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MEMORANDUM

To: **Technical Advisory Council Members**

From: **Trevor Clements, Kimberly Brewer, Jon Butcher and Heather Fisher**

Subject: **June 2, 2006 Technical Advisory Council Conference Call Summary**

A conference call for the Lake Maumelle Technical Advisory Council (TAC) was convened June 2, 2006 at 1:30 p.m. CT. Eleven members were in attendance, along with several guests (see attached attendance list). Trevor Clements moderated the call, and was supported in technical discussion by Kimberly Brewer, Jon Butcher, Heather Fisher and Scott Job on behalf of Tetra Tech, Inc. (Tt).

Trevor took roll call. The purpose of the call was to further discuss the basis for performance standards and to cover topics raised in draft management evaluation memos 2 and 3 prior to sending them to the Policy Advisory Council (PAC).

Technical Considerations for the Performance Standards

Trevor indicated that some of the PAC members had requested further clarification of the technical versus policy aspects of the performance standards that are being recommended. Tetra Tech has stated that the recommended performance standards reflect a technical basis combined with professional judgment. From a technical perspective, watershed modeling for pollutant loads for TSS, TP, and TOC demonstrated that there is a difference in delivery from the Upper Watershed Area of about 10 to 15 percent compared to Critical Area B. The difference in proposed performance standards between these zones reflects that difference in delivery rate. While there are slightly different instream transport times between Critical Areas A and B, they are minor. However, there are considerably different inlake travel times to reach the water supply intake between areas A and B. For our time-of-travel analysis conditions, inputs from land in Critical Area A reached the intake with times between 24 hrs and 6 days, whereas inputs from land in Critical Area B reached the intake between 7 and more than 30 days. Nutrients, sediment, and TOC loaded directly into Critical Area A are adding to conditions nearer the intake (i.e., we would rather see nutrients feeding algae in the upper lake than feeding algae in the intake zone).

Modeling shows that although the Critical Area A loads contribute to higher maximum concentrations at the intake, the overall impact on the summer or annual medians is relatively small. However, this proximity to the intake becomes even more important when evaluating risk from other parameters such as pathogens and toxic materials. Mitigation factors such as use and storage/handling restrictions as well as spill capture/detention devices can help minimize risk from any toxic materials coming off of developed land in Critical Area A. There is greater difficulty in addressing threats such as Cryptosporidium. Much of the new federal requirements under the Safe Drinking Water Act are aimed at addressing Cryptosporidium, and the Arkansas Department of Health includes Critical Area A within its water supply vulnerability zone, so it is important to consider this risk.

Inactivation rates for Cryptosporidium parvum oocysts are typically in the range of 0.02 log-10 per day at 15 degrees C, acknowledging variability in reported values as well as strong temperature dependence. Considering that the average travel time from Critical Area A to the water intake was about 4 days, while the average from the down-lake subwatersheds of Critical Area B was 12 days, the transmission of Cryptosporidium from Zone A is, on average, about 83 percent, while the transmission from the lower portion of Zone B would be, on average, about 50 percent. Although limited data are available on the ability of structural and non-structural BMPs to remove Cryptosporidium oocysts, it is reasonable to assume that increased efforts to control other nonpoint runoff constituents would also reduce risk of Cryptosporidium transmission. To reduce the risk from Zone A to that associated with the lower portions of Zone B, general loading targets for Zone A should be set at 50 percent divided by 83 percent or about 60 percent of the Zone B loading rates.

The recommended performance standards for TP and TSS are 65 percent of the Zone B loading rates. Site evaluation of example development reflecting proposed site requirements for Critical Area A indicated that it was feasible to achieve the rates based on best available information. However, given high uncertainty for application of BMPs due to soil, slope, and meteorological conditions in the Lake Maumelle watershed, pilot demonstrations will be required. A limited degree of sensitivity analysis using the Site Evaluation Tool indicates that the TP performance standard will likely be the most challenging of the three to meet. Depending on the outcome of the pilot projects, BMP designs may need to be refined or alternate nonstructural design may be required to achieve the standards (e.g., increase forested portion, decrease imperviousness, etc.).

From a professional judgment standpoint, Tetra Tech believes the combined information above provides a reasonable technical basis for making a policy decision on the recommended performance standards.

TAC Discussion

TAC Question: What is the existing level of Cryptosporidium load and what might be expected in the future?

Tt Response: That is a difficult question to answer. The risk depends on the genotypes. The greatest risk is from untreated sewage (human generated). Cattle can carry human infectious genotypes. Deer can also have infectious genotypes, and this can be problematic where development corresponds with decreased hunting pressure such that deer populations spike, increasing the risk. Pets pose some threat, but that threat appears to be considerably lower.

