

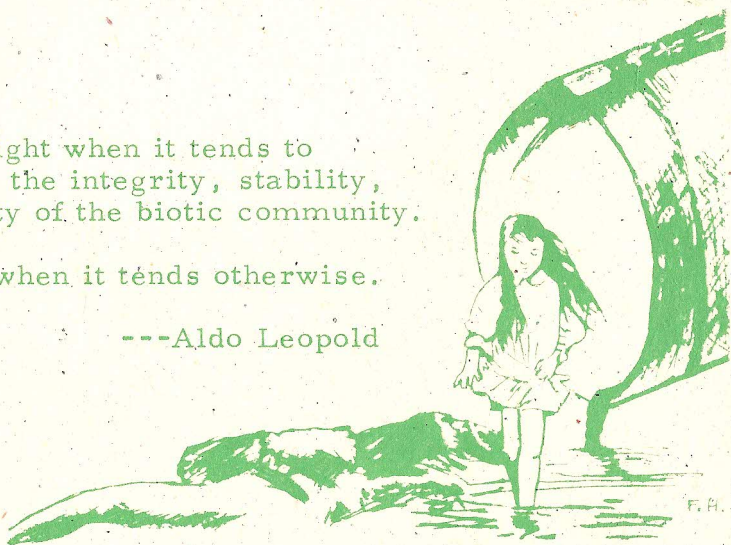
STREAM of a THOUSAND ISLES

THE WISCONSIN RIVER: Its History and
a Plan for Restoration

A thing is right when it tends to
preserve the integrity, stability,
and beauty of the biotic community.

It is wrong when it tends otherwise.

---Aldo Leopold



CNRA Special Report

THE WISCONSIN RIVER: Its History and
a Plan for Restoration

1972

A special report published
by the Citizens Natural Resources
Association of Wisconsin, Inc.

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FOREWARD

The Pollution Issue: Economic Vs. Social Values

A major goal of CNRA -- Clean and safe water for Wisconsin citizens -- clearly exemplifies one of the major issues of our times. Economists and business interests decry and resist the expenditure of vast sums of money required to clean up our air and water to restore a healthy and pleasant environment. A rapidly increasing proportion of people are becoming concerned about the obvious deterioration of the quality of air and water.

We sincerely believe that there are solutions to these problems that will meet the standards of human health and welfare without causing major dislocations in the economy of the state and nation. In fact, the solutions to these vital problems discussed below provide realistic opportunities for the development of a new and important segment of economic activity. Pollution abatement efforts can create work opportunities for thousands of people who now have no active role in our economic system.

CNRA is dedicated to the proposition that our air and water can and must provide both a healthy environment and an enrichment of our lives.

F. M. B., Past President
Citizens Natural Resources Assoc.

"The CNRA holds the philosophy that man is a part of nature and not something above nature, and that the Community known as the State of Wisconsin must retain and create as many natural elements as possible if it is to be a healthy, sound, prosperous and beautiful place in which to live. It holds that as the economic growth and population pressures of our civilization expand, the task of keeping our state productive, beautiful and sound becomes more formidable and that only the most serious effort, thought, and action will prevent unnecessary despoilation."

--Wallace B. Grange (First President, CNRA)

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Mother, may I go out to swim?
 Yes, my Darling daughter.
 Hang your clothes on a hickory limb
 But don't go near the water!

STREAM OF A THOUSAND ISLES

By SYLVIA BECKER *

For centuries the beautiful Wisconsin River, "stream of a thousand isles," as the Winnebagoes and Chippewas described it, harbored myriads of edible fish and nurtured huge concentrations of wildlife. It was the hub of life for the Indian tribes and the immigrants who settled near its banks.

Major A. G. Ellis, who served as mayor of Stevens Point during the Civil War, compiled a history of the city which recorded that the Wisconsin River provided drinking water, sustenance and recreation of infinite variety. As he said, "when the river was full every face wore a smile." Rivermen gave the various rapids of this region pet names; Mosinee was known as Little Bull, Wausau as Big Bull, Merrill as Jenny Bull and still farther up was Grandfather Bull.

Ellis remarked that "as late as 1850 one hundred flocks of passenger pigeons would pass over the village of Stevens Point in an hour. The Buena Vista Marsh was a good feeding ground and the pigeons would roost in that neighborhood."

The oldtime rivermen were known as "suckers" because they arrived to begin running the lumber rafts downstream at about the same time the suckers came up the river to spawn.

There was no closed season on hunting and fishing in those days. An April 2, 1858, account by Ellis declares, "The strife in town the past week has been between the hunters and the anglers. Several hundred of the feathered tribe have been brought in and little short of an equal number of the finny tribe from the eddies of the old Wisconsin."

A February 7, 1867, item read, "A large wildcat was killed in this city last Friday.... Another was killed at Robinson's mill yesterday.... Sporting men are having fine times with their nags on the ice. Fine tracks, a mile and a half long, are cleared for the races." Another item, June 13, 1868, stated, "The enterprising principal took the whole school for a steamboat ride on the Wisconsin River." An August 21, 1875, entry read, "The boys have been slaying the prairie chickens at a rapid rate this week. Sheriff Baker went out Sunday and killed 65; Robert Patrick killed 85 on Monday."

As an index of the purity and freshness of the Wisconsin River in those days a May 6, 1888, item read, "Several speckled trout have been taken from the Wisconsin River below the Clark Dam (Stevens Point) this spring."

* Dept. of English, UW-Stevens Point

An 1895 issue of the Stevens Point Daily Journal disclosed that during the "gay nineties" many Stevens Point folk spent the good part of the summer on the Wisconsin River at two favorite camping grounds. Of the colony of cabins built for this purpose on Martin's Island, a chimney and fireplace remain visible from Highway 10 several miles north of Stevens Point. Maple Beach, six miles up the river from the city, was mostly a tenting ground with "fewer mosquitoes" than Martin's Island.

A July 30, 1898, account from the Daily Journal read, "One of the big fish about which the campers on Maple Beach have been talking so much was caught by Anson Kickland. It was a 4 foot, 4 inch-long rock sturgeon and weighed 38-1/2 pounds, caught with a hook in its side. Mr. Kickland says these fish have regular rubbing places. This one was at an old snag near Maple Beach. At about 4 o'clock in the morning Mr. Kickland went out in a boat to the snag to watch for him. He had a copper wire attached to a small rope and at the end of the wire was a large fish hook. The hook was dropped into the water near the snag, and after a while the snag moved a little. Kickland pulled up quickly with his line and, as luck would have it, caught the fish in the side. The latter immediately darted down stream, nearly pulling the fisherman out of the boat. He had the rod wound around one of his hands, however, and held on, but it was not until after he had been towed down the river more than half a mile that he finally succeeded in landing the fish in the boat. So far as is known this is the largest fish ever caught in the river here but people who have seen them jump out of the water near the beach insist that there are others there, longer and larger than this one. The fish was cut up and sold for 8-1/2 cents a pound." (The American Fisheries Society's charted value for sturgeon today is \$50 a pound which would bring today's value on the above mentioned fish to \$1925.)

Alex Wallace, for many years editor of the Stevens Point Daily Journal, in reprinting the above account in 1945 recalled, "The Wisconsin River was a paradise for fishermen in those days, with its black bass, pike, pickerel, perch and many other varieties of pan fish, and the 28 pound catfish that we caught in the big bend brings back memories of happier days when the Wisconsin River was not a cesspool. We wonder if we have degenerated to the point where we will keep on allowing large corporations to pollute and poison our river."

Wallace then quoted from Goldsmith's "The Deserted Village" as follows:

"Ill fares the land, to hastening ills a prey,
Where wealth accumulates and men decay."

According to Dr. George Becker, Ichthyologist, both species, the rock sturgeon and the flathead catfish, are no longer found in the central sector of the Wisconsin River.

Before the days of the automobile people spent much of their spare time on the river. Excursion boats plied between the village and the islands and people camped and fished. Alex Wallace pointed out that originally the city drew its drinking water from the Wisconsin River, but with the introduction of paper making in local mills in 1891 pollution became such a problem that the city was forced to get its drinking water from the Plover River Basin.

The Newport Mirror reported in 1867 concerning the Dells of the Wisconsin: "In spring, men and boys have great sport fishing there. Each has his spear with a handle ten or fifteen feet long, and a cord attached; and perching himself upon some projecting rock, fifteen, twenty or twenty-five feet above the water, he watches till he sees a good sized pickerel, catfish or sturgeon turn up on the water; then quick as a hawk upon his prey, he darts his spear at his victim, and deliberately draws back, by his cord, spear, fish and all. One part of this operation is of vast importance to those engaged in it; that is to make sure their footing, so they shall not draw themselves in, instead of drawing the sturgeon out."

Louis Romell, Adams county resident and former Sergeant-At-Arms, Wisconsin Legislature, remembers the river in 1904 as "a clean, clear stream with an abundance of aquatic life. Waterfowl of many species common to our northern climate could be found in great numbers on this river watershed." His father had purchased a farm near Petenwell Bluff and he recalls accompanying his father when he tended his set lines on the Wisconsin River. "The fish he caught were catfish, Northern Pike, Walleyed Pike, Sauger or sand pike, small and largemouth bass, pan fish, Rainbow Trout, Sturgeon, and in the early spring Buffalo suckers or Redhorse. Now a good many of these fish have disappeared and they have been replaced by large numbers of Carp. Carp always seem to follow pollution."

