Tsai, Shu-Mei

From: Mosher, Bob
Sent: Thursday, July 02, 2015 11:25 AM
To: Tsai, Shu-Mei
Subject: RE: IL0000108 - Coffeen Power Station

IEPA EXHIBIT
No. 21

Yes the boron and manganese WQS have now officially changed. The comments I made in the 2012 memo about getting rid of boron and manganese limits in the permit are valid.

Bob Mosher
Manager, Water Quality Standards Section
Division of Water Pollution Control
Illinois Environmental Protection Agency
1021 North Grand Ave. East
P.O. Box 19276
Springfield, IL 62794-9276
217/558-2012

From: Tsai, Shu-Mei
Sent: Thursday, July 02, 2015 11:20 AM
To: Mosher, Bob
Subject: RE: IL0000108 - Coffeen Power Station

Has IPCB changed manganese and Boron standards since your October 30, 2012 WQBEL Memo?

From: Mosher, Bob
Sent: Thursday, July 02, 2015 9:06 AM
To: Tsai, Shu-Mei
Subject: RE: IL0000108 - Coffeen Power Station

1. Yes, it is an artificial lake
2. Lakes have a zero 7Q10 flow
3. Mixing zones are allowed in lakes and the dilution ratio would have to be determined by a study. For temperature, this was determined in the past, usually by the IPCB. If they want mixing for something other than thermal, we would want some kind of demonstration.

Bob Mosher
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217/558-2012

From: Tsai, Shu-Mei
Sent: Wednesday, July 01, 2015 1:41 PM
To: Mosher, Bob
Subject: IL0000108 - Coffeen Power Station

Bob:

Please help some information. Thanks

1. Is Coffeen Lake an artificial lake?
2. What is the 7Q10 ?
3. My assume is if the 7Q10 is zero, then the lake doesn't have any dilution ratio?

Shu-Mei Tsai,
Environmental Protection Engineer, Industrial Unit
Permit Section
Division of Water Pollution Control
Illinois Environmental Protection Agency

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Shu-Mei.Tsai@Illinois.gov

LeCrone, Darin

IEPA EXHIBIT
No. 22

From: Tsai, Shu-Mei
Sent: Wednesday, July 08, 2015 2:24 PM
To: LeCrone, Darin
Subject: FW: IPH Coffeen
Attachments: Coffeen Lower Trophic Level Impacts Study.pdf; Review Notes.pdf; Water Quality Standards Unit Memo.pdf

I sent three documents to Sean on May 06

-----Original Message-----
From: Tsai, Shu-Mei
Sent: Wednesday, May 06, 2015 9:25 AM
To: Ramach, Sean
Cc: LeCrone, Darin
Subject: RE: IPH Coffeen

Sean:

See attachments. Please let me know if you need more information. Thanks

Shu-Mei

From: Ramach, Sean [mailto:Ramach.Sean@epa.gov]
Sent: Wednesday, April 08, 2015 4:13 PM
To: Tsai, Shu-Mei; LeCrone, Darin
Cc: Ireland, Scott; Pierard, Kevin
Subject: IPH Coffeen

Hi Shu-Mei and Darin,.

I am starting to review the documents and wanted to request the permit writer review notes and any additional thermal documents/studies that IEPA may have.

I have a number of studies from our last review in 2011, but it appears that the facility was specifically required to conduct 3 years of studies starting in 2010.

The major issue that we raised in our comment letter for the permit modification in 2011 was that the method of and basis for the thermal relief was not clearly consistent with Clean Water Act Section 316(a).

We note that the document provided that assesses the thermal impacts to the lower trophic levels is not the equivalent of a 316(a) demonstration. An identified issue from the 2011 review was that the facility had a breadth of studies, but no clear compilation of the studies that was equivalent to the document EPA believes is necessary to support a request for alternate thermal limits. It does not appear that the deficiency has been corrected for this renewal.

From a quick review of the draft permit, the language still indicates that the relief is based upon the IPCB order authorizing alternate standards under 302.211(j). Any standards established under this regulation would need to be submitted to EPA for approval as site specific WQS prior to incorporation into a NPDEs permit. EPA identified this issue in its 2011 letter and recommended that it be resolved prior to the reissuance of the permit to prevent a potential objection.

EPA recognizes that the Illinois regulations allowing for a facility to petition the IPCB for a 316(a) were adopted last year and the facility may not have had time to complete the process. However, it is not clear that the process has begun and the permit is silent on any requirements to submit such an application under the new regulations to ensure that future permits will incorporate the thermal relief in a manner consistent with the CWA.

We look forward to discussing these matter with you, but wanted to bring them to your attention as significant issues in the permit review.

Cheers,

Sean Ramach

Environmental Scientist | P:312-886-5284 F:312-692-2502| ramach.sean@epa.gov<mailto:kamerath.marcy@epa.gov>
U.S. EPA, Region 5, Water Division, NPDES Programs Branch | 77 W. Jackson Blvd., WN-16J | Chicago, IL 60604

Lower Trophic Level Impacts of a Modified May and October Thermal Standard for Coffeen Lake

Prepared for

Illinois Power Generating Company

Coffeen Power Station

Prepared by

ASA Analysis and Communication, Inc.
5 Fairlawn Drive, Suite 205
Washingtonville, NY 10992

June 30, 2014

Background

On December 15, 2008 Ameren Energy Generating Company (Ameren), the then named owner/operator of Coffeen Power Station (Station),[1] filed a petition to the Illinois Pollution Control Board (IPCB) to modify the site-specific thermal standards for the Station for the months of May and October. Under the thermal standards for May and October existing at that time, thermal discharges from Coffeen Power Station could not result in water temperatures that exceeded:

- 89°F as a monthly average, and
- 94°F as a maximum for more than two percent of the hours during each of those months,

as measured at the boundary of a 26-acre mixing zone. The proposed revised standards for the months of May and October were as follows:

- 96°F as a monthly average, and
- 102°F as a maximum for more than two percent of the hours during each of those months.

In support of the petition, Ameren prepared and submitted a report (ASA 2008) that analyzed the results of extensive research previously conducted on the aquatic community of Coffeen Lake, particularly the sportfish populations. In the report, the potential effects of raising the May and October thermal standards were evaluated by (1) a retrospective assessment, which applied the results of studies on the status of the lake's fish populations to determine whether or how they have adapted to the recent thermal environment in the lake; and (2) a prospective assessment, which predicted how the lake's thermal environment during May and October might be altered under the proposed revised standards.

Following a public hearing, the IPCB issued a Final Opinion and Order on March 18, 2010 (PCB 09-38) granting Ameren the petitioned site-specific thermal standards specific to the months of May and October. On October 6, 2011 following a review of the proposed NPDES permit modification pursuant to 40 C.F.R. §123.44(d)(2), the U.S. Environmental Protection Agency (USEPA) transmitted a comment letter to the Illinois Environmental Protection Agency (IEPA). USEPA's letter stated that Ameren's studies provided "a comprehensive analysis of the biological community and the impacts for the Coffeen Power Station," and the enclosure to USEPA's letter (Comment #2) recognized that "the biological reports did a sufficient job in demonstrating that past thermal discharges did not appear to have an adverse impact on the entire community[.]" However, USEPA expressed concerns regarding the granting of thermal relief for the months of May and October. One of the concerns was the potential for adverse impacts to lower trophic levels due to the proposed alternate limitations, and specifically whether the increase in temperature could result in a change in spawning behavior and increased predation to "significant life stages" due to earlier spawning and increased growth.

[1] In December 2012, Ameren Energy Generating Company was indirectly acquired by Illinois Power Holdings, LLC and renamed Illinois Power Generating Company.

This report addresses that concern raised by USEPA and summarizes available underlying information on the potential for thermal impacts to lower trophic levels and predator-prey relationships in Coffeen Lake.

USEPA Guidance

USEPA Section 316(a) Draft Guidance (USEPA 1977) describes a decision train to be followed by both an NPDES applicant and regulatory agencies as to how to make 316(a) determinations. As part of the decision train, the guidance document describes an early screening procedure to evaluate the relative potential for thermal discharge impact on various components or trophic levels of an aquatic community based on the habitat zones they occupy, the importance of their role in ecosystem energy dynamics, or their life history characteristics. Vulnerability is defined as the potential for exposure to the thermal plume and resistance to impacts from exposure. For this procedure, the community is divided into six "biotic categories," which include phytoplankton, zooplankton, habitat formers, shellfish and macrophytes, fish, and other vertebrate wildlife. A vulnerability evaluation is conducted to develop "biotic category rationales" and to screen out biotic categories that have low potential for impacts. This evaluation allows further study to focus on representative important species (RIS), which are more likely to be exposed to the thermal plume and be sensitive to thermal impacts. The draft guidance further describes three types of 316(a) demonstrations from which an applicant may choose: a non-predictive demonstration of no prior appreciable harm (NPAH or Type I), a predictive demonstration of protection of representative important species (RIS) or Type II demonstration, or a low potential impact demonstration (Type III).

