



# Arkansas Department of Health

4815 West Markham Street • Little Rock, Arkansas 72205-3867 • Telephone (501) 661-2000

Governor Mike Beebe

Paul K. Halverson, DrPH, FACHE, Director and State Health Officer

Engineering Section, Slot 37

Ph 501-661-2623

Fax 501-661-2032

[www.HealthyArkansas.com/eng/](http://www.HealthyArkansas.com/eng/)

After Hours Emergency 501-661-2136

June 10, 2010

Mr. Steve Mallett, Jr., P.E.  
Deputy City Manager  
City of Hot Springs  
780 Adams  
P.O. Box 700  
Hot Springs, AR 71902

RE: Technical Memorandum 3  
Treatment Process Evaluation, Dated February 2010  
Hot Springs Municipal Water Utilities  
Hot Springs, AR  
ADH # 74507

Mr. Mallett:

On April 16, 2010, this office received the above referenced report as well as a copy of Water System Expansion Engineering Report, for our review. These two reports will be reviewed and commented upon separately. This letter will provide review comments for the second of the two reports titled, "Technical Memorandum 3, Treatment Process Evaluation". This report focuses upon the treatment scheme that would be appropriate for a new water treatment plant utilizing Lake Hamilton as a source of raw water. The comments provided are as follows.

1. The report indicates that the appropriate treatment scheme for a new treatment plant would be the same regardless of the location in Lake Hamilton that a new intake would be located. This office does not agree that this would necessarily be appropriate. Different locations in Lake Hamilton are associated with different levels of pathogenic risks emanating from sanitary hazards located along the lake and treatment schemes should reflect greater potential for episodic contamination when located below sanitary hazards. Also, it is not certain that TOC concentrations are uniform throughout the length of Lake Hamilton. TOC sampling and analysis of the upper Lake Hamilton intake, performed by the Arkansas Department of Health, indicate that the TOC concentration for the sampling period is an average of 3.2 mg/L and is almost half of the concentration which the Jacobs report indicates to be an average of 7.1 mg/L. Intake location must be determined prior to finalization of a proposed treatment scheme and after pilot plant testing, if required, is completed and the results evaluated.
2. The conclusion of the reports that there is no difference in the quality of the water between that at the existing Lake Hamilton intake and the proposed lower Lake Hamilton site is based on an inadequate sampling regime at the upper site (six grab samples collected over seven months) and misleading data (four of the six samples were collected following heavy rainfall events). The result is a misrepresentation

that the water quality at the existing intake is much worse than it actually is, and the incorrect assumption, based on the report's treatment recommendations, that advanced or higher levels of treatment are necessary. While the ADH does not have data to contradict the results of sampling at the lower Lake Hamilton site, it does have data contradicting the report's representation of the water quality at the existing intake site. ADH data for TOC at the existing intake site, see attached graph, show a 10 year average of 2.59 mg/l, and for the period of sampling cited in the report (May – November, 2009), an average of 3.2 mg/l with a maximum value of 3.7 mg/l and a minimum value of 3.1 mg/l. The Jacobs report claims the average for the existing intake site to be 7.1 mg/l with a maximum value of 25.9 mg/l and a minimum of 3.2 mg/l. ADH data for raw water turbidity (see attached graph), taken from at the Ouachita WTP and submitted to the Arkansas Department of Health via monthly operational reports, show an average of 1.1 NTU with a maximum of 12.1 NTU and a minimum of 0.3 NTU. The Jacobs report states the average to be 3.4 NTU with a maximum of 30.1 NTU and a minimum of 0.5 NTU. The ADH data shows that for these two critical parameters, the water at the existing intake is not only excellent but superior to that of the lower lake site in regards to TOC levels, the key raw water parameter for disinfection by product formation.

3. Both the Report and TM3 often presumes a worst case level of contaminant to be present in the raw water without providing a basis for that presumption, and then uses that worst case presumption to justify the need for advanced treatment processes. Three examples, among others, are listed as follows:

EXAMPLE. The reports (Report page 15, TM3 page 15, TM3 page 64) advocate a 5.5 log removal/inactivation for *Cryptosporidium* and therefore a necessity for advanced oxidation/disinfection (ozonation and/or UV) when no such treatment level requirement has been established by the ADH. Based on completed sampling at the Ouachita WTP and incomplete sampling at the lower Lake Hamilton site, the actual level will likely only be for a 2 or 3 log removal/inactivation, neither of which requires advanced oxidation/disinfection.

EXAMPLE. The reports state that a finished water quality goal of 0.1 NTU, among other factors, will necessitate the use of membrane filters when, in reality, conventional filters are fully capable of operating at that level. This includes the City's own Ouachita Water Treatment Plant. The Ouachita WTP's capability to continuously operate at 0.1 NTU was documented in the ADH Comprehensive Performance Evaluation of 2007 and that conclusion has been supported by finished water quality reports since then.

EXAMPLE. The Report assumes (page 52) that UV disinfection is required for compliance with Stage 2 DBPR and the LT2 ESWTR, and states (page 53) that redundancy of filters is required for compliance with the LT2ESWTR. There is no basis provided for the assumption on UV disinfection, and there is no EPA regulatory language cited, and none that the ADH is aware of, which mandates redundancy for unit processes under the LT2 ESWTR.