TAC Comment: Have heard that horses can pose a greater risk than cattle.

Tt Comment: The key is that we are looking at relative risk between Critical Area A and the near subwatersheds in Critical Area B regardless of source. The transmission rates reflect the travel time differences. That is the risk that we would like to mitigate.

TAC Comment and Question: What about the 50 percent transmission rate from the near subwatersheds in Critical Area B, should we have animal restrictions because of that?

Tt Response: We're looking more at attenuation. The forest mammalian population is large and current levels in the raw water are low. We don't need to bring the average loading rate down, just protect against significant increases and rare events. Overall risk is low. Per Safe Drinking Water Act recent rule promulgations, water suppliers are charged with minimizing potential increases in the risk of Cryptosporidium.

Tt Comment: We currently plan to have recommendations for animal operations. However, other than for larger confined animal operations the regulatory authority is very limited. Thus, good practices may depend on how effective agricultural extension agents and others who work well with farm and rural landowners can be.

TAC Comment: Should be as specific as possible; not all animals are bad.

TAC Question: Does the model handle interflow?

Tt Response: Yes.

TAC Comment: Another issue is portable toilets in boats and releasing waste illegally.

Tt Response: That then becomes an enforcement issue.

TAC Question: What if someone proposed bringing in a large animal operation?

Tt Response: We believe that the topography and economics (no slaughterhouses nearby) likely decrease the chances of that happening. Nonetheless, from a regulatory standpoint, the lake could benefit from a zoning ordinance that would prohibit certain uses like large animal operations, landfills, etc. If zoning is unlikely, then it would likely fall back to CAW's power of eminent domain to prevent these uses in the watershed.

TAC Question: What about a smaller animal operation such as a horse barn?

Tt Response: Again, this is an example of where support from local extension agents would be important to ensure best management practices (e.g., vegetated filters; restricted access from streams; manure composting). There is some research indicating that vegetated filters around animal operations have proven to be very effective at Cryptosporidium inactivation.

TAC Questions: What if loads are significant (i.e., exceed current assumptions)? Is there a safety factor? It appears that all of the load has been allocated out?

Tt Response: Tetra Tech has built in safety factors to the approach. One, the use of 3.0 µg/L chlorophyll *a* at the intake rather than 3.5 µg/L, has a significant effect. It reduces allowable phosphorus loading by a significant margin and sediment loading by a factor of three or four. Additionally, the performance standards allocate the loading to all developable land (i.e., assume build-out) assuming that all acreage will be developed. It should be noted that these performance standards are restrictive (among the most restrictive of which we are aware). Finally, it should also be recognized that buildout will not occur overnight. Planning should be considered a dynamic process and handled in an adaptive manner. After the initial plan is in place, stakeholders will be able to monitor how well management is working and how accurate certain assumptions are so that adjustments can be made periodically without the threat of ultimate loads being reached in the near term.

TAC Comment: There is a lot of conservatism in the model, but also, what about economic justice? Some will be getting away without complying with the plan.

TAC Member Response: CAW and the Tt project team are working hard to make the plan fair. However, there does appear to be growing resentment in the Perry County portion of the watershed, and we need to build credibility with those stakeholders.

TAC Question: What kind of confidence intervals are there in the modeling? What is the basis of the safety factor?

Tt Response: A good question, and technically difficult to answer. We've chosen the target based on the national limnologist recommendations, and allowed for a 20 percent safety factor (3.0 vs. 3.5 µg/L chlorophyll *a*). We can calculate lake model uncertainty and have accounted for that, but uncertainty in the land use predictions for future uses that don't currently exist is more problematic. Because of this, we have to use some professional judgment. Again, the good news is that this is not a one-time planning process and results are not dependent on having perfect information. Conditions are likely to change unpredictably, and monitoring and re-analysis at future dates can help adapt the plan accordingly.

TAC Comment and Question: Monitoring is continuing to improve. Ultimately, hoping to move to a 3-D model. How much better would that improve predictions and reduce uncertainty?

Tt Response: We don't think that it would change the overall confidence of predictions at the intake that much. However, 3-D modeling would improve predictions of local conditions throughout the lake.

Review and Discussion of Management Evaluation Memo #2

Trevor quickly reviewed the purpose of Memo 2. Based on feedback and questions at the May PAC meeting, Tetra Tech performed additional analyses to look at a broader range of lot size and road/driveway composition for the Non-engineering/Land Conservation Scenario. Because of the potential for significant offsite mitigation requirements if only the original management options are considered under this scenario, the PAC wants to see if other options would be more acceptable and result in less offsite mitigation. Memo 2 summarizes Tetra Tech's additional findings.

