BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

SOUTHERN ILLINOIS POWER COOPERATIVE,	)	
Petitioner,	)	
v.	)	**PCB _____ (Thermal Demonstration)**
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY,	)	
Respondent.	)	

NOTICE OF FILING

To: ALL PARTIES ON THE ATTACHED SERVICE LIST

PLEASE TAKE NOTICE that we have today filed with the Office of the Clerk of the Illinois Pollution Control Board a **PETITION FOR ALTERNATIVE THERMAL EFFLUENT STANDARDS, and APPEARANCES OF GABRIEL RODRIGUEZ AND AMY ANTONIOLLI**, copies of which are herewith served upon you.

/s/ Amy Antoniolli
Amy Antoniolli

Dated: April 12, 2018

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Submitted on behalf of
Southern Illinois Power Cooperative

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PETITION FOR ALTERNATE THERMAL EFFLUENT STANDARDS

Southern Illinois Power Cooperative ("SIPC" or "the Company") requests, by and through its attorneys, Schiff Hardin, LLP, and pursuant to 35 Ill. Adm. Code 304.141(c), Section 316(a) of the Clean Water Act ("CWA"), 33 U.S.C. §1326(a) and 35 Ill. Adm. Code 106, Subpart K, that this Board grant alternative thermal effluent limits applicable to SIPC's discharges to Lake of Egypt.

This petition ("Petition") is divided into four parts. Part I provides the Board with an overview of SIPC's Petition and request for relief. Part II reviews the legal standards applicable to Section 316(a) variances. Part III sets forth SIPC's petition, including the factual background of the Marion Generating Station, its thermal discharges, and Lake of Egypt, and a summary of the 316(a) demonstration and supporting studies. Part IV concludes SIPC's petition.

I. INTRODUCTION

SIPC petitions the Board to grant alternative thermal effluent limits applicable to the Marion Generating Station's discharge to Lake of Egypt pursuant to 35 Ill. Adm. Code

304.141(c), Section 316(a) of the Clean Water Act (CWA), and Section 35 Ill. Adm. Code 106.1100 *et seq*. These federal and state provisions allow a thermal discharger to obtain a thermal effluent variance if it can demonstrate that less stringent thermal effluent standards would be protective of aquatic life in the receiving water body. The showing under federal regulations is both site-specific and fact intensive.

Once SIPC makes the required showing to the Board's satisfaction and the Board then grants SIPC's request for alternative thermal standards, those alternative standards may then be incorporated by IEPA in SIPC's National Pollutant Discharge Elimination System ("NPDES") permit.[1] 35 Ill. Adm. Code 106.1170(a).

SIPC's current NPDES permit requires compliance with Section 302.211f of 35 Ill. Adm. Code Chapter 1, Subtitle C and Section 316(a) of the CWA.[2] To satisfy that condition, SIPC commenced studies beginning in 2006 and continued studies through 2016 in support of this petition. The results are presented in Exhibit B – *Updated 316(A) Variance Demonstration Report* for *Marion Generating Station*, John Dimitry and Jim McLaren, ASA Analysis & Communication, Inc., October 2017 (also referred to as "316(a) Demonstration").

In summary, SIPC asks the Board to grant alternative thermal standards under 35 Ill. Adm. Code 304.141(c) and Section 106, Subpart K applicable to its discharge to Lake of Egypt in lieu of the limits in Special Condition 4. As discussed in this Petition, the 316(a) Demonstration shows that the requested alternative thermal effluent limitations will assure the protection of aquatic life in the Lake of Egypt.

[1] SIPC's NPDES Permit No. IL0004316 is attached to this Petition as Exhibit A.

[2] Exhibit A, Special Condition 7.

II. LEGAL STANDARDS APPLICABLE TO SECTION 316(a) RELIEF

The Board has adopted a mechanism for determining, in accordance with Section 316(a) of the CWA, that specific thermal standards apply to a particular discharger in lieu of the generally applicable thermal standards derived from 35 Ill. Adm. Code 302.211(e). Specifically, Section 304.141(c) provides:

> The standards of this Chapter shall apply to thermal discharges unless, after public notice and an opportunity for public hearing, in accordance with Section 316 of the CWA and applicable federal regulations, the Administrator and the Board have determined that different standards shall apply to a particular thermal discharge.[3]

This Section authorizes the Board to conduct a public hearing on proposed site-specific alternative thermal effluent limitations and evaluate requests and adopt alternative standards in accordance with Section 316(a) and implementing regulations. Demonstrations made pursuant to Section 316(a) and implementing regulations are commonly referred to as "316(a) demonstrations." Section 316(a) establishes a flexible variance process that allows dischargers relief from otherwise applicable thermal standards on a case-by-case basis. Section 316(a) of the CWA provides:

> With respect to any point source otherwise subject to the provisions of section 1311 of this title or section 1316 of this title, whenever the owner or operator of any such source, after opportunity for public hearing, can demonstrate to the satisfaction of the Administrator (or, if appropriate, the State) that any effluent limitation proposed for the control of the thermal component of any discharge from any such source will require effluent limitations more stringent than necessary to assure the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife in and on the body of water into which the discharge is to be made, the Administrator (or, if appropriate, the State), may impose an effluent limitation under such section on such plant, with respect to the thermal component of such discharge (taking into account the interaction of such thermal component with other pollutants), that will assure the protection and

[3] 35 Ill. Adm. Code 304.141(c).

> propagation of a balanced indigenous population of shellfish, fish and wildlife in and on that body of water.[4]

Section 316(a) requires "reasonable assurance of the protection and propagation of a balanced, indigenous population" as opposed to a "no effects" standard.[5] Under this standard, some changes to the population are acceptable as long as the water body will continue to support a balanced population. The regulations define "balanced, indigenous community" or "BIC" as synonymous with the term "balanced indigenous population" or "BIP," and:

> [A] biotic community typically characterized by diversity, the capacity to sustain itself through cyclic seasonal changes, presence of necessary food chain species and by a lack of domination by pollution tolerant species. Such a community may include historically non-native species introduced in connection with a program of wildlife management and species whose presence or abundance results from substantial, irreversible environmental modifications. Normally, however, such a community will not include species whose presence or abundance is attributable to the introduction of pollutants that will be eliminated by compliance by all sources with section 301(b)(2) of the Act; and may not include species whose presence or abundance is attributable to alternative effluent limitations imposed pursuant to section 316(a).[6]

Importantly, economic factors are not part of a 316(a) demonstration. Indeed, the decision to grant or deny a request for less stringent thermal limitations pursuant to Section 316(a) hinges solely on proof of the biological effects of the discharges. Terms commonly used to convey cost considerations are notably absent from Section 316(a), in contrast to other provisions of the Clean Water Act.[7]

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[4] 33 U.S.C. §1326(a).

[5] *In re: Dominion Energy Brayton Point, LLC, Permit No. MA 0003654*, 13 E.A.D. 407 (EAB 2007).

[6] 40 C.F.R. §125.71(c).

