

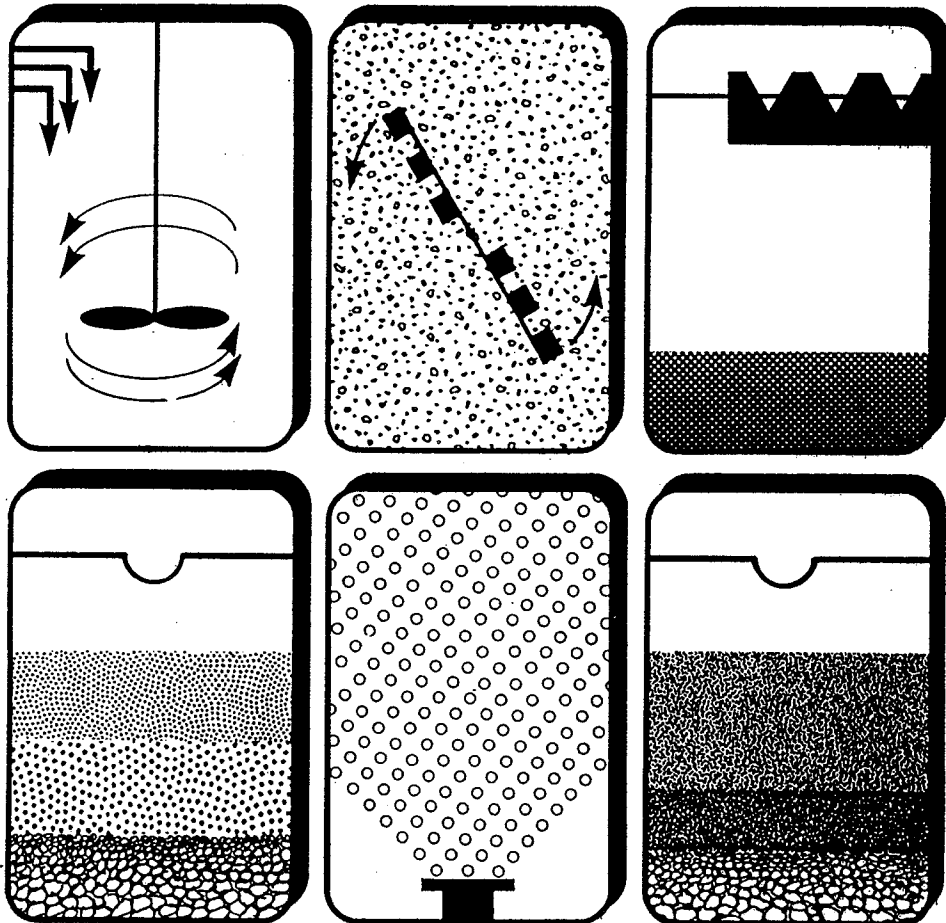
REPORT ON

Water Supply,
Treatment,
and Distribution

FOR THE

Little Rock Municipal Water Works
Little Rock, Arkansas

JOB NO. J-9634



The
Benham Group
Tulsa

A Division of The Benham Group, Inc. - Tulsa, Oklahoma

1188-004-00

LITTLE ROCK MUNICIPAL WATER WORKS
LITTLE ROCK, ARKANSAS

REPORT ON WATER SUPPLY, TREATMENT, AND DISTRIBUTION

Job No. J-9634

August 1988

The Benham Group - Tulsa
Tulsa, Oklahoma

1188-004-00



SUMMARY

1. Lake Maumelle has excellent water quality for the beneficial use as a drinking water supply. Algae is causing seasonal filter clogging and taste and odor problems. The potential for increasing trihalomethane formation exists.
2. Due to Lake Maumelle's shallow mean depth and long hydraulic retention time, nutrients, such as nitrates and phosphates, have a greater impact towards eutrophication than lakes that have greater mean depths and shorter hydraulic retention times. Figure 5 (Lake Maumelle, Tab 8) illustrates this concept.
3. Since 1975 clear cutting activities decreased and/or algae primary productivity increased. This is based on decreasing values of silica and sulfate for Lake Maumelle. Change of land use from forest to agriculture along the Big Maumelle River may have stimulated algae growth. The time of land use changes needs to be determined.
4. The area above State Highway 10 on Lake Maumelle has acted as a sediment and nutrient trap. From air observations it appears this area needs to be dredged to avoid excessive sediment and nutrient loading (short circuiting) to Lake Maumelle.
5. The noncoliform pathogens Giardia and Cryptosporidium are probably present in Lake Maumelle as in any other lake in North America. However, due to the low number of septic tanks, and urban and agricultural development, the densities of these organisms are most likely very low.
6. Best Management Practices (BMPs) are not being fully utilized on the watershed to Lake Maumelle. Due to this, unnecessary sediment and nutrients are being discharged into Lake Maumelle. Road construction for clear cutting activities, housing developments, off the road vehicles,



commercial sites, etc. pose the greatest threat to sediment loss to Lake Maumelle. The change of land use from forest to agriculture to urban will increase nutrient input to the lake several fold per equal amount of surface area.

7. The most sensitive site of Lake Maumelle to nutrient loading and subsequent algae and manganese problems is near the intake structure. Water clarity is best in this part of the lake with a high shoreline development. These two facts promote the potential for higher biological production, e.g., algae production, than other parts of the lake.
8. Increased stocking of threadfin shad (Dorosoma petenense) will increase potential for threadfin shad fish kills and may increase nuisance problems at the intake structure. Maintaining a higher standing crop of these and other forage fish and a resulting higher standing crop of game fish at some level of production has the potential of increasing algae production through biomanipulation.