Mr. Romell comments further, "About this time dams were beginning to be built across the river in many locations, to produce electric power and power for the paper industry. As the paper industry grew and the companies expanded their operations, pollution of the river increased. In this same period cities and villages installed sewerage systems because of the growth of indoor plumbing. As the sanitary regulations of these communities were very meager and lax, the pollution problem increased and has continued to grow greater, and now something has to be done about it."

August Perleth, contemporary Wisconsin writer who represents a fourth generation living along the river, describes similar boyhood fishing memories. In The Wisconsin (Farrar and Rinehart, 1942) he says, "Once it was catfish, suckers, and sunfish that predominated, and full many a time I took to the Wisconsin and its sloughs for sunfish and bass.... And the carp fishing! The carp came up along its shores, and wherever the pea canneries

used to empty their waste into the Wisconsin, the old gaffers and the small boys fished, and the carp they caught were taken home to be pickled for winter eating."

Passenger pigeons no longer roost along the "stream of a thousand isles." The last one surrendered to human gluttony over seventy years ago. Wolves and wildcats, similarly decimated, no longer roam the river's shores. Speckled and rainbow trout find its polluted waters unfit habitat. The flesh of walleyes and bass caught in the Stevens Point area is so saturated with papermill effluent that to cook it is to induce nausea.

"Stream of a thousand isles," once a haven and refuge for fish and wildlife, still the hub of human life; what is its destiny?

THE WISCONSIN RIVER - ITS RESTORATION*

George Becker
Dept. of Biology
UW-Stevens Point 54481

"Call the roll of the great American rivers - they have died for their country." With these immortal words, Senator Gaylord Nelson has called attention to one of the gravest crimes committed by man in his short history. This nation is not even two-hundred years old, and already we have seen fit to rape our major rivers. They have become mute sacrifices to man's rampant growth and that monster the Gross National Product.

At the doorstep of Stevens Point haltingly flows the Wisconsin River. The rapids and swift sectors of the river have been all but obliterated. Today dams and spillways tame the river from Rhinelander down to Prairie du Sac.

I still love the Wisconsin River but I am offended by the odors that hit my nostrils as I step out of my front door.

I am offended by the unsightly brown water flowing over the brown slime-covered rocks.

I am offended that I cannot look into the water and see northerns and other fishes, for the river has lost her former clarity.

I am offended that I cannot drink the water from the river because of its taste and coliform contamination.

* Environmental Teach-in, April 22, 1970, Stevens Point, Wisconsin.

I am offended because as a fish biologist I see the passing of great fish, fish like the sturgeon, which has now disappeared from our waters. In the Lake Wisconsin widespread of the Wisconsin River above the Prairie du Sac dam where sturgeon are still found, a massive kill recently is testimony that this fishery too must be written off.

I am offended because the river, although still producing large walleyes and northerns, does not yield a single edible fish. The flesh of every fish in the river is contaminated with vile odors.

Until 1968 fish from Lake Wisconsin were still edible. This is no longer the case. I maintain that the proof of fishing is partly in the eating. Talk about fish kills! With our wastes we have massacred every fish in the river.

I am offended because in this day, when the future of mankind hangs on a frayed thread, I for one feel that we can no longer allow this river to serve as a municipal and industrial sewer. I do not agree with the water specialist I heard here in a meeting two years ago who maintained that we must designate some of our rivers for handling wastes, while others we will set aside for recreational purposes. For since then I have seen every rivulet, brook, stream and river mismanaged and mishandled and I wonder if man is hellbent on destroying all of his water and wallowing in his own filth.

I am offended that man thinks he can make a sewer out of a mighty river, a river which eventually flows into the sea. Has it ever occurred to man what is happening to the sea? And who is going to clean up the cesspool which the sea is soon destined to become? Bacterial contamination has already reached the estuaries and millions of dollars of shellfish lie unused along the entire length of the Atlantic, Gulf and Pacific coasts.

On the other hand I am encouraged that the city of Wausau is installing a sewage-disposal system which extends far beyond conforming with minimum standards.

I am encouraged that Richard M. Billings, an executive of the Kimberly-Clark Paper Company, recently told representatives of the paper industry here in Stevens Point, that they will have to spend a larger share of their profits on pollution control if environmental contamination is going to be reduced. He said, "if all the known available practical technology were to be installed in the realm, the pollution problem would be very much reduced.... In other words, we'll have to admit, that we are not doing everything that can be done."

Therefore as of this date I propose to initiate formation of a Wisconsin River Restoration Committee. This committee will be dedicated to spread the word up and down the Wisconsin river valley, from Lac Vieux Desert to Prairie du Chien, that this great valley must become a model of cleanliness. The message must

be carried to municipality and to industry, to every man, woman and child. I encourage the active help and leadership of business men, educators, industrialists, law enforcement officers, politicians, and citizens. I encourage each one of you here to join with me to this end.

Let us cure the Wisconsin River of its disease and restore it to its former health. With this our lives will be enriched and man will ensure his continued survival in a better world.

CITIZENS NATURAL RESOURCES ASSOCIATION OF WISCONSIN

(Incorporated under the laws of Wisconsin--1953)

FOR RELEASE AT noon, Saturday,
Jan. 23, 1971

Date: January 14, 1971
To: U.S. Attorney for the Western District of Wisconsin,
John O. Olson
From: Wisconsin River Restoration Committee
Re: Complaint under the 1899 Refuse Act (River and Harbor
Act of March 3, 1899, c. 425, 30 Stat. 1151) against
polluters of the Upper Wisconsin River in the State of
Wisconsin

BACKGROUND INFORMATION

The Wisconsin River Restoration Committee wishes to call the U.S. Attorney's attention to the fact that by testimony (Wisconsin Department of Natural Resources hearing on August 13, 1970, at Wausau, Wisconsin) and by publication (Upper Wisconsin River Pollution Investigation Survey, July, 1970, Department of Natural Resources, Division of Environmental Protection, 103p.) the Wisconsin River, a major waterway within the State of Wisconsin is seriously polluted.

Within the past five years serious fish kills (one involving a remnant sturgeon population) have occurred in various impoundments of the river. Bottom organisms are largely those tolerant to pollution, whereas those intolerant to pollution have disappeared or have been seriously reduced in number of species and individuals. Parts of the river bottom are covered by deep and extensive beds of wood fibers from pulp and paper sources. In those sectors of the river where the water runs free, rocks and bottom are covered with pollution-associated slimes.

For many years the fish from the river have had their flesh contaminated with odors and tastes, virtually rendering them unusable for the table. Sports fishermen largely by-pass the Wisconsin River because of this. Odors from the water are offensive, and despite the river's attractive natural setting, the shore areas adjacent to the river are seldom used by picnickers. During the spring of 1970 the mercury content in the flesh of fish within the river was found to exceed allowable federal tolerances and a state ban was issued relative to use and consumption. This state action precipitated an almost complete collapse of the tourist and recreation industry in the Castle Rock and Peterwell areas during the summer and fall of 1970 and no relief for this collapse is indicated.

The aforementioned report on the Upper Wisconsin River of July, 1970, gives numerous instances where dissolved oxygen levels dropped below that allowed by the water quality standards adopted in 1966 for the State of Wisconsin. Whereas the minimum oxygen level allowed - even in those waters zoned industrial - may not be less than 1 ppm. at any time, zero oxygen has been recorded from several sampling stations during late winter and late summer.

From the report, we read:

Over 90% of the suspended solids and BOD discharged into surface waters of the Upper Wisconsin River Basin are from pulp and paper mills. Substantive improvements in water quality can only be made by drastic reductions in the industrial waste loadings (p. 42).

From the same report it appears that the biological oxygen demand (BOD) loadings have changed little between 1965 and the present but there has been a sharp increase in tonnage discharge of suspended solids. These substantially add to the pollution load of the Wisconsin River.

The Wisconsin River Restoration Committee wishes to make it clear that it recognizes the financial contribution made by the pulp and paper industry to the economy of central and northern Wisconsin. The pulp and paper industry is an integral way-of-life in Wisconsin. Still, the continued damage to the waters of the Wisconsin River will in the long run adversely affect the paper industry as well as other segments of the economy. Some attempts at pollution abatement have been instituted by some mills. In all instances these steps have failed to reach the level of pollution control expected.

The state of the art in pollution control for pulp and paper industries is such that suspended solids and BOD loadings per ton of paper can be curtailed to negligible amount. The state of the art in pollution control for pulp and paper industries has shown that waste recovery systems either show profit, or, at least tend to pay for themselves. Good business dictates that from the standpoint of environmental health, profit and public goodwill, it is in

the interest of the industry to institute at once systems of waste water treatments which will ensure a healthy environment for her citizens. To this end tax refunds are available to those firms placing recovery systems or anti-pollution devices. Also loans of state and federal monies are available for such purposes.

Although the State of Wisconsin has legal channels whereby the Wisconsin Department of Natural Resources can bring action against polluters, this route has been little used by that agency. The Department of Natural Resources has been especially permissive with the major polluters of our Wisconsin waterways, including those of the Wisconsin River. Despite increasing pressure from conservation groups and a concerned public, there is little indication that this policy will be reversed.