[7] *In the matter of: Public Service Company of Indiana, Inc. Wabash River Generating Station NPDES Permit No. IN 0002810* Cayuga *Generating Station NPDES Permit No. IN 002763*, 1 E.A.D. 590, Pg. 10 (E.A.D. 1979).

If a discharger makes the requisite showing, the discharger is entitled to effluent limits for its thermal discharges that are consistent with the Section 316(a) standard of protecting and propagating the BIC. USEPA draft guidance provides that if the applicant's rationale is convincing, supported by other sections of the demonstration, and not "convincingly negated by outside evidence, the applicant's 316(a) demonstration is successful."[8]

Pursuant to the Board's procedural rules, a petitioner for alternative thermal effluent limitations must submit early screening information and a detailed plan of study to IEPA, describing the proposed alternative limits, how the petitioner will conduct studies to support the required demonstration, and the types of data the petitioner intends to submit. 35 Ill. Adm. Code 106.115(a). The petitioner must also consult with IEPA. 35 Ill. Adm. Code 106.115(b). IEPA must provide a written approval or denial of the request within 90 days after submittal of its detailed plan of study. 35 Ill. Adm. Code 106.1120(f). The petitioner must complete the plan of study prior to filing the petition for an alternative thermal effluent limitation with the Board. 35 Ill. Adm. Code 106.1120(g).

The petitioner bears the burden of proof to demonstrate that an applicable thermal effluent limitation is more stringent than necessary to assure the protection and propagation of a BIC. 35 Ill. Adm. Code. 106.1160(a), (b). The demonstration must also show that the requested relief will assure the protection and propagation of the BIC, considering the cumulative impact of the thermal discharge together with all other significant impacts on the species affected. 35 Ill. Adm. Code 106.1160(c). When basing the alternative thermal effluent

[8] *Draft Interagency 316(a) Technical Guidance Manual and Guide for Thermal Effects Sections of Nuclear Facilities Environmental Impact Statements, U.S. Environmental Protection Agency Office of Water Enforcement Permits Division Industrial Permits Branch, Washington D.C., May 1, 1977* (*"1977 Draft Guidance Manual")*, pg. 17.

limitation demonstration on the absence of prior appreciable harm, the demonstration must either show:

> A. That no appreciable harm has resulted from the normal component of the discharge, taking into account the interaction of such thermal component with other pollutants and the additive effect of other thermal sources to [the BIC] in and on the body of water into which the discharge has been made; or
>
> B. That despite the occurrence of such previous harm, the desired alternative thermal effluent limitation (or appropriate modifications thereof) will nevertheless assure the protection and propagation of a balanced, indigenous community of shellfish, fish, and wildlife in and on the body of water into which the discharge is made.

35 Ill. Adm. Code 106.1160(d); 40 C.F.R. §125.73(c)(1). SIPC is relying in part on retrospective analyses and, in part, on predictive analyses. SIPC has not changed operations since 2003, and existing dischargers, such as SIPC, may base their demonstration upon the absence of prior appreciable harm in lieu of predictive studies. 35 Ill. Adm. Code 106.1160(d). However, because SIPC is asking for alternative thermal limitations for the first time, it has also prepared predictive studies to show the requested relief will assure the protection and propagation of the BIC in Lake of Egypt in the future.

The U.S. Environmental Protection Agency ("EPA") issued draft guidance on Section 316(a) demonstrations. The *1977 Draft Guidance Manual* is to be used as "general guidance as a starting point for discussions" and delegated state agencies "are not rigidly bound by the contents" of the document.[9]

[9] *1977 Draft Guidance Manual*, p. 9.

III. PETITION

A. General Plant Description

1. Generating Capacity and Type of Fuel Used

SIPC is a consumer-owned generation and transmission cooperative, headquartered in Marion, Illinois. The Marion Generating Station is a coal-fired power plant located approximately seven miles south of the City of Marion and consists of two coal-fired units and two additional combined-cycle units.[10] A 173 megawatt ("MW") cyclone boiler came online in 1978 and provides steam to one turbine (Unit 4). A second 109 MW circulating fluidized bed boiler came online in 2003 replaced three 33 MW cyclone boilers and provides steam to three small turbines (Unit 123). Together, Units 123 and 4 produce less than 300 MW. The two simple-cycle units (Units 5 and 6) are nominally rated at 83 MW (dependent upon ambient air temperature).[11]

The operation of Unit 123, beginning in 2003, changed the volume and frequency of thermal water discharged into the lake. While the volume of effluent did not increase appreciably, the frequency of thermal discharges increased dramatically. Before the new boiler came online, Units 1, 2, and 3 served primarily as peaker units, operating during the times of highest demand in the summer and winter months. The new boiler, Unit 123, now operates around the clock.

SIPC owns 4,674 acres around the station and employs 130 people. Agriculture is the dominant land use of the area surrounding the plant. Residential and national park use also

[10] Exh. B, p. 1-3.

[11] *Id*.

immediately surrounds portions of the lake. Marion Generating Station uses Illinois basin bituminous coal.

2. The Condenser Cooling System

The condensate system consists of the main condenser, two condensate pumps, air ejection equipment, drain cooler, two low pressure heaters and associated piping and valves. Circulating water serves as the coolant.

3. The Load Factor of the Plant for the Last Five Years, Projected Load Factor for the Next Five Years.

The following table provides the history of the plant's load factor for the past five years:

Year	Unit 123	Unit 4
2013	78%	75%
2014	81%	73%
2015	82%	77%
2016	76%	71%
2017	64%	73%

The projected load factors should follow past load factors for each unit for the life of the plant.

4. Estimated Retirements or Additions.

The plant has no plans to retire either unit, or to add units.

5. History of Plant Shutdowns for the Last Five Years.

The following table shows a history of plant shutdowns over the past five years for each unit:

Unit 123			
Year	**Number of shutdowns**	**Scheduled Hours**	**Unscheduled Hours**
2013	9	1129	98
2014	10	842	18
2015	8	840	1
2016	8	1076	56
2017	10	939	76

Unit 4			
Year	**Number of shutdowns**	**Scheduled Hours**	**Unscheduled Hours**
2013	13	864	330
2014	9	1855	133
2015	8	987	143
2016	16	1337	298
2017	13	1097	347

*Planned or scheduled shutdowns are factored into the Scheduled Hours column, unplanned or emergency shutdowns would be indicated in the Unscheduled Hours.

6. Planned and projected shutdowns with frequency and duration for the next five years.

Unit 123		
Year	**Number of shutdowns**	**Scheduled Hours**
2018	2	840
2019	2	840
2020	2	840
2021	2	840
2022	2	840

Unit 4		
Year	**Number of shutdowns**	**Scheduled Hours**
2018	2	888
2019	2	768
2020	2	1584
2021	2	768
2022	2	768

7. Additional Plant Information.

Pyramid Acres Marina, located on Lake of Egypt, hosted 62 official fishing tournaments from October 2016 through May in 2017. Lake of Egypt is home to a number of other fishing tournaments that are either undocumented or held at other marinas on Lake of Egypt. The popularity of Lake of Egypt as a fishing destination demonstrates that the lake is a valuable recreational resource for Illinois citizens.

