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MEMORANDUM

To: Technical Advisory Council Members

From: Trevor Clements, Leslie Shoemaker, and Jon Butcher

Date: 9/28/2005

Subject: September 23, 2005 Conference Call Summary

A conference call for the Lake Maumelle Technical Advisory Council was convened September 23, 2005 at 2:00 pm CST. 10 of the 14 Council members were in attendance, along with a few Central Arkansas Water (CAW) staff and 2 Policy Advisory Council members (see attached Sign-In record). Trevor Clements moderated the call, which included technical presentations and discussion by Dr. Leslie Shoemaker and Dr. Jon Butcher on behalf of Tetra Tech, Inc. (Tt).

After roll call and review of the agenda, Trevor opened the follow-up discussion on assessment questions and indicator selection. He reminded the Council that an updated table "Linking Threats to Assessment Needs and Indicators" was sent out along with the 9-9-05 meeting summary, and that members were asked to provide any additional comments via email prior to the conference call. Input was received from Bruno Kirsch, and the Marina and boats will be listed as explicit sources for toxic spills. Additionally, Bruno asked about whether Giardia should be added as an indicator since both Giardia and Cryptosporidium are being monitored by CAW. Dr. Butcher suggested that these protozoan pathogens are appropriate tracking indicators, but are difficult to model explicitly and not amenable to model calibration because sources are highly variable and ambient monitoring is not available except at the raw water intake. These indicators are best modeled as general quality constituents with literature-derived die-off rates. A modeling system that addresses risk from bacteria can thus also be applied to evaluate the potential for transport of Giardia and Cryptosporidium.

Dr. Leslie Shoemaker presented an overview of basic modeling concepts and the selection process to provide a common starting point for the Council to work from, along with some common definitions to use. The slide show reviewed the use of models in decision making, the major scales of analysis, and the process for set up and testing of modeling applications. The model selection process was described and key factors reviewed. Model selection initially focuses on the ability of specific models to predict the key indicators that need to be evaluated. Other factors include the specifics land and water features that are being simulated, the key processes that affect the indicators, and the management practices present in the watershed. In addition, the practical and logistical factors of model availability, accuracy, and data needs should be considered.

Dr. Jon Butcher reviewed the handout "Candidate Models to Support Watershed Management Plan Development." The handout contained three linked tables, addressing options for in-lake modeling, watershed modeling, and site-scale modeling. A majority of the indicators address in-lake conditions, so

it is appropriate to select a lake modeling tool first, as this will determine some of the requirements for watershed modeling. Dr. Butcher's initial recommendations was that the existing CE-QUAL-W2 model provided an adequate basis for most lake modeling objectives and could be improved through additional calibration and linkage to a watershed model that would better account for runoff and pollutant transport from the ungaged portions of the watershed. The recommended choice for a general watershed model was HSPF. For both the lake and watershed supplemental analytical tools may be needed to address specific indicators and study questions; however, these models would provide a flexible format to which such analytical tools could be linked.

The CE-QUAL-W2 model is two dimensional, providing longitudinal and vertical – but not lateral – resolution. There was considerable discussion about the appropriateness of a 2-D approach, as well as the accuracy of CE-QUAL-W2 algal simulations.

The primary limitation of a 2-D model is that it does not provide a basis for evaluating lateral gradients, which would be of particular interest for assessing risk associated with activities along the lake shore. Dr. Green pointed out that some lateral resolution can be attained with CE-QUAL-W2 by specification of branches (as was done for the nursery pond), but this would not result in full ability to evaluate the movement of a contaminant plume along the shoreline, for example. Dr. Butcher noted that, if we were starting from scratch without existing models, CE-QUAL-W2 might not have been the first choice. While it still might be the best choice, consideration would also need to be given to the use of 3-D models, such as EFDC, before making a selection. The primary advantages of the CE-QUAL-W2 application are (1) there is an existing model application that can be refined, (2) run times will be shorter, aiding re-calibration, and (3) the model resolution is appropriate to the data resolution, consisting primarily of water quality measurements at three points along the lake centerline. A 3-D model would provide much greater spatial resolution, but also have higher requirements for data and run times. At present, there are not lateral transects or other data available to fully calibrate a 3-D model water quality model.

Regarding accuracy of the algal simulation, Dr. Butcher noted that CE-QUAL-W2 is able to achieve levels of accuracy similar to other lake eutrophication models. Uncertainty is always present in algal simulations calibrated to chlorophyll due to natural variability of algal populations, variability in chlorophyll content of algal cells, and analytical uncertainty in chlorophyll measurements. Since the previous application, CE-QUAL-W2 has gone through two significant upgrades, which improve process representation and allow for the simulation of multiple algal groups. We feel it is likely that the precision of the algal simulation can be improved. However, uncertainty will remain and it will be important to accurately inform decision makers of the degree of uncertainty present in model output. This will be addressed further in the Modeling Quality Assurance Plan.

