

ILLINOIS POLLUTION CONTROL BOARD
August 3, 1978

IN THE MATTER OF:)
)
THE PETITION OF MONSANTO COMPANY) R76-17
FOR A REVISION OF THE MERCURY)
SEWER DISCHARGE STANDARD.)

PROPOSED OPINION AND ORDER OF THE BOARD (by Mr. Dumelle):

On August 9, 1976 Monsanto Company requested that a site specific standard be established which would limit the amount of mercury discharged from its W. G. Krummrich Plant into the Village of Sauget sewer system. The petition was published in Environmental Register #133 on September 22, 1976. Hearings were held on August 23, 1977 at Sauget and October 7, 1977 in Chicago. Hearings on the economic impact of this proposal were held on April 18, 1978 in Chicago and April 25, 1978 in Springfield.

Monsanto's mercury discharge has been the subject of a number of prior variances. The entire records of those cases were admitted into the record of this proceeding as Group Exhibit #1. On the Agency's motion excerpts from the records in R70-5 and R76-21 were also admitted.

Monsanto owns and operates the W. G. Krummrich plant in Sauget, Illinois. The plant employs 1,350 people with a payroll of over \$24 million per year. The chlor-alkali unit at the plant consists of 22 DeNora mercury cells which produce 45,000 tons of chlorine each year, which in turn comprises 40 percent of the plant's chlorine needs. In addition, the chlor-alkali unit produces potassium hydroxide and sodium hydroxide (caustic) and hydrogen which are used in a number of chemical processes by Monsanto. The wastewater from the chlor-alkali unit contains mercury which alone, and in combination with the discharge from the remainder of the plant, exceeds the 0.0005 mg/l sewer discharge standard in Rule 702(a) of Chapter 3: Water Pollution of the Board's Rules and Regulations.

EFFECTS ON WATER QUALITY AND UPON FISH

Exhibit 8 describes the results of a survey of mercury levels in the Mississippi River from October 12-14, 1976. Out of 56 samples taken, only 6 showed detectable levels of mercury

using flameless atomic absorption (0.2 ppb or greater). Of these six, only one exceeded the water quality standard for mercury (0.5 ppb) and that sample was taken five miles upstream from the Sauget sewage treatment plant.

Mr. Robert Harness summarized the results of fish sampling surveys on the Mississippi River which showed that the only recorded violation of the Food and Drug Administration (FDA) standard (0.5 ppm) was upstream from Sauget at Alton. The high reading at Alton was 0.6 ppm (R.120-124). The USEPA reported no detectable mercury at Alton and at Kimmswich, Missouri, which is just below Sauget (R.125).

Exhibit 31(b) in R76-21 lists the levels of mercury found at the water quality stations located throughout Illinois in 1975 and 1976. The Board hereby takes notice of that exhibit. On Page 50 there are 19 total mercury readings from three stations upstream and one station downstream from Sauget. The only violations of the 0.5 ppb water quality standard were readings of 2.1 and 7.0 ppb approximately five miles above Sauget and 13.0, 0.8 and 2.1 ppb at a point approximately 12 miles downstream. It should be noted that although these data show violations in the vicinity of Sauget's discharge, the violations were all recorded in 1975. All six samples below and the one sample above Sauget in 1976 showed mercury levels below the 0.5 ppb water quality standard.

It would appear then that Monsanto has not contributed to any violations of water quality in the Mississippi River with its present discharge. Since the relief requested in this proceeding represents a reduction in mercury in Monsanto's effluent, no adverse impact should be expected.

TECHNICAL FEASIBILITY

On June 1, 1977, the Supreme Court of Illinois addressed the issue of what effluent standard should be set for the mercury discharge from Monsanto's Krummrich plant. (Monsanto Company v. Pollution Control Board, et al., 67 Ill.2d 276, 367 N.E.2d 684). The setting for that decision was an appeal of the conditions the Board had set in a variance proceeding. The Court held that Monsanto had to develop more effective pollution control technology..."to meet the standard which is being addressed in this proceeding." The defense of impossibility was rejected and the Board's authority to set "technology forcing" standards was affirmed in the establishment of interim effluent standards for Monsanto's mercury discharge.

Monsanto has used a sulfide precipitation system for mercury removal from the chlor-alkali waste stream since 1971

(R.41). Since that time mercury has been eliminated from other parts of the plant wherever possible (R.38), and the sulfide system has been improved (R.42-52). The movement of mercury through the plant has been traced to the point where Monsanto now accounts for more mercury than it thought it had in the system (R.61).

The present sulfide precipitation system reduces Monsanto's chlor-alkali effluent component to approximately 50 ppb. In an attempt to reduce this concentration, a reliable add-on system was pursued. A number of these were rejected as unsatisfactory (R.64-67; 76-79; 162-164). The best results were obtained from IMAC-TMR resin which is produced by Akzo Zout Chemie in the Netherlands. This system is described in Exhibit 9. The Akzo resin can reduce the chlor-alkali effluent by 90 percent to approximately 5 ppb mercury although its long range performance cannot be predicted. Monsanto has already begun to install the Akzo resin system on the assumption that permanent relief will be granted (R.180). The combination of sulfide precipitation with the Akzo resin is described in the record as "best available technology" (R.72). Approximately \$1,500,000 has been budgeted for installation of the Akzo resin system. Annual operating expenses for the mercury removal system are expected to increase from \$720,000 to \$1,500,000 (R.75).

Technology has, in this case, been forced far enough.

ECONOMIC REASONABLENESS

The proposed standard which Monsanto has offered is not the only environmentally acceptable alternative. It is, however, the only alternative which balances adequate safeguards against economic disruption.

