BEFORE THE
ILLINOIS POLLUTION CONTROL BOARD

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

NOTICE OF FILING

TO:

John Therriault, Assistant Clerk
Illinois Pollution Control Board
James R. Thompson Center
Suite 11-500
100 West Randolph
Chicago, Illinois 60601

Carol Webb, Hearing Officer
Illinois Pollution Control Board
1021 North Grand Avenue East
P.O.Box 19274
Springfield, Illinois 62794-9274
Webbc@ipcb.state.il.us

Joey Logan-Wilkey
Illinois Environmental Protection Agency
Division of Legal Counsel
1021 North Grand Avenue, East
P.O.Box 19276
Springfield, Illinois 62794-9276

PLEASE TAKE NOTICE that I have electronically filed with the Office of the Clerk of the Pollution Control Board, **AMEREN'S RESPONSE TO INFORMATION REQUESTED DURING PUBLIC HEARING,** copies of which are herewith served upon you.

Ameren Energy Generating Company

Amy Antoniolli

By: Amy Antoniolli

Dated: July 10, 2009

Amy Antoniolli
SCHIFF HARDIN LLP
233 South Wacker Drive
Suite 6600
Chicago, Illinois 60606
Tel: 312-258-5500
Email: aantoniolli@schiffhardin.com

CERTIFICATE OF SERVICE

I, the undersigned, certify that on this 10th day of July, 2009, I have served electronically the attached, **AMEREN'S RESPONSE TO INFORMATION REQUESTED DURING PUBLIC HEARING,** upon the following persons:

John Therriault, Assistant Clerk
Illinois Pollution Control Board
James R. Thompson Center
Suite 11-500
100 West Randolph
Chicago, Illinois 60601
therriauj@ipcb.state.il.us

Carol Webb, Hearing Officer
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By: Amy Antoniolli

July 10, 2009

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BEFORE THE
ILLINOIS POLLUTION CONTROL BOARD

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

AMEREN'S RESPONSE TO INFORMATION REQUESTED DURING PUBLIC HEARING

NOW COMES AMEREN ENERGY GENERATING COMPANY ("Ameren" or "the Petitioner"), by and through its attorneys, SCHIFF HARDIN, LLP, and submits additional information. On June 23, 2009, the Illinois Pollution Control Board ("Board") conducted a hearing in this matter.[1] During the hearing, additional information was requested by either the Board or the Illinois Environmental Protection Agency ("Agency"). The Hearing Officer set the date by which to submit the additional information as July 10, 2009. In response to the information requests and to complete the record, Ameren submits the following:

A. Flow Capacity of Ameren's 48-cell Cooling Tower (Tr. at 69-70): Ameren currently utilizes supplemental cooling towers at the Coffeen Power Station with a flow capacity of 200,000 gallons per minute (gpm). Pet. Exh. 15, pg. 9, Table 3-1. The permit application for the construction of the cooling towers is attached as Exhibit A.

B. Economic Analysis of the Proposed 175,000 gpm Cooling Tower (Tr. at 72-73): As part of the capital planning and budget process, construction projects are screened and ranked based upon an internal determination as to whether such projects are economically viable.

[1] The transcript of the June 23, 2009 hearing will be cited to as "Tr. at __."

The company refers to this analysis as an "EVA" which stands for economic viability analysis. To be viable, a capital project does not necessarily need to generate a "profit." However, the project must, at a minimum, be economically neutral over a reasonable cost-recovery period. Projects necessary to fulfill environmental regulatory requirements such as the $600 million dollars spent installing scrubbers and SCRs at Coffeen Power Station are exempt from this requirement due to the mandatory nature of the project.

In the past ten years, Ameren has approved and implemented various capital projects designed to reduce thermal loading on Coffeen Lake so that Coffeen Power Station could continue to operate within the constraints of its specific thermal limits without resorting to de-rates. These capital projects included the development of a 70-acre cooling basin as well as the construction of a 48-cell cooling tower system. Despite these efforts, de-rates have been necessary from time to time in the shoulder months of May and October. Ameren retained Sargent & Lundy to propose and evaluate additional enhancements to the lake's cooling systems. Sargent & Lundy evaluated eight alternative capital projects designed to reduce further thermal loading on the lake. Of these alternatives, the one providing the best economics was identified: the installation of a 175,000 gpm cooling towers with a capital cost of $18 million dollars.

Ameren analyzed the economic viability of the 175,000 gpm cooling tower in comparison to the alternative of continuing as-is by using derates to comply with the thermal limits. That analysis, performed in 2006, estimated that it would take approximately 11.5 years for the company to recover the costs of its investment in the new cooling tower. Because these were extraordinary costs with a long payback period, the company concluded that these investments, added to the initial investments made in the cooling basin and existing cooling tower, were not justified especially inasmuch as the additional cooling capacity provided by the 175,000 gpm cooling tower would allow Coffeen Station an estimated 185,000 megawatt hours (MWh) of additional annual generation. Ameren also asked Sargent & Lundy to model the

performance of the existing cooling system under warmer-than-normal summer conditions, but with the modified thermal limits being requested in this proceeding. Sargent & Lundy concluded the proposed alternative May and October thermal limits would be able to accommodate the same rate of generation as any of the other proposed additional cooling system modifications. Based on these results, the company concluded that the substantial additional investment costs necessary to meet the existing temperature limits outweighed the marginal benefits to be gained by having a helper cooling tower at the ready, but that would realistically be deployed an average of only 31 days per year during time periods when market prices and operating margins are low. The Company concluded that the proposed project would be uneconomical, particularly when compared to other capital projects that compete for finite capital dollars and promise greater benefit per dollar spent.

In preparing for the hearing in this case, and recognizing that the United States is experiencing economic conditions not seen since the Great Depression, Ameren updated its analysis. In updating the analysis, two critical assumptions have changed: The future market prices for power and the likelihood of additional costs in the form of a CO_2 tax or other compliance cost. When such considerations are taken into account, the costs associated with the capital investment in the 175,000 gpm cooling towers cannot be recovered before the equipment itself needs to be replaced. The power generation industry in Illinois now operates in a deregulated environment and as such capital expenditures are not subject to rate-based regulation or recovery. Accordingly, capital expenditures must be supported by sales of power and associated power prices that are the source of cash flow and earnings. Power prices began a precipitous drop in July 2008 and have continued to be depressed during this prolonged recession that has resulted in record job losses, bankruptcies and lay offs.

Set forth below is a table depicting futures prices for CinHub Real Time (RT) Around-The-Clock (ATC) energy, calculated from peak and off-peak settlement prices reported by the

New York Mercantile Exchange (NYMEX), on a per megawatt-hour (MWh) basis. This data demonstrates the material drop in power prices experienced in the past year, and expected by market participants over the next few years:

Year	As of June 30, 2008	As of June 30, 2009	Change in $/MWh
2009	$63.50	$30.83	($32.67)
2010	$58.66	$36.95	($21.71)
2011	$58.69	$41.10	($17.59)
2012	$61.80	$43.86	($17.94)
2013	$62.18	$48.81	($13.37)

In addition, the original analysis of the economic viability of the 175,000 gpm cooling tower did not consider the cost of compliance with carbon regulation. An energy cost adjustment for pollution control equipment needed for compliance with carbon regulation beginning in 2014 was factored into the updated economic viability analysis. By changing these two critical assumptions, the updated analysis demonstrates that despite the increased availability this alternative would provide, the additional capacity revenues, given the decreasing energy margins and high costs of compliance with future carbon regulation, Ameren would never recover the total capital costs required to implement the 175,000 capacity cooling tower. As a result, Ameren does not consider this technology an economically reasonable alternative.

C. Phosphorus Loading Calculations (Tr. at 226): The calculations attached as Exhibit B are the results Dr. Shortelle relied upon to support her estimate of the amount of phosphorus that would be fluxed into the hypolimnion of Coffeen Lake during the months of May and October. Tr. Exh. 3, Attach.2.

D. **2007 Provisional Variance (Tr. at 109):** The Agency requested a signed copy of the provisional variance granted by the Agency on October 24, 2007 (IEPA-08-14). Hot and humid weather conditions and lack of precipitation during September and October 2007 led to Ameren's request for a provisional variance. By the time the provisional variance was issued, these weather conditions no longer existed and Ameren did not execute the variance or utilize the relief granted.

E. **Coffeen Lake Studies (Tr. at 210-216):** Ameren and IDNR have reached an agreement in principle, a draft memorandum of understanding ("Draft MOU"), to conduct additional studies of Coffeen Lake and the fishery if the Board grants the requested relief. *See* the Draft MOU, attached as Exhibit C. Ameren believes that the draft MOU is ready for final execution by IDNR. The Agency has advised Ameren that it has no objections to the agreement.

Assuming relief from the current thermal limits is granted, the MOU provides that Ameren and IDNR will develop study plans to monitor the status of key fish populations in the lake and document the long-term effects, if any, of the revised thermal limits for the months of May and October on these populations. The studies will also investigate the ability of fish to avoid exposure to stress by seeking preferred temperatures within the Lake's environment and will locate available thermal refuges during peak temperatures. The draft MOU sets forth the conceptual framework for such studies. According to the MOU, the fish population study plan design will be completed in collaboration with the IDNR and the field work will be done as a joint effort between IDNR and Ameren field contractors. The study will include the representative important species (RIS) identified in this petition as well as new species that might be introduced. Ameren is not asking that the studies also be made part of the request for relief before the Board, but Ameren would agree to publish or otherwise make available the results of the studies.

The MOU does not alter IDNR authority or responsibility to investigate and assess fish kills should they occur. If investigation shows that a fish kill has resulted from the requested relief, Ameren agrees to replenish or replace the impacted resource pursuant to the terms and conditions of a Fish Stocking Plan to be developed in consultation with IDNR.

In addition to compliance with the thermal limitations, as well as and restocking and replenishing fish populations as provided in the draft MOU, in the event excessive fish mortality occurs during the summer months, Ameren would also agree to implement appropriate mitigation measures. Ameren will set forth proposed mitigation measures in the post-hearing brief.

Respectfully submitted,

Ameren Energy Generating Company

Amy Antoniolli

By: Amy Antoniolli

Dated: July 10, 2009
Amy Antoniolli
SCHIFF HARDIN LLP
233 South Wacker Drive
Suite 6600
Chicago, Illinois 60606
Tel: 312-258-5500
Email: aantoniolli@schiffhardin.com

EXHIBIT A

Ameren Services
Environmental, Safety & Health
314.554.4581 (Phone)
314.554.4182 (Facsimile)
mjsmallwood@ameren.com

One Ameren Plaza
1901 Chouteau Avenue
PO Box 66149
St. Louis, MO 63166-6149
314.621.3222

November 1, 2001

Mr. Thomas G. McSwiggin, P.E.
Industrial Unit, Permit Section
Illinois Environmental Protection Agency
Division of Water Pollution Control
1021 North Grand Avenue East
PO Box 19276
Springfield IL 62794-9276

RE: Ameren Energy Generating Company – Coffeen Power Station
Supplemental Cooling Tower Construction Permit Application

Dear Mr. McSwiggin:

Enclosed are permit applications (WPC-PS-1, Schedule J, and Schedule N) for the construction of supplemental cooling towers at the Coffeen Power Station. The supplemental cooling towers will enable the Station to have greater flexibility and control to maintain compliance with condenser cooling water temperature limitations.

The supplemental cooling towers will intercept the circulating discharge, prior to release at Outfall 020, and divert the water through the cooling towers as necessary to support plant operation. Water from the cooling towers will be released through a new outfall directly into Coffeen Lake. With the creation of the new outfall, we recognize our obligation to modify the existing Station NPDES permit before any releases occur from the cooling towers. The NPDES modification application will be submitted separately to the Agency within the next week.

As the Station desires to have the cooling towers operational before April 15, 2002, Ameren Energy would sincerely appreciate the Agency expediting the review and approval of this construction permit application so that construction can begin no later than December 15, 2001.

Please contact me if there are any questions relating to the enclosed construction permit application.

Sincerely,

Michael J. Smallwood
Senior Environmental Engineer
Ameren Services As Affiliated Agent for Ameren Energy Generating Company

Bcc: JCP/MJS
WQ3.15.1
Linda Daniels
John Romang
Terri Mackey

Illinois Environmental Protection Agency
Permit Section, Division of Water Pollution Control
P. O. Box 19276
Springfield, Illinois 62794-9276

Application for Permit or Construction Approval

WPC-PS-1

For IEPA Use:

1. **Name and Location:** Ameren Energy Generating Company - Coffeen Power Station
   Name of project: Supplemental cooling towers
   Municipality or Township: Coffeen County: Montgomery
2. **Brief Description of Project:** Installation of 12 Evapco AT 428-1248 induced draft cooling towers, and construction of all auxiliary components for operation and discharge to Coffeen Lake
3. **Documents Being Submitted:** If the project involves any of the items listed below, submit the corresponding schedule, and check the appropriate spaces.

Project

Private Sewer Connection/Extension	A/B	Spray Irrigation	H
Sewer Extension Construct Only	C	Septic Tanks	I
Sewage Treatment Works	D	Industrial Treatment or Pretreatment	J X
Excess Flow Treatment	E	Waste Characteristics	N X
Lift Station/Force Main	F	Erosion Control	P
Sludge Disposal	G	Trust Disclosure	T

Plans: Title See attached Number of Pages:

Specifications: Title Number of Books/Pages:

Other Documents (Please Specify)

4. **Land Trust:** Is the project identified in item number 1 herein, for which a permit is requested, to be constructed on land which is the subject of a trust? Yes____ No X

   If yes, Schedule T (Trust Disclosure) must be completed and item number 7.1.1 must be signed by a beneficiary, trustee or trust officer.

5. **This is an Application for** (*Check Appropriate Line*):

   ____ A. Joint Construction and Operating Permit

   X B. Authorization to Construction (See Instructions) NPDES Permit No. IL0000108 — 9/28/1998 Issue Date

   ____ C. Construct Only Permit (Does Not Include Operations)

   ____ D. Operate Only Permit (Does Not Include Construction)

6. **Certifications and Approval:**

   6.1 **Certificate by Design Engineer** (*When required; refer to instruction*)

   I hereby certify that I am familiar with the information contained in this application, including the attached schedules indicated above, and that to the best of my knowledge and belief such information is true, complete and accurate. The plans and specifications (specifications other than Standard Specifications or local specifications on file with this Agency) as described above were prepared by me or under my direction.

