ILLINOIS POLLUTION CONTROL BOARD
June 16, 1983

In the matter of:	)	
	)	
PROPOSED WATER QUALITY AND	)	
EFFLUENT STANDARDS FOR	)	R81-29
SCHOENBERGER CREEK (PFIZER,	)	
EAST ST. LOUIS)	)	

FINAL ORDER. ADOPTED RULE

OPINION OF THE BOARD (by D. Anderson):

On December 3, 1981 Pfizer, Inc. (Pfizer), a Delaware corporation, filed a proposal for site specific water quality and effluent rules which would allow the direct discharge of non-contact cooling water to Schoenberger Creek in East St. Louis, St. Clair County. The proposal was in codified form, modified at the request of the Board from an earlier version filed September 22, 1980, but never authorized for hearing (Order of October 30, 1980). On February 10, 1983 the Board sent a proposal to first notice (7 Ill. Reg. 2270, February 25, 1983). On March 10, 1983 the Board adopted a Proposed Opinion for public comment. During the first notice period the Board received comments only from the Illinois State Library and the Illinois Environmental Protection Agency, Division of Water Pollution Control.

On April 21, 1983 the Board sent the matter to second notice with no changes in the proposed language. The staff of the Joint Committee on Administrative Rules recommended the addition to Section 304.204 of a cross-reference to Section 304.124. In a separate Order the Board has adopted the proposed language with the recommended changes. This Opinion is the Proposed Opinion as modified in response to comments.

The following provisions are involved in this rulemaking, utilizing the numbers of the first notice Order:

35 Ill. Adm. Code	Description
302.208	General use water quality standard of 1.0 mg/l iron (total)

303.353	Proposed site specific water quality standard of 20 mg/l iron (total)
304.124	Effluent standards of 2.0 mg/l iron (total) and 15.0 mg/l total suspended solids
304.204	Proposed effluent standards of 20 mg/l iron (total) and 37 mg/l total suspended solids

On May 21, 1982 the Board held a public hearing on the proposal at Belleville. Consultants and employees of Pfizer testified in favor of the proposal, as did representatives from the City of East St. Louis. Representatives of the Illinois Environmental Protection Agency (Agency) appeared at the hearing and questioned Pfizer's witnesses, but offered no testimony or exhibits. There was no other public partici-- pation, aside from a newspaper reporter. The Board received a public comment from the City of East St. Louis supporting the proposal.

At the hearing Pfizer requested that the Department of Energy and Natural Resources (DENR) give a "negative declaration" instead of an economic impact study (R. 42). In letters dated November 10 and 16, 1982, DENR informed the Board that a negative declaration had been made instead of a study. On December 7, 1982, the hearing officer closed the record except for final comments.

At the hearing, the Agency was granted leave to request additional information from Pfizer concerning any wastewater treatment contract between Pfizer and the City of East St. Louis, projected charges by the American Bottoms Regional Plant and costs of treatment facilities (R. 176, 208, 213). The Agency asked its questions in a letter dated July 6, 1982. Pfizer responded in a letter dated January 7, 1983. Although there is considerable argument in the final comments concerning these matters, neither party requested that the record be reopened for additional hearings. The letters of July 6, 1982 and January 7, 1983 are therefore incorporated into the record.

FACILITY DESCRIPTION

The plant in question is situated inside the City of East St. Louis in T2N, R9W of the 3rd P.M., St. Clair County. The location is at 2001 Lynch Avenue, which is about one mile east of the intersection of Interstate 55 and 70 with

Interstate 64. The plant is in an industrial area bounded on the west by the Southern Railroad and on the east by the Terminal Railroad. There are residential areas to the west and east of the tracks (R. 76, Ex. 10, 11, 12). The plant employs 375 people with an annual payroll of about $9,000,000.

The plant produces two lines of products, one based on barium sulfate, the other iron oxides. The barium sulfate is used as a metal undercoating in appliance steels. The iron oxide products are used for coatings and magnetic tape. The plant precipitates "synthetic" iron oxides from liquors made from scrap iron, and grinds both natural and synthetic oxides into powders (R. 161).

There appear to be three wastewater streams at the plant: stormwater, process water and non-contact cooling water. Stormwater is contaminated with iron oxides in the form of suspended solids which are picked up from the plant grounds (R. 136, 164). This is accumulated in a settling pond and discharged to the East St. Louis sewer system (R. 136). Process water is subjected to pretreatment consisting of pH adjustment and settling before it is discharged to the City's sewer system (R. 167). Non-contact cooling water is presently discharged directly to the City sewer.

