

**LaSalle Environmental Audit  
Response to Request for Additional Information**

**Index #:** 015      **RAI #:** AQ-05      **Category:** Aquatic Ecology

**Statement of Question:**

Section 4.6 of the ER considers the effects of heat shock on aquatic biota in the Illinois River.

- a. Section 4.6.3.2 of the ER (page 4-34) states that in its Final Environmental Statement (FES) for LSCS operation, NRC staff predicted that under worst-case conditions (highest blowdown temperature) the thermal plume area (defined by the 3°C/5°F isotherm) would be 2,500 m<sup>2</sup> (0.6 ac) and would encompass approximately 9 percent of the river's cross section. Describe any field studies or modeling studies that have occurred during operations that describe the temperature and size of the thermal plume in the Illinois River, such as ComEd's Mixing Zone Thermal Studies from 1989 through 1995.
- b. In its analysis, the NRC staff will consider the effects of heat shock on aquatic biota in both the Illinois River and the cooling pond. To support this analysis, please provide any thermal studies that have been conducted on the cooling pond.

**Response:**

- a. Field data were collected during 1989, 1990, 1993 and 1995 to verify the size of the LSCS thermal plume in the Illinois River. Documentation of these internal studies is being provided as Attachment 1 to this RAI response. In addition, an analysis was prepared in 2009 of expected changes to LSCS environmental effects, including effects from blowdown discharge to the Illinois River, resulting from a Measurement Uncertainty Recapture (MUR) Power Uprate (PU) and a possible future Extended Power Uprate (EPU). The LSCS MUR PU has now been implemented and represents the current licensing basis for the LSCS unit power levels reported in the ER. However, on June 11, 2013, Exelon Generation announced the cancellation of the EPU project due to economic considerations. The analysis was documented in Exelon Nuclear Evaluation No. 2009-08466, Rev. 0, which contains Task Report 47 – Environmental Impact prepared by Sargent & Lundy LLC (September 10, 2009).
- b. LSCS utilizes a predictive thermal model for the cooling pond during the summer to facilitate station and pond operations during extreme heat conditions. The model is not typically used to predict cooling pond temperatures other than in the Ultimate Heat Sink, from which cooling pond blowdown water is discharged. Exelon Generation provided information to the NRC Staff about the model's capabilities and validation in letters dated October 4, 2013 regarding Response to Request for Additional Information Related to License Amendment Request to Technical Specification 3.7.3, "Ultimate Heat Sink (UHS)," (ML13282A345) and December 4, 2014 regarding Response to Request for Additional Information Regarding License Amendment Request to Revise Ultimate Heat Sink Temperature Limits (ML14352A319).

In addition, an analysis of expected changes to the design duty, operating conditions, and performance parameters resulting from revised plant conditions associated with an MUR PU and a possible future EPU for LSCS was prepared in 2009. The LSCS MUR PU has now been implemented and represents the current licensing basis for the LSCS unit power levels reported in the ER. However, on June 11, 2013, Exelon Generation announced the cancellation of the EPU project due to economic considerations. The analysis, which predicts changes in lake blowdown temperature under MUR PU and

EPU conditions, was documented in a report prepared by Sargent & Lundy LLC (S&L) on behalf of Exelon Nuclear (Evaluation No. 2009-07279, Rev. 0, Final Issue), Task Report 17 – Cooling Lake).

In August 2010, Exelon Generation documented Calculation No. L-002456, Rev. 1A, LaSalle County Station Cooling Lake Performance (August 14, 2010). This calculation utilized the Sargent & Lundy computer code LAKET-PC to determine expected change in peak summertime cooling pond temperatures under the new MUR PU operating conditions.

**List of Attachments:**

1. ComEd 1995. Collection of Documents Describing Mixing Zone Thermal Studies from 1989 through 1995.

RAI # AQ-05  
ATTACHMENT 1

# Memorandum

**ComEd**

July 6, 1995

To: C. W. Jeanblanc

Subject: Information Regarding NPDES Thermal  
Compliance for LaSalle County Station

In response to your request, enclosed is the complete file of thermal data which has been accumulated by the Environmental Services Department (ESD) for LaSalle Station since 1989. Included in this package are the results of seasonal field studies which were done by ESD personnel in order to establish baseline compliance with the 26-acre mixing zone limitation during varying seasonal conditions. Based on this data, along with ESD's considerable experience with thermal compliance assessments at our other generating stations, we believe that we have the expertise necessary in order to make informed decisions regarding thermal compliance without the need to perform routine field surveillance. The Illinois Environmental Protection Agency (IEPA) realizes that continuous monitoring within the mixing zone is impractical, and that is the primary reason why LaSalle (as well as our other closed cycle stations) is only required to monitor and report blowdown temperature (per NPDES permit Special Condition No. 3, Section C).

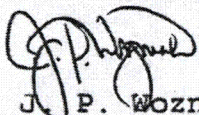
Except during prolonged hot, dry weather conditions, LaSalle's blowdown discharge would not be expected to exceed the 26-acre mixing zone thermal limitation. ESD has requested that all of our stations keep us informed of the incidence of high intake and/or discharge temperatures, so that we can make further compliance evaluations, as deemed necessary according to conditions. (This includes the potential for additional field studies to document compliance with the mixing zone criteria, which have normally been conducted by ESD, with the assistance of station and/or contractor personnel).

I hope that this information will give you the background you require in order to begin to develop a station thermal compliance procedure, if determined to be required by station upper management. I would be more than glad to come out to the station to meet with you to discuss this matter further, if you feel that this would be useful.



July 6, 1995  
C. W. Jeanblanc  
Page 2

If you should have any questions or require additional information, please give me a call at G.O. Ext. 4468.



J. P. Wozniak  
Senior Biologist--ESD

JPW:em  
stemp.mem  
Enclosures

cc: R. H. Varju (w/encl.)  
M. E. Cole (w/o encl.)  
File: W-01-PER-H2 (w/encl.) /

MEMO TO FILE

Subject: LaSalle Station Cooling Pond Blowdown Temperature

Summary of Situation: During the month of March, 1995, LaSalle's blowdown temperature exceeded 60 °F, as detailed below:

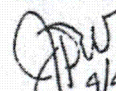
<u>Date</u>	<u># of Hours &gt;60°F</u>	<u>Max. Daily °F</u>	<u>Max. Upstream °F*</u>
March 15	15	69.9	53
March 16	22	68.2	52
March 17	16	67.1	54
March 18	14	63.7	53

\* Data from Dresden Lock and Dam recorder

The blowdown flow rate during this entire period was 32,250 gpm (71.8 cfs). Illinois River flow at Marseilles was in the 9000 cfs range. (Due to the small volume of LaSalle's blowdown, in relation to river flow, immediate mixing can be assumed). Using the most extreme values encountered during this period, the worst-case, fully mixed temperature of the main body of the river would be:

$$\frac{(71.8 \text{ cfs})(69.9 \text{ °F}) + (9000 \text{ cfs})(54 \text{ °F})}{(71.8 \text{ cfs} + 9000 \text{ cfs})} = 54.1 \text{ °F}$$

This value is well within the 60° F limitation which applies at the edge of the 26 acre mixing zone. This information was relayed to Rudy Varju, LaSalle Chemistry Department. Station personnel have been requested to continue to call ESD for compliance evaluation whenever the blowdown temperature approaches the monthly thermal water quality standard for the main body of the river.

  
4/4/95  
J. P. Wozniak

cc: M. E. Cole  
R. H. Varju  
File: W-01-PER-H2  
Thermal Study Book



August 30, 1993

To: J. V. Schmeltz

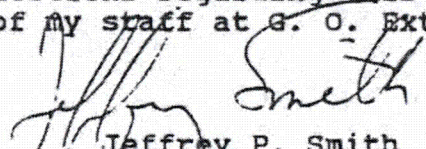
Subject: Thermal Compliance Evaluation of  
LaSalle Station Cooling Pond Blowdown

In response to the numerous reports of blowdown temperatures at LaSalle in excess of 90 degrees Fahrenheit over the past several weeks, a thermal plume study was initiated by the Environmental Services Department (ESD). This study was done in order to document LaSalle station's compliance status in relation to Special Condition No. 3 of its NPDES Permit.

The subject study was conducted on Thursday, August 26, 1993 by J. Wozniak and M. Cole of my staff, with the valuable assistance of both LaSalle station and contractor personnel. Measurements taken on this date indicate that LaSalle station's blowdown continues to be well within the limits established by the General Use thermal standards.

Station personnel should continue to keep ESD informed when blowdown temperature exceeds 90 degrees F. Further thermal studies will be conducted, as deemed necessary, to document continuing thermal compliance.

If you should have any questions regarding this matter, please contact Julia Wozniak of my staff at G. O. Ext. 4468.