B. Description of Method for Heat Dissipation

SIPC uses Lake of Egypt to cool heated water from the station. Marion Generating Station draws water from Lake of Egypt to cool Unit 123 and Unit 4 and then discharges the heated effluent back into Lake of Egypt. SIPC created Lake of Egypt in 1963 by impounding the South Fork of the Saline River for the very purpose of cooling thermal effluent from the station. This privately-owned lake was constructed before Illinois water quality standards or effluent limits existed, and even before artificial cooling lakes were deemed waters of the State.[12]

The dam impounding the lake is located at the north end because South Fork Saline River runs in a northerly direction. Lake of Egypt is located in both Williamson and Johnson Counties, has a surface area of 2,300 acres and approximately 93 miles of shoreline.[13] The average depth in Lake of Egypt is 18 feet, with a maximum depth of 52 feet.[14] The Lake of Egypt Water District withdraws water from the lake to supply approximately 1 million gallons per day of drinking water to Union, Jackson, and Williamson Counties.[15] The plant is located along the northwest bank, which is considered the "lower" end of the lake.[16]

While the lake was created to provide cooling water for the station, it has since become a resource for recreational fishing and boating. The lake is privately owned and open to the

[12] The Board adopted water quality standards in *In the Matter of Effluent Criteria*, R70-8; *Water Quality Standards Revisions*, R71-14; *Water Quality Standards Revisions for Intrastate Waters*, R71-20 (Mar. 7, 1971). The Board defined artificial cooling lakes as waters of the state in *Water Quality and Effluent Standards Amendments, Cooling Lakes ("Cooling* Lakes*")*, R75-2 (Sept. 29, 1975).

[13] Exh. B, App. C, pg. 1.

[14] *Id*., pg. 1-2.

[15] *Id*.

[16] *Id*., pg. 1-3.

public. There are four public access points on the lake including the Hickory Ridge boat launch and campground located within the Shawnee National Forest. A map of private subdivisions and public access areas located along the lake is attached as Exhibit C. The Shawnee National Forest includes trails for hiking and horseback riding along with places to hunt and rock climb. A map of the Shawnee National Forest, which also shows the location of Lake of Egypt, is attached as Exhibit D.

SIPC utilizes once-through cooling for all four turbines with a common intake from and discharge to Lake of Egypt to dissipate waste heat from the Station. SIPC constructed Lake of Egypt with a dike that extends into the lake, providing a flow path for warm discharge water to allow for a greater duration of mixing, evaporative cooling, and convective heat dissipation before the water is recirculated back to the plant.

Water is discharged into Lake of Egypt at an average flow rate of approximately 173,000 gallons per minute and with the maximum instantaneous temperature occurring during each reporting month ranging from 78°F to 124°F based on data over the past ten years. The discharge temperature is typically approximately 25°F to 30°F above the intake water temperature. Approximately 90% of the time, the discharge is between approximately 18°F and 37°F warmer than the intake water. The variation in temperature increase is mostly related to change in pumping rate. Flow rates will change depending on the number of circulation water pumps in operation and applied resistance to flow in the condensers. The 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. This separation is caused by differences in density and is referred to as “stratification,” a common natural phenomenon in lakes. The heated water is cooled by evaporation, convective heat

transfer with the air, convective heat transfer with the lower water layers, and thermal radiation to the atmosphere. A reduction in temperature is also obtained due to mixing of the heated water with lower temperature water from the other portions of the lake or from precipitation and runoff into the mixing zone. Discharge water over time dissipates the accumulated thermal energy to the greater environment or is recirculated into the unit. Repeated passes through the condensers results in a steady increase in the area of the heated water in the lake during summer months.

Changes in local conditions have a distinct impact on the ability of the lake to dissipate thermal energy. Prolonged droughts or periods of elevated air temperatures and humidity reduce the overall ability of the lake to dissipate heat. Droughts result in lower lake levels, reducing the total surface area available for heat transfer. Elevated air temperatures reduce the total temperature difference between the heated water and the environment at large so convective and conductive heat transfer is less effective. High humidity levels reduce the heat transfer caused by evaporative cooling. Uncommon weather conditions such as those seen in December 2012 can result in periods where the lake is incapable of dissipating thermal energy so as to meet the existing permit limits. Observed air temperature was in the mid 60's during daylight hours with the dew point at or above 60°F. These conditions, where lake surface temperature is at or near air temperature, result in the lake behaving as a thermal energy storage device rather than as a means to dissipate heat.

C. Summary of Compliance or Noncompliance

Marion Station has not received any violation notices related to the discharge temperature during the last five years. The requirement to perform thermal studies first appeared in Marion Station's 2007 NPDES permit, Special Condition 7.

D. The Detailed Plan of Study for 316(a) Demonstration

SIPC retained AMEC Environment & Infrastructure, Inc., (formerly MACTEC, and subsequently, Amec Foster Wheeler ("Amec")) in 2004 to perform studies and collect data beginning in 2006. Studies continued through 2010. Meetings and communications with IEPA on Amec's findings began in 2010 and continued through May 13, 2014 when SIPC filed a petition for alternative thermal effluent limitations with the Board (docket PCB 14-129). Amec's report is incorporated into the 316(a) Demonstration as Appendix C.[17] The Board denied SIPC's request on November 20, 2014, identifying deficiencies in the 316(a) studies.

After the Board's decision, SIPC retained ASA to conduct supplemental studies to address the Board-identified deficiencies. For ASA's most recent studies, SIPC submitted early screening information to IEPA on November 2, 2015 and a Detailed Plan of Study on January 29, 2016.[18] IEPA approved SIPC's Detailed Plan of Study in a letter dated March 24, 2016, attached as Exhibit E. The final details of the Detailed Plan of Study were resolved in further discussions between SIPC and IEPA.[19] ASA, with the help of Eastern Illinois University ("EIU"), conducted the supplemental studies in accordance with the Detailed Plan of Study during the summer and fall months of 2016.

SIPC then met with IEPA to review the study results in Spring 2017 and reached a verbal agreement to finalize the demonstration and proceed with a petition for alternative

[17] *Evaluation of Site-Specific Thermal Standards at Marion Power Plant: Submitted in Support of NPDES Permit Renewal* ("AMEC Report"), William Elzinga and Matthew C. Basler, Amec (October 2013) (attached as Exh. B, App. C)

[18] Exhibit B, Appendix A contains the Detailed Plan of Study.

[19] Exh. B, p. 1-2.

thermal effluent limitations.[20] ASA issued the final 316(a) Demonstration on November 8, 2017.

E. Results of 316(a) Studies

1. Background on Proposed Thermal Standards

Marion Station's thermal effluent discharges to Lake of Egypt. The Board's temperature water quality standards prohibit water temperatures in Illinois water bodies from increasing or decreasing more than 5°F from normal temperatures. The Board's rules allow compliance with this water quality standard to be measured at the edge of a 26-acre mixing zone. Because SIPC constructed Lake of Egypt for the sole purpose of cooling discharges from the Marion Generating Station, the baseline lake conditions are manmade.