The original owner/operator of Coffeen Power Station, Central Illinois Public Service Company (CIPS), prepared a thermal demonstration on May 31, 1977 and filed a petition to the IPCB to establish site-specific thermal standards for Coffeen Lake. In response to this filing, on April 27, 1978 IPCB gave CIPS its requested site-specific discharge limits on an interim basis, with the condition that it present additional evidence that it has not caused, nor can reasonably be expected to cause significant ecological harm to Coffeen Lake. Pursuant to this, CIPS hired the Illinois Natural History Survey (INHS) to perform a study of whether the lake is capable of supporting a viable fishery, the only remaining major issue to resolve. The 3-year long INHS study was conducted during 1978-1981 and addressed the biotic categories recommended by USEPA guidance, including lower trophic levels such as phytoplankton/periphyton, zooplankton, and benthic macroinvertebrates, in addition to fish (Tranquilli and Larimore 1981). Trophic relationships were investigated through food habit studies, and the overall effects of the thermal discharge on trophic relationships were expressed in terms of fish growth, condition, and reproduction. Subsequent to the completion of the INHS investigation in 1981, the IPCB on March 19, 1982 granted thermal limitations requested by CIPS in a February 5, 1982 amended petition, which became the site-specific thermal standards existing prior to the December 2008 petition by Ameren for modified limits for the months of May and October.

According to USEPA 316(a) guidance, the INHS studies conformed to a Type I NPAH demonstration. Such a demonstration of no prior appreciable harm to the lake community provided the strongest evidence possible, superior to a Type II predictive assessment, which

typically is required for new or planned facilities. The NPAH assessment approach was made possible because Coffeen Unit 1 had been operating for 13 years, and Unit 2 for 6 years, prior to the investigation, thus allowing for any thermal impacts on the community to be observable. The INHS investigation compared community components occurring within and beyond the direct influence of the thermal plume, and further compared the community to those found both in other cooling lakes (e.g., Lake Sangchris) and non-cooling lakes (e.g., Lake Shelbyville).[2]

INHS Study Findings

The phytoplankton and periphyton of Coffeen Lake were characterized seasonally and spatially in terms of species composition, abundance or standing crop, primary production, chlorophyll a concentration, and periphyton colonization rates (Coutant 1981). This study found a diversity of species in Coffeen Lake at all sampling stations, from within the plume area to the northwestern arm of the lake, the latter of which served as a control for thermal effects. The overall abundance of phytoplankton and chlorophyll a concentrations was within the range of values found in lakes Shelbyville and Sangchris, which either received no or less thermal loading per lake volume. Phytoplankton primary production rates in the heated area of Coffeen Lake were not significantly different from values in other areas of the lake. While there were differences in the relative abundance of flagellate and diatom phytoplankton between the heated discharge area and other areas, these differences were attributed to the influence of the water depths from which they were drawn; i.e., phytoplankton largely populating the thermal discharge area were drawn into the Station's intake at a greater depth (11 m), well below the euphotic zone and where populations of all species are sparse, before being discharged to the heated area sampled. The growth and production of periphyton were reduced in the heated discharge area, but Coutant (1981) suggested that could have been influenced by factors other than temperature such as current or some other growth limiting or inhibiting factor present in this area.

The zooplankton community of Coffeen Lake similarly was characterized seasonally and spatially in terms of species composition and diversity, abundance, and biomass standing crop (Waite 1981). The overall structure of the zooplankton community closely resembled the structure of the zooplankton communities reported for L. Sangchris (the cooling lake) and L. Shelbyville (the non-cooling lake). In the two years of sampling, the species richness was similar among the five sampling stations during the first year but not the second year, when species richness was greater in the shallower area north of the railroad causeway and out of the cooling loop, between the discharge and intake. This difference was attributed, at least partially, to the morphology of the lake basin, in which this shallower area would allow development of more littoral taxa not present in the deeper areas within the cooling loop. There was little evidence that the longitudinal thermal gradient in the lake either restricted or enhanced the distribution of taxa to certain areas in the lake. Sampling stations with high water temperatures during the warm months of summer sustained high diversities of species. Seasonal pulses in

[2] Lake Sangchris was created in 1964-1966 as a cooling water source for the coal-fired Kincaid Station, and Lake Shelbyville was formed by damming the Kaskaskia River in 1970 for flood control. Both are located in central Illinois.

numbers of zooplankters (high in spring/summer and low in late winter) resembled those of Lake Shelbyville, the unheated reservoir. Waite (1981) concluded that the zooplankton community of Coffeen Lake was productive and viable despite the atypical thermal regimes, entrainment through the cooling water intake, or unusual water chemistry.

The benthic macroinvertebrate community of Coffeen Lake was characterized seasonally and spatially in terms of species composition, species diversity, and density at four locations around the lake (Warren et al. 1981). Water temperature, dissolved oxygen (DO) concentrations, and lake morphometry influenced the benthic community composition. Oligochaete worms predominated at the sampling station nearest to the discharge where water temperature was greatest (95°F maximum summer in the channel and 104°F maximum summer in shallow coves), but in this area the bottom was covered with silicate slag originating from the power plant, likely also influencing the community composition. Chironomid midge fly larvae, the phantom midge *Chaoborus punctipennis,* or the burrowing mayfly larvae *Hexagenia limbata* were numerically dominant at other locations. The lowest density, biomass, number of species, and species diversity occurred at the deepest location (#2) near the dam where vertical thermal stratification led to decreased DO concentrations; predation by carnivorous taxa also may have depressed densities there. Comparison of the benthic community in Coffeen Lake to Lake Sangchris was hampered by the differences in lake morphometry, where Coffeen Lake is deeper and Lake Sangchris is shallower and has more extensive littoral areas. Total densities of Chironomidae in lakes Coffeen, Sangchris, and Shelbyville were comparable, however, biomass in Lake Shelbyville was greater. This difference was attributed to the much lower densities of the genus *Chironomus* in Coffeen Lake, which Warren et al. (1981) attributed to predation or the lack of food, and not to thermal factors.

These INHS studies were conducted in 1978-1981 and the phytoplankton/periphyton, zooplankton, and benthic macroinvertebrate communities may have changed somewhat since then. However, it is unlikely that the trophic dynamics would be altered appreciably. At the time of these studies, Coffeen Lake was characterized as being eutrophic, according to the results of the USEPA National Eutrophication Survey conducted in 1973 with the cooperation of IEPA (CIPS 1977). More recently, Coffeen Lake was listed under §303(d) of the Clean Water Act as being impaired for aesthetic quality by excess algae resulting from excess phosphorous loading, for which a TMDL was prepared and approved (IEPA 2007). The consistency of the characterization of the lake being eutrophic suggests that the aquatic community in recent years likely has not changed dramatically.

The 1978-1981 INHS investigations also included food habit studies for bluegill (Newman 1981) and largemouth bass (Newman and Perry 1981). These studies are significant because they provide insight into the upper levels of the food web and indicate predator's food preferences for the prey species available in Coffeen Lake.

Bluegills were found to be opportunistic feeders, feeding on the most abundant and accessible food resources (Newman 1981a). They exploited both aquatic food resources and terrestrial arthropods, the latter originating from overhanging forest vegetation along the shoreline. Gastropods, along with plant material, dominated the food items in bluegill stomachs in the

heated area of the lake, and chironomids and other aquatic insects were prevalent food items in the unheated "ambient" area, reflecting their relative availability and abundance in the two areas. There were seasonal differences in bluegill food habits. In the spring, fish eggs became the dominant food in both areas. In the fall, terrestrial arthropods were the predominant food items throughout the lake, when the diversity of ingested food items was greater in the heated areas than in the unheated areas. Newman (1981a) at that time speculated that intraspecific and interspecific competition for food and space, along with other factors, may have been responsible for stunting the growth of bluegills in Coffeen Lake.

Young-of-the-year (YOY) largemouth bass were insectivorous during the month of June but thereafter were piscivorous (Newman and Perry 1981). Piscivory commenced early in life at a total length of approximately 70 mm. Principal food items in June were microcrustaceans, chironomids and other aquatic arthropods. Shad (*Dorosoma* sp.) was the preferred prey species despite the greater abundance of *Lepomis* sunfish larvae, especially in the near-shore areas. Newman and Perry (1981) concluded that food competition between young largemouth bass and bluegill in Coffeen Lake would be minimal, and that the observed rapid growth of bass indicated that feeding dynamics would not be limiting the success of the largemouth bass population in Coffeen Lake.

