

ILLINOIS POLLUTION CONTROL BOARD

#R70-6: Phosphorus Regulations

January 6, 1971

PREAMBLE

Phosphorus is an element which is a nutrient for algae. Present Federal and State policies for Lake Michigan include the control and reduction of phosphorus in order to limit the production of algae. Algae causes tastes and odors in water supplies and may reduce dissolved oxygen in water. Algae is a nuisance to swimmers and can reduce the enjoyment and property values of shore line property.

The present standards for phosphorus in the water of Lake Michigan are at levels which are thought to be those to which algae blooms will occur and greater than present bulk water levels. The new standard is 2/3 of the former standard. An effluent standard is added to provide a control on phosphorus discharges to Lake Michigan.

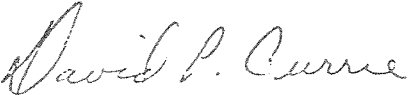
1. Water Quality Standard. Existing Board Regulations specifying water quality standards for Lake Michigan, Wolf Lake and the Calumet River (lakeward of the O'Brien Locks) are hereby amended to provide that the concentration of total phosphorus measured on unfiltered samples in these waters shall not exceed 0.02 mg/l as phosphate ( $\text{PO}_4$ ) or 0.007 mg/l as phosphorus (P).
2. Effluent Standard. Except for unavoidable combined sewer overflows during the interim period before their complete elimination, no effluent to the waters of Illinois listed in Section 1 above, shall include phosphorus in excess of 3.0 mg/l as phosphate ( $\text{PO}_4$ ) or 1.0 mg/l as phosphorus (P) after December 31, 1971. Dilution of effluents

shall not be an acceptable alternative to treatment. Where water is added to streams of waste water and cannot be reasonably separated, then its quantity shall be measured and effluent concentrations recomputed to exclude its diluting effect.

3. Testing. All testing pursuant to the Regulations herein provided shall be made using methods as listed in either "Methods of Chemical Analysis of Water and Wastes", November, 1969, Federal Water Quality Administration, or, "Standard Methods for the Examination of Water and Wastewater," Twelfth Edition, 1965.

4. Effective date. Except as specially provided in Section 2 of these Regulations, the requirements of these Regulations shall be met within ten days after filing with the Secretary of State.

I, David P. Currie, certify that the Board has approved the above provisions on this 6th day of January, 1971.

  
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David P. Currie, Chairman

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LAKE MICHIGAN OPEN WATER - Rule 1.01 (Continued)

Ammonia Nitrogen (N) - Annual Average 0.02 mg/l  
 Single Daily Value or Average 0.05 mg/l

Total Nitrogen (N) (4) 0.4 mg/l

Methylene Blue Active Substance - Annual Average - 0.05 mg/l  
 not more than Single Daily Value  
 or Average -  
 not more than 0.20 mg/l

<u>Chlorides (CL)</u> - mg/l	<u>1965</u>	<u>1970</u>	<u>1980</u>	<u>1990</u>	<u>2000</u>
Annual Average - not more than	8	9	10	11	12
Single Daily Value or Average - not more than 15 mg/l (through 1970)					

Cyanides (CN) - Single Value - not more than 0.025 mg/l

Fluorides (F) - Annual Average - not more than 1.0 mg/l  
 Single Daily Value or Average -  
 not more than 1.5 mg/l

Dissolved Iron (Fe) - Annual Average - not more  
 than 0.15 mg/l  
 Single Daily Value or  
 Average - not more than 0.30 mg/l

Phenol-like Substances - Annual Average - not  
 more than 0.001 mg/l  
 Single Value - not more  
 than 0.003 mg/l

<u>Sulfates (SO<sub>4</sub>)</u> - mg/l	<u>1965</u>	<u>1970</u>	<u>1980</u>	<u>1990</u>	<u>2000</u>
Annual Average - not more than	23	24	26	28	30
Single Daily Value or Average -not more than 50 mg/l (through 1970)					

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Phosphorus

The concentration of total phosphorus measured on unfiltered samples shall not exceed 0.02 mg/l as phosphate ( $\text{PO}_4$ ) or 0.007 mg/l as phosphorus (P).

All testing for phosphorus shall be made using methods as listed in either "Methods of Chemical Analysis of Water and Wastes", November, 1969, Federal Water Quality Administration, or, "Standard Methods for the Examination of Water and Wastewater," Twelfth Edition, 1965.

Miscellaneous Trace Contaminants and Radionuclides -

Shall not be present in concentrations that will prevent meeting PHS 1962 Drinking Water Standards after conventional treatment.

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LAKE MICHIGAN SHORE WATER - Rule 1.02 (continued)

<u>Methylene Blue Active Substance</u> - Annual	
Average - not more than	0.02 mg/l
Single Daily Value or Average	
- not more than	0.05 mg/l
<u>Cyanides (CN)</u> - Single Value - not more than	0.025 mg/l
<u>Phenol-like Substances</u> - not more than	0.05 mg/l

Phosphorus

The concentration of total phosphorus measured on unfiltered samples shall not exceed 0.02 mg/l as phosphate (PO<sub>4</sub>) or 0.007 mg/l as phosphorus (P).