Meanwhile the Wisconsin River continues to degrade, adding its chemical load to that of the Mississippi River and so affects the quality of the downstream interstate waters. The Wisconsin River Restoration Committee calls attention to the fact that pollution in central Wisconsin impinges on other States of the Union and so becomes a federal problem.

PETITION

Therefore the Wisconsin River Restoration Committee implores the Attorney General of the United States of America to bring immediate action against the following industries, forcing them to desist from dumping harmful wastes into the Wisconsin River.

Also, the Wisconsin River Restoration Committee wishes to direct the Attorney General to remit those portions of the fines to which the Wisconsin River Restoration Committee is entitled by law to the Citizens Natural Resources Association of Wisconsin, Inc. Such monies will be used to promote environmental quality wherever needed.

Also, the Wisconsin River Restoration Committee will upon request furnish to the Attorney General such samples of effluent, pictures, or data, to prove pollution from any or all of the industries mentioned below.

Also, let the Attorney General be advised that none of the industries mentioned below has obtained a Department of the Army permit for the discharge of materials into the Wisconsin River and its tributaries, as required by the River and Harbor Act of March 3, 1899 (Letter of October 13, 1970, from Wm. L. Goetz, St. Paul District, Corps of Engineers).

POLLUTERS

ST. REGIS PAPER COMPANY, Rhinelander. Sulfite pulp and paper wastes into Wisconsin River. Est. daily BOD discharge as of Aug. 13, 1970, 17,540 lbs.; suspended solids, 18,900 lbs. Order 3-65J-1; July 28, 1965.

OWENS-ILLINOIS, INC., Tomahawk. Semi-chemical pulp and paper wastes into Wisconsin River. Est. daily BOD discharge as of Aug. 13, 1970, 11,600 lbs.; suspended solids, 11,160 lbs. Order 3-65J-3; July 28, 1965.

AMERICAN CAN COMPANY, Rothschild. Sulfite pulp and paper wastes into Wisconsin River. Est. daily BOD discharge as of Aug. 13, 1970, 85,580 lbs; suspended solids, 18,520 lbs. Order 3-65J-10 & 10A; July 28, 1965; Oct. 7, 1966.

CONSOLIDATED PAPERS, INC., Stevens Point Division. Paper wastes into Wisconsin River. Est. daily BOD discharge as of Aug. 13, 1970, 1820 lbs.; suspended solids, 5360 lbs. Order 3-65J-16; July 28, 1965.

WISCONSIN RIVER DIVISION OF CONSOLIDATED PAPERS, INC., Stevens Point. Groundwood pulp and paper wastes into Wisconsin River. Est. daily BOD discharge as of Aug. 13, 1970, 5,100 lbs.; suspended solids, 18,920 lbs. Order 3-65J-18; July 28, 1965.

WHITING-PLOVER PAPER COMPANY, Whiting. Rag pulp and paper wastes into Wisconsin River. Est. daily BOD discharge as of Aug. 13, 1970, 1,380 lbs.; suspended solids, 2,820 lbs. Order 3-65J-19; July 28, 1965.

KRAFT DIVISION OF CONSOLIDATED PAPERS, INC., Wisconsin Rapids. Kraft pulp waste into Wisconsin River. Est. daily BOD discharge as of Aug. 13, 1970, 36,360 lbs.; suspended solids, 8,580 lbs.

CONSOLIDATED PAPERS, INC., Biron Division. Groundwood pulp and paper wastes into Wisconsin River. Est. daily BOD discharge as of Aug. 13, 1970, 8,600 lbs.; suspended solids, 26,660 lbs. Order 3-65J-20; July 28, 1965.

GEORGIA-PACIFIC CORPORATION, Tomahawk. Paper wastes into Wisconsin River. Est. daily BOD discharge as of Aug. 13, 1970, 1,380 lbs.; suspended solids, 2,280 lbs.

WISCONSIN WATER QUALITY STANDARDS (WIS. ADMINISTRATIVE CODE)

RD 2.02 Categories of standards. To preserve and enhance the quality of waters the following standards are established to govern water management decisions. It should be recognized that these standards will be revised as new information or advancing technology indicate that revisions are in the public interest.

(1) MINIMUM STANDARDS. Regardless of the water quality standards and water use, untreated or inadequately treated wastes may not impair a designated use nor may standards be interpreted to permit a lower quality within a water sector than that now existing or required by

outstanding orders. As a result of municipal, industrial, commercial, domestic, agricultural, land development or other activities, conditions may arise which will be controlled by the following standards:

(a) Substances that will cause objectionable deposits on the shore or in the bed of a body of water, shall not be present in such amounts as to create a nuisance.

(b) Floating or submerged debris, oil, scum or other material shall not be present in such amounts as to create a nuisance.

(c) Materials producing color, odor, taste or unsightliness shall not be present in such amounts as to create a nuisance.

(d) Substances in concentrations or combinations which are toxic or harmful to humans shall not be present in amounts found to be of public significance, nor shall substances be present in amounts, which by bio-assay and other appropriate tests, indicate acute or chronic levels harmful to animal, plant or aquatic life.

(2) FOR PUBLIC WATER SUPPLY. The following standards are applicable where a surface water is classified for public water supply.

(a) Bacteria. Coliform number not to exceed 5,000 per 100 ml. as a monthly arithmetic average value; nor exceed this value in more than 20 percent of the samples examined during any month; nor exceed 20,000 per 100 ml. in more than 5 percent of the samples. Counts as Most Probable Number (MPN) or Membrane Filter Coliform Counts (MFCC).

(b) Dissolved solids. Not to exceed 500 mg/l as a monthly average value, nor exceed 750 mg/l at any time.

(c) pH. A range from 6.0 to 9.0 except in waters naturally having a pH of less than 6.5 or higher than 8.5 where effluent discharges may not reduce the low value or increase the high value of the surface water's pH by more than 0.5 standard units.

(d) The intake water supply will be such that by appropriate treatment and adequate safeguards it will meet the Public Health Service Drinking Water Standards, 1962.

(e) Other. Concentrations of other constituents must not be hazardous to health.

(3) FOR FISH AND OTHER AQUATIC LIFE.

(a) The following standards are applicable to surface waters where maintenance of fish reproduction is of primary importance in the public interest and natural conditions permit:

1. Dissolved oxygen. The dissolved oxygen content shall not be lowered to less than 80 percent of saturation nor to less than 5 mg/l at any time. There shall be no abrupt change from natural unpolluted background by more than 1 mg/l at any time.
2. The temperature shall not exceed 84° F. No change from natural unpolluted background by more than 5° F. at any time nor at a rate in excess of 2° F. per hour.

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outstanding orders. As a result of municipal, industrial, commercial, domestic, agricultural, land development or other activities, conditions may arise which will be controlled by the following standards:

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(c) Materials producing color, odor, taste or unsightliness shall not be present in such amounts as to create a nuisance.

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2. The temperature shall not exceed 84° F. No change from natural unpolluted background by more than 5° F. at any time nor at a rate in excess of 2° F. per hour.

(b) The following standards are applicable to surface waters where fishing is desirable in conjunction with other uses and natural conditions permit:

1. For a balanced warm water fishery the dissolved oxygen content should not be less than 5.0 mg/l during at least 16 hours of any 24-hour period, nor less than 4.0 mg/l at any time.
2. Temperature. The temperature shall not exceed 89° F. for warm water fish. No abrupt change from background by more than 5° F. at any time. In addition, authorization must be obtained for proposed installations where the discharge of a thermal pollutant may increase the natural maximum temperature of a stream by more than 3° F.

(c) Unauthorized concentrations of substances are not permitted that alone or in combination with other materials present are toxic to fish or other aquatic life.

(d) Streams classified by law as trout waters shall not be altered from natural background by effluents that affect the stream environment to such an extent that trout populations are adversely affected in any manner.

- (4) FOR RECREATIONAL USE. A sanitary survey and/or evaluation to assure protection from fecal contamination is the chief criterion in determining the suitability of a surface water for recreational use. In addition, the following bacteriological guidelines are set forth:

(a) A water is acceptable for whole body contact if it has an arithmetic average coliform count of 1,000 per 100 ml. or less and a maximum not exceeding 2,500 per 100 ml. during the recreation season.

(b) A water is acceptable for partial body contact if it has an arithmetic average coliform count of 5,000 per 100 ml. or less and with no more than 1 of the last 5 samples exceeding 20,000 per 100 ml. during the recreation season.

(c) The Membrane Filter Coliform Count (MFCC) is the preferred method for determining coliform density; provided, however, that where turbidity due to algae or other material does not permit testing of a sample volume sufficient to produce significant results, or where low coliform estimates may be caused by high numbers of noncoliforms or the presence of substances toxic to the procedure, the Most Probable Number (MPN) is to be used to determine coliform density. The average is based on the last 5 test results. A more definitive test for fecal pollution is the Membrane Filter Fecal Coliform Count (MFFCC). Tests by this method are acceptable where correlation relating the count to sanitary hazards has been demonstrated. Acceptable values based on MFFCC are not shown, but may be adopted in future revisions.

