



THE MAUMEE RIVER IS AN IMPAIRED WATERBODY FACT DOCUMENT

Earl Wm Campbell Jr. MD
Professor Emeritus of Medicine
MCO—University of Toledo
3 February, 2016

“.... government of the people, by the people and for the people...¹”

Definition of an impaired water body: “Under the federal Clean **Water Act**, **impaired waters** are rivers, lakes, or streams that do not meet one or more **water-quality** standards and are considered too polluted for their intended use.”³

The Maumee River is unique; it is the largest river draining into the Great lakes, its waters course from three states, Ohio, Michigan and Indiana and its watershed includes 4.2 million predominantly agricultural acres. Its waters supply at 3%⁴ of Lake Erie water from which 11,000,000 souls derive their drinking and industrial waters and recreational resources

We submit that the Maumee, an active flowing waterbody, used in itself for recreation, drinking water and industry, (in particular the food industry), is polluted with phosphorus and

nitrogenous nutrients. Such “nutrients” facilitate the production of microcystin toxin to a health endangering extent in addition to significantly increasing the cost to water consumers and industry alike. As noted below, microcystin may not be the only toxin produced in these waters by microcystis

In the following paragraphs we submit commentary to support our contentions with respect to: A, Microcystin. B. Phosphorus (P) and C. Nitrogenous wastes (N) and include related concerns.

SUPPORTING DATA AND ANALYSES

MICROCYSTIN AND MAUMEE RIVER IMPAIRMENT

Data is derived from Ohio EPA excel spread sheet⁵

Bowling Green, Ohio:

Bowling Green Water Intake at Maumee River:

Between 9/4/14 and 11/23/15 microcystin was significantly elevated in waterbody intake, reservoir intake, or reservoir on 28 occasions.

Water body Microcystin was elevated on 4 occasions:

9/4/14, 10µgm. /L, 9/8/14, 9.9µgms./L, 9/14/14 10µgms./L, 9/30/15 >15µgm/L., yielding an average of; 11.22 µgm/L.

Reservoir Intake was elevated on 16 occasions ranging from 2 to 15 μ m/L with an average of 5.17 μ /L.

Reservoir was elevated on four occasions: 9/9/14, 20,000 μ gm./L, 8/10/15, 79 μ gm./L, >15 μ gm./L and 10/19/15, .56 μ gm.

Commentary.

Of note is the fact that on no occasion in the entirety of the Bowling Green data did the finished water values rise above the very important .3 μ gm./L threshold, likely due to its highly trained, alert, technicians, and as the result of a state of the art water processing plant which relies on use of Na carbonate perhydrate as a non-lysing bacterial precipitating agent, extensive use of very fine carbon granule filters and a sophisticated reverse osmotic gradient system.) Other more standard water processing systems would be quite compromised by the microcystin levels noted.

Note well: Ohio EPA microcystin water advisory: >.3 μ /L do not drink [children under 6 and other special groups, >1.6 μ gm. /L μ all children and adults, >6 μ gm./ L not safe for recreation⁶

Concerns:

On 4 occasions the **microcystin levels in the Maumee River at the Bowling Green Intake**, an area used for swimming wading and boating was elevated well above the 6 μ gm. level in fact averaging 11 μ gm./L

- NO PUBLIC ADVISORY WAS ISSUED

- NO SYSTEMATIC ATTEMPT HAS BEEN UNDERTAKEN TO INCREASE THE FRQUENCY OF MEASUREMENTS
- NO SYSTEMATIC ATTEMPT HAS BEEN MADE TO ACCURATELY MEASURE THE NUTRIENT SOURCES (mainly phosphorus) OVER TIME OR TO CORRELATE WITH THE INTERMITTANT AGRUCULTURAL RUNOFF FEATURES

BOWLING GREEN RESERVOIR INTAKE:

Levels at the reservoir intake are direct reflections of the Maumee River microcystin levels. The average value of those 16 measurements is 5.21 μ gms. however it must be noted that 12 of these are above 1.6 μ gms./L no drinking level, and 4 are above the no recreation level.

