ILLINOIS POLLUTION CONTROL BOARD
March 31, 1971

In the Matter of)
)
) #R70-5
)
MERCURY STANDARDS)

Opinion of the Board (by Mr. Currie):

The Board has today adopted new regulations designed to limit the contamination of water and soil by mercury and requiring the reporting of substantial mercury uses. This opinion explains and gives the reasons for the Board's action.

Mercury is a virulent poison whose indiscriminate discharge into the environment has more than once resulted in human tragedy. In the 1950's one hundred ten persons were killed or severely disabled from eating fish contaminated by mercury compounds discharged from a plastic manufacturing plant in Minamata, Japan. Still more recently, children in a New Mexico family were permanently disabled from eating pork from an animal that had been fed mercury-treated seeds. And in March 1970 the Canadian government suspended commercial fishing in Lake St. Clair because of mercury concentrations in fish as high as 5 ppm, attributable to discharges from plants manufacturing chlorine and caustic soda. (See Oct. 8 Ex. 2, pp. 1-33; Ex. 4, p. 2).

The Lake St. Clair experience has prompted an enormous concern over mercury pollution. As a result of rapid federal and state action, significant reductions in mercury discharges to Lake St. Clair and other heavily affected areas have been brought about. Texas and Wisconsin have adopted effluent standards for the first time dealing specifically with mercury. Although we had no reason to believe that a serious problem of mercury contamination existed in Illinois, we proposed a highly restrictive mercury standard (1 microgram per liter) both as an effluent standard and as a water quality standard for all Illinois waters in August, 1970. After public hearings we published a modified proposal in November, which tightened the standards to one half microgram per liter, made the proposal applicable to discharges to the sewers as well as to the waters, and added provisions requiring safe disposal of solid wastes containing mercury and the reporting of mercury uses. The amended proposal, unlike the original, was of serious concern to the paint industry, whose discharges in this State are to the sewers only; we held an additional hearing in January at their request.

On the basis of the transcripts and exhibits in this proceeding, we find the stringent regulation of mercury discharges to the waters and sewers is necessary and [illegible]. We find specifically the following:

1.) Although various mercury compounds are of varying toxicity, all are subject to bacterial conversion into the highly toxic methyl compounds. This conversion is likely to occur under conditions common to Illinois stream beds and to soils (Oct. 14, pp. 11, 44, 73; Oct. 8 Ex. 2, App. I, pp. 14-15). Accordingly it makes sense to deal with all discharges of mercury and its compounds on the assumption that they may end up in methyl form.

2.) Once mercury gets into the environment it neither degrades to harmless substances nor ceases to exist. Mercury deposits presently existing on stream beds will be a continuing source of methyl mercury to the waters for many years (Oct. 14, pp. 47, 56). Dredging of deposits has so far proved of doubtful value, since it stirs up the mercury and increases water concentrations for the short term (Oct. 14, p. 54). Moreover, mercury in bottom sediments is often converted to the volatile dimethyl mercury, which escapes to the atmosphere and comes down in the rain many miles away (Oct. 14, pp. 44-45). In short, mercury once put into the environment remains where it can do harm for a very long time.

3.) Mercury is biologically concentrated by fish on the order of 3000 times (Oct. 14, p. 11; Oct. 8 Ex. 2, App. I, pp. 15-16). This means that very low concentrations in water will result in substantially higher concentrations is fish, which people eat.

4.) The toxic attributes of mercury can be summarized as follows:

First, as to fish and aquatic life, 0.008 mg/l of mercury from mercuric chloride is said to have injured or killed sticklebacks, and 0.006 mg/l to have immobilized daphnia, an important fish food, in 64 hours (Oct. 8, Ex. 2, App. I, pp. 5-6). There was testimony that the behavior of goldfish is affected adversely when water concentrations reach three parts per billion (Jan. 27, p. 226).

Second, the federal Public Health Service has tentatively adopted the U.S.S.R. standard of 0.005 mg/l as a drinking water standard (Oct. 8, p. 6). The basis for this standard is as follows: the blood cells of a person showing definite symptoms of mercurialism contained 1.2 ppm of mercury; his intake of mercury was estimated at one milligram per day; a safety factor of ten results in an allowable total intake of 0.1 mg/day; drinking water is assumed to contribute 1/10 of the total intake, or .01 mg/day; the average water intake of 2 liters per day permits a concentration of .005 mg/l in drinking water. (Oct. 8 Ex. 5, p. 4).

