RECEIVED
CLERK'S OFFICE

NOV 03 2004

STATE OF ILLINOIS
Pollution Control Board

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

BOARD OF TRUSTEES OF SOUTHERN ILLINOIS UNIVERSITY GOVERNING SOUTHERN ILLINOIS UNIVERSITY, EDWARDSVILLE	)	
Petitioner,	)	
v.	)	PCB 02-105 (NPDES Permit Appeal)
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY,	)	
Respondent.	)	

NOTICE OF FILING

Dorothy Gunn, Clerk
Illinois Pollution Control Board
James R. Thompson Center
Suite 11-500
100 West Randolph Street
Chicago, IL 60601

Carol Sudman
Hearing Officer
Illinois Pollution Control Board
1021 N. Grand Ave. East
P.O. Box 19274
Springfield, IL 62794-9274

Joel A. Benoit
MOHAN, ALEWELT, PRILLAMAN & ADAMI
First of America Center
1 N. Old Capitol Plaza, Ste. 325
Springfield, IL 62701

Kim L. Kirn
Southern Illinois University Edwardsville
Office of the General Counsel
Rendleman Hall, Room 3311
Edwardsville, IL 62026-1019

PLEASE TAKE NOTICE that I have today filed with the Office of the Clerk of the Pollution Control Board an original and four (4) copies of the **AGENCY RESPONSE TO SOUTHERN ILLINOIS UNIVERSITY AT EDWARDSVILLE'S REQUEST TO PRODUCE DOCUMENT, REQUEST TO ADMIT, AND INTEROGATORIES** of the Illinois Environmental Protection Agency, a copy of which is herewith served upon you.

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

By:______________________
Sanjay K. Sofat, Assistant Counsel
Division of Legal Counsel

Dated: November 1, 2004
Illinois Environmental Protection Agency
1021 North Grand Avenue East
Springfield, Illinois 62794-9276
(217) 782-5544

THIS FILING PRINTED ON RECYCLED PAPER

RECEIVED
CLERK'S OFFICE
NOV 03 2004
STATE OF ILLINOIS
Pollution Control Board

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

BOARD OF TRUSTEES OF SOUTHERN ILLINOIS UNIVERSITY GOVERNING SOUTHERN ILLINOIS UNIVERSITY, EDWARDSVILLE	)	
Petitioner,	)	
v.	)	PCB 02-105 (NPDES Permit Appeal)
ILLINOIS ENVIRONMENTAL PROTECTION AGENCY,	)	
Respondent.	)	

ILLINOIS EPA'S RESPONSE TO PRAIRIE RIVERS NETWORK'S INTERROGATORIES AND DOCUMENT REQUEST

NOW COMES the Respondent, the Illinois Environmental Protection Agency ("Illinois EPA" or "Agency"), by one of its attorneys, Sanjay K. Sofat, Assistant Counsel and Special Assistant Attorney General, and pursuant to the Illinois Pollution Control Board ("Illinois PCB" or "Board") Regulations at 35 Ill. Adm. Code 101.614, 101.616, 105.202(a)-(b), and 105.204(b), the Illinois Code of Civil Procedures, the Illinois Supreme Court Rules, and the Hearing Officer's Order dated August 12, 2004, hereby responds to the Board of Trustees of Southern Illinois University Governing Southern Illinois University at Edwardsville's ("Petitioner" or "SIUE") request to produce documents, request to admit, and interrogatories with regard to this proceeding and the issuance of NPDES permit IL0075311.

GENERAL OBJECTIONS

The Illinois EPA objects to each of the Petitioner's request to produce documents, request to admit, interrogatories, definitions, and instructions to the extent that, individually or cumulatively, they purport to impose upon the Illinois EPA duties or obligations which exceed or are different from those imposed upon the Illinois EPA by the Illinois Administrative Code and the Illinois Code of Civil Procedure.

The Illinois EPA further objects to each of the Petitioner's request to produce documents, request to admit, interrogatories, definitions, and instructions to the extent that they call for attorney-client communications between or among Illinois EPA's counsel, attorney work product, or any other privileged matters.

THE AGENCY'S RESPONSE TO SOUTHERN ILLINOIS UNIVERSITY AT EDWARDSVILLE'S REQUEST TO PRODUCE ARE IN BOLD LETTERS:

The answers to the request to produce are made by Blaine Kinsley, Unit Manager, Bureau of Water, Illinois EPA, in accordance with his Verification below. The objections to the request to produce are made by the Illinois EPA's attorney, Sanjay K. Sofat.

1. All documents submitted by SIUE to IEPA concerning or relating to SIUE obtaining a NPDES permit for the cooling plant.

   See the Agency Record. Blaine Kinsley.

   Objection: Section 40(d) of the Illinois Environmental Protection Act ("Act") requires the Board to base its decision "exclusively on the record before the Agency including the record of the hearing." 415 ILCS 5/40(f) (2002).

2. All documents submitted by IEPA to SIUE concerning or relating to SIUE obtaining a NPDES permit for the cooling plant.

   See the Agency Record. Blaine Kinsley.

   Objection: Section 40(d) of the Illinois Environmental Protection Act

("Act") requires the Board to base its decision "exclusively on the record before the Agency including the record of the hearing." 415 ILCS 5/40(f) (2002).

3. All documents in IEPA's possession or control concerning or relating to SIUE obtaining a NPDES permit, including, but not limited to, drafts of documents, notes of IEPA employees, and internal communications.

   See the Agency Record. Blaine Kinsley.

   Objection: Section 40(d) of the Illinois Environmental Protection Act ("Act") requires the Board to base its decision "exclusively on the record before the Agency including the record of the hearing." 415 ILCS 5/40(f) (2002).

4. All documents the IEPA will attempt to introduce into the record at any time.

   See the Agency Record. Blaine Kinsley.

   Objection: Section 40(d) of the Illinois Environmental Protection Act ("Act") requires the Board to base its decision "exclusively on the record before the Agency including the record of the hearing." 415 ILCS 5/40(f) (2002).

5. Legible copies of all IEPA reviewer handwritten notes included in the "record" filed by IEPA.

   See the Agency Record. If Petitioner still has problems reading the Illinois EPA engineer's notes, the Agency is willing to make the original notes available for Petitioner's review. Blaine Kinsley.

6. All reports of any Supreme Court Rule 213(g) witnesses.

   Objection: Not applicable. Section 40(d) of the Illinois Environmental Protection Act ("Act") requires the Board to base its decision "exclusively on the record before the Agency including the record of the hearing." 415 ILCS 5/40(f) (2002).

7. All documents the IEPA relied upon in making its final decision

   See the Agency Record. Blaine Kinsley.

   Objection: Section 40(d) of the Illinois Environmental Protection Act ("Act") requires the Board to base its decision "exclusively on the record before the Agency including the record of the hearing." 415 ILCS 5/40(f) (2002).

8. All documents identified in IEPA's answers to interrogatories.

Not applicable.

THE AGENCY'S RESPONSE TO SOUTHERN ILLINOIS UNIVERSITY AT EDWARDSVILLE'S REQUEST TO ADMIT ARE IN BOLD LETTERS:

The name of the Illinois EPA employee making response to the question is provided at the end of the response. A Verification from each of the respondent is enclosed.

1. SIUE's lake is not used as a source of drinking water.

   Admit. Therese Holland.

2. SIUE's lake is located on property owned by SIUE

   Admit. It appears from the information available to the IEPA that the lake in question is located on SIUE property. Blaine Kinsley.

3. SIUE's lake was constructed for the purpose of providing a source of water for SIUE's cooling plant.

   Deny. The Illinois EPA has no direct knowledge that SIUE constructed the lake to provide a source of water for SIUE's cooling plant. Blaine Kinsley.

4. Section 302.211(e) has not been previously applied via a NPDES permit to a discharge of heated water into a lake, other than artificial lakes.

   Deny. The Illinois EPA has indeed applied 302.211(e) to heated discharges into a lake via NPDES permits. Blaine Kinsley.

5. The potential, detrimental impact to a water body which may be caused by discharging water whose temperature is greater than set forth in Section 302.211(e) is affected by both the volume of heated water discharged and its temperature.

   It is true that the volume and temperature of the discharge is needed information in determining potential detrimental impact on a water body.

The nature, size, and temperature of the receiving water body are important factors in determining the potential detrimental impact of a discharge on a water body. Bob Mosher.

6. Where the receiving body of water for a discharge of water exceeding the temperatures set for in Section 302.211(e) for any month in a river, it is not possible to determine whether a violation of Section 302.211(e) is occurring without monitoring water temperature at representative locations in the main river.

   Deny. It is not true that river temperature must be known when assessing 302.211(e) attainment because if no mixing zone is granted, river temperatures at all points must meet the water quality standard. Bob Mosher.

7. Special condition 2 of the NPDES permit states that the thermal limitations are to be met "at the edge of the mixing zone." Admit or deny that testing at a point representative of the discharge, but prior to entry into SIUE's lake, will provide no information concerning whether thermal limitations are met at the edge of the mixing zone.

   Deny. No mixing zone was granted to the SIUE discharge, end-of-pipe thermal limits were established in the permit. Testing at a point representative of the discharge will therefore supply all needed thermal data. Bob Mosher.

8. Testing a point representative of the discharge, but prior to entry into SIUE's lake, will provide no information concerning SIUE's lake's temperature.

   Deny. Testing at a point representative of the discharge will indicate whether the SIUE Lake's temperature will or will not exceed water quality standards and thus the permit limit. Again, this is so because there is no mixing zone granted. Bob Mosher.

<u>THE AGENCY'S RESPONSE TO SOUTHERN ILLINOIS UNIVERSITY AT EDWARDSVILLE'S INTERROGATORIES ARE IN BOLD LETTERS:</u>

The name of the Illinois EPA employee making response to the interrogatory is provided at the end of the response. A Verification from each of the respondent is enclosed. The Illinois EPA's attorney, Sanjay K. Sofat, makes the objections to the interrogatories.

1. Identify every IEPA employee who had any involvement with SIUE's NPDES permit application or the IEPA's decision to issue the NPDES permit at issue, and as to each person identified, set forth their involvement in the permitting process.

Bob Mosher:	**Water quality standard related issues.**
Fred Rosenblum:	**Permit Engineer**

2. Identify all Illinois facilities (by name and address) with NPDES permits regulating the discharge of heated water, other than those facilities discharging heated water into streams, rivers, Lake Michigan, or artificial cooling lakes. As to each facility identified, set forth where the facilities NPDES permit requires that water temperature be monitored to determine compliance with Sections 302.221 (d) and (e).

The information requested requires the Agency to review a list of over 300 dischargers to determine which ones fit the criteria listed above. Once the facilities are identified a review of each and every permit file must be performed to determine how the dischargers are to comply with 302.211 (d) and (e). Blaine Kinsley.

Objection: The request is overly broad and thus, unduly burdensome. In the alternative, the Illinois EPA is willing to provide access to the information on Illinois facilities meeting the criteria described above for the Petitioner's review.

3. To the IEPA's knowledge, have Sections 302.211 (d) and (e)'s temperature restrictions been previously applied to facilities discharging heated water into lakes, other than artificial cooling lakes? If so, identify each facility and the lake into which it discharges.

Yes. See attached list. Blaine Kinsley.

4. Identify all Illinois facilities with NPDES permits regulating the discharge of heated water into rivers and streams. As to each facility identified, set forth where the facility's NPDES permit requires that water temperature be monitored to determine compliance with Sections 302.211 (d) and (e).

The information requested requires the Agency to review a list of over 300 dischargers to determine which ones fit the criteria listed above. Once the facilities are identified a review of each and every permit file must be performed to determine how the dischargers are to comply with 302.211 (d) and (e). Blaine Kinsley.

Objection: The request is overly broad and thus, unduly burdensome. In the alternative, the Illinois EPA is willing to provide access to the

information on Illinois facilities meeting the criteria described above for the Petitioner's review.

5. Does the IEPA contend that 35 Ill. Adm. Code 302.211 (e) applies to lakes? If so, set forth where (including depth at location(s) identified) in the lake the IEPA contends water temperature is to be monitored, the basis for the IEPA's contention, and identify all guidelines, regulations, manuals, or other authoritative sources which support the IEPA's contention.

   Yes, 302.211(e) applies to lakes. All waters of lakes are subject to this standard unless a mixing zone has been granted. If a mixing zone were granted, monitoring conditions would be specified in the permit pertaining to the location, depth, frequency and number of samples to show compliance with the permit limits. The Illinois Environmental Protection Act and the Illinois Pollution Control Board regulations give the Agency authority to establish monitoring requirements in NPDES permits. Bob Mosher.

6. The IEPA's January 2, 2002, letter accompanying the NPDES permit at issue states, in part: "Also, for clarification purposes, temperature monitoring will be required at a point representative of the discharge(s) but prior to entry into Tower Lake." Identify all guidelines, regulations, manuals, or other authoritative sources which support this directive.

   The Illinois Environmental Protection Act and the Illinois Pollution Control Board regulations give the Agency authority to establish monitoring requirements in NPDES permits. Bob Mosher.

7. Regarding "Special Condition 2" of the NPDES permit, identify which provision of Section 302.211 defines the mixing zone.

   No Mixing zone is granted in the permit. Monitoring for compliance with the temperature limit is to be accomplished at a location in the effluent before discharge to the lake. Bob Mosher.

8. Describe the method(s) the IEPA uses or approves of for testing the temperature of lakes. As to each method described, identify all guidelines, regulations, manuals, or other authoritative sources which support the IEPA's use or approval of the method.

   The method for measuring temperature in lakes depends on the purpose for which it is measured. See Attachment A for the Illinois EPA methodology for performing temperature profiles. Also see Attachment B for USGS's field methods. The Illinois Environmental Protection Act and the Illinois Pollution Control Board regulations give the Agency authority to establish monitoring requirements in NPDES permits. Therese Holland.

9. Identify by name and address all the facilities required by their NPDES permit to comply with 35 Ill. Adm. Code 302.211 (e) at a point prior to the heated water being discharged into the receiving water body.

The information requested requires the Agency to review a list of over 300 dischargers to determine which ones fit the criteria listed above. Once the facilities are identified a review of each and every permit file must be performed to determine how the dischargers are to comply with 302.211 (e) at the end of pipe. Blaine Kinsley.

Objection: The request is overly broad and thus, unduly burdensome. In the alternative, the Illinois EPA is willing to provide access to the information on Illinois facilities meeting the criteria described above for the Petitioner's review.

10. Identify by name and address all facilities required by their NPDES permit to comply with 35 Ill. Adm. Code 302.211 (e) at the edge of a mixing zone located in the receiving body of water.

The information requested requires the Agency to review a list of over 300 dischargers to determine which ones fit the criteria listed above. Once the facilities are identified a review of each and every permit file must be performed to determine how the dischargers are to comply with 302.211 (e) at the edge of a mixing zone. Blaine Kinsley.

Objection: The request is overly broad and thus, unduly burdensome. In the alternative, the Illinois EPA is willing to provide access to the information on Illinois facilities meeting the criteria described above for the Petitioner's review.

11. For each "lay witness", as that term is defined in Supreme Court Rule 213(f)(1), identify the lay witness and identify the subjects upon which the lay witness will testify at the hearing.

    1. **Bob Mosher- the water quality standard related issues.**
    2. **Blaine Kinsley- the permit conditions related issues.**
    3. **Fred Rosenblum- the NPDES permit in question**
    4. **Teri Holland- Aquatic life in lakes; methods of measuring temperatures in lakes**

12. For each "independent expert witness" as that term is defined in Supreme Court Rule 213(f)(2), identify the independent express witness and identify the subjects on which the independent witness will testify and the opinions the IEPA expects to elicit from the independent expert witness at the hearing.

None

13. For each "controlled expert witness" as that terms is defined in Supreme Court Rule 213(f)(3), identify the controlled expert witness, his or her employer, and identify: (I) the subject matter on which the witness will testify; (ii) the conclusions and opinions of the witness and the bases therefore; (iii) the qualifications of the witness; and (iv) any reports prepared by the witness about this permit appeal.

1. Bob Mosher- Illinois EPA:
(i) the water quality standard related issues;
(ii) water quality standards apply to waters of the State including lakes, location of the monitoring point to show compliance with the water quality standards is the end of pipe, where no mixing is allowed;
(iii)Maters Degree in Zoology
(iv) Not applicable

2. Blaine Kinsley- Illinois EPA:
(i) the NPDES permit conditions related issues;
(ii) water quality standards apply to waters of the State including lakes, location of the monitoring point to show compliance with the water quality standards is the end of pipe, where no mixing is allowed;
(iii) Engg
(iv) Not applicable

3. Teri Holland- Illinois EPA:
(i) the effects of temperature on aquatic system in lakes related issues;
(ii) the method for measuring temperature in lakes depends on the purpose for which it is measured.;
(iii) Masters Of Art Degree in Environmental Studies;
(iv) Not applicable

14. If the body of water to which heated water is discharged is a lake (other than Lake Michigan), set forth the monitoring procedure (including the locations and depth temperature must be monitored) to determine compliance with Section 302.211(d). Identify all guidelines, regulations, manuals, or other authoritative sources supporting your answer.

Temperature profiles would be collected at a location in the lake unaffected by the thermal discharge. The profiles would include depth and season. Some lakes receiving thermal effluents may not contain areas of natural background temperatures. Bob Mosher.

Respectfully submitted,

ILLINOIS ENVIRONMENTAL
PROTECTION AGENCY

By: ______________________
Sanjay K. Sofat
Special Assistant Attorney General

Date: November 1, 2004

1021 North Grand Avenue East
P.O. Box 19276
Springfield, Illinois 62794-9276
(217) 782-5544

STATE OF ILLINOIS)
) SS
COUNTY OF SANGAMON)

VERIFICATION

Blaine Kinsley, being duly sworn, states that he is the Unit Manager of Water Pollution Control Program, Illinois EPA; that he is duly authorized to provide the foregoing answers to request to produce documents, request to admit, and interrogatories on behalf of Illinois Environmental Protection Agency; and that he makes said answers based upon his personal knowledge, his review of documents that he reasonably believes to be accurate, and information provided to him by other section units that he reasonably believes to be accurate.

Blaine Kinsley

[signature]

Subscribed and sworn to before me, a notary public in and for said County and State, this ______ day of November 1, 2004.

[signature]
Notary Public

OFFICIAL SEAL
LINDA J LAWS
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES: 12/28/05

My Commission Expires: 12/28/05

STATE OF ILLINOIS)
) SS
COUNTY OF SANGAMON)

VERIFICATION

Bob Mosher, being duly sworn, states that he is the Manager of the Water Quality Standards Section within Water Pollution Control Program, Illinois EPA; that he is duly authorized to provide the foregoing answers to request to produce documents, request to admit, and interrogatories on behalf of Illinois Environmental Protection Agency; and that he makes said answers based upon his personal knowledge, his review of documents that he reasonably believes to be accurate, and information provided to him by other section units that he reasonably believes to be accurate.

Robert Mosher

Bob Mosher

Subscribed and sworn to before me, a notary public in and for said County and State, this ______ day of November 1, 2004.

Linda J. Laws

Notary Public

OFFICIAL SEAL
LINDA J LAWS
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES: 12/28/05

My Commission Expires: 12/28/05

STATE OF ILLINOIS)
) SS
COUNTY OF SANGAMON)

VERIFICATION

Teri Holland, being duly sworn, states that she is the Environmental Specialist of Water Pollution Control Program, Illinois EPA; that she is duly authorized to provide the foregoing answers to request to produce documents, request to admit, and interrogatories on behalf of Illinois Environmental Protection Agency; and that she makes said answers based upon his personal knowledge, his review of documents that she reasonably believes to be accurate, and information provided to her by other section units that she reasonably believes to be accurate.

Therese Holland

Therese Holland

Subscribed and sworn to before me, a notary public in and for said County and State, this ______ day of November 1, 2004.