SIUC and EIU Studies

Southern Illinois University-Carbondale (SIUC) conducted studies in Coffeen Lake from 1997 through 2006 (Heidinger et al. 2000, 2001, 2002; Brooks 2004, 2005; Brooks and Heidinger 2006, 2007). The studies were initiated as a condition of an approved 5-year variance for the site-specific thermal standards for May and October arising from a petition by CIPS in early 1997 and approved by the IPCB on June 5, 1997. The studies were designed and conducted specifically to monitor the fishery for any impact from the variance. The results of these studies were used as the basis for the report (ASA 2008) supporting the 2008 petition to again modify the site-specific thermal standards for the months of May and October. The decision to monitor the fishery was the result of concern for the fish species alone that supported the recreational fishery on the lake. It might be inferred that the observed status of the sportfish populations (specifically largemouth bass, bluegill and channel catfish) would accurately reflect the status of lower trophic levels in the lake and the trophic dynamics that support these populations, in that this approach would integrate all aspects of the thermal environment, including their effects on the various trophic levels in the lake. The applicable standard is the protection and propagation of a balanced, indigenous population [community] of shellfish, fish and wildlife in and on the body of water.

In 2010, Eastern Illinois University (EIU) was retained by Ameren to conduct additional studies on Coffeen Lake as result of a Memorandum of Understanding (MOU) with the Illinois Department of Natural Resources (IDNR). Among the objectives of the studies was to evaluate changes in density, age and size structure, condition, growth, and mortality of six targeted sportfish species in Coffeen Lake following the 2010 modification of thermal standards for May and October (Colombo and Porreca 2013a,b). The three key species (largemouth bass, bluegill, and channel catfish) from the SIUC studies were retained, but three species were

added as targeted species: redear sunfish, white crappie, and black crappie. Lower trophic levels were not included directly in the studies, under the continued assumption that their wellness would be reflected by the status of these targeted fish species. The fish populations were sampled primarily by boat electrofishing, supplemented by fyke nets, gill nets, and a Lowrance HDS-10 side-scanning sonar. Thus, these most recent studies, conducted by EIU, provide 2-3 years of data for a demonstration of the realized effects of the higher May and October thermal standards approved in 2010 by the IPCB.

The overall conclusion from the EIU studies supported that of earlier investigations in that the sportfish of Coffeen Lake demonstrate behavioral thermoregulation, i.e., they congregate in cooler waters during warm months and in the warmer waters of the thermal discharge during the winter (Colombo and Porreca 2013a). Other findings included that, following adoption of the higher thermal standards in 2010, largemouth bass have remained in excellent condition, with a relative weight (W_r)[3] of 94.8-98.6 (average 96.1), indicating a healthy population. Crappie species also are in excellent condition (average W_r of 95.1 white crappie and 93.8 for black crappie) and, like largemouth bass, exhibit relatively fast growth. However, crappie are largely restricted to the ambient temperature reach outside the thermal plume. Mortality rates are high for largemouth bass and crappie, likely due to greater angling mortality for these two species, which support very active recreational fisheries in Coffeen Lake.

Bluegill, redear sunfish, and channel catfish are abundant and are in average condition (average W_r of 85.9 for bluegill, 86.6 redear sunfish, and 89.2 for channel catfish), which Colombo and Porreca (2013a) concluded as indicating that food supply does not appear to be influencing condition. Interestingly, no significant difference in bluegill density was found among all five sampling reaches in the lake, including reaches inside and outside the influence of the thermal plume. Colombo and Porreca (2013a) suggested that sunfish species, despite having high densities, have poor size structure (more small fish than large fish) due to thermal impacts in the lake causing scarce food resources during winter months. Although the water temperature during winter is suitable for macroinvertebrate prey for the sunfish, the biomass of macroinvertebrates could be reduced due to reduced plankton abundance throughout the lake, a common seasonal occurrence in temperate regions. Both sunfish species were short-lived (range age 0 to age 4) and high annual mortality rates (0.77-0.80 for bluegill and 0.60-0.84 for redear sunfish). Despite the relatively fast growth rates, the two species do not reach large body size because of the short life span. This phenomenon was characterized as being the common condition for panfish in thermal cooling lakes in Illinois (Colombo and Porreca 2013a).

Channel catfish were significantly more abundant within the "cooling loop" near the dam (Colombo and Porreca 2013a), preferring the greater depths and warmer temperatures there. Channel catfish was the longest-lived sportfish species with fish up to 8 years of age and a fairly normal length frequency distribution.

[3] Relative weight is an index of condition calculated by dividing the weight of the fish by a length-specific standard weight for the species.

Lower Trophic Level Impacts of Modified May and October Standard

Although impacts from the modified May/October thermal standards on lower trophic levels in Coffeen Lake have not been studied directly, the relative magnitude of any impacts can be inferred from data gathered in 1978-1981 on the composition and dynamics of these trophic levels under continuous Station operation, and from the status of the consumer species in the lake subsequent to the standard modification in 2010.

To review, the revisions to thermal standards for Coffeen Lake were limited to the months of May and October, two transition months between winter and summer thermal conditions. As such, the revised standards more realistically reflect a natural thermal environment, where temperature increases or decreases occur more gradually than the abrupt change of up to 8°F (Figure 1) inherent in the previous site-specific standards (ASA 2008). The more gradual increase in temperature allows organisms to easily acclimate to the higher temperatures. Also as shown in Figure 1, there usually is not a full month of temperatures at the maximum limit so that any influence of higher temperatures would be lessened, especially in May. As an ameliorating influence, at any time there is a thermal gradient in the lake either horizontally or vertically (with depth) where a mobile organism can reach a thermal refuge from sustained temperatures that it would not otherwise tolerate.

The INHS studies in 1978-1981 collected seasonal data on lower trophic levels, including during peak summer temperatures that would be expected to exceed May and October water temperatures under the modified thermal standards. Despite these peak temperatures, phytoplankton, zooplankton, and benthic macroinvertebrates maintained normal diverse communities within Coffeen Lake overall, and thus maintained a food base for higher trophic levels such as the sportfish species studied by SIUC and EIU. While trophic dynamics in an artificial cooling reservoir such as Coffeen Lake could be complicated, further detailed study of the lower trophic levels in Coffeen Lake should not be necessary, since there already is valuable information available.

The food web in Coffeen Lake appears to be typical of other Midwestern reservoirs, as are the predator-prey relationships. The predator fish species (e.g., largemouth bass and bluegill) are generalist, opportunistic species that demonstrate prey switching should one or more preferred species be limited in abundance and availability, i.e., require too much energy expenditure to find and capture. This is a feeding tactic commonly observed in aquatic communities and is a benefit of the complexity of food webs in such communities (Murdoch 1969). Food habit studies of bluegill by Newman (1981a) and of largemouth bass by Newman and Perry (1981) demonstrated the potential for prey switching by having a diversity of prey items consumed, depending on location.

Higher temperatures in May and October under the modified standards should have minimal effects on lower trophic communities and the food chain, as demonstrated by the 2010-2012 EIU studies of species at the top of the food chain (Colombo and Porreca 2013a). They concluded that there was no evidence that increased thermal loading from the modified thermal standards for May and October had a detrimental impact on the sportfish populations in Coffeen

Lake and that based on age data, observed recruitment of these species indicated continued successful reproduction and survival. The condition of largemouth bass and crappie was excellent, and average or better for the other target species, indicating that food was not limited during the post-modification period of study. In fact, they state that even for bluegill and redear sunfish (species in average condition), food was abundant in Coffeen Lake. Colombo and Porreca (2013a,b) observed that high abundances and small lengths of the sunfish species would usually indicate stunting, but their age and growth data do not support these populations as being stunted. They concluded that sunfish have ample food