  
Jeffrey P. Smith  
Supervisor of Water Quality

Attachments

cc: R. H. Varju  
M. S. Tyrrell  
K. S. Francis  
File: W-01-GEN-A



LASALLE COOLING POND BLOWDOWN  
THERMAL COMPLIANCE VERIFICATION STUDY

Thursday, August 26, 1993

Plant Operating Conditions:

Unit 1: 1090 MWe  
Unit 2: 804 MWe  
Blowdown Flow Rate: 33,000 gpm (73.5 cfs)

Illinois River Flow Rate: 10,800 cfs

Ambient River Temperature Data:

Upstream of Intake:

South Side (1030)	Mid-Channel (1035)	North Side (1040)
S---- 27.8 deg. C	27.9 deg. C	27.9 deg. C
1'--- 27.8 deg. C	27.9 deg. C	27.9 deg. C
2'--- 27.8 deg. C	27.9 deg. C	27.9 deg. C
4'--- 27.8 deg. C	27.9 deg. C	27.9 deg. C
6'--- 27.8 deg. C	27.9 deg. C	27.9 deg. C
8'---xxxxxxxxxxxx	27.9 deg. C	xxxxxxxxxxxx
10'---xxxxxxxxxxxx	27.9 deg. C	xxxxxxxxxxxx
AVG>>>>27.8 deg. C	27.9 deg. C	27.9 deg. C

Intake:  
(1045)  
S----27.8 deg. C  
1'---27.8 deg. C  
2'---27.8 deg. C  
4'---xxxxxxxxxxxx  
6'---xxxxxxxxxxxx

AVG>>>>27.8 deg. C

Discharge:  
(1050)  
30.5 deg. C  
30.5 deg. C  
xxxxxxxxxxxx  
xxxxxxxxxxxx  
xxxxxxxxxxxx

30.5 deg. C

Downstream River Temperature (Daymark 248.8):

South Side (1020)	Mid-Channel (1015)	North Side (1010)
S---- 27.9 deg. C	27.9 deg. C	28.0 deg. C
1'--- 27.9 deg. C	27.9 deg. C	28.0 deg. C
2'--- 27.9 deg. C	27.9 deg. C	28.0 deg. C
4'--- 27.9 deg. C	27.9 deg. C	28.0 deg. C
6'--- 27.9 deg. C	27.9 deg. C	27.9 deg. C
8'--- 27.9 deg. C	27.9 deg. C	xxxxxxxxxxxx
10'---xxxxxxxxxxxx	27.9 deg. C	xxxxxxxxxxxx
AVG>>>>27.9 deg. C	27.9 deg. C	28.0 deg. C

**LASALLE COOLING POND BLOWDOWN  
THERMAL COMPLIANCE VERIFICATION STUDY**

Calculation of Allowable Thermal Plume:

$$T(\text{amb}) = T_m - \frac{[Q_{ls}](T_d - T_i)}{[Q_{il}]}$$

$$T(\text{allow}) = T(\text{amb}) + 2.8 \text{ deg. C}$$

where:  $T(\text{amb})$ =calculated ambient temperature (deg. C)

$Q_{ls}$ =Cooling Pond Blowdown Flow Rate (cfs)

$T_d$ =Discharge Temperature (deg. C)

$T_i$ =Intake Temperature (deg. C)

$Q_{il}$ =Illinois River Flowrate (cfs)

For August 26, 1993 Conditions:

$$T(\text{amb}) = 27.9 - \frac{[(73.5)(30.5 - 27.8)]}{(10,800)} = 27.9$$

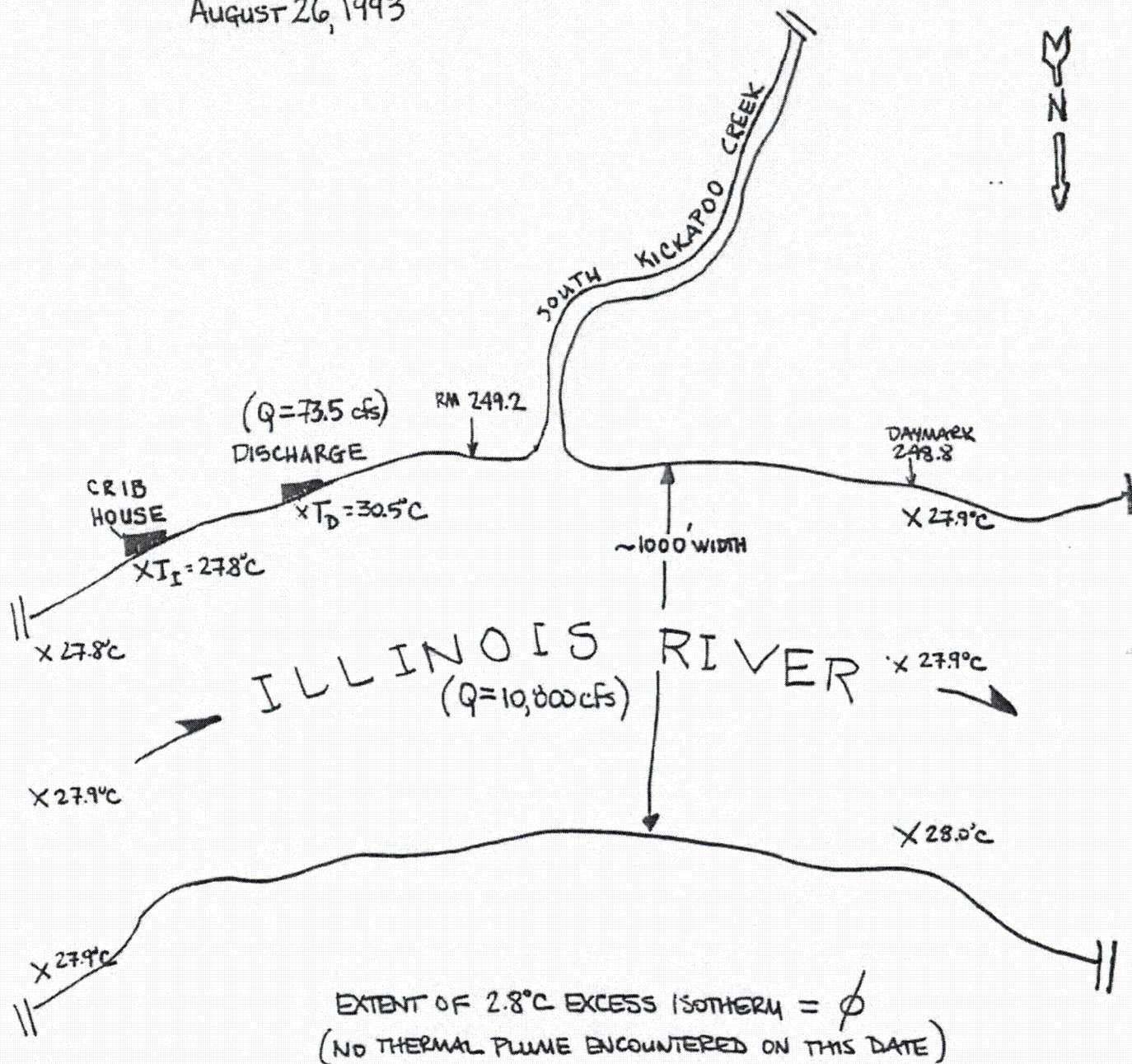
$$T(\text{allow}) = 27.9 + 2.8 = 30.7 \text{ deg. C (Definition of Plume Edge)}$$

Since the blowdown temperature (30.5 deg. F) is less than the calculated allowable plume number, there is no detectable thermal plume on this date.



# LASALLE COOLING POND BLOWDOWN THERMAL PLUME SURVEY

AUGUST 26, 1993



(NOT TO SCALE)

LASALLE COUNTY STATION  
OTHER UPDATED RECORDS REPORT

DATE: 04/11/89  
PAGE: 1

TO: 210070001

OTHER

DATE: 04/04/89

SCHEDULED CAT NOT EVENT LID  
COMPLIANCE TO

AGENT: 0 DEPT: 40 PERSON: HEMMINGER DATE SENT: 04/11/89

OBJECT: TEMPERATURE PROFILE OF THE ILLINOIS  
RIVER AT THE COOLING POND BLOWDOWN,  
OUTFALL 001.

NO	SEVERITY LEVEL	CER NO	CRITERION
1	4/13	RESPONSE DUE	DATE INSPECT: HRS.
2	4/13	TO BY SET BY	SYSTEM
3	4/13	BY	CORRECTIVE ACT
4	4/13	BY	R/F OUTAGE
5	4/13	BY	PRIORITY
6	4/13	BY	TR
7	4/13	BY	5/1/BW PROLEGURE:

THUSMIL: SW: BY: D: L Q: Z: MOD: DNS: ESS: PTC: NFS:

ORIGINAL DUE DATE: 10/31/89	STATUS: OPEN
INTERIM REPORT	RDY FOR CLOSURE
INTERIM REPORT	ORIG EXIT DATE
INTERIM REPORT	ORIG CLOSED
INTERIM REPORT	DATE COMPLETED

REFER: 1989 LASALLE COUNTY STATION GOALS SPECIFIC OBJECTIVE A.02.1 06-95

OBJECT: TEMPERATURE PROFILE OF THE ILLINOIS RIVER AT THE COOLING  
POND BLOWDOWN OUTFALL 001, MIXING ZONE. THIS NEEDS TO BE PERFORMED TO  
ENSURE WPOLE THERMAL LIMITS ARE NOT EXCEEDED.

ACTION SUMMARY

THERMAL STUDIES WERE CONDUCTED IN APRIL, JULY, OCTOBER, NOVEMBER 1989, AND  
JANUARY, 1990. CUMMULATIVE RESULTS INDICATE THAT LASALLES COOLING POND BLOWDOWN  
HAS BEEN IN FULL COMPLIANCE WITH THE GENERAL USE THERMAL STANDARDS ON ALL  
FIVE SURVEY DATES.

*Thomas E. Hemminger* Jun 26, 1990

DATE: 06/01/89 ACTION ACCEPTED: \_\_\_\_\_  
INITIALS (PERSON) (DATE) (RESP. SUPV/DESIGNATE) DATE



January 17, 1990

To: G. J. Diederich

Subject: Thermal Evaluation of LaSalle Station Cooling Pond Blowdown

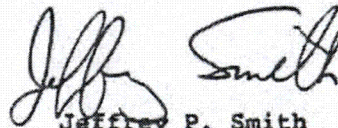
In accordance with LaSalle Station's Final Environmental Statement (November 1978, Section 6.3.2.1), seasonal thermal plume measurements were to be taken in the Illinois River at three month intervals for a total of four studies to determine the extent of the 2.8°C (5°F) excess isotherm. This program was to be instituted after units 1 and 2 went into commercial operation. At the station's request, thermal studies were initiated in April, 1989.

The final winter survey was conducted on Monday, January 15, 1990, by J. Wozniak and K. Owens of my staff. Upon completion of the study it was determined that no measureable 5°F excess isotherm was present on this date.

The attached results constitute the fulfillment of Environmental Affairs' commitment to perform seasonal plume measurements on LaSalle's cooling pond blowdown (as per AIR Item No. 373-251-89-00079, dated 4/4/89). The cumulative data indicates that the station blowdown has been in full compliance with the General Use thermal standards on all five survey dates (4/5/89, 7/19/89, 10/16/89, 11/06/89, and 01/15/90).