OFFICIAL SEAL
LINDA J LAWS
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES: 12/28/05

Linda J Laws

Notary Public

My Commission Expires: 12/28/05

STATE OF ILLINOIS)
) **SS**
COUNTY OF SANGAMON)

PROOF OF SERVICE

I, the undersigned, on oath state that I have served the attached **AGENCY RESPONSE TO SOUTHERN ILLINOIS UNIVERSITY AT EDWARDSVILLE'S REQUEST TO PRODUCE DOCUMENT, REQUEST TO ADMIT, AND INTEROGATORIES** upon the persons to whom it is directed, by placing a copy in an envelope addressed to:

Dorothy Gunn, Clerk
Illinois Pollution Control Board
James R. Thompson Center
Suite 11-500
100 West Randolph Street
Chicago, IL 60601

Joel A. Benoit
MOHAN, ALEWELT, PRILLAMAN & ADAMI
First of America Center
1 N. Old Capitol Plaza, Ste. 325
Springfield, IL 62701

Carol Sudman
Hearing Officer
Illinois Pollution Control Board
1021 N. Grand Ave. East
P.O. Box 19274
Springfield, IL 62794-9274

Kim L. Kirn
Southern Illinois University Edwardsville
Office of the General Counsel
Rendleman Hall, Room 3311
Edwardsville, IL 62026-1019

and mailing it from Springfield, Illinois on November 1, 2004, with sufficient postage affixed as indicated above.

Kim Bolt
____

SUBSCRIBED AND SWORN TO BEFORE ME

this day of November 1, 2004.

Brenda Boehner
Notary Public

OFFICIAL SEAL
BRENDA BOEHNER
NOTARY PUBLIC, STATE OF ILLINOIS
MY COMMISSION EXPIRES 11-14-2005

LIST

10/14/04 PAGE: 1

ACTIVE INDUSTRIALS WITH NPDES TEMPERATURE REQUIREMENTS

QL ************* *************** *************** *************** *************** *************** *************** *************** QL

FACILITY NAME / PIPE	NPDES / PIPE DESCRIPTION	RECEIVING WATERS / PARAMETER	MLOC	LM AV(Q)	LM MX(Q)	LM MN(C)	LM AV(C)	LM MX(C)	REQ MONTHS
ABBOTT LABORATORIES	IL0066435	MIDDLE FORK NORTH BRANCH CHICAGO R							
0010	OVERFLO DURING HEAVY PRECIPTAN	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0020	CW,MISC WTR,DRAINAGE WTR,SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ABBOTT LABORATORIES-ABB OTT PK	IL0074128	UNNAMED TRIB OF A WETLAND							
0010	COOLING TWR,NCCW,REVERSE OSMOS	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ABBOTT LABS-N CHICAGO	IL0001881	LAKE MICHIGAN							
0010	NONCONTACT COOLING WTR,SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0020	NON-CONTACT COOLING WTR; SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ACME PACKAGING CORP-RIVERDALE	IL0076295	LITTLE CALUMET RIVER							
INTK	INTAKE	TEMPERATURE, WATER DEG. CENT	0			******	******	REPORT	YYYYYYYYYYYY
0040	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. CENT	1			******	******	REPORT	YYYYYYYYYYYY
0160	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. CENT	1			******	******	REPORT	YYYYYYYYYYYY
AGRIUM U.S. INC.-HENRY	IL0002518	ILLINOIS RIVER							
001A	NON-CONTACT COOLING WATER; SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
AIRCO INDUSTRIAL GASES	ILG250032	SOUTH BRANCH CHICAGO RIVER							
0010	NONCONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
AKZO NOBEL SURFACE CHEMISTRY	IL0026069	AUX SABLE CREEK							
0020	STRM WTR RUNOFF,BLOWDWN&S OFTNR	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ALLIED LOCKE INDUSTRIES, INC.	IL0063070	TRIB TO GREEN RIVER							
0010	COMBINED NCCW AND SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ACL AMEREN - COFFEEN POWER STATION	IL0000108	COFFEEN LAKE							
0010	CONDENSER COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	REPORT	REPORT	NNNNNYYYYNNN
0010	CONDENSER COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	REPORT	REPORT	YYYYYNNNNYYY
0200	CONDENSER COOLING WTR OVERFLOW	TEMPERATURE, WATER DEG. FAHR	1			******	REPORT	REPORT	NNNNNYYYYNNN
0200	CONDENSER COOLING WTR OVERFLOW	TEMPERATURE, WATER DEG. FAHR	1			******	REPORT	REPORT	YYYYYNNNNYYY
0210	CONDENSER COOLING WTR SUPPLMTL	TEMPERATURE, WATER DEG. FAHR	1			******	REPORT	REPORT	NNNNNYYYYNNN
0210	CONDENSER COOLING WTR SUPPLMTL	TEMPERATURE, WATER DEG. FAHR	1			******	REPORT	REPORT	YYYYYNNNNYYY
0220	CONDENSER COOLING WTR SUPPL	TEMPERATURE, WATER DEG. FAHR	1			******	REPORT	REPORT	NNNNYYYYYNNN
0220	CONDENSER COOLING WTR SUPPL	TEMPERATURE, WATER DEG. FAHR	1			******	REPORT	REPORT	YYYYNNNNNYYY
AMEREN CIPS - GRAND TOWER	IL0000124	MISSISSIPPI RIVER							
0010	MAIN CONDENSER COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
AMEREN CIPS - HUTSONVILLE	IL0004120	WABASH RIVER							
0010	CONDENSER COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ACL AMEREN CIPS - NEWTON	IL0049191	NEWTON LAKE							

12

ACL = Artificial Cooling Lake.

Have identified 11 facilities that discharge wastewater to lakes, ponds, wetlands, or sloughs, that have temperature limits in their NPDES permits.

10/14/04 PAGE: 2

ACTIVE INDUSTRIALS WITH NPDES TEMPERATURE REQUIREMENTS

QL ************* **************** **************** **************** **************** **************** **************** **************** QL

FACILITY NAME / PIPE	NPDES / PIPE DESCRIPTION	RECEIVING WATERS / PARAMETER	MLOC	LM AV(Q)	LM MX(Q)	LM MN(C)	LM AV(C)	LM MX(C)	REQ MONTHS
0020	MAIN CONDENSER CW	TEMPERATURE, WATER DEG. FAHR	1			******	REPORT	111	YYYYYYYYYYYY
0020	MAIN CONDENSER CW	TEMPERATURE, WATER DEG. FAHR	1			******	102	111	YYYYYYYYYYYY
AMEREN ENERGY-MEREDOSIA	IL0000116	ILLINOIS RIVER							
0010	COND COOLING UNITS 1,2,3	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
AMEREN ENERGY-PINCKNEYV ILLE	IL0075906	TRIB TO WALNUT CREEK							
0010	COOLING TWR BD&MISC EQ DRAINS	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0020	EVAPORATIVE COOLERS BLOWDOWN	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
AMERENUE-VENICE POWER PLANT	IL0000175	MISSISSIPPI RIVER							
0030	CONDENSER CW,PUMP LUBE,CAISSON	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0040	CONDENSER CW,PUMP LUBE,CAISSON	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ACL AMERGEN ENERGY CO,LLC-CLINTON	IL0036919	CLINTON LAKE							
0020	DISCHARGE FLUME	TEMPERATURE, WATER DEG. FAHR	1			******	REPORT	110.7	YYYYYYYYYYYY
AMEROCK CORPORATION	IL0003344	NORTH BRANCH KENT CREEK							
0030	ROOF DRAINAGE; NC COOLING WTR	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0040	ROOF DRAINAGE; NC COOLING WTR	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
AMSTED BURGESS NORTON 1-GENEVA	IL0036331	FOX RIVER							
0010	OFFICE A/C,BLO DWN,FIRE TEST W	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0020	NCCW;FIRE TEST WTR;ICE MACHINE	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
AMSTED INDUSTRIES-PLANT 2	IL0049221	STORM SEWER TRIB TO MILL CREEK							
0011	NCCW, BOILER BD,SOFTNER WASTE	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ANAMET ELECTRICAL	IL0004049	WILEY CREEK							
0020	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ANDREW CORPORATION	IL0004952	SPRING CREEK; MARLEY CREEK							
0010	CONTACT COOLING WATER; SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ANR PIPELINE CO-NEW WINDSOR	IL0065129	PARKER RUN CREEK							
0010	BOILER BLOWDOWN & FLOOR DRAINS	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ANTIOCH PACKING HOUSE, INC.	ILG250173	STORM SEWER TRIB TO FOX RIVER							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ARCHER DANIELS MIDLAND COMPANY	IL0064181	TRIB TO SOUTH FORK SANGAMON RIVER							
0010	NCCW & MISC. AUXILLARY STREAMS	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ARCHER DANIELS MIDLAND-PEORIA	IL0061930	ILLINOIS RIVER							
0020	NON CONTACT COOLING WATER; SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY

25

ACTIVE INDUSTRIALS WITH NPDES TEMPERATURE REQUIREMENTS

QL ************* **************** **************** **************** **************** **************** **************** **************** QL

FACILITY NAME / PIPE	PIPE DESCRIPTION / NPDES	PARAMETER / RECEIVING WATERS	MLOC	LM AV(Q)	LM MX(Q)	LM MN(C)	LM AV(C)	LM MX(C)	REQ MONTHS
0040	NON CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ARCHER DANIELS MIDLAND-QUINCY	IL0003590	MISSISSIPPI RIVER							
0010	NONCONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ARMSTRONG WORLD INDUSTRIES	IL0002330	SOLDIER CREEK							
0010	CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ATWOOD MOBILE PRODUCTS	IL0060232	ROCK RIVER							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
AUBREY MANUFACTURING, INC.	IL0038121	TRIB TO KISHWAUKEE RIVER							
001B	NONCONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
AURORA TEXTILE FINISHING	IL0055557	FOX RIVER							
0010	NCCW & EXCESS WELL PUMPAGE	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
AUX SABLE LIQUID PRODUCTS, LP	IL0026662	ILLINOIS RIVER							
0020	COOLING TOWER BD,BACKWASH,DR	TEMPERATURE, WATER DEG. FAHR	1			******	90	93	NNNYYYYYYYYN
0020	COOLING TOWER BD,BACKWASH,DR	TEMPERATURE, WATER DEG. FAHR	1				60	63	YYYNNNNNNNNY
AVENTINE RENEWABLE ENERGY	IL0001953	ILLINOIS RIVER							
0010	TR PROCESS,COOLI NG WTRS,BB,SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0020	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
BALL HORTICULTURAL CO.-W CHICA	IL0054712	CRESS CREEK							
0010	BBD, PLT IRRIGATION & WATERING	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
BANK OF WAUKEGAN-WEST SIDE	IL0070025	SKOKIE RIVER							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
BARBER-COLMAN COMPANY-LOVES PK	IL0003468	LOVES PARK CREEK TRIB TO ROCK RIVER							
0010	NON-CONTACT COOLING WATER; SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0020	NON-CONTACT COOLING WATER; SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0030	NON-CONTACT COOLING WATER; SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0040	NON-CONTACT COOLING WATER; SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0050	NON-CONTACT COOLING WATER; SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0060	NON-CONTACT COOLING WATER; SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
BARNES INTERNATIONAL	ILG250077	KENT CREEK							
0010	NONCONTACT-COOLI NG WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
BILTRITE METAL PRODUCTS, INC.	ILG250124	LITTLE INDIAN CREEK							
0010	NONCONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
BLACHFORD, INC.-WEST CHICAGO	IL0067458	STORM SEWER TRIB TO KRESS CREEK							

38

10/14/04 PAGE: 4

ACTIVE INDUSTRIALS WITH NPDES TEMPERATURE REQUIREMENTS

QL ************* **************** **************** **************** **************** **************** **************** **************** QL

FACILITY NAME	NPDES	RECEIVING WATERS							
PIPE	PIPE DESCRIPTION	PARAMETER	MLOC	LM AV(Q)	LM MX(Q)	LM MN(C)	LM AV(C)	LM MX(C)	REQ MONTHS
0010	NONCONTACT COOLING WATER; SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
BLACKHAWK MOLDING COMPANY	IL0065021	SALT CREEK							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	>			******	******	******	YYYYYYYYYYYY
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	6			******	******	******	NNNYYYYYYYYN
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	6			******	******	******	YYYNNNNNNNNY
BOMBARDIER-WAUKE GAN	IL0002267	WAUKEGAN HARBOR (LAKE MICHIGAN)							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0070	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0080	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0140	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	******	YYYYYYYYYYYY
BP NAPERVILLE COMPLEX	IL0045241	WEST BRANCH OF DUPAGE RIVER							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
BP PRODUCTS-WOOD RIVER	IL0000035	MISSISSIPPI RIVER							
0020	W SURGE POND EMERGENCY OVERFLO	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
BRANCHFIELD CASTING COMPANY,IN	ILG250175	UNNAMED TRIB TO EDWARDS RIVER							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
BVR TECHNOLOGIES COMPANY	IL0074349	UNNAMED TRIB TO KISHWAUKEE RIVER							
0010	NON-CONTACT COOLING WATERS	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
C.M. PRODUCTS, INC.	IL0066311	UNNAMED TRIB OF FLINT CREEK							
0011	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CADBURY ADAMS USA LLC-ROCKFORD	IL0003689	ROCK RIVER VIA DRAINAGE DITCH							
0020	NONCONTACT COOLING WATER; SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CANAL BARGE INC.-CHANNAHON	IL0026581	DES PLAINES RIVER							
0010	STEAM CONDENSATE	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0020	STEAM CONDENSATE	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CARGIL MEAT-BEARDSTOWN	IL0023914	ILLINOIS RIVER							
A010	NCCW,SW,INTERNAL OUTFALL	TEMPERATURE, WATER DEG. FAHR	#			******	******	REPORT	YYYYYYYYYYYY
CARGILL INC. SOYBEAN PLANT	IL0056057	CALUMET RIVER							
0010	INDUSTRIAL& SAN WW& YARD DRAIN	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CARGILL, INC.	IL0002577	SUGAR CREEK							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CARMI CITY POWER PLANT	IL0036498	LITTLE WABASH RIVER							

57

10/14/04 PAGE: 5

ACTIVE INDUSTRIALS WITH NPDES TEMPERATURE REQUIREMENTS

QL ************* **************** **************** **************** **************** **************** **************** **************** QL

FACILITY NAME	NPDES	RECEIVING WATERS	PIPE	PIPE DESCRIPTION	PARAMETER	MLOC	LM AV(Q)	LM MX(Q)	LM MN(C)	LM AV(C)	LM MX(C)	REQ MONTHS
			0010	GENERATOR COOLING WATER;OVERFL	TEMPERATURE, WATER DEG. FAHR	0			******	******	REPORT	YYYYYYYYYYYY
			0010	GENERATOR COOLING WATER;OVERFL	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
			0020	ONCE-THROUGH NC COOLING WATER	TEMPERATURE, WATER DEG. FAHR	0			******	******	REPORT	YYYYYYYYYYYY
			0020	ONCE-THROUGH NC COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CARUS CHEMICAL-LASALLE	IL0002623	LITTLE VERMILION RIVER										
			0010	SOUTH LAGOON DISCHARGE	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CATERPILLAR INC.-MAPLETON	IL0001830	ILLINOIS RIVER										
			B010	NCCW (FORMER 001B)	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
			B010	NCCW (FORMER 001B)	TEMPERATURE, WATER DEG. FAHR	6			******	******	******	YYYNNNNNNNNY
			B010	NCCW (FORMER 001B)	TEMPERATURE, WATER DEG. FAHR	6			******	******	******	NNNYYYYYYYYN
CATERPILLAR INC.-PONTIAC	IL0061361	VERMILION RIVER										
			0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CATHOLIC DIOCESES OF ROCKFORD	IL0071811	MANNING CREEK TRIB TO KISHWAUKEE RV										
			0010	NON-CONTACT COOLING WATER; SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CCL CUSTOM MANUFACTURING, INC.	IL0004162	GRAPE CREEK VIA UNNAMED DITCH										
			0020	REVERSE OSMOSIS & NC COOLING	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CENTER POINT PROPERTIES	IL0001341	SUMMIT-LYONS DITCH										
			0020	NONCONTACT COOLING AND STRMWTR	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
			0031	NON-CONTACT COOLING WATER; SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CENTRAL ILL LIGHT CO-DUCK CK	IL0055620	ILLINOIS RIVER VIA DUCK CREEK										
			0020	COOLING POND OVERFLOW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CENTRAL LAKE COUNTY JAWA	IL0068951	SKOKIE DITCH										
			0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
1 CENTURY TOOL AND MANUFACTURING	IL0073555	STORMWATER RENTENTION POND										
			0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CF INDUSTRIES - PERU	IL0001783	ILLINOIS RIVER										
			0020	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CF INDUSTRIES INC-KINGSTON TER	IL0069272	UNNAMED CREEK TRIB TO ILLINOIS RVR										
			0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CF INDUSTRIES INC-SENECA	IL0069281	ILLINOIS RIVER										
			0010	NCCW,GW,SEPTIC LEACH FIELD,SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CF INDUSTRIES-CO WDEN TERMINAL	IL0048704	KASKASKIA RIVER										

64

ACTIVE INDUSTRIALS WITH NPDES TEMPERATURE REQUIREMENTS

QL ************* **************** **************** **************** **************** **************** **************** **************** QL

FACILITY NAME / PIPE	NPDES / PIPE DESCRIPTION	RECEIVING WATERS / PARAMETER	MLOC	LM AV(Q)	LM MX(Q)	LM MN(C)	LM AV(C)	LM MX(C)	REQ MONTHS
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CFC INTERNATIONAL-CH ICAGO HGTS	ILG250153	STATE STREET DITCH TRIB TO THORN CK							
0010	NCCW; ROOF RUNOFF	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CHEMTOOL, INC.	ILG250003	DRAINAGE DITCH							
0010	NCCW; SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CHICAGO COKE COMPANY	IL0002593	CALUMET RIVER							
0040	NC COOLING,SW,GR OUND WTR	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CHICAGO SUN TIMES BUILDING	ILG250110	CHICAGO RIVER							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CHICAGO TRIBUNE-TRIBINE SQUARE	ILG250112	CHICAGO RIVER							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CHICAGO-OHARE AIRPORT CITY OF	IL0002283	CRYSTAL CREEK							
WQ10	WILLOW CREEK BACKGROUND DATA	TEMPERATURE, WATER DEG. FAHR	Z			******	******	REPORT	YYYYYYYYYYYY
WQ20	BENSENVILLE DITCH BACKGROUND	TEMPERATURE, WATER DEG. FAHR	Z			******	******	REPORT	YYYYYYYYYYYY
WQ30	BENSENVILLE DITCH DOWNSTREAM	TEMPERATURE, WATER DEG. FAHR	6			******	******	REPORT	YYYYYYYYYYYY
CHS ACQUISITION CORP	IL0001678	STATE STREET DITCH TO THORN CREEK							
001A	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CILCO-EDWARDS	IL0001970	ILLINOIS RIVER							
0020	CONDENSER COOLING WATER	TEMPERATURE, WATER DEG. FAHR	>			******	******	5	YYYYYYYYYYYY
0020	CONDENSER COOLING WATER	TEMPERATURE, WATER DEG. FAHR	O			******	******	REPORT	YYYYYYYYYYYY
0020	CONDENSER COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0020	CONDENSER COOLING WATER	TEMPERATURE, WATER DEG. FAHR	6			******	******	93	NNNYYYYYYYYN
0020	CONDENSER COOLING WATER	TEMPERATURE, WATER DEG. FAHR	6			******	******	63	YYYNNNNNNNNY
CIVIC OPERA BUILDING	ILG250025	SOUTH BRANCH CHICAGO RIVER							
0010	NONCONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CLARK JL MFG CO-ROCKFORD	IL0059498	STORM SEWER							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0030	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CLIMATE CONTROL, INC.-DECATUR	IL0066346	SPRING CREEK							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CNH AMERICA LLC-BURR RIDGE	IL0035025	FLAGG CREEK							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CNH AMERICA LLC-EAST MOLINE	IL0004006	MISSISSIPPI RIVER							

77

10/14/04 PAGE: 7

ACTIVE INDUSTRIALS WITH NPDES TEMPERATURE REQUIREMENTS

QL ************* **************** **************** **************** **************** **************** **************** **************** QL