There appeared to be general consensus among the TAC that Tetra Tech should reconsider the lake model recommendations and further evaluate the advantages and disadvantages of employing a 3-D modeling framework.

For the watershed, HSPF provides a good general framework for simulation of loading (erosion, pollutant washoff), flow and transport that will support analysis of watershed response to future land use changes. But, it does not fully address all indicators of interest in the watershed. One important concern is that the model provides a rather simplified representation of sediment transport that does not explicitly address the complexities of cohesive sediment transport or impacts on channels, such as bank erosion. These are anticipated to be major factors in the future health of stream channels in the watershed, as well as having an impact on sediment delivery to the lake. Dr. Butcher suggested that the HSPF framework could be linked to the CONCEPTS model to evaluate channel evolution/degradation in selected segments of the stream network. That option would, however, require a fairly extensive surveying effort.

In response to TAC questions, Dr. Butcher clarified that the HSPF model would be set up with multiple subwatersheds, delineated to represent areas with different characteristics as well as different positions

within the overall watershed. Within each subwatershed, the model can simulate as many individual land classes as appropriate. The general strategy would be to overlay land use with dominant soil and slope characteristics to obtain homogenous units for simulation.

The third table addressed potential site-scale models. These would be used to evaluate responses, at the site-scale, from specific types of land use activities. The general strategy would be to use such site-scale results to constrain the parameters of the overall watershed model.

Dr. Butcher noted that the watershed and lake models discussed would not provide a detailed simulation of mercury in the system, which requires consideration of methylation and other chemical transformation processes. Specialty tools are available to address mercury; however, it may be sufficient to address the gross changes in mercury loads to the lake that may arise from changes in soil erosion and runoff, as the important kinetic processes (such as mercury methylation in lake sediments) are unlikely to change significantly.

There was further general discussion of the use of models in the project. The bottom line is that models are needed to evaluate the potential response to future land use changes. That evaluation will be made in terms of the indicators selected to address the assessment questions. Thus, the models need to address the indicators at a level of sophistication and accuracy significant to answer the assessment questions. This will be laid out more formally as Model Quality Objectives in the forthcoming Modeling Quality Assurance Plan. Finally, it was noted that the models proposed are well accepted and supported tools that are in the public domain and can readily be maintained for future application.

Discussion will continue at the next conference call, scheduled for Friday, September 30th at 2 PM CST. Tetra Tech will follow up on specific issues raised during the September 23rd call, and will begin to outline proposed methods for some of the other assessment questions (e.g., cost). The call-in number, agenda and supplemental materials will be emailed by the end of Wednesday or early Thursday. The meeting was adjourned.

Technical Advisory Council Member Attendance

Meeting Date: September 23, 2005

(P indicates present; NP indicates not present)

<u>MEMBER NAME</u>	<u>REPRESENTING</u>
<u>NP</u>	ARKANSAS NATURAL RESOURCES COMMISSION
<u>NP*</u>	ARKANSAS DEPARTMENT OF ENVIRONMENTAL QUALITY
<u>P</u>	U.S. FOREST SERVICE
<u>NP</u>	UNIVERSITY OF ARKANSAS FOR MEDICAL SCIENCES
<u>P</u>	U.S. GEOLOGICAL SURVEY
<u>P</u>	AUDUBON ARKANSAS
<u>P</u>	CENTRAL ARKANSAS WATER
<u>P</u>	LITTLE ROCK DEPARTMENT OF PLANNING & DEVELOPMENT
<u>P</u>	METROPOLAN COUNCIL OF LOCAL GOVERNMENTS
<u>P</u>	DELTAIC TIMBER CORPORATION
<u>P</u>	ARKANSAS DEPARTMENT OF HEALTH
<u>P</u>	PULASKI COUNTY DEPARTMENT PLANNING & DEVELOPMENT
<u>P</u>	ARKANSAS FORESTRY COMMISSION
<u>NP</u>	UNIVERSITY OF ARKANSAS AT LITTLE ROCK, ENVIRONMENTAL HEALTH SCIENCES

* emailed in advance that could not participate on the call

OTHERS PRESENT

Crawford, Marie
CENTRAL ARKANSAS WATER
Canada, Shani
CENTRAL ARKANSAS WATER
Marsh, Andrew
CENTRAL ARKANSAS WATER
Dicker, Pat
POLICY ADVISORY COUNCIL
Dicker, Herb
POLICY ADVISORY COUNCIL
Shoemaker, Leslie
TETRA TECH, INC.
Butcher, Jon
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Clements, Trevor
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