It is recommended that the station install a reliable temperature monitoring device in the blowdown canal immediately before discharge to the Illinois River in order to verify continued thermal compliance. In addition, Environmental Affairs personnel are available to assist station personnel with the development of site-specific procedures for performing any additional thermal plume studies in the future.

If you have any questions regarding this study, please contact J. Wozniak of my staff at Ext. 4468.



Jeffrey P. Smith  
Supervisor of Water Quality

6841e  
JPW:bg  
Attachments

cc: K. M. Owens  
J. P. Terrones  
C. K. Sprunger  
File: 01-GEN-A

LaSalle Cooling Pond Blowdown

Winter Thermal Plume Survey

January 15, 1990

Pertinent Information

- Illinois River Flow: 5979 cfs  
(Marseilles Lock & Dam)
- Blowdown Rate: 40,000-45,000 gpm (89-100 cfs)
- Station Operation
  - Unit 1: 815 MWe
  - Unit 2: 1135 MWe
- Discharge Channel Width: 20 ft.
- Discharge Channel Depth: 2 ft.
- Discharge Temperature: 4.3°C (39.7°F)



LaSalle Cooling Pond Blowdown

Winter Thermal Plume Survey

January 15, 1990

Ambient River Temperature Data:

Upstream of Intake

<u>S. Side</u> Time (0939)	<u>Mid Channel</u> (0937)	<u>N. Side</u> (0935)
Surface - 1.9°C	Surface - 2.0°C	Surface - 2.1°C
1' - 1.9°C	1' - 2.0°C	1' - 2.0°C
2' - 1.9°C	2' - 2.0°C	2' - 2.0°C
4' - 1.9°C	4' - 2.0°C	4' - 2.0°C
Avg. 1.9°C (35.4°F)	6' - 2.0°C	6' - 2.0°C
	8' - 2.0°C	8' - 2.0°C
	10' - 2.0°C	10' - 2.0°C
	12' - 2.0°C	12' - 2.0°C
	14' - 2.0°C	Avg. 2.0°C (35.6°F)
	Avg. 2.0°C (35.6°F)	

<u>Intake</u> Time (0941)
Surface - 1.9°C
1' - 1.8°C
2' - 1.8°C
4' - 1.8°C
Avg. 1.8°C (35.2°F)

<u>Center of River</u> <u>RM 249.2 (Downstream of discharge)</u> (0951)
Surface - 2.0°C
1' - 2.0°C
2' - 2.0°C
4' - 2.0°C
6' - 2.0°C
8' - 1.9°C
10' - 1.9°C
12' - 1.9°C
Avg. 2.0°C (35.6°F)



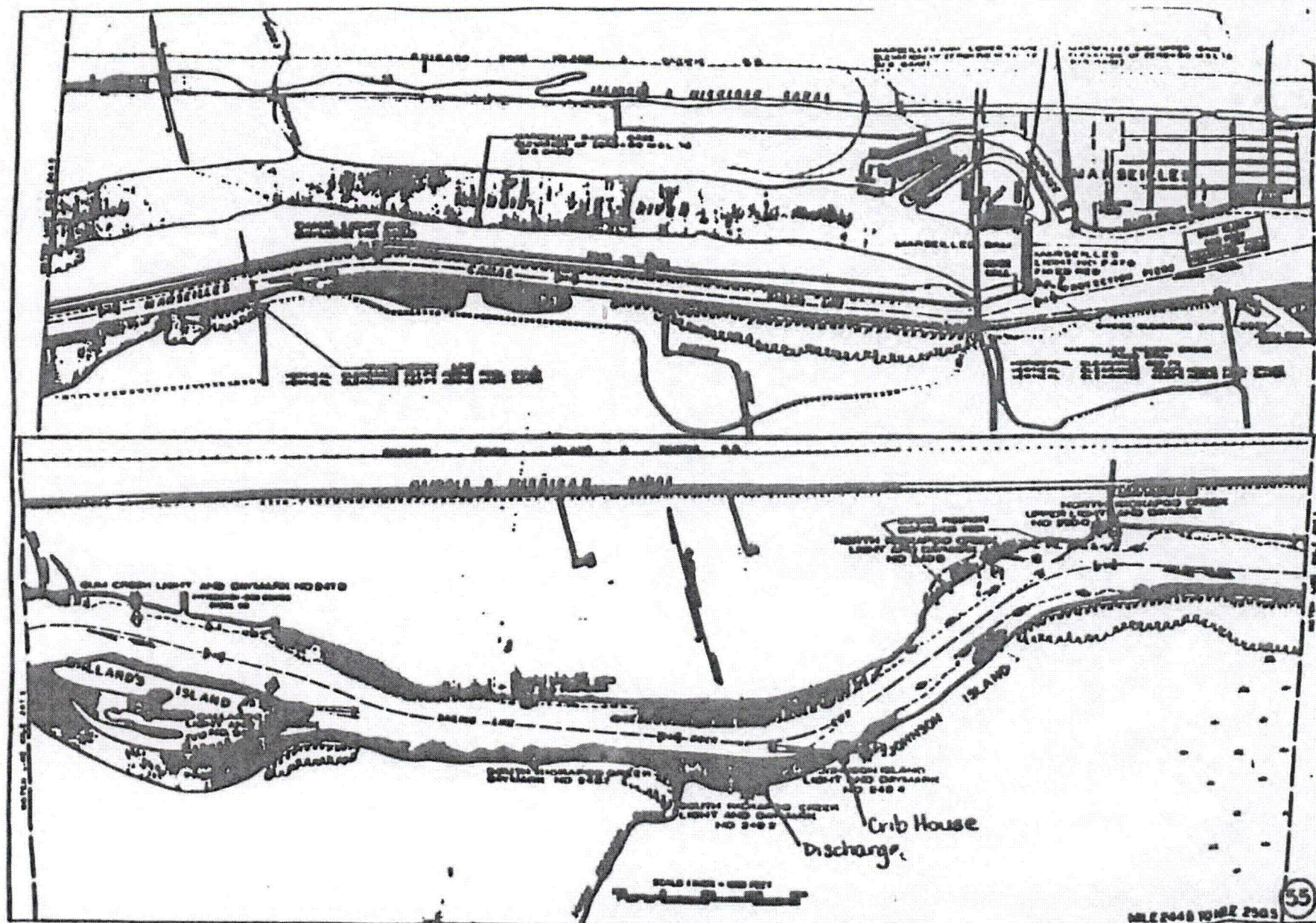


FIGURE 1: ILLINOIS RIVER MAP SHOWING STUDY LOCATION



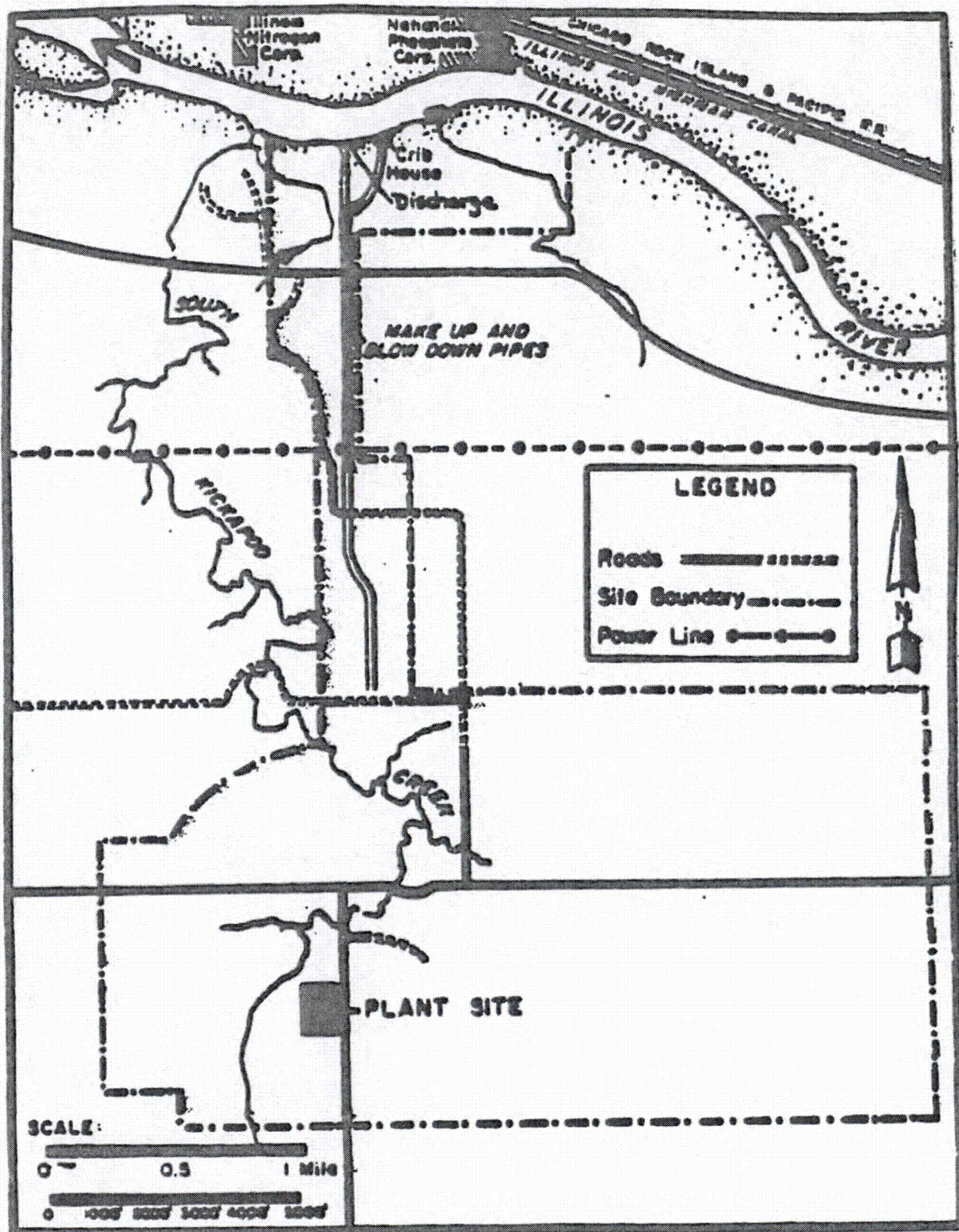


FIGURE 2: STUDY LOCATION IN RELATION TO STATION



LASALLE COOLING POND BLOWDOWN  
THERMAL PLUME SURVEY

A hand-drawn map of the Illinois River and its confluence with South Kickapoo Creek. The map includes the following details:

- Date:** JANUARY 15, 1990
- Location:** ILLINOIS RIVER (Q = 5979 cfs)
- Confluence:** SOUTH KICKAPOO CREEK (Q = avg. 94.5 cfs)
- Temperature Readings:**
  - Upstream of the confluence: 1.9°C, 2.0°C, 2.0°C
  - At the confluence: 1.8°C, 2.0°C, 3.2°C, 2.8°C, 2.0°C
  - Downstream of the confluence: 2.0°C
- Structures:** CRIB HOUSE, DISCHARGE (with a small structure icon)
- Other Labels:** RM 249.2, ~1000' WIDTH
- Orientation:** A north arrow is located in the top right corner.