The operation of Unit 123, beginning in 2003, changed the volume and frequency of thermal water discharged into the lake. IEPA included Special Condition 7 in SIPC's NPDES permit reissued in 2007, which required SIPC to comply with 35 Ill. Adm. Code 302.211(f) and Section 316(a) of the CWA by demonstrating that the thermal discharge from Marion Generating Station will not cause and cannot reasonably be expected to cause significant ecological damage to Lake of Egypt.[21] Special Condition 7 further stated that no additional monitoring or modification was required for reissuance of the NPDES permit.

SIPC had already begun to undertake studies to comply with Special Condition 7. The studies were intended to determine whether SIPC needed to request application of less stringent temperature water quality standards and, if so, whether alternative thermal effluent limitations would meet Section 316(a) criteria.

[20] Exh. B, p. 1-3.

[21] See Exh. A, Special Condition 7.

The 316(a) Demonstration shows that less stringent thermal effluent limitations are justified under the Section 316(a) criteria. There is no evidence that Marion Station, as currently operated, has caused appreciable harm to the BIC in Lake of Egypt. Accordingly, this Petition asks the Board to grant the requested alternative thermal effluent limitations.

2. Data Collection Programs and Methodologies

The 316(a) Demonstration relied upon the following three groups of biological studies to support a retrospective evaluation of the potential effects on aquatic biota associated with the thermal discharges from Marion Station to Lake of Egypt under the current operational regime. In addition, the 316(a) Demonstration relies on a predictive study of the Lake of Egypt thermal conditions associated with the requested alternative thermal limitations under "worst case" conditions.[22] The retrospective evaluation, attached as Exhibit B, shows that the thermal discharges from Marion Station have not caused appreciable harm to the BIC of Lake of Egypt. The predictive study, presented in Exhibit B, Appendix C, Section 5, shows that SIPC's discharges under the requested alternative thermal effluent limits will have a negligible effect on the BIC as well.

a. Dr. Heidinger Studies

Over a period spanning more than three decades, from 1977 through 2007, Southern Illinois University-Carbondale ("SIUC") conducted various studies and reports on the Lake of Egypt sport fish community and the effect of the station's thermal discharge on aquatic life. (Heidinger, 1977; Heidinger, 1986; Heidinger 1988; Heidinger 1990; Heidinger, 1995, Heidinger, 2000, and Heidinger, 2007). Dr. Heidinger studied game fish and their forage base and the SIUC studies were relied on to make management decisions about Lake of Egypt. Dr.

[22] Exh. B, App. C, Section 5.

Heidinger studied the effects of increased thermal loading on fish condition in Newton Lake, Coffeen Lake, and Lake of Egypt. Dr. Heidinger included Lake of Egypt in the study "because a significantly lower amount of thermal loading occurs in this lake as compared to the other two lakes" and "[t]hermal loading in Lake of Egypt results in substantially elevated temperatures only in the immediate vicinity of the thermal discharge."[23] SIUC conducted age-growth studies on several species of fish and documented how the fish populations changed over time.[24] SIUC also studied temperature and dissolved oxygen ("DO") profiles from 1997 to 1999 at 0.5m intervals from the surface to the bottom at different segments in Lake of Egypt bimonthly.[25] SIUC installed temperature loggers at 1.5m intervals from the surface in two different areas within Lake of Egypt.

b. Amec 316(a) Studies

SIPC retained Amec in 2006 to perform thermal studies on Lake of Egypt. Amec collected data regarding the Lake of Egypt fishery and water quality, including water temperatures and DO at several locations and various depths in Lake of Egypt in 2006 and 2010. Amec also conducted hydrothermal modeling to show lake temperatures under both normal and stressed conditions. The results of the hydrothermal modeling form the basis for SIPC's requested alternate thermal limits (*see* Exh. B, App. C, Figures 5-10 through 5-13). Amec used a 95% non-exceedance event for modeling summer and winter conditions.[26] The thermal modeling included calibrating the model and using available climate, water

[23] Exh. B, App. C, App. C, p. 9-7.

[24] Exh. B, App. C, App. C, Ch. 11.

[25] Exh. B, App. C, App. C, p. 1-14, Ch. 15.

[26] Modeling supporting the proposed temperatures during the fall and spring transition periods is provided in Exh. B, App. C, App. F.

temperature, and plant operational data to identify model input parameter values for "normal" and "stressed" conditions. Consequently, the proposed temperature limits are based on model predictions of water temperatures which are related to a quantified risk of exceedance.[27] The proposed temperature limits are maximum temperatures based on the modeled worst-case averages.

Amec examined and summarized the SIUC studies, compared the Amec fisheries data to the historical SIUC fish data and synthesized all of the information, including the results of the hydrothermal modeling, in a report entitled *Evaluation of Site-Specific Thermal Standards at Marion Power Plant: Submitted in Support of NPDES Permit Renewal* ("AMEC Report") (attached as Exhibit B, Appendix C). The Amec Report found that the temperature limits in Special Condition 4 are more stringent than necessary to assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on Lake of Egypt.[28]

SIPC relied on the Amec Report to seek alternative thermal effluent limitations in 2014. The IPCB found SIPC's 316(a) demonstration deficient for the following reasons: (1) the studies did not provide site-specific data for the biotic categories other than fish, (2) the studies did not evaluate thermally sensitive Representative Important Species (RIS) or RIS potentially capable of becoming a localized nuisance, and (3) the studies did not include an age-growth study on White and Black Crappie in Lake of Egypt. *Southern Illinois Power Cooperative v. IEPA*, PCB 14-129, p. 21-22 (Nov. 20, 2014). The Board found, however, that the 2013 Demonstration adequately addressed the other vertebrate wildlife and commercially and recreational important and forage/food chain fish RIS biotic categories. Specifically, the IEPA

[27] Exh. B, App. C, p. 27-28.

[28] Exh. B, App. C, p. 39.

and IPCB concurred with the Amec conclusion that the Lake of Egypt is an area of low potential impact for other wildlife. *Id*.

c. ASA Supplemental 316(a) Studies

SIPC retained ASA in 2015 to perform supplemental pilot 316(a) studies to determine whether more detailed studies would be needed to address the biotic categories where no prior site-specific data were available. SIPC and ASA designed the studies to address the deficiencies in SIPC's 316(a) demonstration noted by IEPA and the IPCB. SIPC retained EIU in January 2016 to collect and analyze all of the data from the supplemental pilot studies, with oversight from ASA.[29] With approval from IEPA, EIU conducted new site-specific pilot studies based on comments and recommendations by the IEPA and the IPCB to address the biotic categories of phytoplankton, zooplankton/meroplankton, shellfish and macroinvertebrates, habitat formers, and fish in thermally sensitive and nuisance species RIS categories.

EIU, with oversight from ASA, conducted the supplemental studies in 2016. EIU collected phytoplankton, zooplankton/meroplankton, and macroinvertebrate and shellfish samples monthly from June 2016 through August 2016 for a total of three sample collections. During each sampling event, water chemistry nutrient samples from each of the three lake zones were also collected. EIU performed one survey of habitat formers during August 2016. EIU scanned the entire main shoreline and selected two random locations to assess and map submerged aquatic vegetation species composition.[30]

[29] The results of EIU's studies are presented in Appendix B to Exhibit B.

