ILLINOIS POLLUTION CONTROL BOARD
December 7, 2018

SOUTHERN ILLINOIS POWER COOPERATIVE,	)	
	)	
Petitioner,	)	
	)	
v.	)	PCB 18-75
	)	(Thermal Demonstration)
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY,	)	
	)	
Respondent.	)	

HEARING OFFICER ORDER

In an order on June 21, 2018, the Board found that Southern Illinois Power Cooperative (SIPC) had provided timely and sufficient notice of its petition for an alternative thermal effluent limitation. The Board noted that it had received no request for a hearing and had not determined whether it would hold one. The Board stated that it may submit questions to SIPC through a hearing officer order.

To assist the Board in its consideration of the petition, SIPC is directed to file written responses to the questions in the attachment to this order within 30 days, on or before Monday, January 7, 2019. Any motion for an extension of that deadline may be directed to the hearing officer. *See* 35 Ill. Adm. Code 101.522.

IT IS SO ORDERED.

Bradley P. Halloran, Hearing Officer
Illinois Pollution Control Board
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CERTIFICATE OF SERVICE

It is hereby certified that true copies of the foregoing order were e-mailed on December 7, 2018, to each of the persons on the attached service list.

It is hereby certified that a true copy of the foregoing order was e-mailed to the following on December 7, 2018:

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The first six questions below refer to USEPA's "Interagency 316(a) Technical Guidance Manual and Guide for Thermal Effects Sections of Nuclear Facilities Environmental Impact Statements (DRAFT)" (May 1, 1977) (USEPA Manual).

The Supplemental Data Collection states that Illinois Natural History Survey (INHS) researchers "used the slow speed side-scan imaging in concert with the transect data to draw a vegetation map of the different areas of the Lake. INHS then extrapolated the transect data coupled with the entire lake side-scan profile to estimate the coverage and species composition of SAVs [submerged aquatic vegetation] in Lake of Egypt." Exh. B, App. B at B-13; *see* USEPA Manual at 22-23 (§ 3.3.3: Habitat Formers).

1) Please provide the vegetation map and estimate of coverage and species composition for the record.

The 2017 Updated Demonstration states that "[n]o threatened or endangered fish species are present in the LOE [Lake of Egypt] thus no adverse impact would be expected to species of concern even if the thermal discharge had a negative effect on habitat formers." Exh. B at 4-9; *see* USEPA Manual at 22-23 (§ 3.3.3: Habitat Formers).

2) Please explain how ASA Analysis & Communication, Inc. (ASA) determined that no threatened or endangered fish are present in Lake of Egypt. If ASA also determined whether other threatened or endangered species such as macroinvertebrates are present in Lake of Egypt, please provide the results of that determination.

3) For Table 3-2 in the 2013 Demonstration (Exh. B, App. C at 9), please indicate which column is for the upper lake and which is for the lower lake. *See* USEPA Manual at 28-32 (§ 3.3.5: Fish).

For white and black crappie, the 2013 Demonstration states that surface waters may be limiting under stressed conditions, but deeper waters would provide suitable habitat. Exh. B, App. C at 44. The updated 2017 Demonstration indicates that under stressed conditions gizzard shad would need to descend to depths of up to 35 feet in the lower one third of the lake. Pet. Exh. B at 42-43. "The average depth in Lake of Egypt is 18 feet, with a maximum depth of 52 feet." Pet. at 11, Exh. B, App. C at 1-2.

The petition states that "EIU performed temperature and dissolved oxygen monitoring weekly from June through September 2016 to evaluate the availability of thermal refuge habitat and an age-growth study to compare Dr. Heidinger's historical results to evaluate the age-class structure and condition of White and Black Crappie populations." Pet. at 20. The 2016 supplemental data provide graphs of dissolved oxygen concentrations and temperature across depths from the areas of the lake. Exh. B, App. B at B-43 to B-46 (Figures 7-3 - 7-6). The supplemental data also includes the location of sampling sites in the three zones of the lake. Exh. B, App. B at B-40 (Figure 1).