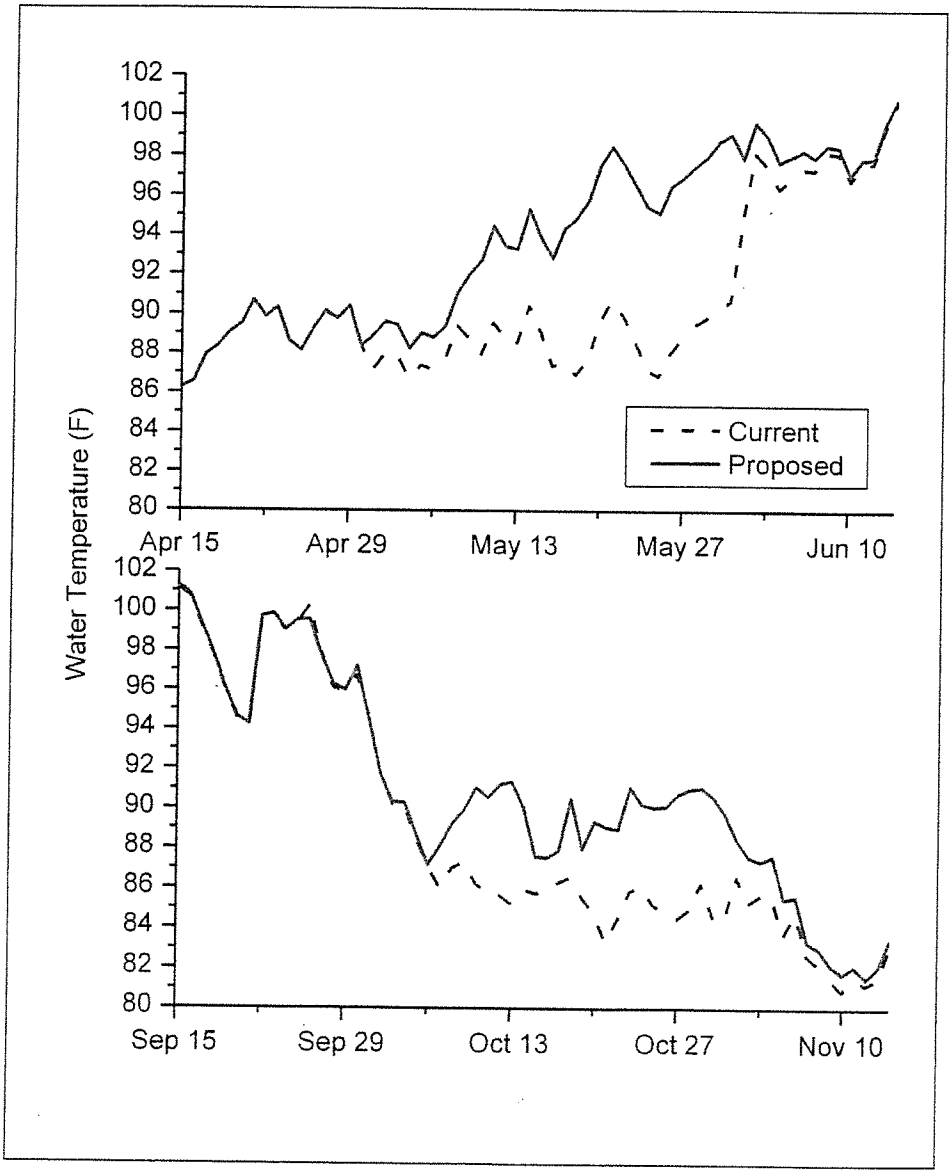

Figure 1. Predicted Mean Daily Near-Surface Water Temperatures at the Mixing Zone Boundary under Current and Proposed Thermal Standards for May and October using 1987 Meteorological Conditions

availability and habitat, and are in better condition than that of stunted populations, contrary to the earlier opinion of Newman (1981a).

USEPA 's specific concern was whether the increase in May temperatures could result in a change in spawning behavior or increased predation to "significant life stages" due to earlier spawning and increased growth. The most relevant information is available for largemouth bass and its prey species in Coffeen Lake. Tranquilli and Perry (1981) found that largemouth bass reached gonad maturation and began spawning in mid or late March in the heated discharge area of the lake, with most intense spawning from mid to late April. Spawning in the unheated "ambient" area did not begin until late April and extended into mid-May, i.e., approximately 3-4 weeks later than in the heated area. Length frequency distributions of YOY largemouth bass in the fall of 1979 indicated two size modes, possibly resulting from differences in spawning time and/or the length of the growing season within the heated and unheated areas of the lake Tranquilli and Perry (1981). The multiplicity of spawned cohorts help stabilize recruitment in a population in an unstable environment, but in Coffeen Lake may give an advantage to earlier spawned YOY, which are afforded a longer growing season.

The food habit study by Newman and Perry (1981) showed YOY largemouth bass in June are insectivorous but by July are piscivorous, with the primary, identifiable prey being *Dorosoma* larvae (likely gizzard shad). Newman (1981b) found that gizzard shad larvae were initially collected on April 23 in the heated area of Coffeen Lake, and approximately one week later in the unheated area, thus demonstrating only a limited influence of the thermal discharge on the timing of spawning for gizzard shad. Larval gizzard shad were present throughout May and June in ichthyoplankton collections (Newman 1981b), but based on food habit studies (Newman and Perry 1981) must also have been present in July. Thus, the occurrence of gizzard shad larvae would coincide with the beginning of piscivory for largemouth bass YOY, and in fact, earlier spawning in the discharge area may prove to be advantageous for young largemouth bass by extending the period of their co-occurrence.

Sunfish (*Lepomis* sp.) have a protracted spawning season, thus their eggs and larvae should be available as alternate prey items for the largemouth bass YOY. *Lepomis* larvae, like gizzard shad, were first collected on April 23 in the heated discharge area of Coffeen Lake, but not until May 21 in the unheated area (Newman 1981b). Peak larval abundance occurred during June. A second period of spawning occurred later in the summer, with larvae being captured in samples from late July until at least late August.

Warmer discharge temperatures in May would be occurring after much of largemouth bass spawning occurs and when they are larvae or begin to feed on insects and other invertebrates. At the same time, gizzard shad and *Lepomis* sunfish would be spawning, or would have spawned and their larvae would be developing, depending on their location within the lake. Warmer temperatures in May potentially would promote higher metabolism, increased feeding, and faster growth for YOY largemouth bass, assuming a sufficient food supply. The warmer temperatures also could accelerate spawning of gizzard shad and *Lepomis* sp. and bring their eggs and larvae into synch with the food demands of the young largemouth bass. The actual

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mechanisms of this predator-prey relationship are unknown at this time, but more important are the observable results. The studies by Colombo and Porecca (2013a,b) have demonstrated that spawning and recruitment of young largemouth bass have been successful annually since the implementation of the modified May and October standards, as also for the other five fish predator species they targeted.

Conclusions

Information on the likely effects on lower trophic levels from raising the site-specific thermal standards for May and October is available from extensive studies conducted on Coffeen Lake since the late 1970s and as recently as 2012. While data directly on the lower trophic levels themselves are not recent, they provide much more information than typically is available for 316(a) demonstrations. Furthermore, Coffeen Lake has remained a eutrophic water body since the earlier studies, and it is unlikely that the trophic dynamics would be altered appreciably over that period.

Higher temperatures in May and October under the modified standards should have minimal effects on lower trophic communities and the food chain. The most recent studies (2010-2012) have concluded that there is no evidence that increased thermal loading from the modified thermal standards for May and October has had a detrimental impact on the sportfish populations in Coffeen Lake. Recruitment of recent year classes observed by these studies on sportfish species have indicated successful reproduction and survival, and rapid growth rates have been maintained, implying that the lower trophic levels in Coffeen Lake have continued to supply an ample food base for these top predators. Since the implementation of the modified thermal standards for May and October, the diversity of thermal habitats has remained for both the lower and upper trophic levels of the Coffeen Lake community, resulting in an exemplary recreational fishery.

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Tsai, Shu-Mei

From: Koch, Brian
Sent: Monday, March 09, 2015 10:59 AM
To: Tsai, Shu-Mei
Cc: Mosher, Bob
Subject: Coffeen 316(a)

The draft Special Condition is below. I suppose we should also include a sentence requiring them to submit a revised 316(a) Demonstration study plan within 6 months of the effective date of the permit.

1. Future 316(a) Demonstrations must continue to annually study Coffeen Lake from May through October using the methods and study designs from the 2010-2012 Eastern Illinois University studies so as to monitor the health of sportfish populations and potentially detect any population level changes in age/growth, condition, density, and mortality of the Representative Important Species (RIS) study organisms. In addition to the continuation of sportfish studies outlined above, the selection of study organisms must be expanded or modified to include fish from additional RIS categories. Recommended RIS categories include a thermally sensitive species (white and black crappie are currently studied as sportfish, but would be suitable organisms for this RIS category), a species necessary in the food chain (e.g., gizzard shad or another important lower trophic level species), and a species potentially capable of becoming a localized nuisance (e.g., common carp or any invasive species of concern).

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276 • (217)782-2829
PAT QUINN, GOVERNOR LISA BONNETT, DIRECTOR

Memorandum

Date: January 7, 2015

To: Shu-Mei Tsai

From: Brian Koch

Subject: Comments Regarding Renewal of Alternative Thermal Limits
Coffeen Power Station - IL0000108 Montgomery County

Pursuant to 35 IAC 106.1180(b), an NPDES permit application for renewal of an alternative thermal effluent limitation must include sufficient information for the Agency to compare the nature of the Permittee's thermal discharge and the balanced, indigenous population of shellfish, fish, and wildlife at the time the Board granted the alternative thermal effluent limitation, and the current nature of the petitioner's thermal discharge and the balanced, indigenous population of shellfish, fish, and wildlife currently extant. As part of the thermal relief granted in Illinois Pollution Control Board (IPCB) Order 2009-R-038, the Permittee was required to conduct annual fish studies for a three year period, beginning in 2010. The following is a summary of the findings from these studies, as well as recommendations for the upcoming permit and future 316(a) Demonstrations to be conducted by the Permittee.