FACILITY NAME / NPDES / RECEIVING WATERS

PIPE	PIPE DESCRIPTION	PARAMETER	MLOC	LM AV(Q)	LM MX(Q)	LM MN(C)	LM AV(C)	LM MX(C)	REQ MONTHS
0010	NCCW & STORM WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0020	NCCW & STORM WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0050	NCCW AND STORMWATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
COE-STARVED ROCK LOCK AND DAM	ILG250079	ILLINOIS RIVER							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
COMDISCO-ROSEMON T	IL0069086	STORM SEWER TRIB TO DESPLAINES RVR							
0010	NON-CONTACT COOLING WATER; SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CONAGRA INTERNATIONAL-N PEKIN	IL0073270	ILLINOIS RIVER							
0010	NONCONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CONOCOPHILLIPS-W OOD RIVER	IL0000205	MISSISSIPPI RIVER							
0010	TR PROCESS, SANITARY AND SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0011	TR PROCESS, SANITARY AND SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0020	TR PROCESS, SANITARY AND SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0021	TR PROCESS, SANITARY AND SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CONSOLIDATED BISCUIT COMPANY	IL0066303	STORM SEWER TRIB TO ROCK RIVER							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CONTINENTAL TIRE-MT VERNON	IL0035017	CASEY FORK CREEK							
0030	MIXING NON-CONTACT COOLING WTR	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
COOK COMPOSITE&POLYME RS-LEMONT	IL0002399	DR DITCH TRIB TO ILL/MICH CANAL							
0010	COOLING TWR BD, NCCW,BOILER BD	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CORDOVA ENERGY COMPANY LLC	IL0074438	MISSISSIPPI RIVER							
0010	TOTAL PLANT EFFLUENT	TEMPERATURE, WATER DEG. FAHR	1			******	******	48	YYNNNNNNNNNN
0010	TOTAL PLANT EFFLUENT	TEMPERATURE, WATER DEG. FAHR	1			******	******	55	NNNNNNNNNNNY
0010	TOTAL PLANT EFFLUENT	TEMPERATURE, WATER DEG. FAHR	1			******	******	60	NNYNNNNNNNNN
0010	TOTAL PLANT EFFLUENT	TEMPERATURE, WATER DEG. FAHR	1			******	******	68	NNNNNNNNNNYN
0010	TOTAL PLANT EFFLUENT	TEMPERATURE, WATER DEG. FAHR	1			******	******	71	NNNYNNNNNNNN
0010	TOTAL PLANT EFFLUENT	TEMPERATURE, WATER DEG. FAHR	1			******	******	78	NNNNNNNNNYNN
0010	TOTAL PLANT EFFLUENT	TEMPERATURE, WATER DEG. FAHR	1			******	******	81	NNNNYNNNNNNN
0010	TOTAL PLANT EFFLUENT	TEMPERATURE, WATER DEG. FAHR	1			******	******	88	NNNNNYNNYNNN
0010	TOTAL PLANT EFFLUENT	TEMPERATURE, WATER DEG. FAHR	1			******	******	89	NNNNNNYYNNNN
CORN PRODUCTS INTERNATIONAL	IL0041009	CHGO SAN/SHIP CA							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
CUSHMAN&WAKEFIEL D OF ILLINOIS	ILG250115	CHICAGO RIVER SOUTH BRANCH							
0010	NONCONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
DANA CORPORATION-WARN ER ELEC	IL0002984	N KINNIKINNICK							

88

10/14/04 PAGE: 8

ACTIVE INDUSTRIALS WITH NPDES TEMPERATURE REQUIREMENTS

QL ************* **************** **************** **************** **************** **************** **************** **************** QL

FACILITY NAME	NPDES	RECEIVING WATERS	PIPE	PIPE DESCRIPTION	PARAMETER	MLOC	LM AV(Q)	LM MX(Q)	LM MN(C)	LM AV(C)	LM MX(C)	REQ MONTHS
			001B	PROCESS WASTE	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
DART CONTAINER-NORTH AURORA	IL0051381	SPRINGBROOK CREEK										
			0010	WTR SOFTENER REGEN & BOILER BD	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
DASCO PRODUCTS INC-ROCKFORD	ILG250154	ROCK RIVER										
			0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
DASCO PRODUCTS-BLACKHA WK PLANT	IL0071544	STORM SEWER TRIB TO ROCK RIVER										
			0010	NONCONTACT COOLING WTR; BOILER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
DEAN FOODS COMPANY-HARVARD	IL0003395	PISCASAW CREEK										
			0010	TREATED PROCESS WTR & NCCW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
DEAN FOODS-BELVIDERE	IL0003387	KISHWAUKEE RIVER										
			0010	NONCONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
			0020	NONCONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
DEAN FOODS-DIXON	IL0062910	STORM SEWER TRIB TO ROCK RIVER										
			0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
DEAN FOODS-HUNTLEY	IL0003409	S BRANCH KISHWAUKEE RIVER										
			0010	NON-CONTACT COOLING WATER; SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
DEAN FOODS-ROCKFORD	IL0003841	NORTH BRANCH OF KENT CREEK										
			0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
DEAN SPECIALTY FOODS-PECATONIC	IL0034908	PECATONICA RIVER										
			0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
DEERE HARVESTER WORKS	IL0003018	MISSISSIPPI RIVER; HONEY CREEK										
			0010	NON CONTACT COOLING WATER; SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
DEERE PLOW AND PLANTER WORKS	IL0003000	MISSISSIPPI RIVER VIA SYLVAN SLOUGH										
			0010	NON-CONTACT COOLING WATER; SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
			0020	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
DEL MONTE CORP-MENDOTA	IL0003115	LITTLE VERMILLION RIVER										
			0020	COOLING WATER; SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
DEVLIEG-SUNDSTRA ND, INC.	IL0037567	KISHWAUKEE RIVER										
			0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
DIAL CORP-MONTGOMERY	IL0001899	MILL CREEK TRIB TO FOX RIVER										
			0010	NCCW & STORMWATER RUNOFF	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY

102

10/14/04 PAGE: 9

ACTIVE INDUSTRIALS WITH NPDES TEMPERATURE REQUIREMENTS

QL ************* *************** **************** *************** **************** **************** **************** **************** QL

FACILITY NAME / PIPE	PIPE DESCRIPTION	NPDES	RECEIVING WATERS / PARAMETER	MLOC	LM AV(Q)	LM MX(Q)	LM MN(C)	LM AV(C)	LM MX(C)	REQ MONTHS
DONNELLY R R & SONS CO		IL0021091	CRABAPPLE CREEK							
0010	NCCW,FBW,CTB,& SWRO		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
DORCHESTER CORPORATION		ILG250038	CHICAGO RIVER							
0010	NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
DRG MOLDING & PAD PRINTING		ILG250186	UNNAMED POND TO DRAINAGE DITCH							
0010	NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
DURA AUTOMOTIVE SYSTEMS		IL0003751	UNNAMED TRIB TO YELLOW CREEK							
B010	NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
DYNEGY MIDWEST GEN-BALDWIN		IL0000043	KASKASKIA RIVER AND DOZA CREEK							
0020	OVRFLO FROM BALDWIN COOLING PD		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
DYNEGY MIDWEST GEN-HAVANA		IL0001571	ILLINOIS RIVER							
0010	CONDENSER COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
DYNEGY MIDWEST GEN-HENNEPIN		IL0001554	ILLINOIS RIVER							
0010	CONDENSER COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
2 DYNEGY MIDWEST GEN-STALLINGS		IL0074837	TRIB TO ELM SLOUGH&HORSESHOE LAKE							
0010	EVAPORATIVE COOLER BLOWDOWN		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0010	EVAPORATIVE COOLER BLOWDOWN		TEMPERATURE, WATER DEG. FAHR	6			******	******	63	YYYNNNNNNNNY
0010	EVAPORATIVE COOLER BLOWDOWN		TEMPERATURE, WATER DEG. FAHR	6			******	******	93	NNNYYYYYYYYN
DYNEGY MIDWEST GEN-WOOD RIVER		IL0000701	MISSISSIPPI RIVER							
0010	001 CONDENSER COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
DYNO NOBEL INC-BARRY		IL0071528	EAST BRANCH OF KISER CREEK							
0010	NCCW, BOILER BLOWDOWN, AND SW		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
EATON CORP-LINCOLN		IL0063614	KICKAPOO CREEK							
0010	NON-CONTACT COOLING WTR & SW		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
EKLUND METAL TREATING-LOVES PK		IL0003280	ROCK RIVER							
0010	NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ELCO INDUSTRIES INC.		IL0054879	UNNAMED TRIB TO KISWAUKEE RIVER							
0010	NCCW AND AIR COMPRESSOR CNDSTE		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ELECTRIC ENERGY-JOPPA		IL0004171	OHIO RIVER							
0060	CONDENSER COOLING 1-4		TEMPERATURE, WATER DEG. FAHR	1			REPORT	REPORT	REPORT	YYYYYYYYYYYY
0070	CONDENSER COOLING 5-6		TEMPERATURE, WATER DEG. FAHR	1			REPORT	REPORT	REPORT	YYYYYYYYYYYY

116

10/14/04 PAGE: ::

ACTIVE INDUSTRIALS WITH NPDES TEMPERATURE REQUIREMENTS

FACILITY NAME / PIPE	NPDES / PIPE DESCRIPTION	RECEIVING WATERS / PARAMETER	MLOC	LM AV(Q)	LM MX(Q)	LM MN(C)	LM AV(C)	LM MX(C)	REQ MONTHS
ELEMENTIS PIGMENTS, INC.	IL0038709	SCHOENBERGER CK TRIB TO CAHOKIA CK							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
EMERSON POWERTRANS-SEALM ASTER	IL0032174	SELMARTEN CREEK							
0011	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ENGINEERED STORAGE PRODUCTS	IL0038377	UNNAMED TRIB TO KISHWAUKEE							
0010	NCCW & STORMWATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
EQUISTAR CHEMICALS, LP	IL0002917	ILLINOIS RIVER; AUX SABLE CREEK							
0070	COMBINED DISCH FROM 001 & 002	TEMPERATURE, WATER DEG. FAHR	1			******	******	******	NNNYYYYYYYYN
0070	COMBINED DISCH FROM 001 & 002	TEMPERATURE, WATER DEG. FAHR	1			******	REPORT	93	NNNYYYYYYYYN
0070	COMBINED DISCH FROM 001 & 002	TEMPERATURE, WATER DEG. FAHR	1			******	******	******	YYYNNNNNNNNY
0070	COMBINED DISCH FROM 001 & 002	TEMPERATURE, WATER DEG. FAHR	1			******	REPORT	REPORT	YYYNNNNNNNNY
EQUITABLE BUILDING	ILG250034	CHICAGO RIVER							
0010	NONCONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
EXCEL FOUNDRY & MACHINE, INC.	IL0063827	OLD CHANNEL TO MACKINAW RIVER							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0020	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
EXELON GENERATING COMPANY-ZION	IL0002763	LAKE MICHIGAN							
0010	HOUSE SERVICE WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	******	YYYYYYYYYYYY
EXELON GENERATION CO.,LLC	IL0002224	ILLINOIS RIVER							
0020	COOLING POND BLOWDOWN	TEMPERATURE, WATER DEG. FAHR	1			******	******	93	YYYYYYYYYYYY
0020	COOLING POND BLOWDOWN	TEMPERATURE, WATER DEG. FAHR	6			******	******	63	YYYNNNNNNNNY
0020	COOLING POND BLOWDOWN	TEMPERATURE, WATER DEG. FAHR	6			******	******	93	NNNYYYYYYYYN
0040	COOLING POND DISCHARGE	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
EXELON GENERATION CO, LLC	IL0048151	ILLINOIS RIVER							
0010	COOLING PND BD;SOFTENER REGERT	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
EXELON GENERATION-BRAID WOOD	IL0048321	KANKAKEE RIVER; MAZON RIVER							
0010	COOLING POND BLOWDOWN LINE	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
EXELON GENERATION-QUAD CITIES	IL0005037	MISSISSIPPI RIVER							
0010	001/002 OPEN CYCLE DIFFUSERS	TEMPERATURE, WATER DEG. FAHR	>			******	******	5	YYYYYYYYYYYY
0010	001/002 OPEN CYCLE DIFFUSERS	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0010	001/002 OPEN CYCLE DIFFUSERS	TEMPERATURE, WATER DEG. FAHR	6			******	******	48	YYNNNNNNNNNN
0010	001/002 OPEN CYCLE DIFFUSERS	TEMPERATURE, WATER DEG. FAHR	6			******	******	60	NNYNNNNNNNNN
0010	001/002 OPEN CYCLE DIFFUSERS	TEMPERATURE, WATER DEG. FAHR	6			******	******	71	NNNYNNNNNNNN
0010	001/002 OPEN CYCLE DIFFUSERS	TEMPERATURE, WATER DEG. FAHR	6			******	******	81	NNNNYNNNNNNN

127

10/14/04 PAGE: 11

ACTIVE INDUSTRIALS WITH NPDES TEMPERATURE REQUIREMENTS

QL ************* *************** *************** ************** *************** *************** *************** *************** QL

FACILITY NAME / PIPE	NPDES / PIPE DESCRIPTION	RECEIVING WATERS / PARAMETER	MLOC	LM AV(Q)	LM MX(Q)	LM MN(C)	LM AV(C)	LM MX(C)	REQ MONTHS
0010	001/002 OPEN CYCLE DIFFUSERS	TEMPERATURE, WATER DEG. FAHR	6			******	******	88	NNNNNYNNYNNN
0010	001/002 OPEN CYCLE DIFFUSERS	TEMPERATURE, WATER DEG. FAHR	6			******	******	89	NNNNNNYYNNNN
0010	001/002 OPEN CYCLE DIFFUSERS	TEMPERATURE, WATER DEG. FAHR	6			******	******	78	NNNNNNNNNYNN
0010	001/002 OPEN CYCLE DIFFUSERS	TEMPERATURE, WATER DEG. FAHR	6			******	******	68	NNNNNNNNNNYN
0010	001/002 OPEN CYCLE DIFFUSERS	TEMPERATURE, WATER DEG. FAHR	6			******	******	55	NNNNNNNNNNNY
EXELON THERMAL TECHNOLOGIES	ILG250151	CHICAGO RIVER							
0020	NONCONTACT-COOLI NG WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
EXXON MOBIL CORPORATION	IL0063061	DES PLAINES RIVER							
0010	BOILER BLOWDOWN,STEAM COND,SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
EXXONMOBIL OIL-JOLIET REFINERY	IL0002861	DES PLAINES RIVER							
0020	NONCONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0020	NONCONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	******	YYYYYYYYYYYY
0020	NONCONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	6			******	******	******	YYYYYYYYYYYY
0020	NONCONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	6			******	******	100	YYYYYYYYYYYY
0020	NONCONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	6			******	******	REPORT	YYYYYYYYYYYY
FANSTEEL INC-NORTH CHICAGO	IL0002411	PETTIBONE CREEK TRIB TO LK MICHIGAN							
0011	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
FINKL, A. AND SONS COMPANY	IL0035483	NORTH BRANCH CHICAGO RIVER							
0020	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0030	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0040	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
FOULD'S INC.	IL0020656	DES PLAINES RIVER							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
FOUR HUNDRED CONDOMINIUM	ILG250035	CHICAGO RIVER							
0010	NONCONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
3 GAS RECOVERY SYSTEMS-HANOVER P	IL0072460	MALLARD LAKE							
0010	DISCHARGE FROM A010; SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
GE PLASTICS-OTTA WA	IL0001929	ILLINOIS RIVER							
B010	COOLING WTR&SW(FORMALLY 001B)	TEMPERATURE, WATER DEG. FAHR	J			******	******	REPORT	YYYYYYYYYYYY
C010	TREATED PROCESS WASTEWATER	TEMPERATURE, WATER DEG. FAHR	J			******	******	REPORT	YYYYYYYYYYYY
GENERAL CHEMICAL LLC	IL0000647	ROSE CREEK							
0010	NON-CONTACT COOLING WATER; SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
GENERAL MILLS INC-BELVIDERE	IL0003450	KISHWAUKEE RIVER							
0020	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY

138

ACTIVE INDUSTRIALS WITH NPDES TEMPERATURE REQUIREMENTS

QL ************* **************** **************** **************** **************** **************** **************** **************** QL

FACILITY NAME	NPDES	RECEIVING WATERS							
PIPE / PIPE DESCRIPTION		PARAMETER	MLOC	LM AV(Q)	LM MX(Q)	LM MN(C)	LM AV(C)	LM MX(C)	REQ MONTHS
0030 NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0040 NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
GENERAL MOTORS-MCCOOK PLANT	IL0001813	TRIB TO MCCOOK-SUMIT DITCH							
0020 TR GW, NCCW, AND SW		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
GLEASON CUTTING TOOLS CORP	IL0060151	UNNAMED DITCH TRIB TO ROCK RIVER							
001A NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
GOLDEN GRAIN CO-BRIDGEVIEW	IL0073342	CHICAGO SANITARY AND SHIP CANAL							
0010 NON-CONTACT COOLING WTR;BLOWDN		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0020 NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
4 GOLDSCHMIDT-MAPL ETON	IL0023728	ILLINOIS RIVER VIA POND LILY LAKE							
0010 NCCW, BOILER BD, SW		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
GOODYEAR TIRE & RUBBER COMPANY	IL0003204	SILVER CREEK							
0020 UTILITY,COOLING, BLOWDOWN SCR W		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
GUNITE CORPORATION-ROCK FORD	IL0068284	ROCK RIVER VIA STORM SEWER							
0010 NCCW, COOLING TWR BLOWDOWN		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0010 NCCW, COOLING TWR BLOWDOWN		TEMPERATURE, WATER DEG. FAHR	6			******	******	63	YYYNNNNNNNNY
0010 NCCW, COOLING TWR BLOWDOWN		TEMPERATURE, WATER DEG. FAHR	6			******	******	93	NNNYYYYYYYYN
HAEGER POTTERIES-DUNDEE	IL0033898	UNNAMED TRIB TO FOX RIVER							
0010 NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
HANDSCHY INK AND CHEMICALS	IL0068926	LITTLE CALUMET RIVER VIA STORM SEWR							
0010 NCCW, BOILER BLOWDOWN, SW		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
HARRIS CORP BROADCAST PRODUCTS	IL0061387	BRANCH OF HOMAN CREEK							
0010 NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
HEAD INCORPORATED	IL0047228	FOX RIVER							
0010 NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
HOFFER PLASTIC CORPORATION	IL0004979	FOX RIVER							
0010 NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
HOFFER PLASTICS CORPORATION	IL0004961	STORM SEWER TRIB TO FOX RIVER							
0010 NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
HOLLAND ENERGY, LLC	IL0074268	KASKASKIA RIVER							
0010 COOLING TOWER BD,SUMPS&DRAINS		TEMPERATURE, WATER DEG. FAHR	1			******	******	63	YYYNNNNNNNNY
0010 COOLING TOWER BD,SUMPS&DRAINS		TEMPERATURE, WATER DEG. FAHR	1			******	******	93	NNNYYYYYYYYN

(51)

ACTIVE INDUSTRIALS WITH NPDES TEMPERATURE REQUIREMENTS

QL ************* **************** **************** **************** **************** **************** **************** **************** **************** QL