4) Please clarify whether the key to Figures 7-3 – 7-6 should describe dissolved oxygen as a "solid" line instead of "solid and dotted." Also, since each of the four figures includes a separate graph for each of the three lake zones, please clarify what is represented by the three dashed lines indicating temperature in each of the twelve graphs.

5) In Figures 7-3 – 7-6, dissolved oxygen levels appear to approach 0 mg/L at depths of approximately 8 feet in all three lake zones and each of the four months sampled. Please comment on the conclusion cited above that "deeper waters would be suitable" and that gizzard shad would need to descend to depths of up to 35 feet in the lower half of the lake. Pet. Exh. B, App. C at 42-43.

The 2013 Demonstration states that, "[w]ithin and beyond the mixing zone the thermal plume is mostly surficial. . . ." Exh. B, App. C at 19. SIPC's petition states that "[t]he heated water flows into the lake mixing zone where it settles into an upper layer of heated water over the existing lake water with some amount of mixing at the boundary between the two layers." Pet. at 12.

6) Please address the outfall configuration and operation under Section 3.5.3.4 of the USEPA Manual.

The Petition states that "projected load factors *should follow* past load factors for each unit for the life of the plant." Pet. at 8 (emphasis added); *see* 35 Ill. Adm. Code 106.1130(a)(5).

7) Does SIPC foresee any factors that may cause projected load factors to vary from past load factors instead of following them? If so, what are those factors?

SIPC reports that the Marion Generating Station consists of two coal-fired units (Units 4 and 123) and two additional combined-cycle units (Units 5 and 6). Petition at 7; Exhibit B at i, 1-3. Units 5 and 6 are not included in the discussion of heated effluent, method for heat dissipation, load factor, or shutdowns. Pet. at 8-11; *see* 35 Ill. Adm. Code 106.1130(a).

8) Please address whether Units 5 and 6 contribute to the thermal loading of the heated effluent to Lake of Egypt. If so, please include information for Units 5 and 6 on the associated heated effluent, method for heat dissipation, load factor, or shutdowns.

The 2013 Demonstration states that "[t]he additional boiler than became operational in 2003 resulted in increases of water use and volume of thermal water discharged into the lake." Exh. B, App. C at 1. The petition states that the operation of Unit 123 beginning in 2003 did not appreciably increase effluent volume but dramatically increased "the frequency of thermal discharges." Pet. at 7.

9) Would SIPC clarify the effect that operation of Unit 123 beginning in 2003 had on the frequency and volume of thermal discharges to the lake?

In the 2013 demonstration (Exhibit B, Appendix C), Table 6-2 cites a 2010 study and indicates that the UILT for threadfin shad is 91.9°F. However, at page 40, the demonstration cites a 1975 study and states that the UILT tolerance range of threadfin shad is 93 to 97°F.

10) Please clarify the temperature constituting UILT for this species.

In the 2013 Demonstration, AMEC used the Generalized Longitudinal Lateral Vertical Hydrodynamic Transport (GLLVHT) model "to predict potential lake temperatures during both summer and winter worst case conditions." Pet. at 24. Tables 5-5 and 5-6 of AMEC's report summarize modeling inputs for the summer and winter, normal and stressed conditions. Exh. B, App. C at 34-35. Figures 5-10 through 5-17 depict the modeling results graphically. Exh. B, App. C at 81-88.

11) Provide directly from the model a printout showing inputs used and outputs obtained for summer and winter normal and stressed conditions. In the printout, please highlight the numbers used in the summaries of the modeling inputs and the numbers used to produce the figures.