- (5) FOR INDUSTRIAL AND COOLING WATER USE. The following standards are applicable to surface waters designated for industrial processes and cooling purposes:

(a) Dissolved oxygen shall not be less than 2.0 mg/l as a daily average nor less than 1.0 at any time.

(b) Dissolved solids shall not exceed 750 mg/l as a monthly average value, nor exceed 1,000 mg/l at any time.

(c) pH shall range from 6.0 to 9.0 except in waters naturally having a pH of less than 6.5 or higher than 8.5 where effluent discharges may not reduce the low value or increase the high value of the surface water's pH by more than 0.5 standard units.

(d) Temperature shall not exceed 89° F, (32° C.).

RD 2.03 Enforcement. Financial assistance, industrial incentives, increased surveillance, orders and legal action will be the means used to implement and enforce the adopted water quality standards. Reasonable time schedules to comply with orders depend on the circumstances. In general, 1 year to provide disinfection, in-plant controls and minor treatment adjustments; or 2 years to install settleable solids removal facilities; or 2-3 years to complete a secondary treatment system should be adequate. Separation of excessive clear waters from sanitary sewerage systems may vary from 1 year for disconnection of roof leaders to 10 years or more where combined sanitary-storm water sewers are involved. All polluters will be required to conform to this timetable and to the annual listing of actions required to achieve the surface water quality standards adopted.

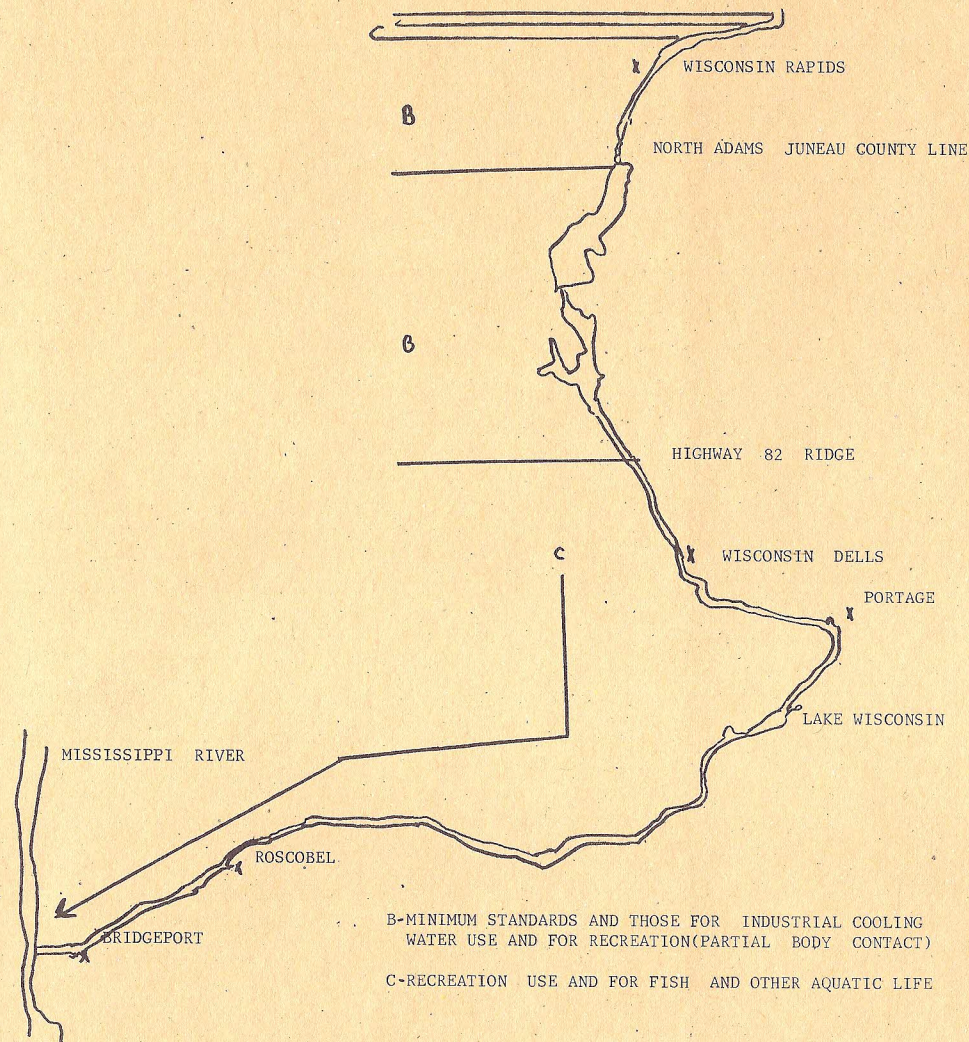
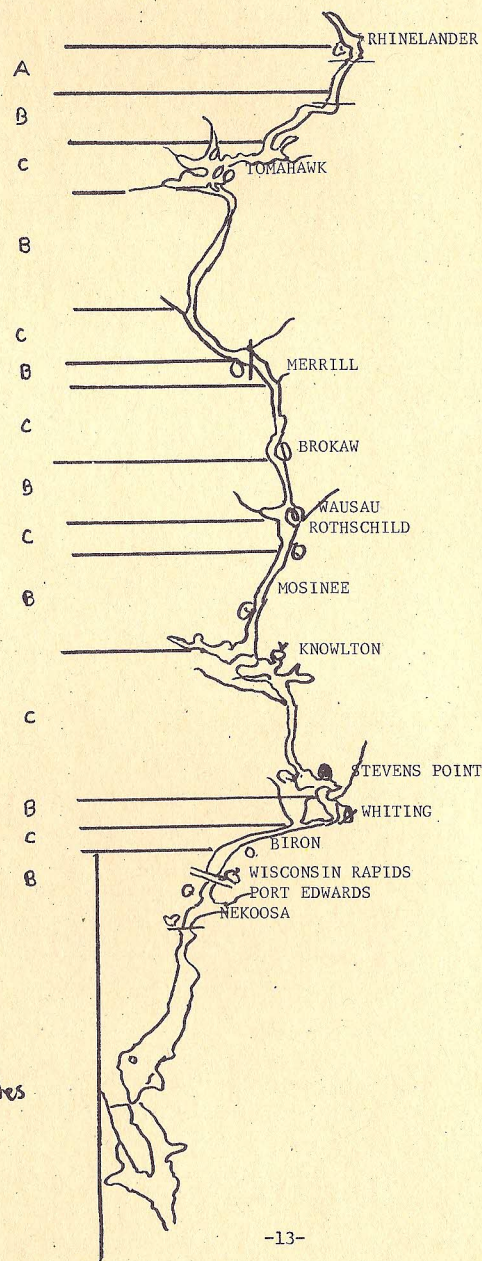
History: Cr. Register, May, 1967, No. 137, eff. 6-1-67.

CNRA RECEIVES FINE MONEY

The St. Regis Paper Co. of Rhinelander was fined \$1000 under the 1899 Refuse Act as a result of CNRA's petition to the United States District Attorney. Half of this fine was divided equally between Congressman Henry Reuss and the CNRA. Congressman Reuss turned his \$250 over to the Wisconsin Department of Natural Resources. CNRA's share will go to further the organization's fight against water pollution.

ESTABLISHED WATER STANDARDS
FOR THE UPPER WISCONSIN RIVER

- A - MINIMUM STANDARDS
B - MINIMUM STANDARDS AND THOSE FOR
INDUSTRIAL AND COOLING WATER USE
AND FOR RECREATION (PARTIAL BODY
CONTACT ONLY)
C - RECREATION USE AND FOR FISH AND
OTHER AQUATIC LIFE
— BRIDGE



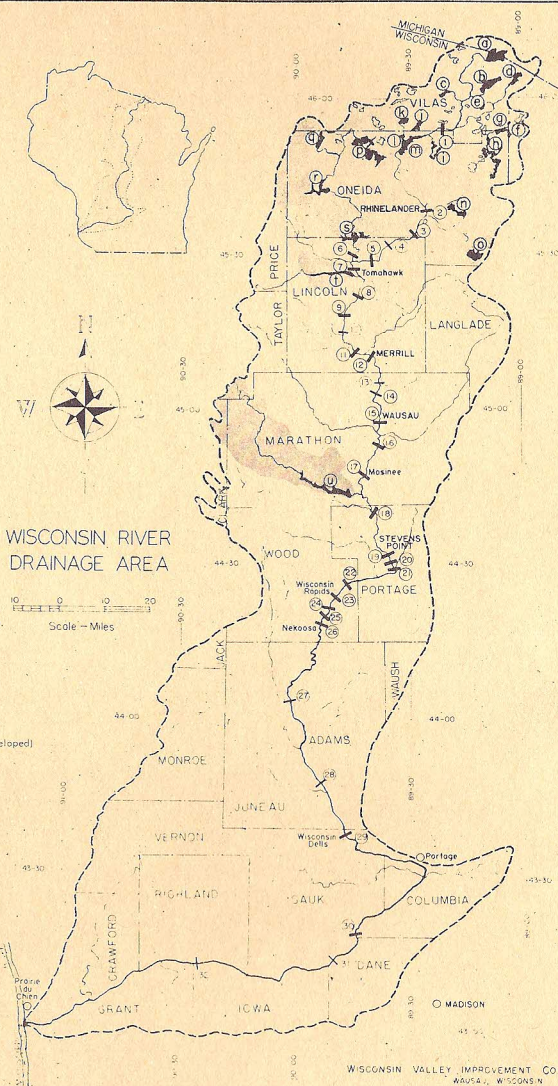
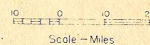
STORAGE RESERVOIRS

