

ILLINOIS POLLUTION CONTROL BOARD
November 23, 1977

UNION ELECTRIC COMPANY,)
)
) Petitioner,)
)
)
) v.) PCB 77-92
)
)
) ENVIRONMENTAL PROTECTION AGENCY,)
)
) Respondent.)

OPINION AND ORDER OF THE BOARD (by Mr. Goodman):

On March 16, 1977, Union Electric Company (UE) filed a Petition for Rule 203(i)(5) Decision before the Board. On April 14, 1977, we indicated that the studies submitted to the Environmental Protection Agency (Agency) in January, 1976, in conjunction with PCB 76-89, a petition for variance from the 5-year delay incorporated in Rule 203(i)(5), constituted Petitioner's submission under Rule 203(i)(5). A hearing was held in this matter on July 8, 1977 in Edwardsville, Illinois. At the hearing the parties submitted a Stipulation. No citizen witnesses testified.

The subject of this Petition is UE's Venice Power Plant, which is on the east bank of the Mississippi River in the City of Venice, Madison County, Illinois. The plant withdraws water from the Mississippi River for use as non-contact cooling water to cool and condense steam and discharges the warmed condenser cooling water to the Mississippi River. The plant has been discharging thermal effluent to the river in this manner for over 25 years.

UE has submitted and the Board has accepted three reports to satisfy the requirements of Rule 203(i)(5), all conducted by Equitable Environmental Health, Incorporated (EEH). The EEH Reports are entitled:

- (a) Assessment of the Venice Plant Cooling Water Discharge Plume;

- (b) A Demonstration of Venice Power Plant Thermal Discharge Effects on Biological Populations of the Mississippi River; and
- (c) Venice Report Appendices AA-H.

EEH conducted surveys of the Venice thermal plume in July, August and November, 1974 and March, 1975 by measuring water temperatures at several locations along a number of transects and at a number of depths. During the surveys, UE operated the Venice Plant as close as possible to maximum generating capacity. Based upon these actual plume measurements, EEH produced a model for prediction of plume dimensions under other than survey conditions. From the actual thermal plume surveys and modeling results, EEH concluded that the Venice thermal plume meets all aspects of the applicable Illinois water quality standards for temperature specified in Rules 203(i)(3) and (4) under both survey and historical worst case conditions.

The maximum temperature rise permitted outside the mixing zone by Rule 203(i)(3), 5°F, was met for all months except July. Additionally, EEH found that under conditions of minimum daily river flow the 5°F isotherm has a surface area of only 2.6 acres and occupies a maximum of 8.6% of the river flow. For the minimum daily flow ever observed in July, the hottest month of the year, the 5° would enclose only 2.0 acres and 4.0% of the flow.

The EEH reports indicate that phytoplankton, periphyton, zooplankton, macroinvertebrates, and fish in the vicinity of the Venice Power Plant were sampled from July, 1974, through June, 1975. The sampling methods are described in both the reports and the Stipulation. EEH concluded that the phytoplankton do not suffer significant ecological harm from the thermal effluent. Temperatures that are potentially lethal for some phytoplankton (98-100°F for large diatoms and about 111° for green algae) would be approached only during a limited portion of the year and then only under extreme conditions. Only a fraction of one percent of the river's drifting plankton would ever be exposed, and the exposure would be brief (less than 10 minutes maximum). Similarly, EEH concluded that zooplankton do not incur ecological harm due to the Venice Plant's thermal plume. EEH found no unusual zooplankton in any samples. Under worst possible plume conditions, identified as maximum ambient temperature of 88°F, maximum plume temperature of 108°F and maximum exposure time of 10 minutes, only a small percentage of the drifting zooplankton would encounter unfavorable plume temperatures. The zooplankton actually entrained through the condenser system, and

thus exposed to the highest temperatures for longer time periods, showed slight, if any, effects from such exposure.