FACILITY NAME / PIPE	PIPE DESCRIPTION	NPDES	RECEIVING WATERS / PARAMETER	MLOC	LM AV(Q)	LM MX(Q)	LM MN(C)	LM AV(C)	LM MX(C)	REQ MONTHS
HOLLYWOOD DINING CENTER-ROCKFD		ILG250056	ROCK RIVER							
0010	NONCONTACT-COOLI NG WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
HOOPESTON FOODS, INC.		IL0022250	N. FORK VERMILION RVR STRM SWR							
0010	NCCW, & BOILER BLOWDOWN		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0020	NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ILLINOIS TOOL WORKS		IL0068179	WILLOW-HIGGINS CREEK							
0010	NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
IMTT-LEMONT		IL0005126	ILLINOIS AND MICHIGAN CANAL							
0010	BOILER BD, SAFETY SYSTEMS, SW		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
INDEPENDENCE TUBE CORPORATION		ILG250128	STORM SEWER TRIB TO ILLINOIS RIVER							
0010	NONCONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
INEOS SILICAS AMERICAS LLC		IL0002569	DES PLAINES RIVER							
0010	NC COOLING & STORM WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
INGERSOLL PRODUCTION SYSTEMS		IL0074462	ROCK RIVER VIA STORM SEWER							
0010	NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
INTERLAKE COMPANIES-PONTIA C		IL0047333	VERMILION RIVER							
0010	STORMWATER & NCCW		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0020	STORMWATER & NCCW		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
INTERMATIC INC.		IL0059145	NIPPERSINK CREEK							
0010	NCCW AND DISCH FROM 001A&001B		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
INTERNATIONAL STEEL-RIVERDALE		IL0002119	LITTLE CALUMET RIVER							
INTK	INTAKE (SPECIAL CONDITION 4)		TEMPERATURE, WATER DEG. CENT	0			******	******	REPORT	YYYYYYYYYYYY
0030	NCCW BASIC OXYGEN; SW		TEMPERATURE, WATER DEG. CENT	1			******	******	REPORT	YYYYYYYYYYYY
INTERNATIONAL TRUCK&ENGINE COR		IL0002046	SILVER CREEK							
0010	NCCW, CONDENSATE, BLOWDOWN, SW		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ISG HENNEPIN INC.		IL0002631	ILLINOIS RIVER							
A010	NON-CONTACT CW, SW, TR PROCESS		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
K.A. STEEL CHEMICALS, INC.		IL0022934	CHGO SAN SHIP CANAL							
0010	MISC & NCCW		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0020	NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
KENT FEEDS, INC.-ROCKFORD		IL0069922	UNNAMED DITCH TRIB TO KISHWAUKEE R							

165

ACTIVE INDUSTRIALS WITH NPDES TEMPERATURE REQUIREMENTS

QL ************* **************** **************** **************** **************** **************** **************** **************** QL

FACILITY NAME / PIPE	NPDES / PIPE DESCRIPTION	RECEIVING WATERS / PARAMETER	MLOC	LM AV(Q)	LM MX(Q)	LM MN(C)	LM AV(C)	LM MX(C)	REQ MONTHS
0010	BOILER BLOWDOWN AND CONDENSATE	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
Acl KINCAID GENERATION, L.L.C.	IL0002241	LAKE SANGCHRIS							
0010	CONDENSER COOLING & HSE SERV	TEMPERATURE, WATER DEG. FAHR	1			******	99	111	YYYYYYYYYYYY
KOCH NITROGEN CO-CREVE COEUR	IL0004898	ILLINOIS RIVER							
0010	NONCONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0030	NONCONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
KOCH NITROGEN COMPANY-E. ALTON	IL0070173	OLD WOOD RIVER CK CHANNEL TO MISS							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	6			******	******	63	YYYNNNNNNNNY
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	6			******	******	93	NNNYYYYYYYYN
0020	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0020	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	6			******	******	63	YYYNNNNNNNNY
0020	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	6			******	******	93	NNNYYYYYYYYN
5 KRAFT FOODS-CHAMPAIGN	IL0004227	COPPER SLOUGH							
0011	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
KRAFT INC-CHAMPAIGN MATTIS	IL0066826	KASKASKIA RIVER							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
LAFARGE CORP.-JOPPA PLANT	IL0004081	OHIO RIVER							
0010	NCCW,COOLING TWR BLDN, & SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
LAGROU DISTRIBUTION SYSTEM	IL0002402	KRESS CREEK							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
LAKESHORE EAST DEVELOPMENT	IL0076783	CHICAGO RIVER							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
LANDIS GARDNER	IL0061948	TURTLE CREEK							
0010	NCCW, STORMWATER, GROUNDWATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
LASALLE ROLLING MILLS, INC.	IL0072885	UNNAMED TRIB TO VERMILION RIVER							
0010	NONCONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
LAUHOFF GRAIN COMPANY	IL0004235	STONEY CREEK							
0010	NONCONTACT COOLING & S. W.	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
LAWRENCE HARDWARE-ROCK FALLS	IL0062979	UNION DR DITCH TRIB TO ROCK RIVER							
0010	NCCW,PUMP OVERFLOW,SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
LINCOLN-CARLYLE HARTFORD,LLC	ILG250029	SOUTH BRANCH CHICAGO RIVER							

78

ACTIVE INDUSTRIALS WITH NPDES TEMPERATURE REQUIREMENTS

QL ************* **************** **************** **************** **************** **************** **************** **************** QL

FACILITY NAME / PIPE	PIPE DESCRIPTION / NPDES	PARAMETER / RECEIVING WATERS	MLOC	LM AV(Q)	LM MX(Q)	LM MN(C)	LM AV(C)	LM MX(C)	REQ MONTHS
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
LINCOLN-CARLYLE HARTFORD,LLC	ILG250030	SOUTH BRANCH CHICAGO RIVER							
0010		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
LINCOLNLAND AGRI-ENERGY-PALE ST	IL0076562	STORM DRAIN TRIB TO LAMOTTE CREEK							
0010	COOLING TOWER;FILTER BACKWASH	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
LONE STAR INDUSTRIES-OGLES BY	IL0036595	VERMILION RIVER							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0020	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0030	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0040	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0050	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
LONZA, INC.	IL0049697	ILLINOIS RIVER							
0010	COOL TOWER BLDN, CONDENS & SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
LSP - KENDALL ENERGY, LLC	IL0073806	ILLINOIS RIVER;TRIB OF DUPAGE RIVER							
0010	TOTAL PLANT DISCHARGE	TEMPERATURE, WATER DEG. FAHR	1			******	90	93	NNNYYYYYYYYN
0010	TOTAL PLANT DISCHARGE	TEMPERATURE, WATER DEG. FAHR	1			******	60	63	YYYNNNNNNNNY
LSP-NELSON ENERGY GENERATION	IL0074209	UNNAMED TRIB TO THREE MILE BRANCH C							
0010	TOTAL PLANT DISCHARGE	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
LURIE COMPANY	ILG250027	CHICAGO RIVER							
0010	NCCW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
MAPEI CORPORATION-WEST CHICAGO	IL0074446	STORM SEWER TRIB TO KRESS CREEK							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
6 MARATHON ASHLAND PETROLEUM LLC	IL0032271	E. CITY RESERVOR							
0010	HYDROSTATIC TEST WATER; SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
MARATHON ASHLAND PETROLEUM,LLC	IL0004073	SUGAR CREEK							
0010	TREATMENT PLANT DISCHARGE	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
7 MATHESON TRI-GAS INC	IL0062618	ABANDONED QUARRY TO SUGAR RUN							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
MATHEWS COMPANY-CRYSTAL LAKE	IL0072851	FOX RIVER							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
MCCLEARY INDUSTRIES	IL0067903	ROCK RIVER							
0010	NONCONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY

191

ACTIVE INDUSTRIALS WITH NPDES TEMPERATURE REQUIREMENTS

FACILITY NAME / PIPE	PIPE DESCRIPTION	NPDES	RECEIVING WATERS / PARAMETER	MLOC	LM AV(Q)	LM MX(Q)	LM MN(C)	LM AV(C)	LM MX(C)	REQ MONTHS
MCWHORTER INCORPORATED		IL0035203	FOX RIVER							
0010	NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0020	NCCW, BOILER BD		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
MEREDOSIA TERMINAL		IL0070343	DRAINAGE DITCH TRIB TO ILLINOIS RVR							
0020	NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
METRON STEEL CORP-CHICAGO		IL0070521	CALUMET HARBOR							
0010	COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
8 MG INDUSTRIES-MA PLETON		IL0070122	POND LILY LAKE TRIB TO ILLINOIS RVR							
0010	COOLING TOWR BLODWN,FILTER BW		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
MGP INGREDIENTS OF ILLINOIS		IL0002909	ILLINOIS RIVER							
0010	CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0020	NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
MIDWEST GENERATION-POWER TON		IL0002232	ILLINOIS RIVER							
0020	COOLING POND EMERGENCY OVERFLO		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
MIDWEST GENERATION,LLC-C OLLINS		IL0048143	ILLINOIS RIVER							
0010	COOLING POND BLOWDOWN		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
MIDWEST GENERATION,LLC-C RAWFRD		IL0002186	CHICAGO SANITARY AND SHIP CANAL							
0010	CONDENSER COOLING WTR&HSE SER		TEMPERATURE, WATER DEG. FAHR	1			******	******	100	YYYYYYYYYYYY
0010	CONDENSER COOLING WTR&HSE SER		TEMPERATURE, WATER DEG. FAHR	6			******	******	93	YYYYYYYYYYYY
MIDWEST GENERATION,LLC-F ISK		IL0002178	SOUTH BRANCH OF CHICAGO RIVER							
0010	CONDENSER COOLING WTR & HOUSE		TEMPERATURE, WATER DEG. FAHR	1			******	******	100	YYYYYYYYYYYY
0010	CONDENSER COOLING WTR & HOUSE		TEMPERATURE, WATER DEG. FAHR	6			******	******	93	YYYYYYYYYYYY
MIDWEST GENERATION,LLC-J OLIET		IL0064254	DES PLAINES RIVER							
0010	CONDENSER COOLING WTR.,HSE SER		TEMPERATURE, WATER DEG. FAHR	1			******	REPORT	REPORT	YYYYYYYYYYYY
0010	CONDENSER COOLING WTR.,HSE SER		TEMPERATURE, WATER DEG. FAHR	6						YYYYYYYYYYYY
0010	CONDENSER COOLING WTR.,HSE SER		TEMPERATURE, WATER DEG. FAHR	6			******	******	93	YYYYYYYYYYYY
MIDWEST GENERATION,LLC-J OLIET9		IL0002216	DES PLAINES RIVER							
0010	CONDENSER COOLING AND HSE SERV		TEMPERATURE, WATER DEG. FAHR	1			******	REPORT	REPORT	YYYYYYYYYYYY
0010	CONDENSER COOLING AND HSE SERV		TEMPERATURE, WATER DEG. FAHR	6			******	******	******	YYYYYYYYYYYY
0010	CONDENSER COOLING AND HSE SERV		TEMPERATURE, WATER DEG. FAHR	6			******	******	REPORT	YYYYYYYYYYYY
MIDWEST GENERATION,LLC-W AUKEGN		IL0002259	LAKE MICHIGAN VIA 001							
0010	CIRCULATING WATER		TEMPERATURE, WATER DEG. FAHR	1			REPORT	REPORT	REPORT	YYYYYYYYYYYY
MIDWEST GENERATION,LLC-W ILL CO		IL0002208	CHICAGO SANITARY AND SHIP CANAL							

204

10/14/04 PAGE: 17

ACTIVE INDUSTRIALS WITH NPDES TEMPERATURE REQUIREMENTS

QL ************* **************** **************** **************** **************** **************** **************** *************** QL

FACILITY NAME	NPDES	RECEIVING WATERS	PIPE	PIPE DESCRIPTION	PARAMETER	MLOC	LM AV(Q)	LM MX(Q)	LM MN(C)	LM AV(C)	LM MX(C)	REQ MONTHS
			0010	CONDENSER COOLING;HSE SERV WTR	TEMPERATURE, WATER DEG. FAHR	1			******	******	100	YYYYYYYYYYYY
			0010	CONDENSER COOLING;HSE SERV WTR	TEMPERATURE, WATER DEG. FAHR	6			******	******	93	YYYYYYYYYYYY
MIDWEST ZINC-HILLSBORO, INC.	IL0000698	UNNAMED STREAM TRIB TO SHOAL CREEK										
			0011	NCCW/ FURNACE MAINTENANCE	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
MINN MINING & MFG.-CORDOVA	IL0003140	MISSISSIPPI RIVER										
			0010	COMBINED WASTEWATER FLOW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
MITSUBISHI MOTOR MANUFACTURING	IL0065269	TRIBS TO SUGAR AND KING MILLS CRKS										
			0010	EAST RETENTION BASIN-NCCW/SWRO	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
9 MOBIL MINING&MINERALS CO-DEPUE	IL0032182	LAKE DEPUE AND TRIB TO ILLINOIS RVR										
			0020	GROUNDWATER/STOR MWATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
MODERN METAL PRODUCTS-ROCKFOR D	ILG250061	ROCK RIVER VIA STORM SEWER										
			0010	NONCONTACT-COOLI NG WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
MODINE MANUFACTURING-MC HENRY	IL0001279	TRIB TO DUTCH CREEK										
			0020	NON-CONTACT COOLING WATER; SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
MORTON INTERNATIONAL-RI NGWOOD	IL0001716	DUTCH CREEK TRIB TO FOX RIVER										
			0010	NCCW, BW, BB, WW, GW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
MORTON MANUFACTURING COMPANY	ILG250015	DES PLAINES RIVER										
			0020	NCCW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
			0030	NCCW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
MPG INDUSTRIES, INC.	IL0074900	DRAINAGE DITCH										
			0010	STEAM CONDENSATE	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
			0010	STEAM CONDENSATE	TEMPERATURE, WATER DEG. FAHR	6			******	******	63	YYNNNNNNNNNY
			0010	STEAM CONDENSATE	TEMPERATURE, WATER DEG. FAHR	6			******	******	93	NNNYYYYYYYYN
NASCOTE INDUSTRIES-NASHV ILLE	IL0068136	MIDDLE CREEK VIA DRAINAGE DITCH										
			0010	COOLING TOWER BLO DOWN; SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
			0020	COOLING TOWER BLO DOWN; SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
NATIONAL MAINTENANCE&REPA IR	IL0068055	MISSISSIPPI RIVER										
			0010	BARGE CLEANING WASTEWATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
NATIONAL STARCH AND CHEMICALS	IL0000621	ILLINOIS RIVER										
			A010	NCCW;SW(INTERNAL)FORMER 001A	TEMPERATURE, WATER DEG. FAHR	J			******	******	REPORT	YYYYYYYYYYYY
			001A	ANNUAL SAMPLING AT 001	TEMPERATURE, WATER DEG. FAHR	J			******	******	******	YYYYYYYYYYYY
NESTLE FOODS-LIBBY DIV MORTON	IL0060852	BULL RUN CREEK										

217

10/14/04 PAGE: 18

ACTIVE INDUSTRIALS WITH NPDES TEMPERATURE REQUIREMENTS

QL ************* *************** **************** *************** *************** *************** *************** *************** QL

FACILITY NAME / PIPE	PIPE DESCRIPTION	NPDES	RECEIVING WATERS / PARAMETER	MLOC	LM AV(Q)	LM MX(Q)	LM MN(C)	LM AV(C)	LM MX(C)	REQ MONTHS
0010	NORTH WEST RETENTICN BASIN		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0030	STORAGE LAGOON 2		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0040	STORAGE LAGOON 3		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0050	STORAGE LAGOON 4		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0060	NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0070	SW RUNOFF FR SEED/SLUDGE AREA		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
NESTLE USA-BLOOMINGTON		IL0001392	UNNAMED TRIB TO SUGAR CREEK							
0020	COOLING TOWER BLOWDOWN		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
NORTHERN STAR PLATING&FINISHNG		IL0061239	ROCK RIVER(SINKIAWIC CREEK)							
0010	NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
NORTHWESTERN FLAVORS, LLC		IL0046540	STORM SEWER TRIB TO KRESS CREEK							
0010	NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
NORTHWESTERN UNIVERSITY		IL0066541	LAKE MICHIGAN							
0010	NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
NOVEON INC-HENRY		IL0001392	ILLINOIS RIVER							
0010	PROCESS WW&ALTERN ROUTE 001A		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
NUCOR STEEL INC-BOURBONNAIS		IL0035297	UNNAMED TRIB TO SOLDIERS CREEK							
0020	PROCESS COOLING WATER; SW		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
OFFICE PARK OF HINSDALE		IL0068381	SALT CREEK							
0010	NC COOLING WATER AND STORMWATR		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0020	NON-CONTACT COOLING WTR AND SW		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0030	NON-CONTACT COOLING WTR AND SW		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
OLIN BRASS AND WINCHESTER, INC		IL0000230	MISSISSIPPI RIVER; WOOD RIVER							
A010	ZONE 17 GRAVITY OR FORCE MAIN		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
A050	W SLOUGH GRAVITY(FORMER 005A)		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
A130	WEST SLOUGH FORCE MAIN		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
B150	ZONE 6 WWTF (EMERGENCY DISCH)		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0010	ZONE 17 WWTF		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0060	ZONE 6 FORCE MAIN (EMERGENCY)		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0130	WEST SLOUGH FORCE MAIN		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0150	ZONE 6 WWTF FORCE MAIN		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ONYX VALLEY LANDFILL-DECATUR		IL0075485	UNNAMED TRIB OF SANGAMON RIVER							
002Q	QUARTERLY MONITORING OF SW		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ONYX ZION LANDFILL INC		IL0067725	DES PLAINES RIVER; LK MICHIGAN(002)							
001Q	QUARTERLY REPORTING AT 001		TEMPERATURE, WATER DEG. FAHR	&			******	******	REPORT	YYYYYYYYYYYY

227

10/14/04 ACTIVE INDUSTRIALS WITH NPDES TEMPERATURE REQUIREMENTS PAGE: 19

QL ************* **************** **************** **************** **************** **************** **************** **************** QL

FACILITY NAME / PIPE	PIPE DESCRIPTION / NPDES	PARAMETER / RECEIVING WATERS	MLOC	LM AV(Q)	LM MX(Q)	LM MN(C)	LM AV(C)	LM MX(C)	REQ MONTHS
001Q	QUARTERLY REPORTING AT 001	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
002Q	QUARTERLY REPORTING AT 002	TEMPERATURE, WATER DEG. FAHR	&			******	******	REPORT	YYYYYYYYYYYY
002Q	QUARTERLY REPORTING AT 002	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
003Q	QUARTERLY REPORTING AT 003	TEMPERATURE, WATER DEG. FAHR	&			******	******	REPORT	YYYYYYYYYYYY
003Q	QUARTERLY REPORTING AT 003	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
004Q	QUARTERLY REPORTING AT 004	TEMPERATURE, WATER DEG. FAHR	&			******	******	REPORT	YYYYYYYYYYYY
004Q	QUARTERLY REPORTING AT 004	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
005Q	QUARTERLY REPORTING AT 005	TEMPERATURE, WATER DEG. FAHR	&			******	******	REPORT	YYYYYYYYYYYY
005Q	QUARTERLY REPORTING AT 005	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
006Q	QUARTERLY REPORTING AT 006	TEMPERATURE, WATER DEG. FAHR	&			******	******	REPORT	YYYYYYYYYYYY
006Q	QUARTERLY REPORTING AT 006	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
007Q	QUARTERLY REPORTING AT 007	TEMPERATURE, WATER DEG. FAHR	&			******	******	REPORT	YYYYYYYYYYYY
007Q	QUARTERLY REPORTING AT 007	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ORICA NITROGEN LLC-SENECA WKS	IL0001767	ILLINOIS RIVER							
0010	PROCESS,COOLING TOWER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
PARK FOODS, LP	IL0005100	FLINT CREEK POND							
0010	NON CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
PARKER HANNIFIN CORP-HAMPSHIRE	ILG250018	TYLER CREEK							
0010	NCCW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
PARKWAY REALTY SERVICES-CHICAG	ILG250036	CHICAGO RIVER							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
PCS PHOSPHATE CO.-MARSEILLES	IL0036463	ILLINOIS RIVER							
0010	STORMWATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0010	STORMWATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	******	YYYYYYYYYYYY
PEKIN PAPERBOARD	IL0037729	ILLINOIS RIVER							
B010	BOILER BLOWDOWN(FORMERL Y 001B)	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
D010	NCCW (FORMERLY 001D)	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
PENRECO	IL0036013	UNNAMED TRIB TO DES PLAINES RIVER							
0010	STEAM CONDENSATE AND SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
PEOPLES ENERGY RESOURCE-ELWOOD	IL0046779	CEDAR CREEK							
001B	SERVICE WATER AND STORMWATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
PEPPERIDGE FARM-DOWNERS GROVE	IL0075426	ST JOSEPH CRK-TRIB E BR DUPAGE RVR							
0010	NCCW & COOLING TOWER SPILLAGE	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
PERFORMANCE PROCESS,INC.-MUN DE	ILG250165	MUNDELEIN STORM SEWER TO SEAVEY DTC							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY

237

10/14/04 PAGE: 20

ACTIVE INDUSTRIALS WITH NPDES ~~TEMPERATURE~~ REQUIREMENTS

QL ************* *************** **************** **************** **************** **************** **************** **************** QL

FACILITY NAME / PIPE	PIPE DESCRIPTION	NPDES	RECEIVING WATERS / PARAMETER	MLOC	LM AV(Q)	LM MX(Q)	LM MN(C)	LM AV(C)	LM MX(C)	REQ MONTHS
PETERS JW INC-ROCHELLE		IL0067261	STORM SEWER TO KYTE CREEK							
0010	SW RUNOFF, MIXER WASHDOWN		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
PHILLIPS PIPELINE COMPANY		IL0002585	TRIB TO WILEY CREEK TO KANKAKEE RTR							
0010	TR EFFL,BLOWDWN, HYDROSTATIC,SW		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
PIERCE & STEVENS CORPORATION		IL0063975	DUPAGE RIVER							
0010	NCCW AND STORMWATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
PIERCE CHEMICAL COMPANY		IL0003191	UNNAMED TRIB TO NORTH FORK KENT CK							
0010	NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
PLOCHMAN, INC.-MANTENO		IL0074144	SOUTH BR ROCK CREEK TO KANKAKEE RTR							
0010	NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0010	NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	6						YYYYYYYYYYYY
0010	NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	6			******	******	REPORT	YYYYYYYYYYYY
PMP FERMENTATION PRODUCTS, INC		IL0025615	ILLINOIS RIVER VIA STORM SEWER							
0010	NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0020	CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0060	NON-CONTACT COOLING WATER; SW		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0070	NON-CONTACT COOLING WATER; SW		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
POWER PACKAGING, INC.-MANTENO		ILG250040	SOUTH BRANCH OF ROCK CREEK							
0010	NONCONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
★ 10 PPG INDUSTRIES		IL0001791	LAKE DECATUR							
A020	NCCW,SW,GW (FORMER 002A)		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
A020	NCCW,SW,GW (FORMER 002A)		TEMPERATURE, WATER DEG. FAHR	6			******	******	63	YYYNNNNNNNNY
A020	NCCW,SW,GW (FORMER 002A)		TEMPERATURE, WATER DEG. FAHR	6			******	******	93	NNNYYYYYYYYN
0010	NCCW, BBD, SW, GW, WTR SOFTNER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0010	NCCW, BBD, SW, GW, WTR SOFTNER		TEMPERATURE, WATER DEG. FAHR	6			******	******	63	YYYNNNNNNNNY
0010	NCCW, BBD, SW, GW, WTR SOFTNER		TEMPERATURE, WATER DEG. FAHR	6			******	******	93	NNNYYYYYYYYN
PRINCE MFG CO-QUINCY		IL0038270	S QUINCY DR DITCH TRIB TO MISS RIVR							
0010	NON-CONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
PROGRESSIVE STEEL TREATING		ILG250067	ROCK RIVER							
0010	NONCONTACT-COOLING WATER		TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
PROGRESSIVE STEEL-LOVES PARK		IL0046566	ROCK RIVER							
A010	NONCONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	J			******	******	REPORT	YYYYYYYYYYYY
B010	NONCONTACT COOLING WATER		TEMPERATURE, WATER DEG. FAHR	J			******	******	REPORT	YYYYYYYYYYYY
PROJECT RESOURCES INC-GENEVA		IL0074420	FOX RIVER							

249

★ I think Lake DeCatur is an ACL, however this is not a powerplant discharge.

QL ************* *************** *************** *************** *************** *************** *************** *************** QL

FACILITY NAME / PIPE	PIPE DESCRIPTION	NPDES / PARAMETER	RECEIVING WATERS	MLOC	LM AV(Q)	LM MX(Q)	LM MN(C)	LM AV(C)	LM MX(C)	REQ MONTHS
0010	COOLING TOWER BLOWDOWN	TEMPERATURE, WATER DEG. FAHR		1			******	******	REPORT	YYYYYYYYYYYY
PVS CHEMICALS, INC.		IL0002640	CALUMET RIVER							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR		1			******	******	REPORT	YYYYYYYYYYYY
0020	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR		1			******	******	REPORT	YYYYYYYYYYYY
QUAKER OATS COMPANY		IL0001473	FLINT CREEK TRIB TO FOX RIVER							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR		1			******	******	REPORT	YYYYYYYYYYYY
QUALITY METAL FINISHING-BYRON		IL0003581	ROCK RIVER							
0020	NON-CONTACT COOLING&TR PROCESS	TEMPERATURE, WATER DEG. FAHR		1			******	******	REPORT	YYYYYYYYYYYY
QUEBECOR WORLD-MT. MORRIS		IL0003972	UNNAMED TRIB TO PINE CREEK							
0010	NCCW,COOLING TWR BD, STORMWATR	TEMPERATURE, WATER DEG. FAHR		1			******	******	REPORT	YYYYYYYYYYYY
RADCO INDUSTRIES INC-LAFOX		IL0068292	TRIB OF MILL CREEK							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR		1			******	******	REPORT	YYYYYYYYYYYY
RESOLUTION PERFORMANCE PRODUCT		IL0075205	TRIB TO CHICAGO SANITARY CANAL							
A050	STEAM CONDENSATE AND SW	TEMPERATURE, WATER DEG. FAHR		1			******	******	REPORT	YYYYYYYYYYYY
0040	STEAM CONDENSATE AND SW	TEMPERATURE, WATER DEG. FAHR		1			******	******	REPORT	YYYYYYYYYYYY
0050	STEAM CONDENSATE AND SW	TEMPERATURE, WATER DEG. FAHR		1			******	******	REPORT	YYYYYYYYYYYY
RHODIA, INC.-CHICAGO HEIGHTS		IL0035220	STATE STREET DITCH TRIB TO THORN CK							
0010	NCCW & STORMWATER	TEMPERATURE, WATER DEG. FAHR		1			******	******	REPORT	YYYYYYYYYYYY
RICHARDSON ELECTRONICS-LAFO X		IL0024333	TRIB TO MILL CREEK							
0020	NON-CONTACT COOLING WATER; SW	TEMPERATURE, WATER DEG. FAHR		1			******	******	REPORT	YYYYYYYYYYYY
0030	NON-CONTACT COOLING WATER; SW	TEMPERATURE, WATER DEG. FAHR		1			******	******	REPORT	YYYYYYYYYYYY
RIVER CITY APARTMENT&COMMER CIA		ILG250047	SOUTH BRANCH CHICAGO RIVER							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR		1			******	******	REPORT	YYYYYYYYYYYY
ROCHELLE FOODS, INC.		IL0003638	KYTE RIVER VIA STORM SEWER							
0010	HEAT EXHANGER,NCCW,FI LTER BW	TEMPERATURE, WATER DEG. FAHR		1			******	******	REPORT	YYYYYYYYYYYY
ROCK PLASTIC PRODUCTS		IL0061816	KENT CREEK							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR		1			******	******	REPORT	YYYYYYYYYYYY
ROCKFORD BOLT&STEEL-ROCKF ORD		ILG250073	ROCK RIVER							
0010	NONCONTACT-COOLI NG WATER	TEMPERATURE, WATER DEG. FAHR		1			******	******	REPORT	YYYYYYYYYYYY
ROCKFORD MEMORIAL HOSPITAL		IL0073580	ROCK RIVER VIA STORM SEWER							
0010	NONCONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR		1			******	******	REPORT	YYYYYYYYYYYY
ROCKFORD POWERTRAIN, INC		IL0066265	DRAINAGE DITCH TRIB TO ROCK RIVER							

263

QL ************** **************** **************** **************** **************** **************** **************** **************** QL

FACILITY NAME / PIPE	NPDES / PIPE DESCRIPTION	RECEIVING WATERS / PARAMETER	MLOC	LM AV(Q)	LM MX(Q)	LM MN(C)	LM AV(C)	LM MX(C)	REQ MONTHS
0040	STORMWATER AND NC COOLING WTR	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ROCKFORD PRODUCTS CORPORATION	IL0067989	ROCK RIVER							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ROCKFORD PRODUCTS-PLANT #2	IL0059714	ROCK RIVER VIA STORM SEWER							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ROWELL CHEMICAL CORPORATION	IL0066613	CHICAGO SANITARY AND SHIP CANAL							
0010	WATER SOFTENER,PROCESS ,NCCW,SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ROYSTER CLARK NITROGEN COMPANY	IL0001708	ILLINOIS RIVER							
0010	COMBINED DISCHARGE	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ROYSTER CLARK-MEREDOSIA HTW	IL0071889	GROUND SURFACE,TRIB TO ILLINOIS RVR							
0020	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ROYSTER-CLARK NITROGEN	IL0003930	MISSISSIPPI RIVER							
0010	BOILER,COOLING TOWER,STORMWATR	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
SANGAMON VALLEY LANDFILL INC	IL0065391	UNNAMED TRIB TO THE SANGAMON RIVER							
001Q	QUARTERLY STORMWATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
002Q	QUARTERLY STORMWATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
SENECA FOODS CORP-PRINCEVILLE	IL0001295	PRINCE RUN CREEK							
0020	NONCONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
SLATER LEMONT CORP-LEMONT	IL0001309	CHICAGO SANITARY AND SHIP CANAL							
A030	OVERFLOW FR ROLLING MILL	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0010	NCCW-MELT-SHOP & REHEAT FURNCE	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0030	ROLLING MILL PROCESS WASTEWATR	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
? ACL SOUTHERN ILL POWER-MARION	IL0004316	LITTLE SALINE CREEK,LAKE OF EGYPT							
0030	CONDENSER COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
SOYLAND POWER COOP INC-PEARL	IL0036765	ILLINOIS RIVER							
0010	CONDENSER COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
SPRINGFIELD CWLP	IL0024767	LAKE SPRINGFIELD							
0010	LAKESIDE CONDENSER COOLING WTR	TEMPERATURE, WATER DEG. FAHR	1			******	******	109	YYYYYYYYYYYY
0020	DALLMAN 1 & 2 CONDENSER CW	TEMPERATURE, WATER DEG. FAHR	1			******	******	109	YYYYYYYYYYYY
0090	DALLMAN 3 CONDENSER	TEMPERATURE, WATER DEG. CENT	1			******	******	******	YYYYYYYYYYYY
0090	DALLMAN 3 CONDENSER	TEMPERATURE, WATER DEG. FAHR	1			******	******	109	YYYYYYYYYYYY
STATE STREET MANAGEMENT-ROCKF	ILG250051	ROCK RIVER							

276

10/14/04 PAGE: 23

ACTIVE INDUSTRIALS WITH NPDES TEMPERATURE REQUIREMENTS

QL ************* **************** **************** **************** **************** **************** **************** **************** QL

FACILITY NAME / PIPE	PIPE DESCRIPTION / NPDES	RECEIVING WATERS / PARAMETER	MLOC	LM AV(Q)	LM MX(Q)	LM MN(C)	LM AV(C)	LM MX(C)	REQ MONTHS
0010	NONCONTACT-COOLI NG WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
STERLING STEEL CO LLC-STERLING	IL0003794	ROCK RIVER							
0020	TREATED SCRUBBER WATER BD	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0040	WEST PLANT RECIRCULATION BLODN	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
STONE CONTAINER CORPORATION	IL0002615	DES PLAINES RIVER							
0010	TREATED PROC, SAN, BBDM & NCCW	TEMPERATURE, WATER DEG. FAHR	1			******	******	100	YYYYYYYYYYYY
SUNTEC INDUSTRIES, INC.	IL0067580	CONCRETE FLUME TRIB TO ROCK RIVER							
0010	NONCONTACT COOLING WATER; SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
SURGIPATH MEDICAL INDUSTRIES	IL0070645	WETLANDS AROUND N BR NIPPERSINK CK							
0010	CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
TESTOR CORPORATION-ROCK FORD	IL0069817	STORM SEWER TO ROCK RIVER							
0010	NCCW AND BOILER BLOWDOWN	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
TESTOR CORPORATION-ROCK FORD	IL0070513	STORM SEWER TRIB TO KEITH CREEK							
0010	NONCONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
TEXTRON INC-CAMCAR TAPTITE DIV	IL0074021	STORM SEWER TRIB TO KISHWAUKEE RVR							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
TOTE CART COMPANY	IL0067911	KENT CREEK SOUTH							
0010	NONCONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
TRIGEN-PEOPLES DIST ENERGY CO	IL0073741	LAKE MICHIGAN							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
TURN-KEY FORGING&DESIGN-E LK GR	IL0076741	WILLOW CREEK TRIB TO DES PLAINES							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
U.S. ECOLOGY, INC.-SHEFFIELD	IL0066176	UNNAMED TRIB TO LAWSON CREEK							
0010	SEEPAGE COLLECTION SYSTEM	TEMPERATURE, WATER DEG. CENT	1			******	******	REPORT	YYYYYYYYYYYY
UNDERWRITERS LABS-NORTHBROOK	IL0002739	W.F.N.BR. CHICAGO RIVER							
0010	NON CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
UNION SPECIAL CORPORATION	IL0003662	KISHWAUKEE RIVER VIA STORM SEWER							
0011	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
UOP LLC-MCCOOK	ILG250139	MCCOOK-SUMMIT DITCH							
0010	NONCONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
US CHROME CORP OF ILLINOIS	IL0003808	MOSQUITO CREEK VIA TILE DRAIN SYSTM							

291

10/14/04 PAGE: 24

ACTIVE INDUSTRIALS WITH NPDES TEMPERATURE REQUIREMENTS

QL ************* **************** **************** **************** **************** **************** **************** ****************

FACILITY NAME / PIPE	NPDES / PIPE DESCRIPTION	RECEIVING WATERS / PARAMETER	MLOC	LM AV (Q)	LM MX (Q)	LM MN (C)	LM AV (C)	LM MX (C)	REQ MONTHS
A010	FORMERLY OUTFALL 01A0	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
VANEE FOODS COMPANY-BERKLEY	IL0069124	UNNAMED TRIB TO ADDISON CREEK							
0010	NON-CONTACT COOLING WATER; SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
VANEE FOODS COMPANY-BROADVIE W	IL0075086	ADDISON CREEK							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
VERTEX CHEMICAL COMPANY-DUPO	IL0039519	UNNAMED TRIB TO PALMER CREEK							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
VIO BIN U.S.A.	IL0005142	UNNAMED TRIB TO SANGAMON RIVER							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
0030	NON-CONTACT COOLING WATER; SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
WINNETKA WATER & ELECTRIC	IL0002364	LAKE MICHIGAN							
0010	CONDENSER AND EQUIPMENT CW; SW	TEMPERATURE, WATER DEG. FAHR	1			******	REPORT	REPORT	YYYYYYYYYYYY
0020	HEATED DISCH FR 20 INCH INTAKE	TEMPERATURE, WATER DEG. FAHR	1			******	REPORT	REPORT	NNNNNYYYYYNN
0030	HEATED DISCH FR 60 INCH INTAKE	TEMPERATURE, WATER DEG. FAHR	1			******	REPORT	REPORT	NNNNNYYYYYNN
WOODWARD GOVERNOR COMPANY	IL0002976	ROCK RIVER VIA UNNAMED TRIB							
0010	NCCW, FOUNDATION DRAINAGE, SW	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
WOODWARD GOVERNOR COMPANY	IL0066508	STORM SEWER TRIB TO ROCK RIVER							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
WRIGLEY BUILDING-SCRIBCO R INC.	ILG250031	CHICAGO RIVER							
0010	NONCONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
ZENITH CUTTER COMPANY-ROCKFORD	IL0068161	WILLOW CREEK TRIB TO ROCK RIVER							
0010	NONCONTACT CW AND STORMWATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY
222 SOUTH RIVERSIDE, LLC	IL0005169	SOUTH BRANCH CHICAGO RIVER							
0010	NON-CONTACT COOLING WATER	TEMPERATURE, WATER DEG. FAHR	1			******	******	REPORT	YYYYYYYYYYYY

TOTAL QUICK LOOK PRINT LINES: 777

301

ATTACHMENT A

6.0 FIELD MEASUREMENTS AND CALIBRATION PROCEDURES

Water quality parameters routinely assessed in the field as indicators of lake quality for the IEPA Ambient Lake Monitoring program include:

pH	Secchi
Conductivity	Water Temperature
Dissolved Oxygen	Alkalinity

With the exception of Secchi transparency, all of the above parameters are collected at each lake site and at the same depth where water samples are collected.

6.1 Field Calibration Procedures

Four water quality parameters including ph, water temperature, specific conductance, and dissolved oxygen, are measured with a Hydrolab Corporation multi-parameter instrument (4000 series, Surveyor II, Surveyor III, or Scout). Calibration procedures for the Hydrolab 4000 series are described in detail in Section B of the DWPC QA and Field Methods Manual.

Individual pH, specific conductance, or dissolved oxygen meters may also be used for measurement of in situ lake parameters when a Hydrolab is not available. Calibration of each instrument is accomplished in accordance with the instructions provided by the manufacturer. In the event a Hydrolab or other instrument is not available, pH and specific conductance of surface and bottom samples may be requested from the Laboratory.

6.2 Dissolved Oxygen/Temperature Profile

In addition to the Hydrolab measurements made at the same depth where water samples are collected, a dissolved oxygen/temperature profile is made as described below:

1. Measure D.O. and water temperature at the surface.

2. Measure D.O. and water temperature at 1 foot below water surface In addition, also record pH and specific conductance at this depth.

3. Proceed at 2 foot intervals, using the marked Hydrolab cable to measure depth, until the bottom is reached.

4. In addition at Site 1, a measurement at 2 feet above the bottom must be made, as well as pH and specific conductance to coincide with depth of the bottom sample.

ATTACHMENT B

USGS
science for a changing world

Techniques of Water-Resources Investigations of the United States Geological Survey

CHAPTER D1

WATER TEMPERATURE–INFLUENTIAL FACTORS, FIELD MEASUREMENT, AND DATA PRESENTATION

By Herbert H. Stevens, Jr., John F. Ficke, and George F. Smoot

BOOK 1

COLLECTION OF WATER DATA BY DIRECT MEASUREMENT

Field applications and procedures

Accurate temperature data are essential in order to document thermal alterations to the environment caused by the activities of man and by natural phenomena. This section on field applications and procedures presents guidelines for selection of suitable instrumentation and recommended procedures for the collection of temperature data in streams, lakes, estuaries, and ground water.

Streams

Objectives and accuracy requirements

A water-temperature station on a stream may be part of a network of continuously reporting stations or a temporary station (continuous or intermittent) for special localized studies, such as one for defining the effects of a heated discharge or a reservoir release. The water temperature reported for a station should represent the stream's mean cross-sectional temperature except at sites where complex temperature gradients exist. Generally, the accuracy should be within 0.5°C; however, special studies may dictate greater or lesser accuracy.

Selection of temperature measuring system

The type of temperature system to be used on a stream will depend upon the kind and frequency of data being sought. Measurements of surface temperature or temperature with depth at irregular intervals may be sufficient at some locations; however, at most locations it is desirable to put in a permanent installation at which the temperature is monitored continuously.

Hand thermometers used to obtain surface observations of water temperature and to check the setting of thermographs should be mercury filled and accurate within 0.5°C. It is essential that all hand thermomters be calibrated before use and checked periodically during use with an ASTM standard or good-grade laboratory thermometer. The recommended procedures to calibrate a hand thermometer are given in the section on operation, maintenance, and calibration of instruments (p. 28-30).

The maximum-minimum thermometer (p. 24) is an inexpensive device for obtaining temperature extremes but not their time of occurrence. James Mundorff (written commun., 1973) has used the maximum-minimum thermometer to obtain maximum and minimum temperatures between observations at a regular gaging station. A maximum-minimum thermometer is placed in a 1-foot (25-cm) length of 2½- or 3-inch (64- or 76-mm) diameter galvanized pipe, such as that used for gage-well intakes. This pipe can either be threaded and capped, or, if 2¹/₃-inch (64-mm) pipe is used, be bored for cross-bolts at both ends of the pipe. If the pipe is capped, it should be perforated with holes to allow free circulation of water. The encased thermometer is placed in the stream near the edge of water in the vicinity of the gage house and is fastened to the gage house with a short length of cable. The best location for placement is where the water is flowing but where the device is somewhat protected.