Third, Canada has adopted, and the Food and Drug Administration has proposed, a standard of 0.5 ppm in fish (Oct. 14, p. 13). Sweden has prescribed 1.0 ppm for fish, with the caution that fish should be eaten no more than once per week (Oct. 14, p. 77; Oct.8 Ex. 2, App. I, p. 17). Fish in Minamata Bay at the time of the disaster contained an average of 50 ppm (Oct. 8, Ex. 2, p. 2).

Finally, one witness suggested that there may be no threshold for some types of mercury poisoning:

"Work by Professor Cember. . . indicated in some studies of urinary excretion that the mercury excreted was entirely in forms bound to tissue fragments. His belief is that mercury does not get out of the animal except as cellular debris. If this is the case, then any exposure to mercury results in a long-term loss of nerve cells." (Jan. 27, p. 226)

Dr. Albert Fritsch, testifying before a Congressional committee last summer, stated that "when speaking of neurological damage, chromosomal aberrations, and teratogenic effects in human beings, we are speaking of mercury contaminated substances of the order of parts per million (and parts per billion in air and water)" (Oct. 8 Ex. 4, p. 3).

Whether or not the no-threshold thesis is accepted, it is clear that we deal with a highly dangerous substance that can cause damage to aquatic life in concentrations as low as a handful of parts per billion, and that may be harmful to man in the parts-per-billion range.

5.) The above evidence, we believe, amply justifies the setting of a water quality standard at 0.0005 mg/l, which can be roughly translated as one half part per billion. Such a level leaves a margin of safety below concentrations at which direct adverse effects of mercury in the water have been detected either in man or in aquatic life. Moreover, it is necessary to keep mercury in the water at least this low if we are to assure that concentrations in fish do not exceed the Canadian and FDA-proposed standards for human consumption. It is not enough to make the water safe for drinking without also assuring that fish living in the water will be safe to eat. In order to protect against a concentration of 1 ppm in fish that concentrate mercury 3000 times we would have to limit the water concentration to about three tenths of a part per billion. Our water quality standard, therefore, is certainly none too tight for this purpose. It should be added that although City of Chicago sampling has failed to reveal any mercury in Lake Michigan despite tests reputedly accurate down to one tenth of a part per billion (Oct. 14, pp. 90, 96), fish have been found in the Lake with as much at 1.5 ppm of mercury (Oct. 14, p. 57). Moreover, a strict water quality standard is in accord with the non-degradation policy expressed in all existing standards. Although the City of Chicago has detected no mercury in Lake Michigan, another tester reports readings in the Lake in the vicinity of 0.5 ppb (Jan. 27, p. 333), and the Metropolitan Sanitary District of Greater Chicago has detected no concentrations above 0.5 ppb in sampling its waterways (Oct. 14, p. 107). Indeed, both the fish concentration factor and the low background levels in Illinois waters so far tested suggest the possibility of an even tighter water quality standard. We are convinced by the evidence, however, that 0.5 ppb is about the lower limit of reliable measurement without resort to neutron activation, which is not readily available; a lower standard would therefore be largely illusory.

Thus the strict water quality standard of 0.0005 mg/l provides a margin of safety against direct adverse effects of mercury in the water;

is necessary to protect against the occurrence of unsafe concentrations of mercury in fish; is necessary to avoid degradation of waters presently relatively free of mercury; and permits reasonably accurate measurement without undue expense.

6.) Water quality standards are useful benchmarks to assess the adequacy of pollution control measures, but the heart of any control program consists of enforceable limitations on what may be discharged to the water. At a minimum such effluent standards must assure that the water quality standards will not be exceeded, now or in the distant future. The quantity of water in the receiving stream, therefore, can be a relevant factor in setting an effluent standard, for in the absence of dilution a given effluent can more rapidly result in an adverse effect on overall stream quality. In the case of a nondegradable poison like mercury, however, the concept of assimilative capacity has a less important place than in the case of the biodegradable oxygen-demanding wastes for which the concept was designed. In a body of water with relatively little outflow, the input of a constant concentration of nondegradable contaminants may under appropriate conditions result in a gradual buildup in overall contaminant levels, as the pollutant may be left behind as the water evaporates. One is reminded of the saltiness of the ocean. Moreover, in the case of mercury, the low solubility and high density of the material cause it largely to settle out in the vicinity of the discharge (Oct. 14, p. 9), so that complete mixing cannot be assumed. Accordingly, while special attention must be given to mercury discharges to waters with very low dilution capacity, we cannot in the case of nondegradable contaminants like mercury rely with full confidence on dilution to justify effluent standards more lax than the standard for the stream itself.

