ILLINOIS POLLUTION CONTROL BOARD
June 20, 1996

IN THE MATTER OF:	)	
	)	
PETITION OF CENTRAL ILLINOIS LIGHT	)	AS 96-8
COMPANY (DUCK CREEK STATION)	)	(Adjusted Standard-Water)
FOR ADJUSTED STANDARD FROM	)	
35 ILL. ADM. CODE 302.208 AND	)	
35 ILL. ADM. CODE 304.105	)	
REGARDING THE PARAMETER BORON[1]	)	

OPINION AND ORDER OF THE BOARD (by R.C. Flemal):

This matter comes before the Board upon a "Petition for Adjusted Standard" (Pet.) filed on January 30, 1996 by Central Illinois Light Company (CILCO) for its Duck Creek Station located in Fulton County. CILCO requests that the Board adopt an adjusted standard for boron to replace the boron General Use Water Quality Standard applicable in Duck Creek and in a limited reach of the Illinois River downstream from the confluence of Duck Creek with the Illinois River. CILCO further requests relief from the water quality-based effluent standard for boron imposed by the Illinois Environmental Protection Agency (Agency), pursuant to 35 Ill. Adm. Code 304.105, in CILCO's NPDES permit No. IL0055620.

The Board's responsibility in this matter arises from the Environmental Protection Act (Act) (415 ILCS 5/1 et seq. (1994)). The Board is charged therein to "determine, define and implement the environmental control standards applicable in the State of Illinois" (Act at Section 5(b)) and to "grant . . . an adjusted standard for persons who can justify such an adjustment" (Act at Section 28.1(a)). More generally, the Board's responsibility in this matter is based on the system of checks and balances integral to Illinois environmental governance: the Board is charged with the rulemaking and principal adjudicatory functions, and the Agency is responsible for carrying out the principal administrative duties.

The Act also provides that "the Agency shall participate in [adjusted standard] proceedings". (415 ILCS 28.1(d)(3) (1994).) As part of that responsibility, the Agency on April 22, 1996 filed a response (Res.) to CILCO's petition in which the Agency recommends that the requested adjusted standard be granted.

CILCO has waived hearing in this matter. (Pet. at 21.) No other person has requested a hearing, and accordingly none has been held.

Based upon the record before it and upon review of the factors involved in the consideration of adjusted standards, the Board finds that CILCO has demonstrated that grant of an adjusted standard in the instant matter is warranted. The adjusted standard accordingly will be granted.

NATURE OF THE FACILITY AND DISCHARGE

CILCO's Duck Creek Station (Station) consists of a single-unit 400 megawatt electric generating facility located near Canton, in Fulton County, in an unreclaimed strip mine region. (Pet. at 3.) Approximately 120 people are employed at the Station, which is staffed 24-hours a day, 7-days a week. Annual operating, maintenance and fuel costs are approximately $48 million. (Pet. Exh. 1, p. 2-1.)

[1] For purposes of better characterizing this action, the Board today adds to the caption the phrase: "regarding the parameter boron".

The generating unit is a coal-fired unit that began operation in 1976. (Pet. at 3.) Coal usage is approximately one million tons per year. (Pet. at 4.) The unit is equipped with electrostatic precipitators and a wet scrubber flue-gas-desulfurization system that allow the Station to burn high-sulfur Illinois coal. (*Id.*; Res. at 5.)

Among the auxiliary facilities at the Station is Duck Creek Reservoir. Duck Creek Reservoir is a 1,655 acre "perched lake" constructed by CILCO to serve a variety of water needs at the Station, including cooling water requirements. According to the Agency, Duck Creek Reservoir is a treatment works and not a "water of the state", and consequently is not itself subject to water quality standards. (Res. at 6, citing EPA v. Central Illinois Light Company, 54 Ill. App.3d 155, 11 Ill. Dec. 935 (3rd Dist., 1977).) The Illinois River is the main source of makeup water for Duck Creek Reservoir.

