

ILLINOIS POLLUTION CONTROL BOARD
May 11, 1989

IN THE MATTER OF:)
)
MARATHON PETROLEUM COMPANY) R87-2
SITE-SPECIFIC)

PROPOSED RULE FIRST NOTICE

OPINION AND ORDER OF THE BOARD (by B. Forcade):

This matter is before the Board on the January 28, 1987 petition of the Marathon Petroleum Company ("Marathon") pursuant to Section 28 of the Environmental Protection Act ("Act"), Ill. Rev. Stat. ch. 111 1/2, par. 1028. That petition seeks site-specific relief from Section 304.105 of the Board's water pollution rules, 35 Ill. Adm. Code 304.105, as it applies to the total dissolved solids (TDS) and chloride (Cl) content of Marathon's wastewater discharges from outfall 001, under NPDES permit No. IL0004073, into an unnamed tributary of Sugar Creek, in the Wabash River Basin, at Robinson, in Crawford County. The signatures of more than 200 persons accompanied Marathon's petition.

The public hearing occurred on June 21, 1988. The Illinois Environmental Protection Agency ("Agency") and Illinois Department of Energy and Natural Resources ("Department") participated. No member of the public attended. R. 4. The Department filed its Negative Declaration, stating that an economic impact study (EcIS) was unnecessary, on October 20, 1988 and indicated the concurrence of the Environmental and Technical Advisory Committee by a letter filed November 2, 1988. Marathon filed a post-hearing brief on February 17, 1989. The Agency filed a reply brief on March 13, 1989.

The Board has received three public comments on the Marathon-proposed rule revision. Public Comment number one (P.C. #1), dated August 19, 1988 from Marathon included only a request to extend the record. P.C. #2, dated November 4, 1988 from the Department, includes an observation that a review of an EcIS from another proceeding (R86-14 on the site-specific rule proposal of Borden Chemical Company for TDS and Cl) and a USX 1987 annual report (the parent company of Marathon) might interest the Board. The Department enclosed copies of those two documents. (On January 9, 1989, the hearing officer denied Marathon's November 14, 1988 motion to strike P.C. #2.) P.C. #3, dated September 2, 1988 from the Agency, includes calculated attainable TDS and Cl water quality standards and effluent limitations for the subject discharge. This comment expresses the Agency's opinion as to the probable impact these would likely have on the

receiving stream. Marathon filed similarly calculated values on a motion to supplement the record on September 8, 1988.

Facts

Marathon owns and operates a petroleum refinery at Robinson, Illinois. This facility produces finished petroleum products from crude oil. Marathon acquired the facility in 1924 and has expanded and modernized it to a present refining capacity of 205,000 barrels of crude oil per day (BPD). The estimated annual production level is about 130,000 BPD. The facility has a weekly payroll of \$415,000 and employs about 638 persons. Robinson has a population of 7,300, and Crawford County has a population of 20,000. Marathon annually pays \$5.2 million in state and local taxes and \$46 million for goods and services.

Process wastewater originates from numerous individual, independent sources in the plant. Crude oil contains salt, which winds up in a few of these discharges. Four or five of these process discharges contain higher levels of TDS and Cl. The highest is "desalter water," which contains over 5,600 milligrams of TDS per liter (mg/l). Marathon's wastewater treatment plant has a primary system capacity of about 3.5 million gallons per day (MGD). It presently treats 1.3 to 1.7 MGD. Marathon recycles a significant amount of its wastewater for plant use. It concedes that this recycling may elevate TDS and Cl contents in its effluent. Eliminating this practice would lower discharge TDS and Cl concentrations, but would not reduce the total amount of TDS and Cl discharged in its effluents. R. 44.

Wastewater Discharges and Stream Impact

Marathon discharges wastewater from two outfalls into an unnamed tributary of Sugar Creek. Sugar Creek, in turn, discharges into the Wabash River. Outfall 001 is involved in this proceeding; it discharges process wastewater. Outfall 002, which primarily discharges stormwater runoff, is not involved. Outfall 001 is about ten stream miles upstream of the confluence of Sugar Creek and the Wabash River. The unnamed tributary has a 7-day, 10-year low flow (7Q10) of zero at the point of discharge. The Wabash River at its confluence with Sugar Creek, where it ultimately receives the Marathon effluent, has a 7Q10 of 820 MGD.

