

**BEFORE THE
ILLINOIS POLLUTION CONTROL BOARD**

AMEREN ENERGY GENERATING)	
COMPANY,)	
)	
Petitioner,)	
)	
v.)	PCB 09-38
)	(Thermal Demonstration)
ILLINOIS ENVIRONMENTAL)	
PROTECTION AGENCY)	
)	
Respondent.)	

ANSWERS TO HEARING OFFICER ORDER

Ameren Energy Generating Company (“Ameren” or “Petitioner”) filed this artificial cooling lake demonstration on December 15, 2008, for Coffeen Power Station (“Station”) at Coffeen Lake, located in Montgomery County. Section 106.208(b) of the Board’s procedural rules provides that the Illinois Environmental Protection Agency (“Agency”) must make a recommendation to the Illinois Pollution Control Board (“Board”) on the petition within 60 days from the date of filing. 35 Ill. Adm. Code 106.208(b). In her March 5, 2009 order, Hearing Officer Webb (“Hearing Officer”) included a series of questions on the petition for Ameren to answer before hearing. On that same date, the Board extended the Agency’s deadline to file the recommendation through April 6, 2009. The parties together with the Board set the hearing date in this matter for May 19, 2009. The Agency filed a recommendation on April 24, 2009. The hearing officer extended the deadline for Ameren to answer the Board’s questions through May 12, 2009. Below Ameren sets out the hearing officer’s questions in italics and provides answers immediately following each question:

1. **35 Ill. Adm. Code 302.211(j)(4) provides:**

The required showing in subsection (j)(3) may take the form of an acceptable final environmental impact statement or provisions of environmental assessments used in the preparation of the final environmental impact statement, or may take the form of a showing pursuant to Section 316(a) of the Clean Water Act (CWA) (33 U.S.C. 1251 et seq.), which addresses the requirements of subsection (j)(3). 35 Ill. Adm. Code 302.211(j)(4).

The United States Environmental Protection Agency (USEPA) has issued an "Interagency 316(a) Technical Guidance Manual and Guide for Thermal Effects Sections of Nuclear Facilities Environmental Impact Statements (DRAFT)" dated May 1, 1977 (Section 316(a) Manual) (available at <http://www.epa.gov/npdpub/pubs/owm0001.pdf>). The Section 316(a) Manual states that a Type II Demonstration would involve:

- 3.5.1 Development of Biotic Category Rationales*
- 3.5.2 Development of Representative Important Species Rationale*
- 3.5.3 Engineering and Hydrological Data for Type II Demonstration*
- 3.5.4 Synthesis of All Information into Master Ecosystem Rationale (Section 316(a) manual at pp. 34-52.)*

As a general response to the Board's first question, Ameren recognizes that predictive Section 316(a) demonstrations are appropriate for new facilities or facilities with major changes to their operational mode. Section 316(a) Manual at 11. However, the Station is not a new facility, nor is it changing any design parameters of its generating equipment that would affect its thermal effluent discharge into Coffeen Lake. Coffeen Lake supports a thriving fishery and over a decade of data has been collected with which to evaluate the effects of the Station's thermal discharge. Even more importantly, Ameren is not requesting a new standard, but rather an incremental modification of Coffeen Lake's winter thermal limits for only the months of May and October.

The Section 316(a) Manual provides valuable guidance on how to evaluate the impacts of thermal effluents on water quality or biota. However, the Section 316(a) Manual is only intended as "general guidance and as a starting point for discussions," and the manual itself notes that State Directors "are not rigidly bound by the contents of this document." Section 316(a) Manual, pp. 8-9. As set forth in more detail below, Ameren believes that it has appropriately considered the history of Coffeen Lake and the Station, Board orders from previous proceedings, as well as valuable empirical

data in demonstrating that the requested relief will continue to support a balanced indigenous community in Coffeen Lake.