The results summarized in Table 2 show that even with paving roads and using gravel plus best management practices (BMPs) for driveways, limiting minimum lot size requirements to 5-acres on high sloped land would require an estimated 3,830 acres (7 percent of developable land) of offsite mitigation. However, this is down from 24,880 acres (47 percent of developable land) if gravel plus BMPs are used on both roads and driveways on 5-acre lots. If the minimum lot size is increased to 10 acres for high slopes, the offsite mitigation requirements can be reduced to 0 acres regardless of driveway requirements.

Tetra Tech also analyzed paving roads and driveways on high sloped areas (assuming 10-acre lots) while allowing low sloped roads and driveways (for 5-acre lots) to use gravel with BMPs. This combination would still result in the need for an estimated 7,350 acres of offsite mitigation (14 percent of developable land).

Tables 3 and 4 provide more detailed results of additional analysis of lot size and road/driveway combinations for low and high sloped land. Some points to note in Table 3 (for Critical Area B):

- For low sloped land, you can achieve the performance standards with a 5-acre minimum lot size if you require paved roads while allowing driveways to remain in gravel.
- For low sloped land, you can meet the standards using gravel roads and driveways if you increase the minimum lot size to 10 acres and preserve 60 percent of the site in undisturbed open space.
- For high sloped land, you can achieve the performance standards with an 8-acre minimum lot size if you require roads and driveways to be paved and undisturbed open space of about 60 percent.
- For high sloped land, you can meet the standards using gravel roads and driveways if you increase the minimum lot size to 20 acres and preserve 50 percent of the site in undisturbed open space. Alternatively, you could limit the increase in lot size to 13 acres with a requirement to maintain 90 percent of the lot in open space.
- For high sloped land, you can achieve the performance standards with a 10-acre minimum lot size if you require paved roads while allowing driveways to remain in gravel.
- For options that do not meet the performance standards, the rate of required offsite mitigation drops substantially by requiring paved roads.

The results for the Upper Watershed Area are relatively similar (Table 4), but there are some differences worth pointing out:

- Because of slightly different soils and the higher average annual rainfall, performance standards are not met for 5-acre lots until best management practices (BMPs) are added to the gravel driveways.
- You can also meet the standards for low sloped areas in the Upper Watershed Area by increasing the minimum lot size to 10 acres while leaving roads and driveways in gravel, however the amount of undisturbed open space increases to 70 percent.

- For high sloped land, you can meet the standards using gravel roads and driveways if you increase the minimum lot size to 20 acres and preserve 30 percent of the site in undisturbed open space. Alternatively, you could limit the increase in lot size to 14 acres with a requirement to maintain 83 percent of the lot in open space.
- For high sloped land, you can meet the standards using a 6-acre minimum lot size if you pave both roads and driveways, and require up to 73 percent open space.

TAC Discussion

TAC Question: What is meant by BMPs for roads?

Tt Response: We are assuming that BMPs for gravel roads would consist of wing ditches and rolling or broad-based dips at the spacing recommended by the Arkansas Forestry Commission. We are not assuming grass swales for gravel road BMPs.

TAC Question: Who will enforce requirements (e.g., open-space, imperviousness, roads, driveways) over time?

TAC member and Tt Response: Options include property owner requirements such as deed restrictions, covenants, etc. (i.e., some self-policing and some reliance on complaints). Tt is looking into the history of enforcement for conservation design.

Review and Discussion of the Management Evaluation Memo #3

Kimberly walked through Memo #3 which addresses cost evaluation for the two initial scenarios. Costs will fall on different parties (e.g., public agencies, developers, CAW, landowners) depending on which options are ultimately selected. For the Non-engineering/Land Conservation Scenario the memo estimates the costs for road improvements, off-site mitigation, and wastewater systems, as well as the hours for development review and inspection during construction. For the Performance Standards/Land Conservation Scenario, the costs were also estimated for constructing and maintaining Stormwater Best Management Practices.

Kimberly said the road construction costs were gathered from local contractors and state and local highway departments. BMP cost information was obtained from national sources. When national or out-of-state costs were used, they were converted to Arkansas prices. Offsite mitigation costs were estimated from the range of vacant land sale values in Perry County in recent years since developers needing to buy offsite conservation area would likely purchase land in the more rural parts of the watershed where land is less expensive. The offsite mitigation cost estimates are for fee simple acquisition. To reduce costs, developers could purchase a conservation easement.

