

ILLINOIS POLLUTION CONTROL BOARD
February 5, 1987

IN THE MATTER OF:)
)
PROPOSAL OF MOBIL OIL CORPORATION)
TO AMEND THE WATER POLLUTION) R84-16
REGULATIONS)
)

PROPOSED RULE. FIRST NOTICE.

PROPOSED OPINION AND ORDER OF THE BOARD (by J. Marlin):

This matter comes before the Board upon the May 1, 1984 filing of a proposal by Mobil Oil Corporation (Mobil) requesting site-specific relief from the ammonia nitrogen effluent standard (Section 304.122(b)). Relief is also requested from the requirement that no effluent shall cause a violation of a WQS (Section 304.105) as it concerns the general use ammonia nitrogen water quality standard (WQS) (Section 302.212), the secondary ammonia nitrogen WQS (Section 302.407), the general use dissolved oxygen (DO) WQS (Section 302.206) and the secondary DO WQS (Section 302.405). Mobil discharges into the Des Plaines River.

Hearing was held in Joliet, Will County, Illinois on July 26, 1984. On October 30 and December 13, 1984, Mobil filed responses to the written inquiries of the Illinois Department of Energy and Natural Resources (DENR). The DENR concluded that an economic impact study was unnecessary and filed its negative declaration on February 22, 1985. The Economic Technical Advisory Committee agreed with this finding, filing its concurrence on March 12, 1985. The last brief was filed on June 4, 1985. The Board by Interim Order dated September 5, 1985, requested that the participants address the question of whether the Board has authority to grant site-specific relief from 35 Ill. Adm. Code 304.105. On February 4, 1986, the Agency moved to file USEPA comments, and on February 7, 1986, Mobil filed its response to USEPA comments which contained amended proposed language. Both motions were granted by a Hearing Officer on February 24, 1986. The Agency on March 20 filed its response to Mobil's response and modified proposal. On April 10, 1986, Mobil moved for leave to file its reply to the Agency's response to the modified proposal. That motion is granted. On July 7, 1986, Mobil filed a motion for leave to file Comment in Opposition to Applicability of Central Illinois Public Service Company v. PCB to this cause. In the Agency's response, filed on July 17, 1986, the Agency did not object to Mobil's motion. Mobil's motion is granted.

Mobil is currently operating under a variance from 3 mg/l ammonia nitrogen effluent standard of 35 Ill. Adm. Code 304.122(b) until July 1, 1988 or until final action is taken in

this matter, whichever occurs first. Under this variance, the ammonia nitrogen concentration in Mobil's discharge must not exceed a monthly average concentration of 25 mg/l and a daily maximum of 35 mg/l. Mobil Oil Company v. Illinois Environmental Protection Agency, PCB 86-45, slip Opinion and Order at 4 (August 14, 1986). Mobil has been granted five previous variances from the ammonia nitrogen standard: PCB 77-22, PCB 78-97, PCB 80-54, PCB 82-36 at PCB 84-37. Mobil has incorporated by reference the proceedings of the five variances in this regulatory proceeding. (R. 114).

Mobil owns and operates a conventional fuels petroleum refinery with a rated capacity of 180,000 barrels per day located in Joliet, Illinois in Will County. The refinery discharges 2.74 million gallons of effluent per day. Stormwater, noncontact cooling water and process water are discharged from the facility into the Des Plaines River. The process water and contaminated surface runoff (1600 gpm) are treated in Mobil's wastewater treatment plant (WWTP) which consists of an API separator, a dissolved air flotation unit, an equalization basin for primary treatment and a conventional activated sludge facility for secondary treatment. Treated effluent from the final clarifier is routed through a 4.98 million gallon guard basin where it is retained for approximately 51 hours and then aerated in the final aeration cone prior to release to the Des Plaines River. The effluent meets all discharge standards other than ammonia nitrogen. Mobil Oil Company, PCB 86-45 at 1-2.