[ NO 2.8°C (5°F) EXCESS ISOTHERM  
PRESENT ON THIS DATE ]

PERFORMED BY: J.P. WOZENIAK  
K.M. DWENS  
(FAD)

1000

November 6, 1989

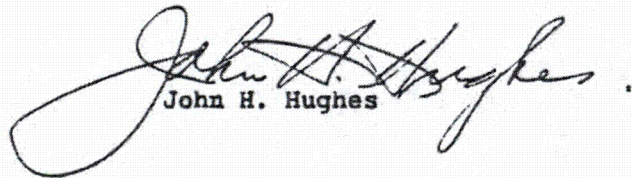
To: G. J. Diederich

Subject: Thermal Evaluation of LaSalle Station Cooling Pond Blowdown

In accordance with LaSalle Station's Final Environmental Statement (November 1978, Section 6.3.2.1), seasonal thermal plume measurements are to be taken in the Illinois River at three month intervals for a total of four studies to determine the extent of the 2.8°C (5°F) excess isotherm. This program was to be instituted after units 1 and 2 went into commercial operation. At the station's request, thermal studies were initiated in April, 1989.

An additional autumn survey was conducted on Thursday, November 2, 1989, by J. Wozniak and K. Owens of my staff. Upon completion of the study, it was determined that no additional heat was being contributed to the Illinois River from LaSalle's cooling pond blowdown. No measurable thermal plume was present on this date. The remaining required thermal survey will be conducted in January, 1990.

If you have any questions regarding this study, please contact J. Wozniak of my staff at Ext. 4468.

  
John H. Hughes

6841e  
JPW:bg

Attachments

cc: K. M. Owens  
J. J. Miller  
File: 01-GEN-A



LaSalle Cooling Pond Blowdown

Autumn Thermal Plume Survey

November 2, 1989

Pertinent Information

- Illinois River Flow: 3164 cfs  
(Marseilles Lock & Dam)
- Blowdown Rate: 36,000 gpm (80 cfs)
- Station Operation
  - Unit 1: 0 MWe
  - Unit 2: 1130 MWe
- Discharge Channel Width: 20 ft.
- Discharge Channel Depth: 2 ft.
- Discharge Temperature: 12.3°C (54.1°F)



LaSalle Cooling Pond Blowdown

Autumn Thermal Plume Survey

November 2, 1989

Ambient River Temperature Data:

Upstream of Intake

<u>S. Side</u> Time (0932)	<u>Mid Channel</u> (0930)	<u>N. Side</u> (0942)
Surface - 13.2°C	Surface - 13.2°C	Surface - 13.3°C
1' - 13.2°C	1' - 13.2°C	1' - 13.3°C
2' - 13.2°C	2' - 13.2°C	2' - 13.3°C
4' - 13.2°C	4' - 13.2°C	4' - 13.3°C
6' - 13.2°C	6' - 13.2°C	6' - 13.3°C
8' - 13.2°C	8' - 13.3°C	8' - 13.3°C
10' - 13.2°C	10' - 13.3°C	10' - 13.3°C
Avg. 13.2°C (55.8°F)	12' - 13.3°C	12' - 13.3°C
	Avg. - 13.2°C (55.8°F)	Avg. 13.3°C (55.9°F)

<u>Intake</u> Time (0950)	<u>S. Side of River</u> <u>RM 249.2 (Downstream of discharge)</u> (1000)
Surface - 13.1°C	Surface - 13.3°C
1' - 13.1°C	1' - 13.3°C
2' - 13.1°C	2' - 13.3°C
4' - 13.1°C	4' - 13.3°C
Avg. 13.1°C (55.6°F)	6' - 13.3°C
	8' - 13.3°C
	10' - 13.3°C
	12' - 13.3°C
	Avg. 13.3°C (55.9°F)



