

ILLINOIS POLLUTION CONTROL BOARD
June 2, 1983

IN THE MATTER OF:)
)
THE PETITION OF THE)
GALESBURG SANITARY DISTRICT) R80-16
TO AMEND REGULATIONS.)

Proposed Rule. First Notice.

PROPOSED OPINION AND ORDER (by J.D. Dumelle):

On August 28, 1980, the Galesburg Sanitary District filed a petition for site-specific regulatory relief which was accepted by the Board and authorized for hearing and publication on September 4, 1980. Four merit hearings were held on December 9 and 10, 1980; and June 8 and 9, 1981. On October 7, 1982, the Department of Energy and Natural Resources transmitted to the Board copies of its economic study entitled The Economic Impact of Proposed Regulation R80-16 Filed by the Galesburg Sanitary District to Amend Chapter 3, Water Pollution Regulations. An economic impact hearing was held to consider that study on January 14, 1983. Final comments were received by the Board on March 11, 1983.

FACILITY

The Galesburg Sanitary District owns and operates a sewer system and sewage treatment plant in Knox County that services primarily the City of Galesburg (R.133). Galesburg was originally constructed as a combined sewer community; however, over 90% of the City is presently served by storm sewers as a result of sewer separation projects that started in 1967. The original 44 overflow points have remained in the system (R.236).

The wastewater treatment facilities provide secondary treatment by a trickling filter process. Dry weather flows receive two stage trickling filter treatment: first through the 1930 plant, then recirculation to the plant completed in 1969. Flows exceeding dry weather flow are given single stage treatment in the 1969 plant. There has been no reported bypassing of the plant since 1970, although combined sewer overflow does occur. Treatment plant effluent, combined sewer overflows, and any by-passing discharge into Cedar Creek (R.160-165).

The Board appreciates the efforts of Lee R. Cunningham, who acted as hearing officer in these proceedings, and Bill S. Forcade, for his assistance in drafting this Opinion and Order.

Cedar Creek begins as a farm tile northeast of Galesburg and flows through Galesburg from Northeast to Southwest. Cedar Creek becomes a paved channel inside the City at the Santa Fe Burlington Northern Viaduct, and continues through the center of the city generally parallel to the main line of the Santa Fe. Cedar Creek emerges from southwest Galesburg, flows past the sewage treatment plant, and continues in a westerly direction through predominantly agricultural land. Ultimately, Cedar Creek flows into Henderson Creek which flows into the Mississippi River (R.132-140).

PROCEDURAL HISTORY

Discharges from the Galesburg Sanitary District treatment plant and combined sewer overflows are subject to Board rules and regulations which establish water quality standards applicable to Cedar Creek. To comply with these rules and regulations the District embarked on a program to plan, design and engineer, and construct improvements to the sewage collection and treatment facilities. During the pendency of that program, the District has sought variances from certain effluent and water quality standards in the following proceedings: PCB 73-86, 74-93, 75-148, 76-154, 76-296, 77-192, and 82-21. The present variance (PCB 77-192) grants the District relief, until June 1, 1982, from 1977 rules governing ammonia nitrogen discharges, deoxygenating wastes discharges, and combined sewers and treatment plant bypasses. The District has a variance request pending, PCB 82-21, seeking similar relief for the future if this site-specific regulatory request is denied.

In the present proceeding the District has sought the following changes in Board Rules and Regulations:

1. That the water use designation for Cedar Creek be changed from general use to general use with certain limitations (Section 302.202).
2. That the current dissolved oxygen standard for Cedar Creek be deleted if treatment plant effluent meets certain standards. The present dissolved oxygen standard requires not less than 6.0 mg/l during at least 16 hours of any 24 hour period, and not less than 5.0 mg/l at any time (Section 302.206).
3. That the treatment plant be required to meet final effluent standards of 20 mg/l of BOD₅ and 25 mg/l of TSS. The current standard is 10 mg/l BOD₅, 12 mg/l of TSS (Section 304.120(b)).
4. That water quality standards for Cedar Creek regarding ammonia nitrogen and un-ionized ammonia be modified to place a maximum of 15 mg/l of ammonia nitrogen and 0.10 mg/l of un-ionized ammonia. Current standards require, below 15 mg/l ammonia nitrogen, a maximum un-ionized ammonia of 0.04 mg/l (Section 302.212).