   Engineer Thomas R. White 062-044402
   Name Registration Number Seal

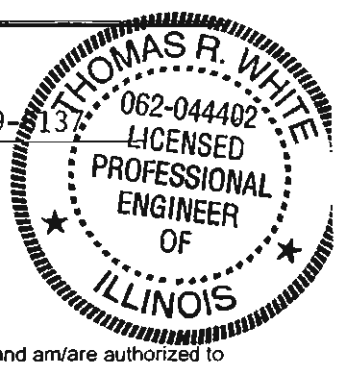
   Firm: Sargent & Lundy, LLC

   Address: 55 East Monroe Street
   Chicago, Illinois 60603

   Phone Number: 312-269-6137

   Signature X Thomas R White

   Phone Number: 312-269-6137



7. **Certifications and Approvals for Permits:**

   7.1 **Certificate by Applicant(s)**

   I/We hereby certify that I/we have read and thoroughly understand the conditions and requirements of this Application, and am/are authorized to sign this application in accordance with the Rules and Regulations of the Illinois Pollution Control Board. I/We hereby agree to conform with the Standard Conditions and with any other Special Conditions made part of this Permit.

7.1.1 Name of Applicant for Permit To Construct Ameren Energy Generating Company

Street One Ameren Plaza, 1901 Chouteau Ave (MC602) City St. Louis State MO

Zip Code 63103

Signature X Michael T Menne

Printed Name Michael L. Menne Phone Number 314-554-2816

Title Manager-Environmental, Safety & Health Organization

7.1.2 **Name of Applicant for Permit to Own and Operate**

Ameren Energy Generating Company

Street One Ameren Plaza,1901 Chouteau Ave (MC602) City St. Louis State MO Zip Code 63103

Signature X Michael T Menne Printed Name Michael L. Menne Phone Number 314-554-2816

Title Manager - Environmental, Safety & Health

7.2 **Attested (Required When Applicant is a Unit of Government)**

Signature X _____ Date _____ Title _____

(City Clerk, Village Clerk, Sanitary District Clerk, Etc.)

7.3 Applicants from non-governmental applicants which are not signed by the owner, must be signed by a principal executive officer of at least the level of vice president, or a duly authorized representative.

7.4 **Certificate By Intermediate Sewer Owner**

I hereby certify that (Please check one):

_____ 1. The sewers to which this project will be tributary have adequate reserve capacity to transport the wastewater that will be added by this project without causing a violation of the Environmental Protection Act or Subtitle C, Chapter I, or

_____ 2. The Illinois Pollution Control Board, in PCB _____ dated _____, granted a variance from Subtitle C, Chapter I to allow construction facilities that are the subject of this application.

Name and location of sewer system to which this project will be tributary: _____

Sewer System Owner _____

Street City State Zip Code

Signature X _____ Date _____ Title _____

7.4.1 Additional Certificate By Intermediate Sewer Owner

I hereby certify that (Please check one):

_____ 1. The sewers to which this project will be tributary have adequate reserve capacity to transport the wastewater that will be added by this project without causing a violation of the Environmental Protection Act or Subtitle C, Chapter I, or

_____ 2. The Illinois Pollution Control Board, in PCB _____ dated _____, granted a variance from Subtitle C, Chapter I to allow construction and operation of the facilities that are the subject of this application.

Name and location of sewer system to which this project will be tributary:

Sewer System Owner _____

Street City State Zip Code

Signature X Date Title

7.5 **Certificate By Waste Treatment Works Owner**

I hereby certify that (Please check one):

_____ 1. The waste treatment plant to which this project will be tributary has adequate reserve capacity to treat the wastewater that will be added by this project without causing a violation of the Environmental Protection Act or Subtitle C, Chapter I, or

_____ 2. The Illinois Pollution Control Board, in PCB _____ dated _____ , granted a variance from Subtitle C,

Chapter I to allow construction and operation of the facilities that are the subject of this application.

I also certify that the industrial waste discharges described in the application are capable of being treated by the treatment works.

Name and location of waste treatment works to which this project will be tributary:_____

Treatment Works Owner_____

Street_____City_____ State_____Zip Code_____

Signature X_____ Date_____ Title_____

This Agency is authorized to require this information under Illinois Revised Statutes, 1979, Chapter 111 1/2, Section 1039. Disclosure of this information is required under that Section. Failure to do so may prevent this form from being processed and could result in your application being denied. This form has been approved by the Forms Management Center.

WPC-PS-1.APP

FOR IEPA USE:
LOG #
DATE RECEIVED:

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF WATER POLLUTION CONTROL
PERMIT SECTION
Springfield, Illinois 62706

SCHEDULE J INDUSTRIAL TREATMENT WORKS CONSTRUCTION OR PRETREATMENT WORKS

1. NAME AND LOCATION:
   1.1 Name of project Ameren Energy Generating Company-Coffeen Power Station - supplemental cooling towers
   1.2 Plant Location
   1.2.1 NE1/4 & SE 1/4 (Quarter Section) 11 (Section) 7N (Township) 3W (Range) _____ (P.M.)
   1.2.2 Latitude 39 3 75 "NORTH
   1.2.3 Longitude 89 23 33 "WEST
   1.2.3 Name of USGS Quadrangle Map (7.5 or 15 minute) Coffeen
2. NARRATIVE DESCRIPTION AND SCHEMATIC WASTE FLOW DIAGRAM: (see instructions)
   Three existing supplemental cooling pond pumps will transport cooling water to 12 induced draft cooling towers for additional supplemental cooling. The period of cooling tower utilization will be dictated by plant operating conditions.
   2.1 PRINCIPAL PRODUCTS: electrical generation
   2.2 PRINCIPAL RAW MATERIALS: coal
3. DESCRIPTION OF TREATMENT FACILITIES:
   3.1 Submit a flow diagram through all treatment units showing size, volumes, detention times, organic loadings, surface settling rate, weir overflow rate, and other pertinent design data. Include hydraulic profiles and description of monitoring systems.
   3.2 Waste Treatment Works is: Batch _____, Continuous _____, No. of Batches/day _____, No. of Shifts/day _____
   3.3 Submit plans and specifications for proposed construction.
   3.4 Discharge is: Existing _____; Will begin on April 17, 2002.
4. DIRECT DISCHARGE IS TO: Receiving Stream X Municipal Sanitary Sewer _____ Municipal storm or municipal combined sewer _____. If receiving stream or storm sewer are indicated complete the following:
   Name of receiving stream Coffeen Lake : tributary to _____ :
   tributary to _____ ; tributary to _____ ;
5. Is the treatment works subject to flooding? If so, what is the maximum flood elevation of record (in reference to the treatment works datum) and what provisions have been made to eliminate the flooding hazard? NA
6. APPROXIMATE TIME SCHEDULE: Estimated construction schedule:
   Start of Construction 12/17/2001 ; Date of Completion 6/01/2002
   Operation Schedule _____ ; Date Operation Begins 4/17/2002
   100% design load to be reached by year 2002
7. DESIGN LOADINGS
   7.1 Design population equivalent (one population equivalent is 100 gallons of wastewater per day, containing 0.17 pounds of BOD_5 and 0.20 pounds of suspended solids;
   BOD _____ ; Suspended Solids _____ ; Flow _____.
   7.2 Design Average Flow Rate _____ MGD.

This Agency is authorized to require this information under IllinoisRevised Statutes, 1979, Chapter 111 1/2, Section 1039, Disclosure of this information is required under that Section. Failure to do so may prevent this form from being processed and could result in your application being denied. This form has been approved by the Forms Management Center.

7.3 Design Maximum Flow Rate 288 MGD.

7.4 Design Minimum Flow Rate 0 MGD.

7.5 Minimum 7-day, 10-year low flow _____ cfs _____ MGD.

Minimum 7-day, 10-year flow obtained from _____

7.6 Dilution Ratio _____ ; _____.

8. FLOW TO TREATMENT WORKS (if existing):

8.1 Flow (last 12 months)

8.1.1 Average Flow _____ MGD

8.1.2 Maximum Flow _____ MGD

8.2 Equipment used in determining above flows _____

9. Has a preliminary engineering report for this project been submitted to this Agency for Approval?

Yes ___ No X. If so, when was it submitted and approved. Date Submitted _____

Certification # _____

Dated _____

10. List Permits previously issued for the facility: NPDES operating permit IL0000108

11. Describe provisions for operation during contingencies such as power failures, flooding, peak loads, equipment failure, maintenance shut downs and other emergencies. Condenser cooling water will be pumped to the supplemental cooling towers. The towers gravity drain into Coffeen Lake via a new outfall. The cooling towers will not be operated continuously, but will be utilized on an as-needed basis to supplement the cooling of the condenser cooling water discharge.

12. Complete and submit Schedule G if sludge disposal will be required by this facility. NA

13. WASTE CHARACTERISTICS: Schedule N must be submitted.

14. TREATMENT WORKS OPERATOR CERTIFICATION: List names and certification numbers of certified operators:

This Agency is authorized to require this information under Illinois Revised Statutes, 1979, Chapter 111 1/2, Section 1039. Disclosure of this information is required under that section. Failure to do so may prevent this form from being processed and could result in your application being denied.

For IEPA Use:

LOG #

DATE RECEIVED:

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
DIVISION OF WATER POLLUTION CONTROL
PERMIT SECTION
Springfield, Illinois 62794-9276

SCHEDULE N WASTE CHARACTERISTICS

1. Name of Project Ameren Energy Generating Company - Coffeen Power Station - supplemental cooling towers

2. FLOW DATA

	EXISTING	PROPOSED-DESIGN
2.1 Average Flow (gpd)	NA	unknown
2.2 Maximum Daily Flow (gpd)	NA	288,000,000

2.3 TEMPERATURE: Actual temperature reduction from cooling towers to be determined when operational. Thermal limits established at edge of mixing zone remains at the: compliance point.

Time of Year	Avg. Intake Temp. F	Avg. Effluent Temp. F	Max. Intake Temp F.	Max. Effluent Temp F.	Max. Temp. Outside Mixing Zone F
SUMMER					
WINTER					

2.4 Minimum 7-day, 10-year flow: NA cfs _____ MGD.

2.5 Dilution Ratio: NA : _____

2.6 Stream flow rate at time of sampling NA cfs _____ MGD.

3. CHEMICAL CONSTITUENT Existing Permitted Conditions ____ ; Existing conditions ____ ; Proposed Permitted Conditions ____.

Type of sample: ____ grab (time of collection ____); ____ composite (Number of samples per day ____)

(see instructions for analyses required) See note following.

CONSTITUENT	RAW WASTE (mg/l)	TREATED EFFLUENT Avg. (mg/l) Max.	UPSTREAM (mg/l)	DOWNSTREAM SAMPLES (mg/l)
Ammonia Nitrogen (as N)				
Arsenic (total)				
Barium				
Boron				
BOD_5				
Cadmium				
Carbon Chloroform Extract				
Chloride				
Chromium (total hexavalent)				
Chromium (total tribalent)				

Copper				
Cyanide (total)				
CONSTITUENT	RAW WASTE (mg/l)	TREATED EFFLUENT Avg. (mg/l) Max.	UPSTREAM (mg/l)	DOWNSTREAM SAMPLES (mg/l)
Cyanide (readily released @ 150· F & pH 4.5)				
Dissolved Oxygen				
Fecal Coliform				
Fluoride				
Hardness (as Ca CO_3)				
Iron (total)				
Lead				
Manganese				
MBAS				
Mercury				
Nickel				
Nitrates (as N)				
Oil & Grease (hexane solubles or equivalent)				
Organic Nitrogen (as N)				
pH				
Phenols				
Phosphorous (as P)				
Radioactivity				
Selenium				
Silver				
Sulfate				
Suspended Solids				
Total Dissolved Solids				
Zinc				
Others				

NOTE: Not Applicable. Water is withdrawn from Coffeen Lake and passed through condensers in the plant. Water temperature is increased in the condensers and the water returned to Coffeen Lake. The supplemental cooling towers will provide additional heat dissipation prior to water discharging to lake. No chemical constituents are added to water other than heat.

Ameren Energy Generating Company – Coffeen Power Station
Supplemental Cooling Tower Project

Plans and Drawings

- Project Executive Summary
- Drawing SK-05102000: Process Flow Diagram
- Drawing S-863: Lake Structures – General Arrangement
- Drawing S-887: Cooling Tower Sections & Details
- Drawing SK-1: Coffeen Power Station Location
- Drawing SK-2: Property Plat, Unit No. 1 & 2, Coffeen Power Station
- Drawing SK-3: Lake Structures, General Arrangement

Ameren Energy Generating Company – Coffeen Power Station
Supplemental Cooling Tower Project Executive Summary

General Scope of Work:

- Civil, structural, mechanical and electrical engineering package.
- Three of the existing vertical turbine pumps will be used to supply water to twelve new cooling towers. Each pump will be dedicated to four towers.
- The existing piping will be modified and abandoned in place.
- Civil work will be performed to supply a clear and level area for placement of the cooling towers (approximately 240 ft. long x 150 ft. wide).
- New concrete and steel structures will be provided for support of the cooling towers.
- Flumes will be provided to direct the tempered water toward the lake channel.
- A final riprap cascade will be provided to direct the tempered water to the lake channel.
- Installation of the cooling towers including rigging, assembly, piping and electrical work.

Equipment:

Qty: 12 Evapco AT 428-1248 Induced Draft Cooling Towers

- 4 cell / 4 fan arrangement (each tower)
- 460 volt/ 60 hz/ 3 phase
- High efficiency totally enclosed fan cooled motors
- Heavy duty Power Band Drive System
- L10 / 75,000 hr. pillow block bearings with extended lube lines
- G235 Galvanized steel construction
- PVC fill, eliminators and water distribution systems
- Large orifice distribution nozzles with ant-sludge ring
- Beveled and grooved inlet and outlet connections
- Motor davit with base
- 5 year motor and drive warranty
- NEMA 4X custom electrical panels to include:
  - motor starters for each motor
  - 65KAIC circuit breakers for each motor
  - main on-protecting electrical disconnect with pad lockable handle
  - time delay between motor starts
  - hand-off-auto switches with indicator lights
  - control power transformer and terminals for remote control

Electrical Consumption:

Each tower has (4) 75 HP motors operating at 460 volts and 54.5 kW.
Each tower will consume 218 kW at full load, or 2,616 kW for all 12 towers at full load.

Civil and Structural Work:

All required excavating and backfill of the proposed cooling tower location is included (approximately 240 ft. long x 150 ft. wide).

Concrete and steel structures will be furnished to support the cooling towers. A flume consisting of concrete walls and riprap bottom will be provided to direct the tempered water, toward a riprap cascade that will deliver the tempered water to the lake channel. Gravel and weed guard will be provided in between the cooling towers.