Portable water-temperature-measuring systems used for obtaining temperature profiles should be compact, rugged, and accurate within 0.5°C. Most portable systems utilize a thermistor as the temperature-sensing element and use dry-cell batteries to supply power needs. Both recording and nonrecording types are available. The temperature in nonrecording systems usually is obtained directly from an electrical meter or from a null-balancing system. Multiparameter systems incorporating measurements of temperature, salinity, and conductivity also are available. (See section on portable recording thermometers starting on page 26.)

The fixed water-temperature-measuring system (thermograph) used at continuous-recording stations should be stable and capable of sensing temperatures within 0.5°C for extended periods of time. The thermograph attachment on the Stevens A-35 water-stage recorder has been widely used at gaging stations (Moore, 1963). This instrument is accurate only within about 1°C, however. Temperature measuring systems incorporating a metallic resistance bulb are considered to be the best because they have a long-term accuracy of about 0.3°C. Thermistor and thermocouple sensors have an accuracy within the required limits, but they tend to shift in calibration with time. The temperature-measuring system can also be part of a multiparameter water-quality data-collection system (Cory, 1965; Anderson and others, 1970). Analog-recording systems provide a pen trace on a strip or circular chart, and digital recording systems produce a punched-paper or magnetic tape. (See p. 28.)

Site selection

When a water-temperature station is established, whether it is to be a recording or nonrecording station, care must be exercised to see that the site is suitable for observing water temperatures. Water-temperature records collected at gaging stations and at damsites provide for convenient access and operation but usually are not located on the basis of their suitability as temperature-measurement sites. The greatest problem at gaging stations is that temperature measurements are influenced by inflow from nearby upstream tributaries or reservoir releases. Water temperatures of outflow at dams are usually measured within the scroll case of one or more turbines, or at a gaging station a short distance downstream from the dam. Temperature data collected in the scroll case can be significantly higher than the average of the total outflow because of temperature stratification in the forebay, heat generated by turbulance, and heat conducted through the turbine shaft and dam.

Water-temperature stations should be located far enough downstream from tributaries or reservoirs to ensure that the waters at the station are completely mixed. Temperature profiles throughout the cross section at the proposed site should be made to test for horizontal and vertical homogeneity. (See page 33.) Checking the cross sectional distribution at just one season of the year may not be sufficient. The greatest likelihood of heterogenity in a cross section occurs in the summer when flows are extremely low. At that time, depths are shallow, turbulent mixing is of minimum intensity, and localized heating of the water may occur. In the spring, cool tributary water derived from snowmelt may not become completely mixed with mainstem waters generally for long distances below the tributary confluence.

Large streams may flow through zones of different temperature regimes. In addition, water flowing through secondary passages where velocities are low, such as sloughs, may gain or lose more heat than the mainstem water thereby, creating temperature gradients at the points of reentry with the main stream. Because of such situations on large streams, it may be necessary to locate a water-temperature station at a site where temperature gradients exist. A special localized study may also dictate a site where gradients exist; however, these sites should be avoided whenever possible.

Some locations may require more than one temperature station to adequately define the mean cross-sectional temperature. It is recommended that two stations be installed in the cross section whenever the horizontal or vertical variation in the water temperature exceeds 2°C more than 5 percent of the time. Some locations may require a period of time to determine if two temperature stations are necessary; hence, it may be desirable to install two stations immediately to insure proper data collection. The second station can be removed if it is later determined that it is not required.

Sensor location

Sensors for water-temperature or two-parameter (water temperature and specific conductance) measuring systems are usually housed in a perforated pipe mounted directly in the streamflow. The conductor wire from the sensor to the recorder is shielded in a metal conduit or plastic pipe.

The sensor must be properly located in the stream channel if the temperature sensed is to be representative of the mean water temperature in the cross section. The sensor must be located in flowing water, but it also must be adequately protected to minimize physical damage, it should not rest on the streambed, and it should not be in direct sunlight. Erroneous temperature registration may result if the sensor is exposed to air or becomes covered with silt or debris. Absorption of direct sunlight can cause the streambed of a shallow stream to be warmer than the water above it; hence, a sensor at the bed might register high. At a gaging station where both water temperature and stage records are collected, the sensor should not be located close to the stilling-well intake. Water in the gage well can be several degrees warmer or cooler than in the stream. Water leaving the gage well during a rapid drop in stage could cause a temporary error in the temperature record.

Sensors for multiparameter water-quality data-collection systems (including the temperature sensor) are housed in a flow-through chamber that receives a continuous flow from a submersible pump. The pumped flow rate must be sufficient to prevent water-temperature change. The pump may be mounted in the stream below the water surface by attaching it to a float arrangement, which rises and falls with the stage (Cory, 1965), or it may be mounted on a platform anchored to the streambed, as shown in figure 13 (Anderson and others, 1970). The float-type mounting is subject to damage by debris and ice. Divers equipped with scuba gear can place pumps on the bed; however, because this is expensive for installation and maintenance, the streambed-platform mounting is limited to wadable streams. Both types of mountings can be washed away.

Anderson, Murphy and Faust (1970) have used a stilling-well type of pump facility. (See fig. 14.) Pump servicing can be done on dry land except during extremely high water. The advantages of easy eccess and servicing with this type of pump facility are obvious; however, frequent cleaning of the stilling well and piping are necessary to remove sediment. High construction costs are an additional disadvantage. Existing structures, such as bridge piers or concrete bulkheads, also can be used to support a pumping facility. An installation of this type is shown in figure 15.

Special procedures

Assuming that the objective in measuring stream temperature is to collect data representing the stream's cross section, particular care has to be devoted to defining the mean and to verification that the data collected indeed represent the mean. At this time the reader should review the material on stream temperatures presented in the subsection on operation, maintenance, and calibration of instruments (p. 28–30), noting definitions of the terms "true stream temperature" (TST), "temperature near sensor" (TNS), and recorder temperature (TRC). The following paragraphs discuss in more detail the measurement and computation of mean temperature (TST).

The temperature distribution should be measured periodically throughout a section that is as close as possible to the temperature sensor in order to define any horizontal or vertical gradients. The required frequency for the cross-section measurements, which usually is low at most stations where TST can be represented by a single water-temperature measurement, is dictated by such factors as tributary inflow, reservoir releases, climatic elements, and channel geometry. At stations where temperature gradients exist all or most of the time, data will be needed as often as practicable to accurately compute the discharge-weighted mean temperature in the cross section (TST) and relate it to TNS; however, time, money, and measurement procedures limit the surveillance activity.

Two methods can be used to obtain temperature distribution data at a cross section. The most common method consists of obtaining vertical profiles by lowering the temperature sensor to predetermined depths at each of several verticals across the section. At most locations, 15 to 30 temperature observations (5 depths at 3 to 6 verticals) will be adquate; however, more observations may be required in large streams where tributary and secondary-channel flow is not well mixed with main-stem flow. In the other method, the sensor is towed successively across the channel at several different predetermined depths. This method is the most satisfactory

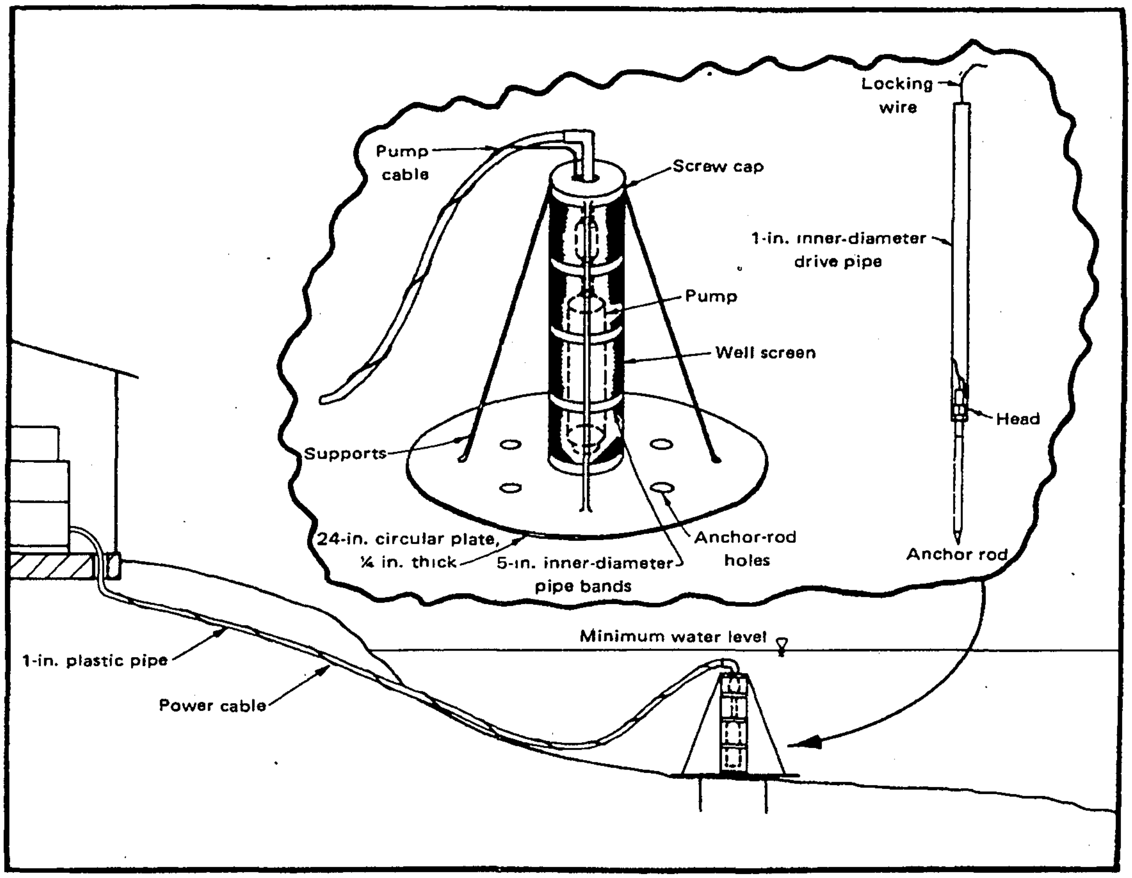


Figure 13.—Platform type of pump support. Platform is anchored by driven rods. (From Anderson and others, 1970, p. 267.)

for large channels. Once the temperature pattern is established at complex locations, the number of observations may be reduced by measuring at the most representative verticals in the cross section.

A stream cross section in which the observed temperature distribution varies over a 2.5°C range is shown in figure 16. The subsection lateral limits are positioned half way between each vertical. Normally, a location with a temperature range of this magnitude would not be selected for a temperature-measuring station, but the temperature-observation data from this cross section are ideal for demonstrating the cross-sectional computation of the average temperature, from the observations, the area-weighted mean temperature, and the discharge-weighted mean temperature.

The average temperature in the stream cross section (T_a) is the summation of the temperature observations (t_o) divided by the number of observations (n). The formula is

$$T_a = \frac{\Sigma\ t_o}{n}. \tag{8}$$

The area-weighted mean temperature in the stream cross section (T_{am}) is the summation of the products of the individual subsection areas (a) and average temperatures (t_a) divided by the total cross-sectional area (A). The formula is

$$T_{am} = \frac{\Sigma\ (a\ t_a)}{A}. \tag{9}$$

The discharge-weighted mean tempera-

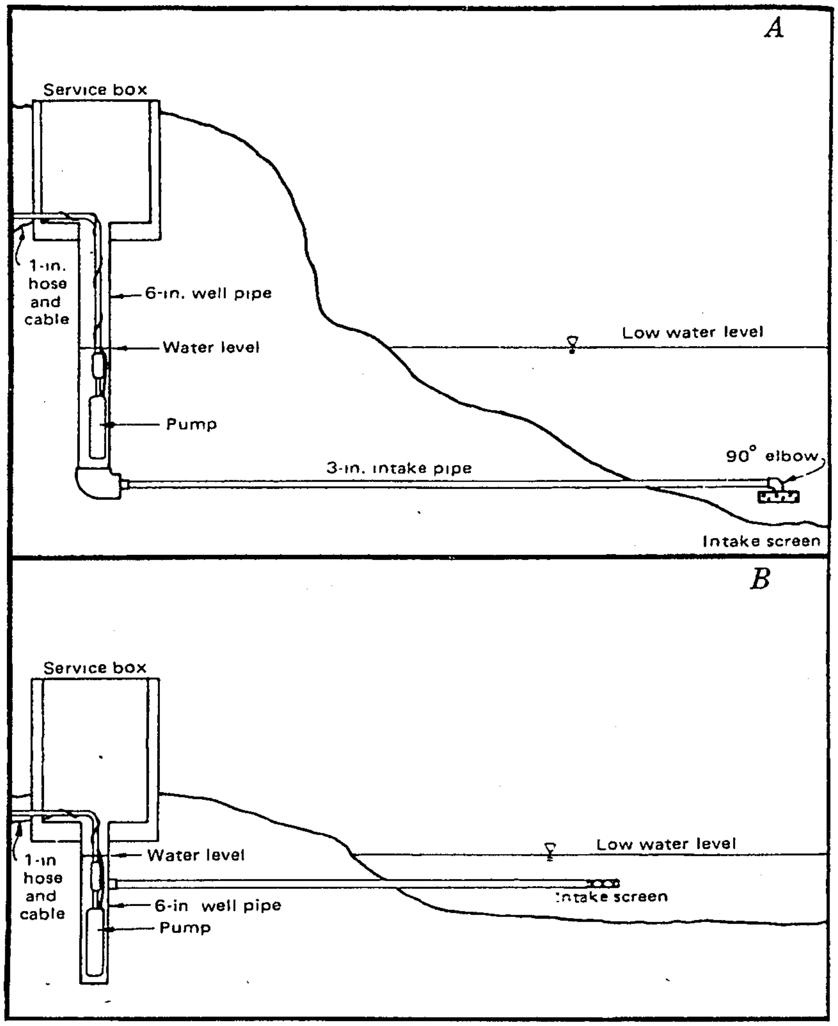


Figure 14 —Two examples of pumps supported within stilling wells. (From Anderson and others, 1970, p. 268.)

ture in the stream cross section (T_{qm}) is the summation of the products of the individual subsection discharges (q) and average temperatures (t_a) divided by the total stream discharge (Q). The formula is

$$T_{qm} = \frac{\Sigma\ (q\ t_a)}{Q}\ . \tag{10}$$

An example of the computation of the cross-sectional mean temperature of a stream by the three methods is shown in table 5. The computed means, based on the data from figure 16, are 11.10°C by the observation-averaging method, 10.82°C by the area-weighting method, and 10.76°C by the discharge-weighting method. Since the differences between the means computed by the three methods are less than the 0.5°C-instrument-accuracy requirement at most locations, as in the above example, the preferred method of computation may vary among data users; however, the discharge-weighted mean is considered to be the best method to use when discharge data is available. Discharge data is readily available at

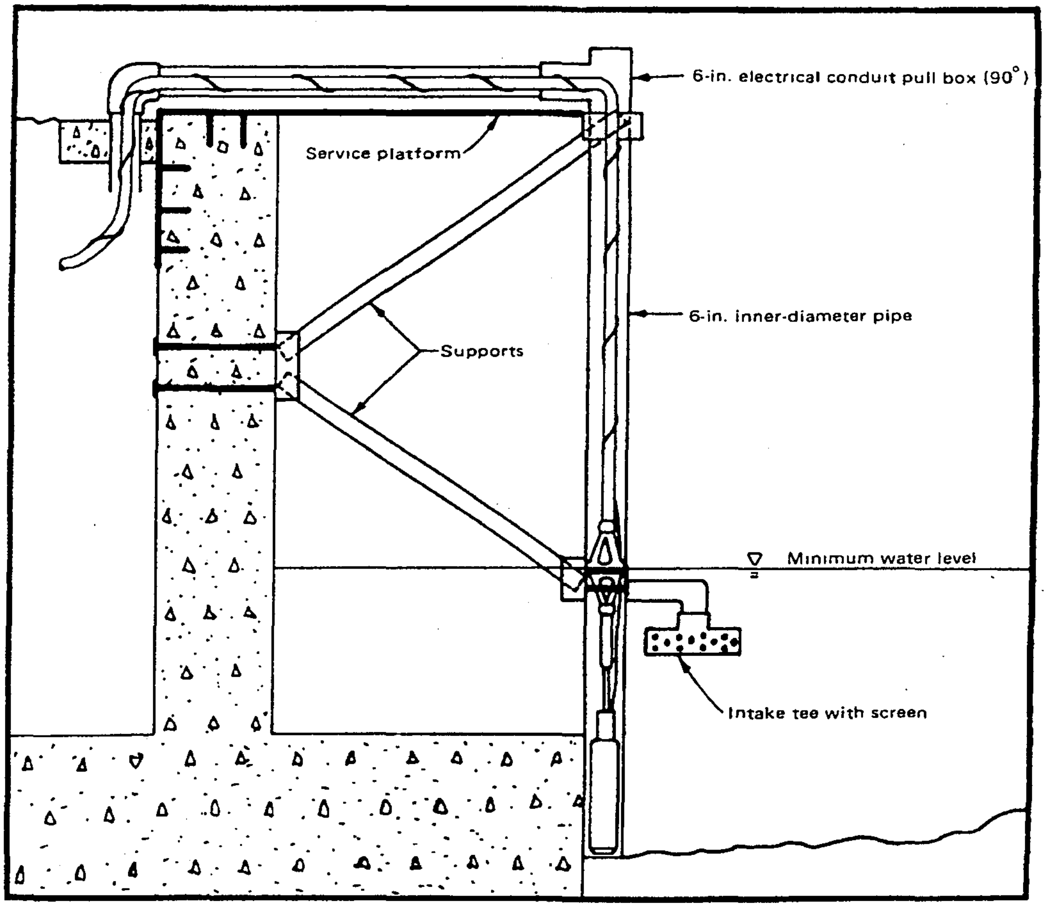


Figure 15.—Facility using bulkhead for pump support (From Anderson and others, 1970, p 269.)

temperature stations located at gaging sites, but at other locations discharge data must be obtained by measurements or indirect means. When the observation-averaging method is to be used, data should be collected at equal depth intervals rather than by equal numbers of samples. The equal-number sampling program, as shown in figure 16, biases the warmer, shallower areas.

Lakes and reservoirs

Objectives and accuracy requirements

Several applications are made of lake-temperature data; consequently, several different accuracy standards must be met. In order to determine if a lake water is suitable for swimming, water skiing, or fish-propagation, temperature-data requirements to within 1°C accuracy certainly are adequate. Unless there are reasons to consider a particularly cold or warm inflow, these requirements also can be met by a measurement at a single place on the lake surface, often near a shore point.

However, for some kinds of computations, such as evaporation measurement, much more accurate measurements of lake-surface temperature are necessary. In order to accurately compute the vapor pressure and back-radiation terms of evaporation computation it is necessary to know mean lake-surface temperature within 0.5°C or better, and it also is necessary to consider areal variations over the surface. Energy-budget computations of heat storage in a lake usually require measuring temperature at points in a vertical to an accuracy of 0.1°C.