- a. Exhibit 11 to the petition is a report prepared by ASA Analysis and Communications, Inc. entitled "Evaluation of Potential Adverse Impacts from Revised Site-Specific Thermal Standards in May and October for Coffeen Lake" dated March 2008 (ASA Report). The ASA Report indicates three fish species were selected as "representative important species" (RIS) based on previous studies. The three RIS selected were largemouth bass, bluegill, and channel catfish. Exh. 11 at 3-1. in this regard, the ASA Report references Tranquilli and Larimore (INHS) 1981 and Heidinger et al. 2000. Please explain more clearly at what point and how the three RIS were selected from among the other life forms observed in the reports by Tranquilli and Larimore 1981 and Heidinger et al. 2000, providing additional documentation if necessary. Please comment on how the selection of the three RIS satisfies the criteria under Section 3.5.2 of the Section 316(a) Manual or the definition of RIS at pp. 78-79.*

The ASA Report relied upon the 1997-2006 studies conducted by Southern Illinois University-Carbondale ("SIUC") as the most recent source of information on the status of Coffeen Lake. These studies were mandated by the Board as the result of a five-year variance granted on June 5, 1997, where May and October limits were raised to levels (105°F monthly mean and 112°F maximum) above those currently proposed in Ameren's petition (96°F monthly mean and 102°F maximum). Data derived from these studies are particularly useful since they can be used to demonstrate whether elevated temperatures that might occur during May and October under the proposed revised thermal standard have caused detectable effects on the biota of Coffeen Lake. The studies on Coffeen Lake were conducted concurrently with more extensive studies on the aquatic ecosystem of Newton Lake, the cooling lake for another Ameren generating facility in Illinois.

To comply with the conditions of the 1997 variance, Ameren retained SIUC to conduct studies proposed by that academic institution. Dr. Roy Heidinger was the project leader and one of three principal investigators. The proposed study underwent review and comment by IEPA and Illinois Department of Natural Resources ("IDNR") staff, as well as the public, prior to

commencing in August 1997. Dr. Heidinger and his staff selected largemouth bass, bluegill, and channel catfish as the target species, in part, for their study because they were the species primarily being caught by anglers at that time. While white crappie, a popular game species, was known to occur in Coffeen Lake, they were very rare in the fish collections made by SIUC (e.g., none caught by seine hauls in August 1997, April-August 1998 and 1999; and only a couple caught by electrofishing during the whole study). The three target fish species were sustained entirely by natural reproduction, whereas white crappie typically had been stocked.

The ASA Report therefore was restricted to the available data for the three target species chosen for the SIUC studies. The three fish species were excellent candidates as “representative important species” or “RIS”, as defined by the U.S. EPA in its 1977 draft 316(a) guidelines¹. They satisfy the criterion of being commercially or recreationally valuable, and in fact are the cornerstone of the recreational fishery of Coffeen Lake. Detrimental effects from the Station’s thermal discharge, if any, are reflected in the status of these RIS. The target fish naturally reproduce in Coffeen Lake, and their population status will reflect all thermally-induced effects on their complete life cycle, including spawning, egg and larval life stages, juveniles, and adults. Their welfare, as top consumers, also reflects the health of the lower trophic levels that provide their forage and nutrition. It would be prohibitive, and not provide additional benefit, to study in detail all species that occur in the lake. Furthermore, in approving the scope of the studies, IDNR concurs that the target fish are representative surrogates of fish population within the lake.

- b. The ASA Report finds and forms part of its basis in the Tranquilli and Larimore 1981 Final Report by the Illinois Natural History Survey (INHS) (INHS 1981 Final Report) that was completed under the previous thermal demonstration for Coffeen Lake in CIPS V. IEPA, PCB 77-158, PCB 78-100 (cons.)(Mar. 19, 1982)(CIPS). Please review this 1981 INHS Report and briefly***

¹ RIS are “representative, in terms of their biological requirements, of a balanced, indigenous community of shellfish, fish and wildlife in the body of water into which the discharge is made.”

comment on the validity of the development of the RIS Rationale in light of current conditions.

The Tranquilli and Larimore (1981) report on the environmental studies conducted on Coffeen Lake during 1978-1980 addressed several components of the aquatic community, including algae, zooplankton, benthos, and fish. Detectable effects from the thermal plume primarily were limited to fish. Whereas the entire fish community was addressed in the report's sections on ichthyoplankton and juvenile/adult species composition and distribution, the three species most frequently chosen for detailed study were largemouth bass, bluegill, and channel catfish, *i.e.*, the three RIS in the ASA Report. Accordingly, in addition to the basis for using RIS as discussed above, the reliance on those species in the Tranquilli and Larimore report provide support that it was appropriate to study the impacts on largemouth bass, bluegill and channel catfish in the ASA Report.