Furthermore, even apart from the nondegradable aspect of mercury pollution, it would be folly to set effluent standards at such a level as to permit existing pollution sources in every case to degrade the water to the level set by the standard. To do so would transform standard designed to protect the environment into licenses to degrade. It would ignore the fact that a water quality standard prescribes not the ideal condition of the environment, but an outer limit of dirtiness that should be avoided if it reasonably can be. It would commit us to the philosophy of allowing the environment to be as dirty as we can bear it, when our correct philosophy should be to make the environment as clean as we reasonably can. Finally, to allocate to existing users the entire waste-diluting capacity of the environment would leave no room for new industry, encourage inefficient practices, and either discriminate against new entrants or require a re-examination and tightening of effluent limit whenever a new facility was contemplated.

As required by section 27 of the Environmental Protection Act, we have considered the extent to which effluent and water quality standards ought to be affected by differing local conditions, such as the quality of the receiving water, the uses to which it is put, and the quantities of water available. We have concluded that, because mercury discharged into a waterway not now designated for aquatic life or for public water supply is likely to find its way into waters that are so designated, and because mercury discharged today may interfere with any later upgrading of water use designations of such waters, there is no basis for drawing distinctions based upon present differences in use, with one exception for small sewer discharges discussed below. Present water quality is taken into account both by the general provision that, notwithstanding the water quality standard, no body of water is to be degraded below its present quality in the absence of a strong showing of necessity and lack of harm, and by the provision that an effluent containing more than 0.0005 mg/l of mercury is permitted if it contains no more mercury than the water used as a source of supply. The quantity of water in the receiving stream, as well as its quality, has been taken into account by providing that no discharge shall be permitted that causes a violation of the water quality standard. This provision would be unnecessary, because the effluent standard is the same as the water quality standard, but for the facts that mercury tends to accumulate around the outfall; that it may remain behind after evaporation of the water in which it is contained; and that there is a special provision for small dischargers that is not phrased in terms of the water quality standard.

Beyond this, however, we have concluded that no greater discharge should be allowed in the case of mercury to a large body of water than to a small one. Because mercury is so highly toxic; because it is not degradable; because it is biologically concentrated in fish; and because it readily converted to its most toxic form, we believe that mercury discharges everywhere should be kept as low as is reasonably feasible. The principle underlying the regulation we adopt today is that no discharge of mercury shall be allowed unless it is essentially unavoidable. To the extent that one half part per billion represents both natural background concentrations and the lower limit of reliable detection this effluent standard means that no mercury shall be added to the water.

7.) The question then arises as to the technical feasibility and economic reasonableness of a strict effluent limitation on mercury. Section 27 of the statute properly requires that we consider these factors. It is almost always feasible to terminate discharges of a pollutant by going out of business, and if the pollution is devastating enough, it may be economically reasonable to require it. We do not believe that is the situation with regard to any mercury discharger in Illinois today, based upon the present record.

The record contains considerable information as to Illinois users of mercury. We are fortunate in that apparently there are no large Illinois mercury discharges from chlor-alkali plants (which manufacture chlorine and caustic soda in cells containing mercury), such as caused the problem in Lake St. Clair. This industry is the largest mercury user in the United States, and before the recent crisis some chlor-alkali plants discharged as much as sixty-six pounds of mercury in a single day (Oct. 8, Ex. 2, App. III, p. 4; Oct. 14, p. 7). Monsanto, which operates a chlor-alkali plant in Sauget, Illinois, wrote us a letter kindly explaining that hospitals might have difficulty in meeting our standard, but offered no facts on which we could base a finding of hardship in its own operation (Ex. 13-S); other evidence suggests that Monsanto may discharge mercury to the waters (Oct. 8 Ex. 2, App. V, Table I, p. 1). A second letter from Monsanto received after publication of the second proposed final draft confluded that chlor-alkali plants could not meet the 0.0005 mg/l standard but gave insufficient facts to justify any amendment of the regulation. We have delayed this action as long as we can; if Monsanto has trouble with the regulation it is free to apply for a variance.