Concerns

- THE COMMENTS NOTED IN PRECEDING SECTION ON BOWLING GREEN WATERBODY INTAKE APPLY HERE AS WELL.
- AS THE MAUMEE RIVER MAY BE THE SINGLE LARGEST CONTRIBUTOR OF PHOSPHORUS, IT IS ESSENTIAL TO UNDERSTAND HOW P LEVEL FLUCTUATES WITH SEASONAL AND METEOROLOGICAL FIELD AND GROUND WATER FLOW AS ITS RELATES TO THE DEVELOPMENT OF MICROCYSTIS MATS IN LAKE ERIE

BOWLING GREEN RESERVOIR MICROCYSTIN LEVELS:

-A matter of great interest -The "perfect storm environment" for microcystis growth and therefore for microcystin toxin production is high temperature sun light, and excessive phosphorus and, or nitrogen compounds. As reservoirs are

by nature static, given the "perfect storm " conditions luxuriant and dangerous levels of toxin may result. The level of 20,000µgms. of microsystem is evidence of what can happen in such a situation. It may be argued that the value represents microcystis scum only, but the point still remains, it had to have been quite toxic and extensive in volume. In a similar situation in 1996 poorly treated water accessed a kidney dialysis unit causing the death of 50% of the patients from acute liver failure.⁷ Excellent and very expensive management in this Bowling Green situation prevented such a disaster. (One recalls the cryptosporidium disaster⁸ and the more recent Flint lead poisoning disaster⁹ when reviewing this problem.)

CONCERNS

- WHAT WERE THE PRECISE CONDITIONS LEADING TO THE STRIKING ELEVATIONS OF MICROCYSTIN IN THE BOWLING GREEN RESERVOIR?
- WHAT WAS THE TOXIN LEVEL IN THE RESERVOIR MICROCYSTIS PRECIPITANT SLUDGE?
- AS MICROCYSTIS HAS A VERY LONG HALF LIFE, WHAT WAS THE TOXICITY OF THE SLUDGE OVER TIME, AND WHAT HAPPENED TO THE SLUDGE, WHERE WAS IT DEPOSITED?
- WHAT IS THE RISK TO PERSONNEL WORKING WITH MICROCYSTIN SLUDGES AND SCUMS IN RECREATIONAL SETTINGS AND IN WATER PLANTS?
- WHO IS LOOKING AFTER THE POSSIBLE HEALTH THREATS TO PERSONS WORKING IN POTENTIALLY HIGH MICROCYSTIN ENVIRONMENTS?^{10, 11}

MICRCYSTIN LEVELS AT THE CAMPBELL SOUP

COMPANY SITES: Microcystin has been found in these sites in the intake water and elsewhere in the treatment systems and raise similar but less well defined questions.

- MORE COMPLETE INFORMATION IS NEEDED FROM MUNICIPALITIES USING MAUMEE WATERS FOR RECREATION AND AS A DRINKING WATER SOURCE.
- MORE DATA IS NEEDED TO ASSIST THE FOOD PRODUCTION INDUSTRY IN THE MAUMEE RIVER WATERSHED.

PHOSPHORUS AND MAUMEE RIVER IMPAIRMENT

“The Maumee River is the largest Great Lakes Watershed.....Agricultural practices along the (Maumee) River have been the primary source off algal blooms in Lake Erie.....The river supplies 3 percent of the lake’s (Erie) water, but half of its phosphorus.....The river (Maumee) dumps 3,800 metric tons of phosphorus in the lake annually.”⁴

Reports by citizen groups demonstrating elevated phosphorus levels have been largely ignored by government officials. One such study, which included 354 data, points in 9 locations along the lower Maumee from Perrysburg to near the Bowling Green water intake demonstrated significant elevations in phosphorus in all sites with levels elevated at all times, but varying according from time to time. This study was forwarded to officials in Ohio including the Ohio EPA, Governor, and Ohio Public health department with no resulting comment.¹²

It is recognized that microcystin blooms vary with respect to increase in field run off as it relates to manure concentrations on fields and magnitude of rainfall and other features.