Gizzard shad and white crappie were not selected as RIS despite their relative abundance as reported in the 1981 report. Although gizzard shad, a forage species, comprised a relatively large proportion of catch, young-of-year gizzard shad appeared to be inadequately sampled by the sampling gear, with the possible exception of cove rotenone sampling, thus making it difficult to determine annual reproductive success. Young-of-year white crappie were rare in the collections.

The derivation of largemouth bass, bluegill, and channel catfish as RIS in the ASA Report is described in the response to question 1(a).

- c. Please describe any consideration that was given to threatened and endangered species as well as other vertebrate wildlife as set out in the Section 316(a) Manual. On this note, the INHS Final Report mentions that Great Blue Herons were occasionally observed in the lake. INHS 1981 Final Report at p. 18.5.***

No threatened or endangered species have been reported for Coffeen Lake except for recent occurrences of the bald eagle. Vertebrate wildlife other than fish have minimal direct

exposure to the thermal plume, and are therefore not vulnerable to direct effects from the discharged heat. Vertebrate wildlife such as ducks, geese, muskrats, and raccoons prefer the shore zone and especially its wetlands. No population of vertebrate wildlife is unique to Coffeen Lake and its surrounding lands. Under the terms of a lease agreement between IDNR and Ameren, the Coffeen Lake State Fish and Wildlife Area is actively and intensely managed for wildlife.

Ameren considered vertebrate wildlife in the Petition,² noting that Coffeen Lake supports a diverse wildlife community as illustrated by the IDNR website page for Coffeen Lake (<http://dnr.state.il.us/lands/Landmgt/Parks/R4/COFFEEN.HTM>). The petition further concludes that the presence of wildlife around Coffeen Lake, in addition to the fish community, provides a valuable recreational and conservation resource for the general public and indicates the general environmental quality and acceptability of the lake.

- d. Exhibit 15 to the petition is a report prepared by Sargent & Lundy entitled "Coffeen Units 1 and 2 Coffeen Cooling System Thermal Study," Report SL-0009346, Revision 0 prepared June 2008 (S&L 2008 Report). The S&L 2008 Report states that it utilizes "S&L's thermal lake modeling software program." S&L 2008 Report, Exh. 15 at p. 4. Please provide additional information on the model, such as when it was developed, if it has a particular name, and why this particular model was used. See Section 316(a) Manual at p. 46.*

Sargent & Lundy ("S&L") originally developed the LakeT analysis program in the early 1970s. This program has been updated by S&L over the years, enhanced, and migrated to new operating systems. LakeT has been applied to conventional fossil-fueled power plants as well as nuclear units to predict the thermal distributions of lakes, rivers, and channels in the vicinity of power stations. As detailed in the S&L 2008 Report, the program uses time-dependent historical weather data from the closest climatic data source location and can be programmed with actual

² Ameren Energy Generating Company v. IEPA, PCB 09-38, Petition at 25 (Dec. 15, 2008).

operating data from the station or theoretical data to analyze “what-if’s.” There are two main variables that can be adjusted to calibrate the model. These include “effective volume” and “effective surface area.” Both of these parameters can be automatically varied by the program in relation to lake level. The effective volume is adjusted to match the circulation time between the model and the station data. The circulation time is the time that a droplet of water takes to travel from the plant outlet through the lake and back to the plant inlet. The larger the effective volume, the longer it takes for water to return to the station inlet. The effective surface area is adjusted to match the temperatures. With higher surface area, more area is utilized for the heat transfer between the lake and the environment.

The LakeT model proved that it was capable of being successfully calibrated to the actual measured lake temperatures as detailed in the S&L 2008 Report. The model was calibrated first with operation with the lake only (1995), and next with the Coffeen helper cooling system installed (2005), including the cooling basin and helper cooling towers. Deviations between actual measured and predicted temperatures are minimal, considering that historical weather data used in the calibration model is from Springfield, Illinois due to the fact that detailed weather data is not recorded in Coffeen, Illinois.