5. That the current requirement that discharges not increase ambient water temperature more than 5°F (2.8°C) be deleted (Section 302.211(d)).

6. That the combined sewer overflow requirement that all of the first flush meet applicable effluent standards be deleted (Section 206.305(a)).

The Agency has recommended that the site specific rules not be adopted.

PRESENT PROCEEDINGS

During these proceedings individuals appearing in favor of the Galesburg Sanitary District's proposal provided testimony and exhibits that:

1) described the present and potential uses of Cedar Creek and surrounding areas,

2) described the chemical and biological nature of Cedar Creek and the impacts caused by sewage discharges as well as the urban and agricultural environment, and

3) described the Galesburg sewage system and plant, their operation, the proposed construction program, and its cost.

Individuals appearing in opposition to the proposal provided testimony and exhibits concerning the nature of Cedar Creek and impact from District discharges, as well as disputing testimony in favor of the proposal.

A local farmer testified that he had lost several calves that drank from Cedar Creek, and presented laboratory results showing nitrate/nitrite levels in Cedar Creek. He claimed the District's discharge partly caused the loss of calves and high nitrate/nitrite levels but did not claim to support or oppose the proposed amendments (R. 280-284, Ex. 32).

In its final brief the District argues that, at present, the total District discharges do not impair present or potential uses of Cedar Creek, that the proposed amendments would simply maintain existing conditions, that the anticipated construction program costs (\$40 million) would far outweigh benefits, and that the proposal is reasonable and appropriate. Final comments submitted by the Agency dispute the District's claims, argue that the level of control required by Board regulations are technically feasible and economically reasonable, and claim that the District has failed to demonstrate a difference in circumstances for its plant or Cedar Creek (compared to any other district or creek) which is necessary for site-specific relief.

DISCUSSION

The District's proposal can be broken into three separate elements:

1. relief from deoxygenating wastes effluent standards, water quality dissolved oxygen and ammonia standards, and water use designation changes,
2. relief from combined sewer overflow regulations, and
3. relief from instream temperature increase regulations.

The District's arguments are conceptually simple. To achieve the applicable standards the District planned a construction program that is now estimated to cost nearly \$40 million. Recent studies indicate the impact of the District's discharges on Cedar Creek does not significantly impair any present or potential use of the Creek, and water quality improvements from the construction program would be minimal compared to the cost.

EFFLUENT CONSIDERATIONS

Effluent from the District's discharge is subject to the deoxygenating wastes standards of Section 304.120. Because the dilution ratio of the District's discharge to Cedar Creek is less than five to one (R.134), the standards of 304.120(c) apply; this requires that effluent not exceed 10 mg/l of BOD₅ or 12 mg/l of TSS except in certain situations not applicable here. The District requests discharge limitations of 20 mg/l BOD₅ and 25 mg/l of TSS found in Section 304.120(b) - the discharge limitations which would apply to the District were it not for the low flow characteristics of Cedar Creek.

In Group Exhibit 17 the District introduced results of effluent analyses from January of 1966 through October of 1980. An examination of the last 36 months of that data shows the discharge failed to meet the 10 mg/l of BOD₅ standard for 26 months and failed to meet the 12 mg/l of TSS₅ standard for 18 months. Results from 1966 to 1976 show even higher BOD₅/TSS values. Clearly the District has had and still has a problem with a 10/12 standard. Closer examination of the discharge data shows a seasonal pattern. During the warmer months (July, August, September) BOD₅/TSS values are lowest and usually comply with a 10/12 standard. During the colder months (January, February, March) BOD₅/TSS values are highest and seldom comply.