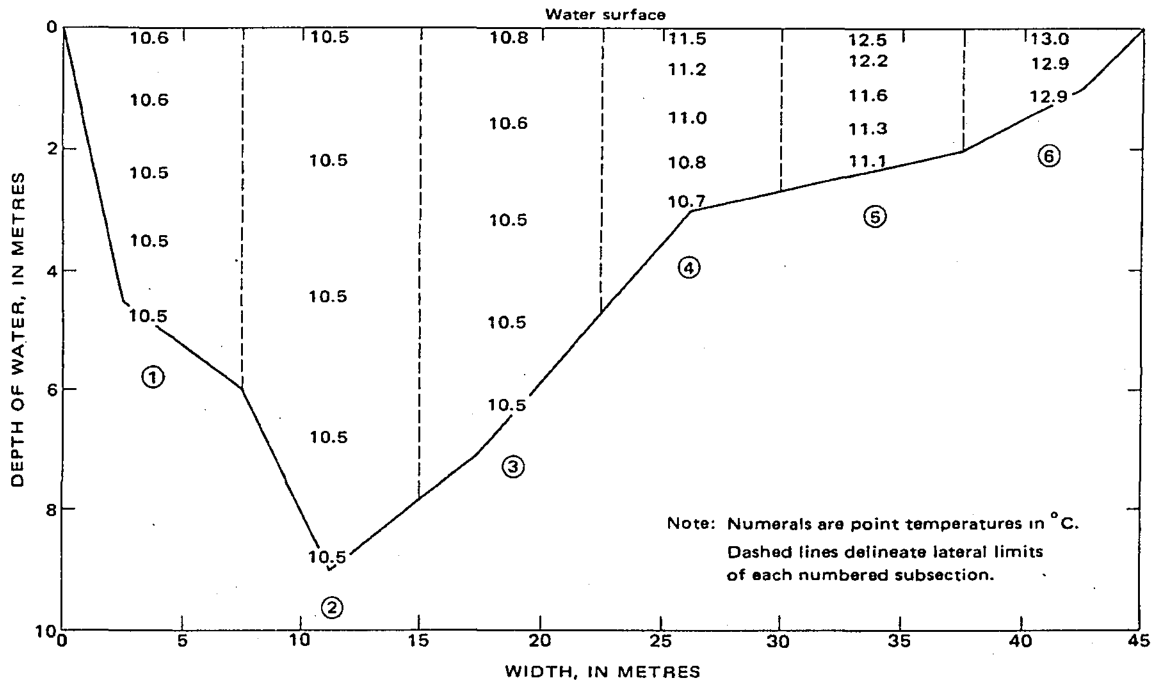


Figure 16.—Stream-temperature distribution in which the temperature varies 2.5° C throughout the cross section.

Table 5.—Computation of the cross-sectional mean temperature of a stream by three methods

Subsection No.	Mean depth (m)	Width (m)	Area (m^2)	Discharge (m^3/s)	Average temperature (°C)	Area times temperature	Discharge times temperature
1	4.3	7.5	32.2	13.5	10.54	339.39	142.29
2	7.8	7.5	58.5	34.7	10.50	614.25	364.35
3	6.4	7.5	48.0	26.4	10.58	507.84	279.31
4	3.4	7.5	25.5	12.3	11.04	281.52	141.31
5	2.4	7.5	18.0	7.7	11.74	211.32	90.40
6	1.2	7.5	9.0	2.7	12.93	116.37	34.91
Total	....	....	191.2	97.3	....	2,070.69	1,052.57
Mean temperature in °C	....	....	....	....	[1]11.10	[2]10.82	[3]10.76

[1]Average of temperature observations.
[2]Area-weighted mean
[3]Discharge-weighted mean.

Definition of mean lake temperature for evaporation computations or temperature modeling also requires a considerable degree of accuracy. Thermal stratification patterns must be measured to an accuracy of 0.1°C if such things as heat transfer through the thermocline are to be computed. On the other hand, if the only purpose of defining temperature at depth is to approximate a model or to estimate reservoir discharge temperature, measurements to within 0.5°C may be suitable.

In some lakes it is possible to ignore areal variations, particularly those lakes which are roughly circular in shape and which do not have large littoral areas. However, in a long narrow reservoir or a very large lake, or in a lake with large shallow areas near the shore, considerable variations in water temperature from place to place may be found at the surface and at depth, and these factors must be considered. If temperature modeling is to be the objective, it is necessary to define the extent of areal variations. However, for evaporation computations by the energy-budget method, it is necessary only to measure temperatures at enough different places to determine mean temperatures to an accuracy of 0.1°C.

Selection of temperature measuring system

It is obvious that the type of measuring system to be used on a lake will depend upon the kind of data being sought, the purpose for which the data are to be applied, and the accuracy requirements of the data user. The following paragraphs rather briefly describe some of the systems that can be used for measurements at a lake surface and measurements at depth, both single observation and recording.

Measurements at the surface.—Simple observations at the lake surface by an observer can be done with a hand-held thermometer. A liquid-in-glass, bimetallic, or resistance-type thermometer will fill this need. The instrument should be immersed to a depth of from 1 to 5 centimetres, allowed to equilibrate, and read with the bulb or sensing unit in place.

When it is necessary to record temperature at the surface continuously, liquid-filled, thermocouple-, or thermistor-type thermometers can be used. If the instrument is installed on a raft that is anchored on a lake, the liquid-filled system is particularly well suited because its rather short probe lead will easily reach from the raft to the surface of the water. When surface temperature is measured at the face of the dam or on a pier at a reservoir that has a considerable stage fluctuation, either the resistance-type or thermocouple-electric thermometer systems will work better because long leads can be better accomodated.

Recording at depth.—When the temperature at various depths is to be recorded, such as to define thermal stratification, either resistance- or thermocouple-type thermometers need to be employed. Several types of switching arrangements can be provided to switch from sensors at one depth to another. Below the surface, diurnal or even day-to-day changes are relatively small. Therefore, if an instrument is being used that makes only single depth measurements at intervals, it can be programed to measure below the surface at 6-hour or greater intervals. Investigators should remember that a.c. electrical power usually cannot be supplied to a raft station and that battery power must be used. Solar panels can be fitted to the raft to extend battery life between recharging.

Single observations at depth.—With proper equipment, it is relatively easy to measure the temperature at different depths of a lake for one-time or survey-type observations. These are the types of measurements commonly used in reconnaissance studies or by hydrologists making thermal surveys for evaporation measurements. The resistance-type thermometer, either recording or nonrecording, can be lowered from the side of a boat and read rather quickly at different points in the vertical. These types of instruments either can be equipped with recorders or the dial readings can be written down.

The bathythermograph (B–T) can also accomplish the job of obtaining a temperature profile from top to bottom. The B–T simultaneously measures depth and temperature by pressure transducer and by metal or liquid-filled systems. Readings are scribed on a glass plate within the instrument and must be placed in a special viewer in order to be read. Accuracy generally is within 0.5°C or better.

Oceanographic techniques can be employed to make rather precise measurements of temperatures at depth in a lake. Reversing thermometers, which are mercury thermometers equipped with a special type of curved tube, will provide readings within 0.01°C. Although these instruments are extremely precise, they must be lowered into place and brought back to the surface for each depth at which a reading is made, or several reversing thermometers may be rigged to the same sampling line. For most uses, the additional cost and inconvenience of the reversing thermometer over the resistance-type or thermocouple thermometer is not necessary to obtain desired accuracy and is not warranted.

Temperature-stratification patterns in lakes during summer seasons will almost always have warm water overlying cold water. For this reason, the maximum-minimum thermometers can be used for single observations of temperature and depth. For example, if the temperature of a lake is 25°C at the surface and its temperature at a depth of 20 metres (66 ft) is desired, the maximum-minimum thermometer can be zeroed and lowered to 20 metres (66 ft). After allowing time for the instrument to equilibrate, it can be brought to the surface, and the minimum temperature shown on the instrument can be assumed to be the temperature at depth of 20 metres (66 ft).

Site selection

No inflexible rule exists for deciding where to measure temperature on a lake surface. It is necessary to consider the shape of the lake surface, shape of the bottom, inflow and outflow patterns, accuracy requirements for the data, and prevailing wind patterns.

For most needs, surface temperature can be monitored at a single point. Generally, it is preferable to locate the monitoring instrument on a raft near the center of the lake; however, in a small lake with variable wind direction, the instrument could be mounted on a dam or at a shore installation. In a large lake, a multibasin lake, or one having a noticeable prevailing wind direction, it may be necessary to monitor temperature at more than one surface location.

When studying temperature distributions throughout a lake or reservoir, or sampling a lake for mean temperature for evaporation computations, it is generally recommended that at least 20 stations on the lake be considered. A common way of locating the stations is to divide the lake surface area into about 20 segments of about equal size and to locate one sampling station in approximately the center of each station. This will provide 20 measurements at the surface and at shallow depths but will only provide a very few measurements at or near the maximum depth of the reservoir. This technique is in keeping with accuracy requirements because there is considerably greater areal variation in temperature at or near the surface than there is at great depth.

Although a minimum of 20 stations is recommended for most studies of variations in lake temperature, in some lakes considerably fewer will suffice. Crow and Hcttman (1973) analyzed data from Lake Hefner (Oklahoma) and determined that the optimum number of stations is 5, and that increasing the number from 5 to 19 resulted in an increase of accuracy of evaporation measurement of only 1 percent.

Sensor location

The sketch in figure 17 shows a raft assembly equipped with instruments for measurement at the surface and at depth, and for measurement of temperature of bottom sediment. Surface temperature is measured by a liquid-filled system having a probe only about 2 metres long. The probe is fastened beneath the raft with a device to hold it within the top 10 centimetres of the water. This instrument, located as shown, will give measurements of surface temperature with 0.5°C and will record variations continuously.

Temperatures at 6 points below the surface in the vertical are best measured by a resistance-type recording thermometer. Lead length for this type of intrument is not a critical factor, and measurements at intervals of several hours are considered to be accurate enough.

Thermocouples are suited for use in the probe set in the bottom sediments of the reservoir. A switching arrangement must be provided to measure the different thermocouple voltages at different intervals. On the instrument shown, no thermocouple reference is necessary because the deepest probe in the sediment can be considered as the reference junction. The raft, as shown in figure 17, is anchored by two different

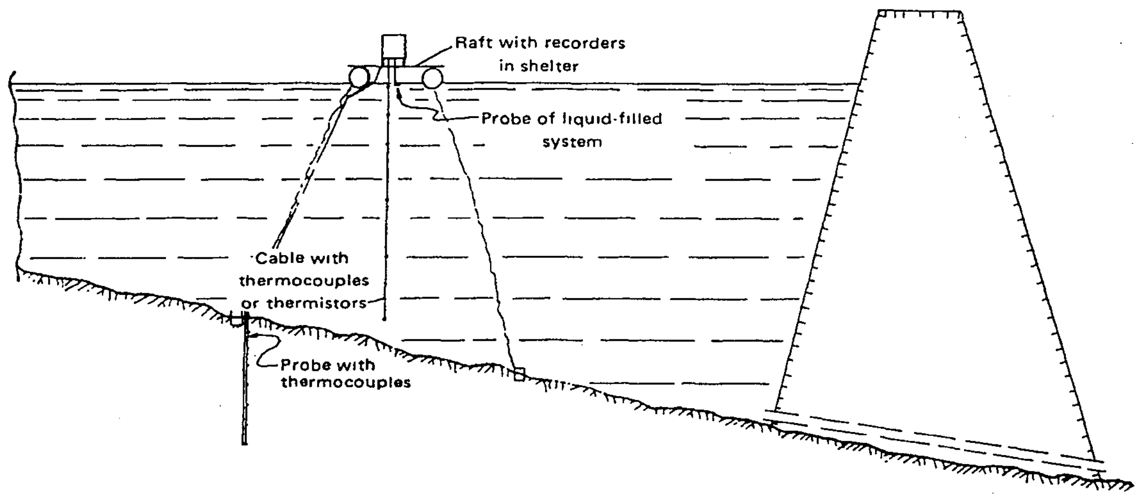


Figure 17.—Raft assembly for measuring temperature at the surface and at depth, and for measurement of temperature of bottom sediment in a lake.

anchors and anchor cables. This is necessary to avoid twisting and tangling of the wires for the depth- and sediment-temperature instruments. However, if only the surface-temperature measuring equipment is used on the raft, it may be possible to use only one anchor and anchor cable. It is desirable to include a piece of chain and swivel at the top end of the anchor cable, or a piece of chain between the anchor and anchor cable.

Equipment for measuring temperature can be mounted on the face of a dam in a manner somewhat similar to the way it is mounted on a raft. The sketch in figure 18 shows an arrangement by which a floating apparatus can be used to support a liquid-filled thermometer used to measure surface temperature only. Such an arrangement will satisfactorily provide a measure of temperature within the top few centimetres. A thermocouple or thermistor thermometer also can be mounted on the dam to measure temperature at several water depths. If there is considerable fluctuation in reservoir elevation, one or more of the sensors may be out of the water part of the time and be measuring air temperature. At a dam installation, prevailing winds may affect the data, and the temperature at the dam may not represent the mean at the surface or at different depths throughout the reservoir.

As mentioned previously, surface temperatures at a shore installation can be measured or some indication of temperature at depth can be gotten by setting instruments on a pier. Pier and shoreline installations should generally be avoided but under some circumstances may be used as the only resort. The largest potential problem of such an installation is caused by effects of shoreline currents and warming of water in littoral areas. In other words, data from a shoreline installation or from a shallow-water pier installation probably do not represent the conditions in the deeper parts of the lake.

Special procedures

Instrument calibration.—Calibration requirements for the purpose of measuring lake temperatures are very similar to calibration requirements for other uses. (See p. 28–30.) Resistance-type recording and nonrecording instruments and liquid-filled systems should be compared with a high-grade mercury-in-glass thermometer. Resistance-type instruments used for temperature surveys should be calibrated at two points each time they are used and should have a complete range calibration at least twice a season. Liquid-filled recording systems should be checked against a mercury-in-glass

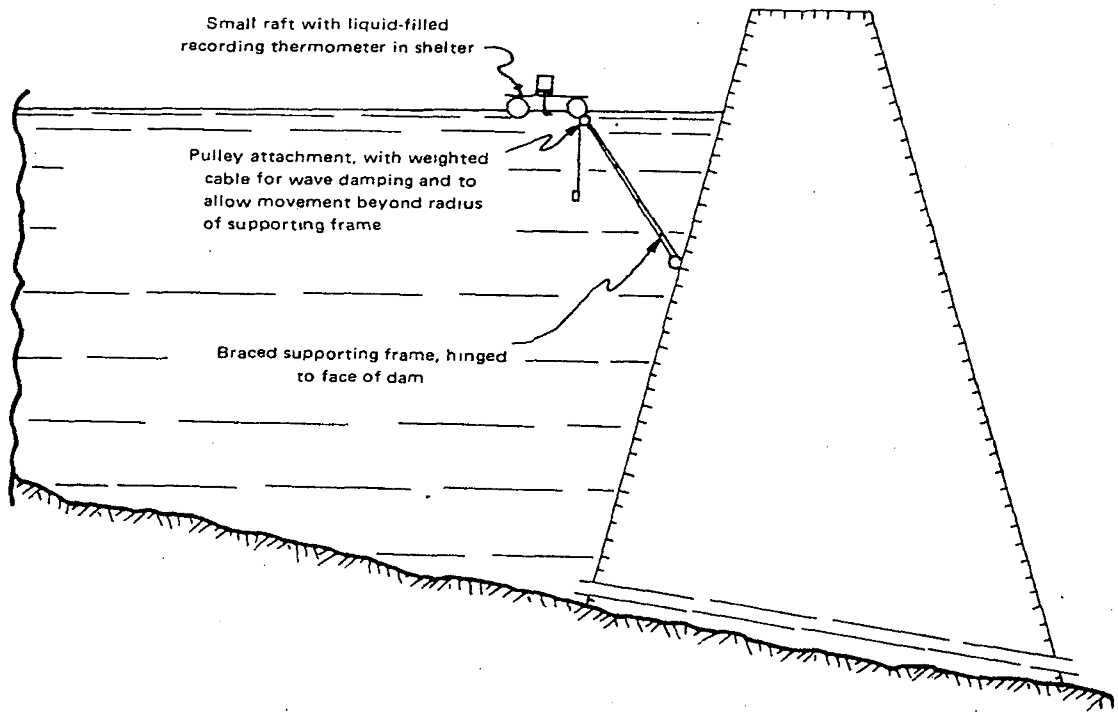


Figure 18 —Device to attach instrument raft at face of dam.

thermometer each time the chart is changed. Resistance or thermocouple units used to measure and record temperature at several depths should be compared with a profile measured with a nonrecording resistance-type thermometer.

Recording instruments located on a raft or on the face of a dam should be "calibrated" to check for comparison with the mean temperature in the lake. This can be done by a 20-point survey of surface temperatures or of temperatures at surface and at depth. If data from the survey indicate that the temperature at the recording station is consistently higher or lower than the mean over the lake surface, it may be necessary to consider other points of measurement. The problem caused by a nonrepresentative station location can be corrected either by moving the station, by adding additional stations, or by establishing (if possible) a calibration relationship between the measured values and true mean temperature.

Computing mean temperature.—Many types of lake studies require that mean temperature of the water body be computed. These computations usually are made from the results of multiple-point surveys, as described earlier in this manual. Figure 19 shows part of a set of field notes from a survey of Gross Reservoir, Colo. Intervals of the depths of observations varied from 2.5 feet (0.76 m) near the surface to 20 feet (6.1 m) at greater depths. The far-right column of the note sheet has been used to show the mean temperature at each of the depths of observation.

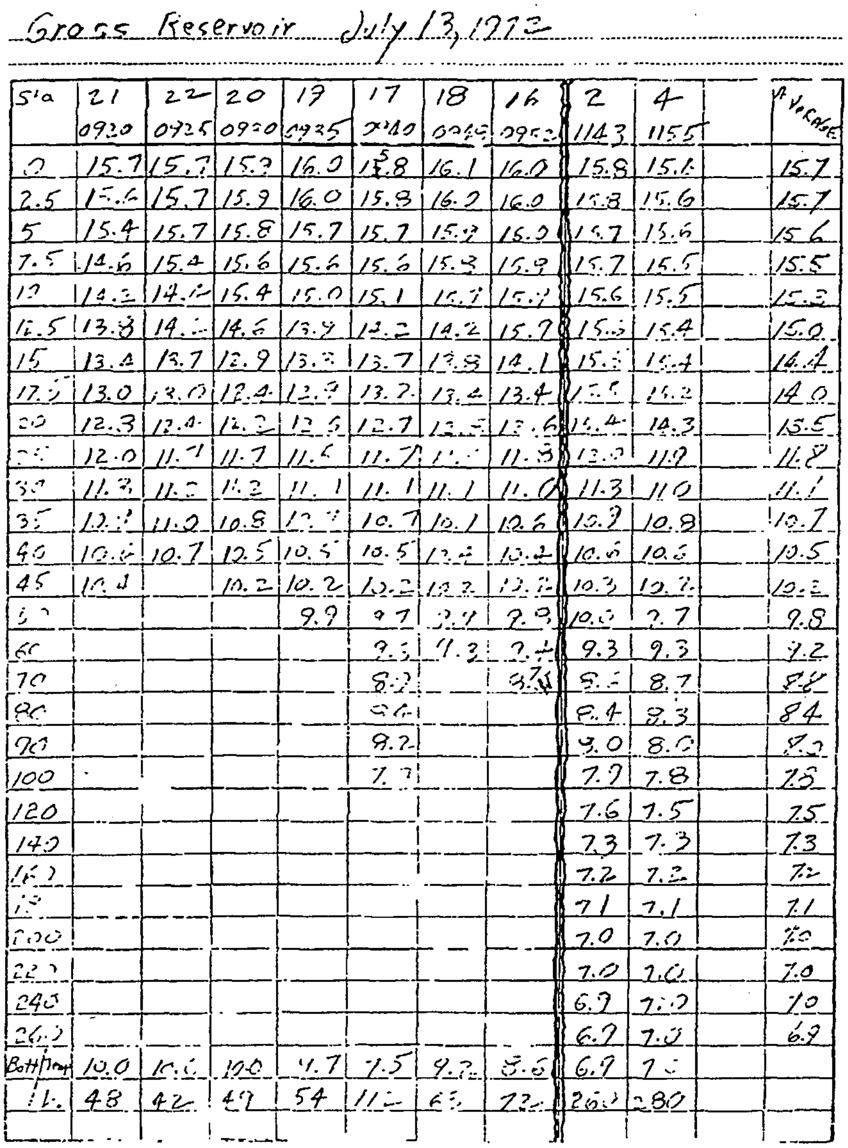
Data from a thermal survey can be used to compute total heat storage by the relationship

$$\Theta = \int_0^H c\, T_z\, A_z\, dz, \qquad (11)$$

Θ = heat storage in the lake above a uniform base temperature of 0°C,

H = total depth,

c = heat capacity of the water, usually



Gross Reservoir July 13, 1972

Sta	21 0920	22 0925	20 0930	19 0935	17	18	16	2 1143	4 1155		Average
0	15.7	15.7	15.?	16.0	15.8	16.1	16.0	15.8	15.6		15.7
2.5	15.6	15.7	15.9	16.0	15.8	16.2	16.0	15.8	15.6		15.7
5	15.4	15.7	15.8	15.7	15.7	15.?	16.0	15.7	15.6		15.6
7.5	14.6	15.4	15.6	15.6	15.6	15.8	15.9	15.7	15.5		15.5
10	14.2	14.2	15.4	15.0	15.1	15.?	15.?	15.6	15.5		15.3
12.5	13.8	14.?	14.6	13.9	14.2	14.2	15.7	15.5	15.4		15.0
15	13.4	13.7	12.9	13.?	13.7	13.8	14.1	15.?	15.4		14.4
17.5	13.0	13.0	12.4	12.?	13.7	13.4	13.4	15.?	15.2		14.0
20	12.3	12.4	12.2	12.6	12.7	12.?	13.6	14.4	14.3		15.5
25	12.0	11.7	11.7	11.6	11.7	11.?	11.8	12.?	11.9		11.8
30	11.3	11.?	11.2	11.1	11.1	11.1	11.0	11.3	11.0		11.1
35	11.?	11.0	10.8	[illegible]	10.7	10.1	10.6	10.9	10.8		10.7
40	10.6	10.7	10.5	10.5	10.5	1?.?	10.2	10.6	10.6		10.5
45	10.4		10.2	10.2	10.2	10.?	10.?	10.3	10.?		10.2
50				9.9	9.7	9.?	9.9	10.0	9.7		9.8
60					9.3	9.3	9.?	9.3	9.3		9.2
70					8.?		8.7	8.?	8.7		8.8
80					8.6			8.4	8.3		8.4
90					8.2			8.0	8.0		8.?
100					7.7			7.9	7.8		7.8
120								7.6	7.5		7.5
140								7.3	7.3		7.3
160								7.2	7.2		7.2
180								7.1	7.1		7.1
200								7.0	7.0		7.0
220								7.0	7.0		7.0
240								6.9	7.0		7.0
260								6.9	7.0		6.9
Bottom	10.0	10.?	10.0	9.7	7.5	9.?	8.6	6.9	7.?		
ft.	48	42	47	54	112	65	72	260	280		

Figure 19.—Part of a set of field notes from a temperature survey of Gross Reservoir, Colo.

assumed to be 1.0 calorie per °C per cm^3,

T_z = mean temperature over the horizontal cross-sectional area of the lake at a given level z, and

A_z = area of the horizontal cross-section at a given level z.

