ILLINOIS POLLUTION CONTROL BOARD
January 6, 1972

In the Matter of EFFLUENT CRITERIA	)	R70-8
In the Matter of WATER QUALITY STANDARDS REVISIONS	)	R71-14
In the Matter of WATER QUALITY STANDARDS REVISIONS FOR INTRASTATE WATERS (SWB-14)	)	R71-20

Supplemental Statement (by Mr. Dumelle)

This is a belated filing of my comments on this extremely important set of effluent standards which I heartily endorse. Mr. Currie's excellent opinion deals well with the reasons for effluent standards and the status of reasonable technology for achieving those standards.

My remarks which follow cover these topics:

1. Certain effluent standards, which as adopted, could have and should have been tighter based on the record in this proceeding or on the exercise of prudence.

2. The effluent standards in some cases were adjusted to an individual industry's need which could have been better left to the variance procedure for solution.

3. Effluent standards should be revised soon after two major Federal documents are issued this year.

4. A possible conflict exists with ORSANCO standards.

GENERAL

The publication "Toxic Substances" by the Council on Environmental Quality (April 1971) capsules the difficulty in standards-setting with this passage

> The Chemical Abstracts Service Registry Number System has registered some 1.8 million chemical compounds, and the list is growing by the addition of 250,000 chemicals each year. Approximately 300 to 500 new chemical compounds are introduced annually into commercial use. (p. 3)

It would be unrealistic to expect the Board to enact standards (either effluent or water quality) on every chemical and for various combinations with others. For this reason, narrative standards which proscribe materials causing harm are always necessary and are the first and most general line of defense of our water environment.

Second come water quality standards which gear amounts of chemicals to known effects or to qualities which are desired or are set to prevent degradation. Water quality standards are difficult to enforce if multiple sources are present.

The third line then becomes effluent standards which are relatively easy to enforce and ideally are geared to achieving water quality standards. But time consuming and expensive river basin studies are needed to relate effluent standards exactly to water quality standards.

A base level of treatment is desirable as a first cut toward cleaning the waters of Illinois. The Council on Environmental Quality in its report cited above gives an excellent example of the complications caused by synergism.

> Synergism is another complicating interaction. Two or more compounds acting together may have an effect on organisms greater than the sum of their separate effects. For example, the toxic effects of mercuric salts are accentuated by the presence of trace amounts of copper. Cadmium acts as a synergist with zinc and cyanide in the aquatic environment to increase toxicity. (pp. 8-9)

To me, what is extremely important, is that "good treatment" may keep out of Illinois water substances about whose synergistic effects we know little and in all probability will never know. Prevention is a better remedy than a costly cure or a cure which is never applied because the problem is not recognized.

Thus where a choice in this proceeding has to be made between two levels of treatment, both reasonable in cost, I would lean toward the tighter standard on the ground that we ought to keep out of the environment all substances that may be harmful.

1. Harmful Substances

The majority opinion, in which I join, dealt at length with the testimony of Dr. Wesley Pipes of Northwestern University (pp. 9-10). Dr. Pipes listed seven elements " which function only as toxic agents (and) should be eliminated from the water as much as possible. " He goes on to list barium, cadmium, lead, chromium, mercury, selenium and silver as examples of these toxic agents.

The regulation adopts 2.0 mg/l as a standard for barium. Weston stated that barium is readily reduced to levels of 1 to 2 mg/l (see Currie opinion, p. 12). I would have set a standard of 1.0 mg/l. This would also have made low flow streams with high barium flows usable for drinking water supplies without dilution.

The effluent standard for cadmium as adopted was 0.15 mg/l. Cadmium is highly toxic as the Currie opinion points out (p. 13). The Council on Environmental Quality report mentioned above states

> Some preliminary studies indicate that exposure to low levels of cadmium from sources present in the environment may lead to hypertension and heart disease and perhaps to cancer. (p. 11)

The synergism of cadmium with zinc and cyanide in the aquatic environment resulting in increased toxicity has been mentioned earlier. All of the known effects of cadmium, in my opinion, place it in a category very similar to that of mercury. It appears to be a highly dangerous metal that ought to be kept out of the environment to the greatest extent possible. I would have opted for the level of 0.01 mg/l as a cadmium effluent standard as suggested by Dodge in this record. Again since the 0.01 mg/l level is the drinking water supply standard it would make possible this use for low flow streams into which high volumes of cadmium-bearing effluents are discharged. Prudence calls for cadmium control.