To resolve these problems the District, beginning in 1972, contracted with Clark, Dietz & Associates for a series of reports and studies identifying the nature of the problem and making recommendations to satisfy existing regulatory requirements (R.201). The controlling requirements were effluent characteristics of 4 mg/l BOD₅, 5 mg/l TSS, and 400 fecal coliform per 100 ml. The

stream standards for Cedar Creek included a maximum 1.5 mg/l ammonia nitrogen standard* (R.220). The report recommended several specific changes and additions to the existing system (R.226-230. Ex. 25, 31, 33).

The cost of constructing these improvements, in 1980 dollars, is estimated at \$19,858,000 by Clark-Deitz (Ex. 31). Annual operation and maintenance (O & M) for the improved facility is likewise estimated at \$1,107,900 per year. Mr. James Browning, the District's Superintendent, testified that plant improvements would substantially raise sewage related fees for area residents and industries. Presently the O&M costs are paid by sewer user charges; plant improvements would increase that rate from \$1.24 per month and \$0.29 per 1000 gallons to the same monthly fee and \$1.10 per 1000 gallons (R.190, read together with prepared testimony p.28, to correct transcription errors).

Construction costs are paid by taxes collected to pay for bonds sold to finance the construction. Although the record did not report the increase in tax rate for plant improvements alone, the current rate of \$0.30 per \$100 assessed valuation (R.190) would undoubtedly increase significantly.

With the exception of costs, the Agency disputes little of the preceding information. The Agency provided a USEPA report by the Advanced Wastewater Task Force which indicated user fees of \$163/year/customer (Ex.33(d), p.4). The District claims that is too low and estimates a rate of \$1.24 per month and \$1.10 per 1000 gallons. The same Agency exhibit claims annual capital and O&M costs for the entire project are less than 2.5% of median incomes over \$10,000. The District argues that for a family with a \$50,000 market value home and usage of 10,000 gallons per month total costs (taxes & user fees) would increase 288% from \$8.33/month to \$23.90/month (R.190-191). The Economic Impact Study recounted the District's statistics, but did not resolve the conflict in terminology with the Agency's statistics (Ex.48, pp.44-46).

Since the District is applying for site specific rules that would relax effluent limitations to 20/25 (the limits which apply to all large sewage treatment plants) from 10/12 (the limits to protect streams receiving large percentages of effluent) the appropriate question is whether the more stringent effluent standards would improve water quality or water uses. Such improvements must then be balanced against the technical feasibility and economic reasonableness of reduced contamination. Since all participants agree that the proposed construction is technically feasible, that ceases to be an issue.

* The requirements also may have included a maximum effluent concentration of 0.1 mg/l Phosphorus (R.210)

Briefly, the District presented testimony and exhibits to demonstrate that the plant effluent and combined sewer overflow have minimal or no impact on downstream dissolved oxygen levels and that the aquatic habitat is not limited by D.O., but is limited by chloramines and ammonia nitrogen. Thus, they argue, if \$19 million is spent on plant improvements, dissolved oxygen will not increase, and even if dissolved oxygen increases, the habitat for aquatic life will not improve. The District believes that, aside from improved aquatic habitat, Cedar Creek meets the standards for all other present or potential uses.

The District provided testimony by Dr. Milton L. Bowman that Cedar Creek was presently used for frequent and somewhat successful fishing (R.47, 48, 488 and 489), trapping, stock watering (R.138, 479 and 488) and trapping turtles (R.489). After discussing his evaluation of the aquatic biology of Cedar Creek, Dr. Bowman concluded that "in light of the present uses of the upper portion of Cedar Creek, the existing water quality is acceptable for these uses." (R.467, 481). Several District witnesses testified that although plant effluent has an adverse impact on the biological community in Cedar Creek (1) the existing biological community is typical of similar Illinois streams and improving (2) the adverse effluent impact is predominantly from chlorination, (3) any impacts rapidly dissipate downstream, and (4) factors other than effluent quality limit diverse biological populations.