Inflow to Duck Creek Reservoir consists of recycled condenser and turbine cooling water, service water, and boiler blowdown water; runoff from various Station areas and surfaces; infiltrated groundwater; and makeup water pumped from the Illinois River. (Res. at 6.) Waste water from the ash slurry system and the wet scrubber is *not* discharged to the Reservoir; rather, the clarified water is pumped back to the plant for reuse in the treatment system. (Res. at 5.)

The water in Duck Creek Reservoir currently contains elevated levels of boron. Water samples taken by CILCO from Duck Creek Reservoir showed minimum, average, and maximum boron concentrations of 2.32 mg/L, 2.96 mg/L, and 3.94 mg/L respectively, taken from 1990 through 1993. (Annual Reservoir Water Quality Data from 1990-1993, Pet. Exh. Table 3.1, p.3-9.) It is the Agency's belief that the major pathway via which boron enters the Reservoir is groundwater infiltration, "with much smaller contributions from runoff from the coal storage area and occasional spills from the waste transfer systems or overflows from the waste pond system" (Res. at 6). The boron itself is abundant in the at- and near-surface coal-bearing strata and spoil piles that occur within the basin of Duck Creek, from which it readily leaches into the groundwater. (Pet. Exh. 1 at 4-3; Res. at 6.)

Similarly, water that is discharged from Duck Creek Reservoir contains elevated levels of boron. This is borne out in data collected by CILCO showing that between 1990-1994 discharge concentrations ranged from 1.12 mg/L to 4.37 mg/L, measured as daily maximum concentrations. (Pet. Exh.1 at Table 3.2.)

Discharge from Duck Creek Reservoir occurs via a "morning glory" spillway that discharges through a 1,100 foot tunnel into Duck Creek, and ultimately to the Illinois River. (Pet. at 5.) This outfall, which is denominated outfall 002, is the subject of the instant adjusted standard petition[2]. The volume of the outfall is seasonally variable, with monthly average discharges ranging from 0.0 to 50.0 million gallons per day as measured over the five year period 1990 through 1994. (Pet. Exh. 1 at Table 4.4.)

Outfall 002 is governed by NPDES permit No. IL0055620. Among the provisions of this permit is a requirement that effective October 23, 1996, boron concentrations from outfall 002 not exceed 1.0 mg/L. 1.0 mg/L is equal to the Board's General Use Water Quality Standard for boron, which is the standard applicable in Duck Creek and in the Illinois River[3]. The 1.0 mg/L NPDES limit is in part determined by the prohibition against "causing or allowing" violation of any water quality standard found in the Board's regulations at 35 Ill.

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[2] There are two associated outfalls, 001 and 003, that are not relevant to the instant petition. They are, however, regulated by the same NPDES permit. Outfall 001 discharges water from the Reservoir dam seepage collection system into Duck Creek and outfall 003 discharges river intake screen backwash into the Illinois River. (Pet. at 5.)

[3] See 35 Ill. Adm. Code 302.201 and 302.208(e).

Adm. 304.105[4]. Setting the effluent limit in the permit equal to the water quality standard assures that the boron concentrations in Duck Creek will not exceed the water quality standard.

CILCO seeks to be able to discharge boron in concentrations greater than 1.0 mg/L. CILCO accordingly seeks adjustment of the boron water quality standard in Duck Creek and the immediately downstream waters of the Illinois River, as well as adjustment of the prohibition against causing or contributing to water quality concentrations greater than 1.0 mg/L.

ADJUSTED STANDARD PROCEDURE

The Illinois Environmental Protection Act at Section 28.1 (415 ILCS 5/28.1 (1994)) provides that a petitioner may request, and the Board may impose, an environmental standard that is different from the standard that would otherwise apply to the petitioner as the consequence of the operation of a rule of general applicability. Such a standard is called an adjusted standard. The general procedures that govern an adjusted standard proceeding are found at Section 28.1 of the Act and within the Board's procedural rules at 35 Ill. Adm. Code Part 106.

The Board's general effluent regulations do not include specific limitations for boron. However, they do prohibit any discharge that would cause or contribute to a violation of any water quality standard. (35 Ill. Adm. Code 304.105.)

The Board does have a water quality standard for boron, which occurs in the Board's General Use Water Quality Standards found at 35 Ill. Adm. Code 302.208. The standard is 1.0 mg/L.