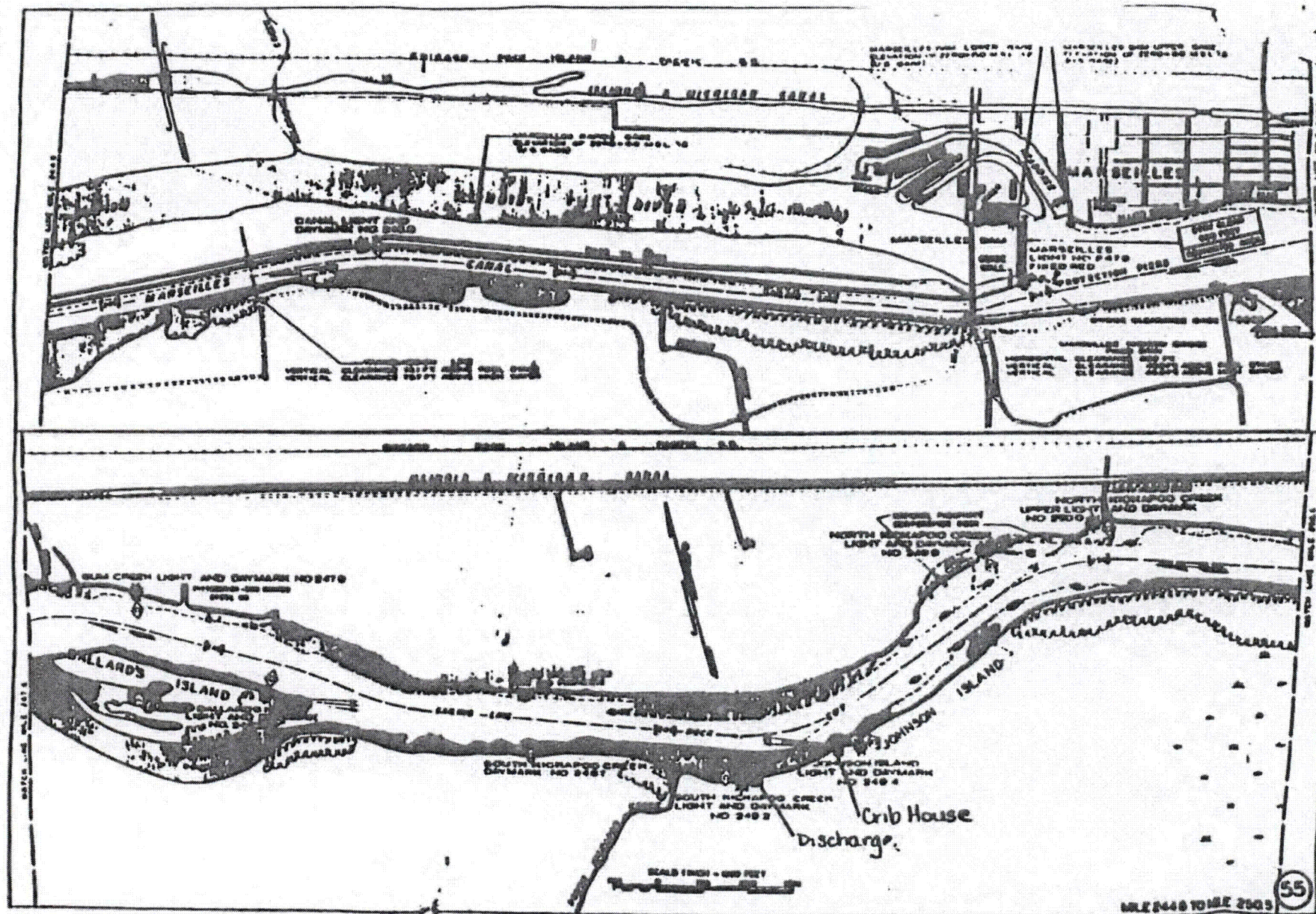


FIGURE 1: ILLINOIS RIVER MAP SHOWING STUDY LOCATION



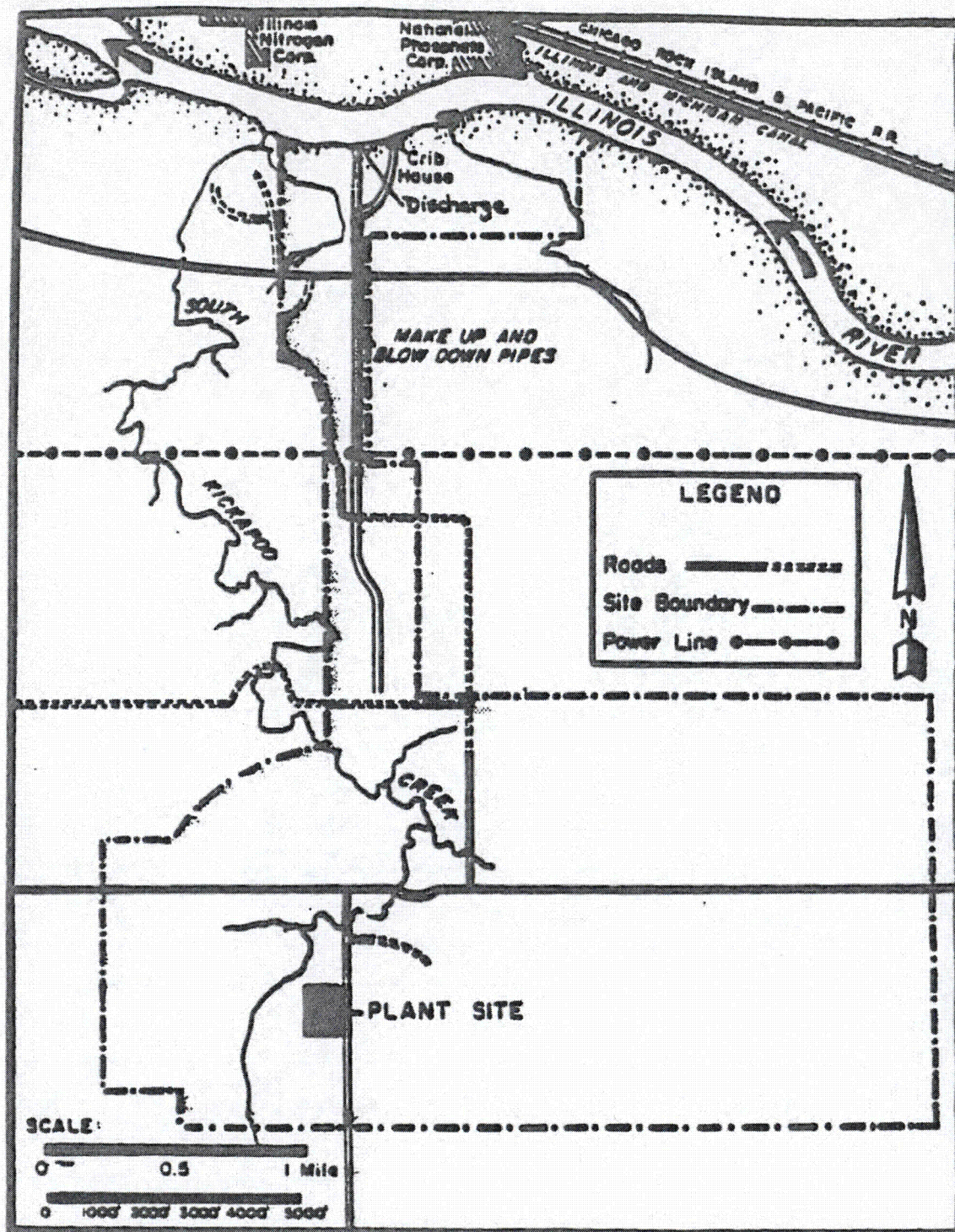


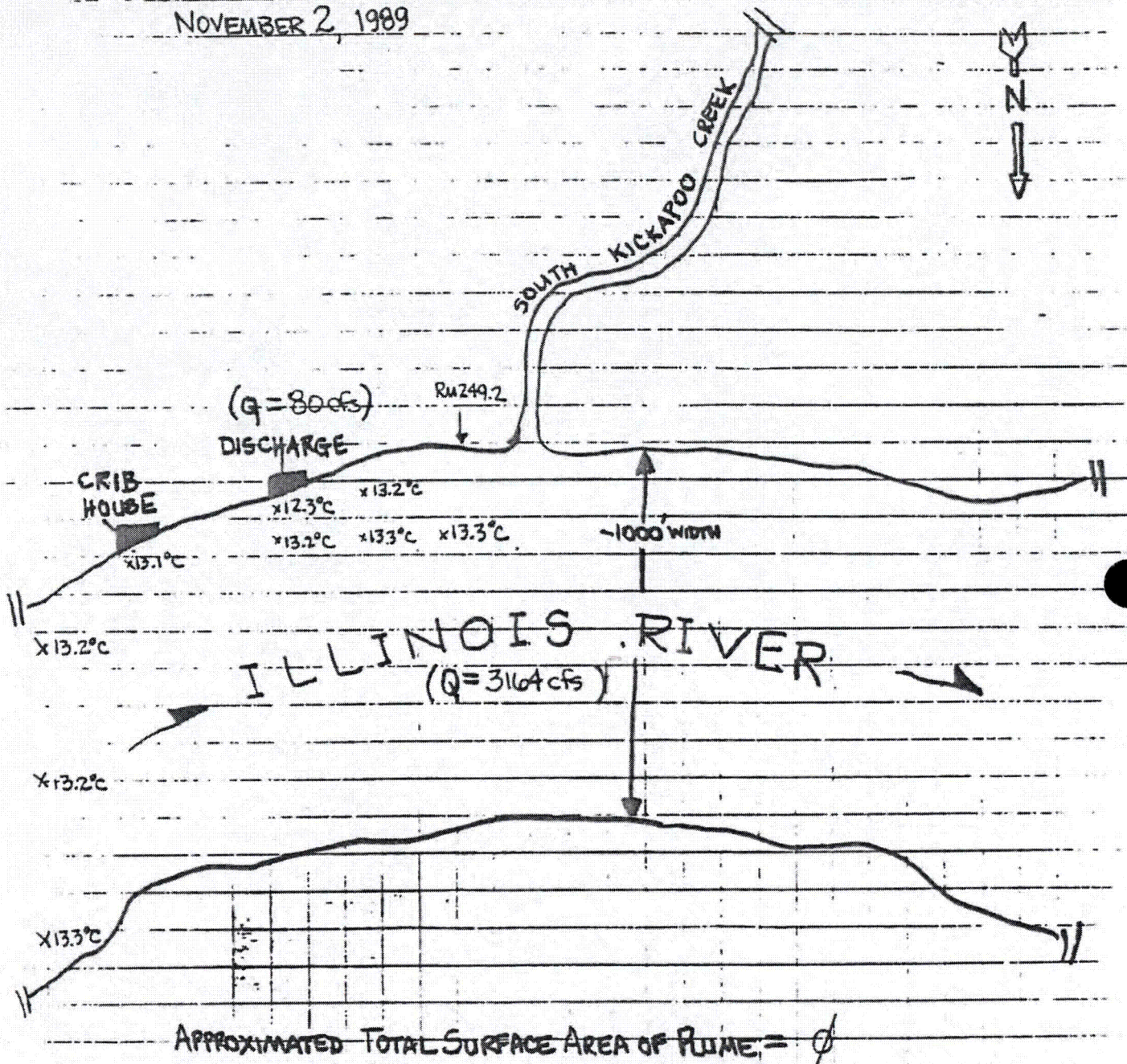
FIGURE 2: STUDY LOCATION IN RELATION TO STATION



FIGURE 3

LASALLE COOLING POND BLOWDOWN  
THERMAL PLUME SURVEY

NOVEMBER 2, 1989



PERFORMED BY: J.P. WOZNIAK

(APPROX. TO SCALE)



October 16, 1989

To: G. J. Diederich

Subject: Thermal Evaluation of LaSalle Station Cooling Pond Blowdown

In accordance with LaSalle Station's Final Environmental Statement (November 1978, Section 6.3.2.1), seasonal thermal plume measurements are to be taken in the Illinois River at three month intervals for a total of four studies to determine the extent of the 2.8°C (5°F) excess isotherm. This program was to be instituted after units 1 and 2 went into commercial operation.

The third of these four required studies was conducted on Wednesday, October 11, 1989 by J. Wozniak and K. Owens of my staff. Although neither unit has been in operation since mid-September, this situation provided a unique opportunity to obtain data which reflects ambient river conditions and associated cooling pond effects upon unheated water. Upon completion of the study, it was determined that the cooling pond blowdown was approximately 2°C lower in temperature than the main body of the Illinois River. This net cooling is explained by the extended absence of heat loading to the cooling pond combined with overlying meteorological effects. An additional autumn survey will be conducted when one of LaSalle's units is operating at greater than 50% capacity.

If you have any questions regarding this study, please contact J. Wozniak of my staff at Ext. 4468.



John H. Hughes

6841e  
JPW:bg

Attachments

cc: K. M. Owens  
J. J. Miller  
File: 01-GEN-A



LaSalle Cooling Pond Blowdown

Autumn Thermal Plume Survey

October 11, 1989

Pertinent Information

- Illinois River Flow: 2435 cfs\*  
(Marseilles Lock & Dam)
- Blowdown Rate: 17,500 gpm (39cfs)
- Station Operation
  - Unit 1: 0 MWe
  - Unit 2: 0 MWe
- Discharge Channel Width: 20 ft.
- Discharge Channel Depth: 2 ft.
- Discharge Temperature: 13.4°C (56.1°F)

\* Pool elevation was being revised on this date, therefore only one gate was open at the Marseilles lock & Dam.

