ILLINOIS POLLUTION CONTROL BOARD
December 20, 1984

IN THE MATTER OF:	)	
	)	
SITE-SPECIFIC PHOSPHORUS	)	R83-12
LIMITATION FOR THE CITY	)	
OF SHELBYVILLE	)	

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

This matter comes before the Board upon a May 23, 1983 filing by the City of Shelbyville (City) requesting site-specific regulatory relief from the phosphorus water quality standard. On July 14, 1983 the Board granted the City's motion for waiver of the 200 signature requirement (53 PCB 65). The City filed a supplemental petition on January 17, 1984 and a second supplemental petition on April 26, 1984, the latter requesting relief from the phosphorus effluent standard located at 35 Ill. Adm. Code 304.123(c), or in the alternative that Shelbyville's effluent not contain more than 2.8 mg/l of phosphorus as P, or such other relief from Section 304.123(c) that the Board may deem appropriate. A public hearing was held in Shelbyville, Illinois on April 24, 1984 at which members of the public and press attended. The Illinois Department of Energy and Natural Resources issued a negative declaration on July 9, 1984, finding that an economic impact study was not necessary. On July 24, 1984 the Economic Technical Advisory Committee concurred in this finding. Shelbyville filed its brief on September 10, 1984 and the Illinois Environmental Protection Agency (Agency) filed its comments on October 16, 1984.

The City previously was granted variance from 35 Ill. Adm. Code 302.205 (Old Rule 203(c) of Chapter 3) and Section 304.105 (Old Rule 402 of Chapter 3) until June 1, 1982 or upon a change in regulations (27 PCB 136, August 4, 1977, PCB 77-150). The previously inapplicable phosphorus effluent standard (Old Rule 407 of Chapter 3) was modified and codified at 35 Ill. Adm. Code 304.123, effective May 17, 1979, and became applicable to Shelbyville at that time. The City's NPDES permit was amended by the Agency to require that the City's effluent not exceed 1 mg/l phosphorus (Pet., Exh. A, at 2). The City's population equivalent is more than 5,000.

The City's wastewater treatment plant (WWTP) is being upgraded to include an activated sludge system. The design includes chemical and polymer feed facilities for phosphorus. The current peak flow to the WWTP is 3 MGD. The average flow is 1.5 MGD. Modifications to the plant will limit peak flow to 2 MGD. After modification, the plant effluent will have

an average flow rate of 0.73 MGD, and the storm lagoon overflow, 0.77 MGD (Pet. Exh. A, at 4). With a phosphorus concentration of 1 mg/l, the combined effluent would contribute 2066 kg/yr phosphorus (5.66 kg/day) during normal operation (Ag. Exh. 2, revised Table 4). These figures correctly assume that first flush is fully treated for phosphorus as required by 35 Ill. Adm. Code 306.305. Presently, based on an average flow rate of 1.6 MGD and an average phosphorus concentration of 2.8 mg/l, the WWTP discharges 6,260 kg/yr phosphorus (17.15 kg/day or 37.73 lbs/day) into the Kaskaskia River (Ag. Exh. 2, Table 3). The City's figures estimate 33.8 lbs/day phosphorus (Pet. Exh. A, at 4).

The WWTP discharges to the Kaskaskia River, a tributary of the Carlyle Reservoir (Reservoir). The Kaskaskia flows 85 stream miles (47 miles, R. 124) south to the 41 square mile reservoir constructed by the Army Corps of Engineers in 1967. The Reservoir is used for flood control, navigation, water supply, recreation and low flow augmentation. It provides water to 8,500 people and is visited by 2.5 million recreationists a year (R. 122). The average depth is 8.9 feet (R. 69). The Reservoir watershed of 2,678 square miles is composed of eighty percent cropland, ten percent pasture and ten percent woodland (Ag. Exh. 2, Table 1). The average retention time for the Reservoir is 64 days (Pet. Exh. A, at 10). While the water quality standard for the Reservoir is 0.05 mg/l total phosphorus (35 Ill. Adm. Code 302.205), the Reservoir contains 0.14 mg/l (R. 164), almost triple the standard. Of that amount, 0.03 mg/l is dissolved phosphorus which is available for plant growth (R. 165). Exhibit A to the petition cites that the median concentration of total phosphorus in Lake Carlyle is 84 mg/l (p. 13). The Board assumes this figure is in error.

DISCUSSION

The City contends it should be granted relief because "[t]he imposition and enforcement of Sections 304.123(c) and 302.205 would not only impose an arbitrary and unreasonable economic hardship upon the City, but would also have no significant effect upon the Carlyle Reservoir." (Pet. Brief, at 15).

The estimated cost of the WWTP upgrading is $4.7 million (R. 15). This does not include the cost of any sewers. The capital cost of phosphorus control equipment is $33,500 with an estimated annual operation and maintenance cost of $44,200 (Pet. Exh. A, at 5-7).

