previous and Concurrent Efforts: We have these questions regarding use of data from previous and ongoing efforts:

Aqua Terra does a nice job of summarizing previous computer modeling efforts in the watershed. In the final draft, could Aqua Terra elaborate on data gaps/deficiencies that were identified in these past modeling studies, and provide an update as to whether these gaps/deficiencies have been addressed? If not, what are the implications for the current modeling effort? As an example, the QAPP noted that Storm (2006) relied on a relatively simple representation of riverine processes for Total P—was this because of data limitations that will also affect the current modeling effort?

Additionally, the Data Review Report notes that the —Illinois River Watershed Partnership Watershed Management Plan|| (for the State of Arkansas) was recently published and that there is a —comparable effort ongoing for the Oklahoma portion by the Oklahoma Conservation Commission.|| How will the modeling effort/TMDL interface with the Arkansas and Oklahoma watershed management plans?

We asked our utilities attorney to comment on the advisability of utilizing data from the ongoing litigation involving the State of Oklahoma and the poultry industry. In this regard, we observe that before raw data from any source are used, Aqua Terra should independently verify that the data are complete, reliable and verifiable, including a thorough a review of sample collection and laboratory analytical QA/QC procedures. To the extent that raw data are included in a report prepared for litigation, the raw data, but not the interpretive report, may be an appropriate source of information, provided the raw data are found to be complete, reliable and verifiable.

Figure 2-4, —USGS Stream Gage Locations in the IRW,|| indicates that there was only one USGS station in Arkansas used in previous HSPF and SWAT models.

By contrast, five were used in Oklahoma upstream from the reservoir. Why is there such a discrepancy?

Background Conditions: Background loading is a key component of the TMDL load allocations; however, neither the QAPP nor the Data Review Report provides much information in this regard. Are existing data adequate to determine background phosphorus concentrations and loads in this watershed? Fundamentally, it is important to know whether background sources would cause the Oklahoma standard of 0.037 mg/L to be exceeded in the absence of anthropogenic point and nonpoint sources.

Land Use Data: Section 3.3 addresses land use. We have questions regarding how both urban and pervious land use data will be integrated, as well as specific questions related to agricultural management practices.

With regard to pervious areas, we presume that Aqua Terra will identify different kinds of forest cover, meadows, pastures and other areas that are largely pervious. In our experience, in these areas, it will be important to realistically represent surface runoff, interflow (both —quick|| and —delayed|| interflow), groundwater return flow and deep groundwater loss.

Are there watershed-specific data for these factors that Aqua Terra has been able to locate? We believe that defining the nature of return flows to the surface stream system is very important because phosphorus concentrations (and types of phosphorus) will vary depending on the nature of the return flow.

With regard to the cropland GIS data layer, how will NLCD data be adjusted to reflect 2005 – 2007 land use for non-cropland land uses? What percent of the basin is cropland and covered by the CDL? An additional issue related to characterizing agricultural land use in the model includes management practices such as crop rotation and varying land use conditions due to demand for product. Will these practices be taken into consideration with regard to agricultural land use characterization? The ability to account for such factors should be a consideration in model selection, given the significant land area dedicated to agriculture in this watershed.

With regard to urban land uses, runoff quantities and quality, the Data Review Report has very little discussion regarding urban runoff quantities or quality, use of BMPs, and how the hydrology will be simulated, depending on the timestep selected for modeling. We presume that this type of information will be more clearly described in the Simulation Report.

Precipitation Data: How will data from the five stations with hourly precipitation data be adjusted to represent rainfall in other parts of the watershed? It appears that none of these stations are in the watershed itself. Does the Fayetteville Airport have hourly data that could be used? If only hourly data are available, will that time step be sufficient to simulate runoff from urban areas?

Water Quality Data: We recognize that it is very difficult to model the various forms of phosphorus, including transformations, in a system of this size and complexity. Nevertheless, we were anticipating more discussion of this topic in the Data Review Report. It is not clear whether adequate data are available for the various water chemistry parameters that affect phosphorus transformations/chemistry. Per the Executive Summary, Aqua Terra indicates that the water quality data —appear to be adequate based on this initial assessment|| and will address this further in the Model Simulation report. We concur that a more thorough evaluation of the adequacy of the water quality data is needed. Specific comments include: With regard to the STORET data, how many of the stations include flow data taken at the time of water quality sampling? Does the CDM/USGS effort include both flow and water quality?