All testing for phosphorus shall be made using methods as listed in either "Methods of Chemical Analysis of Water and Wastes", November, 1969, Federal Water Quality Administration, or, "Standard Methods for the Examination of Water and Wastewater, Twelfth Edition, 1965.

Miscellaneous Trace Contaminants and Radionuclides - Shall not be present in concentrations that will prevent meeting the PHS 1962 Drinking Water Standards after conventional treatment.

Note: mg/l symbol for milligrams per liter and approximates the older term, parts per million.

If more than one sample per day is examined, the limit shall be the daily average. If only one sample per day is taken, the single value shall govern.

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WOLF LAKE - Rule 1.04 (continued)

Dissolved Oxygen - Annual Average  
-not less than 90% saturation  
Single Value -  
not less than 80% saturation

Ammonia Nitrogen (N) - Annual  
Average - not more than 0.05 mg/l  
Single Daily Value or Average  
-not more than 0.12 mg/l

Methylene Blue Active Substance -  
Annual Average - not more than 0.02 mg/l  
Single Daily Value or Average  
-not more than 0.05 mg/l

Cyanides (CN) - Single Value - not  
more than 0.025 mg/l

Phosphorus

The concentration of total phosphorus measured on unfiltered samples shall not exceed 0.02 mg/l as phosphate ( $PO_4$ ) or 0.007 mg/l as phosphorus (P).

All testing for phosphorus shall be made using methods as listed in either "Methods of Chemical Analysis of Water and Wastes", November, 1969, Federal Water Quality Administration, or, "Standard Methods for the Examination of Water and Wastewater, Twelfth Edition, 1965.

Note: mg/l symbol for milligrams per liter and approximates the older term, parts per million.

- (1) Criteria apply at beaches as well as at Toll Road Bridge Station.

If more than one sample per day is examined, the limit shall be the daily average. If only one sample per day is taken, the single value shall govern.

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- c. Storage facilities for materials which are hazardous to health and welfare, and for oils, gases, fuels, or other materials capable of causing water pollution if accidentally discharged, shall be located so as to minimize or prevent any spillage or leakage that might result in water pollution. Structures and devices to contain spillage, such as catchment areas, relief vessels, or entrapment-dikes, should be installed at existing facilities, shall be installed at all new facilities, and shall be required following any discharge resulting in pollution.
  
- d. Except for unavoidable combined sewer over-flows during the interim period before their complete elimination, no effluent to Lake Michigan or Wolf Lake shall include phosphorus in excess of 3.0 mg/l as phosphate ( $\text{PO}_4$ ) or 1.0 mg/l as phosphorus (P) after December 31, 1971. Dilution of effluents shall not be an acceptable alternative to treatment. Where water is added to streams of waste water and cannot be reasonably separated, then its quantity shall be measured and effluent concentrations recomputed to exclude its diluting effect.

11. Guidelines Regarding Range of Treatment

a. Secondary treatment resulting in effluents ranging from 20 to 40 mg/l five-day BOD and 25 to 45 mg/l suspended solids is acceptable on Lake Michigan. Tertiary or other advance treatment or modifications of conventional treatment will be specified for all intermittent streams and small or low flow streams, and shall include effluent disinfection at least through the recreational season of April through October.

b. Permissive Treatment & Effluent Requirements  
Based on Average Strength Municipal Wastes

Type Treatment	BOD or ODI Reduction Percent	Effluent BOD, ODI mg/l	Suspended Solids mg/l	Type Facilities	Stream Dilution Requirements
Secondary	85	30	35	Trickling filter	Lake Michigan
Secondary	90 *(or trickling filter & supplemental treatment)	20	25	*Activated Sludge	2 to 1
Tertiary	95	10	13	Secondary plus Supplemental	1 to 1

Disinfection with up to 1 mg/l of chlorine residual in the effluent to reduce Coliform to 5,000 or less, where necessary.

Bypass flows in excess of waste treatment works capacity shall be given primary treatment, and chlorination if necessary, in auxiliary facilities.

c. Within design limitations, operation shall be of such quality to obtain the best possible degree of treatment from all treatment works. Every effort must be made to eliminate all system bypasses and overflow otherwise measures must be taken to provide treatment units such as lagoons, detention or holding basins, and chlorination. Installation of new combined sewers are prohibited. Existing combined sewer systems should be patrolled; overflow regulating devices shall be adjusted to convey the maximum practicable amount of combined flow to treatment facilities. Excess infiltration into the sewer system should be eliminated to keep dry weather flow within design limits of conduits and treatment works.



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Dissolved Iron - mg/l

Annual Average	Not more than 0.15
Single Daily Value or Average	Not more than 0.30

Phenol-like Substances - mg/l

Annual Average	Not more than 0.002
Single Daily Value or Average	Not more than 0.005

Sulfates - mg/l

		<u>1965</u>	<u>1970</u>	<u>1980</u>	<u>1990</u>	<u>2000</u>
Annual Average	Not more than	35	36	39	42	45
Single Daily Value or Average	Not more than	75 (through 1970)				

Phosphorus in the Calumet Harbor

The concentration of total phosphorus in the Calumet Harbor measured in unfiltered samples shall not exceed 0.02 mg/l as phosphate (PO<sub>4</sub>) or 0.007 mg/l as phosphorus (P).