Mobil is requesting that its effluent limits for ammonia nitrogen be set at 25 mg/l for a monthly average and 40 mg/l for a daily maximum. (Pet. Brief, p. 3).

In the past 13 years, Mobil has expended considerable time and effort in its attempt to reach ultimate compliance with the ammonia standards. The total cost of ammonia related capital expenditures is in excess of \$2.1 million. The average annual operating cost for ammonia reduction projects during the last five years has been \$1,801,000, including amortization of capital investments. Equalization system improvements and continuous dissolved oxygen monitoring in the aeration basins cost an additional \$64,000 between 1982 and 1985. Projects have included the purchase and installation of a nitrification pilot plant, nitrification inhibition studies, mutant bacteria trials, alkalinity addition and temperature control in the aeration basins. Since 1973, these efforts have reduced Mobil's discharged ammonia concentration by 96 percent (Id). Mobil Oil Company, PCB 86-45, at 2.

Mobil investigated six alternative nitrification technologies. Three biological systems (activated sludge, trickling filter and rotating biological contactor) were rejected because of their inability to consistently achieve the ammonia nitrogen effluent standard of 3 mg/l (R. 97-8, See Pet. Exh. 2, p. 59, 60). Three chemical processes were also addressed.

Breakpoint chlorination and ion exchange processes would consistently meet the 3 mg/l standard (R. 94-5). However, breakpoint chlorination was not recommended because of the formation and release of toxic chlorinated byproducts (R. 94). The ion exchange process would entail a 7-8 million dollar capital cost with a \$450,000 annual operating cost, plus an added cost for activated carbon treatment if organic fouling occurred (R. 95). The third chemical process, ammonia stripping, would not enable Mobil to reduce its effluent concentration enough to achieve the 3 mg/l standard. In addition, it has relatively high capital and operating costs as well as potential operational problems. (R. 96). After assessing the available control alternatives, an expert witness for Mobil concluded that absolute compliance with the 3 mg/l standard could only be achieved by the ion exchange process. He stated that "[i]n the absence of a beneficial influence on receiving water quality, it is difficult to recommend the expenditure of several million dollars to achieve further reduction in effluent ammonia at the Joliet refinery." (R. 103).

Environmental Impact

Water quality standards for ammonia nitrogen and dissolved oxygen are being exceeded in the Des Plaines River at the point of Mobil's discharge, river mile 278. (R. 157-8). Mobil asserts, and the Agency agrees, that the condition of the river is primarily due to the discharges of three Metropolitan Sanitary District of Greater Chicago (MSDGC) sewage treatment plants located upstream of Mobil. (Pet. Brief, p. 6-7; Ag. Brief, p. 3). Based on an annual average, calculated from data taken from July, 1982 through December 31, 1983, Mobil's discharge constitutes 0.3 percent of the river's total point source loading of ammonia nitrogen. (R. 139). The MSDGC sewage treatment plant discharges make up 96 percent of the ammonia nitrogen loading. (Pet. Exh. #7, p. 8).

The Agency concurs with Mobil that Mobil's current discharges of ammonia nitrogen have "no significant environmental impact." The Agency states that "continued discharges by Mobil at its present rate and concentration will have no discernible effect upon the biota in the lower Des Plaines and upper Illinois Rivers." (Ag. Brief, p. 3).

In addition, the nearest actual or proposed public water supply downstream of Mobil's outfall is the City of Peoria which is 110 river miles away. Because of the distance and the relative amount of the discharge, a witness for Mobil stated that the ammonia nitrogen added by Mobil would have "appreciable time for degradation" by the time it reaches Peoria. (R. 182).