	Full Acres
(a) Vieux Desert	5066
(b) Twin Lakes	3616
(c) Buckatahpon	1070
(d) Long Lake	2715
(e) Little Deerskin	312
(f) Seven Mile	535
(g) Lower Nine Mile	863
(h) Burnt Pathways	7657
(i) Sugar Camp	2209
(j) Little St. Germain	1030
(k) Big St. Germain	1568
(l) Pickerel	1130
(m) Rainbow	4485
(n) North Pelican	1394
(o) South Pelican	3450
(p) Minocqua	6729
(q) Squirrel	1876
(r) Willow	7368
(s) Rice	4435
(t) Spirit	2096
(u) Eau Pleine	6998
Total	66,602 Acres

POWER DAMS

NAME	OWNER
(1) Otter Rapids	W.P.S. Corp.
(2) Rhinelander	St. Regis Pap. Co.
(3) Hat Rapids	W.P.S. Corp.
(4) Menard Isle	W.P.S. Corp. (undeveloped)
(5) Kings Dam	Tomahawk Power & Pulp Co.
(6) Jersey City	W.P.S. Corp.
(7) Tomahawk	W.P.S. Corp.
(8) Grandmother	Owens Illinois Glass Co.
(9) Grandfather	W.P.S. Corp.
(10) Bill Cross	W.P.S. Corp. (undeveloped)
(11) Alexander	W.P.S. Corp.
(12) Merrill	W.P.S. Corp.
(13) Trappe	W.P.S. Corp. (undeveloped)
(14) Brokaw	Wausau Pap. Mills (undeveloped)
(15) Wausau	W.P.S. Corp.
(16) Rahlschild	American Can Co.
(17) Mosinee	Mosinee Pap. Mills
(18) Du Bay	Consolid. Water Pwr. Co.
(19) Stevens Point	Consolid. Water Pwr. Co.
(20) Wis. River Div.	Consolid. Water Pwr. Co.
(21) Whiting Plaver	N.E.P. Co.
(22) Bron	Consolid. Water Pwr. Co.
(23) Wis. Rapids	Consolid. Water Pwr. Co.
(24) Centralia	N.E.P. Co.
(25) Port Edwards	N.E.P. Co.
(26) Nekoosa	N.E.P. Co.
(27) Fetenwell	Wis. Riv. Power Co.
(28) Castle Rock	Wis. Riv. Power Co.
(29) Wis. Dells	W.P. & L. Co.
(30) Prairie du Sac	W.P. & L. Co.
(31) Honey Creek	(undeveloped)
(32) Muscoda	(undeveloped)

WISCONSIN RIVER DRAINAGE AREA



RELATED INFORMATION

Total Drainage Area	12,280 sq. mi.
Present Controlled Drainage Area	1,911 sq. mi.
Additional Controlled Drainage Area Planned	376 sq. mi.
Total Storage Capacity	17,440,000,000 cu. ft.

CITIZENS NATURAL RESOURCES ASSOCIATION

OF WISCONSIN

DATE: April 1, 1971
TO: L. P. Voigt, Secy. DNR
FROM: Wisconsin River Restoration Committee (CNRA)
Citizens Natural Resources Association of Wisconsin, Inc.
RE: Petition for review and revision of water quality
standards and zones as they apply to the Wisconsin River.

In the document published July, 1970, by the Division of Environmental Protection, Wisconsin Dept. of Natural Resources entitled UPPER WISCONSIN RIVER-POLLUTION INVESTIGATION SURVEY, we read on page 5:

"Four use classifications have been set forth in the standards, these are: public water supply, fish and other aquatic life, recreational use, and industrial and cooling water supply. In addition, all waters must meet minimum standards." (The underline is ours).

Under Wis. Administrative Code, Chapt. PD 2.02 Categories of standards (1) Minimum Standards (c), we read "Materials producing color, odor, taste, or unsightliness shall not be present in such amounts as to create a nuisance."

We should like to call attention to the fact that the water of the Wisconsin River emits objectionable odors for a good portion of its length, that these odors are associated with the emissions from certain paper industries along the river,

That these odors are especially noticeable at the time the ice leaves the river, although they persist in varying degrees throughout spring, summer, fall, and winter,

That the fish within the river have their flesh permeated with odors and tastes of similar origin,

That, as a result, these fish are frequently rejected as food because of such odors and tastes,

And that collectively, such odors over and within the water of the Wisconsin River and within the flesh of the fish from said river constitute a nuisance of the highest order.

Also under Minimum Standards (d), we read "Substances in concentrations or combinations which are toxic or harmful to humans shall not be present in amounts found to be of public health significance, nor shall substances be present in amounts, which by bio-assay and other appropriate tests, indicate acute or chronic levels harmful to animal, plant, or aquatic life."

We wish to call attention to the large amounts of mercury found in bottom muds and in the flesh of fish in the Wisconsin River. This problem is continuing through discharge of the Wyandotte Chemical Company of some mercury directly into the

water and some airborne mercury which falls upon the water. In addition to mercury there may be substances like arsenic, cadmium, chromium and lead which may also be above limits allowed by the United States Public Health Service. Our minimum standards should show these substances and the allowable limits of same.

We have learned through shocking experience that public water, whether used for drinking, boating, swimming or fishing must be free of harmful toxins, or these toxins will continue to haunt us. It helps neither the transient tourist nor the resort owner and his guests to know that water, heavily contaminated with a deadly toxin, is perfectly safe for swimming and catching fish for fun.

Another key substance is oxygen. The amount needed by fish and other aquatic organisms is as important as that required by human beings. For aquatic animals this varies with the temperature of the water. However, the oxygen level cannot drop safely much below 3 ppm at any time of the year for most fishes.

We wish to call attention to the fact that in many parts of the Wisconsin River oxygen has indeed dropped below those levels required by "animal, plant, or aquatic life." Recent pollution reports (Div. of Environmental Protection, 1970. Upper Wisconsin river pollution investigation survey. DNR, Madison), give a number of oxygen levels at zero or near zero. Such readings appear in early spring and again in late summer.

We note changes in the composition of animal communities as affected by sewage and industrial outfall. In all reports from the Wisconsin River, from Rhinelander to Castle Rock, we see a sudden drop in species number and numbers of organisms sensitive to pollution. In many sectors mayflies and caddisflies decrease or disappear entirely whereas pollution-tolerant forms such as bloodworms and sludgeworms increase.

We call attention to the Standards for Industrial and Cooling Water Use:

"The following standards are applicable to surface waters designated for industrial processes and cooling purposes:

- a. Dissolved Oxygen: Not less than 2.0 mg/l as a daily average value nor less than 1.0 at any time.
- b. Dissolved Solids: Not to exceed 750 mg/l as a monthly average value, nor exceed 1,000 mg/l at any time.
- c. pH. A range from 6.0 to 9.0 is permitted except in waters naturally having a pH of less than 6.5 or higher than 8.5 where effluent discharges may not reduce the low value of the surface water's pH by more than 0.5 standard units.
- d. Temperature: Not to exceed 89° F."

Without going into detail, these industrial and cooling water standards seriously violate the minimum standards. Any

biologist can take item by item and document such violations. It becomes clear that all waters do not meet minimum standards, if industrial and cooling water standards are allowed. Such zones quickly become biological deserts, and the minimum water quality standards shall have been violated.

PETITION.

Whereas the Wisconsin River Restoration Committee and the Citizens Natural Resources Association, Inc., find that the present water quality standards have been seriously violated in practice, and

Whereas some classifications of the present water quality standards are in serious conflict with one another, and

Whereas in the light of present knowledge it becomes necessary for us to recognize and identify acute toxins in our aquatic environment.

Now therefore be it resolved that the Wisconsin River Restoration Committee and the Citizens Natural Resources Association, Inc. request the Department of Natural Resources to immediately re-examine the current water quality criteria and establish such criteria which are realistic and which will be in the best interest of the people of Wisconsin.

And be it resolved that the Department of Natural Resources reclassify the water quality zones on the Wisconsin river so that the natural systems and beauty of the river are restored and that the recreational potential of this valuable river system is realized.

George C. Becker Chmn.

George C. Becker
Wisconsin River Restoration Committee (CNRA)

F. M. Baumgartner Pres.

Frederick Baumgartner
Citizens Natural Resources Association of Wis., Inc.

April 2, 1971

MERCURY IN WISCONSIN RIVER BASIN

George Becker

GENERAL INFORMATION

Federal law allows mercury within products of 0.5 parts per million.

On June 20, 1970, the Wisconsin River Restoration Committee went on record requesting the State of Wisconsin to establish a standard which requires total elimination of all mercury and its compounds from all effluents discharged into state waters.

On August 11, 1970, I testified at the Department of Natural Resources hearing on mercury at which time I resubmitted the June 20 resolution adopted by our committee.