[30] Exh. B, p. 4-8.

ASA studied White and Black Crappie in the thermally sensitive category and Common Carp in the nuisance category. EIU performed electrofishing targeting Common Carp in the fall of 2016. Sample locations were similar to historical sampling locations used by SIUC. EIU gathered two sets of data to address thermally-sensitive White and Black Crappie. 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. EIU conducted an additional electrofishing effort and a Fyke net sampling effort in the fall of 2016 to collect additional White and Black Crappie specimens for the age-growth analysis.

3. Summaries of Physical, Chemical, Biological and Technical Data Supporting the Demonstration, and Discussion of the Data.

a. Biotic Category Rationales

ASA's site-specific supplemental pilot studies for the phytoplankton, zooplankton/meroplankton, benthic macroinvertebrates and shellfish, and habitat former biotic categories showed no difference in these communities between lake zones attributable to the Marion Generating Station's thermal effluent.[31] These site-specific data show that the thermal effluent has not caused appreciable harm to the organisms in these biotic categories. Lake of Egypt is an area of low potential impact for the vertebrate wildlife category. Sport species such as ducks and Canada Geese are commonly observed on Lake of Egypt, along with other waterfowl such as herons and various shorebirds.[32] The observed use of Lake of Egypt by

[31] Exh. B, Section 4.

[32] Exh. B, Append. C, p. 23.

numerous species of wildlife indicate that the proposed alternative effluent limitations have not and will not cause appreciable harm to the BIC for this category.

b. Fish Category

(i) Retrospective Assessment

The retrospective assessment of the Marion Station's discharges to Lake of Egypt is presented in Exh. B. A retrospective assessment of fish species provides strong evidence of whether there are any harmful effects from the existing and proposed thermal standards because it integrates all aspects of the thermal environment on the life cycle for the fish species and the various trophic levels in the lake, expressed at the uppermost consumer levels. The 316(a) Demonstration's retrospective assessment shows a consistent fish community over the last 20 years suggesting that fish populations have adapted and thrived in the thermal environment of Lake of Egypt.[33] The consistent fish community also suggests that the lower trophic levels in the lake, such as phytoplankton, epiphyton, macrophytes, zooplankton and benthos are of sufficient quality and quantity to support the upper trophic levels (*i.e.* fish). The 316(a) Demonstration finds no clear evidence of population change for any fish RIS before and after the 2003 boiler replacement.[34] The results showed significantly more fish in the heated portion of the lake compared to the mid and upper lake zones.[35] This evidence and the excellent condition of fish in the Lake of Egypt based on Largemouth Bass and Black Crappie condition indices show that fish have not suffered appreciable harm. The results also show ample areas of thermal refuge exist even during the warmest months of July and August and suggest that fish

[33] Exh. B, p. 4-14.

[34] Exh. B, p. 1-2.

[35] Exh. B, p. B-23.

behaviorally adapt to the warmest temperatures in the lake by avoiding them during the summer months and seeking areas with cooler temperatures.[36] The Lake of Egypt fish studies conclude that higher temperatures are beneficial to Threadfin Shad because they are surviving well in Lake of Egypt, while they do not in non-cooling reservoirs.[37]

(ii) Predictive Assessment

Though as an existing discharger SIPC may satisfy its burden under 40 C.F.R. §125.73(c)(1)(i) by demonstrating the absence of prior appreciable harm in Lake of Egypt, the regulations also allow for predictive studies. Considering the potential for "stressed conditions," SIPC also conducted a predictive study to show that even under these potential, less typical conditions, the lake will continue to assure the protection and propagation of a BIC. The analysis determined that the Company's discharges pose little or no potential threat to the BIC in Lake of Egypt and makes certain that the proposed discharge will assure the protection and propagation of the BIC in Lake of Egypt. The predictive assessment evaluating potential biological effects related to the Marion Station's thermal plume under normal and worst-case weather conditions under the proposed revised alternative thermal limits is presented in Exh. B, Appendix C, Section 5.2.

(a) RIS Selection

In a predictive 316(a) demonstration, the applicant selects a number of important species representative of the aquatic community and studies the effects of thermal discharges on those species in detail. RIS can be selected from the biotic categories of fish, shellfish, or habitat

[36] Exh. B, p. 4-17

[37] Exh. B, p. 1-4.

formers.[38] Based on the assumptions in the RIS concept, the selection should consider any threatened or endangered species, thermally sensitive species, as well as commercially or recreationally valuable species.[39]

Amec selected RIS appropriate for a lake that has been stocked since its construction.[40] Amec selected seven species of fish that have commercial and/or ecological importance and are considered representative of other species occupying the same trophic group: Threadfin Shad, Gizzard Shad, Channel Catfish, Bluegill, White and Black Crappie, and Largemouth Bass. In Lake of Egypt, Channel Catfish, Bluegill, and Largemouth Bass are recreationally important. In addition, these species have been collected and analyzed in previous studies on the Lake of Egypt fishery offering greater data for comparison.[41] Threadfin Shad and Gizzard Shad are considered an important prey species for Largemouth Bass. White and Black Crappie, in addition to being recreationally important, are thermally sensitive species. While undocumented, it is speculated that the lake was initially stocked with four of the RIS – Gizzard Shad, Channel Catfish, Bluegill, and Largemouth Bass – following its construction in 1963.[42] SIUC reports refer to these species as species of fish "normally associated with southern Illinois reservoirs."[43] SIPC introduced Threadfin Shad in the 1970's to enhance the forage base for predators. Since that time, Threadfin Shad has maintained its own population through natural

[38] *1977 Draft Guidance Manual,* pg. 36.

[39] *Id*. at 37-38.

[40] Illinois defines an "artificial cooling lake" as "any manmade lake, reservoir or other impoundment, constructed by damming the flow of a stream, which is used to cool the water discharged from the condensers of a steam-electric generating plant for recirculation in substantial part to the condensers." 35 Ill. Adm. Code 301.225.

[41] Exh. B, App. C, pg. 36.

[42] Exh. B, App. C, p. 6.

[43] Exh. B, App. C, pg. 6.

reproduction. In 2008, 2009, 2010, and 2015 SIPC stocked Lake of Egypt with Black Crappie fingerlings. As discussed above, Common Carp was added as an RIS in SIPC's supplemental studies as a species with the potential for becoming a localized nuisance.

(b) Hydrothermal Modeling

The predictive assessment relied upon hydrothermal modeling to characterize and predict hydrothermal conditions in the Lake of Egypt during both summer and winter worst case conditions. Both "stressed" scenarios reflect a set of weather and climactic conditions that are considered to be rarely exceeded.[44] The predictive assessment incorporated existing data on the lake's thermal environment and the thermal requirements of its fish populations as reported in the literature. It assessed the thermal tolerances and requirements of the selected RIS – Threadfin Shad, Gizzard Shad, Largemouth Bass, Bluegill, Channel Catfish, and Black and White Crappie – and compared them to the water temperatures that could exist under the proposed thermal standards and stressed environmental conditions. Based on the prospective assessment, the 316(a) Demonstration finds that suitable habitat would be available to all RIS even under the modeled worst-case or "stressed" conditions.[45]

The 316(a) Demonstration uses the Generalized Longitudinal Lateral Vertical Hydrodynamic Transport ("GLLVHT") model to predict lake temperatures during both summer and winter worst-case or "stressed" conditions.[46] SIPC and Amec spoke with USEPA regarding model selection and received concurrence prior to using the GLLVHT model. The model input used a single equilibrium temperature (T_{eq}) value based on a 30-day average of climatic

[44] Exh. B, App. C, Exh. B.