Kimberly then reviewed the costs for example developments in the three proposed watershed management areas as follows.

Upper Watershed Area

The first example was of a 100-acre development with nineteen 5-acre lots in the Upper Watershed Area on low slopes (i.e., less than 15 percent slope). Kimberly walked through the memo's Table 1, which shows how the costs vary depending on the type of road improvement:

- Gravel roads and driveways.
- Gravel with BMPs on roads and driveways.
- Paved roads and gravel driveways.
- Paved roads with gravel and BMPs on the driveways.

She pointed out that the construction costs for the first two options involving unpaved roads are less than half of the costs of the last two examples. However, the *annual* maintenance for the options with gravel roads is significantly more than those with paved roads. In a short period, the *overall cost* of constructing and maintaining the gravel roads would exceed that of paved roads. In addition, if a developer were to use gravel roads and driveways or gravel with BMPs on the roads and driveways, the development would not meet the onsite loading allocations. Therefore, the developer would need to buy 130 acres offsite on low slopes (or 165 acres on high slopes) and dedicate it as conservation land at a cost likely to be somewhere between $131,000 to $1,179,000 (assuming fee simple acquisition).

If the landowner did not want to do offsite mitigation, he or she could build 10-acre lots using gravel roads and driveways or 9-acre lots using gravel with BMPs.

Kimberly next reviewed the wastewater system costs and administrative costs for the 5-acre, 9-acre, and 10-acre lot developments. For the 5-acre lot development, the wastewater system cost is estimated at $71,000 (for conventional septic system) to $142,000 (for a tank and capping fill system), and the average annual maintenance cost would be approximately $500 to $700. She reminded the group that most areas in the watershed are not suitable for conventional septic systems, and alternatives such as capped systems would therefore be required. Because there would be fewer households in the 100-acre development with 9-acre or 10-acre lots, the wastewater systems would cost less: $38,000 to $82,000 with annual maintenance costs of approximately $300 to $400.

Finally, for this example, Kimberly reviewed the administrative time required. She said the existing amount of time the staff would likely spend in reviewing these developments under existing regulations would be about 45 hours (based on conversations with the Pulaski County Planning Department). To review development plans in the future under the requirements shown in the example, it would take approximately 90 to 120 hours. This latter estimate is based on interviews with the Pulaski County Planning Department and local governments that are currently implementing similar requirements. The administrative time required per development review would more than double.

Critical Area B

The next example reviewed was for the same 100-acre development with nineteen 5-acre lots, however this time located in Critical Area B on a low-slope area. Although the costs change somewhat compared to the Upper Watershed example above, the bottom line is the same.

Kimberly said that if pilot projects show that BMPs perform adequately and a Performance Standards/Land Conservation option is approved, a landowner could use BMPs to help meet the performance standards. The memo evaluated this same development, assuming gravel roads and driveways, with the addition of forested filter strips as an engineered BMP. The main differences between this development and the previous 5-acre lot example are:

a. No offsite mitigation is required.

b. BMP construction costs are estimated at $47,000 with an annual maintenance cost estimate of approximately $1,000.

c. Additional staff administrative review time is required for BMP design and construction (approximately 25 additional hours).

This option appears to have the lowest infrastructure costs and mitigation costs over time for this example development.

Kimberly then reviewed the costs associated with a cluster design development on high slopes in Critical Area B. This is a 100-acre parcel with nineteen 3-acre lots, and it is assumed that roads and driveways are paved. The estimated construction costs for the paved roads and driveways are $831,000, with average annual maintenance estimated at $20,000. Offsite mitigation is required, but substantially less

land is needed for offsite mitigation compared to the 5-acre lot example development. The estimated wastewater system cost is $161,000 to $240,000 in capital costs and $7,000 to $10,000 in annual maintenance costs. Administrative hours would more than double from the existing 45 hours to 90-120 hours to review a development.

Critical Area A

The final example was for a 100-acre development with nineteen 3-acre lots in Critical Area A. It was assumed that roads and driveways are paved. If a pilot project is performed for BMPs and they perform adequately, and local governments adopt a performance standard option, this development design might use 19 bioretention cells (one on each lot) and 3 extended dry detention ponds to meet the performance standards.

The estimated construction costs for the paved roads and driveways would be $831,000, with average annual maintenance of $20,000. Stormwater best management practices would cost an estimated $256,000 with an annual maintenance of $3,000. The wastewater system cost would reflect the requirement to pump wastewater out of the watershed and the methods applied. Thus, those costs are to be determined. Administrative hours would be expected to rise substantially, increasing from the existing 45 hours to 300-400 hours to review a development. Many of those hours would be devoted to reviewing BMP design and inspecting BMP construction.