The regulation adopts 1.0 mg/l for trivalent chromium and 0.3 mg/l for hexavalent chromium. I would have adopted 0.1 mg/l for each type of chromium based upon the clear statement in the record by Dr. James W. Patterson and Dr. Roger A. Minear of the Illinois Institute of Technology. In their study "Wastewater Treatment Technology" published in August 1971 by the Illinois Institute for Environmental Quality and a part of this record they describe a 1959 report of an industrial plant which discharged zero hexavalent and 0.06 mg/l trivalent chromium (p. 44). It seems reasonable to assume that technology would have improved chromium removal techniques in the past 13 years so the 0.1 mg/l for each form of chromium seems an eminently justifiable level of treatment. And as before, the 0.1 mg/l level would approach drinking water standards.

An effluent standard of 0.1 mg/l for lead has been adopted in this proceeding. The drinking water standard is 50% of this level or 0.05 mg/l. Patterson and Minear in their report cited above state

> Little data is available on effluent lead values after treatment costs have been found. However, the extreme insolubilities of both lead hydroxide and lead carbonate, the two most common precipitation products, would indicate that good conversion of dissolved lead to insoluble lead should be achieved. (p. 133)

My preference would have been for the tighter 0.05 mg/l standard. The Council on Environmental Quality report states

> ...the critical question today is whether the total body burden produced by inhaling air polluted with lead and by drinking water containing small amounts of lead is sufficiently large to produce any adverse effects. The data are not conclusive, but in the opinion of at least one recognized expert, "There is little doubt that at the present rate of pollution, diseases due to lead toxicity will emerge within a few years."

The expert referred to above is Dr. Henry A. Schroeder, a physician at Dartmouth Medical College, who has done a great deal of research into trace metal toxicity.

The recent IIEQ work "A Study of Environmental Pollution by Lead" (November 1971) states

> Other authorities believe that biological changes are exhibited at all lower exposures (to lead), that no threshold exists below which no damage results. (p. 91)

One can argue that the above statements have merit only when applied to the lead level at the point of consumption, i. e. in the drinking water supply. But we do not know for certain the concentration mechanisms of biota on lead. Prudence would say that we ought to keep as much lead out of the environment as we reasonably can.

The mercury standard of 0.0005 mg/l developed in R70-5 has been retained. It is interesting to note that the latest draft of the new Federal drinking water standards discussed later has lowered the tentative level of 0.005 mg/l for mercury to 0.002 mg/l and is thus now much closer to the year-old Illinois standard.

The mercury standard is a good example of this Board's action on a "no threshold" and cumulative pollutant. The same sort of prudence is called for in similar situations with other pollutants.

The effluent standard for selenium adopted in this standard was 1.0 mg/l. The drinking water supply standard is 0.01 mg/l and Dodge testified on this record that the tighter figure could be achieved as an effluent standard. Because of the toxicity of selenium which is recognized in the Currie opinion (p. 18) I would have enacted the 0.01 mg/l standard stated to be attainable by Dodge. Again, this level might make certain streams usable directly as drinking water supplies.

The standard for effluents in Illinois for silver is adopted here as 0.1 mg/l. The drinking water supply limit is 0.05 mg/l or 50% as much and is the value I would have desired. The Patterson-Minear report states

> The value of silver makes recovery from process streams attractive... co-precipitation with other metal hydroxides under alkaline conditions improves silver removal to less than 0.1 mg/l.... Very low residual silver concentrations are possible with ion exchange. (p. 229)

The above indicates to me that 0.05 mg/l is a technically feasible and economically reasonable effluent standard for silver. And since silver is a precious metal in short supply such a standard would directly follow the Illinois Environmental Protection Act purpose "to promote the development of technology for environmental protection and conservation of natural resources." [Sect. 2(a)4]

This completes an analysis of the seven elements which Dr. Pipes stated "should be eliminated from the water as much as possible."

2. Standards or Variances?

One of the dilemmas faced in setting a standard is the problem of how much reliance to place upon a single industry's testimony. Are the facts alleged true industry-wide or a problem unique to that plant with its own special equipment and processes?

In this proceeding there appear five effluent standards which were set based wholly or partly on a single industry's testimony. To examine each in detail would require too much in time and space. I will list the parameters here and ask that a revision to these standards investigate more fully the individual plant question. If a standard cannot be met, except by unreasonable costs, at an individual plant, then a variance is the mechanism to use. And this variance could well be a perpetual variance, renewed from year to year until the plant has been retired. This procedure has the advantage of ensuring that new plants will be built to the tighter (and also feasible) standard.