LaSalle Cooling Pond Blowdown

Autumn Thermal Plume Survey

October 11, 1989

Ambient River Temperature Data:

Upstream of Intake

<u>S. Side</u> Time (0947)	<u>Mid Channel</u> (0444)	<u>N. Side</u> (0940)
Surface - 15.1°C	Surface - 15.1°C	Surface - 15.2°C
1' - 15.1°C	1' - 15.1°C	1' - 15.1°C
2' - 15.1°C	2' - 15.1°C	2' - 15.1°C
4' - 15.1°C	4' - 15.1°C	4' - 15.1°C
6' - 15.1°C	6' - 15.1°C	6' - 15.1°C
8' - 15.1°C	8' - 15.1°C	8' - 15.1°C
10' - 15.1°C	10' - 15.1°C	10' - 15.1°C
Avg. 15.1°C (59.2°F)	12' - 15.1°C	12' - 15.1°C
	Avg. - 15.1°C (59.2°F)	Avg. 15.1°C (59.2°C)

Intake

Time (0950)

Surface - 15.0°C
1' - 14.9°C
2' - 14.9°C
4' - 14.9°C
Avg. 14.9°C (58.8°C)

S. Side of River

RM 249.2 (Downstream of discharge)  
(1000)

Surface - 15.0°C
1' - 15.0°C
2' - 15.0°C
4' - 15.0°C
6' - 15.0°C
8' - 15.1°C
Avg. 15.0°C (59.0°F)



