

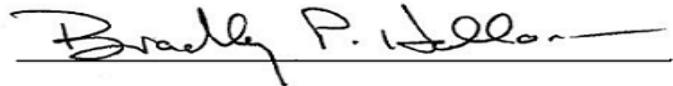
ILLINOIS POLLUTION CONTROL BOARD
November 21, 2018

MIDWEST GENERATION LLC,)	
)	
Petitioner,)	
)	
v.)	
)	PCB 18-58
ILLINOIS ENVIRONMENTAL)	(Thermal Demonstration)
PROTECTON AGENCY,)	
)	
Respondent.)	

HEARING OFFICER ORDER

To further assist the Board's understanding of the above-captioned matter, petitioner Midwest Generating LLC is directed to address the attached questions in a filed written response on or before December 21, 2018.

IT IS SO ORDERED.



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Hearing Officer
Illinois Pollution Control Board
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PCB 18-58
Midwest Generation LLC
Will County Generating Station Alternative Thermal Effluent Limitation Demonstration

Questions for Petitioner

1. **106.1130(b)(1) Description of Method for Heat Dissipation**

Midwest Generation (Midwest Gen) states, “Cooling water, once passed through the cooling condensers, exits the plant through this approximately 250-foot discharge canal which leads directly back to the CSSC. There are no flow controlling structures or gates associated with the WCGS discharge canal.” Pet. at 9. Midwest Gen noted that the cooling water intake structure withdraws water from the entire water column. Pet. at 6. For the cooling water discharge, Midwest Gen stated, “[T]he thermal plume is surficial in nature...” Exh. 2. The cross section vertical profiles south of the outfall show the surficial nature of the thermal plume. Exh. 4, App. D.

35 Ill. Adm. Code 302.102(b)(2) provides:

Mixing must be confined in an area or volume of the receiving water no larger than the area or volume which would result after incorporation of outfall design measures to attain optimal mixing efficiency of effluent and receiving waters. These measures may include, but are not limited to, use of diffusers and engineered location and configuration of discharge points.

- a. Please describe the flow dynamics of the discharge canal and how the flow dynamics provide for mixing in the CSSC as required under 35 Ill. Adm. Code 302.102(b)(2).
- b. Is maintaining the thermal plume near the surface more beneficial in terms of providing a zone of passage than rapid mixing with the entire water column?
- c. Although Midwest Gen contends that there is not sufficient space to install helper cooling towers to meet the thermal water quality standards (Pet. at 6-7), please comment on whether modifications to the discharge structure or canal have the potential to increase the zone of passage when upstream canal flow provides a dilution ratio greater than 3:1.

2. **106.1130(e)(3) Results of Studies: Summaries of physical, chemical, biological and technical data supporting the demonstration, along with a discussion of the data**

Midwest Gen requests that the proposed alternative thermal effluent limitations be effective at the edge of the allowed 26-acre mixing zone and that compliance be demonstrated through the continued use of the WCGS Near-Field Thermal Compliance Model as was previously done under the terms of its NPDES Permit. Pet. at 26. Midwest Gen states that it uses the Near-Field Thermal Compliance Model to determine the water

temperature in the CSSC at the edge of the 26-acre mixing zone. Midwest Gen explains, “The Near-Field Thermal Model utilizes real-time station operating data and 24-hour antecedent flow to calculate fully mixed temperatures in the main body of the waterway...The results produced by the Near-Field Thermal Model have been demonstrated to be equivalent to the approximate edge of the allowed 26-acred mixing zone for WCGS.” Pet. at 10. Additionally, the model “is also designed to allow for the accounting and reporting of excursion hour use.” App. D, Exh. D. “The Excel-based Near-Field Thermal Compliance Matrix can be used by station personnel on an as-needed basis to ensure that compliance with the Secondary Contact thermal standards is maintained under current receiving stream conditions.” Exh. 4, App. D, Exh. D at 2.