Because neither 35 Ill. Adm. Code 302.208 nor 304.105 specify a level of justification or other requirement for an adjusted standard for this matter, sections 28.1(c)(1) through (c)(4) of the Act are relevant in this proceeding. Consequently, petitioner has the burden of proving the following for an adjusted standard from a rule of general applicability:

1. factors relating to that petitioner are substantially and significantly different from the factors relied upon by the Board in adopting the general regulation applicable to the petitioner;

2. the existence of those factors justifies an adjusted standard;

3. the requested standard will not result in environmental or health effects substantially and significantly more adverse than the effects considered by the Board in adopting the rule of general applicability; and

4. the adjusted standard is consistent with any applicable federal law.

DISCUSSION

Justification

CILCO believes that the factors relating to outfall 002 are substantially and significantly different than the factors relied upon by the Board in adopting the General Use Water Quality Standard for boron. (Pet. at 19.) CILCO claims that the standard was set to protect irrigated crops and Duck Creek is not used for irrigation of

[4] In pertinent part, Section 304.105 reads: "no effluent shall, alone or in combination with other sources, cause a violation of any applicable water quality standard".

crops. (*Id*.) The Agency agrees with CILCO that the factors relating to Duck Creek in the vicinity of outfall 002 are substantially and significantly different from the irrigation factor. (Res. at 13.)

CILCO also observes that Duck Creek has been dammed to create Duck Creek Reservoir, channelized, and is subject to strip mine runoff and siltation. The Agency believes that the damming and channelization are the factors that control water quality and aquatic life in Duck Creek. (Res. at 13.) It is thereby CILCO's contention that "compliance with the General Use Water Quality Standard for boron would not improve the degree of aquatic life support in Duck Creek". (*Id*.)

CILCO also claims that the requested adjusted standard "will not result in environmental or health effects substantially or significantly more adverse than the effects considered by the Board in adopting the General Use Water Quality Standard for boron". (Pet. at 19-20.) Because the Station will continue to operate as it is currently does, the current use of Duck Creek for aquatic life support will continue if the adjusted standard is granted. CILCO also claims that future uses will be protected. (Pet. at 20.) As a result CILCO asserts that reducing boron in its situation would achieve no benefit.

Lastly, after analyzing alternative compliance plans, CILCO contends that there is no technically and economically reasonable alternative to meet the General Use Water Quality Standard and the NPDES Permit effluent limitation.

CILCO assures the Board that granting the requested adjusted standard will not result in a change in its present Station operating conditions, including the discharge flow rate and concentration of boron from outfall 002. (Pet. at 15.)

The Agency states that concentrations of boron in excess of the 1 mg/L General Use Water Quality Standard are characteristic of discharges at power plants that burn Illinois coal. (Res. at 2.) The Agency believes the situation at Duck Creek is accordingly similar to that generally encountered at Illinois power plants which burn Illinois coal. Specifically, the Agency supports the petition for adjusted standard because: 1) the conditions under which boron would have an adverse impact on the environment are lacking and 2) the available methods to achieve the boron water quality standard are neither technically feasible nor economically reasonable. (Res. at 2-3.)

Compliance Alternatives

CILCO has investigated both combinations of alternate operating procedures, and water treatment processes and methods for attaining compliance. (Pet. at 7-11.)

CILCO has determined that changes in operating procedures alone are unlikely to measurably impact boron concentrations in the Reservoir (Pet. at 7), or in turn at outfall 002 and the downstream reaches of Duck Creek. CILCO reached this determination based on consideration of the sources of boron in the Reservoir.

CILCO found three potential sources of boron in the Reservoir: runoff from the coal storage area, spills or overflow from the waste disposal system, and groundwater. (Pet. at 8.) The runoff from the coal storage area is collectable and treatable; however it only comprises 2% of the runoff to Duck Creek Reservoir. Therefore, although feasible to treat, the runoff from the coal storage area did not represent enough of a percentage of the total runoff to be significant. (Pet. at 8.)

Next, CILCO found that spills and overflows from the waste disposal system, although high in boron (greater than 200 mg/L (Res. at 8)), occurred too infrequently and in too small amounts to be significant sources of the boron in Duck Creek Reservoir. (Pet. 8-9; Res. at 8.)