- e. The Section 316(a) Manual sets out criteria for development of a “Master Rationale, Demonstration as a Whole.” Section 316(a) Manual at pp. 70-71. Please develop and provide this information in support of the requested modifications.*

The investigation by ASA Analysis & Communications, Inc. (“ASA”) focused on three primary recreational fish species in Coffeen Lake using an approach similar to the U.S. Environmental Protection Agency’s Ecological Risk Assessment (“ERA”) framework. Recent 316(a) assessments have shown that the decision criteria from the USEPA Draft 316(a) Guidance is congruent with this more recently developed guidance for evaluating the adversity of effects

from a wide variety of ecological stressors. The ERA framework was developed with considerable scientific and public input and represents the most current scientific and regulatory view on approach for assessing ecological risks.

This approach used multiple lines of evidence for both a retrospective assessment and a prospective (or predictive) assessment of the potential risks for increasing the site-specific thermal standards in the months of May and October. The investigation relied upon data collected from Board-mandated studies intended to monitor the thermal effects on the lake's aquatic community arising from the 5-year variance for May and October standards granted in 1997. As such, these studies were an incremental step in compliance with NPDES permit conditions for the Station rather than a Section 316(a) demonstration. Nevertheless, elements of a Section 316(a) demonstration such as the Master Rationale can serve as an efficient summary of the conclusions from the present investigation conducted on Coffeen Lake in order to facilitate the decision making with regard to the requested thermal standard modifications.

The retrospective assessment utilizing data collected by SIUC and IDNR since 1997 indicated no appreciable harm to the populations of largemouth bass, channel catfish, or bluegill caused by the ongoing thermal discharge from the Station. Operation of the Station during summer months has resulted in water temperatures that exceed the limits requested by the petition, yet viable populations of these species have been maintained through natural reproduction in the lake. These species continue to support a healthy, popular recreational fishery. In fact, all three RIS exhibit characteristics such as survival, growth, body condition, population size, and recruitment of young that are comparable to or exceed those for populations in other regional and national water bodies. Fish passage will not be impaired by the marginal increase in water temperatures during May and October; this was demonstrated by the free

movement of sonic transmitter-tagged largemouth bass during warm summer months to areas in the lake distant from the discharge area.

The viability of these populations and their frequently demonstrated exemplary growth and condition attest to the conclusion that Coffeen Lake's thermal regime is also suitable for lower trophic levels that provide forage for these top consumers. Studies conducted on Coffeen Lake by the Illinois Natural History Survey ("INHS") in 1978-1981 targeted the lower trophic levels of phytoplankton, zooplankton, and benthic macroinvertebrates. The existing site-specific thermal standards, especially the summer limits which exceed the proposed May and October limits, were based on the findings of these early studies.

On rare occasions, such as in July 1999, abnormal meteorological conditions (*e.g.*, prolonged heat and humidity, reduced wind/waves, and overcast sky), coupled with unusually warm water temperatures, have led to a limited fish kill (*e.g.*, approximately 200 or fewer fish recovered). As in July 1999, similar fish kills can be experienced at other regional lakes, including some not serving as cooling reservoirs for thermal power plants. Since 1999, the Station has adopted several measures to avoid thermal conditions similar to those that might have led to the fish kills that were experienced earlier. These measures include installation of a 70-acre supplemental cooling basin, the use of Solar bees to mix water as it passes through the cooling basin, and a 48-cell helper cooling tower structure in 2002, as well as intensive monitoring of water temperatures at several locations within the cooling loop including discharge, the cooling basin, at the edge of the mixing zone and intake.

Excessive growth of nuisance species is not anticipated to result from the marginal increase in water temperatures during May and October under the proposed standards. There is no unique or rare habitat under the influence of the thermal plume in Coffeen Lake that could be

harmful. With the exception of the bald eagle, there are no threatened or endangered species residing in or depending upon Coffeen Lake. While the marginal increase in water temperatures during May and October would not be expected to affect the bald eagle, it likely benefits from the increased fish production and ice-free lake surface resulting year-round from the thermal plume.