The chart provided in Exh. 4, App. D, Exh. D, Att. 1 is a sample output produced by the Near-Field Thermal Compliance Model based on certain inputs for pump rate, mixing ratio, upstream canal flow, available dilution flow, intake temperature, and discharge temperature. Exh. 4, App. D, Exh. D at 2. The calculated maximum downstream temperatures are displayed for the various input parameters. Calculated temperatures that exceed the water quality standard are highlighted in yellow to indicate situations under certain flow rates and intake temperatures where excursion hours are being used for water temperatures greater than the standard. Station personnel can read off the chart whether excursion hours are being used by lining up the Upstream Canal Flow and Available Dilution with the Intake Temperature.

- a. The chart lists a range for “Upstream Canal Flow” from 1405 to 5205 cfs. Please explain why the chart does not extend all the way down to the 7Q10 flow¹ of 1315 cfs. Exh. 4, App. D at D-13, D-30.
- b. The equation in the chart for calculating the downstream temperature at the edge of the mixing zone is depicted as:
$$C_{DE} = (C_E Q_E + C_{US} Q_{US}) / (Q_E + Q_{US})$$
 - i. Q_{US} is denoted as “25% of the available receiving stream flow in cfs”. Is Q_{US} equal to 25% of the “Upstream Canal Flow, cfs” depicted in the left column of the chart?
 - ii. Since Midwest Gen has requested that the zone of passage be reduced from 75% to 50%, would Q_{US} change to 50% of the Upstream Canal Flow in the calculation? If so, please describe how the calculated maximum downstream temperatures would change and the corresponding impact on potential excursion hours being displayed in the chart.
 - iii. Are there any other parameters in the equation or model that would be affected by the proposed alternative thermal effluent limitations?
- c. The highlighted calculated maximum downstream temperatures in the chart show “Excursion hours are being used”, which are based on the previous temperature

¹ The 7Q10 is the lowest 7-day average flow that occurs (on average) once every 10 years.

standards for Secondary Contact and Indigenous Aquatic Life Use. Those standards covered one time period: January – December at 93°F. The proposed alternative thermal effluent limitations splits the temperature standards into eight time periods: (1) January-February 70°F, (2) March 75°F, (3) April 80°F, (4) May 85°F, (5) June – September 93°F, (6) October 90°F, (7) November 85°F, and (8) December 75°F.

Since the proposed alternative thermal effluent limitations split the temperature standards into eight time periods, please provide updated charts for each time period, similar to the one provided in Exh. 4, App. D, Exh. D, Att. 1. Please reflect the range of excursion hours during each time period for the associated proposed temperature standard. Additionally, please incorporate the change in Q_{US} to 50% of available receiving stream flow, as well as any other updates necessitated by the proposed alternative thermal effluent limitations.

- d. Please explain the mechanics behind how Midwest Gen would demonstrate NPDES compliance with the 50% zone of passage under the proposed alternative thermal effluent limitations? Would Midwest Gen calculate, record, and report the specific percent zone of passage or simply indicate that it is greater than 50%?

3. **106.1130(g)(1) Requested Relief for the Alternative Thermal Effluent Limitation**

Midwest Gen proposed alternative thermal effluent limitations language for the Board’s order. Pet. at 25-26. Please comment on the revised language below:

Under 35 Ill. Adm. Code 106.SubpartK and 35 Ill. Adm. Code 304.141(c), the Board determines that the following alternative thermal effluent limitations apply to Midwest Generation, LLC’s Will County Generating Station.

1. Temperature

- a. In lieu of the Chicago Area Waterway System Aquatic Life Use B (ALU B) thermal water quality standards in 35 Ill. Adm. Code 302.408(h), the following daily maximum temperature limits apply:

Months	Daily Maximum (°F)
January	70
February	70
March	75
April	80
May	85
June	93
July	93
August	93

September	93
October	90
November	85
December	75

- b. In lieu of the water temperature requirements of 35 Ill. Adm. Code 302.408(c), (d), (e), and (f), water temperature must not exceed the daily maximum temperature limits in paragraph (1)(a):
 - i. By more than 5% of the hours (438 hours) in the 12-month period ending with any month; or
 - ii. By more than 1.7°C (3°F) at any time.
 - c. The alternative thermal effluent limitations in paragraphs (1)(a) and (1)(b) apply at the edge of the 26-acre mixing zone allowed in Will County Generating Station's NPDES permit.
2. Zone of Passage. In lieu of 35 Ill. Adm. Code 302.102(b)(8), the mixing zone identified in paragraph (1)(c) must allow for a zone of passage that includes at least 50% of the cross-sectional area and volume of flow of the Chicago Sanitary and Ship Canal.
 3. Compliance. Midwest Generation, LLC must demonstrate compliance with paragraph (1) and (2) by modeling that is:
 - a. Designed consistent with this opinion and order; and
 - b. Approved by the Illinois Environmental Protection Agency as a condition of Will County Generating Station's NPDES permit.
 4. The Agency must expeditiously modify Midwest Generation's NPDES permit consistent with this opinion and order.