Process water is purchased from the Illinois American Water Company, while cooling water comes from wells on the plant property. Process and cooling water each amount to about 2 million gallons per day (2 MGD, 7.6×10^6 liters per day)(R. 168).

Cooling processes include boiler cooling tubes, but are primarily tube and shell heat exchangers used to cool products (R. 169, 183, 193). A typical application seems to be cooling batches to crystallize a product (R. 217).

The cooling water enters at 54° F and exits at 56° F (R. 173, 183). Some processes are designed around having a large flow of cooling water at this temperature to produce a precipitate with the right color or magnetic properties (R. 217). This imposes a constraint on alternatives such as refrigeration or other water sources.

Pfizer's proposal is intended to allow direct discharge of the non-contact cooling water. The proposed discharge would be to an existing, but unused, storm sewer which runs under the Terminal Railroad tracks at the northeast edge of the plant property. The storm sewer flows about four blocks through a residential area before discharging to Schoenberger Creek just north of Morris Avenue (R. 80, 82, Ex. 10). Pfizer has an NPDES permit to discharge to the storm sewer, but has never done so because it could not meet the permit conditions (R. 143).

The iron and suspended solids in the discharge are naturally occurring background in the well water. They do not come from the processes, although they are contaminants which would be expected in the process water. The cooling system is protected from leaks since it is at a higher pressure than the processes. When it goes to direct discharge, Pfizer will monitor pH and turbidity in the cooling water for indications of leaks, and will provide for emergency diversion to the City sewer system (R. 181).

The well water contains dissolved iron and suspended solids. The dissolved iron is mostly ferrous iron, since at neutral pH ferric iron precipitates as ferric hydroxide or ferric oxide. On exposure to the atmosphere ferrous iron is oxidized to the ferric state, at which time it precipitates forming suspended solids (R. 132).

The Board at one time regulated dissolved iron. This was repealed in R76-21 at about the same time this proposal was filed (35 Ill. Adm. Code 304.124, 6 Ill. Reg. 563, effective December 24, 1981). Iron is now regulated as total iron, which includes both ferrous and ferric. The total iron is included in suspended solids to the extent it is in suspended form.

Analysis of well water and cooling water reveal the following average levels of contaminants (Ex. 13, 14, 15):

Parameter	Average Concentration or Range	kg/day at 2 MGD
Iron (total)	14.1 mg/l	110
Iron (dissolved)	1.5 mg/l	11
Total Suspended Solids	32 mg/l	240
Total Dissolved Solids	637 mg/l	4830
pH	6.84 to 7.58	--

DIRECT DISCHARGE AND ALTERNATIVES

Pfizer has several alternatives, including the following:

1. Deep well injection;

2. Use of City water for cooling;

3. Recycle of cooling water with mechanical chilling;

4. Treatment of well water prior to use;

5. Treatment prior to direct discharge;

6. Continued discharge to the City sewer system;

7. Direct discharge of untreated cooling water, as requested.

Reinjection of non-contact cooling water into the aquifer from which it was drawn may be permitted as a Class V well under the underground injection control program (35 Ill. Adm. Code 704.124 and 730.105; 6 Ill. Reg. 12,479). However, there appears to be a problem with plugging of the aquifer unless suspended solids are removed prior to reinjection (R. 204, 215).

City water is too warm for Pfizer to use in the summer (R. 202). Cooling towers will not produce cold enough water during periods of high humidity (R. 203). Mechanical chilling of recycled water would cost about $1,105,000 to build and $210,000 per year to operate (Ex. 17).

Two other options include treatment of well water prior to use or prior to discharge. These would involve essentially the same treatment. Because Pfizer experiences no difficulties from operations with the untreated cooling water it would gain nothing by treatment prior to use. There may also be difficulties with temperature increases during treatment (R. 148).

Pfizer's treatment proposal involves aeration, alkali addition, pH control and clarification with polymer addition (R. 199, 209, 217). Pfizer first estimated that this would cost about $1,588,000 to build and $75,000 per year to operate (Ex. 17).

In the post-hearing submissions the Agency estimated that the cost of the clarifier would be $187,000, much less than the $800,000 used in Pfizer's estimate (letter of July 6, 1982). In its response Pfizer indicated that a 60-foot clarifier would cost around $250,000, again less than the $800,000 estimated. However, Pfizer also indicated that it had decided the 60 foot clarifier would not be large enough to assure compliance with the 2 mg/l iron (total) standard. Pfizer indicated that it would "stand with the $1,638,000 estimated cost" (Attachment to letter of January 7, 1983). In the cover letter the cost was quoted as $1,688,000. These are both different from the $1,588,000 originally quoted (Ex. 11). The construction cost estimates therefore range from $975,000, with the Agency's clarifier estimate, to $1,688,000, which could have been a typographical error intended to be $1,588,000.

