ILLINOIS POLLUTION CONTROL BOARD
November 12, 1982

In the matter of:	)	
	)	
PROPOSED WATER QUALITY STANDARD FOR WOOD RIVER (OLIN, EAST ALTON)	)	R81-24

PROPOSED RULE. FIRST NOTICE

OPINION OF THE BOARD (by D. Anderson):

On September 24, 1980 Olin Corp. (Olin) filed a proposal for a site-specific water quality standard for copper in Wood River Creek, near East Alton, in Madison County. On August 17, 1981 an amended proposal was docketed as R81-24. On July 30, 1982 Olin filed a second amended proposal in codified form. The following provisions are involved in this rulemaking:

35 Ill. Adm. Code	Chapter 3	Description
§302.208	203(f)	General use water quality standard of 0.02 mg/l copper (total)
Part 303	203.1	Exceptions to Rule 203 standards
§304.105	402	Requirement that effluents not cause violation of water quality standards
§304.124	408	Effluent standard of 0.5 mg/l copper (total)
§304.203	---	Codified designation for this proposal

HEARING

A public hearing was held on December 9, 1981 at Edwardsville. The Illinois Environmental Protection Agency (Agency) appeared as a participant. Representatives of Granite City Steel, the City of East Alton, and Illinois Power Company attended the hearing. There was no public comment, as such, although East Alton testified for Olin in favor of the proposal. The record was left open to allow for an economic impact hearing and possible additional merit hearings.

On February 22, 1982, the Department of Energy and Natural Resources advised the Board that the Economic Technical Advisory Committee had voted a "negative declaration" pursuant to P.A. 82-548. This satisfied the economic impact study requirement.

On August 2, 1982 Olin and the Agency filed a stipulation concerning the admission of additional exhibits without the necessity of conducting a second merit hearing. On August 19 the Hearing Officer admitted exhibits Z-1 and Z-2 and closed the record except for comment periods.

PREVIOUS ACTIONS

Copper discharges from Olin's East Alton facility have been the topic of several previous Board cases:

PCB		
73-484	14 PCB 689	December 19, 1974
75-369	19 PCB 404	December 4, 1975
73-509 73-510	22 PCB 3	June 3, 1976
80-170	40 PCB 137 41 PCB 321	December 18, 1980 May 1, 1981
80-126	45 PCB 389 46 PCB 7	February 17, 1982 April 1, 1982

The Board originally granted Olin a variance from the water quality standard for copper in 1972. This was extended in 1976 and in 1980. Olin is currently subject to an effluent limitation in its variance of 0.3 mg/l copper, based on monthly averages.

In PCB 73-509,-510 Olin sought a declaration that Wood River was a "secondary contact water" and hence not subject to the general use water quality standards. The Board held that such designations must be made only by way of rulemaking (54 Ill. App. 3rd 480, 370 NE 2d, 5th District, October 20, 1977). The secondary contact standards were subsequently amended to state this result (Rule 302, Section 303.102, 3 Ill. Reg. no. 20, p. 95). This site-specific proposal is the result of that holding.

FACILITY DESCRIPTION

Olin operates a manufacturing facility in East Alton, Madison County. The facility occupies 1732 acres and employs 4300 workers, with an annual payroll of $86,000,000. The facility includes a brass casting operation, manufacture of copper and copper alloy slabs, strip tubing, fabricated products and small arms ammunition. Several operations result in discharge of copper to the plant's sewage system.

The following table summarizes the discharges and "Zones" of the facility which are involved in this rulemaking:

Treatment Plant	Zones	Discharge	Type of Discharge
Zone 6	1-7	015,006	Main outfall
		002, 003, 004, 005, 009, 010, 013, 014	Overflow discharges
		007, 008, 011, 012	Stormwater discharges
Zone 17	17	001	Main outfall

Zone 6 is the older of the two treatment plants. Both plants treat for copper, and other heavy metals, by lime precipitation with polymer coagulation and flocculation. The discharges are authorized by NPDES Permit No. IL 0000230. Discharge 001 is to Wood River Creek; 015 is upstream on the East Fork.