Mechanical Installation:

Included as part of this proposed project is the labor and material required to install and pipe the proposed cooling towers. This will include:

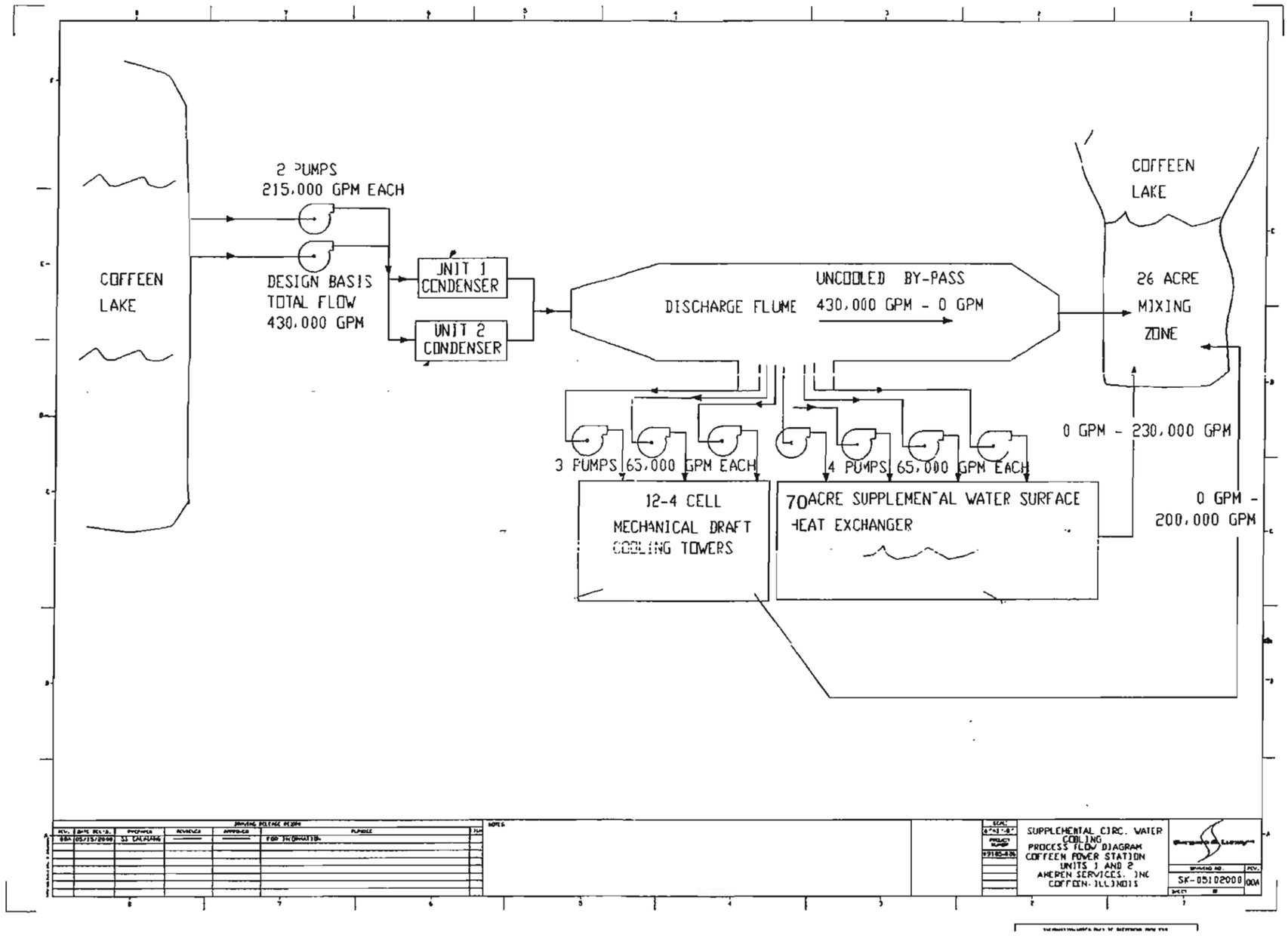
- rigging and setting of the cooling towers
- assembly of the cooling towers
- cutting of the existing piping
- piping and piping supports from the existing piping to the cooling towers
- manual shut-off valves at each cooling tower cell
- painting of the new piping

Electrical Installation:

Labor and materials for the electrical installation is provided as follows:

- Two new low voltage switchgear, unit substation transformers (2,000 KVA) and medium voltage switches will be furnished and installed.
- Wiring in conduit to all terminations for cooling tower fans and associated motor control centers.
- Wiring in conduit back to electrical supply in existing pump house.
- Control signal wiring to each motor control center.
- Proper grounding rods will be provided.

C:\WINDOWS\Desktop\E-Mail\C1001Towers\sk-05102000.dwg



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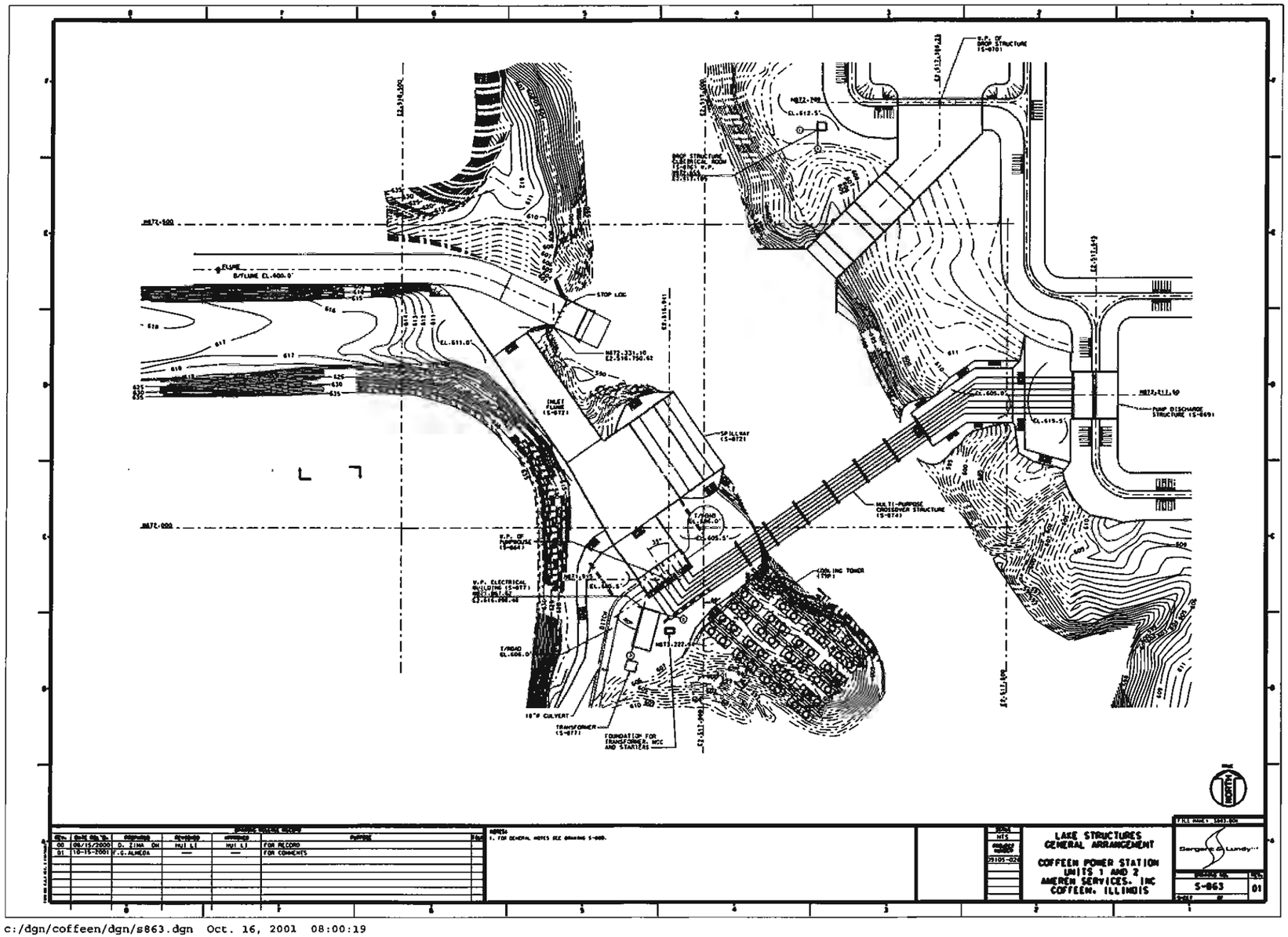

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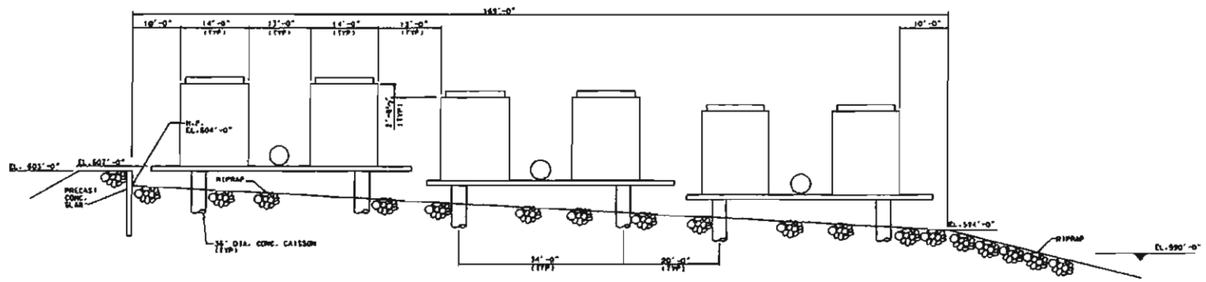
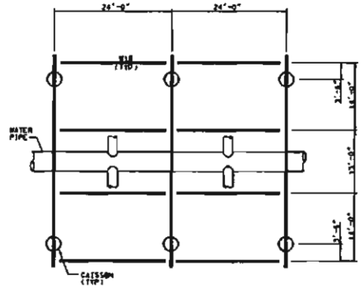