Please specifically address the following:

- a. Section 302.408(f) limits the exceedance of the temperature limits during a 12-month period ending with any month. 35 Ill. Adm. Code 302.408(f). Midwest Gen proposes that its daily maximum excursions not exceed more than 5% of the time in a calendar year. Pet. at 25.
 - i. Please explain if Section 302.408(f)'s any 12-month period is appropriate, or if it is more stringent than necessary and Midwest Gen's calendar year period should be granted.

- ii. For the previously applicable Secondary Contact and Indigenous Aquatic Life temperature standards, identify all instances over the past five years when excursion hours were exceeded during a twelve-month calculation but would not have been under a calendar year calculation. During these times, were operations at the Will County Generating Station curtailed or did Midwest Gen take other measures to address the exceedance of excursion hours?
 - iii. For the currently applicable temperature standards, identify all instances over the past five years when excursion hours would have been exceeded during a twelve-month calculation but would not have been under a calendar year calculation. If excursion hours reach near exceedance under the twelve-month calculation, what measures would Midwest Gen take that would not be necessary under the calendar year calculation?
- b. Is having the Board's order specify the method of demonstrating compliance appropriate or necessary? If so, is the revised language in paragraph (3) above sufficient?

4. **106.1130(g)(2) Requested Relief from Mixing Zone Regulations at 35 IAC 302.102-Zone of Passage**

Midwest Gen uses a hydrothermal model as part of its Type II Predictive Demonstration. Exh. 4, App. B. The petition states, "The proposed AELs would provide sufficient limits on heated effluent such that the CSSC will maintain a zone of passage even under worst-case scenarios." Pet. at 21. The 316(a) Demonstration states, "Only under the worst-case condition, at the 7,000 ft downstream of the WCGS discharge location, was the zone of passage for the 90°F isotherm less than 75% of the water column. Although a zone of passage of less than 75% may affect some species in a limited fashion, the instances where the zone of passage downstream of the WCGS thermal discharge is less than 75% (but not less than 50%) are expected to be rare and limited in duration. Under these limited conditions, there would be only temporary and infrequent avoidance of the plume. Given the nature of the BIC in the CSSC, a temporary reduction in the extent of the zone of passage is unlikely to result in adverse harm." Exh. 4 at 5-2.

Under the worst-case winter scenario for the 70°F isotherm/proposed alternative thermal effluent limitation (January-February), the tables in Exh. 4, App. D show the zone of passage reaching 14% at the 180-foot transect, and 0% for the 7,000-foot transect (edge of the allowed 26-acre mixing zone) and 11,000-foot transect further downstream. For the 75°F isotherm, the zone of passage reached 66% at the 180-foot transect and 100% at the 7,000-foot transect. The worst-case winter scenario was modeled when temperatures were unseasonably warm and flow was near 7Q10 of 1315 cfs. Exh. 4, App. D at D-39 to D-40.

35 Ill. Adm. Code 302.102(b)(6) provides, "Mixing must allow for a zone of passage for aquatic life in which water quality standards are met."