2. *Exhibit 4 to the petition is a "Coffeen Lake Diagram:"*

a. *Please provide a copy with more easily readable site numbers for the Lake Temperature Monitor Locations*

Please see Attachment A for a site diagram indicating temperature monitoring locations in Coffeen Lake.

b. *Please visually indicate the "Edge of the Mixing Zone," as the label for "Edge of Mixing Zone" is not pinpointed to a particular location on the diagram.*

Please see Attachment A for a site diagram indicating the expected mixing zone boundaries under anticipated lake elevations.

c. *Please describe and comment on any effect of the "Sewage Treatment Plant Discharge 001D" on thermal standards in Coffeen Lake.*

The design maximum discharge flow of the Station package sewage treatment plant (NPDES Permit IL0000108, Outfall D01) is 0.030MGD. Ameren estimates that the discharge temperature would approximate that of the ambient temperature during warmer months, since temperature is not routinely monitored for this discharge. During periods of maximum flow, the sewage treatment plant discharge represents about 0.005% $((0.030\text{MGD}/629\text{MGD}) * 100)$ of the total condenser cooling water discharge flume flow and therefore would have negligible, if any, impact on the thermal discharge.

- d. Please visually indicate, and specify the depth of, the deepest point in Lake Coffeen, and indicate whether Ameren monitors at this point.*

Please see Attachment A for a site diagram that indicates the deepest area of Coffeen Lake.

The greatest depth is believed to be approximately 58 feet, located near the dam in Segment 2.

Ameren does not monitor temperature at this depth.

- 3. Exhibit 2 to the petition is a provisional variance issued by IEPA in Ameren Energy Generating Company Coffeen Power Station v. IEPA, IEPA-08-14 (Oct. 24, 2007). This provisional variance recites that Ameren was “operating four solar-powered aeration pumps in the lake to draw water from the bottom to the top in an attempt to cool the water.” Exh. 2 at 3. The S&L 2008 Report (Exh. 15) does not list the solar-powered pumps as part of the existing cooling system. Please explain whether use of the solar-powered pumps to cool the lake water is intended under the proposed modification, and if not why not.*

Ameren intends to continue using the solar-powered aeration pumps (“solar bees”) in the cooling basin of Coffeen Lake to mix and cool the water. While the solar bees were not in use at the time S&L gathered data to produce the 2008 report, the solar bees have been an added measure employed by Ameren to enhance heat dissipation.

- 4. Please specify whether Ameren has measured the water temperature and dissolved oxygen profiles during May and October in 2007 and 2008 (i.e. since completion of the Southern Illinois University-Carbondale (SIUC) fishery studies of 1997-2006 referenced in the ASA Report). Please state whether the same locations were used in any 2007 and 2008 measurements as were used in the SIUC studies.*

In order to ensure compliance with the temperature limits set forth in its NPDES permit, Ameren measures water temperature at a depth of approximately 18 inches below surface at discrete locations within the cooling loop. Such locations however are not coincident with locations used by SIUC in its analysis. No water temperature and dissolved oxygen profiles of the water column within the lake have been measured since 2006.

5. ***The ASA Report states "Coffeen Lake has had an abundance of submerged macrophytes." ASA Report at 3.7. If possible, please quantify, in terms of percent coverage, the abundance of macrophytes and relate that to amounts considered beneficial to aquatic life.***

Ameren is not aware of any quantitative study of the abundance of submerged aquatic vegetation ("SAV") in Coffeen Lake. However, dense mats can be observed in Coffeen Lake's coves, shallow waters north of the railroad crossing, and larger embayments such as the area known as cemetery bay. IDNR periodically has used treatments to control coontail (*Ceratophyllum*) and creeping water primrose (*Ludwigia peploides*).

Studies on the use of SAV by bluegills and largemouth bass have indicated that dense vegetation (approximately 1,000 stems/m² or greater) afford bluegills the greatest protection from predation by largemouth bass. On the other hand, largemouth bass growth and standing crop appear to optimal when SAV cover is intermediate (*e.g.*, 10-25 percent) due to a favorable blend of food availability and cover.

Respectfully submitted,

AMEREN ENERGY GENERATING
COMPANY,

Dated: May 12, 2009

by:

Amy Antoniolli
One of Its Attorneys

Amy Antoniolli
SCHIFF HARDIN, LLP
6600 Sears Tower
233 South Wacker Drive
Chicago, Illinois 60606
312-258-5500
Fax: 312-258-2600
aantoniolli@schiffhardin.com

AFFIDAVIT OF MICHAEL SMALLWOOD

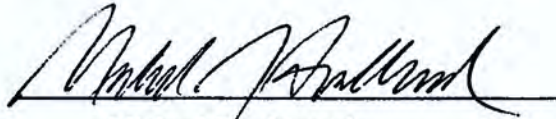
I, MICHAEL SMALLWOOD, having first been duly sworn, states as follows:

1. I am employed by Ameren Services Company as a consulting engineer in the Environmental Services Department, and as such have knowledge of the Ameren Energy Generating Company Coffeen Power Station wastewater discharges, and, in particular, the sewage treatment plant flow.