Background

The original owner/operator of Coffeen Power Station (Central Illinois Public Service Company) hired the Illinois Natural History Survey (INHS) to perform studies from 1978-1981 in support of a 316(a) Demonstration. As part of this initial demonstration, INHS addressed the biotic categories recommended by USEPA guidance, including lower trophic levels such as phytoplankton/periphyton, zooplankton, and benthic macroinvertebrates, in addition to fish. The overall effect of thermal discharges on trophic relationships was investigated through fish diet studies and was expressed in terms of fish growth, condition, and reproduction. Following completion of the INHS studies, the IPCB granted site-specific thermal standards which remain in place today, with exception to months of May and October which are now subject to modified limits. The studies performed by INHS conformed to a Type I No Appreciable Harm demonstration under the 1977 USEPA Section 316(a) Draft Guidance document, as Unit 1 and 2 of the facility had been in operation for 13 years and 6 years, respectively, therefore allowing for any thermal impacts on the aquatic community to be observable at the time of study. From 1997-2006, additional studies on Lake Coffeen were conducted by Southern Illinois University-Carbondale (SIUC) in response to a 5-year variance for site-specific thermal standards for the months of May and October which was approved by IPCB on June 5, 1997. In contrast to the earlier studies performed by INHS, the SIUC studies were designed and conducted specifically to monitor the valuable sportfish populations for any adverse impact from the variance. Largemouth bass, bluegill, and channel catfish were selected as study organisms, as the lake was being managed with an emphasis on sportfish to provide recreational opportunities to fishermen. The lake is presently being managed by the Illinois Department of Natural Resources (IDNR)

and continues to be managed in a manner to provide a fishery that supports healthy populations of sportfish that are sought out by recreational anglers.

Current 316(a) Demonstration

Given that sportfish are the biotic category that the lake is being managed for, ongoing 316(a) studies have studied the potential negative impacts of increased thermal loadings on sportfish. As part of the thermal relief granted in IPCB Order 2009-R-038, the Permittee was required to conduct annual fish studies from 2010-2012. Eastern Illinois University (EIU) was retained by Ameren to conduct additional studies on Coffeen Lake through a Memorandum of Understanding (MOU) with IDNR. Objectives of the studies included the evaluation of changes in density, age and size structure, condition, growth, and mortality of six targeted sportfish species in Coffeen Lake following the 2010 modification of thermal standards for May and October. The Representative Important Species (RIS) selected included largemouth bass, bluegill, channel catfish, redear sunfish, white crappie, and black crappie. The results of the 2010 surveys serve as an assessment of the indigenous population of fish at the time of the Board granting thermal relief, whereas the 2011-2012 results serve as an assessment of the effects (or lack thereof) of the thermal variance on this population. Results from the 2010-2012 studies did not suggest that increased thermal loadings have altered the sportfish populations in Coffeen Lake. Although body condition (relative weight) was found to decrease for channel catfish and crappie in 2012 compared to 2010 results, largemouth bass body condition increased. The age structure of sportfish populations from 2010-2012 varied, but was not perceived to be outside the norm of the natural cyclical nature of recruitment success across year classes. For example, largemouth bass were found to have reduced recruitment in 2011 and 2012, while recruitment of white crappie, a thermally intolerant species, was found to be highly successful in 2011. Growth across year classes from 2010-2012 was not found to be observably altered for any species. Largemouth bass and white crappie have exhibited fast growth across study years, likely due to an abundance of prey fish and increased water temperatures that are conducive to fast growth.

The Permittee has successfully completed the requirements stipulated in the thermal relief granted in IPCB Order 2009-R-038. Additionally, given that Coffeen Lake is being managed for sportfish with oversight from IDNR, the 2010-2012 studies on sportfish populations in Coffeen Lake are considered sufficient in regards to NPDES permit renewal application requirements of 35 IAC 106.1180(b), which require a demonstration that alternative thermal effluent limitations have not adversely impacted the balanced, indigenous population of shellfish, fish, and wildlife of the affected water body. Based on these findings, I recommend that the alternative thermal effluent limitations in the current NPDES permit be incorporated into the renewed permit.

Consistency with Federal Requirements

The USEPA 316(a) Technical Guidance Manual lists six categories that should be considered when selecting RIS for 316(a) Demonstrations. However, given that Coffeen Lake is being managed for sportfish with oversight from IDNR, the Permittee selected RIS with one category in mind, recreationally important species. Although the 316(a) Manual itself states that "The manual is intended to be used as a general guidance and as a starting point for discussions", and that State Directors "are not rigidly bound by the contents of this document.", a study consisting solely of recreationally important species is impractical and not conducive to a successful 316(a)

Demonstration. Although not all of the recommended categories may be applicable or practical for every 316(a) Demonstration, three additional RIS categories that should potentially be considered for future Coffeen Lake 316(a) demonstrations include "thermally sensitive" species, "species necessary in the food chain", and "species potentially capable of becoming a localized nuisance". The inclusion of a new RIS from the "species necessary in the food chain" has previously been suggested by USEPA, as outlined in the September, 2011 letter from Tinka Hyde to Marcia Willhite. Among USEPA's concerns voiced in this letter was the question of whether increased lake temperatures could impact forage species due to changes in spawning behavior, and increased predation at significant life stages by top predators due to increased growth of forage fish and predators. Although a direct study on forage species was not incorporated into the 2010-2012 EIU studies, insight into the balance and health of lower trophic levels may be ascertained through the successful recruitment of recent year classes of sportfish species and health body condition (relative weight) of these species. An evaluation of the balance and health of lower trophic levels was provided by the Permittee in the form of the June 30, 3014 document entitled "Lower Trophic Level Impacts of a Modified May and October Thermal Standard for Coffeen Lake", prepared by ASA Analysis and Communication, Inc. The document concluded that recruitment of recent year classes of predatory species have indicated successful reproduction and survival, and rapid growth rates have been maintained, implying that the lower trophic levels in Coffeen Lake have continued to supply an ample food base for top predators. The Agency agrees with this assertion and believes the information provided by the Permittee has sufficiently demonstrated that the thermal relief has not adversely impacted lower trophic levels. However, the Agency recognizes the shortcomings of studies focusing solely on sportfish, and therefore requests that future demonstrations on the balanced, indigenous populations of aquatic life be expanded as suggested below.

Recommendations

While the Agency finds that the Permittee has met IPCB requirements and the NPDES permit renewal application requirements of 35 IAC 106.1180(b), the 316(a) Demonstration is not entirely consistent with the 316(a) Manual guidance and the overall intent of Federal requirements, which is assure the protection and propagation of the waterbody's balanced, indigenous population of shellfish, fish and wildlife (which is not limited solely to sportfish). If the Permittee is to retain the alternative thermal effluent limitations in the upcoming NPDES permit renewal, the plan of study for the upcoming 316(a) Demonstration must be amended with the following provisions.

1. Annual Monitoring: The recent 316(a) Demonstration study only spanned three years, with the first year of sampling occurring after the IPCB approved the increased thermal limits, and the remaining two years of studies being conducted in subsequent years. Other than fish kills or other acute, clearly observable impacts due to increased thermal loads, adverse effects from the increased thermal limits are not expected to become evident in such a short period of time. Population level changes resulting from increased thermal loadings, such as a shift to thermally tolerant organisms, altered recruitment of sportfish or forage fish, or changes in age/growth and body condition, would take several years to manifest themselves. Future 316(a) Demonstrations should continue to annually study Coffeen Lake from May through October using the methods and study designs from the 2010-2012 studies so as to

monitor the health of sportfish populations and potentially detect any population level changes in age/growth, condition, density, and mortality of the RIS species.