Table F-2 of AMEC's "Supplemental Spring and Fall Hydrothermal Modeling" presents the "Summary of Model Inputs for Lake of Egypt Thermal Simulations" for spring (May 31) and fall (October 1) conditions. Exh. B, App. C, App. F at 5. AMEC's report states that

> Maximum surface temperature resulting from the spring condition simulation for a May 31 date was 29.9° C (85.8° F). Under fall conditions (October 1) a maximum surface temperature of 32.6° C (90.7° F) was simulated from the model. At the edge of the proposed mixing zone, the spring water temperature is 29.8° C (86° F) and the fall water temperature is 32.5° C (91° F)." Exh. B, App. C, App. F at 2.

12) Provide directly from the model a printout showing inputs used and outputs obtained from the Supplemental Spring and Fall Hydrothermal Modeling. In the printout, please highlight the numbers used in the summaries of the modeling inputs and the numbers reported above as the maximum surface temperatures and the temperatures at the edge of the mixing zone from the simulation of the spring and fall conditions.

In the 2013 Demonstration, Figures 5-10 through 5-17 illustrate lake surface temperatures generated by the model. Exh. B, App. C at 81-99. Figures 5-14 through 5-17 specifically show the model results at the cross sections. *Id*. at 85-88. Transect A appears to pass through the mixing zone, while Transect B appears to pass approximately 700 feet east of the edge of the mixing zone shown in Figures 5-10 through 5-13. *Id*. at 81-84.

13) Please explain the reason for locating Transect B beyond the edge of the mixing zone.

14) Address whether a north-south cross section otherwise similar to Transect B at the eastern edge of the mixing zone would show temperatures greater than those along Transect B.

15) For Figures 5-14 through 5-17, please provide a scale for depth and surface distance.

16) For Figures 5-14 through 5-17, please show the location of the edge of the mixing zone.

The 2013 Demonstration states that "[s]urface temperatures for the simulation for stressed winter conditions are presented in Figure 5-13." Exh. B, App. C at 37. The warmest isotherm in Figure 5-13 is 68.1 – 69° F. *Id*. at 84.

The 2013 Demonstration also states that "[c]ross-sectional diagrams of model results under 'normal' and 'stressed' conditions are illustrated in Figures 5-14 and 5-15 for the summer period and in Figures 5-16 and 5-17 for the winter period." Exh. B, App. C at 37. The warmest isotherm in Figure 5-16 is 69.1 – 70° F at cross section A, which passes through the mixing zone. *Id*. at 87.

17) Please identify the modeled winter maximum temperature at the edge of the mixing zone.

18) SIPC stated that the hydrothermal modeling "forms the basis for SIPC's requested alternate thermal limits." Pet. at 28. Please explain why SIPC proposed 72° F as the winter maximum instead of the highest modeled result of 70° F which passes through the mixing zone or the highest temperature at the edge of the mixing zone as indicated by the hydrothermal model.

19) The 2013 Demonstration states that model inputs "were based on the 95% [annual probability of] non-exceedance event corresponding to an average occurrence frequency of approximately once in 20 years," except where 98% was used for winter. Exh. B, App. C at 28. Given that the winter results from the hydrothermal modeling of 70° F are representative of the 98^{th} percentile, please explain whether the proposed excursion temperatures (3° F) and hours (1% of 12-month period) would provide an adequate range for the alternative thermal effluent limitation for winter temperatures that might exceed 70° F during conditions that would occur above the 98^{th} percentile.

The Board has granted alternative thermal effluent limitations based on the highest values in the modeled extreme-case scenarios. *See* Exelon Generation v. IEPA, PCB 15-204, slip op. at 82 (Mar. 3, 2016). To address the possibility of temperatures above modeled extreme-cases, the Board has provided excursion temperatures and hours, which SIPC has also requested.

20) If SIPC complies with a winter maximum of 70° F instead of 72° F, please explain whether allowable excursion temperatures and hours would require SIPC to take other measures, such as curtailing operations or derating.

21) Comment on proposing 70°F for the maximum temperature at the edge of the mixing zone as indicated by the hydrothermal model as the winter (December – March) limit instead of 72°F as requested in the petition.