Step 3 construction funding was approved by the Agency (Pet. Brief at 3). A City contract has been awarded for $4,268,500 (Id.). The City's 25 percent share would be

$1,067,125 (R. 15). The City voters passed a referendum authorizing the issuance of $1,100,000 in general obligation bonds for the project (Pet. Brief at 3). This adds to the previous debt of one million and sets the municipal debt at $2.1 million (R. 18). The City figures that it will be necessary to raise the combined sewer and water bills for each connection by seventeen to twenty-two dollars annually to cover the operation and maintenance costs (R. 45, 46, 47, 51).

The total engineering fees for the WWTP project approximate $392,581.46 (R. 25-6). The City must pay $11,000 of that amount for a combined sewer overflow study and will be reimbursed by the Agency for 75 percent of $381,581.46, which totals $286,186.10 (Id.).

The City is having financial problems. Income for the 1984 fiscal year was $803,000 while expenditures were $869,000 (R. 13). The City has suffered a decline in revenue due to a variety of causes including the recession, reduced sales tax revenue, declining revenue sharing and the homestead exemption. The City has laid off five employees (R. 37), needs a new water tower which is expected to cost $450,000 to $500,000 (R. 39-41), can only make emergency sewer repairs to the seventy year old portions of the sewer system rather than replacing them (R. 11-12), has other projects on hold and is expected to pass tax anticipation warrants in May 1984 (R. 35).

In 1981 the water rates were increased 30 percent and the sewer rates 80 percent (Pet. Brief at 7, Pet. Exh. 2). A 1982 ordinance increased the rates by another 30 percent (Pet. Brief at 7, Pet. Exh. 3). The minimum monthly sewer and water bills are $4.50 each (R. 34). The Mayor testified that an average bill for a family of two for sewer and water is twenty-five to thirty dollars (R. 35).

The expected rise of seventeen to twenty-two dollars per connection per year for combined sewer and water bills (R. 46, 49) amounts to a user charge of $1.42 to $1.84 per month to cover annual operation and maintenance costs (Id.).

The Agency contends that the annual operation and maintenance estimates for phosphorus removal may be overstated (Ag. Brief at 3). The City's consultant based the estimate on reducing phosphorus content from 8 mg/l in the raw influent water to 1.0 mg/l in the effluent (R. 83). However, the current plant produces an effluent with an average phosphorus concentration of 2.7 mg/l (R. 62) without phosphorus treatment. The Agency believes that this might allow the reduced use of chemicals which make up about 75 percent of the operation and maintenance costs. The City's consultant states

that the upgraded plant will differ from the current system and that "we'll not necessarily see the same reduction in phosphorus through an activated sludge plant as we do through the current plant." (R. 83).

The City has not argued that the entire upgrading project is economically infeasible; only that the phosphorus control equipment is economically infeasible.

The Board notes that in R76-1 it deleted the general water quality standard for phosphorus of 0.05 mg/l and replaced it with a 1.0 mg/l effluent standard for discharges affecting lakes and reservoirs of twenty acres or larger. The Economic Impact Study (EcIS) concluded that without the change, the 27 municipalities currently required to meet the 1.0 mg/l standard would have had to expend an additional total of 2.2 to 2.7 million dollars to meet the 0.05 mg/l standard (EcIS at 2).

The City maintains it currently discharges 12,300 pounds of phosphorus annually to the Kaskaskia River. Carlyle Reservoir receives a total of 698,100 pounds. The City, therefore, claims responsibility for about 1.8 percent of the total (Pet. at 12). The City further maintains that by meeting the standards it will reduce total impact to the lake by a mere 0.54 percent (R. 70). The City points out that 80-90 percent of the loading comes from non-point sources and that the reduction obtained by treatment does not justify the expense.

An Agency witness contends that if Shelbyville meets the standard, total loadings will be reduced by about three percent (R. 133). She stated that the reservoir currently receives 198,816 kg (437,395 lbs) of phosphorus per year. She pointed out that the phosphorus input from non-point sources has been reduced by 34 percent since 1973 and is expected to be reduced by an additional ten percent as conservation tillage is used on additional acres of cropland (R. 126) and that her data is more recent than that used by the City. She also assumed that more of the City's total discharge would be treated than did the City (R. 134).

The record in numerous places makes a distinction between phosphorus which is available for uptake by algae and readily contributes to eutrophication and that which for a variety of reasons is not readily available. The term "total phosphorus" does not distinguish between the two forms. The Board will take notice of comments on this point from the EcIS in R76-1 to help clarify the situation:

> "The benefits derived from phosphorus removal from waste water treatment plants are calculated on a total phosphorus basis. This type of calculation underestimates the benefits of this phosphorus removal. The reason is that not all of the phosphorus in a lake or in a discharge to a lake can be utilized by the organisms in that lake. Only that which is orthophosphate or is converted to orthophosphate in the lake is available for uptake by organisms. The percentage of phosphorus which is available in waste water effluents is quite high, usually greater than 80 percent. Conversely, the percentage of phosphorus from indirect sources--erosion, etc. is usually much less than 50 percent. Thus, removing one pound of phosphorus from waste water effluents is equivalent to removing 2 or 3 pounds of phosphorus from other sources."