Periphyton, or attached algae, showed no adverse effects. No undesirable community shift from diatoms to blue-green algae were observed in the vicinity of the plant, and algae communities were similar above, at, and below the discharge of the Venice Power Plant. Also, EEH concluded that, even with all units in operation, the area of the heated Venice plume was so transitory and small that the thermal discharge does not affect macroinvertebrate populations in the vicinity of the plant.

The fish sampling program at Venice found twenty fish species, all of which are common to this region of the Mississippi, and also revealed that fish are relatively low in numbers. EEH reported that no fish mortality due to the Venice thermal plume was observed at any time during the study. Since the mobility of the fish allows them to avoid the warmest areas of the plume, some minor seasonal distributional modification was observed. There was some indication that species of game and commercial fish avoid the warmer plume areas in July and August, but more fish were present at the plume station than at the upstream station in September. Similarly, in April, a preference for plume over ambient temperatures was observed. EEH concluded that the distributional modification resulting from fish seeking their preferred temperature range is very slight and causes no ecologically significant adverse effects.

The EEH Thermal Effects Status Report also addressed the possibility of "cold shock" resulting from southern plant shut-downs in the winter when fish occupying the plume and acclimated to the warmer plume temperatures are quickly exposed to colder ambient river temperatures. The EEH Report concluded that cold shock has not been a problem, and outlined several reasons why it would not be expected to occur. First, Venice generally does not operate at high loads for sustained periods during the winter. Fish attracted to the plume would not be exposed to the higher temperatures for long enough periods to become acclimated. Second, to the extent that acclimation of some fish might occur within the small plume resulting at low loads, plume temperatures would generally be within the range from which acclimated fish could withstand a sudden return to ambient. Moreover, at Venice's typically low loads a relatively large proportion of condenser cooling water is recycled through warming lines during the winter, so that the small thermal discharge plume would be correspondingly reduced in size. Thus the potential for harmful acclimation of fish is even further limited by the extremely small size of the plume within

which such acclimation could possibly occur. Third, the tendency of particular fish which are quite abundant in the locale to move into deeper water and become less active during the winter indicates they are unlikely to congregate in the vicinity of the Venice plume. Results of the EEH sampling program did suggest such a trend. Finally, although UE instituted an operating program designed to take the Venice Plant off the line entirely on the weekends, these shutdowns will not be characterized by a sudden drop from relatively high loads to no load, but rather by a gradual step down to very low loads from which the Plant will be shutdown. Thus, if any fish are attracted to the warmest portion of the plume long enough to become acclimated, they will be gradually exposed to cooler temperatures as the Plant load decreases and the plume subsides.

EEH reported that the shoreline near Venice is not particularly suitable for fish spawning or nursery activities. Additionally, fish spawning is most intense at, or close to, times of highest river flow and thus smallest thermal plumes. The plume configuration indicates that the plume would not impede upstream migration of spawning fish. EEH, therefore, found that the thermal discharge at Venice does not have any effect on fish spawning, behavior or nursery areas.


The Board finds that Union Electric has satisfied its burden under Rule 203(i)(5) of Chapter 3. Union Electric has demonstrated to the satisfaction of the Board that, based upon the operating practices outlined in the EEH Reports, the discharges from the Venice Power Plant have not caused and cannot reasonably be expected to cause significant ecological damage to the receiving waters. The Board finds that, assuming the operational practices designed to minimize the possibility of ecological damage are continued, no corrective measures will be necessary.

This Opinion constitutes the findings of fact and conclusions of law of the Board in this matter.

ORDER

It is the Order of the Pollution Control Board that Union Electric Company has complied with Rule 203(i)(5) of Chapter 3 in that it has demonstrated that discharges from the Venice Power Plant have not caused and cannot reasonably be expected to cause significant ecological damage to the receiving waters, the Mississippi River.

I, Christan L. Moffett, Clerk of the Illinois Pollution Control Board, hereby certify the above Opinion and Order were adopted on the 23RD day of November, 1977 by a vote of 5-0.



Christan L. Moffett, Clerk
Illinois Pollution Control Board