- SIGNIFICANT DATA ABOUT PHOSPHORUS LEVELS IN THE MAUMEE STEM AND TRIBUTARIES IS LACKING.
- DETAILED INFORMATION MUST BE COLLECTED TO IDENTIFY POINT AND NON POINT ORIGINS OF EXCESSIVE PHOSPHORUS LEVELS
- DERIVED PHOSPHORUS DATA MUST BE COLLECTED ON A REGULAR BASIS AND, AS WELL, BE CORRELATED WITH VARIATIONS IN RAINFALL, AND WATERBODY FLOW.

NITROGENOUS WASTE AND THE MAUMEE RIVER

During the 1990 decade the City of Bowling Green, drawing its water from the Maumee River became aware of a host of water related problems including atrazine, foul taste and dangerously toxic levels of nitrogenous (nitrates and nitrites) compounds, possibly high enough to risk generation of methemoglobinemia (blue baby syndrome). These problems resulted in development of a highly sophisticated water treatment plant—at some significant expense to citizens.

Perusal of Ohio EPA data¹³ reveals that areas of the lower Maumee and miniscule creeks, mostly confined to Eastern

Wood County, have been designated as **impaired** with respect to nitrogen. Significantly, reports are isolated and no attempt seems to have been made to link these areas generally with the river in terms of cause and effect. Effective planning appears not taken place and no unified picture of the problem has been developed with respect to the Maumee River. Again the public health may be endangered for lack of clarity

BMAA (beta-methylamino-L-alanine) Toxin

An extensive literature has now developed about this neurotoxin which functions as a prion molecule capable of inducing amyotrophic lateral sclerosis ALS, (Lou Gehrig's Disease), Alzheimer dementia and Parkinson's disease. BMAA has been found in brain tissue of patients with these disorders and is now considered to be one of the causal agents.. Cyanobacteria, Microcystis species in particular, is capable of producing toxic amounts of BMAA. BMAA has become a recognized problem in New England.^{14, 15}

- AT THIS TIME THERE IS NO EVIDENCE THAT TESTS FOR BMAA ARE BEING UNDERTAKEN IN LAKE ERIE WATERS, THE MAUMEE OR ITS TRIBUTARIES.

CARCINOGENIC BY PRODUCTS OF MICROCYSTIS DISINFECTION BY CHLORINATION

Of the by products of detoxification of microcystin, trichloromethane (chloroform) and tetrachloromethane (carbontetrachloride) are carcinogenic. These products are increased indirect proportion to the concentration of microcystin and may rise well above the Federal EPA levels

of 80 parts per billion in treated water. Long term exposure may also induce liver, kidney, central nervous dysfunction as well as decline in testicular hormones in adolescents. ^{16,17}

Citizens of Lower Monroe County in Michigan, which derive their water supply from the Toledo, Ohio water system were notified on September 4, 2105, that their exposure to trihalomethanes over the past 12 months was 93 ppm. well above the permitted level.¹⁸ Other recipients of the same Toledo water source were never informed of the happening. Furthermore, there was no public communication about what remedial steps were to be taken. The probable link to the Lake Erie Toledo microcystis source, and its potential link to microcystis originating from the Maumee River was never revealed to the consuming public.

EPA GUIDELINES WERE EXCEEDED IN 2015 IN AREAS SERVED BY THE TOLEDO DRINKING WATER SUPPLY, THE ISSUE WAS NOT COMMUNICATED TO ALL CONSUMERS AND NO REMEDIATION PLAN WAS REVEALED TO THE PUBLIC.

CONCLUDING COMMENTARY

The reader is directed to the summary comments terminating each heading above. The following suggestions are considered imperative by the authors.

