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FEB 20 2002

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

STATE OF ILLINOIS
Pollution Control Board

IN THE MATTER OF :

WATER QUALITY AMENDMENTS TO)	
35 Ill. Adm. Code 302.208(e)-(g), 302.504(a))	R02-11
302.575(d), 303.444, 309.141(h); and)	Rulemaking-Water
PROPOSED 35 Ill. Adm. Code 301.267)	
301.313, 301.413, 304.120, and 309.157.)	

NOTICE OF FILING

Dorothy Gunn, Clerk
Illinois Pollution Control Board
100 West Randolph Street
Suite 11-500
Chicago, Illinois 60601

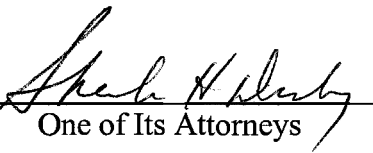
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Springfield, Illinois 62701-1787

PLEASE TAKE NOTICE that I have today filed with the Office of the Clerk of the Pollution Control Board the WRITTEN TESTIMONY OF MICHAEL CALLAHAN ON BEHALF OF THE ILLINOIS ASSOCIATION OF WASTEWATER AGENCIES, a copy of which is served upon you.

ILLINOIS ASSOCIATION OF WASTEWATER AGENCIES,

By: 
One of Its Attorneys

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THIS FILING PRINTED ON RECYCLED PAPER

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WRITTEN TESTIMONY OF MICHAEL CALLAHAN ON BEHALF OF THE
ILLINOIS ASSOCIATION OF WASTEWATER AGENCIES

Michael Callahan, Executive Director of the Bloomington & Normal Water Reclamation District, and on behalf of the Illinois Association of Wastewater Agencies (IAWA), submits this testimony to the Illinois Pollution Control Board (Board) in support of a component of the proposal made by the Illinois Environmental Protection Agency (Agency) in PCB R02-11. Specifically, the IAWA endorses the Agency's recommendation to change the term designating the oxygen demand of wastewater treatment effluents from the term five (5) day biochemical oxygen demand to five (5) day carbonaceous biochemical oxygen demand (CBODS₅).

It is IAWA's observation that opposition to this change is based on the erroneous belief that the change will relax the existing effluent standard. The IAWA believes that the change is not a mechanism to relax existing effluent standards. Rather, the reason for the change in this term is the need to clarify the terminology of the present regulations. In support of its view, the purpose of this testimony is to provide the Board with the collective IAWA recollection of the history of this matter in Illinois.

IAWA believes that the effluent regulation of BOD₅ in NPDES discharge permits issued by the Board's rules was historically intended to address 5 day carbonaceous biochemical oxygen demand. The effluent limit at issue was first considered by the Board in PCB R71-14. See Opinion of the Board in PCB R71-14 as written by Mr. Currie on March 7, 1972. The general

intent of the R71-14 proceedings was to consolidate and codify the various water quality standards that the Board had inherited from its predecessor, the Sanitary Water Board. One of the standards considered in this docket was the effluent limit for BOD₅. Prior to the R71-14 rulemaking, the effluent limit for BOD₅ in Illinois had been developed by the Sanitary Water Board and was established as 4 mg/L. The initial proposal of PCB R71-14 contained a recommendation of a water quality standard for BOD of 7 mg/L. Through the rulemaking process the Board decided to delete such a standard. On Page 5 of the Opinion of the Board the following statement was made relevant to this water quality standard:

“The evidence is that the effect of a given level of BOD on a stream is too dependent upon reaeration rates to make any prescribed standard meaningful.”

Also during the R71-14 proceeding, Dr. John Pfeffer provided testimony that the 4 mg/L BOD limit was overly protective for most streams of Illinois. He stated in his testimony that the Streeter-Phelps stream reaeration equation, using reaeration rate constants typical of small Illinois streams with low dilution ratios, showed that a BOD effluent limit of 10 mg/L was protective of our present day dissolved oxygen water quality standards. The Board concurred with Dr. Pfeffer's contention and adopted a BOD effluent limit of 10 mg/L contingent upon the downstream dissolved oxygen level remaining adequate. This analysis by Dr. Pfeffer has since come to be known as the "Pfeffer Exemption" and was applied by the Agency to issue effluent BOD limits of 10 mg/L in Illinois. The following text is taken from the discussion contained in the Opinion of the Board in R71-14 on page 15:

“As Dr. Pfeffer points out, the BOD₅ test principally measures the carbonaceous BOD and ignores the often delayed but eventual oxygen demand exerted by ammonia, to which we have directed our attention in the regulations adopted January 6 (1971).”

This statement in the Opinion of the Board has historically been interpreted to imply that effluent regulation of BOD₅ in NPDES discharge permits issued by the Board's rules was meant to address 5 day carbonaceous biochemical oxygen demand. Additional text taken from Page 15 of the Opinion of the Board states:

“Inherent in Dr. Pfeffer’s proposal, as several witnesses representing municipal discharges expressly agreed, is that a considerable number of plants may be required to do something about ammonia in addition to those already subject to the January 6 (1971) effluent standards.”