According to AMEC's "Supplemental Spring and Fall Hydrothermal Modeling, " "[m]aximum surface temperature resulting from the spring condition simulation for a May 31 date was 29.9° C (85.8° F). Under fall conditions (October 1) a maximum surface temperature of 32.6° C (90.7° F) was simulated from the model. At the edge of the proposed mixing zone, the spring water temperature is 29.8° C (86° F) and the fall water temperature is 32.5° C (91° F)." Pet. Exh. B, App. C, App. F at 2.

22) For fall (October – November), SIPC proposed the maximum surface temperature of 91° F that was simulated from the model at the edge of the mixing zone as the alternative thermal effluent limitation. Explain why SIPC proposed 90° F as the spring alternative thermal effluent limitation instead of 86° F as the maximum indicated by the hydrothermal model at the edge of the mixing zone.

23) If spring results of the supplemental hydrothermal modeling are representative of the 95th percentile (Exh. B, App. C, App. F at 2), once in 20-year frequency (Exh. B, App. C at 28), please explain whether the proposed excursion temperatures and hours would provide an adequate range for the alternative thermal effluent limitation for spring temperatures that might exceed 86°F during conditions above the 95th percentile.

24) If SIPC complies with a spring maximum of 86° F instead of 90° F, please explain whether allowable excursion temperatures and hours would require SIPC to take other measures, such as curtailing operations or derating.

25) Please comment on proposing 86° F or the maximum temperature at the edge of the mixing zone as indicated by the hydrothermal model as the spring (April – May) limit instead of 90° F as requested in the petition.

The 2013 Demonstration states that the eastern (downstream) boundary of the 26-acre mixing zone "generally corresponds to the 101° F isotherm as predicted in the summer stressed condition modeling scenario." Exh. B, App. C at 55. Results for summer stressed condition modeling are shown in Figures 5-11, 5-14, and 5-15. *Id*. at 82, 85-86. The highest isotherm in these figures appears to be 99.1 – 100° F. Figures 5-11, 5-14, and 5-15 do not appear to include a 101° F isotherm. Table 5-1 of the 2013 Demonstration shows the highest water temperature recorded in the chart as 100.6° F taken on August 17, 2010. Note b to the table states that the "[m]easurement was taken inside the mixing zone, near the discharge outfall." Exh. B, App. C at 25.

26) Clarify the modeled summer maximum temperature at the edge of the mixing zone.

27) Explain why SIPC proposes 101° F as the summer maximum, corresponding to a measurement taken near the discharge outfall, instead of the highest modeled result of 100° F or the highest temperature at the edge of the mixing zone as indicated by the hydrothermal model.

28) If summer results of the hydrothermal modeling represent the 95th percentile (Exh. B, App. C, App. F at 2), once in 20-year frequency (Exh. B, App. C at 28), explain whether the proposed excursion temperatures and hours would provide an adequate range for the alternative thermal effluent limitation for summer temperatures that might exceed 100° F during conditions that would occur above the 95th percentile.

29) If SIPC complies with a summer maximum of 100° F, please explain whether allowable excursion temperatures and hours would require SIPC to take other measures, such as curtailing operations or derating.

30) Please comment on proposing 100° F or the maximum temperature at the edge of the mixing zone as indicated by the hydrothermal model as the summer (June – September) limit instead of 101° F as requested in the petition.

SIPC appears to request relief from all of Section 302.211 by proposing the alternative thermal effluent limitations be worded "[i]n lieu of the temperature water quality standards defined by Section 302.211…" Pet. at 12. Only the numeric standards derived from Section 302.211(d) and (e) are currently imposed in the NPDES permit. Relief from the entire Section 302.211 would include the requirements to perform studies as required by IEPA (Section 302.211(h)), to take corrective measures if the thermal effluent causes significant ecological damage (Section 302.211(i)), and to comply with other requirements in Section 302.211.

31) Please explain whether SIPC intends also to request relief from the entirety of Section 302.211. If so, please justify each provision other than subsections (d) and (e) from which SIPC seeks relief.

32) If not, please indicate each provision from which it does not seek relief.