(p. 10-11).

The Agency witness explained that the terms ortho-, free, soluble and dissolved phosphorus all are generally equivalent (R. 175). She said that about 35 percent of the phosphorus from non-point sources is dissolved as opposed to almost 80 percent from point sources. She also said that approximately seven percent of the dissolved phosphorus reaching Lake Carlyle comes from the Shelbyville discharge (R. 137-8). The witness for the City had conducted no study of the availability of phosphorus for uptake by algae and could provide no information on that specific topic (R. 93-5).

In response to the City's contention that meeting the regulation would not significantly impact the eutrophication problem, the Agency witness conceded that the reservoir would remain eutrophic even if the standard were met (R. 164). She went on to point out, however, that reducing the point source inputs would prevent future degradation of the resource since phosphorus builds up in the reservoir over time, making the problem worse (R. 165-8). She also testified that because of the direct relationship between phosphorus concentrations and algal biomass, reducing phosphorus loadings would reduce algal biomass in Carlyle Reservoir (Ag. Exh. 2, p. 5). She pointed out that the City's distance from the reservoir does not diminish the impact of its phosphorus discharge.

It is clear from the record that the phosphorus discharge from Shelbyville is a contributing factor to eutrophication in Carlyle Reservoir. When the percentage of dissolved phosphorus is considered, the impact of the discharge far exceeds the level indicated by the City.

The City has requested a 2.7 mg/l limit on the amount of phosphorus it may discharge as an alternative to installing control equipment. A careful reading of the record shows that this would not work. In the first place the 2.7 mg/l figure is a mean value with a range of 1.0 to 3.6 mg/l. It is based on an unspecified number of effluent samples taken between April of 1975 and September of 1976 (R. 61-2). It is unlikely the plant could meet a standard based on 2.7 mg/l without a considerable allowance for exceedences. Secondly, and most importantly, the plant is being upgraded and the past performance cannot be used to predict performance at the upgraded facility according to the City's witness (R. 83). The Board gives more weight to this conclusion by the witness than the statement at R. 103-4 which was in the context of the plant as operated in 1975 and 1976. It should be noted that Vandalia's WWTP currently discharges 6.2 mg/l to the Kaskaskia (R. 148).

The Agency points out that Shelbyville is one of three cities which fall under the 1.0 mg/l standard which together account for seven percent of the total phosphorus discharge to the reservoir and questions the adverse precedential value if relief is granted (R. 127-8). In this context the Agency argues:

> "The requirement to keep site specific relief site specific is important for many reasons. When the Board originally promulgated the rule it based its decision on a broad range of information pertaining to dischargers throughout the state and intended the rule to apply to those dischargers with relatively few exceptions. To the extent that the Board creates new exceptions, it undercuts the enforceability of the original rule. If the Board makes a site specific rule change for one discharger when others are similarly situated, enforcement of the original rule is simply unfair. In addition the concept of having rules of general applicability fails when each rule is riddled by exemptions." (Agency Brief)

CONCLUSIONS

The Board finds that phosphorus from point sources is an important contributor to eutrophication in Carlyle Reservoir and that the 1.0 mg/l standard will help protect the reservoir resource which is used by 2.5 million people annually. The seven percent of the total dissolved phosphorus input to the Reservoir from the City cannot be considered insignificant. Point source phosphorus control will become increasingly important as non-point sources are reduced.

Given these environmental benefits, the Board finds that the small capital costs of installing phosphorus controls are reasonable. The construction of phosphorus control equipment is a small part of the proposed project. Once it is in place the City will have the ability to control phosphorus by adding certain amounts of chemicals. Once the plant is in operation, the actual operating and maintenance costs will be determined. The record indicates that the future operating and maintenance costs may be less than estimated.

Based on the record here, granting site specific relief is not justified and is at best premature.

The Board appreciates Shelbyville's current fiscal difficulties. However, on reviewing the justification for permanent site-specific relief, the Board focuses on the economic reasonableness of the expenditures as related to the environmental effects. This would be true even if a community has a temporary money surplus. For the Board to do otherwise would undermine the basis for the regulation itself. Over twenty other local governments are subject to the regulation, two of whom affect Lake Carlyle. In so saying the Board also notes, for clarification only, that claims of arbitrary or unreasonable economic hardship can be heard in a variance proceeding, and can provide temporary relief if justified as balanced against temporary environmental consequences.

Shelbyville's petition for site-specific relief is denied.

ORDER

It is the Order of the Pollution Control Board that the petition of the City of Shelbyville for site-specific relief from 35 Ill. Adm. Code. 304.123(c) is denied.

IT IS SO ORDERED.

I, Dorothy M. Gunn, Clerk of the Illinois Pollution Control Board, hereby certify that the above Opinion and Order was adopted on the 20th day of December, 1984 by a vote of 5-0.

Dorothy M. Gunn

Dorothy M. Gunn, Clerk
Illinois Pollution Control Board