2. I have read the answers to questions 2 (c) of the preceding Answers to Hearing Officer Questions.

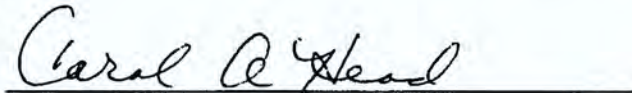
3. The statements of facts contained therein are true and correct to the best of my knowledge and belief.

FURTHER, AFFIANT SAYETH NOT.



Michael Smallwood

Subscribed and sworn to before me this 12th day of May, 2009.



NOTARY PUBLIC

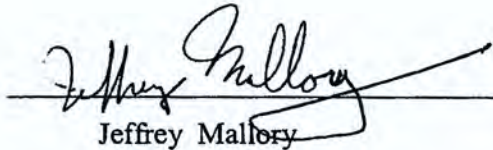


AFFIDAVIT OF JEFFREY MALLORY

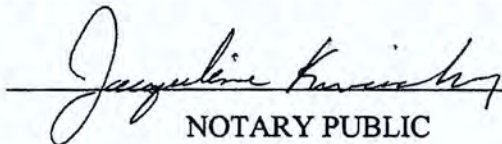
I, JEFFREY MALLORY, having first been duly sworn, state as follows:

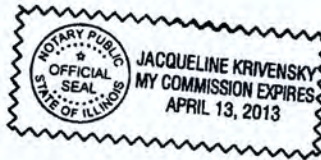
1. I am an employee of Sargent & Lundy, author of "Coffee Units 1 and 2 Coffee Cooling System Thermal Study," Report SL-009346, June 2008, attached to the Ameren Energy Generating Company Petition for Modified Thermal Standard as Exhibit 15, and as such have knowledge of the model and data used to prepare such document and the conclusions made therein.
2. I have read the answer to question 1(d) of the preceding Answers to Hearing Officer Questions.
3. The statements of facts contained therein are true and correct to the best of my knowledge and belief.

FURTHER, AFFIANT SAYETH NOT.


Jeffrey Mallory

Subscribed and sworn to before me this 11th day of May, 2009.


NOTARY PUBLIC

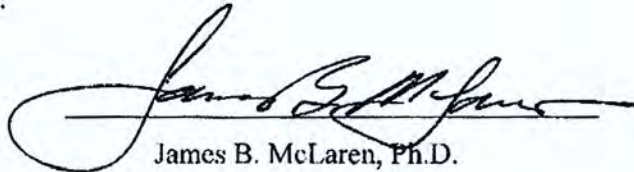


AFFIDAVIT OF JAMES B. McLAREN, Ph.D.

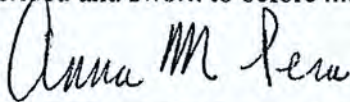
I, JAMES B. McLAREN, Ph.D., having first been duly sworn, state as follows:

1. I am an employee of ASA Analysis and Communication, Inc., author of "Evaluation of Potential Adverse Impacts from Revised Site-Specific Thermal Standards in May and October for Coffeen Lake," March 2008, attached to the Ameren Energy Generating Company Petition for Modified Thermal Standard as Exhibit 11, and as such have knowledge of the underlying data used to prepare such document and the conclusions made therein.
2. I have read the answers to questions 1(a), (b), (c), (e), and 5 of the preceding Answers to Hearing Officer Questions.
3. The statements of facts contained therein are true and correct to the best of my knowledge and belief.

FURTHER, AFFIANT SAYETH NOT.


James B. McLaren, Ph.D.

Subscribed and sworn to before me this 11th day of May, 2009.



NOTARY PUBLIC

ANNA M. PERA
Notary Public, State of New York
Qualified in Niagara County
My Commission Expires April 3, 2010

ATTACHMENT A

Revised Coffeen Site Diagram