SECTION A



STEEL FRAMING PLAN

NO.	DATE	APPROVED	REVISIONS	APPROVED	REMARKS
00	10-15-2001	F.C. NAMOA	—	—	FOR COMMENTS

1. FOR GENERAL NOTES SEE DRAWING S-000.

SCALE: AS SHOWN
PROJECT NUMBER: 29105-029

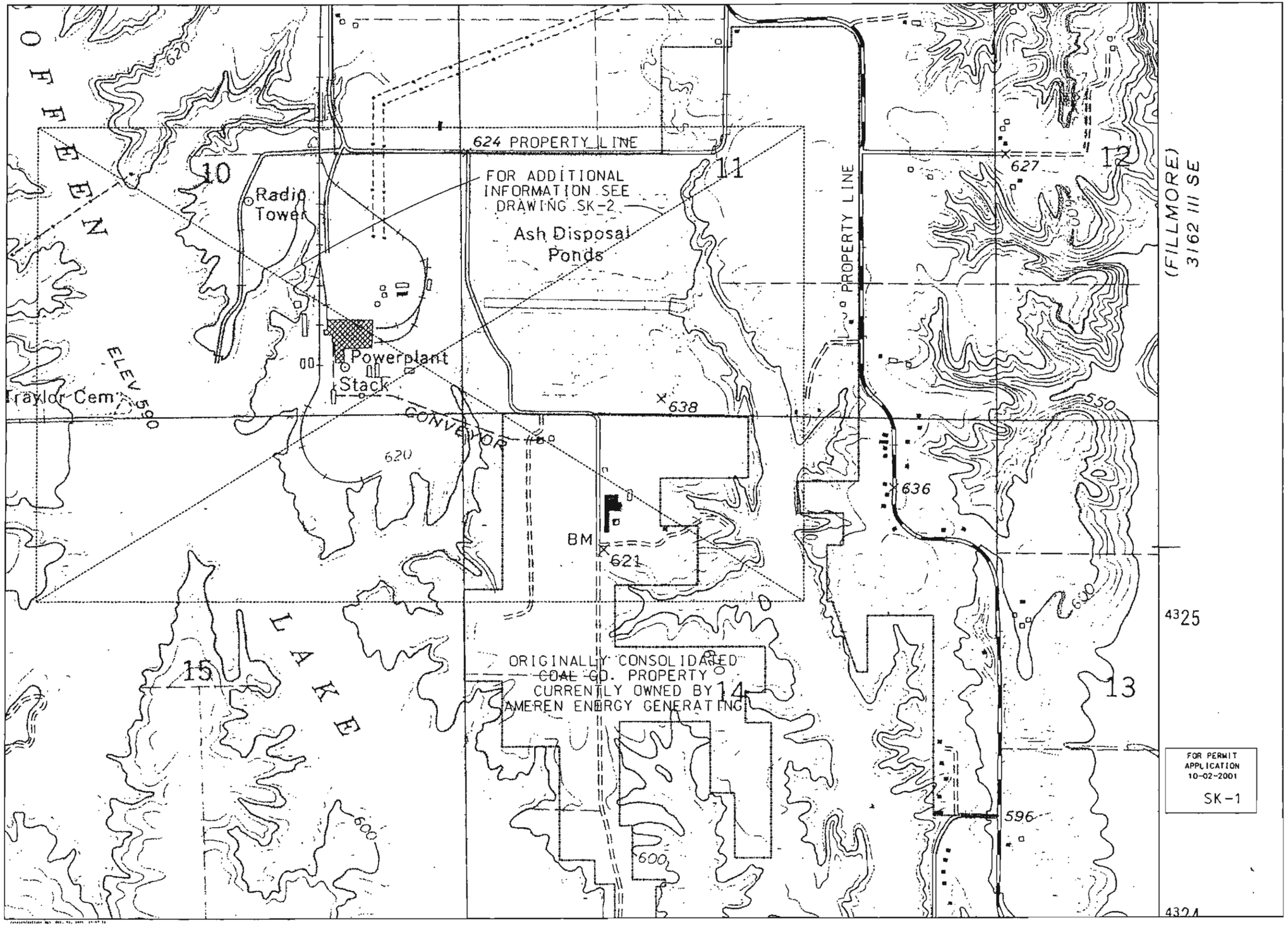
COOLING TOWER
SECTIONS & DETAILS

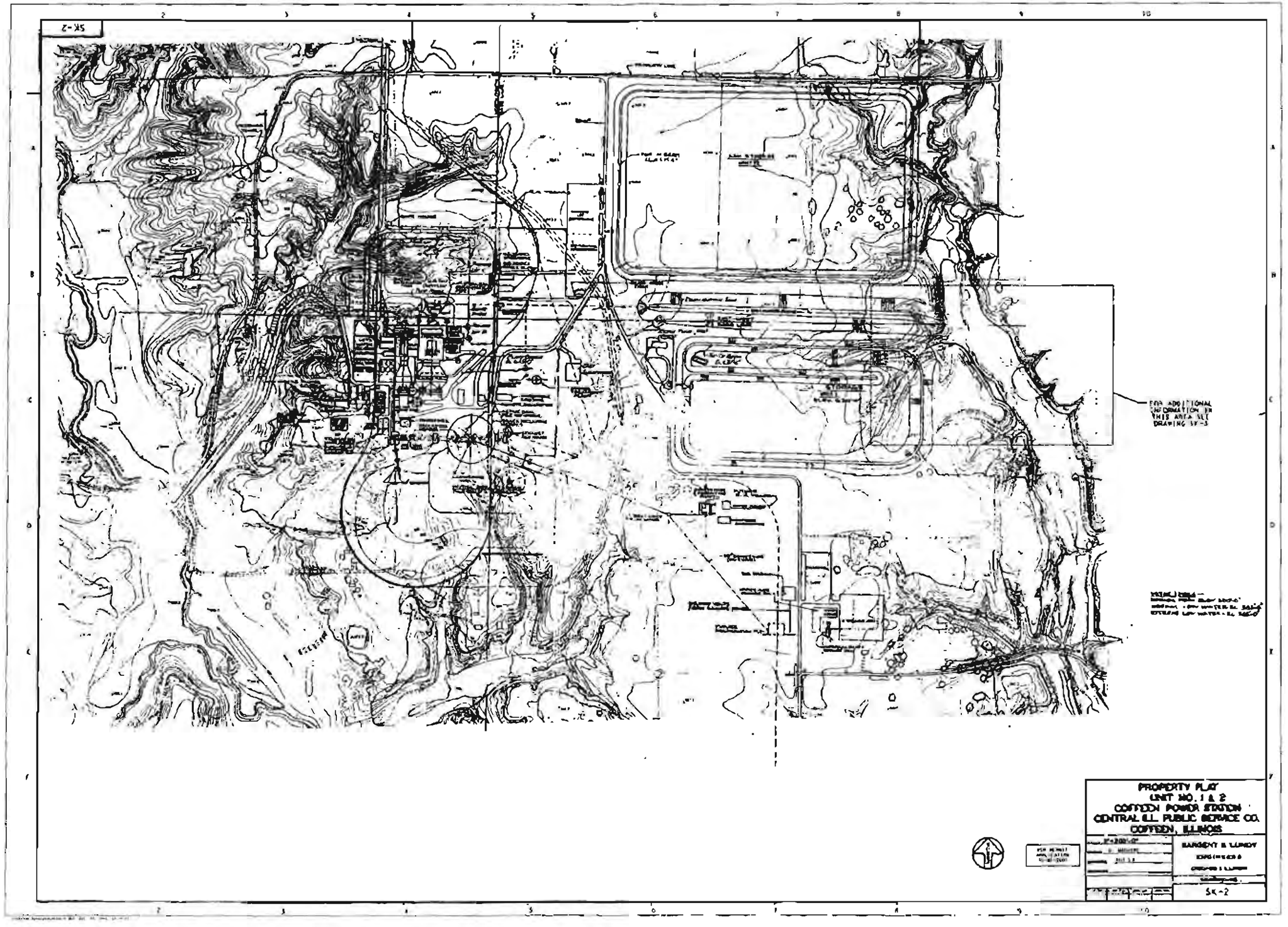
COFFEEN POWER STATION
UNITS 1 AND 2
AMEREN SERVICES, INC
COFFEEN, ILLINOIS

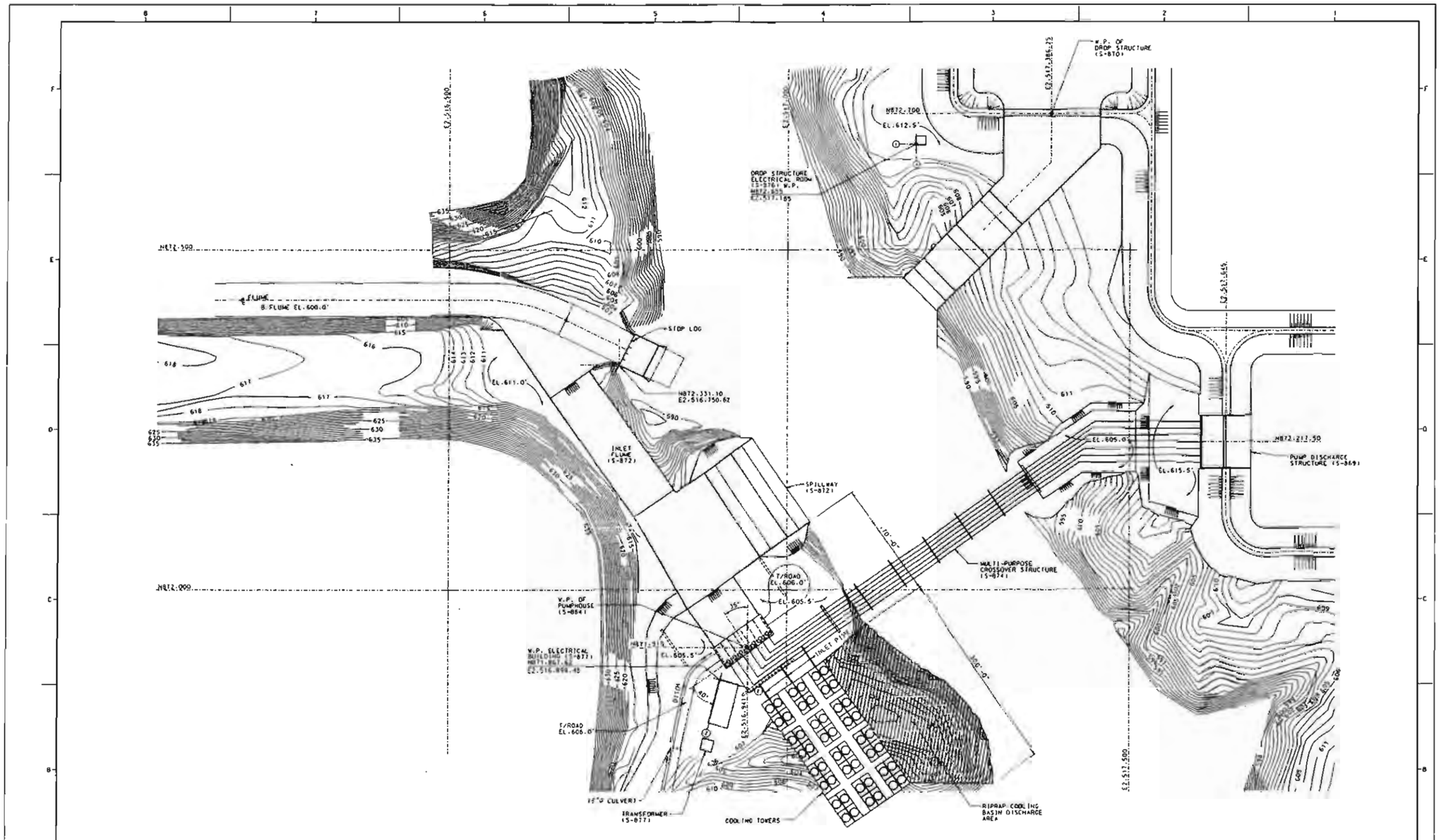
Sargent & Lundy

DRAWING NO. S-087 REV. 00

c:/dgn/coffeen/dgn/sk-4.dgn Oct. 16, 2001 07:56:01


624 PROPERTY LINE
FOR ADDITIONAL INFORMATION SEE DRAWING SK-2
Ash Disposal Ponds
Radio Tower
Powerplant Stack
CONVEYOR
Traylor Cem.
ELEV 590
PROPERTY LINE
(FILLMORE) 3162 III SE
10
11
12
13
14
15
BM
621
627
638
636
620
600
550
596
LAKE
ORIGINALLY CONSOLIDATED COAL CO. PROPERTY CURRENTLY OWNED BY AMEREN ENERGY GENERATING
4325
4324
FOR PERMIT APPLICATION 10-02-2001
SK-1


SK-2
FOR ADDITIONAL INFORMATION IN THIS AREA SEE DRAWING SK-3
PROPERTY PLAT
UNIT NO. 1 & 2
COFFEEN POWER STATION
CENTRAL ILL. PUBLIC SERVICE CO.
COFFEEN, ILLINOIS
SARGENT & LUNDY
SK-2



DRAWING RELEASE RECORD

REV.	DATE REL'D	PREPARED	REVIEWED	APPROVED	PURPOSE	FILM
	10/02/2008	D. MACGUIRE	HUE LI		FOR PERMIT APPLICATION	

NOTES:
1. FOR GENERAL NOTES SEE DRAWING S-600.

SCALE: 1"=50'
PROJECT NUMBER: 09105-037

LAKE STRUCTURES
GENERAL ARRANGEMENT

COFFEEN POWER STATION
UNITS 1 AND 2
AMEREN SERVICES, INC
COFFEEN, ILLINOIS

FILE NAME: SK-2.DGN

Sargent & Lundy

DRAWING NO. SK-3 REV.

SHEET OF

EXHIBIT B

Phosphorus Water Quality Analysis and Internal Loading Calculations

Seasonal Phosphorus Comparison

Seasonal phosphorus comparisons within Coffeen Lake were made after incorporating additional phosphorus data used in the 2009 TMDL (Illinois EPA, 2009a) with the Illinois EPA 2007 TMDL dataset (Illinois EPA, 2007). Results were consistent with the 2007 TMDL.

Table A-1. Phosphorus Data Used for Seasonal Comparison Between 1989 and 2008

Station ID	Date Sampled	Characteristic Name	Concentration (mg/L)
ROG-1	4/27/1989	Total Phosphorus	0.04
ROG-1	4/27/1989	Total Phosphorus	0.06
ROG-1	4/28/1993	Total Phosphorus	0.11
ROG-1	4/28/1993	Total Phosphorus	0.11
ROG-1	4/14/1997	Total Phosphorus	0.08
ROG-1	4/14/1997	Total Phosphorus	0.09
ROG-1	4/18/2002	Total Phosphorus	0.041
ROG-1	4/18/2002	Total Phosphorus	0.066
ROG-2	4/27/1989	Total Phosphorus	0.024
ROG-2	4/28/1993	Total Phosphorus	0.117
ROG-2	4/14/1997	Total Phosphorus	0.077
ROG-2	4/18/2002	Total Phosphorus	0.041
ROG-3	4/27/1989	Total Phosphorus	0.04
ROG-3	4/28/1993	Total Phosphorus	0.12
ROG-3	4/18/2002	Total Phosphorus	0.144
Lake at Cribhouse	4/25/2006	Total Phosphorus	0.18
Lake at Cribhouse	4/18/2007	Total Phosphorus	0.21
Lake at Cribhouse	4/16/2008	Total Phosphorus	0.12
ROG-1	6/23/1977	Total Phosphorus	0.01
ROG-1	6/15/1989	Total Phosphorus	0.04
ROG-1	6/15/1989	Total Phosphorus	0.09
ROG-1	6/16/1993	Total Phosphorus	0.12
ROG-1	6/16/1993	Total Phosphorus	0.08
ROG-1	6/2/1997	Total Phosphorus	0.05
ROG-1	6/19/2002	Total Phosphorus	0.212
ROG-1	6/19/2002	Total Phosphorus	0.098
ROG-2	6/23/1977	Total Phosphorus	0.02
ROG-2	6/15/1989	Total Phosphorus	0.055
ROG-2	6/16/1993	Total Phosphorus	0.066
ROG-2	6/2/1997	Total Phosphorus	0.045
ROG-2	6/19/2002	Total Phosphorus	0.088
ROG-3	6/23/1977	Total Phosphorus	0.09
ROG-3	6/15/1989	Total Phosphorus	0.08

Station ID	Date Sampled	Characteristic Name	Concentration (mg/L)
ROG-3	6/16/1993	Total Phosphorus	0.06
ROG-3	6/2/1997	Total Phosphorus	0.08
ROG-3	6/19/2002	Total Phosphorus	0.121
Lake at Cribhouse	6/27/2006	Total Phosphorus	0.11
Lake at Cribhouse	6/25/2007	Total Phosphorus	0.1
Lake at Cribhouse	6/18/2008	Total Phosphorus	0.12
ROG-1	7/11/1989	Total Phosphorus	0.19
ROG-1	7/11/1989	Total Phosphorus	0.04
ROG-1	7/8/1993	Total Phosphorus	0.06
ROG-1	7/8/1993	Total Phosphorus	0.06
ROG-1	7/1/1997	Total Phosphorus	0.04
ROG-1	7/1/1997	Total Phosphorus	0.05
ROG-1	7/22/2002	Total Phosphorus	0.096
ROG-1	7/22/2002	Total Phosphorus	0.368
ROG-2	7/11/1989	Total Phosphorus	0.024
ROG-2	7/8/1993	Total Phosphorus	0.055
ROG-2	7/1/1997	Total Phosphorus	0.023
ROG-2	7/22/2002	Total Phosphorus	0.08
ROG-3	7/11/1989	Total Phosphorus	1.52
ROG-3	7/8/1993	Total Phosphorus	0.08
ROG-3	7/1/1997	Total Phosphorus	0.06
ROG-3	7/22/2002	Total Phosphorus	0.087
Lake at Cribhouse	7/24/2006	Total Phosphorus	0.11
Lake at Cribhouse	7/23/2007	Total Phosphorus	0.1
Lake at Cribhouse	7/16/2008	Total Phosphorus	0.1
ROG-1	8/8/1989	Total Phosphorus	0.03
ROG-1	8/8/1989	Total Phosphorus	0.53
ROG-1	8/19/1993	Total Phosphorus	0.26
ROG-1	8/19/1993	Total Phosphorus	0.08
ROG-1	8/4/1997	Total Phosphorus	0.21
ROG-1	8/4/1997	Total Phosphorus	0.04
ROG-1	8/22/2002	Total Phosphorus	0.081
ROG-1	8/22/2002	Total Phosphorus	0.081
ROG-2	8/8/1989	Total Phosphorus	0.024
ROG-2	8/19/1993	Total Phosphorus	0.07
ROG-2	8/4/1997	Total Phosphorus	0.048
ROG-2	8/22/2002	Total Phosphorus	0.065
ROG-3	8/8/1989	Total Phosphorus	0.05
ROG-3	8/19/1993	Total Phosphorus	0.07

Station ID	Date Sampled	Characteristic Name	Concentration (mg/L)
ROG-3	8/4/1997	Total Phosphorus	0.07
ROG-3	8/22/2002	Total Phosphorus	0.075
Lake at Cribhouse	8/28/2006	Total Phosphorus	0.1
Lake at Cribhouse	8/28/2007	Total Phosphorus	0.1
Lake at Cribhouse	8/19/2008	Total Phosphorus	0.1
ROG-1	10/12/1989	Total Phosphorus	0.28
ROG-1	10/12/1989	Total Phosphorus	0.06
ROG-1	10/14/1993	Total Phosphorus	0.11
ROG-1	10/14/1993	Total Phosphorus	0.1
ROG-1	10/14/1993	Total Phosphorus	0.12
ROG-1	10/2/1997	Total Phosphorus	0.13
ROG-1	10/2/1997	Total Phosphorus	0.04
ROG-1	10/11/2002	Total Phosphorus	0.103
ROG-1	10/11/2002	Total Phosphorus	0.099
ROG-2	10/12/1989	Total Phosphorus	0.064
ROG-2	10/14/1993	Total Phosphorus	0.098
ROG-2	10/2/1997	Total Phosphorus	0.032
ROG-2	10/11/2002	Total Phosphorus	0.068
ROG-3	10/12/1989	Total Phosphorus	0.07
ROG-3	10/2/1997	Total Phosphorus	0.05
ROG-3	10/11/2002	Total Phosphorus	0.063
Lake at Cribhouse	10/31/2006	Total Phosphorus	0.14
Lake at Cribhouse	10/25/2007	Total Phosphorus	0.1
Lake at Cribhouse	10/15/2008	Total Phosphorus	0.1

Data Sources: Illinois EPA (2007). Greenville Lake and Coffeen Lake TMDL. August 2007.
Illinois EPA (2009). Coffeen Lake and East Fork Shoal Creek TMDL Addendum. June 2009.