Information from the laundry industry made clear that mercury is not needed in its operations. Although mercury has been used as a bactericide and mildew control agent in laundries, an alternative has been developed that is equally effective and that does not contain any other polluting materials. The Professional Laundry Institute reports that the businesses it represents have discontinued the use of mercury (Ex. 15-S). Consequently, as a supplier testified, "establishing stringent mercury discharge regulations need not be a handicap to the laundry and linen supply industries" (Jan. 27, pp. 328-29).

Hospitals utilize mercury as a diuretic, as a tissue preservative, as an antiseptic (mercurochrome), and for various purposes (such as pressure measurement in manometers) in laboratories. Two witnesses estimated that a small hospital might discharge as much as 150 pounds of mercury per year (Oct. 14, p. 42; Jan. 27, p. 258). Obviously this quantity of mercury is of concern. The Director of the Department of Biochemistry at Michael Reese Hospital in Chicago, however, testified that mercurochrome use has declined to about ten grams per year in that hospital; that the total amount of the most common diuretic used there last year was about 4 grams; and that the only significant hospital mercury problem was that of the laboratory (Jan. 27, p. 161). We are convinced by this testimony that the problem of mercury in hospital effluents, apart from laboratory wastes, is too small to be of concern, and therefore we have provided an exemption allowing hospital wastes to the sewers not exceeding one half pound per year from sources other than laboratories, provided that the effluent from the sewer system does not itself violate the effluent standard.

The laboratory problem is a general one and much more serious. It is not confined to hospitals; universities, industry, and others have similar problems. Michael Reese is said to lose twenty to thirty pounds of mercury per year through breakage, spillage, and other laboratory troubles (Jan. 27, p. 162). Fortunately the technology is at hand to achieve substantial reductions in laboratory losses. Good practice is to collect spilled mercury by vacuuming and then to reuse it (Jan. 27, p. 180). Mercury traps made of copper mesh, we were told, can be and have been installed in laboratory drains to recover mercury for reuse; with mercury at $24 per pound, the traps more than pay their cost (Jan. 27, pp. 168-72). We think it reasonable to require that such steps be taken by all laboratories to minimize the loss of mercury down the drain. We don't have figures on the mercury concentrations to be expected in the effluent from a well-kept laboratory doing its best to minimize losses; suffice it to say the Board will be receptive to claims of hardship on behalf of a laboratory that has done all it can and has reduced discharges to a few ounces a year, if there remains an inability to meet the concentration standard and if the effluent from the receiving sewer system does not itself violate the effluent standard.

Virtually the only opposition to the proposed effluent standard came the paint manufacturers and associated industries. The paint industry is the third largest mercury user in the country (Oct. 14, p. 8).

Mercury compounds (principally phenyl mercury compounds) are used for two related purposes in this industry: to prevent the deterioration of latex paints during their shelf life before use, and to prevent mildew in exterior paints, both latex and solvent-based, after they are applied (Jan. 27, pp. 197-99). In the United States in 1968, 40,000 pounds of mercury were used (at an average concentration of 30 ppm) as a latex paint shelf preservative, and 720,000 pounds were used to fight mildew in exterior paints (at an average concentration of 500 ppm) (Jan. 27, p. 197). Without a shelf preservative, bacterial action would destroy the latex paint before it could be applied (Jan. 27, pp. 199-200). Mildew protection adds one to two years to exterior paint durability (id., p. 199).

Mercury discharges from paint manufacture occur when paint residues are washed from the tanks in which latex paints are mixed (id., p. 185). There is no effluent from equipment washing in the case of solvent-based paints, and therefore any mercury discharges from the manufacture of non-latex paints are accidental and sporadic (id., p. 201).