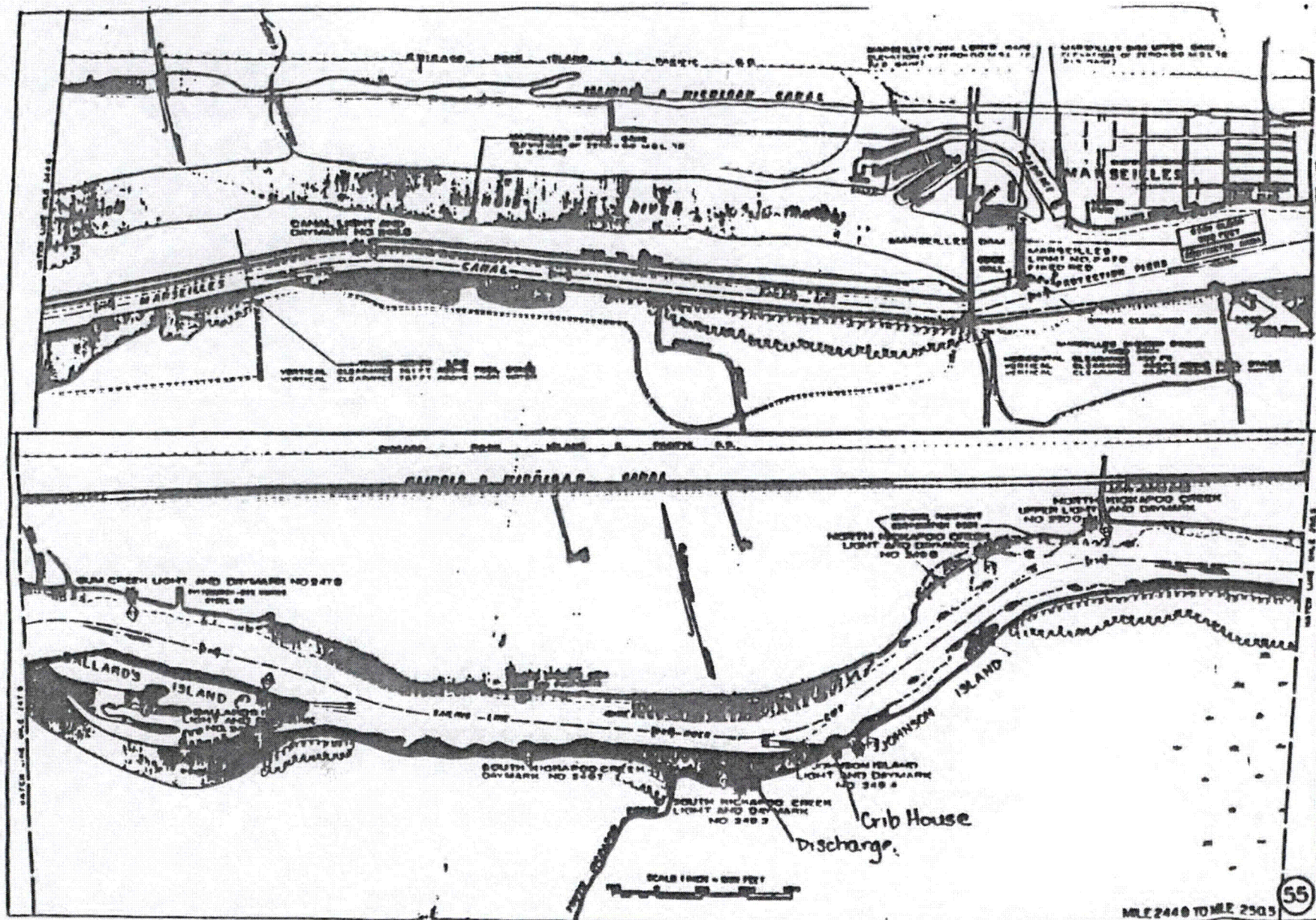


FIGURE 1: ILLINOIS RIVER MAP SHOWING STUDY LOCATION



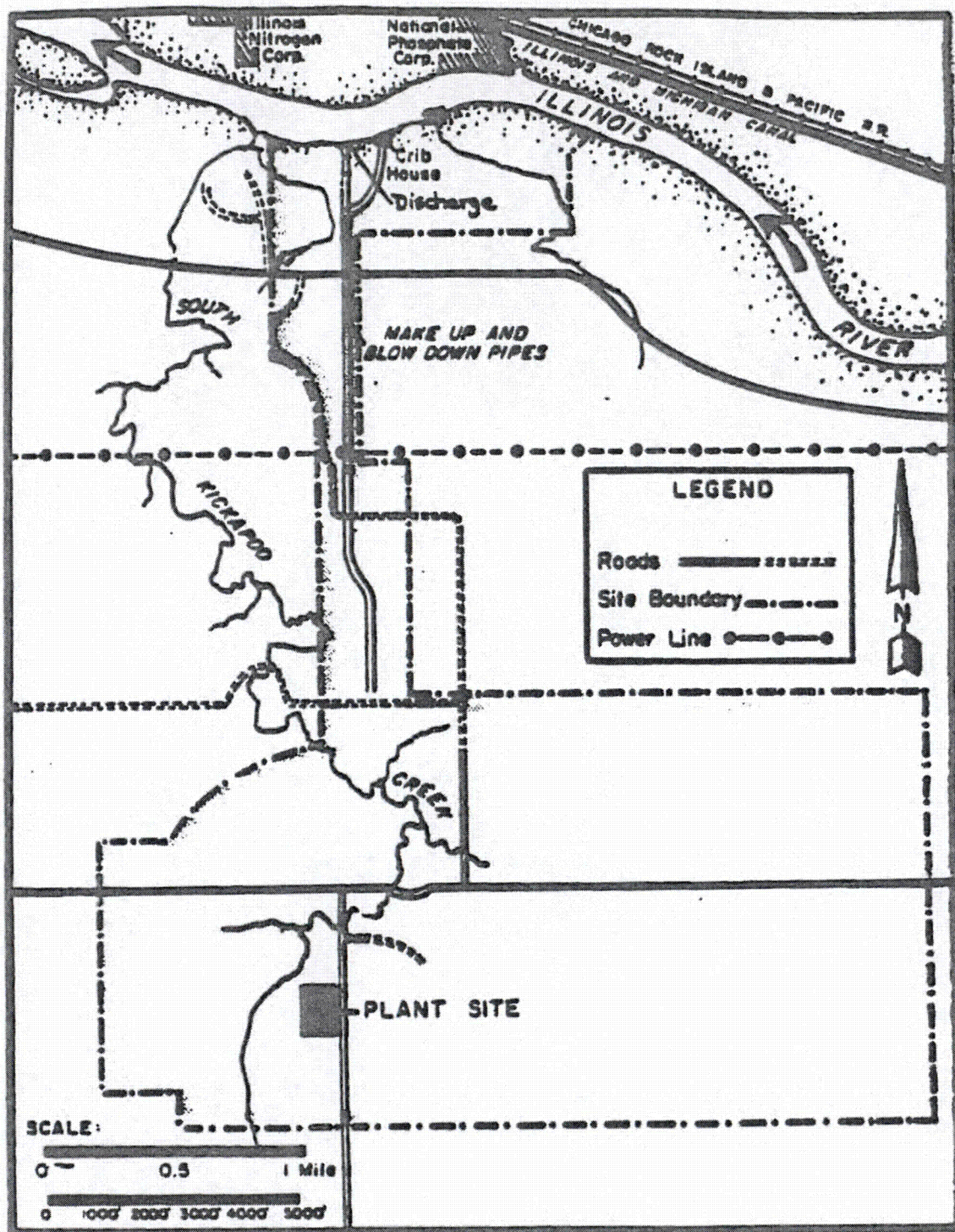


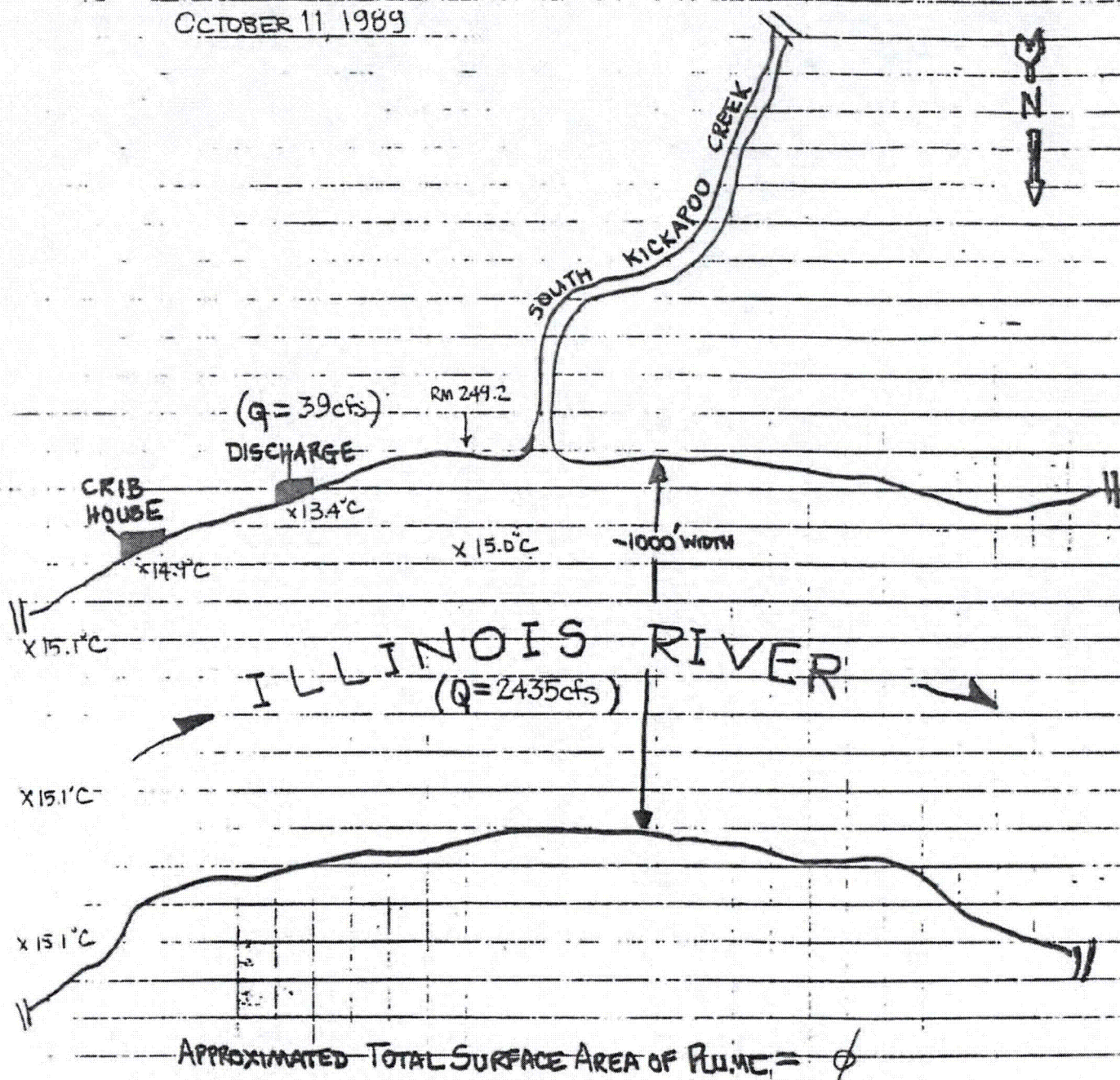
FIGURE 2: STUDY LOCATION IN RELATION TO STATION



FIGURE 3

LASALLE COOLING POND BLOWDOWN  
THERMAL PLUME SURVEY

OCTOBER 11, 1989



PERFORMED BY:- J.P. WCAJIAK  
C.M. OWENS

(APPROX. TO SCALE)



July 19, 1989

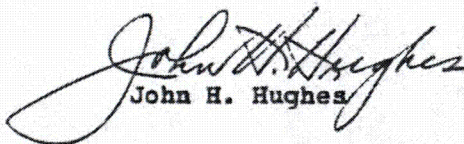
To: G. J. Diederich

Subject: Thermal Evaluation of LaSalle Station Cooling Pond Blowdown

In accordance with LaSalle Station's Final Environmental Statement (November 1978, Section 6.3.2.1), seasonal thermal plume measurements are to be taken in the Illinois River at three month intervals for a total of four studies to determine the extent of the 2.8°C (5°F) excess isotherm. This program was to be instituted after units 1 and 2 went into commercial operation.

The second of these four required studies was conducted on Thursday, July 13, 1989 by J. Wozniak and K. Owens of my staff. Upon completion of the study, it was determined that there was no measureable thermal plume present on this date. (Since the blowdown temperature at the discharge point was only approx. 1°C higher than ambient river temperature, the 2.8°C excess isotherm could not be delineated.) This data indicates that the station's blowdown is well within the limits established by the General Use thermal standards.

If you have any questions regarding this study, please contact J. Wozniak of my staff at Ext. 4468.

  
John H. Hughes

5722e  
JPW:ssp

Attachments

cc: R. H. Kohlmann  
File: 01-GEN-A



LaSalle Cooling Pond Blowdown

Summer Thermal Plume Survey

July 13, 1989

Pertinent Information

- Illinois River Flow: 2450 cfs\*  
(Marseilles Lock & Dam)
- Blowdown Rate: 43,000 gpm (95.8cfs)
- Station Operation  
Unit 1: 1003 MWe  
Unit 2: 1006 MWe
- Discharge Channel Width: 20 ft.
- Discharge Channel Depth: 2 ft.
- Discharge Temperature: 29.8°C (85.6°F)

\* Work was being done at the Marseilles Lock & Dam on this date.