[45] Exh. B, p. 2-2.

[46] In *Illinois* Power *Co. v. IEPA*, PCB 92-153 (see petition filed Oct. 14, 1992), the petitioner also relied on the GLLVHT model in support of its petition.

conditions. The modeled scenarios demonstrated that even under conditions of warmer-than-normal meteorological conditions and maximum operating conditions, water temperatures decrease as distance from the discharge increases. According to the 316(a) Demonstration, there is available habitat for fish species even when temperatures at the edge of the mixing zone would approach the proposed thermal standard under worst case conditions.

According to the 316(a) Demonstration, the proposed thermal limits, which reflect current thermal conditions, will continue to be protective of the BIC due to four observable patterns in Lake of Egypt.[47] First, observed temperatures outside of the mixing zone throughout the lake during normal summer conditions were within the tolerance limits of the RIS even while the plant operated at full capacity.[48] Further, modeling showed that even under rarely expected extreme summer conditions, there would be extensive areas in the lake that fish could utilize as thermal refugia.[49] Second, the proposed thermal limits will actually benefit the BIC. Under the proposed limits, Lake of Egypt will continue to sustain enhanced overwintering survival for Threadfin Shad which are an important subset of the forage base for largemouth bass and other predator species.[50] Third, the resident fish community has shown stable composition and abundance before and after the boiler replacement, which is not expected to change due to thermal influence.[51] Fourth, there is abundant habitat available at all times for

[47] Exhibit B, Append. C, at 3.

[48] *Id*. at 3, 4.

[49] *Id*.

[50] *Id*. at 5.

[51] *Id*. at 54.

the BIC, both horizontally throughout the lake and vertically in the water column.[52] These patterns show that Lake of Egypt has protected and will continue to protect a BIC.

When performing a predictive assessment, the 316(a) Demonstration must show fish RIS communities will not suffer appreciable harm from the applicant's thermal discharges.[53] Addressing the *1977 Draft Guidance Manual*'s criteria, the 316(a) Demonstration reaches the following conclusions:

Direct or indirect mortality from cold shock or excess heat – The 316(a) Demonstration concluded there is little to no potential for fish kills in Lake of Egypt due to thermal conditions resulting from the discharges from the Marion Generating Station. Fish kills can occur under conditions of elevated water temperatures combined with insufficient levels of DO saturation, or from a sudden drop in lake temperatures. There have been no past incidences of summer fish kills even during periods of highest lake temperatures, suggesting that the fish community has adapted to warm-water conditions and can move to refuge areas to avoid potentially lethal conditions, should they occur. The absence of historical thermal-related fish kills, combined with no anticipated increase in thermal loading suggest that future fish kills are extremely unlikely.[54]

In addition, SIPC plans plant outages during the fall and spring transitional months, which coincide with periods of lower demand which reduces the risk of temperature shock. Sometimes unplanned outages do occur during the summer and winter months. The effect of an outage on thermal discharges varies depending on the cause of the outage. An extended winter

[52] *Id*.

[53] *1977 Draft Guidance Manual*, pg. 65

[54] *Id*. at 43.

outage would stress Threadfin Shad that typically seek the warmer waters near the plant discharge during winter months.[55] It is in the best interest of both the company and the lake to minimize the duration of the outage to regain generation and maintain a consistent lake environment.

Reduced reproductive success or growth as a result of the heated discharge – While the thermal discharges from the Marion Generating Station may result in earlier spawning in the heated portions of the lake, the discharges have not adversely affected recruitment of any of the RIS.[56] The 316(a) Demonstration analyzed the effects of the Lake of Egypt thermal regime on the reproductive cycles of the RIS by examining published spawning temperatures and timing for RIS, reported literature from other Illinois artificial cooling lakes, and observed trends in larval fish abundance and recruitment in Lake of Egypt both before and after the 2003 boiler replacement. Similar to trends in other Illinois artificial cooling lakes, spawning in heated portions of Lake of Egypt occurs somewhat earlier than in unheated portions for all RIS.[57] A comparison of data collected before and after the boiler replacement shows that catch rates in 2010 were similar to those from 1998 and 1999.[58]

At the recommendation of Dr. Heidinger, SIPC stocked Lake of Egypt with Threadfin Shad in 1971 to provide a forage base for Largemouth Bass.[59] Threadfin Shad are unable to overwinter under normal Illinois temperature regimes. However, since the stocking event, the

[55] *Id*. at 52

[56] *Id*. at 42-45.

[57] *Id*.

[58] *Id*. at 47.

[59] Exh. B, App. C, App. E (Heidinger, 1990), pg. 4.

Lake of Egypt thermal regime has allowed the Threadfin Shad population to sustain itself by minimizing winter mortality. Based on the results of its fish studies, the 316(a) Demonstration concludes that higher, stable water temperatures in winter and early spring may result in faster growth for several species, notably Largemouth Bass, and actually lead to improved overwinter survival for these species.[60]

Exclusion from unacceptably large areas - The Marion Station thermal discharges will not make an unreasonably large portion of the lake uninhabitable for the RIS. Data and modeling also show that at all times Lake of Egypt provides adequate thermal refugia. A review of summer lake surface temperatures along with published thermal tolerance data shows that under normal conditions, the proposed thermal limit summer temperatures would be within the upper incipient lethal temperature tolerances for all the RIS throughout the Lake of Egypt outside of the mixing zone. While parts of the lake may be excluded for growth, development, and reproduction under "stressed" conditions, there would still be extensive areas of suitable habitat within the thermal tolerance ranges for these parameters available to all of the RIS evaluated.

In addition, the RIS are adaptable. The literature-based temperature maxima derived from laboratory studies likely underestimate the tolerances of these species that have adapted and acclimated to the Lake of Egypt thermal regime over generations.[61] In fact, Dr. Heidinger's 2000 study found that mean internal body temperatures of Largemouth Bass in Lake of Egypt exceeded the preferred temperature in July and August 1998 and 1999. Maximum internal body temperatures exceeded the preference temperature in June through September 1998 and June

[60] Exh. B, App. C, p. 51.