2. Increased RIS Categories: In addition to the continuation of sportfish studies outlined above, the selection of study organisms should be expanded or modified to include fish from additional RIS Categories. Species selected for representation of these additional RIS categories should be studied in a similar manner to the previous sportfish studies conducted by EIU from 2010-2012. Potential RIS categories and study organisms are provided below.
    a. Thermally Sensitive Species: Although currently being studied due to their recreational importance, white crappie and black crappie are recognized as being thermally intolerant and may therefore be considered suitable candidates for the "thermally sensitive" category. Thus, no additional study organisms may be required to address this RIS category.
    b. Species Necessary in the Food Chain: USEPA previously voiced concerns over whether increased lake temperatures could impact forage species due to changes in spawning behavior, and increased predation at significant life stages by top predators due to increased growth of forage fish and predators. Previous studies at Coffeen Lake found that gizzard shad were the preferred prey species for largemouth bass, therefore the study of gizzard shad populations would be a useful tool in assessing the health of lower trophic levels towards fulfillment of this category.
    c. Species Potentially Capable of Becoming a Localized Nuisance: Given that this RIS category was not specifically studied in past 316(A) Demonstrations at Coffeen Lake, an assessment of "species potentially capable of becoming a localized nuisance" may not be possible. However, should sufficient historical data from a suitable organism become available (e.g., common carp), this additional RIS category should be incorporated into future 316(a) Demonstrations.
3. Continuation of Special Condition 5: Special Condition 5 of the Permittee's existing NDPES permit was required via the IPCB Order 09-38 and should remain a requirement in the upcoming NPDES permit renewal. Provisions 1 and 2, listed above, should be included within this Special Condition. Additionally, a requirement to provide the Agency with a revised plan of study for the 316(a) Demonstration should be included within this Special Condition. The Permittee shall be afforded 30 days from the effective date of the permit to submit this study plan and shall begin fulfillment of the study plan immediately following Agency approval.

These recommendations reflect a water quality standards perspective only and should not be construed as being indicative of all factors to be taken into consideration by the permit writer.

BK:bk/Coffeen_316aComments_Dec14

cc: Bud Bridgewater
Bill Ettinger

Industrial NPDES Permit Review Notes

I. **Permittee:** Illinois Power Holdings, LLC **Permit No.** IL0000108
Facility Name: Coffeen Power Station
City: Coffeen **County:** Montgomery
Facility Contact: Rick Diericx **Phone No.** 618/206-5912
Major ☐ **Minor** ☑ **New** ☐ **Reissued** ☑ **Modified** ☐
SIC Code: 4911 **SIC Category:** Electric Services

Brief description of manufacturing operations and discharge sources: The applicant operates an existing 950 MW coal fired steam electric generating station. Cooling and service water for the power station is provided by Coffeen Lake which occupies 1100 acres. Once through cooling systems are used to cool the main condensers of each unit and condenser cooling water is discharged from the units to Coffeen Lake for dissipation of waste heat via flume. Service water is used for make up to the recycle pond (approximately 23 acres) and to the water treatment plant. A municipal water supply is utilized for sanitary use and make up to the water treatment plant.

II. **Name of Receiving Stream:** Coffeen Lake (segment ROG)
Use Classification: **General Use** ☑ **Secondary Contact** ☐ **Other (specify)**
7Q10: 0 cfs **Source of data:** Standards Unit
Notifications Needed: **Bordering State** ☐ **ORSANCO** ☐
CMAP ☐ **SWIMRPC** ☐ **GERPDC** ☐
The Conservation Foundation of DuPage County ☐ **Saline County Conservation District** ☐

III. **Federal Categorical Standards Apply:** Yes ☑ No ☐
40 CFR 423 Steam Electric Power Generating

Federal production-based categorical standards: **Yes** ☐ **No** ☑

IV. **Stormwater Classification:** **Not Covered** ☐ **Category:** vii
Form 2F received **Yes** ☑ **No** ☐

V. **Discharges**

001 Condenser Cooling Water (DAF = 0.144 MGD)
A01 Boiler Draining Water (Intermittent Discharge)
B01 Raw Water Treatment and Demineralizer Regenerant Wastes (DAF = 0.39 MGD)
C01 Unit 1 Floor Drains/Sumps and Stormwater (Intermittent Discharge)
D01 Sewage Treatment Plant Discharge (DAF 0.0085 MGD)
E01 Unit 2 Floor Drains/Sumps and Stormwater (Intermittent Discharge)
G01 Equalization Tank Bypass Line Discharge (Intermittent Discharge)
H01 Stormwater from Southwest Corner of Closed Ash Pond (Intermittent Discharge)
I01 Stormwater from Southeast Corner of Closed Ash Pond (Intermittent Discharge)
J01 Chemical Metal Cleaning Wastes (Intermittent Discharge)
002 Coal Yard Settling Pond Discharge (DAF = 0.6 MGD)
A02 Coal Pile Runoff (Intermittent Discharge)
003 Intake Screen Backwash (Intermittent Discharge)
008, 009, 010, 011, 012, 013, 014, 015, 016 Storm Water Runoff from Rail Spur (Intermittent Discharge)
018 Storm Water Runoff Associated with Ash Landfill (Intermittent Discharge)
020 Condenser Cooling Water Diversion Channel Overflow (DAF = 527.69 MGD)
021 Condenser Cooling Water Supplemental Cooling Pond Overflow (DAF = 37.97 MGD)
022 Condenser Cooling Water Supplemental Cooling Tower Discharge (DAF = 85.35 MGD)

Source of flow data: Previous Permit
If change from pervious permit describe reason:

1. Received thermal relief comments from US. EPA dated October 13, 2011
2. Received Lower Trophic Level Impacts from ASA Analysis and Communication, Inc. Dated July 1, 2014
3. 7/13/2014 and 12/10/2014 discuss about the thermal issue
4. Received the thermal limits memo dated 1/7/2015 from Brian Koch

IEPA Permit Reviewer Shu-Mei Tsai Date: Monday, April 14, 2014

VI. **Water Quality Based Effluent Limit analysis:** Yes ☑ No ☐
Date requested from Standards Unit: **Date received:** October 30, 2012
Biomonitoring data available: Yes ☐ No ☑
Attachments (as needed): ☑ **Flow diagram of waste sources, treatment processes**
☐ **DMR Summary**

Permit Limits Derivation – Outfalls 001, 020, 021, and 022

Parameter – conc. mass	Current Limits Avg.	Current Limits Max.	Sec. 304 Limits Avg.	Sec. 304 Limits Max.	Fed. Limits* Avg.	Fed. Limits* Max.	WQBEL Avg.	WQBEL Max	Prop. Limits Avg.	Prop. Limits Max	Mon. Freq Sample Type	Notes or Comments
Flow											Daily Cont. Recording	
pH (min. and max.)	6.0 – 9.0		6.0 – 9.0				6.5 – 9.0		6.5 – 9.0		2/Month Grab	35 IAC 302.204
Temperature											Daily	IPCB 09-38
TRC		0.2				0.05				0.05	Cont. Recording * Grab	35 IAC 302.208

TRC shall be sampled whenever chlorination or biocide addition is being performed or residuals are likely to be present in the discharge.

R 348

All units are mg/l (concentration) and lb./day (mass).

*Attach calculations if needed. Limit is based on categorical standards unless "BPJ" is noted in comments column, indicating technology-based limit was determined based on case-by-case BAT/BCT under 40 CFR 125.3

Permit Limits Derivation – Outfall A01

Parameter – conc. mass	Current Limits Avg.	Current Limits Max.	Sec. 304 Limits Avg.	Sec. 304 Limits Max.	Fed. Limits* Avg.	Fed. Limits* Max.	WQBEL Avg.	WQBEL Max	Prop. Limits Avg.	Prop. Limits Max	Mon. Freq Sample Type	Notes or Comments
Flow											Daily When Discharging	
TSS	15	30	15	30					15	30	Daily When Discharging Grab	40 CFR 423.12(b)(3)
Oil and Grease	15	20	15	30					15	20	Daily When Discharging Grab	40 CFR 423.12(b)(3)

R 349

All units are mg/l (concentration) and lb./day (mass).
*Attach calculations if needed. Limit is based on categorical standards unless "BPJ" is noted in comments column, indicating technology-based limit was determined based on case-by-case BAT/BCT under 40 CFR 125.3

Permit Limits Derivation – Outfall B01

Parameter – conc. mass	Current Limits Avg.	Current Limits Max.	Sec. 304 Limits Avg.	Sec. 304 Limits Max.	Fed. Limits* Avg.	Fed. Limits* Max.	WQBEL Avg.	WQBEL Max	Prop. Limits Avg.	Prop. Limits Max	Mon. Freq Sample Type	Notes or Comments
Flow											2/Month	
TSS	15	30	15	30					15	30	2/Month 8-Hr .Composite	40 CFR 423.12(b)(3)
Oil and Grease	15	20	15	30					15	20	2/Month Grab	40 CFR 423.12(b)(3)

R 350

All units are mg/l (concentration) and lb./day (mass).