HUMAN TOXICITY

"The symptoms in man of poisoning from mercury compounds may occur weeks to months after an acute exposure of toxic concentrations. Symptoms include numbness and tingling of the lips, of hands and feet, ataxia, disturbances of speech, concentric constriction of visual fields, impairment of hearing, and emotional disturbances, with severe intoxication the symptoms are irreversible. In infants born to mothers with exposure to large amounts of methyl mercury, the symptoms are somewhat different. Most children suffer mental retardation and also cerebral palsy with convulsions.

"One characteristic of methyl mercury is its tendency to accumulate in the human brain. One of the observable effects of methyl mercury poisoning in man is the impairment of the coordination of muscle movement, etc., resulting from damage to certain brain cells. After damage of one or a few cells, other cells may take over, the net result showing up as no effect in a clinical investigation. When too many cells have been damaged during a short time, clinical results show up early.

"The reduction in residual brain capacity can occur in the prenatal stages. The human fetus acquires higher mercury concentrations than the mother-to-be, so that infants with congenital brain damage from methyl mercury are born to mothers who show no symptoms of methyl mercury poisoning. Methyl mercury easily penetrates to the fetus via the placenta, and the concentration of mercury in the fetal blood is about 20 per cent higher than in the mother and in the brain of the fetus as well." (Sport Fishing Bulletin, No. 215, June, 1970, p. 1).

MERCURY IN THE WISCONSIN RIVER BASIN

"Fish samples taken over the 350-mile stretch of the Wisconsin River extending below Rhinelander contain mercury residues

averaging above the .5 ppm guideline established by the Food and Drug Administration as an "action level" for banning fish from interstate markets. The Wisconsin Department of Health and Social Services warned against the frequent consumption of these fish but advised that one meal of fish per week would not constitute a health hazard. These warnings have been communicated to the public A mercury cell process chlor-alkali plant (the Wyandotte Chemicals Corporation at Port Edwards) is located on the Wisconsin River." (Kleinert, Stanton & Paul Degurse 1971. Res. Rep. 73 Dept. Nat. Res., Madison)

From the same report I have extracted high contamination readings for sites located below the Wyandotte plant:

Wood Co. below Nekoosa Dam (1.62 ave.)
Adams-Juneau Cos. upper Peterwell flowage (2.36 ave.)
Adams-Juneau Cos. above Castle Rock Dam (2.22 ave.)
Adams-Juneau Cos. above Dells Dam (1.23 ave.)
Sauk Co. below Dells Dam (1.09 ave.)
Sauk Co. below Dells Cr. (1.83 ave.)
Columbia-Sauk Cos. at Merimac (.83 ave.)
Iowa-Sauk Cos. at Spring Green (1.01 ave.)
Grant-Crawford at Bridgeport (1.84 ave.)
Grant-Crawford at Boscobel (1.07 ave.)

I secured the feathers and bones of great blue herons from the upper Peterwell flowage in August, 1970. These I sent to Mr. Paul Degurse for analysis. In a letter, October 30, 1970, I received the following report:

Feather (vane or web)	22.7 ppm
Feather (shaft)	15.3 ppm
Leg bone	.123 ppm
Leg bone	.145 ppm
Back bone	.148 ppm

DNR REGULATIONS PERTAINING TO MERCURY DISCHARGE INTO WATERS OF THE STATE OF WISCONSIN

Order Number: GO-EP-1-70

Section 1. ORGANIC MERCURY COMPOUNDS. The discharge of organic mercury compounds to the waters of the state shall not exceed 0.0005 mg/l of mercury as measured in a 24-hour composite sample.

Section 2. INORGANIC MERCURY COMPOUNDS AND METAL MERCURY. The discharge of inorganic mercury compounds and metallic mercury to the waters of the state shall not exceed the background level by more than 0.05 pound per 1,000,000 gallons of effluent discharged. The maximum discharge of inorganic mercury compounds and metallic mercury shall be 0.15 pound of mercury per day averaged over a 30-day period, however in any one day there shall not be a discharge in excess of 0.50 pound.

MERCURY DISCHARGE INTO THE AIR - WYANDOTTE PLANT

The Department of Natural Resources in its order 1A-70-17U-1 to the Wyandotte Chemicals company states "That the Wyandotte Chemical Company discharges mercury or mercury-containing compounds to the atmosphere in such quantities and of such duration as is or tends to be injurious to the public health, safety or welfare," and it orders "That Wyandotte Chemicals Company reduce the concentration of mercury discharged to the atmosphere with the hydrogen and end-box venting streams to a level corresponding to the equilibrium partial pressure of mercury at 5°C. The total discharge of mercury to the atmosphere with these streams shall not exceed 0.9 pounds per day," and "That complete compliance with these orders shall be accomplished by July 2, 1971."

Let me quote from a letter I received from Donald R. Winger, Administrative Assistant DNR (dated Jan. 20, 1971):

"Enclosed please find a copy of the Wyandotte Chemical Company orders as per your request.

"Exact figures on mercury emissions to the atmosphere are not available. However, losses to the atmosphere have been reduced to 20 to 25 pounds of mercury per day by the use of mist eliminators and heat exchangers.

"This represents approximately a 50% reduction. Some increase in mercury concentrations in the soils downwind from the plant have also been noted."

DISCUSSION

Considering the prevailing winds in the Port Edwards area, it is reasonable to assume that of the 20 to 25 pounds of mercury released from the stack of the Wyandotte plant, a considerable percentage will drop directly into the Wisconsin River and into the Peterwell and Castle Rock reservoirs to the south. The remainder will fall onto the land within the Wisconsin River basin and can, through flooding and runoff, find its way eventually into the Wisconsin River and its reservoirs.

It is unrealistic to assume that because the element is released to the air that water pollution is being avoided. Furthermore it may be assumed that the 0.15 pound of mercury per day allowed by the water regulations cited above is being violated.

Thus the Wisconsin River basin and the mainstem of the river are being contaminated daily by an additional load of mercury from a large air-borne source.

One expert has estimated that with no additional contamination it would take 50 years before the mercury in the bottom muds of the Wisconsin River would be exhausted. I.e., fish may be expected to show large methylmercury content over that period. Our present method of mercury containment by allowing serious violation hardly

seems the proper method for alleviating this long-term problem.

Although the Department of Natural Resources has been doing considerable testing of fishes and other animals, no testing has determined levels in the human being.

I called Dr. Hugh Skinner of the State Department of Health and Social Service on March 5, 1971, at which time he indicated to me that his office is not planning on testing for mercury in occupational workers, and, that to his knowledge such testing has not been done in this river basin except for one small study. He related that Dr. Louis R. Pfeiffer of the Nekoosa Medical Center, Nekoosa, has tested the blood of 3 or 4 workers from the Wyandotte plant. Results of mercury level were not disclosed to me.

Mercury released into the environment is not to be underestimated. As indicated above, this element is extremely toxic and potentially hazardous to the human being. With some reservations, I want to illustrate this with the following model:

Assuming the mercury level of 25 ppm throughout body tissues of a human being as sufficient to produce severe mercury disease or death. Then the amount producing such disease or death is equivalent to 0.00375 pounds of mercury per person (150 pound average). Potentially the 20 to 25 pounds of mercury released daily by a plant can produce disease or death in 5000 to 6000 persons.

Naturally this potential is not realized because the toxin is scattered widely into the environment. Moreover much of it is not immediately converted into methylmercury, the most toxic form of the element. Also the level of mercury intake by the people of central Wisconsin in general is perhaps minute and in such quantities that slow elimination from the system does not allow the build-up necessary for developing acute symptoms.

The extent of mercury fixation in the bodies of workers in the Port Edwards plant has not been adequately searched, or, if it has, it has not been made public knowledge. Nor is the degree of build-up of mercury known in those citizens not directly associated with the industry.

ALTERNATE METHOD FOR PRODUCTION OF CAUSTIC SODA AND CHLORINE

In addition to the mercury cell, another process called the diaphragm cell extracts identical products from brine. The process has been evaluated by the Hooker Chemical Corporation and average current efficiency is 96.4% as compared with 95.5% obtained by conventional methods and practices. Brine is fed to cells which are divided into an anolyte and catholyte compartments with a diaphragm of chlorinated poly (vinyl chloride) or polypropylene.

SUMMARY

1. Proper concern for the health of the citizens of the State of Wisconsin has not been exhibited by the State Department of Health, by the Department of Natural Resources, by the paper industry or the State of Wisconsin
2. Environmental contamination by mercury is continuing from a single source in this state at the rate of 20 to 25 pounds per day.
3. The mercury cell method of treating brine for the manufacture of caustic soda and chlorine can be replaced by the safe diaphragm cell method. The latter is used in a number of plants throughout the United States already.
4. Between this date and July 2, 1971, (when emissions into the atmosphere must be cut according to DNR order to 0.9 pound or less) the Wyandotte plant will be contaminating the air, soil and water of central Wisconsin by scattering over a ton of mercury. This it is doing with the permission of the State Department of Health and the Department of Natural Resources.
5. Little concern is shown by state or private agencies for the welfare of the tourist and recreation industry which has already suffered severe financial loss because of mercury contamination of fish. Continued contamination with this element will greatly protract the recovery period for these industries.