This statement by the Board was, at that time quite farsighted given the extent to which dischargers have subsequently been required to provide nitrification capability in their wastewater treatment processes. This is evidenced by the example used in the Opinion of the Board (Page 15) to illustrate the extent of nitrogenous oxygen demand. This example involved an ammonia concentration of 20 mg/L. The evolution of effluent ammonia regulation within Illinois has, since the R 71-14 proceedings, established an absolute maximum discharge limit of 15 mg/L with the vast majority of NPDES permits containing limits of between <1 mg/L and 4 mg/L.

Though it is clear that the Board originally intended to regulate biochemical oxygen demand in wastewater discharges as 5 day carbonaceous biochemical oxygen demand, after the adoption of the 10 mg/L CBOD₅ effluent standard by the Board, the Agency remained obligated by USEPA to determine the efficiency of secondary treatment plant processes in terms of 85% BOD₅ removal. Initially the BOD₅ required by USEPA for this determination was total BOD₅. Consequently, the Agency initially wrote NPDES permits for Illinois dischargers with total BOD₅ effluent limits. A problem shortly developed with the use of the total BOD₅ test for determining secondary treatment process efficiencies. Wastewater treatment plants, which were

under-loaded organically, were found to inadvertently develop some nitrification capabilities and the effluents of these plants were thus inoculated with nitrifying bacteria. These nitrifying bacteria would then exert a nitrogenous oxygen demand *in vitro* when subjected to the BOD₅ analysis. A portion of the sample's nitrogenous oxygen demand was, therefore, being detected simultaneously with the carbonaceous biochemical oxygen demand resulting in an erroneously high analytical result. The converse of this situation also occurred. Secondary treatment systems that provided no nitrification capability would not inoculate their effluents with nitrifying bacteria and thus the nitrogenous oxygen demand of these samples would not be detected. Consequently, such effluents could be determined by the total BOD₅ test to be of comparable or better quality than the under loaded treatment plants which, in reality, were producing higher carbonaceous oxygen demand removal efficiencies and better overall treatment. A detailed discussion of this phenomenon is given in the following two articles enclosed with this submittal:

Attachment A: Nitrification in NODS Test Increases POTW Noncompliance, J.C. Hall and R.I. Foxen, Journal of the Water Pollution Control Federation, Vol 55, No 12, pp1461-1469, December 1983.

Attachment B: 30/30 Hindsight, K.B. Carter, Journal of the Water Pollution Control Federation, Vol 56, No 4, pp301-305, April 1984.

This inconsistency was realized by USEPA in 1984. USEPA subsequently determined that the use of carbonaceous BOD₅, was a better measurement of secondary treatment removal efficiencies than was total BOD₅ and thus authorized the use of CBOD₅ as the parameter for such determinations. At that time the Agency began issuing NPDES Permits in Illinois with effluent BOD limits defined in terms of CBOD₅ believing that such was the original intent of the Board.

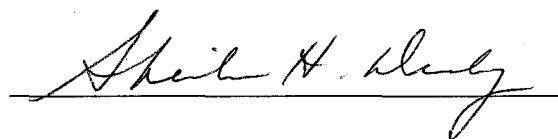
Another source of information on this matter can be found in the recognized source of analytical protocol used by our industry, Standard Methods for the Examination of Water and

Wastewater (Standard Methods). **Attachment C**, enclosed with this testimony, is a copy of the introduction to the section on biochemical oxygen demand from Standard Methods, 20th Edition. Standard Methods clearly states that; "Nitrogenous demand historically has been considered an interference in the determination of BOD, as clearly evidenced by the inclusion of ammonia in the dilution water." Further, Standard Methods indicates that only ultimate oxygen demand (UBOD) will measure both the carbonaceous oxygen demand and the nitrogenous oxygen demand. The UBOD test exists as only a proposed analytical procedure at this time in Standard Methods 20th Edition. An incubation period of sixty (60) to ninety (90) days is required. This is obviously not the type of oxygen demand determination that was considered with the initial application of the BOD₅ effluent regulation.

The IAWA believes that the present action before the Board regarding BOD is an attempt to more clearly define the wording and terminology of this existing regulation, in accordance with the Board's historical intent, and not an attempt to affect a quantitative change in allowable discharges of biochemical oxygen demand. The accuracy of the BOD₅ test has always been a problem because of the variable contribution of the nitrogenous BOD₅, to the point that the BOD₅ test is of limited value. From a performance measure, compliance measure, and from an historical regulatory perspective, CBOD₅ is the appropriate test for wastewater discharges. IAWA appreciates this opportunity to provide testimony and input to this current proceeding. The IAWA has a history before the Board of contributing to the development of protective and economically justifiable water quality and effluent standards. The IAWA wishes to continue with such assistance and will remain at the Board's disposal for further assistance in this matter.

CERTIFICATE OF SERVICE

The undersigned certifies that a copy of the foregoing WRITTEN TESTIMONY OF MICHAEL CALLAHAN ON BEHALF OF THE ILLINOIS ASSOCIATION OF WASTEWATER AGENCIES was filed by hand delivery with the Clerk of the Illinois Pollution Control Board and served upon the parties to whom said Notice is directed by first class mail, postage prepaid, by depositing in the U.S. Mail at 321 North Clark Street, Chicago, Illinois on Wednesday, February 20, 2002.

A handwritten signature in cursive script, appearing to read "Keith H. Blady", is written over a horizontal line.

CH02/22173413.1