Table A-2. Regression Statistics for Seasonal Phosphorus Comparisons

Regression Statistics	
Multiple R	0.023
R Square	0.0005
Adjusted R Square	-0.010
Standard Error	0.163
Observations	96

Table A-3. ANOVA Summary Statistics for Seasonal Phosphorus Comparisons

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.096	0.062	1.553	0.124	-0.027	0.218	-0.027	0.218
X Variable 1	0.002	0.008	0.225	0.822	-0.015	0.019	-0.015	0.019

Comparison of Phosphorus and Chlorophyll-A by Station

Mean phosphorus and chlorophyll-a concentrations were found to be elevated at ROG-3 as compared to ROG-1 and ROG-2. Chlorophyll-a concentrations at ROG-3 were approximately 68 and 24 percent greater than ROG-1 and ROG-2 respectively. Mean phosphorus concentrations at ROG-3 measured approximately 28 and 64 percent greater than ROG-1 and ROG-2 respectively.

Comparison of mean monthly chlorophyll-a concentrations between monitoring stations reveals that ROG-3 maintains elevated chlorophyll-a concentrations during all summer months, particularly when compared to ROG-1. During these months, chlorophyll-a concentrations at ROG-3 were between 37-77 percent greater than ROG-1. Mean phosphorus concentrations were also highest at ROG-3, which contained the greatest range of phosphorus concentrations (0.04-2.52 mg/L) of all stations.

Table A-4. Phosphorus Data by Station and Month

Station	Date Sampled	Parameter	Result (mg/l)
ROG-1	4/27/1989	Total Phosphorus	0.04
ROG-1	4/27/1989	Total Phosphorus	0.06
ROG-1	4/28/1993	Total Phosphorus	0.11
ROG-1	4/28/1993	Total Phosphorus	0.11
ROG-1	4/14/1997	Total Phosphorus	0.08
ROG-1	4/14/1997	Total Phosphorus	0.09
ROG-1	4/18/2002	Total Phosphorus	0.041
ROG-1	4/18/2002	Total Phosphorus	0.066
ROG-1	6/23/1977	Total Phosphorus	0.01
ROG-1	6/15/1989	Total Phosphorus	0.04
ROG-1	6/15/1989	Total Phosphorus	0.09
ROG-1	6/16/1993	Total Phosphorus	0.12
ROG-1	6/16/1993	Total Phosphorus	0.08
ROG-1	6/2/1997	Total Phosphorus	0.05
ROG-1	6/19/2002	Total Phosphorus	0.212
ROG-1	6/19/2002	Total Phosphorus	0.098
ROG-1	7/11/1989	Total Phosphorus	0.19
ROG-1	7/11/1989	Total Phosphorus	0.04
ROG-1	7/8/1993	Total Phosphorus	0.06
ROG-1	7/8/1993	Total Phosphorus	0.06
ROG-1	7/1/1997	Total Phosphorus	0.04
ROG-1	7/1/1997	Total Phosphorus	0.05
ROG-1	7/22/2002	Total Phosphorus	0.096
ROG-1	7/22/2002	Total Phosphorus	0.368

Station	Date Sampled	Parameter	Result (mg/l)
ROG-1	8/8/1989	Total Phosphorus	0.03
ROG-1	8/8/1989	Total Phosphorus	0.53
ROG-1	8/19/1993	Total Phosphorus	0.26
ROG-1	8/19/1993	Total Phosphorus	0.08
ROG-1	8/4/1997	Total Phosphorus	0.21
ROG-1	8/4/1997	Total Phosphorus	0.04
ROG-1	8/22/2002	Total Phosphorus	0.081
ROG-1	8/22/2002	Total Phosphorus	0.081
ROG-1	10/12/1989	Total Phosphorus	0.28
ROG-1	10/12/1989	Total Phosphorus	0.06
ROG-1	10/14/1993	Total Phosphorus	0.11
ROG-1	10/14/1993	Total Phosphorus	0.1
ROG-1	10/14/1993	Total Phosphorus	0.12
ROG-1	10/2/1997	Total Phosphorus	0.13
ROG-1	10/2/1997	Total Phosphorus	0.04
ROG-1	10/11/2002	Total Phosphorus	0.103
ROG-1	10/11/2002	Total Phosphorus	0.099
ROG-2	4/27/1989	Total Phosphorus	0.024
ROG-2	4/28/1993	Total Phosphorus	0.117
ROG-2	4/14/1997	Total Phosphorus	0.077
ROG-2	4/18/2002	Total Phosphorus	0.041
ROG-2	6/23/1977	Total Phosphorus	0.02
ROG-2	6/15/1989	Total Phosphorus	0.055
ROG-2	6/16/1993	Total Phosphorus	0.066
ROG-2	6/2/1997	Total Phosphorus	0.045
ROG-2	6/19/2002	Total Phosphorus	0.088
ROG-2	7/11/1989	Total Phosphorus	0.024
ROG-2	7/8/1993	Total Phosphorus	0.055
ROG-2	7/1/1997	Total Phosphorus	0.023
ROG-2	7/22/2002	Total Phosphorus	0.08
ROG-2	8/8/1989	Total Phosphorus	0.024
ROG-2	8/19/1993	Total Phosphorus	0.07
ROG-2	8/4/1997	Total Phosphorus	0.048
ROG-2	8/22/2002	Total Phosphorus	0.065
ROG-2	10/12/1989	Total Phosphorus	0.064
ROG-2	10/14/1993	Total Phosphorus	0.098
ROG-2	10/2/1997	Total Phosphorus	0.032
ROG-2	10/11/2002	Total Phosphorus	0.068

Station	Date Sampled	Parameter	Result (mg/l)
ROG-3	4/27/1989	Total Phosphorus	0.04
ROG-3	4/28/1993	Total Phosphorus	0.12
ROG-3	4/18/2002	Total Phosphorus	0.144
ROG-3	6/23/1977	Total Phosphorus	0.09
ROG-3	6/15/1989	Total Phosphorus	0.08
ROG-3	6/16/1993	Total Phosphorus	0.06
ROG-3	6/2/1997	Total Phosphorus	0.08
ROG-3	6/19/2002	Total Phosphorus	0.121
ROG-3	7/11/1989	Total Phosphorus	1.52
ROG-3	7/8/1993	Total Phosphorus	0.08
ROG-3	7/1/1997	Total Phosphorus	0.06
ROG-3	7/22/2002	Total Phosphorus	0.087
ROG-3	8/8/1989	Total Phosphorus	0.05
ROG-3	8/19/1993	Total Phosphorus	0.07
ROG-3	8/4/1997	Total Phosphorus	0.07
ROG-3	8/22/2002	Total Phosphorus	0.075
ROG-3	10/12/1989	Total Phosphorus	0.07
ROG-3	10/2/1997	Total Phosphorus	0.05
ROG-3	10/11/2002	Total Phosphorus	0.063

Data Source: Illinois EPA (2007)

Table A-5. Chlorophyll-A Data by Station and Month

Station	Date Sampled	Parameter	Result (µg/l)
ROG-1	4/27/1989	CHLOROPHYL-A	7.63
ROG-1	4/28/1993	CHLOROPHYL-A	4.61
ROG-1	4/14/1997	CHLOROPHYL-A	4.26
ROG-1	4/18/2002	CHLOROPHYL-A	26.6
ROG-1	6/15/1989	CHLOROPHYL-A	8.23
ROG-1	6/16/1993	CHLOROPHYL-A	5.36
ROG-1	6/2/1997	CHLOROPHYL-A	4.68
ROG-1	6/19/2002	CHLOROPHYL-A	16.3
ROG-1	7/11/1989	CHLOROPHYL-A	11.3
ROG-1	7/8/1993	CHLOROPHYL-A	5.2
ROG-1	7/1/1997	CHLOROPHYL-A	13.17
ROG-1	7/22/2002	CHLOROPHYL-A	16.2
ROG-1	8/19/1993	CHLOROPHYL-A	10.82
ROG-1	8/4/1997	CHLOROPHYL-A	13.26
ROG-1	8/22/2002	CHLOROPHYL-A	15.3

Station	Date Sampled	Parameter	Result (µg/l)
ROG-1	10/12/1989	CHLOROPHYL-A	7.43
ROG-1	10/14/1993	CHLOROPHYL-A	3.8
ROG-1	10/2/1997	CHLOROPHYL-A	3.01
ROG-1	10/11/2002	CHLOROPHYL-A	7.44
ROG-2	4/27/1989	CHLOROPHYL-A	11.5
ROG-2	4/28/1993	CHLOROPHYL-A	13.6
ROG-2	4/14/1997	CHLOROPHYL-A	2.8
ROG-2	4/18/2002	CHLOROPHYL-A	23.9
ROG-2	6/15/1989	CHLOROPHYL-A	14.5
ROG-2	6/16/1993	CHLOROPHYL-A	11.1
ROG-2	6/2/1997	CHLOROPHYL-A	108.3
ROG-2	6/19/2002	CHLOROPHYL-A	16.8
ROG-2	7/11/1989	CHLOROPHYL-A	22
ROG-2	7/8/1993	CHLOROPHYL-A	11.8
ROG-2	7/8/1993	CHLOROPHYL-A	11.8
ROG-2	7/1/1997	CHLOROPHYL-A	16.8
ROG-2	7/22/2002	CHLOROPHYL-A	24
ROG-2	8/8/1989	CHLOROPHYL-A	15.7
ROG-2	8/19/1993	CHLOROPHYL-A	12.7
ROG-2	8/19/1993	CHLOROPHYL-A	16.4
ROG-2	8/4/1997	CHLOROPHYL-A	17.9
ROG-2	8/22/2002	CHLOROPHYL-A	18.9
ROG-2	10/12/1989	CHLOROPHYL-A	9
ROG-2	10/14/1993	CHLOROPHYL-A	10
ROG-2	10/2/1997	CHLOROPHYL-A	5.2
ROG-2	10/11/2002	CHLOROPHYL-A	17.7
ROG-3	4/27/1989	CHLOROPHYL-A	20.83
ROG-3	4/28/1993	CHLOROPHYL-A	5.78
ROG-3	4/14/1997	CHLOROPHYL-A	26.83
ROG-3	4/18/2002	CHLOROPHYL-A	61.4
ROG-3	6/15/1989	CHLOROPHYL-A	53.12
ROG-3	6/16/1993	CHLOROPHYL-A	27.18
ROG-3	6/2/1997	CHLOROPHYL-A	3.91
ROG-3	6/19/2002	CHLOROPHYL-A	67.4
ROG-3	7/11/1989	CHLOROPHYL-A	29.62
ROG-3	7/8/1993	CHLOROPHYL-A	14.94
ROG-3	7/1/1997	CHLOROPHYL-A	11.02
ROG-3	7/22/2002	CHLOROPHYL-A	16.9
ROG-3	8/8/1989	CHLOROPHYL-A	20.84
ROG-3	8/4/1997	CHLOROPHYL-A	21.71

Station	Date Sampled	Parameter	Result (µg/l)
ROG-3	8/22/2002	CHLOROPHYL-A	20.2
ROG-3	10/12/1989	CHLOROPHYL-A	20.01
ROG-3	10/14/1993	CHLOROPHYL-A	24.52
ROG-3	10/2/1997	CHLOROPHYL-A	7.1
ROG-3	10/11/2002	CHLOROPHYL-A	12.7

Data Source: Illinois EPA (2007)

Comparison of Suspend Solids by Station and Month

The majority of the Total Suspended Solids (TSS) values, a leading contributing factor to turbidity, reported for Coffeen Lake provided in the 2007 TMDL (Illinois EPA, 2007) were under 20 mg/L. Comparing between stations, ROG-3 was determined to have statistically higher concentrations of TSS than ROG-1 and ROG-2.

Table A-6. Total Suspended Solids Data by Station and Month

Station	Date Sampled	Parameter	Value (mg/L)
ROG-1	6/23/1977	TSS	6
ROG-1	4/27/1989	TSS	10
ROG-1	4/27/1989	TSS	4
ROG-1	6/15/1989	TSS	2
ROG-1	6/15/1989	TSS	4
ROG-1	7/11/1989	TSS	13
ROG-1	7/11/1989	TSS	35
ROG-1	8/8/1989	TSS	100
ROG-1	8/8/1989	TSS	7
ROG-1	10/12/1989	TSS	7
ROG-1	10/12/1989	TSS	9
ROG-1	4/28/1993	TSS	5
ROG-1	4/28/1993	TSS	6
ROG-1	6/16/1993	TSS	12
ROG-1	6/16/1993	TSS	6
ROG-1	7/8/1993	TSS	2
ROG-1	7/8/1993	TSS	7
ROG-1	8/19/1993	TSS	11
ROG-1	8/19/1993	TSS	8
ROG-1	10/14/1993	TSS	1
ROG-1	10/14/1993	TSS	4
ROG-1	10/14/1993	TSS	3
ROG-1	4/14/1997	TSS	10
ROG-1	4/14/1997	TSS	12
ROG-1	6/2/1997	TSS	11
ROG-1	7/1/1997	TSS	5
ROG-1	7/1/1997	TSS	7
ROG-1	8/4/1997	TSS	4
ROG-1	8/4/1997	TSS	4
ROG-1	10/2/1997	TSS	6
ROG-1	10/2/1997	TSS	7
ROG-1	4/18/2002	TSS	12
ROG-1	4/18/2002	TSS	8