The treatment scheme is intended to meet the 2 mg/l effluent standard for iron and 15 mg/l standard for suspended solids. Pfizer has considerable experience in treating for iron, including its process water pretreatment plant at the facility. The problem is that the iron is so dilute that a fine precipitate will form on aeration. It would require polymer addition and unreasonably long settling times to achieve compliance with the standards.

The cost estimates for treatment may be overstated for other reasons. Pfizer's witness admitted that alkali addition and pH control might not be necessary. A much simpler treatment scheme consisting only of aeration and detention might be capable of meeting intermediate standards for iron and suspended solids at a reasonable cost (R. 217). Such a scheme would at least lessen the oxygen demand of the waste-stream which is discussed below. However, the record is not sufficient to fix a suitable compromise.

Pfizer presently discharges to the East St. Louis sewer system. The City's treatment plant receives a dry weather flow of 10 to 14 MGD. The 2 MGD of non-contact cooling water thus represents 14% to 20% of dry weather flow (R. 46). East St. Louis estimates that elimination of this flow will increase retention time and increase suspended solids removal efficiency by 5 to 8% (R. 47). The City will also save from decreased wear on equipment and decreased utility bills from reduced pumping (R. 49).

At the time of the hearing Pfizer paid a flat rate of $80,000 per year to the City for sewer service (R. 174). The Agency questioned whether the City would gain if this contribution were lowered. Pfizer indicated that the rate would be increased regardless of whether the cooling water discharge continued (R. 175).

The East St. Louis plant will soon be replaced by the American Bottoms Regional Plant. Pfizer will pay a rate based on flow with a surcharge for solids (R. 176). The estimated charge by American Bottoms would be $708,435 per year for the cooling water (R. 177, Ex. 18; letter of January 7, 1983).

The discharge of relatively clean wastewater to the American Bottoms plant is itself objectionable. An increase in flow to a well operated plant will not change the concentrations of the contaminants discharged. An increase in flow entering the plant, even of distilled water, would result in an increase in the discharge flow and an increase in the mass of all contaminants discharged. Even though the

plant would still comply with concentration limits, a larger mass of contaminants would be washed through it.

The direct discharge of cooling water, the alternative requested by Pfizer, will require changes in piping costing $560,000, with annual operating costs of $15,000.

STREAM DESCRIPTION

Schoenberger Creek arises to the east of East St. Louis (Ex. 11). It flows as an intermittent stream in a northwesterly direction through the residential neighborhood to the east of the plant (Ex. 10). From about two blocks before the proposed discharge from the storm sewer, it flows alongside the Penn Central and Baltimore and Ohio tracks. Immediately after the proposed discharge point it turns north and flows under the tracks into an uninhabited, marshy area. Near here it loses the name "Schoenberger Creek" and becomes an unnamed tributary of the Cahokia Canal. About 1000 feet north of the tracks, it turns west and flows under an interchange on Interstate 55 and 77. Beyond the interchange it turns northwest and receives an Illinois Department of Transportation (IDOT) discharge which will be discussed below (R. 80). Beyond this discharge, the unnamed tributary is a perennial stream (R. 88, Ex. 16).

The unnamed tributary joins the Cahokia Canal about 2 miles northwest of the plant, still in the marshy area north of the railroad tracks. The canal flows west and southwest to join the Mississippi about 2 1/2 miles west of the plant. Prior to that, the canal flows under the levee formed by the tracks and into an area consisting of railroad yards and the National City Stockyards. There are some residences in this area.

The entire route from the discharge point to the Mississippi has been channelized and leveed to a high degree. The canal disappears underground at several points in the stockyards and railyards. The marshy area through which it first flows is subject to flooding from the Mississippi (R. 83).

IDOT operates a series of 42 wells near the interchange to lower the water table to protect the roadbed (R. 88). In 1978, during a period of drought, these wells pumped 6 MGD (R. 91). This is drawn from the same source as Pfizer's cooling water. The flow enters the unnamed tributary near the interchange.

As a general rule the Board does not consider noncomplying discharges in mitigation of the effects of other discharges. However, the IDOT discharge is operated by a

State agency as an integral part of a large capital improvement, the Interstate highway. For purposes of this decision, the Board will accept the IDOT discharge as a fundamental, irreversible change in the stream.