As regards groundwater, CILCO states that it is considering[5] plans to close Waste Pond II, which it expects will eliminate the continuing introduction of high concentrations of boron into the groundwater. (Pet. at 9.) However, CILCO still believes that the high concentrations of boron already in the groundwater will persist for many years, and continue to contribute to the boron concentrations of the Reservoir and outfall 002 discharges.

CILCO has investigated three water treatment alternative: activated carbon adsorption, selective ion exchange, and reverse osmosis/mechanical evaporation. According to both CILCO and the Agency, sizing the equipment for the broad ranges of flows that occur at outfall 002 (between 1990-1994 the monthly discharge flows ranged from 0 gallons to 1.5 billion gallons), proves to be problematic with respect to all each of the alternative processes. (Pet. at 9; Res. at 9.)

First, activated carbon adsorption was preliminary evaluated, without economic evaluation, and was found to be technically infeasible at the Station. (Pet. at 7.) The Agency agrees with CILCO that the size and number of treatment units that would be required makes use of carbon adsorption impossible for Duck Creek Reservoir. (Res. at 10.)

Selective ion exchange (and the reverse osmosis/mechanical evaporator system) would use filters upstream of the ion exchange vessels to remove suspended solids from the Reservoir water. Regenerating the resin would produce wastewater with a high boron concentration which would need to be disposed of via an evaporator or waste dryer. (Pet. at 10.) This method is the least expensive of the technically feasible alternatives, with an estimated present cost of $11,760,000 (including a capital cost of $7,800,000, excluding infrastructure improvements, and an annual operating cost of $260,000, excluding disposal of the boron wastewater) excluding costs for infrastructure changes and necessary waste disposal. (Pet. at 11 and 20.) Nevertheless, the Agency believes even this cost to be unreasonable. (Res. at 10.)

A reverse osmosis/mechanical evaporator system is capable of removing 60% to 98% of influent boron over a pH range of 5.0 to 9.0. (Pet. at 10-11.) However, this process is very costly at an estimated $54,320,000 (including a capital cost of $14,700,000, excluding infrastructure improvements, and an annual operating cost of $2,600,000, excluding disposal of the boron wastewater) (Pet. at 11.) The Agency agrees the system would not be economically reasonable. (Res. at 10-11.)

Environmental Impacts

CILCO believes that "[c]ompliance with the General Use water quality standard is not necessary in this case because the particular factor on which the standard is based does not apply to Duck Creek, and compliance would not affect the uses of the Creek." (Pet. at 13.) CILCO assures the Board that if the adjusted standard is granted, it will not change its present operations at the station and therefore there will be no change in the present water quality in Duck Creek. (*Id*.) According to CILCO, "[n]o adverse environmental impacts would be likely to occur with an adjusted water quality standard because none presently occur". (*Id*.)

The Agency agrees that CILCO has demonstrated, based on its own studies and information presented, "that no adverse environmental impacts will occur as the result of the grant of the requested adjusted standard". (Res. at 11.) The Agency echoes CILCO's petition and states that the purpose of the General Use Water Quality Standard for boron, which is the protection of irrigated crops, is not applicable to and would not be affected by the Board granting this adjusted standard for outfall 002.

CILCO asserts that if there are any observable impairment to the aquatic life in Duck Creek, it is not attributable to concentrations of boron in the outfall of 002. Rather, it is attributable to known and obvious

[5] CILCO states only that it is "considering" closing Waste Pond II. (See Pet. at 9). The Agency states that CILCO "will close" the pond. (See Res. at 8.)

causes of potential degradation, including disruption of natural flow due to the Reservoir dam, stream channelization, strip mine run-off, and siltation. (Pet. at 18.)

The Agency agrees with CILCO that "the proposed discharge of 4.5 mg/L of boron will not have any adverse effects on humans, animals (including mammals, fish and aquatic invertebrates), or terrestrial or aquatic plants". (Res. at 12).