Station	Date Sampled	Parameter	Value (mg/L)
ROG-1	6/19/2002	TSS	20
ROG-1	6/19/2002	TSS	12
ROG-1	7/22/2002	TSS	9
ROG-1	7/22/2002	TSS	7
ROG-1	8/22/2002	TSS	3
ROG-1	8/22/2002	TSS	3
ROG-1	10/11/2002	TSS	3
ROG-1	10/11/2002	TSS	3
ROG-2	8/19/1993	TSS	10
ROG-2	10/14/1993	TSS	1
ROG-2	4/14/1997	TSS	8
ROG-2	6/2/1997	TSS	8
ROG-2	7/1/1997	TSS	5
ROG-2	8/4/1997	TSS	8
ROG-2	10/2/1997	TSS	5
ROG-2	4/18/2002	TSS	8
ROG-2	6/19/2002	TSS	17
ROG-2	7/22/2002	TSS	6
ROG-2	8/22/2002	TSS	4
ROG-2	10/11/2002	TSS	3
ROG-2	6/23/1977	TSS	6
ROG-2	4/27/1989	TSS	1
ROG-2	6/15/1989	TSS	2
ROG-2	7/11/1989	TSS	4
ROG-2	8/8/1989	TSS	4
ROG-2	10/12/1989	TSS	4
ROG-2	4/28/1993	TSS	16
ROG-2	6/16/1993	TSS	7
ROG-2	7/8/1993	TSS	3
ROG-3	4/27/1989	TSS	4
ROG-3	6/15/1989	TSS	4
ROG-3	7/11/1989	TSS	9
ROG-3	8/8/1989	TSS	10
ROG-3	10/12/1989	TSS	8
ROG-3	4/28/1993	TSS	15
ROG-3	6/16/1993	TSS	13
ROG-3	8/19/1993	TSS	8
ROG-3	4/14/1997	TSS	13
ROG-3	6/2/1997	TSS	17
ROG-3	7/1/1997	TSS	7

Station	Date Sampled	Parameter	Value (mg/L)
ROG-3	8/4/1997	TSS	10
ROG-3	10/2/1997	TSS	12
ROG-3	4/18/2002	TSS	27
ROG-3	6/19/2002	TSS	17
ROG-3	7/22/2002	TSS	12
ROG-3	8/22/2002	TSS	7
ROG-3	10/11/2002	TSS	5
ROG-3	6/23/1977	TSS	47

Data Source: Illinois EPA (2007)

Table A-7. ANOVA Analysis of Total Suspended Solids by Station

	ROG-1	ROG-2	ROG-3
ROG-1	1.000		
ROG-2	0.493	1.000	
ROG-3	0.665	0.203	1.000

Table A-8. ANOVA Analysis of Total Suspended Solids by Month

	April	August	July	June	October
April	1.000				
August	0.975	1.000			
July	0.999	0.911	1.000		
June	0.993	1.000	0.958	1.000	
October	0.800	0.433	0.922	0.525	1.000

Internal Loading Calculations

Estimates of average depth to anoxia and number of anoxic days per month were made using water profile data from the Southern Illinois University at Carbondale (SIUC) annual monitoring reports (SIUC, 2006 and SIUC, 2007).

Table A-9. Water Quality Profile Data by Year from SIUC Reports for Segment 1

Date	Bottom Depth (m)	Depth <1.0 mg/L O2 (m)	Anoxic Depth (m)	Stratified ?	Depth to thermocline (m)
1/18/2001	9.5	9.5	0	Y	1.5
1/19/2001	10	10	0	Y	1.5
2/27/2001	9	9	0	Y	1.8
3/30/2001	8.5	8.5	0	Y	1.5
4/25/2001	7.5	7.5	0	Y	2.9
5/9/2001	8	8	0	Y	2.7
5/24/2001	11	11	0	Y	8
6/8/2001	9	9	0	Y	2.7
6/13/2001	9	9	0	Y	4.0
6/19/2001	8.5	8.5	0	Y	2.4
6/25/2001	8.5	7.5	1	Y	2.4
7/3/2001	9	6.5	2.5	Y	3.0
7/10/2001	8.5	6.5	2	Y	2.4
7/19/2001	8.5	6	2.5	Y	2.4
7/24/2001	8.5	5.5	3	Y	2.7
8/8/2001	8.5	6	2.5	Y	2.0
8/15/2001	8.5	4	4.5	Y	3.5
8/22/2001	9.5	8	1.5	Y	2.1
8/29/2001	8.5	6	2.5	Y	2.7
9/5/2001	8	5.5	2.5	Y	2.9
9/19/2001	8.5	6	2.5	Y	2.7
10/22/2001	8	8	0	Y	6
11/27/2001	8	8	0	Y	4.0
12/11/2001	8.5	8.5	0	Y	1.2
6/8/2003	8	7	1	Y	4.3
6/17/2003	10	7	3	Y	2.0
6/23/2003	9.5	5.5	4	Y	1.2
7/1/2003	9.5	7	2.5	Y	7.5
7/8/2003	9.5	6	3.5	Y	7.9
7/15/2003	9.5	6	3.5	Y	8
7/24/2003	11	3.5	7.5	Y	8
7/30/2003	10	3.5	6.5	Y	8
8/6/2003	10	6	4	Y	8

Date	Bottom Depth (m)	Depth <1.0 mg/L O2 (m)	Anoxic Depth (m)	Stratified ?	Depth to thermocline (m)
8/13/2003	9.5	4.5	5	Y	8
8/20/2003	9.5	5.5	4	Y	6.7
8/27/2003	9	6.5	2.5	Y	8.0
9/3/2003	9.5	8	1.5	Y	8
9/10/2003	9.5	6	3.5	Y	8.5
9/18/2003	9	6.5	2.5	Y	2.0
9/26/2003	9	4	5	Y	1.3
10/2/2003	8.5	7	1.5	Y	2.0
5/5/2004	10	9.5	0.5	Y	7
5/12/2004	10	7	3	Y	4.0
5/19/2004	10	8.5	1.5	Y	8.0
5/26/2004	10.5	8	2.5	Y	8.0
6/2/2004	10.5	7	3.5	Y	8.5
6/9/2004	10	6.5	3.5	Y	1.5
6/16/2004	10	5.5	4.5	Y	8
6/23/2004	10	4	6	Y	8
6/30/2004	10	4	6	Y	8.5
7/7/2004	10	6	4	Y	8.9
7/14/2004	10	7	3	Y	8.9
7/21/2004	10	6.5	3.5	Y	8.5
7/28/2004	10.5	3	7.5	Y	1.9 & 8.5
8/4/2004	10.5	6	4.5	Y	9
8/11/2004	6	6	0	Y	2
8/18/2004	10.5	6	4.5	Y	9
8/25/2004	11.5	5.5	6	Y	1.8
9/1/2004	10	5.5	4.5	Y	6.7
9/10/2004	9.5	5.5	4	Y	1.5 & 8.5
9/15/2004	10	5.5	4.5	Y	9
9/22/2004	10	6	4	Y	8.5
6/3/2005	11	6.5	4.5	Y	9
6/8/2005	10.5	6	4.5	Y	8
6/16/2005	10	6	4	Y	7.9
6/21/2005	13	6	7	Y	7.9
6/28/2005	10.5	7	3.5	Y	5
7/7/2005	9.5	4	5.5	Y	1.5 & 8
7/13/2005	9.5	4.5	5	Y	7.9
7/20/2005	10	6	4	Y	8
7/27/2005	9.5	6	3.5	Y	6
8/2/2005	10	6	4	Y	7.6
8/9/2005	9.5	6.5	3	Y	7.9

Date	Bottom Depth (m)	Depth <1.0 mg/L O2 (m)	Anoxic Depth (m)	Stratified ?	Depth to thermocline (m)
8/18/2005	9.5	6	3.5	Y	8.5
8/23/2005	9	5	4	Y	8
8/31/2005	8.5	5.5	3	Y	2.4
9/8/2005	10	6.5	3.5	Y	8
9/14/2005	9	9	0	Y	8
9/21/2005	9.5	5.5	4	Y	8
9/29/2005	9.5	8	1.5	Y	8
5/4/2006	9	8	1	Y	2
5/11/2006	9.5	8	1.5	Y	3.7
5/18/2006	9.5	8.5	1	Y	8.5
5/25/2006	9.5	8	1.5	Y	1.5
6/1/2006	4	N/A	0	Y	1.8
6/9/2006	9	6	3	Y	8
6/15/2006	9.5	5.5	4	Y	6
6/22/2006	9	6.5	2.5	Y	2.4
6/29/2006	9	4.5	4.5	Y	7.3
7/6/2006	8.5	4.5	4	Y	7.4
7/13/2006	9	5	4	Y	8
7/19/2006	9	6	3	Y	7.6
7/27/2006	9	5.5	3.5	Y	7.6
8/3/2006	8.5	5.5	3	Y	7.6
8/10/2006	9	3.5	5.5	Y	8
8/18/2006	9	5	4	Y	8
8/24/2006	8.5	5	3.5	Y	7.6
8/30/2006	8	4.5	3.5	Y	2
9/6/2006	8.5	5	3.5	Y	1.5
9/12/2006	8.5	5.5	3	Y	7
9/19/2006	8	5	3	Y	3.0
9/28/2006	9	9	0	N	N

Data Source: SIUC 2006 and 2007

Table A-10. Water Quality Profile Data by Year from SIUC Reports for Segment 2

Date	Bottom Depth (m)	Depth <1.0 mg/L O2 (m)	Anoxic Depth (m)	Stratified?	Depth to thermocline (m)
1/18/2001	11.5	11.5	0	Y	1.2
1/19/2001	11.5	11.5	0	N	N
2/27/2001	12	12	0	N	N
3/30/2001	12	12	0	Y	4.6
4/25/2001	11.5	11.5	0	Y	2.7
5/9/2001	13	13	0	Y	8.0
5/24/2001	11.5	9.5	2	Y	9.1
6/8/2001	13.5	12	1.5	Y	11.0
6/13/2001	12	12	0	Y	3.0
6/19/2001	9	9	0	Y	6.1
6/25/2001	12	11	1	Y	8.2
7/3/2001	12.5	8	4.5	Y	7.6
7/10/2001	12.5	8.5	4	Y	8.5
7/19/2001	12.5	8.5	4	Y	8.8
7/24/2001	12	8.5	3.5	Y	8.8
8/8/2001	11	6.5	4.5	Y	9.0
8/15/2001	11	9.5	1.5	Y	8.1
8/22/2001	12	10	2	Y	8.8
8/29/2001	11.5	9.5	2	Y	9.0
9/5/2001	12	7	5	Y	8.8
9/19/2001	4.5	4.5	0	N	N
10/22/2001	12	12	0	N	N
11/27/2001	12	12	0	N	N
12/11/2001	12	12	0	Y	2.0
6/8/2003	10.5	10	0.5	Y	3.4
6/17/2003	12.5	7.5	5	Y	1.5
6/23/2003	11	7	4	Y	2.4
7/1/2003	11.5	7.5	4	Y	7.6
7/8/2003	10.5	6	4.5	Y	7.9
7/15/2003	11	7.5	3.5	Y	8.0
7/24/2003	11.5	8.5	3	Y	7.5
7/30/2003	11	7.5	3.5	Y	8.5
8/6/2003	10.5	6.5	4	Y	8.5
8/13/2003	11	8	3	Y	8.1
8/20/2003	11	6	5	Y	7.9
8/27/2003	10	6.5	3.5	Y	8.0
9/3/2003	10	9	1	Y	7.5
9/10/2003	9.5	9	0.5	Y	9.5
9/18/2003	10.5	7	3.5	Y	8.8

Date	Bottom Depth (m)	Depth <1.0 mg/L O2 (m)	Anoxic Depth (m)	Stratified?	Depth to thermocline (m)
9/26/2003	10	9.5	0.5	Y	8.5
10/2/2003	10.5	10.5	0	N	N
5/5/2004	12	12	0	Y	1.5
5/12/2004	13.5	10	3.5	Y	5.0
5/19/2004	13	8.5	4.5	Y	7.3
5/26/2004	11.5	8	3.5	Y	7.9
6/2/2004	11.5	8	3.5	Y	7.8
6/9/2004	13	7	6	Y	8.2
6/16/2004	12.5	7	5.5	Y	7.6
6/23/2004	9.5	8	1.5	Y	8
6/30/2004	13	6.5	6.5	Y	9.5
7/7/2004	12.5	7.5	5	Y	9.0
7/14/2004	13	6.5	6.5	Y	9.1
7/21/2004	11.5	7.5	4	Y	8.5
7/28/2004	12	9	3	Y	9
8/4/2004	11.5	6.5	5	Y	9
8/11/2004	10	8	2	Y	8.5
8/18/2004	11	9	2	Y	9
8/25/2004	12	7.5	4.5	Y	7.9
9/1/2004	12.5	6.5	6	Y	9
9/10/2004	12.5	8.5	4	Y	8.5
9/15/2004	11	7	4	Y	9
9/22/2004	12	8	4	Y	8.5
6/3/2005	12.5	7.5	5	Y	8.5
6/8/2005	11.5	6	5.5	Y	8
6/16/2005	11.5	8	3.5	Y	7.6
6/21/2005	11.5	7.5	4	Y	7.9
6/28/2005	10.5	7	3.5	Y	8.0
7/7/2005	10.5	7.5	3	Y	7.9
7/13/2005	10.5	8.5	2	Y	8.5
7/20/2005	10.5	6	4.5	Y	8.5
7/27/2005	10.5	7.5	3	Y	7.6
8/2/2005	11	6	5	Y	8.5
8/9/2005	10.5	6.5	4	Y	8.1
8/18/2005	10	8.5	1.5	Y	7.9
8/23/2005	10	7.5	2.5	Y	8.2
8/31/2005	10	9	1	Y	8.1
9/8/2005	10	8.5	1.5	Y	8.0
9/14/2005	9.5	9.5	0	Y	7.6
9/21/2005	10	8.5	1.5	Y	9.1

Date	Bottom Depth (m)	Depth <1.0 mg/L O2 (m)	Anoxic Depth (m)	Stratified?	Depth to thermocline (m)
9/29/2005	10	10	0	Y	9.0
5/4/2006	11.5	8.5	3	Y	5.0
5/11/2006	11	7.5	3.5	Y	3.7
5/18/2006	11	10	1	Y	1.5
5/25/2006	10.5	9.5	1	Y	0.9
6/1/2006	10.5	6.5	4	Y	4.6
6/9/2006	11	8	3	Y	8.1
6/15/2006	10	6	4	Y	8
6/22/2006	10	7.5	2.5	Y	2.0
6/29/2006	10.5	9	1.5	Y	8.1
7/6/2006	11	6.5	4.5	Y	8.1
7/13/2006	10	4.5	5.5	Y	7.6
7/19/2006	10.5	6	4.5	Y	8.1
7/27/2006	10	7	3	Y	7.6
8/3/2006	10	6.5	3.5	Y	7.0
8/10/2006	10	7.5	2.5	Y	7.9
8/18/2006	10	7.5	2.5	Y	8.0
8/24/2006	9.5	7	2.5	Y	8
8/30/2006	10	8	2	Y	8.0
9/6/2006	10	8.5	1.5	Y	8
9/12/2006	9.5	7.5	2	Y	8.0
9/19/2006	10	7	3	Y	7.9
9/28/2006	9	9	0	N	N