In R76-21 the Board changed the copper effluent standard from 1.0 to 0.5 mg/l. Direct comparison of these numbers is difficult because at the same time the Board changed the method of determining the concentration from a daily to a monthly basis. In adopting this standard the Board found that it was technologically reasonable to treat copper to a level of 0.5 mg/l (43 PCB 367, September 24, 1981; 6 Ill. Reg. 563). As noted in that Opinion, Olin treats its wastewater to a greater degree. Its current variance contains a 0.3 mg/l limitation, based on monthly averages. Olin presented a summary of nearly 1200 daily composites from outfalls 015 and 001 from 1975 through 1981 (R. 146, Ex. B and C). The following table is abstracted from those exhibits:

	Cumulative % of daily composites less than indicated level	
Copper (mg/l)	015	001
0.5	97.6%	92.1%
1.0	99.6%	97.9%

The median values for the discharges are in the range of 0.2 to 0.3 mg/l, with about 98.8% of daily composites being less than 1.0 mg/l. Olin has violated the 0.3 mg/l monthly variance standard only two times since the variance was granted (R. 214).

The following table summarizes average flows and mass discharge data based on the average flow at 0.5 mg/l:

Discharge	Zone	Flow MGD	Flow Liters x 10^6	Mass at 0.5 mg/l kg/day
015	6	2.7	10	5.0
001	17	0.52	2.0	1.0

TREATMENT ALTERNATIVES

The lime precipitation process which Olin uses is the most common copper treatment technology. In R76-21 the Board identified it as the technology on which the 0.5 mg/l standard was based, although Olin's plants perform better than this. Olin has considered several alternative processes which might reduce copper levels (R. 152). These are summarized as follows for the Zone 6 plant:

Process	Expected Copper (mg/l	Zone	Capital	Operating
Sulfide precipitation	0.05	6	$ 2,650,000	$1,500,000
		17	498,000	70,000
Ion Exchange	0.09	6	8,740,000	467,000
		17	1,448,000	285,000
Reverse osmosis	0.09	6	19,300,000	8,500,000
		17	4,460,000	1,240,000
Starch xanthate	0.05	6	290,000	920,000
		17	65,000	102,000

None of the alternatives would be capable of meeting the 0.02 mg/l water quality standard. Reduction from 0.5 to 0.1 mg/l would reduce the combined Zone 6 and 17 copper discharge from 6.0 to 1.2 kg/day.

Other treatment alternatives were considered but rejected without detailed estimates. These include electrolytic recovery, cementation, evaporative recovery and sodium borohydrate. These either were too expensive, did not perform well enough, or both (R. 158). Direct discharge to Mississippi River is too expensive ($2,600,000) and merely gets the copper to the Mississippi quicker (R. 159).

WOOD RIVER CREEK

The lower reaches of Wood River Creek were discussed at length in a previous site-specific rulemaking concerning boron discharges from Illinois Power Company's ash pond, which is situated downstream from Olin (R76-18, 29 PCB 395, March 16, 1978; 2 Ill. Reg. no. 27, page 221, effective July 5, 1978).

The waterway is referred to as "Wood River" and as "Wood River Creek" (R. 27). The Board will continue with the latter designation which was followed in R76-18. Addition of the word "creek" to the name avoids confusion with the nearby town of Wood River. Furthermore, the term "river" generally denotes a larger stream than Wood River Creek, which has a seven day, ten year low flow of zero (R. 141).

Wood River Creek arises above the Mississippi River bluffs. It has a maximum length of about 20 miles and watershed of 125 square miles. The East Fork has an average flow of 110 million liters per day (44 cubic feet per second)(R. 42, 173, Ex. X, Z). The East and West Forks meet between Olin's discharge points, with the Zone 6 discharge (015) upstream on the East Fork. The lower reaches of Wood River Creek and the East Fork have been straightened and leveed. There is a dam across the mouth of the creek, which is less than one mile below Olin's discharges.