IN BEHALF OF A WISCONSIN RIVER SANITARY AUTHORITY*

("George's Pipe-Dream")

George Becker

There are many redeeming values about the Wisconsin River valley but the water in her mainstem and in many of her tributaries is not one of them. I have heard officials from municipalities and mostly those from certain industries say that the Wisconsin River is in better shape today than it was ten years ago. The evidence indicates otherwise.

Water quality standards set recently prescribe scarcely more than minimum standards for those sectors of the stream which receive outfall from industries and municipalities. And, although the remaining sectors of the stream "shall meet the standards for recreational use, and those for fish and other aquatic life," many sportsmen will charge that these standards are a fraud.

As fish biologist I am disturbed by a fishery which for many years has been virtually unusable. The odors of the fish flesh interfere with their edibility. Those few fishermen who fish do so on a catch-and-return basis or fill the stringer for a photo. In the past few years even the fish from Lake Wisconsin have become tainted. Also in recent years Lake Wisconsin sustained a massive and most unfortunate winter-kill of large sturgeon. The blame, according to one biologist, was due to oxygen-demanding wastes from the paper industries upstream.

Increasing complaints on the condition of the river have been coming from resort owners on the Peterwell and Castle Rock impoundments. Residents and business people of Wisconsin Dells are disturbed with the malodorous water as it interferes with enjoyment of the unusual rock formations there.

PRESENT SANITARY STANDARDS UNSATISFACTORY

Wisconsin has adopted essentially a double standard in waste treatment. Most municipalities and industries in the Great Lakes drainage are required to install pollution abatement facilities which include not only primary and secondary treatment but also the removal of a large proportion of the phosphates. Phosphates are responsible in large part for the rapid growth of algae and weeds. These will build up in the waters, die and decay. Not

*Many basic ideas expressed in this paper came from Atty. Maurice Van Susteren, Legal Div., Dept. of Natural Resources, Madison. Published in Wisconsin Master Plumber, July 1970, 25(7):7-18.

only are these plants unsightly but they produce offensive odors, and, upon decaying, reduce the oxygen content of water. Phosphate removal, therefore, is required to attempt control of these undesirable features which have contributed substantially to the problems of bodies of water like Lake Michigan, Green Bay, Lake Winnebago and the Fox River of eastcentral Wisconsin.

In the Mississippi River drainage (includes the Wisconsin River valley), municipalities and industries are required, according to present standards, to give their wastes only primary and secondary treatment. This means that large quantities of phosphates, nitrates, and minerals pass directly into the river where water conditions will indeed worsen instead of improve. As yet the artificial lakes of the Wisconsin River are not hurting as are the waters in the eastern part of the state. But, as one person put it, "Are we supposed to wait until the Wisconsin River is in the same stinking mess before we turn to measures which will improve conditions?"

We have therefore a double standard for pollution cleanup in the State of Wisconsin. But if we were to evaluate the total effectiveness of each standard we would find ourselves somewhat short of our goals. It is a fact that EVEN WITH COMPLETE POLLUTION ABATEMENT COMPLIANCE ON THE PART OF EVERY INDUSTRY AND MUNICIPALITY OF THE STATE OF WISCONSIN, THE POLLUTION OF OUR WATERS WOULD CONTINUE.

These pollutants are:

1. Phosphates
2. Nitrates
3. Dissolved minerals (calcium, magnesium)
4. Toxic substances (mercurial compounds, lead compounds, hard pesticides)

Total primary and secondary treatment would allow large amounts of the above to move through into our streams and lakes. Actually some of the organic compounds will be broken up into simpler forms which are more readily taken up by the algae and higher plants. Pollution abatement compliance on the part of all industries and municipalities would at best merely slow up aquatic deterioration. THE CONTINUED DECLINE OF OUR STREAMS AND LAKES IS INEVITABLE.

Moreover, can we continue to have one environmental disaster after the other? First DDT poisoning, next mercury poisoning, then what? Our water quality standards are so tolerant of permissiveness by municipality and industry that it is quite possible that we are dumping dozens of toxins into our waters. These could be industrial compounds of sublethal character which are cumulative in nature and may eventually prove to be lethal to man and to other organisms.

It is unhealthy and poor business to designate any stream or lake draining into a stream as a sump which may receive wastes. We have done this regularly with our large intra-state and interstate rivers. The wastes do not stay in the river system for

eventually they flow into the ocean. There is already much evidence that the ocean is being seriously threatened by a large number of materials which have profound effect upon the fish and invertebrate organisms. Many fish species are being decimated through contamination of estuarine areas where they spawn. Shrimp fisheries are suffering. Yearly oyster beds worth millions of dollars are lost through coliform contamination.

Present attempts to abate pollution in Wisconsin appear futile for the following reasons:

1. Legal enforcement is lacking or poorly coordinated.
2. The enforcement system is lax. Additional concessions are allowed and legal docketings for industries and municipalities show numerous time extensions.
3. Discrepancies in enforcement seem to favor the larger corporate units. The small industries often appear discriminated against.
4. Sufficient financial aids for poor communities and marginal industries are not available. Nor is there any indication that a favorable change will occur in the near future.
5. Attitudes of business and municipality toward pollution abatement are lukewarm at the best. Resistance to comply with orders appears to be a general human failing.

A WISCONSIN RIVER SANITARY AUTHORITY

A Wisconsin River Sanitary Authority (may be similar to TVA) will be a corporation responsible for the collection and the treatment of all industrial and municipal wastes. Its role will be to collect, treat and recycle all effluent. No effluent from home, industry or municipality may flow either by seepage, canal or pipe into any lake or stream within the Wisconsin River valley. Agricultural land runoffs would have to be controlled as well. Hopefully the Wisconsin River will be virtually free of human-based outfall. The Authority would control effluent from the origin of the Wisconsin River at Lac Vieux Desert to its mouth at Prairie du Chien.

The sewage disposal system for the Wisconsin River Sanitary Authority may be located at one or more sites on the basin. Since a collecting duct will run from the upper part of the valley to Prairie du Chien, it has been suggested that the master plant be located at Prairie du Chien although a secondary plant at Nekoosa for disposal of wastes from all paper and pulp mills may be considered. The collecting duct will be joined by lateral trunks from the main drainage areas within the basin.

Wastes will be processed at the plant(s) by the most modern methods available. Primary and secondary treatment methods combined with electrodialysis and reverse osmosis will remove all impurities and virtually all soluble salts. A modern disposal plant will render the wastes into a number of valuable industrial com-

pounds. Untreated sewage water can be used for cooling electric generating plants located along the main pipe-stem (thus avoiding thermal pollution of the Wisconsin). The outfall water from the master treatment plants(s) will be potable and clean and can be piped back to homes, industries and communities for reuse.

Advantages of the Proposed plan are:

1. All polluters will be immediately brought into the treatment system. Our present piecemeal attempt at pollution abatement for each rural home, industry and municipality has been ineffective and there is no visible sign that our present system will curb or, much less, hold pollution problems at the present level.
2. Total cost for the Authority treatment plant(s) and pipe system will be less than the combined costs of individual treatment plants. Costs for individual treatment plants are very high and prohibitive for marginal industries and poor communities.
3. Total sewage treatment under the Authority will be superior in the removal of eutrophication and toxic wastes. Actually the best sewage treatment methods can be utilized at a cost lower than cost for installation of equipment needed to comply with present inadequate anti-pollution orders.
4. Perpetuation of unreal water quality standards for the Wisconsin River and its tributaries will be unnecessary under the Authority plan. Our present water quality standards actually encourage pollution in those zones where minimum or near-minimum standards are in effect.
5. The Wisconsin River will be returned to a near-pristine state. It is conceivable that within a short time after complete operation of the Authority, the water from the river will (with minor treatment) be potable. This will provide an additional source of water for the future.
6. Valuable inorganic and organic products will be recovered by the Authority and recycled into our economic system.
7. The value of the products recovered from the Authority treatment system will subtract from operational costs. It is conceivable that eventually the Authority may be self-sustaining from such income.
8. The economic value of fishing and recreation on the Wisconsin River and its tributaries will rise precipitously. This accrual of wealth to the Wisconsin River basin may offset quickly the cost and maintenance of the Authority.
9. Property values along the river shorelines will increase substantially.

IS A WISCONSIN RIVER SANITARY AUTHORITY FEASIBLE?

The answer is "Yes." The laying of a pipe or duct which can handle millions of gallons of wastes daily is no problem. This duct can be laid adjacent to the river, along a railroad line or along a highway bed. Cost of such a line will probably be less than the construction of a highway.

The cost of master treatment plant(s) will be considerably less than the total expenditure for constructing many small plants. Also cost of sewage treatment drops quickly with the increase in amount to be treated.

Plant operation will be in the hands of special engineers and technicians devoted to doing a 100% efficient job. Our present, often parttime, talent is spread rather thin in dozens of plants poorly constructed and inadequate for handling the waste load.

Our present technology can handle the extraction of many valuable products from sewage, no matter how rich or how "contaminated" it may be. "The richer the better" as one man put it! Extraction of such wealth will detract from the cost of the operation. There need be no concern about phosphates in detergents, about mercury poisoning, about waste oil disposal. The system will accept and extract all of these items for reuse. Better still, they will not be getting out into and contaminating the environment.