Data Source: SIUC 2006 and 2007

Table A-11. Water Quality Profile Data by Year from SIUC Reports for Segment 3

Date	Bottom Depth (m)	Depth <1.0 mg/L O2 (m)	Anoxic Depth (m) Above Seds	Stratified ?	Depth to thermocline (m)
1/18/2001	7.5	7.5	0	N	N
1/19/2001	7.5	7.5	0	N	N
2/27/2001	7.5	7.5	0	N	N
3/30/2001	7.5	7.5	0	Y	5.5
4/25/2001	7.5	7.5	0	N	N
5/9/2001	8	7.5	0.5	Y	6.7
5/24/2001	7	7	0	N	N
6/8/2001	7.5	7.5	0	Y	3.4
6/13/2001	7.5	7.5	0	Y	4.6
6/19/2001	7.5	7.5	0	Y	5.5
6/25/2001	7.5	7.5	0	Y	6.1
7/3/2001	7.5	7.5	0	N	N
7/10/2001	7	7	0	Y	1.8
7/19/2001	7.5	7.5	0	N	N
7/24/2001	7.5	7.5	0	N	N
8/8/2001	7.5	6.5	1	N	N
8/15/2001	7	7	0	N	N
8/22/2001	7	7	0	N	N
8/29/2001	7	7	0	N	N
9/5/2001	7	7	0	N	N
9/19/2001	7	7	0	N	N
10/22/2001	7	7	0	N	N
11/27/2001	7	7	0	N	N
12/11/2001	7.5	7.5	0	N	N
6/8/2003	6.5	6.5	0	Y	2.1
6/17/2003	7	7	0	Y	4.0
6/23/2003	7	7	0	Y	5.2
7/1/2003	6.5	6.5	0	Y	4.6
7/8/2003	6.5	6.5	0	N	N
7/15/2003	6.5	6.5	0	N	N
7/24/2003	7.5	7	0.5	N	N
7/30/2003	7	7	0	Y	5.5
8/6/2003	6.5	6.5	0	N	N
8/13/2003	7	7	0	Y	5.9
8/20/2003	7	7	0	Y	5.8
8/27/2003	6.5	6.5	0	Y	5.0
9/3/2003	7	7	0	Y	5.5
9/10/2003	6.5	6.5	0	Y	5.5
9/18/2003	6	6	0	Y	5.5

Date	Bottom Depth (m)	Depth <1.0 mg/L O2 (m)	Anoxic Depth (m) Above Seds	Stratified ?	Depth to thermocline (m)
9/26/2003	6.5	6.5	0	Y	6.0
10/2/2003	6.5	6.5	0	Y	5.5
5/5/2004	7	7	0	Y	4.0
5/12/2004	7.5	7.5	0	Y	6.7
5/19/2004	7.5	7.5	0	Y	4.6
5/26/2004	8	7.5	0.5	Y	4.3
6/2/2004	7	7	0	N	N
6/9/2004	7.5	7.5	0	Y	4
6/16/2004	7.5	7.5	0	Y	5
6/23/2004	8	8	0	Y	6.3
6/30/2004	7	7	0	N	N
7/7/2004	7.5	7.5	0	N	N
7/14/2004	7	4	3	N	N
7/21/2004	7	7	0	Y	5.4
7/28/2004	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
8/4/2004	6	4	2	N	N
8/11/2004	7.5	7.5	0	Y	6.2
8/18/2004	7	7	0	Y	5
8/25/2004	8	7.5	0.5	Y	6.4
9/1/2004	7.5	7.5	0	Y	5.8
9/10/2004	7.5	7	0.5	Y	6.1
9/15/2004	9	7.5	1.5	Y	6.0
9/22/2004	7	7	0	Y	6.1
6/3/2005	7.5	7.5	0	Y	4.9
6/8/2005	7.5	6.5	1	Y	4.0
6/16/2005	7.5	7.5	0	N	N
6/21/2005	7.5	7	0.5	N	N
6/28/2005	7	6.5	0.5	N	N
7/7/2005	6.5	6	0.5	Y	6.0
7/13/2005	7.5	7.5	0	Y	6.7
7/20/2005	7	7	0	N	N
7/27/2005	7	7	0	N	N
8/2/2005	7	7	0	N	N
8/9/2005	7	7	0	N	N
8/18/2005	6.5	6.5	0	Y	6.0
8/23/2005	6.5	6.5	0	Y	6.0
8/31/2005	6.5	6.5	0	N	N
9/8/2005	6.5	6.5	0	N	N
9/14/2005	7	7	0	Y	5.49
9/21/2005	7	7	0	Y	5.03

Date	Bottom Depth (m)	Depth <1.0 mg/L O2 (m)	Anoxic Depth (m) Above Seds	Stratified ?	Depth to thermocline (m)
9/29/2005	6	6	0	Y	5
5/4/2006	7	7	0	Y	6.7
5/11/2006	7.5	6.5	1	Y	5.0
5/18/2006	6.5	6.5	0	N	5
5/25/2006	6.5	6.5	0	Y	5
6/1/2006	7	6.5	0.5	Y	4.3
6/9/2006	7	7	0	Y	N
6/15/2006	6.5	6.5	0	Y	5
6/22/2006	6.5	6.5	0	Y	N
6/29/2006	6.5	6.5	0	N	6.0
7/6/2006	7	7	0	Y	1.5
7/13/2006	6.5	6.5	0	N	N
7/19/2006	6.5	6.5	0	N	N
7/27/2006	6.5	6.5	0	N	N
8/3/2006	6	5.5	0.5	N	N
8/10/2006	6	6	0	N	N
8/18/2006	6	6	0	N	N
8/24/2006	6	6	0	N	5.5
8/30/2006	6	6	0	N	5.5
9/6/2006	6	6	0	Y	N
9/12/2006	6	6	0	Y	4.6
9/19/2006	4	4	0	N	N
9/28/2006	5	5	0	N	N

Data Source: SIUC 2006 and 2007

Table A-12. Water Quality Profile Data by Year from SIUC Reports for Segment 4

Date	Bottom Depth (m)	Depth <1.0 mg/L O2 (m)	Anoxic Depth (m)	Stratified ?	Depth to thermocline (m)
1/18/2001	7.5	7.5	0	N	N
1/19/2001	7.5	7.5	0	Y	4.0
2/27/2001	8	8	0	Y	4.0
3/30/2001	7.5	7.5	0	Y	5
4/25/2001	7.5	7.5	0	N	N
5/9/2001	8	8	0	Y	5.2
5/24/2001	8	8	0	N	N
6/8/2001	7.5	7.5	0	Y	2.0
6/13/2001	7.5	7.5	0	Y	4.6
6/19/2001	7.5	7	0.5	Y	4.6
6/25/2001	7.5	7.5	0	Y	7.0
7/3/2001	7.5	7.5	0	N	N
7/10/2001	7.5	7.5	0	N	N
7/19/2001	7	7	0	N	N
7/24/2001	7.5	7.5	0	Y	5
8/8/2001	7.5	7.5	0	N	N
8/15/2001	7.5	7.5	0	N	N
8/22/2001	7.5	7.5	0	N	N
8/29/2001	7	7	0	N	N
9/5/2001	7.5	7.5	0	N	N
9/19/2001	7	7	0	N	N
10/22/2001	7.5	7.5	0	N	N
11/27/2001	7	7	0	N	N
12/11/2001	7.5	7.5	0	N	N
6/8/2003	6	6	0	Y	3.0
6/17/2003	7	7	0	Y	5.0
6/23/2003	6.5	6	0.5	Y	4.9
7/1/2003	6.5	6.5	0	N	N
7/8/2003	6.5	6.5	0	N	N
7/15/2003	6	6	0	N	N
7/24/2003	7	6.5	0.5	N	N
7/30/2003	7	7	0	N	N
8/6/2003	7	6.5	0.5	N	N
8/13/2003	6.5	6.5	0	N	N
8/20/2003	7	7	0	N	N
8/27/2003	6.5	6.5	0	N	N
9/3/2003	6.5	6.5	0	N	N
9/10/2003	6.5	6.5	0	N	N
9/18/2003	6	6	0	N	N

Date	Bottom Depth (m)	Depth <1.0 mg/L O2 (m)	Anoxic Depth (m)	Stratified ?	Depth to thermocline (m)
9/26/2003	6	6	0	N	N
10/2/2003	6.5	6.5	0	N	N
5/5/2004	7	7	0	N	N
5/12/2004	7.5	7.5	0	Y	6
5/19/2004	7	7	0	Y	6
~~5/26/2004~~	4.5	4.5	0	Y	4
6/2/2004	8.5	8	0.5	Y	6
6/9/2004	7.5	6.5	1	Y	4.3
6/16/2004	7.5	6.5	1	Y	6
6/23/2004	8	8	0	N	N
6/30/2004	7.5	6	1.5	N	N
7/7/2004	6.5	6.5	0	N	N
7/14/2004	7	6.5	0.5	N	N
7/21/2004	6.5	6.5	0	N	N
~~7/28/2004~~	NO DATA	NO DATA	NO DATA	NO DATA	NO DATA
8/4/2004	7	5.5	1.5	N	N
8/11/2004	7	7	0	N	N
8/18/2004	7.5	6.5	1	N	N
8/25/2004	7	7	0	N	N
9/1/2004	7	7	0	N	N
9/10/2004	8	7.5	0.5	N	N
9/15/2004	8.5	8	0.5	N	N
9/22/2004	7	7	0	N	N
6/3/2005	7.5	7	0.5	Y	5.6
6/8/2005	8	7	1	Y	4.0
6/16/2005	6	6	0	N	N
6/21/2005	6.5	6.5	0	N	N
6/28/2005	6.5	6	0.5	N	N
7/7/2005	6.5	6.5	0	N	N
7/13/2005	8	8	0	N	N
7/20/2005	6.5	6	0.5	N	N
7/27/2005	7	7	0	N	N
8/2/2005	7	6	1	N	N
8/9/2005	6.5	6.5	0	N	N
8/18/2005	7	7	0	N	N
8/23/2005	6.5	6.5	0	N	N
8/31/2005	6	6	0	N	N
9/8/2005	6	6	0	N	N
9/14/2005	7	7	0	N	N

Date	Bottom Depth (m)	Depth <1.0 mg/L O2 (m)	Anoxic Depth (m)	Stratified ?	Depth to thermocline (m)
9/21/2005	7	7	0	N	N
9/29/2005	6.5	6.5	0	N	5.5
5/4/2006	6.5	6.5	0	Y	5.5
5/11/2006	6.5	6.5	0	Y	4.6
5/18/2006	6.5	6.5	0	Y	4.6
5/25/2006	6	6	0	Y	4.0
6/1/2006	6.5	6.5	0	Y	6.1
6/9/2006	6.5	6.5	0	Y	N
6/15/2006	6.5	6.5	0	Y	N
6/22/2006	6	6	0	Y	N
6/29/2006	6.5	6.5	0	N	N
7/6/2006	6.5	6.5	0	N	N
7/13/2006	6.5	6.5	0	N	N
7/19/2006	6.5	6.5	0	N	N
7/27/2006	6	6	0	N	N
8/3/2006	6	6	0	N	N
8/10/2006	6	6	0	N	N
8/18/2006	6	6	0	N	N
8/24/2006	6	6	0	N	N
8/30/2006	6	6	0	N	N
9/6/2006	6	6	0	Y	N
9/12/2006	6	6	0	Y	N
9/19/2006	5	5	0	N	N
9/28/2006	5	5	0	N	N

Data Source: SIUC 2006 and 2007

Table A-13. Summary of Average Depth to Anoxia for Segment 1 by Year

Segment 1 - Average depth to Anoxic conditions (<1mg/L O2) in Meters												
	JAN	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
2001	N	N	N	N	N	1.00	6.13	6.67	5.75	N	N	N
2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2003	NA	NA	NA	NA	NA	6.50	5.20	5.63	6.83	7.00	NA	NA
2004	NA	NA	NA	NA	8.25	5.40	6.50	5.83	5.67	NA	NA	NA
2005	NA	NA	NA	NA	NA	6.30	5.50	5.80	7.25	NA	NA	NA
2006	NA	NA	NA	NA	8.13	5.63	5.25	4.70	6.13	NA	NA	NA
Monthly Average	**NA**	**NA**	**NA**	**NA**	**8.19**	**4.97**	**5.72**	**5.73**	**6.33**	**7.00**	**NA**	**NA**

Note:
N = no anoxic conditions identified
NA = No data available

Table A-14. Summary of Average Depth to Anoxia for Segment 2 by Year

Segment 2 - Average depth to Anoxic conditions (<1mg/L O2) in Meters												
	JAN	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
2001	N	N	N	N	9.50	11.50	8.38	8.88	*NA	N	N	N
2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2003	NA	NA	NA	NA	NA	8.17	7.40	6.75	8.63	10.50	NA	NA
2004	NA	NA	NA	NA	8.83	7.30	7.63	7.75	7.50	NA	NA	NA
2005	NA	NA	NA	NA	NA	7.20	7.38	7.75	8.50	NA	NA	NA
2006	NA	NA	NA	NA	8.88	7.40	6.00	7.30	7.67	NA	NA	NA
Monthly Average	**NA**	**NA**	**NA**	**NA**	**9.07**	**8.31**	**7.36**	**7.69**	**8.07**	**10.50**	**NA**	**NA**

Note:
N = no anoxic conditions identified
NA = No data available

Table A-15. Summary of Average Depth to Anoxia for Segment 3 by Year

Segment 3 - Average depth to Anoxic conditions (<1mg/L O2) in Meters												
	JAN	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
2001	N	N	N	N	7.50	N	N	6.50	N	N	N	N
2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2003	NA	NA	NA	NA	NA	N	7.00	N	N	N	NA	NA
2004	NA	NA	NA	NA	7.50	N	4.00	5.75	7.25	NA	NA	NA
2005	NA	NA	NA	NA	NA	6.67	6.00	N	N	NA	NA	NA
2006	NA	NA	NA	NA	6.50	6.50	N	5.50	N	NA	NA	NA
Monthly Average	**NA**	**NA**	**NA**	**NA**	**7.17**	**6.58**	**5.67**	**5.92**	**7.25**	**NA**	**NA**	**NA**

Note:
N = no anoxic conditions identified
NA = No data available

Table A-16. Summary of Average Depth to Anoxia for Segment 4 by Year

Segment 4 - Average depth to Anoxic conditions (<1mg/L O2) in Meters												
	JAN	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
2001	N	N	N	N	N	1.00	6.13	6.67	5.75	N	N	N
2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2003	NA	NA	NA	NA	NA	6.50	5.20	5.63	6.83	7.00	NA	NA
2004	NA	NA	NA	NA	8.25	5.40	6.50	5.83	5.67	NA	NA	NA
2005	NA	NA	NA	NA	NA	6.30	5.50	5.80	7.25	NA	NA	NA
2006	NA	NA	NA	NA	8.13	5.63	5.25	4.70	6.13	NA	NA	NA
Monthly Average	**NA**	**NA**	**NA**	**NA**	**8.19**	**4.97**	**5.72**	**5.73**	**6.33**	**7.00**	**NA**	**NA**