The unnamed tributary that receives Marathon's effluent has a degraded water quality, as indicated by the absence of fish and an elevated macroinvertebrate biological diversity index (MBI). (MBI values range from 0 to 11, and vary inversely with macroinvertebrate diversity.) There are fish upstream of Marathon, but the Agency observes that there is a "near extirpation" of fish for over eight stream miles below the outfall, despite the lack of an in-stream barrier. Ex. 9, p. 3. The City of Robinson and

other point sources discharge upstream of Marathon. The MBI is 6.0 upstream and 8.3 immediately downstream of the Robinson outfall. The MBI subsequently improves to 6.3 immediately upstream of Marathon, but it increases to 9.8 a short distance downstream. It improves to 8.6 one mile downstream of Marathon. The Agency observed that there is "severe degradation" of the macroinvertebrate community downstream of Marathon. Ex. 9, p. 2. Overall, the Agency observed that "severe stream degradation" is attributable to Marathon and that the Marathon wastewater discharges have a "pronounced and often variable effect" on stream discharge and water quality. Ex. 9, p. 1.

Stream water quality is also degraded as indicated by its TDS and Cl contents. Upstream of Marathon, the average TDS content of the stream was 1,225 mg/l, as observed by the Agency in 1978. It was between 1,390 and 2,740 mg/l downstream. Ex. 10, pp. 13 & 16. The Agency observed that the majority of the TDS water quality violations occurred downstream of Marathon. Ex. 10, p. 2. Marathon notes that some upstream source is responsible for an elevated TDS content of 8,000 to 9,000 mg/l and a Cl content of about 4,000 mg/l in a tributary discharging near its outfall, whereas its own highest individual wastewater stream contains only 5,600 mg/l TDS. Marathon's average effluent contains about 2,045 mg/l TDS and 588 mg/l Cl, as indicated by its discharge monitoring reports. Ex. 11.

The causative factor for the degraded stream water quality and the adverse effect of Marathon's effluent on the stream is unknown, but it is not likely due to the TDS and Cl content of Marathon's discharges. Radian Corporation, a consulting engineering firm retained by Marathon, pointed out that the stream water exceeds the TDS and Cl standards even without the Marathon discharges, and that the elevated contents are quickly diluted in the stream when Sugar Creek discharges into the Wabash River. This fact would minimize the impact on groundwater quality. R. 83-84. Radian found, using synthetic brine solutions, that TDS and Cl at the levels found in Marathon's effluents did not increase fathead minnow or Daphnia magna mortality within 96 hours, although 2,360 mg/l TDS did produce stress in fathead minnows. The lethal concentration to 50 percent (LC50) of fathead minnows is 3,085 mg/l TDS. The LC50 for Daphnia magna is 3,240 mg/l TDS. Radian did not believe that TDS and Cl are responsible for the observed biological impacts in the stream. Ex. 4, pp. 2-5 & 2-6; R. 78. Radian was unaware of the suitability of the water for use in irrigation. R. 85-86. The Agency agrees that Marathon TDS and Cl discharges are not likely causing the observed stream degradation. R. 104.

The record further indicates that a decrease in stream TDS and Cl content would not likely enhance its aquatic biology. R. 50. This was the opinion held by Radian. Radian did not know the upper tolerance limit for TDS and Cl in the stream, but found

that the U.S. Environmental Protection Agency indicated that 15,000 mg/l is unsuitable and the National Academy of Sciences indicated a limit of 5,000 to 10,000 mg/l TDS, depending on other in-stream factors. R. 76.

Control Alternatives

Marathon found numerous processes for reducing effluent TDS and Cl contents in the literature: reverse osmosis, electro-dialysis, distillation, freezing, ion exchange, polymer, ultrafiltration, activated carbon, and magnetic treatment methods. Ex. 2. Radian selected three alternative control schemes and investigated those.

Alternative No. 1 would involve segregation of the individual high TDS and Cl waste streams from the rest of the process flows, separate treatment of those streams to reduce their TDS and Cl contents, and disposal for the 30,000,000 gallons per year of resulting brine. These individual streams include desalter water (average 0.31 MGD at 5,640 mg/l TDS and 2,880 mg/l Cl), cooling tower blowdown water (average 0.36 MGD at 1,720 mg/l TDS and 170 mg/l Cl), demineralizer regeneration wastes (average 0.09 MGD at 3,040 mg/l TDS and 80 mg/l Cl), and boiler blowdown water (average 0.17 MGD at 1,010 mg/l TDS and 200 mg/l Cl; for aggregated average total flow of 0.93 MGD at 3,000 mg/l TDS and 300 mg/l Cl). Problems with this approach include the presence of free oil in the desalter water, which affects treatability; the difficulty of segregating the presently combined flows; and the environmental hazards of disposing of resulting brines or salt cake by deep well injection or landfilling. Radian considered reverse osmosis the most viable treatment method for the high TDS and Cl wastewater streams. The capital cost of this alternative is about \$1,320,000, and the annual operating cost is about \$271,000 without deep well injection. The costs are about \$2,550,000 and \$300,000, respectively, with deep well injection. Ex. 5; R. 49 & 80-81.