There need be little concern about reducing our consumption of goods so that "there will be something left for future generations." What goes into the system will be extracted and recycled over and over again.

SUMMARY

A Wisconsin River Sanitary Authority is a plan for placing all man-derived wastes into a closed system. The Wisconsin River valley with the Authority will have:

HIGH RECREATIONAL VALUE
HIGH ECONOMIC VALUE
CLEAN, ENRICHED LIVING
A MODEL PLAN FOR OTHER RIVER BASINS

The Wisconsin River Sanitary Authority is A PLAN FOR THE PRESENT DESIGNED FOR A FUTURE.

(QUESTIONS FREQUENTLY ASKED ABOUT THE PIPELINE CONCEPT FOLLOW)

Q. How big would the pipe be?

A. Engineers have suggested that it would be best to break the basin into 4 (or more) segments with treatment plants, let us say, at Merrill, Wausau, Wisconsin Rapids and Prairie du Chien. Each plant would be responsible for treatment and recycling of reclaimed resources and water from its own portion. Thus the pipe size leading into a master plant would be considerably reduced. Pipe size is a matter to be determined by engineers and would vary according to the load. Hydraulic transport of wastes through pipes 12-feet or more in diameter are currently in use.

Q. Is transport by large pipe practical and economical?

A. We are already moving by pipe large amounts of natural gas and oil to various parts of the United States and Canada. If this were not practical and economical, would industry have gone to this kind of transport?

Q. How many millions of gallons of sewage are we talking about?

A. Approximately 200-300 million gallons per day.

Q. The recycled water would have to be pumped uphill to the users. Wouldn't this make water too expensive?

A. Water is a valuable commodity. All life is dependent on large quantities of water. Our problem is that for too long we have assumed that water is there in the ground simply for the taking. We are finding that our groundwater supplies are quickly diminishing and in Wisconsin it has been suggested by authorities that before the year 2000 we will be using more water than is being recharged. Returning clean water directly to the users will make water more expensive than it currently is, but in the long haul it is going to avoid water catastrophes.

Q. Isn't the thought of recycled water disgusting to you?

A. Actually all the water we are using has passed through a weird assortment of organisms many times already. This is inevitable since the water we and our domestic animals use is part of the water cycle. First it flows to the sea as sewage. From the sea it is evaporated, condensed into clouds and then blown landward by the winds. As rain it falls upon land, eventually recharging the huge underground storage areas.

Q. Won't the water have a funny taste?

A. Not if the treatment engineers are doing their job. I have talked with sanitary engineers who have drunk water coming from reverse osmosis treated sewage. They say it has an earthy taste. Sanitary engineers can reconstitute such water so it tastes like the finest well water. Moreover, it will be safer than the drinking water we get from many of our wells. Unfortunately even in Wisconsin an increasing number of our wells are becoming unsafe through nitrate and coliform contamination. Therefore another advantage of the Sanitary Authority lies in providing the citizens in the basin with safe water.

Q. What will be the cost of the Sanitary Authority?

A. Ball park engineering figures are now in preparation. We don't have a cost analysis as yet but I would estimate in the neighborhood of \$1 billion. Of course, we should subtract from that figure the almost immediate increase in property values along the Wisconsin river mainstem and tributaries. In addition growth in recreational dollars will offset a good part of the Authority's cost.

Q. Is it necessary to go to the whole Sanitary Authority plan at one time?

A. No. The plan may be instituted in stages. Since the 16 paper and pulp mills on the Wisconsin River are responsible for 90% of the pollution on the river, it stands to reason that one or two treatment plants for handling the paper wastes would almost immediately relieve the pollution burden of the river. Also, these treatment plants would have to reconstitute water just enough for fine paper making. What I'm saying is that it won't be necessary for the treatment plant(s) to pipe water of drinking quality back to the paper mills. Also, since paper mill wastes pose their own peculiar problems, it would be best to treat them separately.

Stage two in priority would be to handle domestic wastes from large cities and rural areas with livestock waste problems. Upon completion of this stage better than 95% of our water pollution problems would be under control.

Stage three would involve reaching out into small communities and into rural units where the pollution load is light. Per capita cost for development of this step in the Sanitary Authority would be high, but when this is accomplished the "closed system" will be complete.

Q. You have mentioned a "closed system." Does this mean you can return 100% of the treated water to its original user?

A. Actually there are gaps in any "closed system." For instance, you lose water as you perspire, as you breathe. Also at the treatment plant only about 85% of the water arriving there can be returned to the user as recycled water. So when we talk about a "closed system" we are talking roughly about a water system that can recycle 70% plus or minus. The remainder of our water needs will have to come from groundwater or surface water sources.

Q. Is your "pipeline" idea unique?

A. Not exactly. The Seattle (Washington) Sanitary Authority has placed large sewage lines throughout the drainage basin for saving their unique lakes and streams. Two large sewage plants receive the effluent from these lines. The treated effluent is discharged into Puget Sound. My "pipeline" idea differs in that I would recycle recovered materials and water.

Q. What are the treatment methods you might use in your system?

A. This is a matter for engineering determination. But two methods for treatment offer great promise.

Reverse osmosis is a simple method for placing sewage water under high pressure against a membrane with very fine openings. The almost pure water molecules are forced through the fine openings and the larger waste molecules are held back by the membrane.

The physical-chemical waste treatment process is more elaborate and uses a settling chemical plus adsorption carbon. The water coming from this system is good enough to drink. At South Lake Tahoe the effluent water from this system supplies an artificial lake which has been planted to rainbow trout. Also the lake is used for boating, swimming and other recreational uses.

REFLECTIONS OFF THE WATER

George Becker

The Wisconsin River Sanitary Authority may well lie at the core of an unusual ecological experiment--that of handling the multitude of problems stemming from crowding and an unusually high appetite for goods with built-in obsolescence.

The total plan for the basin must include all problems--water, air, and soil. These are intertwined with one another. Currently the Wisconsin Department of Natural Resources, through its many divisions is tackling each problem piecemeal, without appreciating that you can't remedy water pollution without properly understanding what is happening on the soil and in the air.

I suggest that the Wisconsin River Sanitary Authority operate like a public utility. Recognized by the Wisconsin legislature and licensed by the Public Service Commission, it would be given the right to administer many functions, among them:

1. Sewage disposal
2. Industrial and domestic water supply
3. Agricultural and irrigation water
4. Solid waste disposal
5. Smoke and air quality control
6. Transportation

For instance, in the planning for proper sewage disposal it would be well to consider at the same moment solid waste disposal. Consideration may be given to hooking up garbage disposals in each kitchen sink to get rid of waste fats, vegetables, bones and meat. Such organic materials could be handled and treated at sewage disposal plants.

The rest of the solid wastes, namely the paper, glass, wood, and metals can be transported to one or more recycling centers in the basin. Recycling must be part of the Sanitary Authority's duty. As a result the garbage collection process and program in each community would change radically.

This summer I had the opportunity to see a modern, clean electric power plant, producing enough electricity for 10,000 inhabitants. The only fuel furnishing the power for turning the generators was some of the garbage from Geneva, Switzerland. Another plant in the same community was composting garbage for returning to the land.

This is a far cry from the "unsanitary" and "sanitary" landfills which our affluent State of Wisconsin allows for disposal

of valuable materials. Such landfill sites are pollution. We must remember that pollution is misplaced resources.

Despite our high standard of living, we are doing little to assure that this standard will continue. We are squandering our resources as if they are going out of style. Geneva, Switzerland, is turning her wastes into much-needed resources. We would do well to look in such direction.

There are a number of ways that each of the above six problems might be tackled. Put a cost analysis on each in conjunction with each of the others, dovetailing and streamlining wherever possible. Put it to the computer and you get a clue as to the best, the most efficient and the most economical systems under which to operate.

Lastly, it would appear that if the Sanitary Authority should materialize and produce a clean, enriched society for the benefit of mankind, then we may expect more company. People just naturally want to move to the most idyllic, to the best regulated, part of the country. Our Wisconsin basin utopia would become Mecca for many. Our basin would become overrun and all systems which were originally "go" would suddenly bog under the human crush. What the Sanitary Authority worked so hard for and finally realized could suddenly become faulty and inadequate.

Any machine has a capacity rating. By running it faster you may get it to put out a bit more work. But you are taking the chance that with the strain the mechanism will collapse. Likewise, if our authority machine should be built with a capacity for 1 million people (about three times our present population), it would be catastrophic to open the gates wide to allow 2 or 3 million and to spoil the very thing for which we worked so hard.

In some parts of our United States the gates are already being closed and even visitors are welcome only as overnight guests. Since we shall have spent much blood and sweat in setting our Wisconsin River basin into technological balance, it follows that we must establish a population balance. I presume that we won't always be able to avoid unpleasant situations. Hard decisions are being made today. To save the future, even harder decisions must continue to be made.

"Progress" in the Wisconsin River basin must not be equated with growth in population and business. Rather "Progress" must become a measure of greater enrichment in the lives of each citizen within the basin.

Spaceship earth is simply an extension of the Wisconsin River Sanitary Authority. Let us build the better mousetrap here. We will gladly supply specifications and blueprints for others.

Stevens Point, Wisconsin
October 12, 1971