Note:
N = no anoxic conditions identified
NA = No data available

Table A-17. Summary of Estimated Number of Anoxic Days for Segment 1 by Year

Segment 1 – Estimated Number of Anoxic Days												
	JAN	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
2001	N	N	N	N	0	5	30	30	30	0	N	N
2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2003	NA	NA	NA	NA	NA	22	30	30	30	2	NA	NA
2004	NA	NA	NA	NA	25	30	30	30	22	NA	NA	NA
2005	NA	NA	NA	NA	NA	27	30	30	30	NA	NA	NA
2006	NA	NA	NA	NA	30	30	30	30	19	NA	NA	NA
Monthly Average	**NA**	**NA**	**NA**	**NA**	**18**	**23**	**30**	**30**	**26**	**1**	**NA**	**NA**

Note:
N = no anoxic conditions identified
NA = No data available

Table A-18. Summary of Estimated Number of Anoxic Days for Segment 2 by Year

Segment 2 – Estimated Number of Anoxic Days												
	JAN	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
2001	*N*	*N*	*N*	*N*	6	13	30	30	NA	*0*	*N*	*N*
2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2003	NA	NA	NA	NA	NA	26	30	30	26	2	NA	NA
2004	NA	NA	NA	NA	18	30	30	30	24	NA	NA	NA
2005	NA	NA	NA	NA	NA	27	30	30	15	NA	NA	NA
2006	NA	NA	NA	NA	26	30	30	30	19	NA	NA	NA
Monthly Average	**NA**	**NA**	**NA**	**NA**	**17**	**25**	**30**	**30**	**21**	**1**	**NA**	**NA**

Note:
N = no anoxic conditions identified
NA = No data available

Table A-19. Summary of Estimated Number of Anoxic Days for Segment 3 by Year

Segment 3 – Estimated Number of Anoxic Days												
	JAN	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
2001	N	N	N	N	15	0	0	7	0	0	N	N
2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2003	NA	NA	NA	NA	NA	0	9	0	0	0	NA	NA
2004	NA	NA	NA	NA	6	0	7	8	5	NA	NA	NA
2005	NA	NA	NA	NA	NA	15	7	0	0	NA	NA	NA
2006	NA	NA	NA	NA	7	6	0	7	0	NA	NA	NA
Monthly Average	**NA**	**NA**	**NA**	**NA**	**9**	**4**	**5**	**4**	**1**	**0**	**NA**	**NA**

Note:
N = no anoxic conditions identified
NA = No data available

Table A-20. Summary of Estimated Number of Anoxic Days for Segment 4 by Year

Segment 4 – Estimated Number of Anoxic Days												
	JAN	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
2001	N	N	N	N	0	6	0	0	0	0	N	N
2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2003	NA	NA	NA	NA	NA	7	6	6	0	0	NA	NA
2004	NA	NA	NA	NA	0	16	6	6	7	NA	NA	NA
2005	NA	NA	NA	NA	NA	10	6	6	0	NA	NA	NA
2006	NA	NA	NA	NA	0	0	0	0	0	NA	NA	NA
Monthly Average	**NA**	**NA**	**NA**	**NA**	**0**	**8**	**4**	**4**	**1**	**0**	**NA**	**NA**

Note:
N = no anoxic conditions identified
NA = No data available

GIS Calculation of Anoxic Substrate Area

Average monthly depths to anoxia (Tables A-8 through A-11) were used to set as the area/volume planes in GIS. Because the lake was analyzed within four segments, separate outputs were generated for each segment. The raw GIS output was in the form of a text (.txt) file with square and cubic feet as the units. Once conversion of units was performed, data was provided as a summary of the anoxic substrate surface area by month.

Table A-21. Summary of Lake Areas and Volumes Beneath the Water Surface

	Water Surface	Substrate Surface	Volume	Depth Mean	Depth Max
Segment	**km^2**	**km^2**	**m^3**	**m**	**m**
1	0.79	0.80	5,086,066	5.97	16.76
2	1.47	1.48	12,110,289	7.72	16.76
3	0.49	0.49	1,786,325	2.91	10.64
4	1.09	1.09	3,968,561	2.55	9.14
Total	3.84	3.87	22,951,242	5.00	16.76

Table A-22. Summary of GIS Output of Anoxic Substrate Surface Area Under Existing Conditions By Month (square meters)

	MAY	JUN	JUL	AUG	SEP	OCT
Segment 1	252996	418480	382107	381670	297466	280984
Segment 2	726558	771795	834444	809588	786065	522929
Segment 3	63855	68450	96183	89143	63194	0
Segment 4	0	133142	139594	142908	113172	0

Table A-23. GIS Output of Incremental Increase in Substrate Anoxia During May and October (square meters)

	MAY	MAY Proposed	OCTOBER	OCTOBER Proposed
Segment 1	252996.28	418480	280984	288935
Segment 2	726558.29	771795	522929	626321

EXHIBIT C

MEMORANDUM OF UNDERSTANDING

This memorandum of understanding ("**Memorandum**") is made as of the ___ day of _____, 2009 by and between Ameren Energy Generating Company, an Illinois corporation ("**Ameren**"), and the State of Illinois, acting by and through the Department of Natural Resources ("**DNR**").

WHEREAS, Ameren is the fee simple owner of certain real property located in Montgomery County, Illinois depicted on Exhibit A attached hereto and made a part hereof (the "**Property**");

WHEREAS, Ameren operates the Coffeen Power Generating Station (the "**Coffeen Station**") on the Property, and the reservoir located thereon known as Coffeen Lake (the "**Lake**") was constructed for the purpose of providing cooling water for the Coffeen Station and for other purposes relating to the operation of the Coffeen Station;

WHEREAS, Central Illinois Public Service Company, an Illinois corporation ("**CIPS**"), as the prior Ameren of the Property, and DNR (formerly known as the Department of Conservation) entered into that certain Lease Agreement dated July 2, 1986 (commonly referred to as Lease Agreement No. 416A), as amended by that certain Amendment to Lease dated 1988, that certain Amendment to Lease dated November 11, 1989, that certain Amendment to Lease dated June 11, 1991, that certain Amendment #4 dated October 1, 1995, that certain Amendment #5 dated August 20, 1996, and that certain Amendment #6 dated June 30, 1997 (collectively, the "**Lease Agreement**") relating to DNR's right to use certain portions of the Property for the purposes of conservation and public recreation;

WHEREAS, Ameren is the assignee of CIPS' interest in the Lease Agreement;

WHEREAS, Owner's primary obligation as an electric and power generating company is to provide adequate and reliable service to its customers, and Ameren and DNR recognize that use of the Lake and the adjoining recreational areas by DNR and the public must be restricted in order that such use shall not conflict or interfere with the present and future operation and use of the Coffeen Station; and

WHEREAS, Ameren is seeking regulatory relief from the Illinois Pollution Control Board for certain thermal discharge standards applicable to its cooling water discharge to the Lake in the months of May and October; and

WHEREAS, the parties desire to promote the continued use of the Lake for recreational purposes and to identify fish species tolerant of thermal conditions within cooling lakes such as the Lake; and

NOW, THEREFORE, in consideration of the foregoing premises and the mutual covenants and agreements set forth in this Memorandum, the parties agree as follows:

1. **Fish Population and Behavior Status Monitoring Studies.** Ameren shall monitor the status of key fish populations in the Lake and document the long-term effects, if any, of the revised thermal standards for the months of May and October on these populations. This study will also investigate the ability of fish to avoid exposure to stress by seeking preferred temperatures within the Lake's environment and will locate available thermal refuges during peak temperatures. IDNR annually monitors six fish species in the Lake and has created an extensive long-term database. The proposed study will be designed to complement and utilize IDNR data to the extent possible. A more detailed study design will be completed after review of IDNR sampling methods and data, followed by a meeting with IDNR personnel to reach agreement on sampling objectives and methodology. The study may be performed as a joint study between IDNR and Ameren field contractors. The study plan design will be completed within one year of execution of this Agreement MOU. Studies will be conducted under strict quality assurance protocols including Standard Operating Procedures (SOP) to ensure reliable data collection.

2. **Fish Stocking Pilot Study**. In order to better evaluate suitable fish species for cooling lakes in Illinois, Ameren will implement, in conjunction with IDNR, a three-year fish stocking pilot study at the Lake. The stocking study will assess the viability of adding a new fish to the lake. The fish population study will assess thermal impacts on the existing fish population and the new species added as well. These studies includes Ameren's agreement to dedicate up to $20,000.00 per year for the three-year pilot towards stocking the Lake with suitable species, such as the blue catfish, to help IDNR better assess the long term nature of maintaining a viable fishing resource.

3. The foregoing studies shall include at least the following elements:

   a. Collect annual data on the relative abundance, growth, condition, and size structure of key fish populations such as largemouth bass, white crappie, bluegill, channel catfish, and species stocked as a result of this agreement, e.g., blue catfish.
   b. Compare results to data from previous years to detect long-term trends possibly related to a changing thermal regime.
   c. In vertical and horizontal planes, determine whether fish avoid certain areas and congregate in others during near-peak water temperatures.
   d. Record vertical profiles of water temperatures and dissolved oxygen in areas where fish are aggregated and compare to other locations in the Lake.
   e. In the event of excessive fish mortality, identify key species that are tolerant of thermal conditions within the Lake.

4. The studies may incorporate the following methodologies**:**

   a. Fish Population Study
      1. Study duration—three to five years
      2. Sampling frequency—one survey per year during September or October

3. Sampling stations—stratified design to include all lake zones with stations to be determined after consultation with IDNR
4. Sampling gear—boat-mounted electrofisher
5. Sample processing—species identification, length and weight measurements, scale samples for possible age analysis

b. Fish Behavior

1. Study duration—one year
2. Sampling frequency—one survey in mid- or late summer
3. Sampling stations—zig-zag transects across the lake along the axis of the lake, to include major embayments (e.g., cemetery bay) and the northern arm above the intake and railroad bridge
4. Sampling gear—scientific-grade hydroacoustics employing side-scan and down-looking transducers; variable-mesh gill nets and/or boat-mounted electrofisher for species/size composition; hand-held CTD (conductivity, temperature, and depth) and DO meters
5. Sampling procedures— Run simultaneous, synoptic thermal/DO 3-dimensional mapping to characterize available habitat at the time of hydroacoustic sampling; run additional profiles in areas of fish aggregations, as needed

5**.** **Deliverables.** Ameren shall provide an **a**nnual summary data report and maintain an electronic database.

6. **Corrective Action – Fish Mortality.** During summer months, the Lake will be monitored. In the event of an apparent fish kill, Ameren will investigate whether the fish kill resulted from the increase in temperature and, specifically, Ameren's electric generation activities, resulted in the fish kill. If the fish kill resulted from the increase in thermal limits then Ameren shall replenish or replace the impacted resource pursuant to the terms and conditions of a Fish Stocking Plan to be developed in consultation with IDNR.

7. Ameren recognizes and agrees that IDNR participation in this study effort does not prejudge or determine responsibility for fish kills in the Lake; IDNR will still be responsible for investigation and assessment of such kills and for determining the agents and entities responsible for fish kills. Further, IDNR participation does not commit IDNR to any position on planned or future regulatory proceedings that might effect operations of the Ameren power plant or the Lake.

8. With respect to the Petition to Modify Thermal Standard in Ameren Energy Generating Company v. IEPA, PCB No. 2009-0038, currently pending before the Board, IDNR has reviewed the technical support materials and consulted with Ameren's fish experts, and has agreed to the above described studies and actions to document and mitigate the effects, if any, of the revised thermal standards on the lake fishery. Notwithstanding the foregoing, nothing in this Agreement shall be construed to preclude or inhibit IDNR in any future legal proceeding.

9. Designated Contacts. Notices, deliverables and other written communications made under this Memorandum shall be sent to the persons listed herein, unless a Party designates in writing another person as its contact:

For AMEREN:

AMEREN ENERGY GENERATING COMPANY
Coffeen Power Station
134 CIPS Lane
Coffeen, IL 62739

ATTN: Plant Manager

For DNR:

Chief of Fisheries, Illinois Department of Natural Resources
One Natural Resources Way
Springfield, IL 62702-1271

IN WITNESS WHEREOF, the parties have executed this Agreement as of the date first above written.

OWNER:

Attest:

Ameren Energy Generating Company, an Illinois corporation

_____ By: _____
Name: _____ Name: _____
Title: _____ Its: _____

DNR:

Attest:

Department of Natural Resources, State of Illinois

_____ By: _____
Name: _____ Name: _____
Title: _____ Its: _____

AFFIDAVIT OF ANN B. SHORTELLE, PH.D.

I, ANN B. SHORTELLE, PH.D., having first been duly sworn, state as follows:

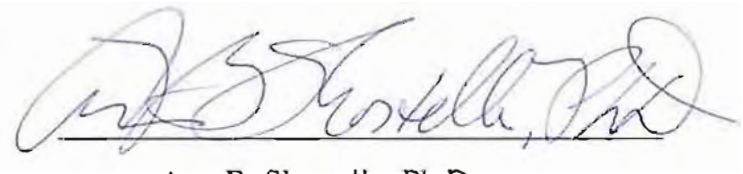
1. I am a Chief Scientist with MACTEC Engineering and Consulting, Inc. ("MACTEC"). I have 24 years of professional experience in limnology and lake and reservoir management, including surface water quality monitoring and analysis.

2. In May 2009, Ameren Energy Generating Company ("Ameren") engaged MACTEC to prepare a report on the conditions of Coffeen Lake with regard to phosphorus and mercury. MACTEC evaluated the conditions in Coffeen Lake and the potential for impacts on phosphorus and mercury cycling from Ameren's proposed modification to the current site-specific thermal standards. The report is entitled "Evaluation of Effects of Revised Thermal Standards on Phosphorus and Mercury Cycling in Coffeen Lake."

3. I have read Section C of the preceding Ameren's Response to Information Requested at Public Hearing.

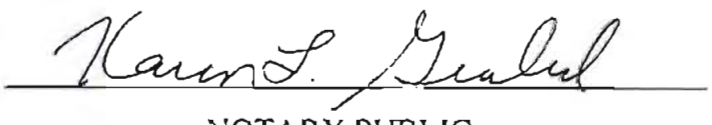
4. The statements of facts contained therein and the calculations contained in Exhibit B attached to Ameren's Response to information Requested at Public Hearing are true and correct to the best of my knowledge and belief.

FURTHER, AFFIANT SAYETH NOT.



Ann B. Shortelle, Ph.D.

Subscribed and sworn to before me this 10th day of July, 2009.



NOTARY PUBLIC

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NOTARY PUBLIC-STATE OF FLORIDA
Karen L. Grubel
Commission # DD528637
Expires: MAR. 29, 2010
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