- **THE STEM MAUMEE RIVER WATERBODY AND ITS TRIBUTARIES MUST BE DESIGNATED IMPAIRED.**

- APPROPRIATE PHOSPHORUS AND MICROCYSTIN TMDL STUDIES MUST BE DONE AND AN OVERALL STRATEGIC MANAGEMENT PLAN DEVELOPED. (The reader is encouraged to view the Fox River, Chesapeake Bay and Lake Champlain projects.)
- MICROCYSTIN PROPAGATION IN THE MAUMEE RIVER MUST BE DOCUMENTED ON A CONTINUING BASIS AND CORRELATED WITH FLUCTUATION OF PHOSPHORUS LEVELS.
- MICROCYSTIN BIOLOGICAL EFFECTS ON HUMANS MUST BE DOCUMENTED, IN PARTICULAR CITIZENS INVOLVED WITH WATER TREATMENT AND WHO HAVE REGULAR EXPOSURE TO CONTAMINATED WATER AND AEROSOL.
- IN VIEW OF RECENT INFORMATION BMMA PRODUCTION FROM MAUMEE AND LAKE ERIE MUST BE EVALUATED.
- THE PUBLIC MUST BE PROTECTED TO REOLONGED EXPOSURE TO CARCINOGENS PRODUCED BY MICROCYSTIN DETOXIFICATION.

--Vox Populi--

THE MAUMEE RIVER IS AN IMPAIRED WATERBODY

FOOTNOTES

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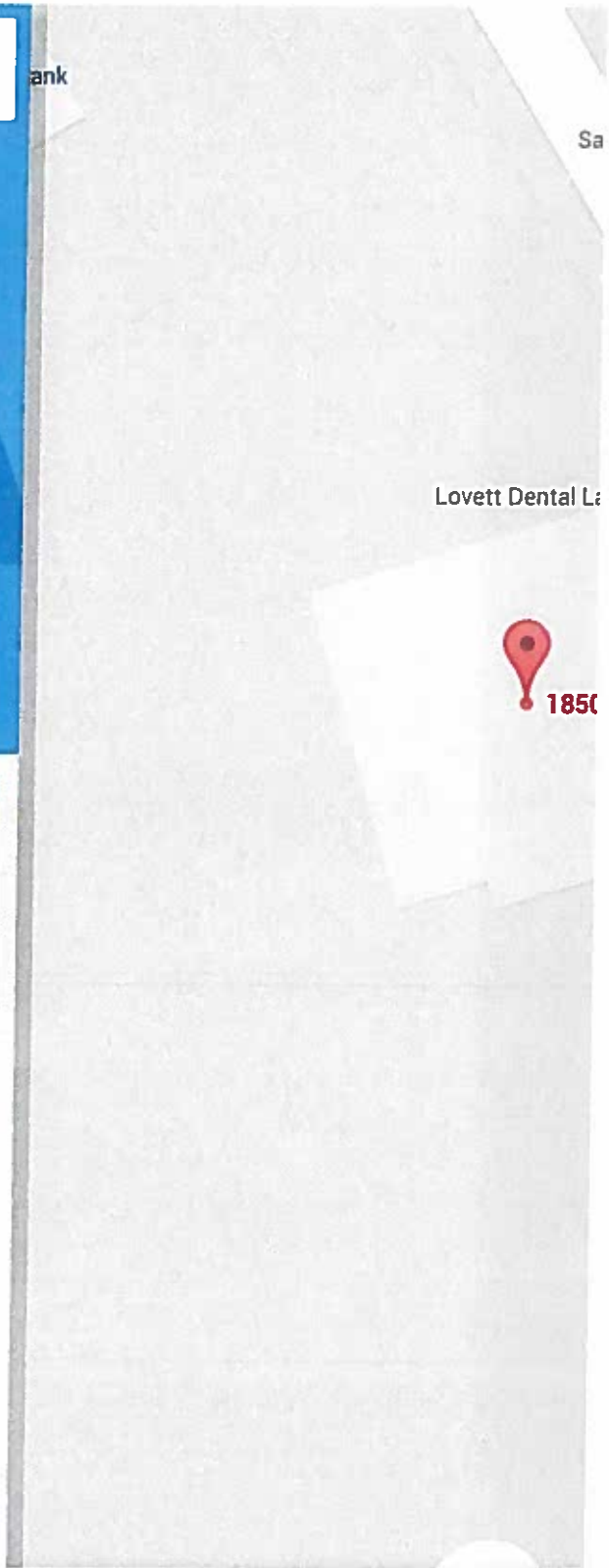
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