9. Lake Maumelle has a very low buffering capacity (low alkalinity) and hardness (soft). Due to this the aquatic organisms in Lake Maumelle are very sensitive to chronic and acute toxicity of chemicals. Also, when lake water is slightly acidic diatom and green algae populations are favored over bluegreen algae. More algae and pH data should be collected for Lake Maumelle and made part of the trendline monitoring program.
10. Increases in sediment and nutrient deposition and loading to Lake Maumelle are extremely detrimental to Lake Maumelle's water quality. The lake is presently mesotrophic bordering on becoming eutrophic (Figure 5, Section 8). Increases in algae production will result in increasing costs for water treatment. Technologies may be available to treat Lake Maumelle's water at less cost than current conventional treatment. However, increasing algae production, i.e., significant deterioration of Lake Maumelle's water quality, will significantly increase treatment cost.



determine potential impacts of Lake Maumelle's fishery on algae production.

14. Giardia and Cryptosporidium are probably present in Lake Maumelle like any lake in the United States. They are found in many kinds of domestic and wild animals, as well as in humans. Due to the low number of septic tanks and other type of sewage discharges, as well as the low percentage of agriculture land use in Lake Maumelle's watershed, Giardia populations are most likely very low. Protection of the watershed against human inhabitation and agricultural development is recommended.
15. The Arkansas Fish and Game Commission should assist Little Rock Municipal Water Works in implementing controls for nonpoint and point source pollution problems from its fish hatchery located on Lake Maumelle. Sediment impacts and Arkansas water quality violations (Photo 1 and 2, Section 8) have already been experienced on Twin Creek and Lake Maumelle from the clearing of a 100 acre site for the Arkansas Fish and Game Commission Fish Hatchery. Depending on the activities of the fish hatchery many steps can be taken to prevent or minimize nonpoint or point source pollution from the hatchery. Potential pollutants are bacteria, fungi, oxygen demanding waste, nutrients, suspended solids, herbicides, pesticides, etc. Unwanted exotic or other type fish introductions should also be prevented.
16. The configuration of Lake Maumelle allows water to be flushed through the lake via the overflow structure. However, the Little Rock Municipal Water Works intake structure is in an isolated section of the Lake. Consideration should be given to improving circulation, i.e., reducing hydraulic retention time in this area of the Lake.
17. Intensive control of beaver (Castor canadensis) is not recommended if the purpose of their control is because they are thought to be causing a problem with Giardia. Their contributions to the overall density of this noncoliform pathogen would be insignificant. Giardia densities are



probably very small in Lake Maumelle. However, if beaver populations are causing stream bank and lake shore erosion problems from excessive destruction of trees, control of their populations would be recommended at that time.