Hardness should be among the constituents included in the phosphorus model since it influences the chemical processes that precipitate and dissolve various compounds of phosphorus into and from stream sediments and minerals. Hardness may be particularly important in karst areas. Additionally, alkalinity may also be important (particularly in

Tenkiller Reservoir) due to its buffering effect on pH, which in turn affects phosphorus transformations.

Phosphorus Transport/Sources: Delivery processes for nutrients can include surface water, groundwater, atmospheric deposition, release from sediment, and natural background/other sources. The primary emphasis of the Data Review Report is on surface water. Although it may be determined later that surface water is the dominant source of phosphorus, information on other sources should not be discounted in the early stages of the project. For example:

Regarding Table 1.1, —Data Requirements for Typical Watershed Model Applications, we do not see an item that addresses the interrelationship between groundwater and surface water, yet this is very important. Similarly, there seems to be more emphasis on storm runoff than on baseflows.

Internal loading of phosphorus from reservoir sediments in Tenkiller Reservoir could be a significant limiting factor for modeling the lake and the effect of management alternatives during later stages of the project.

The report recognizes that atmospheric deposition of phosphorus, known to be significant, is a data-gap item, and attempts will be made to try to estimate it. It is our understanding that data for atmospheric loading of phosphorus may be available through the USGS National Atmospheric Data Program (NADP), even though such data are not explicitly listed on the NADP website.

Channel Characteristics: The Data Review Report discusses the significance of channel cross sections and sediment-bound phosphorus movement through the system. This is noted as an area where more data are desirable. Based on the information presented in the report, it is not clear how much of the stream has adequate cross-section data or geomorphic/ecologic data, nor is it clear how much more additional data are required. Will it be feasible to gather enough data for this key topic, given the geographic scope and diversity of channel types in the watershed? What is the plan for acquiring these data and how current are the existing cross-section data? Also, will sediment contributions from channel scour be distinguishable from surface runoff? Will the data collected, particularly for higher order streams, be sufficient to distinguish between varying bed load characteristics as stream order and morphology change?

Geology: In addition to soils data, are GIS data available with information on geology/bedrock? EPA's Nutrient TMDL Guidance (1999) notes that streams draining watersheds with phosphorus-rich geologic formations (such as those of sedimentary or volcanic origin) can be sources of phosphorus loading. Although this may not be a specific input parameter for the model itself, this information may be important to consider, since it could affect background loading.

Effect of Karst Geology: As previously noted, we are pleased that the report includes consideration of karst geology. We anticipate that karst geology may have both water quality and hydrologic implications for modeling. Key comments include:

General: From Figure 3.5, it is difficult to discern how the karst areas relate to the stream system and the watershed in general. An overlay onto the stream system would be helpful in assessing adequacy of the karst information. This is an area where a local karst expert would be very helpful in appropriately accounting for karst conditions in the model.

Hydrology: Karst formations in the watershed could significantly reduce storm runoff, and stream flows could be affected by water flowing out of the karst layer into the river or into the karst layer from the river. If the karst intersects the river channel, this could result in additions or subtractions of river flow that would be challenging to quantify.

Adequacy of Point Source Data: The report states that point source data are —not a data gap (p. ii); however, adequate characterization of point sources in terms of time series and loads is critical to the model and must be carefully completed. This is acknowledged in the report, but we emphasize that this is an area where careful review of screening criteria and assumptions will be important in the next stage of the project. From the Data Review Report, it is not clear whether currently available data for point sources are adequate. Other specific questions related to point sources include:

Because this TMDL process has the potential to significantly impact the wastewater treatment facilities in the watershed, could a list of the NPDES permittees be provided to include information for each, including permitted flow rate, type of treatment processes, etc? Based on the information presented in Figure 2.7, there appears to be only ten NPDES permits with point sources.

Page 27 of the Data Review Report indicates that where site-specific data are unavailable, effluent data may be derived from a national inventory of wastewater NPDES records that were used to develop a table of typical effluent concentrations. When effluent data for specific facilities are available, we concur that site-specific datasets should be used rather than generalized, national data (as per Table 2.10 on page 28). With regard to potential use of national data, we have the following additional questions and comments:

i. Which of the wastewater treatment facilities in the watershed have specific phosphorus loading data?

ii. Where site-specific data are not available, can site-specific monitoring be requested to obtain these data? This is a critical aspect to the entire study.

iii. Lacking site-specific phosphorus data from the wastewater dischargers, can a more refined research effort be made to determine the phosphorus concentrations in wastewater effluent with specific, different kinds of treatment? Relying on the national inventory of NPDES records is not adequate for the purposes of establishing TMDLs. Based on our own research, the phosphorus data that are presented in Table 2.10 for —Secondary,|| —Advanced Secondary,|| and —Advanced Wastewater Treatment|| mischaracterize the removal and concentrations.