The paint industry has been winding down its use of mercury and promises that it will "substantially reduce" its mercury effluents in the "very near future" (id., p. 191). It maintains that at the present time there is no wholly satisfactory substitute for mercury compounds in all products and asks that it be given more time--the figure usually mentioned is one year--in which to come up with an answer (e.g., December 22, pp. 59-62; Jan. 27, p. 323). There was considerable testimony as to mercury substitutes. De Soto, Inc. testified that it had found non-mercurial mildew preventatives that were more effective than mercury; that it had discontinued the use of mercury for this purpose in all but a few of its products and would replace mercury in the rest during 1971; that it had not yet found a satisfactory alternative to mercury for shelf preservation of latex paints; but that it planned to eliminate even this use of mercury by December 1, 1971 (Jan. 27, pp.262-64). Glidden testified that it eliminated mercury from its non-latex paints two years ago and that in January 1971 it eliminated mercury from its interior latex paints, leaving mercury only in its exterior latex products, as to which it estimates another two years will be required (Jan. 27, pp. 311-12). Arnold Nilsen, a small Chicago paint manufacturer, has been making both latex and non-latex paints without mercury since December of 1969, and he testified that his substitute shelf preservative--barium metaborate, purchased from Buckman Laboratories--is more effective as well as safer than mercury (Jan. 27, pp. 273-75). Buckman testified that it has ceased to manufacture mercurials and stated flatly that "there are effective non-mercurials available for the control of microorganisms" in paint, while conceding that time will be required to achieve a complete changeover (Jan. 27, pp. 281-91). Other industry spokesmen warned the Board that they could not rush into the use of substitutes without prior assurance that they would not be more harmful than mercury; we were reminded of the abortive switch from phosphates to NTA in the detergent industry, and we were warned by Board Member Aldrich that boron can be highly toxic to plants (Dec. 22, pp. 60, 108).

While seeking substitutes for mercury, the paint industry has also sought to reduce mercury discharges by improved housekeeping and by [illegible] processes. In the housekeeping category, Glidden testified that it had reduced the wastage of latex paints during tank cleaning by squeegeeing the tanks and re-using the captured residue (Jan. 26, pp. 315-16), and was experimenting with putting mercury compounds directly into each paint can instead of into the mixing tank so as to avoid any mercury discharge in the wash water (id., p. 313). Numerous companies including Glidden said they were attempting to recycle the wash water (e.g., id., p. 314), although one company said reuse was not feasible for a company making large numbers of different products because of the storage problem (id., p. 245).

Treatment for the removal of mercury from effluents has been tried and found highly successful, yet so far incapable of meeting the standard of one half part per billion in paint washwater. DeSoto has installed a chemical flocculation system, followed by a biological treatment system, that removes a number of contaminants including 99% of the mercury in actual practice. Although DeSoto has reduced its discharge to 0.01 ounce of mercury per day (less than 1/4 pound per year), it does not meet the half-part-per-billion standard. (Dec. 22, pp. 68-69; Jan. 26, p. 269). Installation of the chemical flocculation unit at any paint company, DeSoto said, could be accomplished within nine months (Dec. 22, p. 77). A recent article in Chemical and Engineeri[ng] News described successful removal of mercury by carbon absorption down to 1 or 2 parts per billion (Dec. 22, p. 112; Jan. 26, p. 204); Tenneco has had excellent success with absorption tests and believes the mercury can be recovered after absorption and reused (Jan. 26, pp. 204, 210). Troy Chemical Co., which manufactures microbicides for the paint industry, has no mercury discharge at all; it manages complete recycling of mercury wastes, recapturing the mercury from sludges, and is prepared to let others copy its wastewater system without charge, while pointing out that its problems are not identical to those of the paint manufacture[rs] (Dec. 22, pp. 115-17).