*Attach calculations if needed. Limit is based on categorical standards unless "BPJ" is noted in comments column, indicating technology-based limit was determined based on case-by-case BAT/BCT under 40 CFR 125.3

Permit Limits Derivation – Outfall C01

Parameter – conc. mass	Current Limits Avg.	Current Limits Max.	Sec. 304 Limits Avg.	Sec. 304 Limits Max.	Fed. Limits* Avg.	Fed. Limits* Max.	WQBEL Avg.	WQBEL Max	Prop. Limits Avg.	Prop. Limits Max	Mon. Freq Sample Type	Notes or Comments
Flow											2/Month 24-Hr. Total	
TSS	15	30	15	30					15	30	2/Month 8-Hr .Composite	40 CFR 423.12(b)(3)
Oil and Grease	15	20	15	30					15	20	2/Month Grab	40 CFR 423.12(b)(3)

R 351

All units are mg/l (concentration) and lb./day (mass).
*Attach calculations if needed. Limit is based on categorical standards unless "BPJ" is noted in comments column, indicating technology-based limit was determined based on case-by-case BAT/BCT under 40 CFR 125.3

Permit Limits Derivation – Outfall D01

Parameter – conc. mass	Current Limits Avg.	Current Limits Max.	Sec. 304 Limits Avg.	Sec. 304 Limits Max.	Fed. Limits* Avg.	Fed. Limits* Max.	WQBEL Avg.	WQBEL Max	Prop. Limits Avg.	Prop. Limits Max	Mon. Freq Sample Type	Notes or Comments
Flow											2/Month	
pH											2/Month Grab	
TSS	30	60	10	12					10	12	2/Month 8-Hr .Composite	35 IAC 304.120(c)
BOD	30	60	12	24					12	24	2/Month Grab	35 IAC 304.120(c)
TRC		0.05				0.05				0.05	Daily when Chlorinating Grab	35 IAC 302.208
Fecal Coliform									400/100ml		2/Month Grab	35 IAC 304.121

R 352

All units are mg/l (concentration) and lb./day (mass).

*Attach calculations if needed. Limit is based on categorical standards unless "BPJ" is noted in comments column, indicating technology-based limit was determined based on case-by-case BAT/BCT under 40 CFR 125.3

Permit Limits Derivation – Outfall E01

Parameter – conc. mass	Current Limits Avg.	Current Limits Max.	Sec. 304 Limits Avg.	Sec. 304 Limits Max.	Fed. Limits* Avg.	Fed. Limits* Max.	WQBEL Avg.	WQBEL Max	Prop. Limits Avg.	Prop. Limits Max	Mon. Freq Sample Type	Notes or Comments
Flow											2/Month 24-Hr. Total	
TSS	15	30	15	30					15	30	2/Month 8-Hr .Composite	40 CFR 423.12(b)(3)
Oil and Grease	15	20	15	30					15	20	2/Month Grab	40 CFR 423.12(b)(3)

R 353

All units are mg/l (concentration) and lb./day (mass).
*Attach calculations if needed. Limit is based on categorical standards unless "BPJ" is noted in comments column, indicating technology-based limit was determined based on case-by-case BAT/BCT under 40 CFR 125.3

Permit Limits Derivation – Outfall G01

Parameter – conc. mass	Current Limits Avg.	Current Limits Max.	Sec. 304 Limits Avg.	Sec. 304 Limits Max.	Fed. Limits* Avg.	Fed. Limits* Max.	WQBEL Avg.	WQBEL Max	Prop. Limits Avg.	Prop. Limits Max	Mon. Freq Sample Type	Notes or Comments
Flow											Daily When Discharging Estimate	
TSS	15	30	15	30					15	30	Daily When Discharging 8-Hr .Composite	40 CFR 423.12(b)(3)
Oil and Grease	15	20	15	30					15	20	Daily When Discharging Grab	40 CFR 423.12(b)(3)

R 354

All units are mg/l (concentration) and lb./day (mass).

*Attach calculations if needed. Limit is based on categorical standards unless "BPJ" is noted in comments column, indicating technology-based limit was determined based on case-by-case BAT/BCT under 40 CFR 125.3

Permit Limits Derivation – Outfall J01

Parameter – conc. mass	Current Limits Avg.	Current Limits Max.	Sec. 304 Limits Avg.	Sec. 304 Limits Max.	Fed. Limits* Avg.	Fed. Limits* Max.	WQBEL Avg.	WQBEL Max	Prop. Limits Avg.	Prop. Limits Max	Mon. Freq Sample Type	Notes or Comments
Flow											Daily When Discharging	
pH			6.0 – 9.0						6.0 – 9.0		Daily When Discharging Grab	35 IAC 304.125
TSS			15	30	30	100			15	30	Daily When Discharging Grab	35 IAC 304.124
Oil and Grease			15	30	15	20			15	20	Daily When Discharging Grab	40 CFR 423.12(b)(5)
Iron	2	4	2	4	1.0	1.0			1.0	1.0	Daily When Discharging Grab	40 CFR 423.12(b)(5)
Copper	0.5	1.0	0.5	1.0	1.0	1.0			0.5	1.0	Daily When Discharging Grab	35 IAC 304.124

Wastes may alternatively be placed on the coal pile for incineration in the boilers provided a demonstration showing BAT equivalency is submitted.

R 355

All units are mg/l (concentration) and lb./day (mass).
*Attach calculations if needed. Limit is based on categorical standards unless "BPJ" is noted in comments column, indicating technology-based limit was determined based on case-by-case BAT/BCT under 40 CFR 125.3

Permit Limits Derivation – Outfall 002

Parameter – conc. mass	Current Limits Avg.	Current Limits Max.	Sec. 304 Limits Avg.	Sec. 304 Limits Max.	Fed. Limits* Avg.	Fed. Limits* Max.	WQBEL Avg.	WQBEL Max	Prop. Limits Avg.	Prop. Limits Max	Mon. Freq Sample Type	Notes or Comments
Flow											1/Week	
pH	6.0 – 9.0		6.0 – 9.0		6.0 – 9.0		6.5 – 9.0		6.5 – 9.0		1/Week Grab	35 IAC 302.204
TSS	15	30	15	30					15	30	1/Week 24-Hr .Composite	40 CFR 423.12(b)(3)
Oil and Grease	15	20	15	30					15	20	1/Week 8-Hr .Composite	40 CFR 423.12(b)(3)
Iron	1	2	1	2					1	2	1/Month 8-Hr .Composite	35 IAC 304.124
Boron		1.8						1.8		1.8	1/Month 8-Hr .Composite	25 IAC 302.102

TDS limits were removed as the standard no longer exists. Manganese no longer has a reasonable potential to exceed WQ standards and the limits will be removed. A mixing zone is recognized for Boron. Compliance with the 1.8 mg/l limit will result in compliance with the 1.0/2.0 boron limits of 302.208 at the edge of the mixing zone. See October 30, 2012 WQBEL Memo.

R 356

All units are mg/l (concentration) and lb./day (mass).

*Attach calculations if needed. Limit is based on categorical standards unless "BPJ" is noted in comments column, indicating technology-based limit was determined based on case-by-case BAT/BCT under 40 CFR 125.3

Permit Limits Derivation – Outfalls F01, H01, I01, 008, 009, 010, 011, 012, 013, 014, 015, 016, and 018

Parameter – conc. mass	Current Limits Avg.	Max.	Sec. 304 Limits Avg.	Max.	Fed. Limits* Avg.	Max.	WQBEL Avg.	Max	Prop. Limits Avg.	Max	Mon. Freq Sample Type	Notes or Comments
SWPPP												40 CFR 122.26(b)(14)(vii)

R 357

All units are mg/l (concentration) and lb./day (mass).
*Attach calculations if needed. Limit is based on categorical standards unless "BPJ" is noted in comments column, indicating technology-based limit was determined based on case-by-case BAT/BCT under 40 CFR 125.3

VIII. Discussion of parameters considered for regulation but not included in permit: N/A

Documents not cited above utilized in permit review: N/A

Other review comments: N/A

IX. Proposed Special Conditions

- ☑ Flow reporting
- ☑ pH limit/reporting
- ☑ Temperature limits
- ☑ Monitoring location
- ☑ DMR Submission
- ☑ Class K operator
- ☑ Water treatment additives
- ☑ BAT/BCT for Stormwater (002 Stormwater is treated and subject to effluent limits)
- ☑ SWPPP
- ☐ No Exposure
- ☑ Re-opener
- ☑ TRC

Additional Special Conditions
Metals Monitoring
316(b) Submittal
Incineration of Chemical Metal Cleaning Wastes
Mixing Zone for Boron from 002

X. Treatment Types
(Check all that apply)

Physical/Chemical Treatment

☐1A Ammonia Stripping
☐2A Carbon Absorption
☐2N Chemical Hydrolysis
☐2B Chemical Oxidation
☐2C Chemical Precipitation
☐2D Coagulation
☐2E Dechlorination
☐2F Disinfection (Chlorine)
☐2G Disinfection (Ozone)
☐4I Disinfection (Ultraviolet)
☐2H Disinfection (Other)
☐1D Distillation
☐2I Electrochemical Treatment
☐1E Electrodialysis
☐1F Evaporation
☐1G Flocculation
☐1I Foam Fractionation
☐1J Freezing
☐1K Gas Phase Separation
☐2J Ion Exchange
☐1O Mixing
☐2K Neutralization
☐2L Reduction
☐1W Solvent Extraction
☐1X Sorption