[61] Exh. B, App. C, pg. 41.

through August 1999. These data suggests that Largemouth Bass are tolerating temperatures in Lake of Egypt that are actually higher than those found in the literature.[62] Even relying on literature-based temperature maxima, the 316(a) Demonstration showed that the proposed thermal effluent limits under normal late summer weather conditions may result in avoidance or adaptive behaviors only in localized areas within the lower lake, which is supported by the Lake of Egypt data.[63]

Blockage of migration - Due to the Lake of Egypt bathymetry, SIPC's discharges impact a small portion of the lake and, consequently, does not block or hinder fish migration even under stressed conditions.[64]

Overall, the 316(a) Demonstration and the data on which it relies demonstrate that Lake of Egypt is supporting a healthy fishery and will continue to do so during anticipated normal and worst-case operating conditions even with SIPC's requested relief.

4. Criteria or Methodology Used to Determine the BIC of Shellfish, Fish and Wildlife Will be Maintained

ASA developed a master rationale that gives an overall picture of the ecosystem as projected by the six Biotic Category Rationales, the resource zones impacted, and a summary of why the data shows that the balanced, indigenous community ("BIC") will be protected. The master rationale of the demonstration should review the six biotic categories, summarize the key findings, and generally show how the BIC will be protected.[65]

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[62] *Id*. at 14-15.

[63] *Id*. at 54.

[64] Exh. B, App. C.

[65] *1977 Draft Guidance Manual*, pg. 52.

Under the regulation, if there has been no prior appreciable harm as a result of the thermal discharges, it may be reasonably assumed that a balanced aquatic community will be maintained in the future. Accordingly, the requirements of Section 316(a) and the regulations are satisfied and no further demonstrations are required.[66] Conversely, if prior appreciable harm has occurred, it may be reasonably assumed that it will continue in the future and a balanced aquatic community will not be maintained. Either of these assumptions may be rebutted by evidence to the contrary.[67]

The 316(a) Demonstration relies on available data to characterize the fish community, develop the RIS rationales, and identify habitat utilization. Species composition and abundance estimated by fish surveys from 2016 and earlier suggest that the populations are healthy and self-sustaining. The historical and 2016 electrofishing data shows the fish community in Lake of Egypt has remained relatively stable over the past 20 years.[68]

The 316(a) Demonstration looked at the phenomena indicative of appreciable harm and concluded the requested alternative thermal effluent limitations will assure the protection and propagation of a BIC in and on Lake of Egypt for the following reasons[69]:

- The data show no increase of any nuisance species in the Lake of Egypt as a result of the thermal discharge.

[66] *In the matter of: Public Service Company of Indiana, Inc. Wabash River Generating Station NPDES Permit No. IN 0002810 Cayuga* Generating *Station NPDES Permit No. IN 002763*, 1 E.A.D. 590, Pg. 4 (E.A.D. 1979).

[67] *Id*., pg. 7.

[68] Exh. B, p. I.

[69] *316(a) Technical Guidance—Thermal Discharges (DRAFT)*, Water Planning Division Office of Water and Hazardous Materials Environmental Protection Agency, p. 23, Sept. 30, 1974.

- There is no substantial decrease in the abundance of fish RIS, and no decrease in indigenous species in the other biotic categories.
- The Marion Generating Station's thermal discharges have not caused an unaesthetic appearance or odor in the receiving water.
- The Marion Generating Station's thermal discharges have not eliminated any recreational uses of the Lake of Egypt or surrounding areas. To the contrary, Lake of Egypt is a thriving recreational resource for fishermen.
- The data show there is no evidence of reduced successful completion of life-cycles of indigenous species in the Lake of Egypt.[70] The 316(a) Demonstration concludes the resident fish species will in fact benefit from the heated discharge.

[70] Exh. B, p. II.

F. Additional Information Supports SIPC's Request for Alternative Thermal Effluent Limitations.

1. SIPC Employs Best Management Practices to Address Lake of Egypt Water Quality.

SIPC also ensures minimal impacts to the environment from its thermal discharges by instituting good management practices at the Marion Generating Station. Storm water runoff from the plant property is collected through one of the many settling ponds utilized under the facility's NPDES permit. SIPC has a storm water pollution prevention plan which covers the settling ponds and controls pollutants from storm water discharges. The Company educates its employees on how the plan operates and about the procedures necessary to implement the plan. SIPC also monitors lake health, stocks fish periodically, and constantly monitors the lake for signs of stress to aquatic populations.

2. Lake of Egypt Was Constructed to Cool SIPC's Thermal Discharges and Now Constitutes a Valuable Recreational Asset for Illinois.

The Marion Generating Station has been operating for more than 40 years and has maintained the current thermal regime for approximately 14 years. Lake of Egypt supports abundant and diverse wildlife, including mallard ducks, bald eagles, Canada geese, coyote, and white-tailed deer. It also supports a robust fishery comprised of approximately 30 species of fish and is well known as the home of numerous competitive sport-fishing tournaments. Representative game species include Largemouth Bass, Bluegill, Channel Catfish, Flathead Catfish, White Bass, Black Crappie and White Crappie. The lake fishery has continued to thrive under current operating conditions. The proposed alternative thermal limit will not adversely affect the fishery. Further, the 316(a) Demonstration shows that abundant suitable habitat is always available and would even be available during worst-case "stressed" conditions. During these conditions, data suggest that the fish in Lake of Egypt avoid unsuitable habitat.

The Board has granted alternate thermal limits on numerous occasions where data shows that behavioral avoidance leads those fish to environmentally acceptable waters.[71]

As discussed in more detail above, SIPC is fortunate to have lake data gathered over several decades which demonstrate a stable lake environment. This strengthens SIPC's demonstration that the lake temperatures have not caused prior appreciable harm to the BIC.

3. The Proposed Alternate Thermal Limits Will Have No Adverse Impact on Recreation in and on Lake of Egypt.

Granting SIPC's requested alternate thermal limit will have no impact on recreational use of the lake. SIPC owns the lake and the lake's primary purpose is to provide water for electricity generation. However, the majority of the lake is available for use by both private homeowners and the public. Shoreline property owners must agree with Lake of Egypt rules and regulations.[72] The rules and regulations specify that certain areas marked as "restricted" are not open for recreation. The restricted area is limited to the area near the CWIS and includes the mixing zone. Also, water skiing is limited to certain areas of the lake and is prohibited after sundown. Numerous fishing tournaments are held on the lake throughout the year, but tournaments must be registered. The Company has also placed number, length, and seasonal restrictions on certain fish species that may be caught in Lake of Egypt in an effort to manage the fishery. The proposed alternative thermal limits will not impact any of these guidelines, rules, or regulations affecting use of the lake. The survival of fish and wildlife in and around

[71] *In the Matter of: 410(c) Petition for Dresden Nuclear Generating Station*, PCB 79-134, slip op. at 3 (Jul. 9, 1981); see also *In re: Aurora Energy, LLC*, 2004 WL 3214470, pg. 6 (Sept. 15, 2004) (rejecting review of a USEPA-issued permit pursuant to Section 316(a) where Region 10 explained fish will use behavioral means to avoid harmful temperatures and maintain optimal body temperatures and "optimal temperatures do not have to occur everywhere all the time."). UPDATE.

[72] See Exh. B.

Lake of Egypt provides a vibrant recreational resource for public use and the lake itself will continue to be a valuable public resource.