To require the paint industry at once to meet a flat effluent standard of one half part per billion would put many of the manufacturers temporarily out of the latex paint business, which has expanded since its commencement in 1948 to embrace about 70% of the market (Jan. 26, p. 190). We would not have to do without paint in that event, but in addition to the hardships that such a move would impose on the paint industry itself the solvent-based paints are not without their own environmental problems, such as air pollution from the escape of reactive solvents (Dec. 22, p. 65). These problems may not in the long run be as serious as mercury contamination. But our choices are not only to abolish latex paints today or to put up with perpetual mercury poisoning. We are convinced the paint industry will soon be out of the mercury business, and we mean to help them along toward that exit. At the same time we are not confronted with the type of immediate crisis that was presented by the enormous discharges of mercury from chlor-alkali plants on Lake St. Clair. As mentioned above, one chlor-alkali plant was found discharging 66 pounds in a single day, while the largest mercury discharge among Illinois paint manufacturers has been 78 pounds per year (Jan. 26, p. 322). This is too much, and the industry concedes that this discharge should be reduced by 90%, proposing a standard allowing any single source to discharge up to 0.03 pounds (13-14 grams) of mercury per day, or 7.8 pounds in a year (id., p. 322). Sherwin-Williams, with no control equipment for mercury, discharges two to four grams per day (Oct. 14, p. 145; December 33, p. 114). DeSoto, with 99% removal, discharges less than 1/4 pound per year (Dec. 22, p. 69; Jan. 26, p. 269). Effluent concentrations (whether after dilution with other plant wastes is unclear) range from 0.115 to 5.0 parts per million, substantially above the general standard (Dec. 22, p. 82).

A parts-per-billion standard is necessarily a crude tool. It requires special provisions to prevent circumvention by dilution; it misses an important point by focusing on concentration rather than on total quantities discharged; it can penalize those who have substantially reduced their pounds of pollution by recycling, if they have to discharge a relatively concentrated but small quantity of blowdown; it fails to recognize that our principal interest is in keeping as much of a pollutant out of the water as is feasible. In the field of air pollution we have long since largely got away from the parts-per-million concept in favor of a more meaningful regulation relating the pounds of contaminants that may be discharged to the productivity of the process (see the Rules and Regulations Governing the Control of Air Pollution). It is true that in addition to limiting pounds of discharge in order to assure the use of good control technology it may be necessary to impose additional limits in order to assure that air or water quality standards are not exceeded by the aggregate of well-controlled sources. It is also true that the development of accurate pounds-per-day limits tailored both to the control capabilities of each industry and to the available dilution water is a complicated process, and that we cannot afford to postpone all action until we have completed it. It is for this reason that we are content in the short run to adopt standards in terms of an across-the-board concentration in parts per million or billion. But the administrative ease of such a standard should not blind us to its defects or to the desirability of adopting an alternative pounds-per-day standard when we have the information to enable us to do so.

We have some of that information in the present situation. We know that a number of paint companies, employing rather sophisticated control equipment, could not meet the half-part-per-billion standard at the present time. We also know that the quantities of mercury they discharge are in some cases extremely small, on the order of less than a pound a year. Moreover, these discharges are not to small waterways designated for aquatic life or for drinking water but to the sewers of very large sanitary districts, so that their discharges have been diluted beyond the point of detection before they reach water in which fish are expected to live. We have therefore amended the final regulation to provide an exception for discharges of under five pounds per year to sewers serving a plant treating over 25,000 population equivalents, provided that reasonable efforts are being made to reduce such discharges by providing removal of not less than 95% of the mercury that would be discharged in the absence of control before December 1, 1971. Anyone discharging more than five pounds today can continue to do so only upon receiving a variance from this Board after a showing of arbitrary and unreasonable hardship, which must contain a firm program for substantial reduction of mercury discharges in the near future. Moreover, all mercury dischargers (with the exception of hospital uses under one half pound per year) not meeting the 0.0005 mg/l standard, regardless of the amount discharged, must demonstrate 95% control of mercury by the first of December. Finally, because the principal problem is with the paint industry, which has said it will soon be able to terminate mercury use altogether, we have provided that the five-pound exception will terminate at the end of 1974.

The propriety of our limiting discharges to the sewers has been questioned. Our doing so is prompted not by any desire to make the sewers a place where fish can thrive or thirsty people find fresh water, but by the conviction that without limiting sewer discharges we cannot adequately protect either the waters or the soils from mercury contamination. One of two things can happen to mercury discharged to the sewers; it may pass through the treatment plant and into the public waters, or it may be deposited in the sludge during sewage treatment. In the former case dilution may make the mercury undetectable as it enters the stream, but the discharge nevertheless may contribute to the gradual buildup of mercury in the waters. Mercury in sludge is equally a problem, for the heat drying or incineration of sludge is likely to put mercury into the air, while heavy metals in sludge are a serious drawback to the possible use of sludge as fertilizer because of the danger of contaminating plants and soils. Our authority to regulate discharges to the sewers derives from two sources. First, for reasons just given, regulation of such discharges is necessary to prevent pollution of the streams and lakes and therefore within the general grant of authority to adopt regulations to prevent water pollution (section 13). Moreover, we have express authority under section 13(b) to prescribe effluent standards for discharges to any waters, and "waters" are defined in section 3(o) to include underground artificial channels. Sewers therefore qualify as waters for which we can prescribe discharge standards directly; any other construction would cripple our power to protect against pollution of the streams and soils. The present regulation is not the first to reach sewer discharges; SWB-5, adopted by our predecessor the Sanitary Water Board under a far less expansive statute, forbids all discharges of cyanide to the sewers, for reasons that closely parallel our reasons for limiting discharges of mercury.