Alternative No. 2 would involve holding effluents for discharge only during times when there is sufficient flow in the unnamed tributary to provide adequate dilution. This would involve construction of a 99,000,000 gallon reservoir for four months' wastewater retention capacity. The capital cost of this alternative is about \$5,580,000, and the annual operating cost is about \$212,000. Ex. 5; R. 49-50.

Alternative No. 3 would involve dilution of the effluent with well water during periods of low stream flow in the unnamed tributary. This would require installation of a five-mile long 14-inch water main and other necessary transport equipment to obtain diluent from a well having sufficient capacity. The capital cost of this alternative is about \$1,700,000, and the annual operating cost is about \$80,000. Marathon believes that

this alternative would waste groundwater, which is a resource. Ex. 5; R. 50.

The Agency agrees that none of these three alternatives is viable. R. 93-94. However, the Agency asserted at hearing that Marathon neglected a fourth alternative: construction of an outfall at the Wabash River. The Agency maintained that this would result in compliance with the water quality standards and have less impact than the present discharge into the unnamed tributary. R. 93-95. Marathon states that this would require installation of a nine-mile long, 14-inch discharge pipe and the acquisition of necessary easements. R. 13. The record indicates that five miles of such pipe cost about \$1,660,000. Ex. 5, p. 3-24. Therefore, associated with this alternative are costs at least equivalent to those of the three considered by Radian.

The Agency ultimately asserted at hearing that it did not oppose site-specific relief for Marathon. Rather, it suggested that the Board should impose an alternative water quality standard, instead of merely imposing an effluent limitation on Marathon's TDS and Cl discharges. R. 91-93 & 99-100. In its post-hearing brief, the Agency stated its support for site-specific relief that would impose effluent limitations and water quality standards in the unnamed tributary and the affected reach of Sugar Creek. Agency Post-Hearing Brief at 6.

Adverse Effects Versus Cost of Control

The Board agrees, based on this record, that site-specific relief is appropriate. The reduction of TDS and Cl concentrations would not likely result in a significant improvement in stream quality or the range of potential stream uses. The costs associated with the control alternatives appear disproportionately high in relation to any probable improvements in the stream. Further, the record indicates that the observed biological degradation of the receiving stream probably results from some cause(s) other than Marathon's TDS and Cl discharges. The unnamed tributary is a short intermittent stream, and ample dilution at the confluence with the Wabash River, a short distance away, rapidly negates any adverse effects resulting from these discharges.

Proposed Rule

The Board's water pollution rules do not include specific effluent limitations for TDS and Cl. Rather, they prohibit any discharge that would cause or contribute to a violation of a water quality standard. 35 Ill. Adm. Code 304.105. The regulations impose in-stream water quality standards of 1,000 mg/l TDS and 500 mg/l Cl. 35 Ill. Adm. Code 302.208. It is relief from Section 304.105, as it relates to TDS and Cl, that Marathon now seeks. Marathon proposes a site-specific rule that

would except the unnamed tributary from the TDS and Cl standards, so long as its effluent does not exceed 3,000 mg/l TDS or 700 mg/l Cl. The Agency would also impose water quality standards of 2,000 mg/l TDS and 550 mg/l Cl on the receiving stream.

In PCB 80-102, which expired on October 2, 1985, the Board granted Marathon a variance that allowed it to discharge a 3,500 mg/l TDS and 700 mg/l Cl effluent from this outfall. Ex. 8. In PCB 85-83, the Board granted 2,500 mg/l TDS and 700 mg/l Cl. Ex. 7. Marathon concedes that its effluent has exceeded 2,500 mg/l TDS about eight times and 3,000 mg/l TDS three or four times over a three-year period. R. 12. The record indicates that Marathon's outfall 001 effluent has exceeded 3,000 mg/l TDS four times and 2,500 mg/l ten times between 1982 and 1987. The effluent exceeded 700 mg/l Cl thirteen times during this same period. Ex. 1; see Ex. 11. Marathon states that it based its proposed limitation for TDS on historical data. R. 11. Marathon states that it would need to exert effort to comply with the proposed 3,000 mg/l TDS limit, but could not consistently comply with 2,500 mg/l. R. 8 & 36-37.

Focusing on the proposed effluent limitations of 3,000 mg/l TDS and 700 mg/l Cl, both Marathon and the Agency agree on these numbers. The participants calculated achievable effluent and water quality standards that would not cause further degradation of the receiving stream. Both derived the same effluent limitations. P.C. #3; Marathon September 8, 1988 filing. In the absence of a dispute or any evidence that these numbers would cause an adverse impact on the stream, the Board will adopt them for Marathon's effluent from its outfall numbered 001.