G. Statement of the Requested Relief

There are no applicable effluent limitations for temperature and SIPC notes that not all of the Illinois temperature general use water quality standards apply to Lake of Egypt. Specifically, the Board has held that the seasonal temperature limits found in Section 302.211(e) do not apply to lakes.[73] Accordingly, Section 302.211(e) does not apply to Lake of Egypt and Special Condition 4(B) of SIPC's NPDES permit should not be included upon reissuance. The remaining applicable section of Special Condition 4 prohibits a temperature rise of more than 5°F above natural temperatures at the edge of the mixing zone and is based on Section 302.211(d) of the Board's water quality standards.[74] SIPC asserts that this effluent limit is more stringent than necessary to assure the protection and propagation of a balanced, indigenous community of shellfish, fish and wildlife in and on Lake of Egypt. In lieu of this standard, SIPC requests that the following alternative thermal effluent limits apply:

> In lieu of the temperature water quality standards defined by Section 302.211, the thermal discharge to Lake of Egypt from SIPC's Marion Generating Station shall not exceed the following maximum temperatures, measured at the outside edge of the 26-acre mixing zone in Lake of Egypt, by more than 1 percent of the hours in a 12-month period ending in any month:
>
> 1. 72°F from December through March;
>
> 2. 90°F from April through May;
>
> 3. 101°F from June through September; and

[73] *See Board of Trustees of Southern Illinois University Governing Southern Illinois University, Edwardsville v. IEPA*, PCB 02-105, slip op. at 13 (Aug. 4, 2005) (holding that Section 302.211(e) applies only to rivers).

[74] 35 Ill. Adm. Code 302.211(d).

4. 91°F from October through November.

At no time shall the water temperature at the edge of the mixing zone exceed these maximums by more than 3°F.

Compliance with the alternative thermal effluent limits will be determined through temperature monitoring at the outside edge of the mixing zone. SIPC monitors temperature using a continuous monitoring device on a buoy placed in Lake of Egypt and will utilize the data from this device to determine compliance with the proposed alternative effluent limits.

IV. CONCLUSION

Based on the results of the Amec Report, the supplemental biotic category field studies, and the updated 316(a) variance demonstration, SIPC contends the thermal effluent limits applicable to SIPC's discharges to Lake of Egypt are more stringent than necessary to assure the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife in and on Lake of Egypt. SIPC has made its demonstration and met the Illinois requirements for an alternative thermal limit satisfying state and federal rules and federal guidance as to the substantive showing requirements. The 316(a) Demonstration shows that SIPC's discharges under the requested thermal effluent limits will continue to assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on Lake of Egypt.

WHEREFORE, for all the foregoing reasons Southern Illinois Power Cooperative ("SIPC") respectfully requests that the Illinois Pollution Control Board find SIPC has made the requisite showing and grant this Petition for Alternative Thermal Effluent Standards.

Respectfully submitted,

SOUTHERN ILLINOIS POWER COOPERATIVE

By: /s/ Amy Antoniolli
Amy Antoniolli

Amy Antoniolli
Gabriel Rodriguez
Schiff Hardin LLP
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EXHIBIT LIST

Exhibit A. NPDES Permit No. IL0004316 – SIPC Marion Station.

Exhibit B. *Updated 316(A) Variance Demonstration Report for the Marion Generating Station*, ASA Analysis & Communication, Inc., October 2017.

- Appendix A. Marion Generating Station 316(a) Study Plan
- Appendix B. Supplemental Data Collection for the Marion Generating Station 3165(a) Studies, Eastern Illinois University
- Appendix C. *Evaluation of Site-Specific Thermal Standards at Marion Power Plant*, Amec Environmental & Infrastructure, Inc., October 2013.
  - Appendix A. Marion Power Plant 316(b) Impingement Mortality Characterization Report
  - Appendix B. Surface Water Temperatures Along Five Transects in the Lower Portion of the Lake of Egypt
  - Appendix C. AmerenCIPS Newton Lake Project, 15 August 1997 – 30 August 1999 (Volume 2)
  - Appendix D. Current Status of Sport Fish Populations in Lake of Egypt – 1988
  - Appendix E. Status of Sport Fish Populations in lake of Egypt and Management Recommendations-1990
  - Appendix F. Supplemental Spring and Fall Hydrothermal Modeling

Exhibit C. Map of Lake of Egypt and Official Lake of Egypt Rules and Regulations, July 2006.

Exhibit D. Map of Shawnee National Forest, United States Forest Service.

Exhibit E. March 24, 2016 letter from Illinois Environmental Protection Agency to SIPC Approving Detailed Plan of Study to Support Alternative Thermal Limits.

AFFIDAVIT OF LEONARD HOPKINS ON BEHALF OF SOUTHERN ILLINOIS POWER COOPERATIVE

I, Leonard Hopkins, first being duly sworn on oath, depose and state as follows:

1. I am currently employed as Vice President Environmental & Safety at Southern Illinois Power Cooperative ("SIPC") located south of Marion, Illinois, in Williamson County. I am responsible for environmental compliance and fuel procurement at the Marion Station. I have worked at SIPC for 25 years, with the last six years in my current position. I received a Bachelor's of Engineering from Southern Illinois University in 1977.

2. I participated in the preparation of the Petition for Alternative Thermal Effluent Standards ("Petition") and the 316(a) demonstration by ASA Analysis & Communications report attached to the Petition.

3. I have read the Petition and, based on my personal knowledge and belief, the facts stated therein regarding the Marion Generating Station and its operation are true and correct.

FURTHER, Affiant sayeth not.

Leonard Hopkins

Subscribed and sworn to before me

this 11th day of April 2018.

OFFICIAL SEAL
Loretta J. McElmurry
Notary Public - State of Illinois
My Commission Expires 10/29/2019

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

SOUTHERN ILLINOIS POWER COOPERATIVE,	)	
Petitioner,	)	
	)	**PCB _____**
v.	)	**(Thermal Demonstration)**
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY,	)	
Respondent.	)	

APPEARANCE

I, Gabriel Rodriguez, hereby file my appearance in this proceeding on behalf of Southern Illinois Power Cooperative.

/s/ Gabriel Rodriguez

Gabriel Rodriguez
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Dated: April 12, 2018

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

SOUTHERN ILLINOIS POWER COOPERATIVE,	)	
Petitioner,	)	
v.	)	**PCB _____ (Thermal Demonstration)**
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY,	)	
Respondent.	)	

APPEARANCE

I, Amy Antoniolli, hereby file my appearance in this proceeding on behalf of Southern Illinois Power Cooperative.

/s/ Amy Antoniolli

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Dated: April 12, 2018

CERTIFICATE OF SERVICE

I, the undersigned, certify that on this 12th day of April 2018, I have served by messenger the attached **PETITION FOR ALTERNATIVE THERMAL EFFLUENT STANDARDS, and APPEARANCES OF GABRIEL RODRIGUEZ AND AMY ANTONIOLLI,** upon all parties on the attached service list.

My e-mail address is aantoniolli@schiffhardin.com

The number of pages in the e-mail transmission is __.

The e-mail transmission took place by 5:00pm.

/s/ Amy Antoniolli
Amy Antoniolli

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