- a. Please elaborate on the duration of the worst-case winter scenario and the predicted 0% zone of passage for the 70°F isotherm/proposed alternative thermal effluent limitation (January-February).
- b. Please indicate if the hydrothermal model would be able to calculate a zone of passage of 50% or more for an isotherm somewhere between 70°F and 75°F at the 180- and 7,000-foot transects. If so, what would that isotherm be? Given the 3°F allowable excursion above the daily maximum limits under the proposed alternative thermal effluent limitations (70°F + 3°F = 73°F), would a 50% zone of passage be achieved at the 180- and 7,000-foot transects at a temperature of 73°F?
- c. Please indicate if there ever was a fish kill in the CSSC that was attributed to the WCGS thermal plume under the conditions in the worst-case winter scenario.
- d. Does WCGS plan to do anything to assure the zone of passage does not drop below the requested 50%, such as derate at river flows below a certain level?
- e. Midwest Gen states, “Based on review of historical operating and canal flow data, it can be expected that a 75% or greater ZOP under the proposed thermal AELs would be available in the CSSC near WCGS most of the time. However, due to the frequency of erratic flow fluctuations, as well as low flow conditions where the dilution ratio may be less than 3:1, IEPA already allows for a reduced ZOP of 50%.” Exh. 4 at 3-8.

In PCB 14-123 Exelon Generation LLC, Quad Cities Nuclear Generating Station, the Board granted an ATEL that included relief from the zone of passage requirements; however, the size of the zone of passage for the Quad Cities’ ATEL was conditioned upon the quantity of flow in the receiving stream. The ATEL allowed a zone of passage of no less than 66% only when the flow in the receiving stream was less than 16,400 cfs. When the river flow was more than 16,400 cfs, the Station was required to provide a 75% zone of passage. See PCB 14-123, slip op. at 54-55 (September 18, 2014).

Please address whether a similar condition to the one in PCB 14-123 should be included in the proposed ATEL. If not, explain why the conditions in this case are different from those in PCB 14-123. If including a similar condition is appropriate, what is the minimum flow where a 75% zone of passage would be provided under the modeled worst case scenarios?

5. **106.1103(g)(3) Any other relief sought - Excursion Hours**

Midwest Gen requests an increase in excursion hours from 87.6 excursion hours (1% of 8,760 hours in a year) allowed under 35 Ill. Adm. Code 302.408(h) to 438 excursion hours (5% of 8,760 hours in a year) allowed under the previous Secondary Contact and Indigenous Aquatic Life standards. WCGS would use excursion hours when the temperature at the edge of the mixing zone exceeds the numerical limit up to 3°F over the

limit. Pet. at 18. Midwest Gen states, “[T]he Demonstration Report shows that, because the species inhabiting the CSSC are generally tolerant and have the ability to sense and avoid areas of water temperatures outside of their preferred range, these temporary instances of increased thermal discharge temperatures will not fundamentally change the inhabitability of the CSSC.” Pet. at 23-24. EA Engineering notes that most of the RIS can tolerate water temperatures above 95°F for extended periods of time (48-96 hours) at acclimation temperatures above 85°F. Exh. 4, App. B at B-30.

The hydrothermal analysis documents the historic number of hours and months with discharge temperatures greater than the proposed alternative thermal effluent limits from 2011 to 2016. Exh. 4, App. D, Tables D-3a to D-3c. EA Engineering writes,

Based on continuous temperatures from 2011-2016 recorded at the WCGS discharge, temperatures of the magnitude approaching those modeled for the “worst-case” scenario are expected in July and August from about one to 5% of the time (Appendix D; Table D-1). Discharge temperatures exceeding 33.9°C (93°F) can be expected up to 20% of the time within the summer period from June through September, based upon actual data from 2011-2016. Exh. 4, App. B at B-35.

- a. Please specifically address whether the requested *increase* in excursion hours from 87.6 to 438 hours would cause appreciable harm to the BIC.
- b. Please explain the effect on the BIC of the worst-case summer and winter scenarios (Exh. 4, App. D) if excursion hours are used 20% of the time within the summer period from June through September as in 2011-2016. Please explain the likelihood of the excursion hours occurring consecutively in periods exceeding 96 hours (the extended period of time EA Engineering noted that most RIS can tolerate water temperatures above 95°F. Exh. 4, App. B at B-30.).
- c. Address whether any fish kills have been documented that were associated with the thermal component of the WCGS discharge within the range of temperatures and excursion hours that would be allowed under the proposed alternative thermal effluent limitations.

6. **106.1103(g)(3) Any other relief sought: 302.408(c) and (d) Temperature Fluctuations**

In addition to relief from the thermal numeric water quality standards, the provision for excursion hours, and the zone of passage requirements, Midwest Gen also proposes that the alternative thermal effluent limitations would replace subsections (c), (d), and (e) of Section 302.408. 35 Ill. Adm. Code 302.408(c), (d), and (e).