Dr. Allison R. Bringham performed a 1980 stream study of benthic macroinvertebrates and evaluated a 1976 study by the Agency. Based on this information she concluded, "that Cedar Creek is an average low gradient, slowly flowing Illinois stream." (R.366) and that, "in general, the diversity of aquatic life increased from 1976 to 1980." (R.362). Dr. Charles B. Muchmore testified, based on stream testing and toxicity calculations, that, "the major toxic factor contributed to Cedar Creek by the Galseburg sewage treatment plant discharge was total residual chlorine..." (R.330). All four District scientists testified that the treatment plant impacts on Cedar Creek dissipate rapidly: within 7.7-15.4 km (R.330,332), within 1.5 miles (R.362), within 8 miles (R.418), and 4.1 miles (R.467). Also, all four testified that, aside from residual chlorine, factors other than plant effluent limited improvements in water quality and diverse biological community: substrate, lack of extensive rocky riffle, sediment, and erosion (R.324, 332, 425, 467).

In total, the District presented a voluminous body of evidence that, aside from chlorine, present plant discharges do not have a substantial or limiting impact on the biological community or uses of Cedar Creek. The Agency did not present evidence to dispute these claims, but did show low dissolved oxygen levels and high ammonia nitrogen in Cedar Creek. In Exhibit 33(c) the Agency developed a Streeter-Phelps model for Cedar Creek which shows

effluent controls anticipated in the proposed construction will result in achieving the required dissolved oxygen levels.

Testimony for the District by James Huff concluded that the dissolved oxygen sags occur closer to the plant than the Agency model predicts, and that when the plant effluent achieves characteristics assumed in the model, dissolved oxygen sags are lower than predicted (R.775). A regression analysis shows little correlation for existing discharge values of BOD₅ and ammonia nitrogen relating to D.O. values (R.778). The Agency's model is based on low sediment oxygen demand typical of a cleaner stream bed (Ex. 33(c), pp.2 & 6) and would therefore only be valid for future conditions.

The evidence presented to the Board is that the expensive construction to achieve an effluent of 10 mg/l BOD₅, 12 mg/l TSS will not substantially improve dissolved oxygen levels, biological habitat, or use characteristics for Cedar Creek. Moreover, the lowest D.O. levels occur during periods (warm weather) when plant effluent is least contaminated. For that reason, the Board proposes to adopt a modified effluent limitation for the District which allows up to 20 mg/l BOD₅ and 25 mg/l TSS only during those periods (cold weather) of reduced plant efficiency, and more stringent limitations when plant operations can be more efficient. A review of the District's effluent data for the recent past (Group Ex. 17) shows some values above the modified effluent limitations. However, with careful attention to operating procedures and some minor improvements, such as enclosing the trickling filters to retain heat in winter, these levels should be achievable.

The Board declines the request to adopt a dissolved oxygen standard for Cedar Creek of zero. None of the hearing participants provided testimony or exhibits to show such a standard would protect existing biological communities and uses of Cedar Creek, or be acceptable to USEPA. The Board reaffirms that Section 302.206 applies to Cedar Creek and direct the District in today's order to achieve that standard not later than November 1, 1984, by use of effluent aeration, in-stream aeration, or other methods.

The District has requested that the ammonia nitrogen and un-ionized ammonia standards be relaxed. In essence, the District requests that, below 15 mg/l ammonia nitrogen, maximum un-ionized ammonia be increased from 0.04 mg/l to 0.10 mg/l. This presents a problem.

