



Arkansas Department of Health

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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: Water System Expansion Engineering Report, Dated April 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 Technical Memorandum 3, Treatment Process Evaluation, for our review. These two reports will be reviewed and commented upon separately. This letter will provide review comments for the first of the two reports titled, "Water System Expansion Engineering Report". This report largely focuses upon choosing between the two alternatives of either continued use and expansion of the existing upper (upstream) Lake Hamilton raw water intake site or initiating a new raw water intake site located in the lower (downstream) Lake Hamilton area near to Carpenter Dam. The comments provided are as follows.

1. The proposed lower Lake Hamilton intake site is not in compliance with the Arkansas Department of Health's Rules and Regulations Pertaining to Public Water Systems. These regulations require that the water system own and effectively control restricted buffer zones to protect the source of raw water for drinking water purposes from potential sanitary hazards. The specific requirements can be found in Section IX.B of these regulations. Not only does the proposed lower Lake Hamilton site not provide needed restricted buffer areas, but also the proposed lower Lake Hamilton site is located downstream of numerous sanitary hazards that could potentially contaminate the raw water source. These upstream sanitary hazards include, but are not limited to: several hundred individual residential sewage pumps that are subject to malfunction and sewage spill, several wastewater treatment plant discharges into Lake Hamilton, numerous storm water discharges from the City of Hot Springs which carry the majority of drainage from Hot Springs into Lake Hamilton, and all boating and body contact recreation in Lake Hamilton occurs upstream of the proposed lower Lake Hamilton site. Potential sanitary hazards that are located in close proximity to this lower Lake Hamilton site include: all boating

activity entering and leaving Entergy Park, body contact recreation, residences which include individual sewage pumps that are subject to malfunction and spill, private boat dock/houses some of which appear to be habitable, and a large peninsula located directly upstream that is heavily developed and served with both gravity sewer lines and individual grinder pumps that are both subject to blockage, malfunction and sewage spill. On Figure 5-7 of the report, it is apparently proposed to leave in place existing sanitary hazards which are in close proximity to the proposed site. This proposal disregards accepted concepts and practices with regards to drinking water source protection.

2. The Report (page 40) continues to inaccurately present the requirements of the ADH regulations in regards to the required buffer zone. The current regulations, based on the definition of a public water supply reservoir, require that a 300 foot buffer zone be obtained around Lake Hamilton's entire perimeter if a lower lake intake is developed. The Engineering Section had proposed to view Lake Hamilton as a federal reservoir and establish a buffer zone equal to that historically required by the ADH of such intakes, but that proposal was never pursued by the City or Jacobs. The buffer zone proposed by Jacobs for the lower Lake Hamilton site meets neither the current regulations nor that historically required of intakes on federal reservoirs. Even if the City had proposed the latter, the Engineering Section likely would have opposed the development of the lower site due to its poorer water quality and increased vulnerability to contaminants, and our belief that cost effective alternatives to the development of a lower site are available (Section V.B of the ADH Regulations).
3. Section 5 of the report attempts to compare the existing upper Lake Hamilton intake site with the proposed lower Lake Hamilton site with regards to sanitary hazards that are located within a 2 mile radius of each. However, even though the report points out that under certain circumstances the upper channel can be affected by rising water levels Lake Hamilton, the fact remains that water in this channel normally flows downstream. Clearly, the existing upper Lake Hamilton intake site is upstream of almost all sanitary hazards associated with Lake Hamilton (as well as those found within a 2 mile radius) and the proposed lower Lake Hamilton site is downstream of and vulnerable to contamination from all of those same hazards. This office does not agree nor accept the report's presentation that the two locations (upper and lower Lake Hamilton) are equivalent with regard to water quality risks.
4. The report is ambitious in its attempt to plan needed water source, treatment, and distribution needs over a 50 year planning period. It could be argued that only a rough estimate of water quantity needs can be accurately estimated and planned for over such a long period of time. With regards to quantity needs, this process has documented that with construction of a spillway gate below the existing upper Lake Hamilton intake (to protect against a theoretical malfunction of Carpenter Dam) the existing upper Lake Hamilton intake can be developed to satisfactorily supply all water quantity needs during the planning period.
5. The report attempts to utilize the challenges associated with Disinfection By Products (DBPs) as a vehicle for justifying a lower Lake Hamilton site so that treatment would be closer to some growth areas and thus reduce water age (Section 7.1.2 of the report). However, less expensive compliance strategies have not been explored by the utility. These strategies include, but are not limited to, reducing water age by better water storage management, modifying distribution storage and operation to eliminate stagnation in storage tanks submerged below the hydraulic

grade line, enhancing organic removal at the existing Ouachita Water Treatment Plant (the soon to be installed tube settlers may help in this effort), use of alternative oxidation/disinfection strategies such as chlorine dioxide pretreatment, staged chlorine application for distribution system residuals, and tank mixing and possibly tank aeration in the areas of the distribution system where DBPs are high. It is important to note that, under current operational methods, unnecessarily high chlorine use is employed in the clearwell at the Ouachita Water Treatment Plant due to an inability to booster chlorinate in the distribution system. This is an easily remedied and inexpensively remedied deficiency.