EXISTING WATER QUALITY

Olin has taken actual water quality measurements in 1975 and in 1980 (Ex. P, W). Upstream copper levels tend to be around 0.02 mg/l, the general use water quality standard. Downstream, grab samples have been taken which are in excess of 0.5 mg/l, but averages tend to be below 0.1 mg/l (R. 95, Ex. P, W). Stream modeling tends to indicate that levels in excess of 0.5 mg/l should occur 19% of the time, but this is not borne out by the data (Ex. Z-1).

ENVIRONMENTAL IMPACT

The areas surrounding the lower reaches of Wood River Creek are almost entirely occupied by heavy industry, including Olin, Illinois Power and a junk yard. There is a small area where residences are close to the levy and where public access is possible. However, the Mayor of East Alton and other testified that they have never known of any recreational use being made of the creek. The area is heavily overgrown and is not accessible or attractive from a recreational point of view. The creek does not normally have a sufficient flow for usual recreational activities such as swimming and boating (R. 32, 127, 163).

The physical condition of the creek is the same as was discussed at length in R76-18. The low head dam cuts the stream off from the Mississippi most of the time. This prevents utilization by river fish. The channelization, leveeing and urbanization, combined with the dam, have eliminated the habitat diversity which is essential to a diverse aquatic population. The lack of habitat is the principal limiting factor, not the chemical composition of the water.

Olin's discharges keep water in the stream even during the dryest times. This increases species diversity by protecting fish which would be unable to escape during dry periods.

Copper is toxic material which is also a trace nutrient at low levels. It is used as an algicide and piscicide at levels ranging from 1 to 10 mg/l (R. 121). Toxicity varies with species under consideration, with LC-50's ranging from 0.007 to 10 mg/l (R. 98). Toxicity also depends on hardness of the water. The water in Wood River Creek is sufficiently hard to reduce toxicity of copper (R. 100). The species present, which are determined by habitat, are generally tolerant to higher copper levels.

Olin's limnologist, Dr. Donald B. McDonald, a professor of environmental engineering at the University of Iowa, examined the creek above and below the discharge points to determine whether there was any change in species or counts from the discharge. None was found. Indeed, the largest number of species and individuals was found in a pool below Olin's Zone 6 discharge. At the time flow was sufficient to allow the fish to escape upstream to lower copper levels. The fish were expressing a preference for the better habitat and larger flow below the discharge rather than the lower copper levels upstream (R. 63, 88).

The Board finds that the existing conditions of Wood River Creek near Olin's discharge are dominated by irreversible changes in the drainage basin rather than copper levels. Enforcement of the existing standard, or requiring treatment to 0.1 mg/l, the next level of treatment technology, would cost money but would not significantly improve environmental conditions, or increase the aesthetic or recreational value of Wood River Creek. The Board will therefore modify the water quality standard to a level reflecting existing conditions with Olin's historical discharges.

PROPOSED ACTION

Olin originally proposed a water quality standard of 0.5 mg/l. The first modified proposal asked for an effluent standard of 0.5 mg/l with an exemption from the water quality

standards. In January, 1982 the general effluent standard of Section 304.124 was changed to 0.5 mg/l, mooting the site specific modification of the effluent standard. On July 30, 1982, in response to questions raised at the hearing, Olin returned to a modified water quality standard of 0.5 mg/l. At the hearing, and in its comments of August 31, 1982, the Agency opposed this shift back to a straight water quality standard revision. On September 21 Olin indicated that it didn't care whether relief was granted by way of modification of the water quality standard or exemption from the water quality standard.

The Board has proposed to adopt Section 304.203, which would provide Olin with a site-specific exemption from the requirement of Section 304.105 that its effluent discharges comply with the water quality standard for copper of Section 302.208. The text of the proposed rule appears in a separate Order. This Opinion supports that Order.

I, Christan L. Moffett, Clerk of the Illinois Pollution Control Board, hereby certify that the above Opinion was adopted on the 14th day of November 1982 by a vote of 5-0.

Christan L. Moffett, Clerk
Illinois Pollution Control Board