Surrounding Areas

Duck Creek originates in the northeast part of Fulton County in an area surrounded by intensive historic and current strip mining. The surface topography and vegetation communities have been significantly impacted by surface mining within the 20-square-mile watershed. (Pet. at 14.) Duck Creek flows generally south toward the Illinois River, except where it has been channelized to flow eastward downstream of Duck Creek Reservoir.

CILCO provides studies conducted over a three-decade period showing that the water quality of upper Duck Creek and Duck Creek Reservoir is characterized as good to moderate. (Pet. at 15-18.)

CILCO claims that no uses of Duck Creek for irrigation downstream of outfall 002 have been located. To support this claim CILCO contacted a variety of organizations[6] for information regarding known water uses of Duck Creek. (Pet. at 14.) The "only uses of Duck Creek reported for the relevant area are receiving the CILCO discharges from outfalls 001 and 002 and the support of aquatic life", not for irrigation, stock watering, recreation or potable water supply. (*Id*.) CILCO states that toxicological studies indicate that compliance with the 1.0 mg/L General Use Water Quality Standard for boron is not necessary to protect aquatic life or terrestrial animals. Rather, no adverse effects on the Duck Creek biological community should be observed at or below 11 mg/L of boron. (*Id*.)

According to the Agency, there "appear to be no public water supply intakes in Duck Creek or in the 100-yard 'area of mixing' in the Illinois River included in the proposed adjusted standard". (Res at 12.)

Consistency with Federal Law

Both the Agency and CILCO observe that the Board may grant the requested adjusted standard consistent with Federal Law. The Board agrees.

CONCLUSION

In sum, the Board finds that CILCO has demonstrated that grant of an adjusted standard is warranted. The Board has reviewed the justification provided by CILCO and the Agency, and the studies included in CILCO's petition, and finds that CILCO has made the demonstrations required pursuant to the adjusted standard regulations at Section 28.1 of the Act.

CILCO requests, and the Agency concurs, that the adjusted standard be set at a maximum concentration of 4.5 mg/L, the historical maximum discharge concentration. CILCO and the Agency have provided evidence warranting a finding that Duck Creek will not be adversely affected by concentrations of boron at this level. On this basis the Board finds that the adjusted standard will not result in health or environmental effects substantially or significantly more adverse than the effects considered by the Board when promulgating the rule of general applicability.

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[6] CILCO contacted the offices of Water Resources and Agriculture with the Illinois Department of Natural Resources; the Fulton County Soil and Water Conservation District; and the Fulton County Cooperative Extension Service of the University of Illinois. (Pet. Exh. 1, p. 3-8.)

This opinion constitutes the Board's findings of fact and conclusions of law in this matter.

ORDER

Central Illinois Light Company is hereby granted an adjusted standard applicable at CILCO's Duck Creek Station. This adjusted standard is subject to the following conditions:

a) This adjusted standard applies only to discharges to Duck Creek from outfall 002 of an existing facility currently owned and operated by Central Illinois Light Company and located in Fulton County, Rural Route #5, Canton, Illinois.

b) Such discharges shall not be subject to the water quality standard for boron set forth in 35 Ill. Adm. Code 302.208 and also shall not be subject to 35 Ill. Adm. Code 304.105 as it applies to the water quality standard for boron set forth in 35 Ill. Adm. Code 302.208.

c) Instead of the water quality standard for boron set forth in 35 Ill. Adm. Code 302.208, the discharge from outfall 002 shall not cause the boron concentration in Duck Creek and the Illinois River to exceed the following concentration: 4.5 mg/L from outfall 002 in Duck Creek to 100 yards downstream of the confluence of Duck Creek with the Illinois River.

IT IS SO ORDERED.

Section 41 of the Environmental Protection Act, 415 ILCS 5/41 (1994), provides for appeal of final orders of the Board within 35 days. The Rules of the Supreme Court of Illinois establish filing requirements. (See also 35 Ill. Adm. Code 101.246, Motions for Reconsideration.)

I, Dorothy M. Gunn, Clerk of the Illinois Pollution Control Board, hereby certify that the above opinion and order was adopted on the _____ day of _____, 1996 by a vote of _____.

_____
Dorothy M. Gunn, Clerk
Illinois Pollution Control Board