It should be added that the problem of water pollution from direct discharges of effluents containing mercury is only one of the many problems of mercury in the environment, and that it may not, in Illinois, at least, even be the most important one. We have heard evidence that well pumps may contain as much as thirty-five pounds of mercury, which has been known to find its way into public water supplies on the rupturing of a seal (Jan. 26. p. 334), and that mercury is used in trickling filters for sewage treatment (id., p. 343). Air pollution by mercury is said to be a problem in laboratories (id., p. 163); mercury is said to be released to the air in the combustion of fossil fuels (Oct. 14, pp. 120-21) and through the incineration of mercury street lamps and of long-life alkaline batteries (Jan. 26, p. 344; Oct. 14, p. 42). These batteries contain 8% mercury; Union Carbide, which manufactures them, responded to our inquiry by estimating that 3,600 pounds of mercury were used for batteries in Illinois in 1969 and by callously observing that it assumed the exhausted batteries were disposed of along with household garbage (Ex. 14-S). The Institute for Environmental Quality is conducting studies that may lead to additional regulations on some of these subjects.

Moreover, in the paint industry and elsewhere, our environmental problems are by no means solved by merely removing mercury from the effluent discharged to the waters. Doing that is of very little use if the sludge containing the extracted mercury is disposed of in a way that returns the mercury to the waters through leaching or deposits it in soil where there may be a danger that it will be taken up by growing crops. Consequently the present regulation requires that sludges be disposed of in a safe manner, and reclaimed if at all possible. This requirement may prove difficult to meet in some cases, and this difficulty alone may suggest that substitution of other substances for mercury is far preferable to treatment of the effluent. Further, it may yet prove that the paint industry's greatest mercury problem is not direct effluent discharge but the wholesale broadcast of mercury into the environment as paint is applied to houses and other surfaces. The mercury in paint does not disappear after the paint is used; it may be slowly eroded by the air and by the rains, in which case it contributes to the pollution of air, water, and soil; or it may be incinerated or otherwise released when the painted materials are ultimately demolished. In any event the mercury will sooner or later find its way from the paint into places where it can do harm, and in quantities exceeding by several orders of magnitude the amounts now being discharged to the streams and sewers as a result of washing residues out of the mixing tanks.

We refrain from outlawing the use of mercury in paints today, both because no such proposal has been directly before us in this proceeding and because it seems clear that to do so at once would impose severe hardship on the paint industry that is not warranted by the seriousness of the situation. But the industry is aware that the handwriting is on the wall, and it is in hot pursuit of substitutes. The time must soon come when man stops the deliberate broadcasting of long-lasting, cumulative poisons into the environment, whether in paints, in long-lived mercury pesticides, or in batteries that put volatile mercury into the air when incinerated. We have not finished with the subject of mercury; let those who have an interest in spreading mercury or similar substances around the environment take notice that we shall very likely be holding further hearings looking toward the elimination of these practices in the near future.

The reporting requirement adopted today will give the enforcement agency necessary information on which to protect the public from mercury dangers and will give the Board information on which possible additional regulations can be based. This requirement implements the Agency's authority under sections 4(b) and (h) of the Environmental Protection Act and is in accord with our authority to adopt regulations to prevent water and land pollution under sections 13, 13 (i), 22, and 22(d) of the Act.

I, Regina E. Ryan, Clerk of the Pollution Control Board, certify that the Board adopted the above opinion and order this 31 day of March, 1971.

Regina E. Ryan (JH)

REGINA E. RYAN

CLERK OF THE BOARD