The importance of using current data for POTWs is demonstrated in the QAPP report, which notes that the City of Springdale, Arkansas, POTW upgrades in 2004 reduced total phosphorus concentrations in the discharge from > 5 mg/L to < 1 mg/L.

Figure 2.7 on page 30 indicates that there are many construction stormwater general permits, particularly in Arkansas. Is Aqua Terra proposing to model sediment/phosphorus inputs from construction sites, and if so, what data will be utilized regarding quantity and quality of these sites?

Mass and Water Balances: Would it be feasible for Aqua Terra to provide simple schematic diagrams depicting the key components of hydrologic and mass balances for this watershed

as part of final Data Review Report? In such schematics, all of the significant surface and subsurface factors that affect the water balance and phosphorus balance for the river system, and the corresponding data for each component, could be shown. Based on our review of the draft Data Review Report, we are not certain that all of the significant components of these balances have been taken into account.

Tenkiller Reservoir: We have questions regarding scope of effort and operational practices.

Scope: From the standpoint of interests in Arkansas, why is it necessary to include Tenkiller Reservoir in the TMDL and associated modeling effort? Will the reservoir modeling be used to determine whether the current state-line phosphorus standard of 0.037 mg/L is appropriate to achieve beneficial uses and accompanying numeric standards in Tenkiller Reservoir?

Reservoir Operational Practices: Will Tenkiller Reservoir operational practices change in the future and, if so, how will this affect phosphorus and chlorophyll-a concentrations? This emphasizes the importance of our observation that the data relied upon must reflect contemporary activities and management practices.

Other Preliminary Comments Related to Subsequent Phases of the Project

As we reviewed the Data Review Report, several additional considerations were apparent that are more applicable to subsequent stages of the project, including:

Project Scope: We have two general questions regarding the scope of the modeling effort:

1. Model Uses: A question that we posed in our January 6 letter still applies: Is the scope of this effort limited to watershed model development or does it also include applying the model to allocate point and nonpoint source phosphorus reductions and evaluate alternative management approaches? Assuming that the model will be used to evaluate management alternatives, when will data collection regarding expected performance of management alternatives (e.g., BMPs) be addressed?

2. Phosphorus-only versus General Water Quality Model: Our understanding is that the overall objective of the project is to determine reductions in phosphorus loads needed to meet standards. If this is the case, why are nitrogen species included in the modeling? Will the study include the analysis of nitrogen loading and impacts to the water quality standards regarding nitrogen forms? Will the objectives of the study be expanded to include an analysis of the impact of nitrogen/phosphorus relationships to the overall trophic status of the streams and Tenkiller Reservoir? Similarly, will the model assess the dissolved oxygen conditions in the reservoir with respect to water quality standards?

General TMDL Approach: Given potential data gaps and inadequacies, is a phased TMDL with adaptive management provisions being considered as the general direction of the project? If this type of process is envisioned, then there may be more flexibility in terms of assumptions related to data gaps and inadequacies than if this is envisioned as a one-phase, final TMDL. A phased TMDL could account for improved wastewater treatment, significant land use changes, new regulations, etc. The initial TMDL is always limited by available data, and after it is in place, more data gaps become evident, and there should be a mechanism for updating.

Margin of Safety: Given the ultimate use of the model in development of the TMDL, will an implicit or explicit margin of safety envisioned? Although only peripherally related to this

Data Review Report, assumptions related to data sources that are conservative should be well documented if an implicit margin of safety is envisioned.

Reasonableness Checks: Although Aqua Terra thoroughly emphasizes the importance of data for calibration and validation, we did not see text regarding simple —reasonableness checks. That is, before even getting to the stage of calibration/validation, are the model results reasonable? For example:

Are unit rates of runoff for various return frequencies for different categories of land use and soil types reasonable and consistent with other hydrologic studies in the area? (Stated another way, are the calculated values in terms of cfs/acre reasonable?)

Are predicted phosphorus concentrations from different kinds of land use for different return frequency storms reasonable?

For different kinds of land use, are the predicted ratios of dissolved phosphorus to total phosphorus reasonable and consistent with other data from comparable land use types?

Again, Rogers Water Utilities sincerely appreciates your consideration of our questions and comments. We would welcome the opportunity to meet in person with all interested parties.

Very truly yours,

Tom McAlister Director
Attachment