Subsection (c) prohibits abnormal temperature changes that may adversely affect aquatic life unless caused by natural conditions. Subsection (d) requires maintaining the normal daily and seasonal temperature fluctuations that existed before the addition of heat due to

other than natural causes shall be maintained. And subsection (e) requires that maximum temperature rise will not exceed 5°F above the natural temperatures.

- a. Please explain how Sections 302.408(c), (d), and (e) are more stringent than necessary.
- b. Please explain how the proposed alternative thermal effluent limitations replace or address these provisions.

Clean Water Act Section 316(a) Demonstration Elements

(Based on USEPA Technical Guidance Manual: “USEPA: “Interagency 316(a) Technical Guidance Manual and Guide for Thermal Effects Sections of Nuclear Facilities Environmental Impact Statements (DRAFT)” (316(a) Manual), May 1, 1977)

7. 3.3.3 Habitat Formers

The 316(a) Demonstration states that the State threatened “Banded Killifish were caught in *unique* habitat for a main channel border in the lower Lockport Pool due to the presence of shallow littoral zone areas with dense aquatic vegetation. Banded Killifish normally inhabit clear, glacial lakes with abundant aquatic vegetation. The area near WCGS does not provide this type of habitat, nor does most of the lower Lockport Pool (Appendices A, C, F and G).” Exh. 4 at 4-8 (emphasis added). IDNR noted that although the Banded Killifish is present in the vicinity, IDNR found that adverse impacts from the ATEL were unlikely. Rec. at 9.

In other places, the 316(a) Demonstration states, “The Lockport Pool does not provide *unique* or critical habitat for the survival and growth of any wildlife species.” Exh. 4 at 6-14 (emphasis added). Later in the same page, the 316(a) Demonstration states, “*Unique* or rare aquatic habitat that could be affected by operation of the cooling water system does not occur in the segment of the CSSC near WCGS.” Exh. 4 at 4-8 (emphasis added).

The 316(a) Manual specifies, “There will be no destruction of *unique* or rare habitat without a detailed and convincing justification ...” 316(a) Manual at 71 (emphasis added).

In the PCB 14-123 Thermal Demonstration for Exelon Generation’s Quad Cities Nuclear Station, the US Fish and Wildlife Service required Exelon to work in collaboration to prepare a Habitat Conservation Plan to protect a federally endangered species. The habitat was considered “unique” but not rare. The US Fish and Wildlife Service designated the areas as “essential habitat” for the particular endangered species. PCB 14-123 Pet. Exh. 1 App. C at C-12; PCB 14-123 Pet. Exh. 4 at 17-18; PCB 14-23 slip op. at 12 (September 18, 2014).

In the Illinois Endangered Species Protection Act, " 'Essential Habitat' means the specific ecological conditions required by an endangered or threatened species for its survival and propagation, or physical examples of these conditions." 520 ILCS 10/2.

Please clarify whether the characterization of the habitat where the State threatened Banded Killifish were caught as "unique" (Exh. 4 at 4-8) was meant to comport with the meaning of "unique" and "essential habitat" as used in the 316(a) Manual at 71 and the Illinois Endangered Species Protection Act at 520 ILCS 10/2. If so, please address whether a condition requiring a Conservation Plan be submitted to Illinois Department of Natural Resources is appropriate.

8. **3.3.4 Shellfish/Macroinvertebrates**

The 316(a) Demonstration states that the 7Q10 flow is 1315 cfs,.and the design flow of the WCGS facility is 882 cfs, which is greater than 30% of the 7Q10 flow. *See* Exh. 4, App. D at D-13, D-30. Under Section 3.3.4 of the 316(a) Manual, for a demonstration to be "judged successful", the petitioner must demonstrate:

Discharge equal to 30% or more of the 7Q10 flow would be cause for concern unless invertebrates do not serve as a major forage for fish, food is not a limiting factor, and drifting invertebrate fauna is not harmed by passage through the thermal plume. 316(a) Manual at 24-25. *See also* Exh. 4 at 6-6.

Please specifically address these criteria.