Economic Impact

An expert witness of Mobil stated that if the lower Des Plaines and upper Illinois rivers improved greatly in quality

such that it would become a combined sport and commercial fishery, its value would be \$51,633 per mile per year. (R. 187). If Mobil discharged 3 MGD at 40 mg/l into the river during a seven-day, ten-year low flow of 1186 MGD, the river's concentration of ammonia nitrogen would rise by 0.101 mg/l near the discharge point. (R. 145-6). The river would flow approximately 1.85 miles before the added concentration of ammonia nitrogen would be completely nitrified. (R. 187). If it is assumed that a 0.101 mg/l increase in ammonia nitrogen would completely destroy the value of the river's potential in being a sport and commercial fishery, the impact would equate to a loss of \$95,521 per year. When figuring Mobil's relative contribution to an overall 1.6 mg/l river concentration, the monetary loss directly attributable to Mobil would be \$6,448 per year. (R. 188) It was estimated that if Mobil is granted relief, it would save, at the minimum, \$420,000 per year. Based upon these assumptions, the ratio of Mobil's savings to society's cost would be 65 to 1. (R. 189-90). It is Mobil's position that a treatment plant expansion, required to achieve compliance with the existing standard is not economically justified. (Pet. Brief, p. 10). The Agency concurs with Mobil that "the ratio of likely cost expansion to likely beneficial impact would be extremely high, and thus economically unjustified." (Ag. Brief, p. 4).

The DENR concluded that the "cost of making a formal study is economically unreasonable in relation to the value of the study to the Board in determining the adverse economic impacts of the regulation." (DENR Negative Declaration, p. 2). Consequently, it issued a negative declaration in this matter.

Ammonia Nitrogen Limitations

Mobil requested that the Board set limitations of a 25 mg/l monthly average and a 40 mg/l daily maximum. These limitations were determined by evaluating the historical performance data of the WWTP. According to Mobil, these limits are necessary to account for fluctuations in the effluent concentrations. Studies indicate that the WWTP consistently removes a 17 mg/l increment from the WWTP influent. Consequently, Mobil concludes that the effluent fluctuations are due to higher crude nitrogen and production levels. Due to these variations, Mobil states that the requested limitations are necessary to "insure consistent compliance." (Pet. Reply, p. 6).

Pursuant to a Hearing Officer Order dated August 13, 1985 in this proceeding and the variance conditions of PCB 86-45, Mobil has submitted bi-monthly reports which cover effluent data from January, 1983 to December, 1986. The data from these bi-monthly reports can be summarized as follows:

AMMONIA NITROGEN CONCENTRATIONS (MG/L)

<u>Year</u>	<u>Yearly Avg. of the Monthly Avg's.</u>	<u>Highest Monthly Avg.</u>	<u>Highest Daily Maximum</u>
1983	4.35	15	27
1984	2.58	8	19
1985	3.33	16	25
1986	4.00	11	32

The Board recognizes that in 1973 Mobil's discharge averaged 77 mg/l and that in 1979 and 1980, it averaged 13 and 17 mg/l respectively. Mobil Oil Company, PCB 86-45 at 2. However, data from the past four years indicates that Mobil's actual performance level, when calculated on an annual average, is quite close to the 3 mg/l standard.

The Board finds that if Mobil is granted relief, the resulting environmental and economic impact would be minimal. Considering the available alternatives for Mobil, compliance with the 3 mg/l standard, although technically feasible, would be economically unreasonable given Mobil's current performance levels. Consequently, the Board will grant Mobil relief from Section 304.122(b).