4. The Hot Springs Water Utility has two approved and existing water sources, the Upper Lake Hamilton source supplying the Ouachita Water Treatment Plant and the smaller municipal owned reservoirs serving the Lakeside Treatment Plant. *Cryptosporidium* sampling, conducted by this office, has shown that Ouachita Water Treatment plant, which obtains water from the upper Lake Hamilton site, will not be required to provide any extra *cryptosporidium* removal/inactivation (Bin 1).


However, the Lakeside Water Treatment Plant will be required to provide 1 log additional cryptosporidium removal/inactivation (Bin 2). The report fails to address the Lakeside plant treatment scheme. It should be noted that there are compelling reasons, including minimizing costs, for keeping the Lakeside plant on-line through the year 2028. The report incorrectly evaluates treatment schemes for any and all water sources obtained from Lake Hamilton based upon a worst case (Bin 4) classification which would require an extra 2.5 log removal/inactivation of cryptosporidium. Based upon the completed cryptosporidium sampling, there does not appear to be any basis for a Bin 4 classification to be utilized for the existing upper Lake Hamilton site in the evaluation of treatment schemes. In doing so, it would appear that costs are unnecessarily inflated for the upper Lake Hamilton site where the cryptosporidium sampling has been completed.

5. It should be noted that cryptosporidium sampling and Bin classifications are site specific and if a different site were used for obtaining raw water from Lake Hamilton, cryptosporidium sampling would have to be completed and that site would receive it's own and possibly higher Bin classification.
6. While both the Report and TM3 discuss a number of treatment alternatives, the actual treatment processes used for final cost estimates are unclear, and tables comparing the first cost and operational costs for the various options discussed for each unit process (pre-oxidation, clarification, filtration, and disinfection) were not included in either document.
7. It should be noted that the conventionally designed Ouachita Water Treatment Plant has an excellent record meeting required TOC reduction requirements. Also, the data collected by the Arkansas Department of Health, from the Ouachita Water Treatment plant indicates that raw water TOC concentrations, obtained from upper Lake Hamilton, average about 3.2 mg/L which is less than the average for Lake Hamilton as indicated by Jacobs to be 7.1 mg/L. It appears to be the case that the upper Lake Hamilton site has lower concentrations of TOC and that water quality degrades downstream.
8. The report proposes a treatment scheme that includes high rate settling, membrane filtration, and UV disinfection. It is not clear that this treatment scheme would be effective in reducing TOC to levels that would enable compliance with disinfection-by-product limitations. A pilot plant demonstration would be required to document the effectiveness of TOC reduction. The report is not clear concerning the effectiveness of virus removal by the membrane system and virus inactivation by the ultraviolet system. It is likely that the Arkansas Department of Health would require chemical disinfection to be included in the treatment train in order to provide contact time adequate to show appropriate virus inactivation levels. The Arkansas Department of Health will be resistant to approving a treatment scheme that would be more operationally complex than conventional treatment, such as UV disinfection, unless the need were justified by an unusually high cryptosporidium removal/inactivation requirement. Based upon current disinfection by product (DBP) monitoring results, the system appears to be in a good position to comply with DBP limitations through simpler and less expensive strategies.
9. Continued use of the Lakeside Water Treatment plant should be evaluated separately in the context of a Bin 2 classification. It would appear that this plant complies with required TOC reductions and turbidity control. The cost of complying with the requirements associated with a Bin 2 classification should be weighed against the utility this plant provides with regards to meeting peak summertime demands.

10. The cost comparison with regards to filtration options appears to unfairly penalizes the less expensive option of conventional filtration by utilizing a loading rate of 2 gpm/ft<sup>2</sup> rather than the accepted normal rate of 3 gpm/ft<sup>2</sup>.
11. It is not clear that compliance with disinfection by product limitations would require inclusion of GAC treatment with the conventional filtration option. This unfairly inflates the cost of the conventional filtration option and it would appear that there are many other methods, most less expensive, for disinfection by product control, that have not yet been explored by the utility. These include: use of pre-oxidants, reducing water age by optimized tank management, staged disinfectant application for distribution residuals, tank mixing, chloramination, and possibly tank aeration among others.
12. Due to the fact that the upper Lake Hamilton source will obtain the favorable Bin 1 classification, the good performance of the Ouachita Treatment Plant with regards to removing TOC, the moderate levels of DBP's in the distribution system, and the availability of less costly DBP control strategies for additional DBP reductions, the treatment scheme proposed does not appear to be justified and in fact unfairly penalizes the existing upper Lake Hamilton alternative.
13. Prior to determination of any treatment scheme for a wholly new water treatment plant facility, it would appear to be prudent for Hot Springs Water Utility to first monitor DBP levels in the distribution system: after tube settlers have been installed in the Ouachita Water Treatment Plant, after better tank management practices have been instituted with the aim of minimizing water age and maximizing water turnover in the tanks, after staged use of disinfectants in the treatment plant and distribution system has been implemented, after tank stagnation due to submergence of tanks below the hydraulic grade line has been corrected, and after options for localized treatment near the monitoring sites associated with higher DBP levels has been evaluated. It should be noted that the DBP levels of concern in the distribution system are the trihalomethane compounds which are more easily reduced via aeration. The levels for HAA5's are well within compliance limitations.

When submitting correspondence pertaining to this project, please include our reference number ADH # 74507.

Sincerely,

  
Jeff Stone, P.E.  
Chief Engineer  
Engineering Section

Cc: Jacobs Engineering

Terry Paul, Chief, Environmental Health Branch

Robert Brech, Office of General Counsel