TAC Discussion

TAC Comment: Design, engineering, and construction/maintenance costs look reasonable and might even be a little low. The administrative costs may be a little high, but not too high.

Tt Response: Tetra Tech has a breakdown of the basis for the administrative costs to provide the rationale for the estimates.

Bruno Kirsch stated that CAW can't set a water meter unless there is an acceptable wastewater option established. He has asked the local sanitarians to review the memos and recommendations in order to get their feedback and will help bring that information back to Tt and the TAC.

TAC Comment: Many times administration costs are born by the developer. Perhaps there can be a sliding scale with increased fees required for increased options administration.

Tt Comment: The main purpose of Memo #3 is to show that there is a gap between current and future costs, so that the plan needs to address this in preparing for implementation.

TAC Comment: Several members commented on differences between level of support and resources in Saline, Pulaski, and Perry counties.

Bruno noted that CAW is planning to provide funds to help support administration; CAW recognizes that it is asking for the plan and will need to support implementation.

Jim McKenzie indicated that Metro Plan can provide regional administration based on its authority if local governments provide appropriate inter-local agreements.

Kimberly added that programs like mitigation banking are typically best done through a regional approach.

TAC Comment: If we can't recoup the cost through an administrative charge to developers, then we could spread the cost out through the entire CAW rate base.

TAC question to Dick Cassatt (ADEQ): With regard to the wastewater provisions rule-making being considered, how long of a process would this likely be and what would that process be?

Dick responded that it depends on the amount of public interest and protest, but probably around 6 months. The process is outlined in Regulation #2.

Another possible option for achieving the goal of no direct discharge of wastewater was mentioned as using the State's Water Quality Management Planning Process. An amendment could be used to set up a limit in the Lake Maumelle watershed for total phosphorus (e.g., zero). If this amendment only affects NPDES permitees, it should result in less protest. This should be explored further.

Next Steps

Trevor reminded members that the next PAC meeting was scheduled for June 15 at the Arts Center. Also, Tetra Tech will be making a joint presentation to the Little Rock and Pulaski County Planning Boards on June 14 at 3:30 p.m. With regard to the next TAC call, emphasis in the coming month will be on preparing for the public meetings. However, if technical questions arise, Tetra Tech will call upon the TAC for advice and consultation.

Tetra Tech thanked the Council members for their participation, and the call was adjourned.

Lake Maumelle Technical Advisory Council Call Attendance Date: Friday, June 2, 2006

	MEMBER NAME	REPRESENTING
P	Mr. Dick Cassat	Arkansas Department of Environmental Quality
P	Mr. Roger Miller	Arkansas Department of Health and Human Services
NP	Mr. John Shannon	Arkansas Forestry Commission
NP	Mr. Ken Brazil, P.E.	Arkansas Natural Resources Commission
P	Ms. Stephanie Hymel	Audubon Arkansas
P	Mr. Bruno Kirsch, Jr., P.E.	Central Arkansas Water
P	Ms. Munsell McPhillips, Ph.D.	Deltic Timber Corporation
P	Mr. Walter Malone	Little Rock Department of Planning & Development
P	Mr. Jim McKenzie	Metroplan Council of Local Governments
P	Ms. Ashley Pope	Pulaski County Department of Planning & Development
P	Mr. Alan Clingenpeel	U.S. Forest Service
P	Mr. Reed Green, Ph.D.	U.S. Geological Survey
P	Mr. Carl Stapleton, Ph.D.	University of Arkansas at Little Rock
NP	Mr. Morris Cranmer, Ph.D.	University of Arkansas for Medical Sciences
P	Kimberly Brewer	Tetra Tech, Inc.
P	Trevor Clements	Tetra Tech, Inc.
P	Jonathan “Jon” Butcher, Ph.D.	Tetra Tech, Inc.
P	Heather Fisher	Tetra Tech, Inc.
P	Scott Job	Tetra Tech, Inc.
P	Shani Canada	Central Arkansas Water
P	Nicole Lacy	Central Arkansas Water
P	Gary Hum	Central Arkansas Water
P	Forrest Payne, Ph.D.	Instructor of Biology, University of Arkansas at Little Rock
P	Tim Daters, P.E.	White-Daters & Associates, Inc.
P	Charles Nestrud	Attorney for Deltic Timber Corporation
P	Kathleen Oleson	Lake Maumelle Policy Advisory Council Member
P	Pat Dicker	Lake Maumelle Policy Advisory Council Member