The Agency is concerned that if the Board grants Mobil the limits that it is requesting, Mobil may relax its present control methods thereby increasing the ammonia nitrogen concentration in its discharge. The Agency proposed a 10 mg/l monthly average, a 30 mg/l daily maximum, and a 5 mg/l annual average. The Board shares the Agency's concern in light of the fact that limits requested by Mobil are considerably higher (sometimes by a factor of two) than its actual discharge. Consequently, the Board will require that Mobil's discharge not exceed the following limitations: monthly average, 20 mg/l; daily composite, 35 mg/l; and and yearly average, 8 mg/l. The daily composite limit is set to allow Mobil the day to day fluctuations of effluent concentrations that it periodically experiences. The monthly average limit is set to account for the impact that these daily fluctuations have upon a monthly average calculation. The Board believes that this objective can be fully achieved by a 20 mg/l standard and that the monthly standard proposed by Mobil is unnecessarily high. The Board understands that Mobil experiences periodic losses of nitrification. However, Mobil's present levels of performance, including its variations, are well within these limitations. The yearly average of 8 mg/l will allow for considerable deviation from current performance due to anticipated problems and varying feedstocks without allowing Mobil to significantly decrease its control efforts.

Mobil has asserted that an increase in the nitrogen content of the crude oil it refines correspondingly increases its effluent concentration. In particular, it claims that nitrogen content of the crudes have increased over the years. The crude oil nitrogen content at the Joliet refinery has gone from a low of about 680 parts per million (ppm) in 1976 to a high of about 1450 ppm in 1984. In 1985, it dropped to a level of 1120 ppm. Mobil Oil Company, PCB 86-45 at 3. If Mobil finds in the future that it exceeds the standards on a regular basis, it can come before the Board under another docket to seek relief. However, even though in recent years Mobil's crude feedstocks have had a high nitrogen content, its effluent has been within the limits set herein.

The methodology for computing the annual average shall be determined during the permit process. It is expected that if a differing number of samples are gathered from different months then the results of these samples should be weighted accordingly so as to yield a reasonably accurate annual average. Mobil will be required to monitor and report its effluent concentration. However, procedures for monitoring and reporting effluent concentrations, will also be set forth in the permit. Mobil will be required to report on an annual basis the nitrogen content of its feedstock.

Water Quality Standard Relief

Mobil has also requested relief from being liable for causing the violation of various water quality standards (WQS). In response to a U.S. Environmental Protection Agency (USEPA) Review Statement submitted by the Agency, Mobil modified its original proposed language addressing the water quality standards issue. Essentially, the modified language states that 35 Ill. Adm. Code 304.105 will apply to Mobil with respect to general use and secondary contact WQS for ammonia nitrogen and dissolved oxygen, "unless such discharge does not cause or contribute significantly to the violation" of the WQS. (Mobil Response, p. 1). Mobil's discharge is located approximately 200 feet upstream of the I-55 bridge. The river upstream of the bridge is classified as secondary contact, whereas downstream of the bridge, the river is considered general use. (R. 125-26). Consequently, Mobil's discharge may, in theory, impact upon both secondary contact and general use streams.

The general use water quality standard for total ammonia nitrogen, given the river's pH and temperature, is 1.5 mg/l (35 Ill. Adm. Code 302.212). The general use water quality standard for dissolved oxygen is 6 mg/l (35 Ill. Adm. Code 302.206). Mobil's impact upon these standards is discussed in Petitioner's Exhibit 3, a report prepared by an expert witness for Mobil.

The report shows that the general use standard for ammonia nitrogen is exceeded downstream of Mobil's discharge. However, it is concluded that under worst case conditions (Mobil

discharging 3 MGD at 40 mg/l into the river flowing at a low level of 1,186 MGD), Mobil's discharge would extend by only 1.85 miles the reach of the river which did not meet the ammonia nitrogen standards (Pet. Exh. #3, p. 16).

Similarly, the dissolved oxygen standard is exceeded downstream of Mobil. However, under the same worst case conditions, Mobil's discharge would not extend by more than one mile the reach of the river which did not meet the dissolved oxygen standard. (Id. at 19).

The secondary contact ammonia nitrogen standard is 2.5 mg/l (35 Ill. Adm. Code 302.407). It is apparent from data reported in Petitioners Exhibit #3 that this standard is exceeded upstream of Mobil's discharge. (Pet. Exh. #3, p. 17).