As to attainable in-stream TDS and Cl water quality standards, the Agency's calculated values are within the range of those derived by Marathon. The Board infers agreement to the extent of the overlap of calculated values. However, this overlap does not imply total agreement. The Board will adopt the Agency's 2,000 mg/l TDS and 550 mg/l Cl water quality standards for the unnamed tributary for first notice publication. The Board invites comments as to the acceptability of these proposed water quality standards. The Board believes that an alternative water quality standard is necessary to prevent further stream degradation.

The rule the Board today proposes for first notice follows that proposed by Marathon with the addition of an alternative water quality standard, as suggested by the Agency. The proposed rule would render the prohibition of Section 304.105 inapplicable to the unnamed tributary of Sugar Creek as it pertains to TDS and Cl, so long as Marathon's outfall 001 effluent does not exceed either 3,000 mg/l TDS or 700 mg/l Cl and the stream water quality does not exceed either 2,000 mg/l TDS or 550 mg/l Cl.

ORDER

The Board hereby proposes the following rule for first notice publication and directs the Clerk of the Board to file them with the Office of the Secretary of State.

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

PART 303
WATER USE DESIGNATIONS AND SITE SPECIFIC
WATER QUALITY STANDARDS

SUBPART A: GENERAL PROVISIONS

Section
303.100 Scope and Applicability
303.101 Multiple Designations
303.102 Rulemaking Required

SUBPART B: NONSPECIFIC WATER USE DESIGNATIONS

Section
303.200 Scope and Applicability
303.201 General Use Waters
303.202 Public and Food Processing Water Supplies
303.203 Underground Waters
303.204 Secondary Contact and Indigenous Aquatic Life
Waters

SUBPART C: SPECIFIC USE DESIGNATIONS AND SITE SPECIFIC
WATER QUALITY STANDARDS

Section
303.300 Scope and Applicability
303.301 Organization
303.311 Ohio River Temperature
303.312 Waters Receiving Fluorspar Mine Drainage
303.321 Wabash River Temperature
303.322 Unnamed Tributary of the Vermilion River
303.323 Sugar Creek and Its Unnamed Tributary
303.331 Mississippi River North Temperature
303.341 Mississippi River North Central Temperature
303.351 Mississippi River South Central Temperature
303.352 Unnamed Tributary of Wood River Creek
303.353 Schoenberger Creek; Unnamed Tributary of Cahokia
Canal
303.361 Mississippi River South Temperature
303.441 Secondary Contact Waters
303.442 Waters Not Designated for Public Water Supply
303.443 Lake Michigan

SUBPART D: THERMAL DISCHARGES

Section
303.500 Scope and Applicability
303.502 Lake Sangchris Thermal Discharges

Appendix A References to Previous Rules
Appendix B Sources of Codified Sections

AUTHORITY: Implementing Section 13 and authorized by Section 27 of the Environmental Protection Act (Ill. Rev. Stat. 1987, ch. 111 1/2, pars. 1013 and 1027).

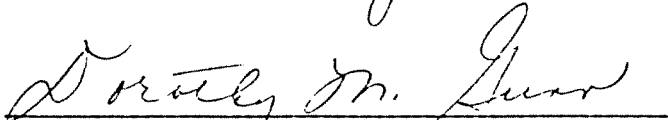
SOURCE: Filed with the Secretary of State January 1, 1978; amended at 2 Ill. Reg. 27, p. 221, effective July 5, 1978; amended at 3 Ill. Reg. 20, p. 95, effective May 17, 1979; amended at 5 Ill. Reg. 11592, effective October 19, 1981; codified at 6 Ill. Reg. 7818; amended at 6 Ill. Reg. 11161, effective September 7, 1982; amended at 7 Ill. Reg. 8111, effective June 23, 1983; amended in R87-27 at 12 Ill. Reg. 9917, effective May 27, 1988; amended in R87-2 at _____ Ill. Reg. _____, effective _____.

Section 303.323 Sugar Creek and Its Unnamed Tributary

- a) This Section applies only to Sugar Creek and its unnamed tributary from the point at which Marathon Petroleum Company's outfall 001 discharges into the unnamed tributary to the confluence of Sugar Creek and the Wabash River.
- b) Section 304.105 shall not apply to total dissolved solids and chlorides discharged by Marathon Petroleum Company's outfall 001, so long as both of the following conditions are true:
 - 1) Effluent from Marathon Petroleum Company's outfall 001 does not exceed either 3,000 mg/l total dissolved solids or 700 mg/l chlorides,
 - 2) The water in the unnamed tributary does not exceed 2,000 mg/l total dissolved solids or 550 mg/l chlorides.

IT IS SO ORDERED.

I, Dorothy M. Gunn, Clerk of the Illinois Pollution Control Board, hereby certify that the above First Notice Opinion and Order was adopted on the 17th day of May, 1989, by a vote of 7-0.



Dorothy M. Gunn, Clerk
Illinois Pollution Control Board