Solution of the above equation usually is performed by dividing the lake into horizontal layers and totaling the products of mean temperature and water volume for each layer.

Figure 20 shows a printout of the computer computation of heat storage and mean temperature in Gross Reservoir for the thermal survey recorded in the notes in figure 19.

The example shown in figure 20 uses rather unorthodox units for convenience. For example, heat storage in each computation layer is in acre-feet times °C, and total heat in the reservoir is shown as 415,715 A-F × °C.

GROSS RESERVOIR THERMAL SURVEY OF JULY 13, 1972

NOBS= 29 GHDAY= 7281.41

DOBS	GHO	VOL	VOLINC	TEMP	TEMINC	HTINC
0.0	7281.41	41568.		15.70		
			1021.		15.70	16034.
2.5	7278.91	40547.		15.70		
			1004.		15.65	15713.
5.0	7276.41	39543.		15.60		
			988.		15.55	15359.
7.5	7273.91	38555.		15.50		
			968.		15.40	14914.
10.0	7271.41	37587.		15.30		
			951.		15.15	14413.
12.5	7268.91	36635.		15.00		
			937.		14.70	13767.
15.0	7266.41	35699.		14.40		
			921.		14.20	13082.
17.5	7263.91	34777.		14.00		
			906.		13.75	12453.
20.0	7261.41	33872.		13.50		
			1764.		12.65	22319.
25.0	7256.41	32107.		11.80		
			1702.		11.45	19492.
30.0	7251.41	30405.		11.10		
			1640.		10.90	17875.
35.0	7246.41	28765.		10.70		
160.0	7121.41	4721.		7.20		
			1582.		7.15	11313.
180.0	7101.41	3138.		7.10		
			1213.		7.05	8551.
200.0	7081.41	1925.		7.00		
			880.		7.00	6157.
220.0	7061.41	1046.		7.00		
			581.		7.00	4069.
240.0	7041.41	464.		7.00		
			340.		6.95	2362.
260.0	7021.41	125.		6.90		
			124.		6.90	858.
295.4	6986.01	0.		6.90		
			41568.			415715.

DOBS = Depth of temperature observation below surface, here in feet

GHO = Gage height (altitude) of observation, here in feet above sea level

VOL = Volume of water in storage below GHO, here in acre-feet

VOLINC = Volume of the layer between two GHO's, here in acre-feet

TEMP = Observed temperature at DOBS, in °C

TEMINC = Mean temperature in the layer between two GHO's, in °C

HTINC = Heat in the layer (above 0°C base), here in acre-feet x °C

AREA= 411.7 ACRES 0.16662E 11SQUARE CM HEAT=0.51278E 15CAL

ENERGY STORAGE= 30775.CAL/SQCM AVE TEMP=10.00DEGREES C

Figure 20 —Printout of computation of heat storage and mean temperature in Gross Reservoir, Colo.

The value of total heat in storage is shown converted to 0.51278×10^{15} calories, or a mean storage of 30,775 cal/cm^2. Average temperature of 10.00°C was found by dividing the total heat (415,715 A-F × °C) by the volume of the reservoir (41,568 A-F).

Estuaries

Objectives and accuracy requirements

Water temperature in an estuary fluctuates annually, seasonally, diurnally, and spatially. Circulation and thermal patterns vary from estuary to estuary. (See p. 12.) Because of the complexities of the temperature gradients, a water-temperature-reporting station on an estuary is usually useful only for providing data for special localized studies, such as defining the effects of a heated discharge at a point within the estuary. Generally, the accuracy of each temperature reported should be within 0.5°C. The collection of synoptic data over tidal cycles is required to define thermal patterns near a reporting station or to define longitudinal temperature patterns within the estuary.

Selection of temperature measuring system

Any portable water-temperature-measuring system used in an estuary must be accurate to within 0.5°C and, because of the complex temperature gradients, be capable of responding to temperature changes rapidly enough to permit the measurement of complete vertical temperature profiles in a short time. Most systems that meet these requirements utilize a thermistor as the temperature-sensing element and use dry-cell batteries to supply power needs. Both recording and nonrecording types are available.

In estuarine studies, multiparameter systems incorporating measurements of temperature and conductivity are often used. Salinity data, determined from the temperature and conductivity data, facilitate the analysis of estuary circulation patterns. In the Columbia River estuary, a temperature-conductivity-measuring system and a velocity system for measuring velocity from a moving boat (Prych and others, 1967) was used to rapidly define velocity, temperature, and salinity profiles throughout the total depth. Outputs from the sensors were recorded on magnetic tape with a system that consisted of a scanning voltmeter coupled to a tape unit. This magnetic-tape data-acquisition system permitted automatic data handling but is bulky and requires a 110-volt electricity supply.

The fixed water-temperature-measuring system (thermograph) used at continuous recording stations should be stable and capable of sensing temperatures within 0.5°C for extended periods of time. Temperature-measuring systems incorporating a metallic resistance-bulb sensor are considered to be the best, and such systems can also be part of a multiparameter water-quality data-collection system. (See p. 32, under "Streams.")

Site selection

Most estuary water-temperature stations are located at special study sites, and the instruments are mounted on existing structures. For water temperatures at a station to most represent the thermal patterns in an estuary, the station should be located in a central location where the flow is relatively deep and fast. Tidal flats and other areas where velocities and depths are low exhibit the greatest diurnal and wind-induced temperature fluctuations (p. 13).

Sensor location

Sensors for water-temperature or two-parameter (water temperature and specific conductance) measuring systems are usually housed in a perforated pipe mounted directly in the water, whereas sensors for multiparameter water-quality data-collection systems (including the temperature sensor) are most often housed in a flow-through chamber which receives a continuous supply of water from a submersible pump. The proper placement of the sensor and (or) pumping systems are described in the section on streams. (See p. 32–33.)

Vertical temperature gradients can be defined with multisensor or multipump-intake systems at several points in the vertical. Anderson, Murphy, and Faust (1970) used motor-operated ball valves to direct the inflowing sample from different points in the depth to the sensor unit. Cory and Nauman (1968) used a multiparameter system that had a floating pump with an intake 1 foot below the water surface and a temperature sensor fixed 1 foot above the bed. When multisensor or multipump-intake systems are used, digital recorders coupled to programable servo-drive mechanisms are used for recording each sensor output. (See p. 28.)

Special procedures

Temperature sensors are nearly trouble free; however, in the saltwater environment of an estuary, continuous maintenance is required to insure proper operation of recorders and other types of sensors (Nauman and Cory, 1970). Condensation of water vapor in the marine environment causes a salt film to deposit on all equipment. The salt accelerates corrosion of mechanical parts and electrical contacts, thereby creating mechanical binding and increased electrical resistance (Bromberg and Carames, 1970).

Observers should follow the same maintenance and calibration procedures as given in the section on streams (p. 33). An estuary station will require more frequent servicing, including the washing of sensors with freshwater to prevent the buildup of salt deposits, to assure the collection of continuous and accurate temperature data. The complex temperature gradients prohibit the determination of the mean cross-sectional water temperature in most estuaries; however, the thermal patterns near the reporting station may be defined by the collection of synoptic profile data over tidal cycles.

Ground water

Objectives and accuracy requirements

As with streams, lakes, and estuaries, the accuracy required for ground-water-temperature measurements depends upon the intended use of the data. If the measurements are made to determine suitability of the water for domestic, municipal, or industrial use, an accuracy of 1°C is adequate. A standard laboratory mercury thermometer that is accurate to 0.5°C can be used for this purpose. Other more sophisticated instrumentation generally used in ground-water studies is usually accurate to less than 0.1°C (Sass and others, 1971).

In many studies that involve determining rate and direction of ground-water movement from temperature data, the accuracy of the absolute temperature is not of great importance, but a high level of precision is needed to accurately measure temperature gradients. It is possible under ideal conditions to measure water temperature with a precision of 0.0005°C. However, a practical limit for the precision of water temperatures measured in boreholes has been found to be about 0.01°C (Sorey, 1971). This appears to be adequate for most purposes. If higher precision is required, it may be attainable by using extreme care both in calibration of the temperature detector and in application to field use.

Selection of temperature measuring system

The kind of measuring system to use will depend upon the problem at hand, the accuracy requirements, the frequency of sampling, and the location of the data points. In some instances, it may be desirable to install a temperature recorder. In other instances, a single measurement at a given location is adequate.

There are several different ground-water temperature detectors, including, for example, mercury thermometers, thermocouples, and resistance thermometers. The thermistor, and type of resistance thermometer, is frequently used in borehole thermometry. Perhaps the simplest and least expensive equipment for measuring ground-water temperature with accuracy sufficient for many purposes is the mercury thermometer. A standard laboratory partial-immersion mercury thermometer can be used to measure the temperature of water discharging from wells or springs.

A good device for temperature measurements just below the water table in boreholes or wells is the maximum-minimum thermometer (p. 24), which costs only a few dollars, is readily available, and is easy to use. It is especially useful for reconnaissance work, in which an accuracy of about 0.5°C is adequate and only one or two readings in a well are needed. One disadvantage is that continual raising and lowering of the thermometer to get readings at different depths becomes tedious and tends to disrupt the thermal stratification of water in the well. The possibility of thermometer breakage presents a pollution hazard. In addition, thermometers of this type are pressure sensitive, so measurements taken at depth may be significantly in error. To avoid this effect, the thermometers can be placed in a pressure tube, sealed to prevent entrance of water (Birch, 1947.)

A commonly used system for borehole-temperature measurements consists of a multiconductor cable and hoist, a probe that contains a temperature transducer, and a resistance-measuring system. The multiconductor cable and hoist can be hand or power driven, depending upon the depth to which temperature measurements are to be made. The location of the probe below land surface is obtained from a depth indicator located on the reel. Temperature transducers usually consist of a number of thermistor beads encased in a probe some 6 inches (15 cm) in length and 1 inch (2.54 cm) in diameter. The thermistors are arranged to give maximum sensitivity and preferably, but not necessarily, a linear output. The linear output allows one to read the temperature directly in degrees Celsius. The thermistors are semiconductors which have a large temperature coefficient of resistance (about -4 percent/°C). It is this fact which is the principle behind their use as temperature detectors; hence, some variation of the Wheatstone bridge is often used to measure the resistance across the thermistors. Details of a typical arrangement for temperature measurement in wells are given by Sass and others (1971). Units adequate for most purposes are available commercially at a cost of about $200 (Olmsted, oral commun., 1973).

The logging unit just described has advantages over the maximum-minimum thermometer in that many more measurements can be taken in a shorter period of time with a much higher degree of precision. Thermal stratification of water within the well is less likely to be upset as the probe is lowered slowly and is not pulled back to the surface to get a reading.

The amount of time needed to attain a stable reading at any given point depends upon the distance from the surface, where the temperature gradient is steepest, and upon the heat capacity and initial temperature of the probe. Usually, 1 to 3 minutes is adequate.

A thermistor probe device that may be used to provide a continuous log of temperature with depth is also available (Keys and Brown, 1975). The device detects temperature-related resistance changes in the thermistor through a voltage-controlled oscillator. The pulses may be integrated by a rate meter to provide an analog record of pulse counter. The probe used by Keys and Brown is electrically and thermally stable, and they were able to repeat temperature measurements in a borehole with 0.02°C.

Site selection

Ground-water temperatures may be measured in unused wells, pumping wells, discharging springs, mines, or any other accessible location, depending on the purpose of the measurements. Usually, for reasons of cost, the hydrologist is restricted to collecting data at existing sites or installations.

If a temperature profile in a well is to be measured to study slowly moving ground water, considerable care must be taken in selecting the observation well. It is preferable that the well be idle for a number of years and that it not be disturbed in any way. There should not be any circulation within the well bore, such as from one screened interval to another, or along the outside of the casing. Wells that have been backfilled with cement should be avoided because cement, upon curing, generates heat for years after installation. This generated heat may be of sufficient magnitude to upset the local thermal gradient. A metal well casing may distort the local temperature profile because of its high thermal conductivity. Another important consideration is the well diameter, because thermal gradients will induce vertical convection in the fluid within the well bore of large-diameter wells (Sammel, 1968).

Preferably, the wells should be 2 inches (50.08 cm) or less in diameter for a temperature profile.

Despite the apparent violation of many of these considerations, Sorey (1971) obtained satisfactory results from many wells. Just the same, it is wise to keep these points in mind when planning a ground-water-temperature study.

More reliable results probably can be obtained by using wells especially designed for temperature measurements. Again the design will depend somewhat upon the purpose for which the data are to be used. For most studies, wells should be drilled below the depth of seasonal-temperature variation as well as below it. (Such data may provide useful information, such as thermal diffusivity of the near-surface materials and whether local ground-water recharge is taking place.) A plastic pipe with no perforations, either sealed at the bottom or fitted with a well point and a screen, may be used. Plastic has the advantage that its thermal conductivity more closely represents that of the natural porous medium than does steel. A well point and screen are used if it is desired to measure water levels.

The annulus between the well and casing should be backfilled with a material other than cement that prevents the circulation of water. A soil that contains clay may bridge and cause gaps in the annulus.

If the casing is sealed at the bottom, it is filled with water to the desired level. This may be above the water table if measurements of temperature in the unsaturated zones are desired.

A newly drilled hole usually upsets the thermal regime in the vicinity of the well because of the drilling process. This may result in the generation of heat by friction or, in a thermal area, may cool rather than heat the materials near the hole by rapid circulation of the drilling fluid. It is best to monitor the temperature profile after completion of the drilling to determine when it has come into thermal equilibrium with its surroundings. This may take from days to months, depending upon the thermal properties of the materials and the degree by which the thermal regime is upset.

Sensor location

When measuring the temperature of discharging wells or springs, placement of the sensor generally presents little problem. Care must be taken to avoid extraneous effects, such as heat exchange between water and the pump or the atmosphere (Schneider, 1962).

When taking a temperature profile in a well, the sampling interval must be decided upon. This depends primarily upon the thermal gradient in the well. Steeper gradients require a shorter distance between measuring points. A 10-foot (3-m) interval will provide sufficient data to accurately represent the thermal profile in most instances, but, if it is desired to relate the thermal profile with lithology, a 2-foot (0.6-m) interval may be necessary.

The depth to which temperature measurements should be made depends upon requirements of the problem. To be in the range of the geothermal gradient undisturbed by seasonal-temperature fluctuations, measurements should be made below about 20 m (66 ft). Above about 10 m (33 ft), the influence of surface temperature produces high thermal gradients that cause instability in all but very small diameter wells.

Special procedures

Mercury thermometers require little maintenance, but thermistor temperature-measuring systems require considerably more. Batteries, electronic equipment, and electrical connections in these systems invariably require checking to insure that they are in good working order. The thermistor probes should be checked to see if their response has changed because of thermal shock, aging, or other factors. The probes should be checked frequently for leaks, as water will make a thermistor inoperative. See additional material in the subsection on operation, maintenance, and calibration of instruments (p. 28–30).

Commercially available temperature-detecting units are calibrated at the factory. However, precision required in ground-water-temperature measurements is often such that recalibration is necessary. The systems used by Sorey (1971) were calibrated with platinum resistance and mercury thermometers to a precision of 0.005°C. Thermistor probes tend to be very stable with passage of time if properly cared for. They have drift rates of about 0.01°C/yr or less and, hence, need recalibration only occasionally.

Part 3. Data Presentation

Observation and monitoring schemes described in earlier parts of this report provide new data in a relatively crude form. Single observations by an observer or a fieldman may be penciled notes in a fieldbook or on observer forms. Charts from analog-type recorders are simply an inked or scribed line on a piece of paper. Digital recorders will produce either a magnetic or a punched tape, which is difficult to read or totally unintelligible and unusable without special processing.

On the other hand, the user of temperature data requires information in a more usable and more interpretable form. Publication of raw data is common and must be in a form that is suitable to a rather wide variety of users. Research data often have special format needs, but, again, the purpose is to provide the information in a form that it can be put to the best use.

This section presents information on the reduction of raw field data, application of corrections, and forms of publication.

Reduction and correction

An ideal temperature-measuring system would produce data ready to publish without exerting additional effort. However, considering the state of the art of instrumentation today, this dream is probably not to be realized for some time.

The job of reducing temperature data breaks down into two basic operations—removal of error caused by imperfect equipment and conversion of the recorded instrument output to numeric values. The procedures differ with types of equipment, but the following discussion is designed to provide some general guidelines.

Correcting instrument error

Perfectly operating instruments that are serviced by a careful operator generally require very little correction in their record. Realistically, however, there are errors that creep into all the records, owing to drift of the instrument or to failure of different parts of the mechanism, such as the timing devices. The most common error probably is drift between servicing. An instrument may be left operating in good calibration but will drift out of calibration over several days of operation. This is the reason that it is important to make a calibration check of an instrument before it is readjusted.

Figure 21 shows two examples of the type of error that may be found when an instrument is calibrated. Constant error through the calibration range is most common, with a displacement of the same number of degrees at all temperatures. Nonuniform error is not so common but is found frequently enough that the two-point calibration is justified. (See p. 28.) Not shown, but also possible, is a curvilinear calibration whereby an instrument is nearly in calibration over part of its range, but deviates significantly in another part. This type of error is rather infrequent and, therefore, generally does not justify calibrating at more than two points in the instrument range.

Corrections can be applied to the records of analog recorders at the same time the records are reduced. If a constant error of 2°C is found at the end of a 2-week period, and if the instrument was in adjustment at the beginning of the period, the 2°C error should be prorated over time, in increments of 0.5°C. Nonuniform error over the calibration range is a little more difficult to correct, and the correction usually is best applied by assuming a constant rate of drift at each end of the calibration curve. For example, if the nonuniform error shown in figure 21 developed over a period of 2 weeks, the 2°C error at 15°C could be assumed to have been 1°C at the end of the first week.