The secondary contact standard for dissolved oxygen is 4 mg/l (35 Ill. Adm. Code 302.405). Data shows that this standard is exceeded in the river mile where Mobil discharges. (Pet. Exh. #3, p. 18). Consequently, it is likely, given the upstream exceedences of the ammonia nitrogen standard, that the dissolved oxygen standard is also being violated upstream of Mobil's discharge point.

In the USEPA's Review Statement, the USEPA stated that Mobil's addition to the river is "insignificant" with respect to water quality violations. It concluded:

Mobil should not be granted relief from Section 304.105 but should be required in their NPDES permit to, in addition to standard effluent monitoring, conduct upstream and downstream ammonia-N monitoring at representative sampling points to clearly ascertain whether or not they are responsible for water quality standards violations for ammonia-N.

The Board agrees and finds that Mobil's current impact on water quality is de minimus. Consequently, the Board will not grant Mobil relief from Section 304.105. The Board notes that its determination that Mobil's discharge is de minimus only applies to the present situation. Should conditions in the river change, Mobil's discharge might cause WQS violations in the future. The Board also believes that the instream monitoring, as proposed by the USEPA, is a requirement suitable for consideration by the Agency as a permit condition.

Finally, it is the Board's position that the record supports the granting of permanent relief from the ammonia nitrogen effluent standard. In re Union Oil Company of California, R 84-13, January 8, 1987, the Board also granted Union Oil relief from the ammonia nitrogen effluent standard with regard to its Lemont Refinery. However, the Board limited the relief to seven

years. Such a "sunset provision", though, is not necessary in this matter.

The data shows that Mobil, unlike Union, has largely been successful in reducing the concentration of ammonia nitrogen in its discharge. The Board notes that on an annual average Mobil's discharge has been quite close to the 3 mg/l standard. This is true even in recent years when the nitrogen content of the oil feedstocks have been high. The Board fully expects Mobil to continue its high performance level concerning ammonia nitrogen concentrations. The Board, therefore, grants Mobil permanent relief from Section 304.122(b) within the conditions listed in the Order.

ORDER

The Board hereby proposes to adopt the following rule and instructs the Clerk of the Board to cause its publication for First Notice in the Illinois Register:

TITLE 35: ENVIRONMENTAL PROTECTION
SUBTITLE C: WATER POLLUTION
CHAPTER I: POLLUTION CONTROL BOARD

PART 304
EFFLUENT STANDARDS

SUBPART B: SITE-SPECIFIC RULES AND
EXCEPTIONS NOT OF GENERAL APPLICABILITY

Section 304.214 Mobil Oil Refinery Ammonia Discharge

- a) This Section applies to discharges from Mobil Oil Corporation's Refinery, located near Joliet, into the Des Plaines River.
- b) The requirements of Section 304.122(b) shall not apply to the discharge. Instead Mobil's discharge shall not exceed the following limitations:

CONSTITUENT	CONCENTRATION (mg/l)
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Ammonia Nitrogen	
Monthly Average	20
Daily Composite	35
Yearly Average	8

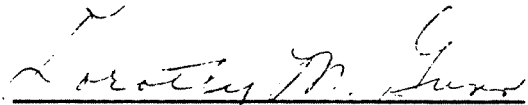
- c) Section 304.104(a) shall not apply to this Section. Monthly average and daily composites are as defined in Section 304.104(b).

- d) Mobil shall monitor the nitrogen concentration of its oil feedstocks and report on an annual basis such concentrations to the Agency. The report shall be filed with the Agency by January 31 of each year.

(Source: Added at 11 Ill. Reg. _____,
effective _____)

IT IS SO ORDERED.

I, Dorothy M. Gunn, Clerk of the Illinois Pollution Control Board, hereby certify that the above Proposed Opinion and Order was adopted on the 5th day of February, 1987, by a vote of 6-0.



Dorothy M. Gunn, Clerk
Illinois Pollution Control Board