6. Comments regarding the proposed water treatment schemes will be offered in a separate review letter concerning "Technical Memorandum #3, Treatment Process Evaluation" which was submitted, for ADH review, at the same time as this Preliminary Engineering Report.
7. Much of the cost difference between the development of the upper and lower Lake Hamilton intake sites is the result, not of treatment costs, but rather distribution piping. In fact, over the first 20 year planning period, the difference in present worth cost for source development and treatment between the two intake sites is less than \$5 million. It should be noted that the reports present a worst case scenario for estimating distribution costs. One example, among others: Example: the Report (page 76) proposes, and the cost estimates reflect, a 54-inch pipeline be built from a new Upper Lake Hamilton WTP in 2017. The size of the pipeline is based on the hydraulic flows estimated to occur in 2060. Constructing a pipeline whose capacity would not be needed for over 40 years is not realistic and needlessly inflates the cost estimate for that alternative which happens to be the one recommended against by the report.
8. 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.

9. Operational costs are a key consideration when comparing alternatives for infrastructure improvements. To exclude such costs presents only half of the picture. However, this is what Jacobs has apparently done when citing Table 6-1 as evidence that the lower Hamilton option is a more cost effective alternative. Table 6-1 only captures capital costs and does not include the operational costs for treatment. Such an omission is crucial when the report itself shows that operational costs can make a significant difference over the planning period. For example, the operational costs for pressure membrane filters (recommended by the report) are estimated in Appendix E to be 39% higher than that for conventional filters (\$51.7 million vs. \$37.2 million). To leave such operational costs out of Table 6-1 and when combined with the tendency in the report to presume worst case scenarios for treatment and distribution costs, the basic conclusion that the lower Hamilton site is a more cost effective alternative is called into question.
10. The report states (page 97) that the existing intake is "unreliable" and subject to turbidity spikes that make the water "untreatable". The unreliability of the intake and the frequency of the turbidity spikes are not quantified but represented in the report to be such a burden and so frequent as to require the relocation of the intake. Such a statement is highly questionable and in need of justification when one considers the over 40 years of continuous use of this intake, the actual daily raw water turbidity values cited in a previous comment, and the continued excellent performance of the Ouachita WTP with regard to turbidity performance. Jacobs own assessment found it feasible to construct a spillway gate below the existing intake to protect against the unlikely event of a tainter gate failure at Carpenter Dam, and other measures to mitigate for the occasional turbidity spike at the existing intake can be investigated.
11. The Hot Springs Water Utility is encouraged to pursue improvements to the Ouachita Water Treatment Plant and existing upper Lake Hamilton Intake that would result in an additional 9 million gallons per day of treatment source and treatment capacity bringing the system total capacity to 35 million gallons per day as outlined in the report in Table 6-2, "Upper Lake Hamilton Alternative". The report indicates that this 9 million gallon per day expansion could be provided at a reasonable cost and would include the construction of the spillway gate which would secure adequate water source quantity for the entire planning period. It would appear that these improvements alone would provide adequate additional treated water quantity for a 15 to 25 year planning period before the cost of an additional treatment plant, at the upper Lake Hamilton site, would need to be incurred. During that 15 to 25 year period, the system would have adequate time to:
 - a) pursue improvements that would optimize utilization of water storage and minimize water age in the distribution system
 - b) more precisely document growth rates and growth patterns for use in planning the second half of the 50 year planning period
 - c) determine the most effective and economical DBP control strategy
 - d) make necessary distribution system piping improvements consistent with observed growth patterns and hydraulic needs

- e) reduce the rate at which water is lost in the distribution system (currently 35 to 40 % of all treated water produced)
- f) allow for the 2nd round of cryptosporidium sampling to occur which is scheduled to begin in late 2015

It should be noted that the first round of cryptosporidium sampling is complete and the results did not show the presence of cryptosporidium at the upper Lake Hamilton site. This water quality result is the best that could have been hoped for and the result will be that the treatment of the water from the upper Lake Hamilton site will not be required to provide any extra treatment for the purposes of cryptosporidium removal/inactivation at this time. There is no reason to expect that the 2nd round of sampling, beginning in late 2015, will show any great difference from the just completed 1st round.

In summary, this office encourages the Hot Springs Water Utility to promptly pursue improvements to the existing intake site and the Ouachita Water Treatment Plant so that capacity needs for the medium range (15 to 25 year) planning period are met. As was discussed in Item I above, the proposed lower Lake Hamilton intake site is not in compliance with the Arkansas Department of Health's Rules and Regulations Pertaining to Public Water Systems, specifically Section IX.B. We also feel that the better quality water source – upper Lake Hamilton, can be developed in a cost effective manner and should be given priority (Section V.B of the regulations).

Sincerely,



Jeff Stone, P.E.
Chief Engineer
Engineering Section

Cc: Jacobs Engineering, Attn: Julian Brown
Terry Paul, Chief, Environmental Health Branch
Robert Brech, Office of General Counsel, ADH