Sludge Management

☐5A Aerobic Digestion
☐5B Anaerobic Digestion
☐5C Belt Filtration
☐5D Centrifugation
☐5E Chemical Conditioning
☐5F Chlorine Treatment
☐5G Composting
☐5H Drying Beds
☐5I Elutriation
☐5J Flotation Thickening
☐5K Freezing (Sludge Treatment)
☐5L Gravity Thickening
☐5M Heat Drying
☐5N Heat Treatment
☐5O Incineration
☐5P Land Application (Sludge)
☐5Q Landfill
☐6E Lime Stabilization
☐5R Pressure Filtration
☐5S Pyrolysis
☐5T Sludge Lagoons
☐6K Thermophilic Digestion
☐5U Vacuum Filtration
☐5V Vibration
☐5W Wet Air Oxidation

Biological Treatment

☐3A Activated Sludge
☐3B Aerated Lagoons
☐3C Anaerobic Treatment
☐3K Biological Hydrolysis
☐8F Contact Stabilization
☐8G Extended Aeration
☐8D Lagoon(s)
☐3P 1 Cell Lagoon
☐3Q 2 Cell Lagoon
☐3R 3 Cell Lagoon
☐3S 4 Cell Lagoon
☐3D Nitrification – Denitrification.
☐8E Oxidation Pond or Ditch
☐3J Polishing Lagoons
☐6I Rock Filter
☐3I Rotating Biological Contractors
☐8B Secondary Treatment
☐3F Spray Irrigation/Land Application
☐3G Stabilization Ponds
☐8C Tertiary Treatment
☐3M Treatment by Plain Aeration
☐3H Trickling Filtration
☐6L Two Stage Activated Sludge
☐6M Vegetative Filter

Preliminary, Primary, Filtration, Other Treatment

☐1C Diatomaceous .Earth Filtration
☐1Y Equalization
☐6A Excess Flow Treatment
☐1H Flotation
☐4H Grease Removal
☐1L Grinding (Comminutors)
☐1M Grit Removal
☐3N Holding/Detention Pond
☐6B Imhoff Tank
☐1Z Intermittent Sand Filters
☐6C Irradiation/Beta Ray
☐6D Irradiation/Gamma Ray
☐1N Microstraining (Microscreening)
☐1P Moving Bed Filters
☐1Q Multimedia Filtration
☐2M Odor Control
☐6F Oil-Water Separator
☐6G Pasteurization
☐6H Phosphorus Removal
☐3L Post Aeration
☐3E Pre-Aeration
☐8A Primary Treatment
☐1R Rapid Sand Filtration
☐1S Reverse Osmosis
☐1T Screening
☑1U Sedimentation
☐1V Slow Sand Filtration
☑4F Temperature Control

Discharge Type

☐8H Constructed Wetland
☑4A Discharge to Surface Water
☐4B Ocean Discharge
☐4C Reuse/Recycle-Treated Effluent
☐4E Reuse/Sale of Wastewater
☐6J Subsurface Seepage
☐4D Underground Injection

LeCrone, Darin

IEPA EXHIBIT
No. 23

From: LeCrone, Darin
Sent: Wednesday, July 08, 2015 2:30 PM
To: Tsai, Shu-Mei
Subject: Coffeen

Take a look at the thermal condition in the permit. Make sure we have a statement in there that if requesting renewal of the 316(a) variance in the next permit cycle, they have to comply with 35 Ill. Adm. Code Part 106.1180 when filing the renewal application.

Darin E. LeCrone, P.E.
Manager, Industrial Unit
Division of Water Pollution Control
Illinois Environmental Protection Agency

217/782-0610

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19276, SPRINGFIELD, ILLINOIS 62794-9276 • (217) 782-3397

PAT QUINN, GOVERNOR JOHN J. KIM, INTERIM DIRECTOR

IEPA EXHIBIT
No. 24

Memorandum

Date: August 18, 2015

To: Shu-Mei Tsai

From: Bob Mosher RM

Subject: Ameren Coffeen Power Station Antidegradation Assessment Review
NPDES No. IL0000108 Montgomery County

The facility has discovered that an overflow discharge is possible from the gypsum recycle pond. No outfall is currently recognized from this source in the permit. In the event of a very heavy rainstorm, or if pumps failed and water was not sent back to the air scrubbers, an overflow could occur from the gypsum recycle pond. It is believed that such a discharge event has not yet occurred and that the probability of a future occurrence is somewhat slim. Outfall 023 has been proposed. An unnamed tributary of Coffeen Lake will receive the effluent should it ever occur.

Coffeen Lake (segment code ROG) is listed as impaired on the draft 2014 Illinois Integrated Water Quality Report and Section 303(d) List for fish consumption use. The cause given for fish consumption use impairment is mercury. Aquatic life and aesthetic quality uses are fully supported. A TMDL has been completed for Coffeen Lake. Coffeen Lake is not given an integrity rating in the 2008 Illinois Department of Natural Resources Publication *Integrating Multiple Taxa in a Biological Stream Rating System.* Coffeen Lake is not designated as an enhanced water pursuant to the dissolved oxygen water quality standard.

The antidegradation standard at 35 Ill. Adm. Code 302.105(d) Activities Not Subject to Further Antidegradation Review has a provision for "Short-term, temporary (i.e., weeks or months) lowering of water quality". The discharge of gypsum recycle pond water due to a storm event of infrequent recurrence or a pump failure that will occur while the pump is put back in service fits the definition of short-term or temporary. No further antidegradation review is necessary.

These recommendations reflect a water quality standards perspective only and should not be construed as indicative of all factors that must be taken into consideration by the permit writer.

cc: FOS Region 5 Manager
Bill Ettinger

Tsai, Shu-Mei

From: LeCrone, Darin
Sent: Wednesday, July 08, 2015 2:30 PM
To: Tsai, Shu-Mei
Subject: Coffeen

Take a look at the thermal condition in the permit. Make sure we have a statement in there that if requesting renewal of the 316(a) variance in the next permit cycle, they have to comply with 35 Ill. Adm. Code Part 106.1180 when filing the renewal application.

Darin E. LeCrone, P.E.
Manager, Industrial Unit
Division of Water Pollution Control
Illinois Environmental Protection Agency

217/782-0610

Tsai, Shu-Mei

From: Koch, Brian
Sent: Thursday, July 02, 2015 1:46 PM
To: Tsai, Shu-Mei
Cc: Mosher, Bob; Twait, Scott
Subject: RE: Emailing: Coffeen_316aComments_Dec14.docx
Attachments: Coffeen Comment #12.pdf

Gizzard shad is an organism commonly studied by industries that conduct 316(a) Demonstrations. While electrofishing may not be the preferred gear for conducting surveys on gizzard shad, other facilities have successfully completed 316(a Demonstrations utilizing this gear type for all of their study organisms, which often include gizzard shad. Electrofishing for gizzard shad may not be preferred gear for assessing gizzard shad densities in Coffeen Lake, but should be suitable in assessing age/growth to determine the potential impacts that predators may be having on the gizzard shad population due to increased lake temperatures and the resulting effects on spawning behavior.

Brian Koch
Illinois Environmental Protection Agency Bureau of Water, Water Quality Standards

Office: 217.785.4116
Fax: 217.782.5549

----Original Message-----
From: Tsai, Shu-Mei
Sent: Thursday, July 02, 2015 11:42 AM
To: Koch, Brian
Subject: RE: Emailing: Coffeen_316aComments_Dec14.docx

Brian:

Please look the second paragraph of Comment #12, do you have any suggestion about it? Thanks

Shu-Mei

-----Original Message-----
From: Koch, Brian
Sent: Friday, January 16, 2015 12:03 PM
To: Tsai, Shu-Mei
Subject: Emailing: Coffeen_316aComments_Dec14.docx

Your message is ready to be sent with the following file or link attachments:

Coffeen_316aComments_Dec14.docx

LeCrone, Darin

IEPA EXHIBIT
No. 25

From: Tsai, Shu-Mei
Sent: Wednesday, August 26, 2015 9:15 AM
To: LeCrone, Darin
Subject: RE: Coffeen

Already email them.

From: LeCrone, Darin
Sent: Wednesday, August 26, 2015 9:09 AM
To: Tsai, Shu-Mei
Subject: Coffeen

Dynegy's comments say that they inject chlorine 12 times per day per unit. How are they meeting the two hours per day per unit maximum doing this? Check with them real quick. I want to get this signed for public notice today.

Darin E. LeCrone, P.E.
Manager, Industrial Unit
Division of Water Pollution Control
Illinois Environmental Protection Agency

217/782-0610