The testimony of Dr. Muchmore is that the maximum un-ionized ammonia observed during his studies was 0.03 mg/l (R.330), which is below the 0.04 mg/l limit established by 35 Ill. Adm. Code 302.212. Dr. York testified that the District's discharges did not appear to increase ammonia nitrogen in Cedar Creek and that the highest ambient ammonia nitrogen was 0.77 mg/l. The Clark-Dietz water quality survey (Ex.42) contains, at Table 3 a year long sampling program with over 50 samples, at Table 4 a two

month sampling program with nearly 30 samples, and at Table 9 a two day sampling program with 15 samples. Although data on pH and temperature are missing, none of these results are established to be over 0.04 mg/l un-ionized ammonia and nearly all are clearly below that level. Group Exhibit 17 contains a table showing four years of downstream ammonia nitrogen levels. Again, while pH data is lacking and temperature is not correlated with specific ammonia nitrogen levels, there is no clear indication that un-ionized ammonia values below 0.04 mg/l are not being achieved. Despite several hundred samples, the Board has no evidence of an un-ionized ammonia concentration above 0.04 mg/l, the current standard.

Non-compliance is a necessary element when seeking site specific relaxation of a generally applicable standard. The Board is aware that should the District select in-stream or effluent aeration to achieve downstream D.O. levels, that may further reduce ammonia nitrogen concentrations (R.472). Also, should effluent chlorination be eliminated,* the nitrification rate might increase (R.348). Because of the lack of present violation and possibility of a future improvement, the Board will not adopt a less protective ammonia nitrogen and un-ionized ammonia standard for Cedar Creek. Moreover, there was no evidence presented to show that un-ionized ammonia levels of 0.10 mg/l would protect or harm the present or potential biological community of Cedar Creek.

COMBINED SEWER OVERFLOWS

Overflows from the District's combined sewers are subject to Section 306.305. The District has requested that the portion of the rule which governs combined sewer overflow first flush not apply to the District. Specifically, the section requires, "the first flush of storm flows, as determined by the Agency, shall meet the applicable effluent standards."

Galesburg was originally constructed as a combined sewer community. However, as a result of flooding the District began a sewer separation project in 1967. Originally over 90% of the city had combined sewers, now 90% of the city has separate sanitary and storm sewers. The original 44 overflow points have remained in the system (R.237). Historically, overflows were large and frequent, now they are smaller and less frequent.

See: R77-12 (October 14, 1982); appeal pending sub nom Illinois v. Pollution Control Board, 82-2728, Illinois Appellate Court, First Judicial District.

From October to December 1980, Huff & Huff, Inc. conducted a study to determine the characteristics of first flush and its fate in the sewer system. After two small rain events, Huff & Huff conducted tests and calculations on a December 6, 1980 storm. Results of that testing showed that with two minor modifications to the system the treatment plant could receive 99.8% of the first flush volume, and without modifications the plant receives 99.8% of the BOD₅ and TSS associated with first flush (Ex. 38, p.7).

The Agency responds that the two prior rainfall events and the limited intensity of the December 6 storm render the first flush evaluation invalid for determining compliance with Section 306.305. The Agency introduced "Procedures for determining compliance with Rule 602(c) of Chapter 3 [Present Section 306.305(a)]" in support of their arguments (Ex. 39). In relevant part, that document provides at page 3:

- (i) The storm chosen to determine first flush effects must have a minimum recurrence interval of one year
- (ii) There should be sufficient time between the storm event chosen to determine first flush and any previous event, to allow for adequate solids deposition in the sewers and on the streets. As a rule of thumb, one month should be sufficient.

A supplemental statement by Mr. Michael Teirstriep of the Agency indicates: (1) the above procedures require a one year-one hour storm, (2) the procedure does not provide a method of determining inches of rainfall, (3) there are only two recognized sources of such data (U.S. Weather Bureau Technical Paper 40, and Illinois State Water Survey Technical Letter 13), (4) both give similar results (1.1 inches, 1.3 inches), and (5) the Huff & Huff report chose a value of 0.75 inches from a 1979 Agency report on urban stormwater management, a result "not intended in the IEPA regulation...". (Public Comment #5, p. 1-2).