All testing for phosphorus shall be made using methods as listed in either "Methods of Chemical Analysis of Water and Wastes," November 1969, Federal Water Quality Administration, or, "Standard Methods for the Examination of Water and Wastewater," Twelfth Edition, 1965.

Filterable Residue (Total Dissolved Solids)-mg/l

		<u>1965</u>	<u>1970</u>	<u>1980</u>	<u>1990</u>	<u>2000</u>
Annual Average	Not more than	187	190	197	204	211
Single Daily Value or Average	Not more than	230 (through 1970)				

Miscellaneous Trace Contaminants and Radionuclides - Shall not be present in concentrations that will prevent meeting PHS 1962 Drinking Water Standards after conventional treatment.

\*Except during periods of storm water runoff when coliform should not exceed 24,000/100 ml.

Rule 1.05 (a)

Phosphorus in Calumet River (Lakeward of the O'Brien Locks)

The concentration of total phosphorus in the Calumet River (lakeward of the O'Brien Locks) measured in unfiltered samples shall not exceed 0.02 mg/l as phosphate (PO<sub>4</sub>) or 0.007 mg/l as phosphorus (P).

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All testing for phosphorus shall be made using methods as listed in either "Methods of Chemical Analysis of Water and Wastes," November 1969, Federal Water Quality Administration, or, "Standard Methods for the Examination of Water and Wastewater," Twelfth Edition, 1965.

### Rule 1.06. Related Water Quality Criteria

The Illinois Sanitary Water Board has adopted water quality criteria for Interstate Waters -- Lake Michigan-Calumet Area, Des Plaines River, and for Intrastate Waters as follows:

1. Rules and Regulations SWB-7, Lake Michigan, Wolf Lake, Grand Calumet River and the Little Calumet River from the Illinois-Indiana line to the Calumet-Sag Channel. Calumet Harbor Basin Criteria are contained in Rule 1.05, above.
2. Rules and Regulations SWB-11, Des Plaines River from the Wisconsin border to the Confluence with the Chicago Sanitary and Ship Canal.
3. Rules and Regulations SWB-14, all intrastate waters exclusive of interstate waters.

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<u>Constituent or Property</u>	<u>Concentration</u> <u>Milligrams per liter</u>
Ammonia Nitrogen <u>not to increase stream content above</u>	2.5
*Arsenic	1.0
*Barium	5.0
*Cadmium	0.05
*Chromium - Hexavalent (Chromate or dichromate)	0.05
*Chromium - Trivalent (Chromic or chromite)	1.0
*Copper	0.04
Cyanide - Reduced at least to cyanate and approach zero as CN	0.025
Iron (Total) - Free from color, floating or suspended iron	10.0
*Lead	0.1
Nickel	2.0
Nitrate Nitrogen	45.0
Oil - Substantially free from visible floating oil and not to exceed	15.0
pH (units) 6.0 - 10.0	
Phenols	0.2
*Selenium	0.01
*Silver	0.05
Temperature and rate of discharge not to elevate stream, after reasonable admixture above 90°F, except as permitted by Rule 1.04.	
*Zinc	1.0

Dissolved solids: Not to exceed 750 mg/l as a monthly average value, nor exceed 1000 mg/l at any time, from process sources.  
 Radium-226 and Strontium-90 shall not exceed 3 and 10 pico-curies/liter respectively in the stream. In the absence of Strontium-90 and alpha emitters, the gross beta concentration shall not exceed 1000 pico-curies/liter.

Except for unavoidable combined sewer over-flows during the interim period before their complete elimination, no effluent to the Calumet Harbor or to the Calumet River (Lakeward of the O'Brien Locks) shall include phosphorus in excess of 3.0 mg/l as phosphate (PO<sub>4</sub>) or 1.0 mg/l as phosphorus (P) after December 31, 1971. Dilution of effluents shall not be an acceptable alternative to treatment. Where water is added to streams of waste water and cannot be reasonably separated, then its quantity shall be measured and effluent concentrations recomputed to exclude its diluting effect.

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\*Heavy Metals

11. Storage facilities for materials which are hazardous to health and welfare, and for oils, gases, fuels, or other materials capable of causing water pollution if accidentally discharged, shall be located so as to minimize or prevent any spillage or leakage that might result in water pollution. Structures and devices to contain spillage, such as catchment areas, relief vessels, or entrapment-dikes, should be installed at existing facilities, shall be installed at all new facilities, and shall be required following any discharge resulting in pollution.
12. Guidelines Regarding Range of Treatment
  - a. Tertiary or other advanced treatment or modifications of conventional treatment will be specified for all intermittent streams and for small or low-flow streams, and shall include effluent disinfection at least through the months of May to October.