If this proposal were declined by the Board, Monsanto would have to wait until a final decision is reached in R76-21. If the Board decides to raise the mercury effluent standard to 3 ppb in that proceeding, Monsanto would be forced to either: a) treat its entire waste stream down to an average of 3 ppb; b) remove mercury from its process; or c) close down its chlorine-caustic-hydrogen production facilities altogether. An analysis of these alternatives follows.

a) At the April 18, 1978 hearing, Mr. Lee Rogers, one of the authors of Exhibit 23, the economic impact study prepared for this proceeding, stated that the estimated cost of treating the entire flow from the Krummrich plant down to 3 ppb would be \$18,251,000 per year (4/18/78,p.22). Along with being an abnormally high cost figure, there is no feasible way to treat

flows of this magnitude (6.12 MGD) down to 3 ppb consistently (4/18/78,p.22). So if such a system were designed and installed (and none ever has been), it still might not work. This would leave the future of the chlor-alkali unit in doubt since Monsanto would have to re-evaluate its decision to extend the life of the system for another ten years (R.168). The existence of the chlor-alkali unit at the Krummrich plant makes that plant more attractive as a potential site for capital expansion. If the future of the chlor-alkali unit becomes uncertain, some other Monsanto plants outside Illinois might compete more favorably in Monsanto's future plans. (R.157-159.)

b) In order to produce chlorine without the use of mercury cells, Monsanto would have to install either a diaphragm cell or a membrane cell process. A 270,000 ton per year diaphragm cell unit would have to be installed to obtain unit costs comparable to the present use of mercury cells (R.154). Monsanto stated that the rate of return for such a project was not sufficient to justify its selection over the alternative of shutting down the chlorine production facilities and buying these products on the open market (R.155). A membrane cell could be installed but this would produce a maximum concentration of only 40% caustic. Since Monsanto and its customers require 45-50 percent caustic, an added degree of evaporation/concentration would have to be employed. This added step would offset any advantage of lower energy costs or lower losses of asbestos and lead associated with the membrane cell process as compared to the diaphragm cell process. (R.155-156). If either alternative were followed, Monsanto would be producing a great deal more chlorine and caustic than it presently does. This would force Monsanto into the market to sell these surpluses which would be impossible with its present corporate staff (R.156).

c) If the chlor-alkali unit at the Krummrich plant was simply shut down, Monsanto would suffer a loss of \$100,000,000 gross profits over the ten year period from 1977-1986 (R.157). This loss would occur because all the chlorine, caustic, and hydrogen which Monsanto needs would have to be purchased elsewhere. The only estimate of the economic impact of this alternative is a loss of \$0-24 million in payroll and 0-1350 jobs, but any loss of jobs in the East St. Louis area would be accented by the fact that the plant is located in an economically depressed area. (Ex. 23, p. 155.)

THE PROPOSED STANDARD

Monsanto has requested that its mercury effluent standard be measured in pounds/day instead of by concentration. In its plan to upgrade the chlor-alkali unit, \$1,500,000 has been allocated toward reducing water usage (R.68). A reduction in flow would necessarily increase the concentration of mercury in the waste-

stream. Since the Board commends Monsanto's attempts to reduce its flow and a mass limitation accounts better for variations in flow, the pounds standard will be used.

The proposed monthly average (0.25 pounds/day) has not been consistently met by Monsanto. The data submitted for 1977 through August of that year shows three months (June, July, August) which exceeded the limit. During that same period the daily average (0.50 pounds/day) has been exceeded on ten days (February 8, March 1 and 28, June 17, 22 and 29, July 10, 28, 29, 30) (Ex. 21 and 22). It can be assumed, then, that the improvements to the chlor-alkali unit, including the installation of the Akzo resin system will result in consistent compliance. At the April 18, 1978 hearing, Mr. Rogers, the author of the economic impact study, stated that Monsanto's proposal would allow only a small margin of error (0.02 pounds/day) providing the finished effluent from the chlor-alkali effluent is treated to a level of 5 ppb (4/18/78,p.24). Although the performance of Monsanto's improved waste-water treatment system cannot be firmly established, these proposed standards fall into a range which is possible with optimum performance. Hence the Board finds that they are appropriate.

Since the proposed standard can be measured accurately with the flameless atomic absorption method of analysis, the Board sees no reason why the more expensive neutron activation analysis method should be employed (R.137-141).

The proposed language which gives a credit to any publicly owned treatment works which receives Monsanto's wastewater is appropriate. The Board is endorsing the level of technology which Monsanto intends to use and no municipal plant, including Sauget and the proposed regional plant which will receive Sauget's wastewater, can treat effectively for mercury (R. 76-21, R.445). If Monsanto's discharge complies with this proposal but causes a violation of the mercury effluent standard, no liability should attach.

This Opinion constitutes the Board's findings of fact and conclusions of law in this matter.

ORDER

It is the Order of the Pollution Control Board that Rule 702 of Chapter 3: Water Pollution of the Board's Rules and Regulations be amended by the addition of a new subsection (f) which shall read as follows:

(f) The Monsanto Company plant located in the Village of Sauget may discharge mercury in excess of that allowed by Rules 408(a) and 702(a), provided the total quantity of mercury discharged by said plant shall not exceed an average of 0.25 pounds per day during any calendar month, nor a maximum of 0.5 pounds during any one day. Furthermore, any publicly owned treatment works which, directly, or indirectly, receives Monsanto's wastewater shall be entitled to discharge mercury in excess of that provided in Rule 408(a) to the extent that said discharge exceeds Rule 408(a) because of Monsanto's discharge.

I, Christan L. Moffett, Clerk of the Illinois Pollution Control Board, hereby certify the above Opinion and Order were adopted on the 3rd day of August, 1978 by a vote of 5-0.

Christan L. Moffett
Christan L. Moffett, Clerk
Illinois Pollution Control Board