Mr. Huff responded for the District stating: (1) Mr. Teirstriep admitted a value of 0.75 inches could be used (R.738) (2) of all the CSO studies to date only one has achieved the higher value (Ex. 50,51) and (3) even if recalculated for a 1.3 inch rainfall the CSO capture drops from 99.8% to 99.1% (Ex. 53, p.15).

While the Board has received conflicting testimony on the rainfall intensity the Agency would like to receive in CSO evaluations, the language of the procedure is not disputed. That language does not mention "hourly intensity", does not mention the only two sources of data that may be used, and does not mention whether the minimum, average, or maximum hourly intensity is to be used. In such circumstances, the event chosen by Huff & Huff, Inc., seems in reasonable compliance with the procedures for a one-year storm.

In a similar context the Agency argues that the two rainfall events preceding the December 6 event render the results invalid under Agency procedures. In the District's view, competent experts testified that adequate solids deposition had occurred (R. 268-269) and one month of dry weather would be expected once every 238 years. (Ex. 53, p.10).

The Board is reluctant to dismiss the only current first flush data presented when competent testimony claims it to be valid; there is no testimony that adequate solids deposition did not occur, and the alternative is additional delay.

The Board accepts the validity of the District's study which demonstrates 99% compliance with the first flush requirements of Section 306.305(a). Today's Board Order requires additional improvements to the District's collection system. The Board finds that this program, when completed, will result in substantial compliance with Section 306.305(a). Accordingly, the District's request for site-specific regulatory relief is denied.

TEMPERATURE

The District has requested site-specific relief from the temperature requirements of Section 302.211(c). A reading of that section, and its frequent references to "heated effluent", shows the request to be misdirected. This section was never intended to apply to publicly owned sewage treatment works receiving predominantly residential flows. Therefore, the relief is not needed.

ORDER

The Board proposes to adopt the following rules for First Notice, which shall be published in the Illinois Register

Title 35: Environmental Protection

Subtitle C: Water Pollution

Chapter 1: Pollution Control Board

PART 304

Effluent Standards

Subpart B: Site-Specific Rules and
Exceptions Not of General Applicability

Section 309.201 Calumet Treatment Plant Cyanide Discharges
(No Change)

Section 304.202 Chloralkali Mercury Discharges in St. Clair
County (No Change)

Section 304.203 Galesburg Sanitary District Deoxngenating Wastes Discharges

a) The deoxygenating wastes general effluent standards of 304.120(c) shall not apply to the Galesburg Sanitary District discharges into Cedar Creek. Such discharges must meet the deoxygenating wastes general effluent standards set below:

<u>Constituent</u>	<u>Storet Number</u>	<u>Concentration mg/l</u>
<u>BOD₅</u>	<u>0031</u>	
<u>April-November</u>		<u>17</u>
<u>December-March</u>		<u>20</u>
<u>Suspended Solids</u>	<u>00530</u>	
<u>June-February</u>		<u>15</u>
<u>March-May</u>		<u>25</u>

b) The above standard shall apply so long as the Galesburg Sanitary District achieves:

- 1) by November 1, 1984, compliance with Section 302.206 throughout Cedar Creek, by effluent aeration, in-stream aeration, or other means,
- 2) by November 1, 1984, raising the dams, on all 44 overflow points, to a level that prevents overflows prior to interceptor surcharging,
- 3) by November 1, 1983, an operational procedure for the influent pumps which prevents interceptor surcharging at flows below hydraulic capacity.
- 4) by November 1, 1983, eliminating all downspout connections, and
- 5) by November 1, 1983, preventing inflow by sealing all leaking catch basins, replacing all leaking manhole lids and frames, and sealing drainage inlets.

c) If the conditions set out in Section 304.203(b) are not met, the deoxngenating wastes general effluent standards of 304.120(c) shall apply to the Galesburg Sanitary District discharges into Cedar Creek.

IT IS SO ORDERED.

I, Christan L. Moffett, Clerk of the Illinois Pollution Control Board, hereby certify that the above Opinion and Order were adopted on the 2nd day of June, 1983, by a vote of 4-0.

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