The Pfizer discharge should have no adverse effect downstream of the IDOT discharge. The segment which is subject to degradation is the stretch from the discharge point to the interchange, a span of 2000 to 3000 feet through an uninhabited, marshy area. This intermittent stream contains pools of stagnant water during times of low flow (R. 83). These pools are often contaminated with raw sewage from illegal sanitary discharges to the creek upstream in the residential areas (R. 97, 127). The bottom consists of sludge deposits up to one meter thick (Ex. 16).

WATER QUALITY

Environment Energy Consultants took stream samples for Pfizer on two dates in March and April, 1981 (Ex. 14 and 15). Samples taken near the proposed discharge point and just upstream of the IDOT discharge showed the following average contaminant levels:

Parameter	Average Concentration or Range
Iron (total)	0.77 mg/l
Iron (dissolved)	0.11 mg/l
Total Suspended Solids	13 mg/l
Dissolved oxygen	15 mg/l (10 to 11 a.m., 10° C.)
Fecal coliform	4300 counts/100 ml
pH	7.37 to 8.26

Below the IDOT discharge, iron, suspended solids and pH changed to levels comparable to Pfizer's well water, which is summarized above. Fecal coliform fell to about 23 counts/100 ml. Dissolved oxygen fell to about 8.8 mg/l, still well in excess of the minimum levels required by Section 302.206.

The increased flow of relatively clean water from the Pfizer dishcarge will improve the water quality in the stretch prior to the IDOT discharge in a manner similar to the improvement downstream of the discharge. However, this is more because of the illegal sewage discharges to the Creek than the absolute quality of Pfizer's discharge.

The adverse impacts expected from the proposed discharge primarily center on the oxidation of ferrous iron and precipitation of ferric oxide or hydroxide. Essentially the same process will occur in the stream as would be employed in the treatment for iron. The ferrous iron will exert a chemical oxygen demand on the stream, and ferric iron will coat the bottom of the stream, destroying habitat. Fine suspensions of iron can be toxic to fish by coating gills (R76-21, Economic Impact Study on deletion of dissolved iron standard). Downstream of the IDOT discharge there is a depression of oxygen levels and an orange deposit in the stream bed (R. 114, 129, 136).

It is reasonable to anticipate that similar effects will be noted downstream of the Pfizer discharge. However, Pfizer has not requested modification of the dissolved oxygen or unnatural sludge provisions (Sections 302.206 and 302.203). Pfizer has even denied that such effects will occur. Should such problems arise, Pfizer will be expected to solve them. Aeration prior to entry into the storm sewer could alleviate these problems.

The entire watershed downstream of the discharge has been dedicated to storm drainage and flood control. The channelization and leveeing limit habitat availability so that it will never approach a natural backwater area. The existing IDOT discharge seems to be a positive factor in the stream. The Pfizer discharge will further improve the stream water quality, and will be fully consistent with the primary use for storm drainage. The increased flow and lower contaminant levels could increase utilization of this stream reach.

REGFLEX

Pursuant to Section 4.03 of the Administrative Procedure Act, the Board gave notice of the hearing to the Small Business Office of the Department of Commerce and Community Affairs. Pfizer is not a small business, and no one came forward with any small business impacts (R. 262).

IMPACT OF FEDERAL REGULATIONS

Federal regulation of water quality is through USEPA review of the State's water quality management plan. The revised water quality standards may require incorporation into the plan and USEPA approval. This is handled by the Agency, which has given no indication that it anticipates any difficulties in obtaining any necessary federal approvals.

Federal regulation of effluents is through incorporation of federal effluent regulations from 40 CFR 400 et seq. into NPDES permits. This is done by the Agency, which issues the permits. If the federal regulation of this effluent is more stringent than the site specific effluent standard, the Agency will impose the federal effluent standard in the permit. However, there is no indication that this will be a problem.

PROPOSED ACTION

On February 10, 1983 the Board sent a proposed rule to first notice. The proposal differed from Pfizer's proposal to the Board only in minor respects. The Board has limited the effluent standard so that it applies only to discharges from "an existing facility owned by Pfizer, Inc." This is intended to bring the matter back before the Board should a new facility, built by Pfizer or anyone else, seek to make a similar discharge. The phrase "owned by Pfizer" is intended to identify the facility as of the time of adoption of the rule, and is not intended to terminate the rule in the event the plant is sold to someone else.

The Board has made other editorial changes in the proposal, the most important of which is specification of "St. Clair County" rather than "Madison County" (Ex. 11). This apparently was a typographical error in Pfizer's proposal.

This Opinion supports the Board's Order of this date.

I, Christian L. Moffett, Clerk of the Illinois Pollution Control Board, hereby certify that the above Opinion was adopted on the 16th day of June, 1983 by a vote of 4-0.

Christian L. Moffett

Christan L. Moffett, Clerk
Illinois Pollution Control Board