The arsenic standard of 0.25 mg/l is based partly on the Abbott Laboratories testimony and is 500% of the drinking water standard.

The copper standard of 1.0 mg/l appears to have been based largely upon the Olin Corporation testimony. The Currie opinion (p. 14) quotes Patterson as stating that 0.1 to 0.3 mg/l are achievable and Weston as stating that 0.5 mg/l can be reached for costs comparable for removal to other metals regulated by this proceeding.

The fluoride standard of 2.5 mg/l is based to a large extent upon Olin Corporation testimony for its Joliet fertilizer plant. Both Weston and Dodge stated that 1.0 mg/l was readily achievable though Patterson did not.

The manganese standard of 1.0 mg/l seems to be based entirely upon the Carus Chemical Company testimony. Patterson and Weston indicate that 0.05 mg/l can be achieved but there is some doubt as to applicability of this standard to industrial wastewaters.

The phenol standard of 0.3 mg/l seems to be based entirely upon the Monsanto Corporation testimony. The drinking water supply standard is 0.001 mg/l and consequently a stream flow 300 times that of an effluent at the maximum phenol standard is required to achieve this use. Patterson and Minear in their report show that high phenol concentrations are attractive from an economic standpoint for recovery (p. 197-200). Thus high levels phenols ($>$ 500 mg/l) can be dropped from consideration here since their treatment pays for itself. And intermediate levels (5-500 mg/l) appear to cost about the same as sewage to treat (p. 203-4) which (at 10 cents per 1000 gallons) we would agree is not an excessive cost.

We are thus left with the consideration of the low levels of phenolic wastes (under 5 mg/l). And the Patterson evidence seems to indicate costs of from 4 to 15 cents per 1000 gallons (Fig. 6, p. 211) depending upon the flow. These do not seem to be excessive costs even when added to the previous 10 cents per 1000 gallons and seem greatly at variance with the Monsanto figure of $1.25 per 1000 gallons additional cost to reduce phenols from 0.3 mg/l to 0.1 mg/l.

3. Effluent Standard Revision Needed

Two major Federal documents will be issued in 1972. The revision of the 1962 Public Health Service Drinking Water Standards is anticipated in June 1972. This new edition, incorporating the latest findings on effects of pollutants in water, is expected to include some parameters such as sodium, that have never before been listed. These effluent standards should be revised in light of this new information.

Similarly, the 1972 updating of the 1968 Water Quality Criteria is expected from the Federal government in September 1972. This document will in all probability, contain new parameters and new numerical levels, all of which should be considered in a revision to these effluent standards.

The list of "Threshold Limit Values," which contains more than 500 pollutants, is revised annually by the American Conference of Governmental Industrial Hygienists. Annual revision of all standards, whether effluent or water quality is a desirable goal. In this way the latest scientific knowledge is embodied into regulation. And plants which may be otherwise subject to costly retrofitting may be caught at the pre-design stage by frequent revisions.

4. The ORSANCO Effluent Standards

Illinois is a party to the Ohio River compact (ORSANCO) and is bound by the regulations issued by that body. Effluent standards have been promulgated by ORSANCO which generally are tighter than those here enacted.

While most of Illinois industry is not located along the Ohio River it is still a confusing situation to have two sets of effluent standards legally effective in the state.

President Nixon's Message on the Environment of February 8, 1971 states

> I again propose that Federal-State water quality standards be revised to impose precise effluent

limitations on both industrial and municipal sources.

If this power to set effluent standards, is given to the Federal government, then Illinois may be subjected to a third set of standards which will make simplification of standards all the more desirable.

SUMMARY

Effluent standards are a better tool for enforcement than are water quality standards. President Nixon's Message on the Environment mentioned above puts it

> (Water quality standards) provide a poor basis for enforcement: without a precise effluent standard, it is often difficult to prove violations in court.

So I am happy that this first set of State-wide effluent standards has been enacted. I hope the foregoing comments may be used in a forthcoming revision to make these standards an even better mechanism to clean up and protect our water environment.

Jacob D. Dumelle

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I, Christan L. Moffett, Clerk of the Illinois Pollution Control Board, hereby certify the above Supplemental Statement was submitted on the 24th day of May, 1972.

Christan L. Moffett

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Illinois Pollution Control Board