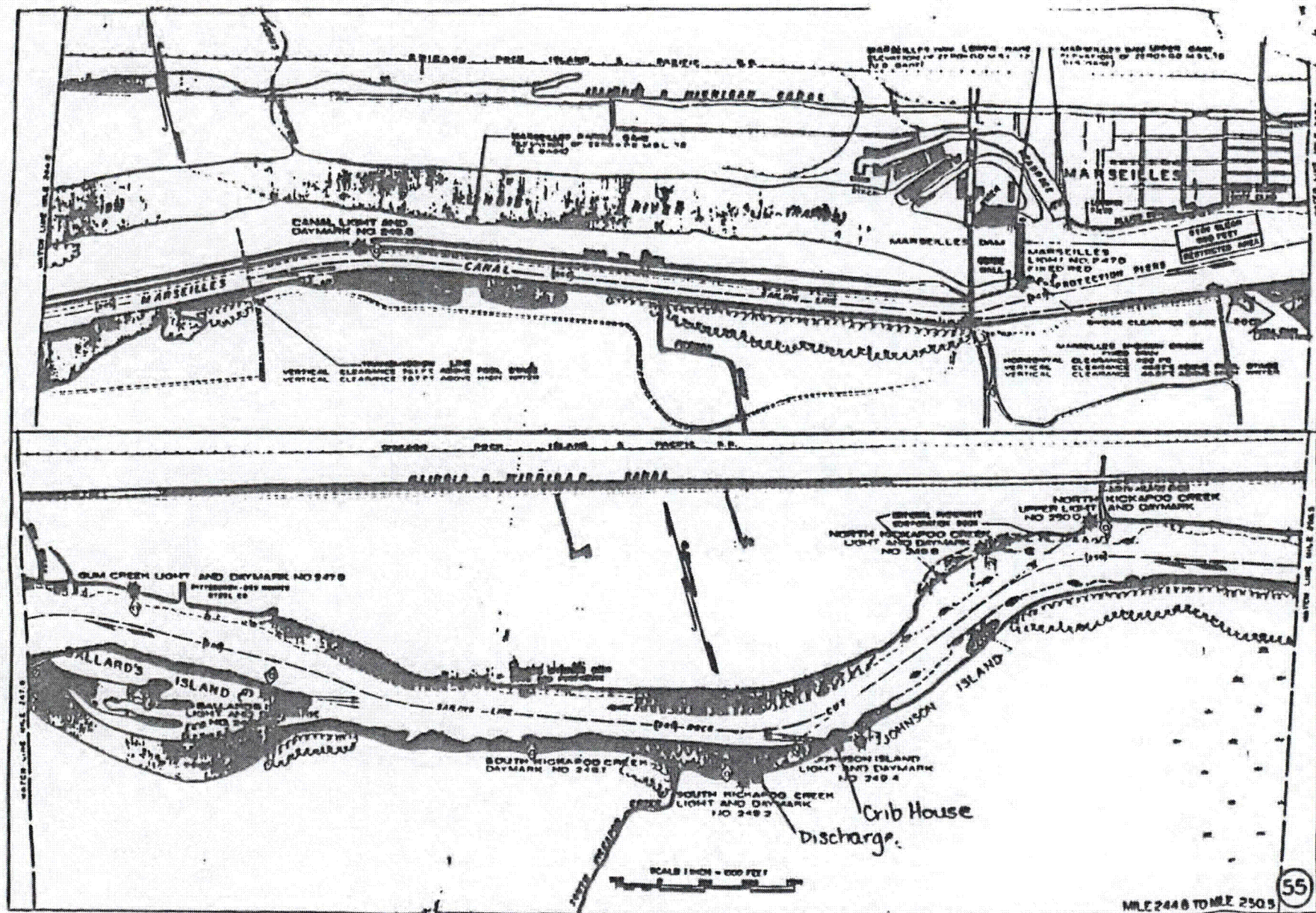


FIGURE 1: ILLINOIS RIVER MAP SHOWING STUDY LOCATION



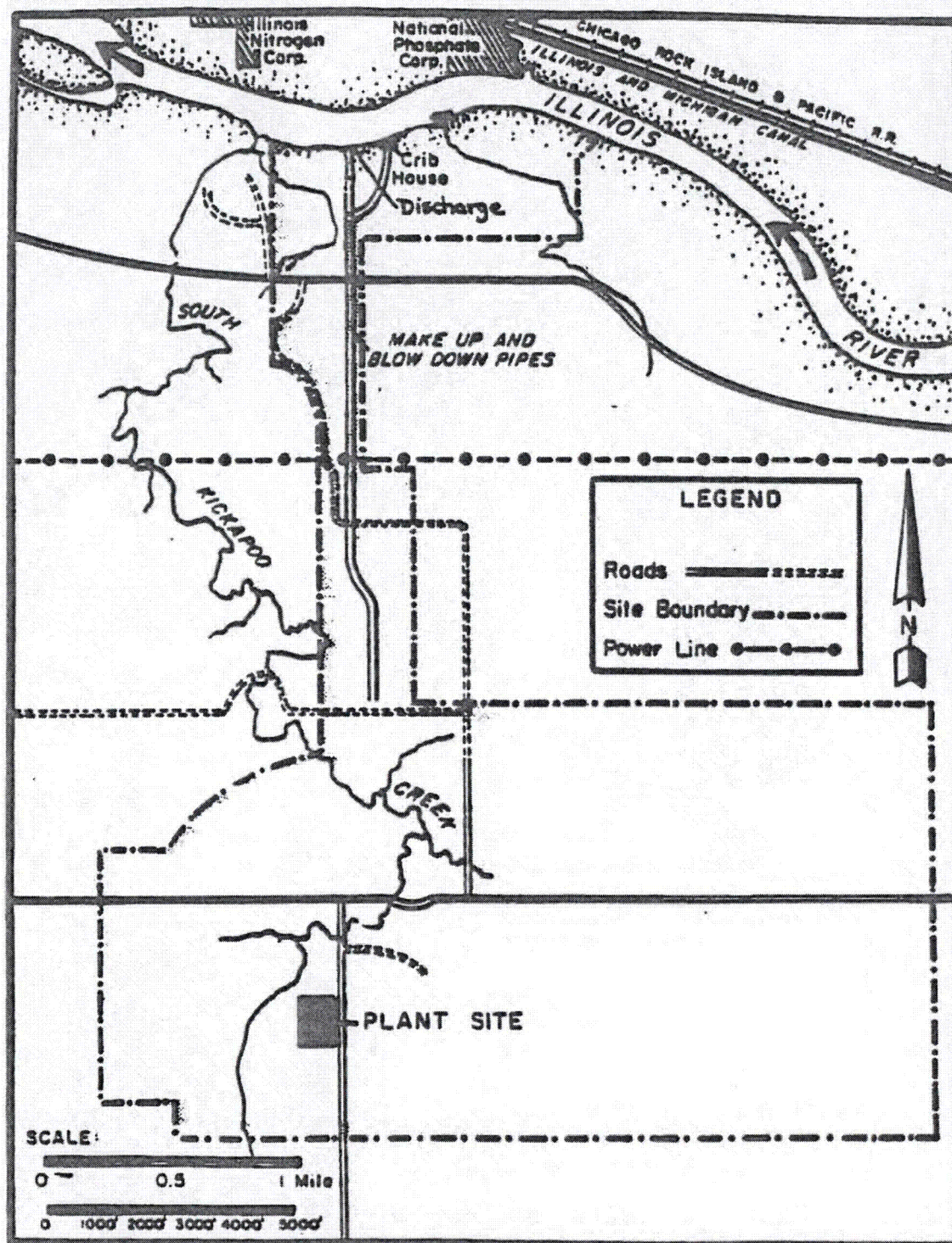


FIGURE 2: STUDY LOCATION IN RELATION TO STATION



LaSalle Cooling Pond Blowdown

Summer Thermal Plume Survey

July 13, 1989

Ambient River Temperature Data:

Upstream of Intake

<u>S. Side</u> Time (0956)	<u>Mid Channel</u> (0952)	<u>N. Side</u> (0955)
Surface - 29.0°C	Surface - 29.0°C	Surface - 28.9°C
1' - 29.0°C	1' - 29.0°C	1' - 28.9°C
2' - 29.0°C	2' - 29.0°C	2' - 28.9°C
4' - 29.0°C	4' - 29.0°C	4' - 28.9°C
6' - 29.0°C	6' - 29.0°C	6' - 28.9°C
8' - 29.0°C	8' - 28.9°C	8' - 28.9°C
Avg. - 29.0°C (84.2°F)	10' - 28.9°C	10' - 28.9°C
	12' - 28.8°C	Avg. - 28.9°C (84.0°F)
	Avg. 28.9°C (84.0°F)	

Intake  
Time (0958)  
Surface - 29.0°C  
1' - 29.0°C  
2' - 28.9°C  
4' - 28.9°C  
6' - 28.9°C  
Avg. - 28.9°C (84°F)

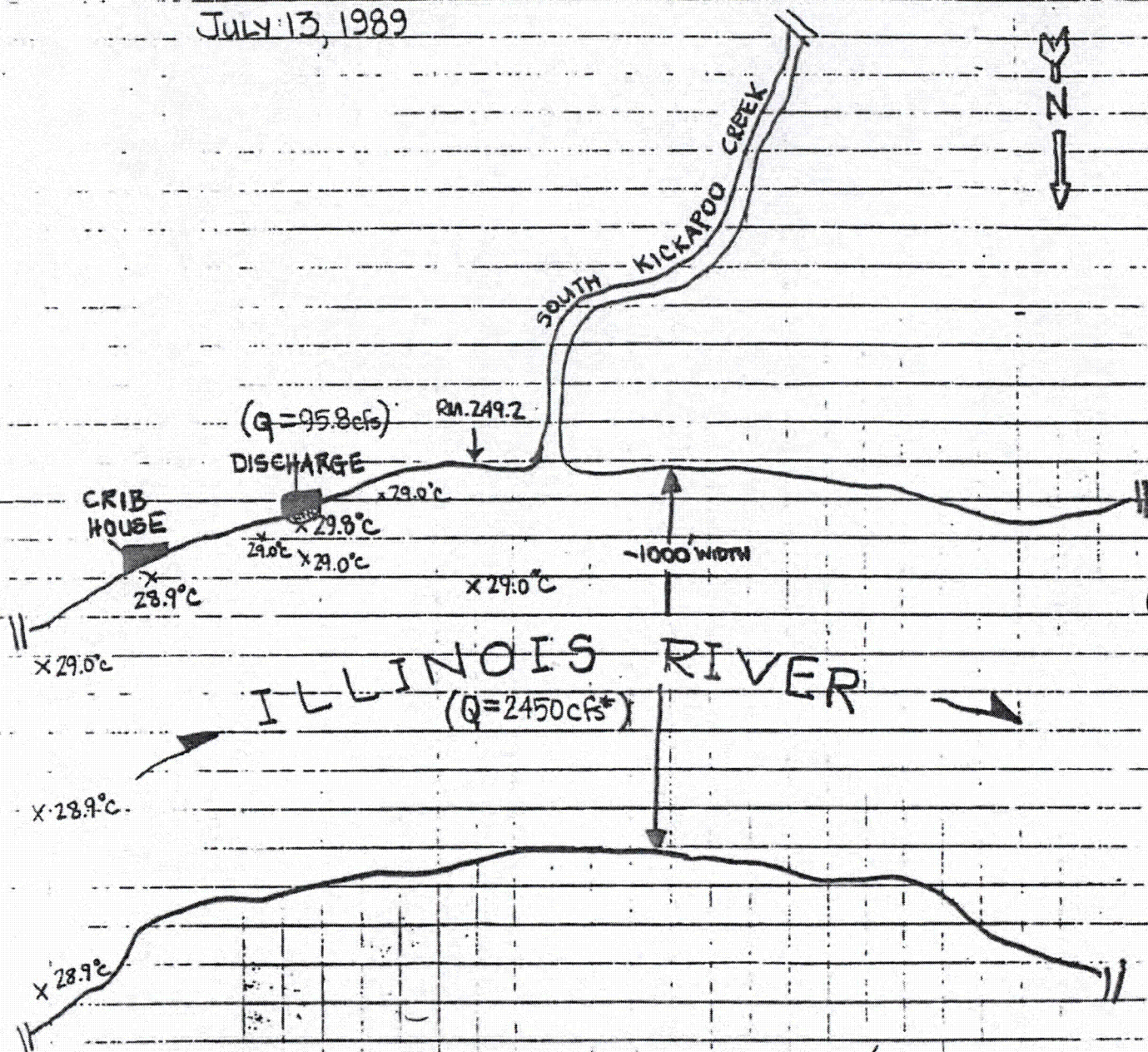
S. Side of River  
RM 249.2 (Downstream of discharge)  
(1006)  
Surface - 29.0°C  
1' - 29.0°C  
2' - 29.0°C  
4' - 29.0°C  
6' - 29.0°C  
Avg. - 29.0°C (84.2°F)



FIGURE 3

LASALLE-COOLING POND-BLOWDOWN  
THERMAL PLUME SURVEY

JULY 13, 1989



APPROXIMATED TOTAL SURFACE AREA OF PLUME =  $\phi$

(\* work being done on Marseilles lock & dam on this date)

PERFORMED BY: J.P. WODZNIAK / K.M. OWENS

(APPROX. TO SCALE)



April 5, 1989

To: G. J. Diederich

Subject: Thermal Evaluation of LaSalle Station Cooling Pond Blowdown

In accordance with LaSalle Station's Final Environmental Statement (November 1978, Section 6.3.2.1), seasonal thermal plume measurements are to be taken in the Illinois River at three month intervals for a total of four studies to determine the extent of the 2.8°C (5°F) excess isotherm. This program was to be instituted after units 1 and 2 went into commercial operation.

The first of these four studies was conducted on Tuesday, April 4, 1989 by J. Wozniak and H. Bernhard of my staff. Upon completion of the study, it was determined that the station's entire thermal plume on this date covered much less than one river acre and was restricted to the south bank near the discharge point. The 2.8°C (5°F) excess isotherm was confined to within 20 feet of the immediate discharge canal. This data indicates that the station's blowdown is well within the limits established by the General Use thermal standards.

If you have any questions regarding this study, please contact J. Wozniak of my staff at Ext. 4468.



John H. Hughes

5722e  
JPW:ssp

Attachments

cc: R. H. Kohlmann  
D. M. Lyon  
File: 01-GEN-A



LaSalle Cooling Pond Blowdown  
Spring Thermal Plume Survey

April 4, 1989

Pertinent Information

- Illinois River Flow: 16,000 cfs  
(Marseilles Lock & Dam)
- Blowdown Rate: 39,000 gpm (87cfs)
- Station Operation  
Unit 1: 1120 MWe  
Unit 2: 1124 MWe
- Discharge Channel Width: 20 ft.
- Discharge Channel Depth: 2 ft.
- Discharge Temperature: 16.1°C (61°F)
- Avg. River Velocity: 0.8 fps

Ambient River Temperature Data:

<u>Intake</u> Time (1250)	<u>Mid Channel</u> (1350)	<u>N. Side</u> (1315)
Surface - 10.5°C (50.9°F)	Surface - 10.4°C (50.7°F)	Surface - 10.4°C (50.7°F)
2' - 10.4°C (50.7°F)	2' - 10.3°C (50.5°F)	2' - 10.4°C (50.7°F)
4' - 10.4°C (50.7°F)	4' - 10.2°C (50.4°F)	4' - 10.4°C (50.7°F)
	6' - 10.2°C (50.4°F)	
Avg. - 10.4°C (50.7°F)	8' - 10.2°C (50.4°F)	Avg. - 10.4°C (50.7°F)
	10' - 10.2°C (50.4°F)	
	12' - 10.1°C (50.2°F)	
	14' - 10.1°C (50.2°F)	
	Avg. - 10.2°C (50.4°F)	



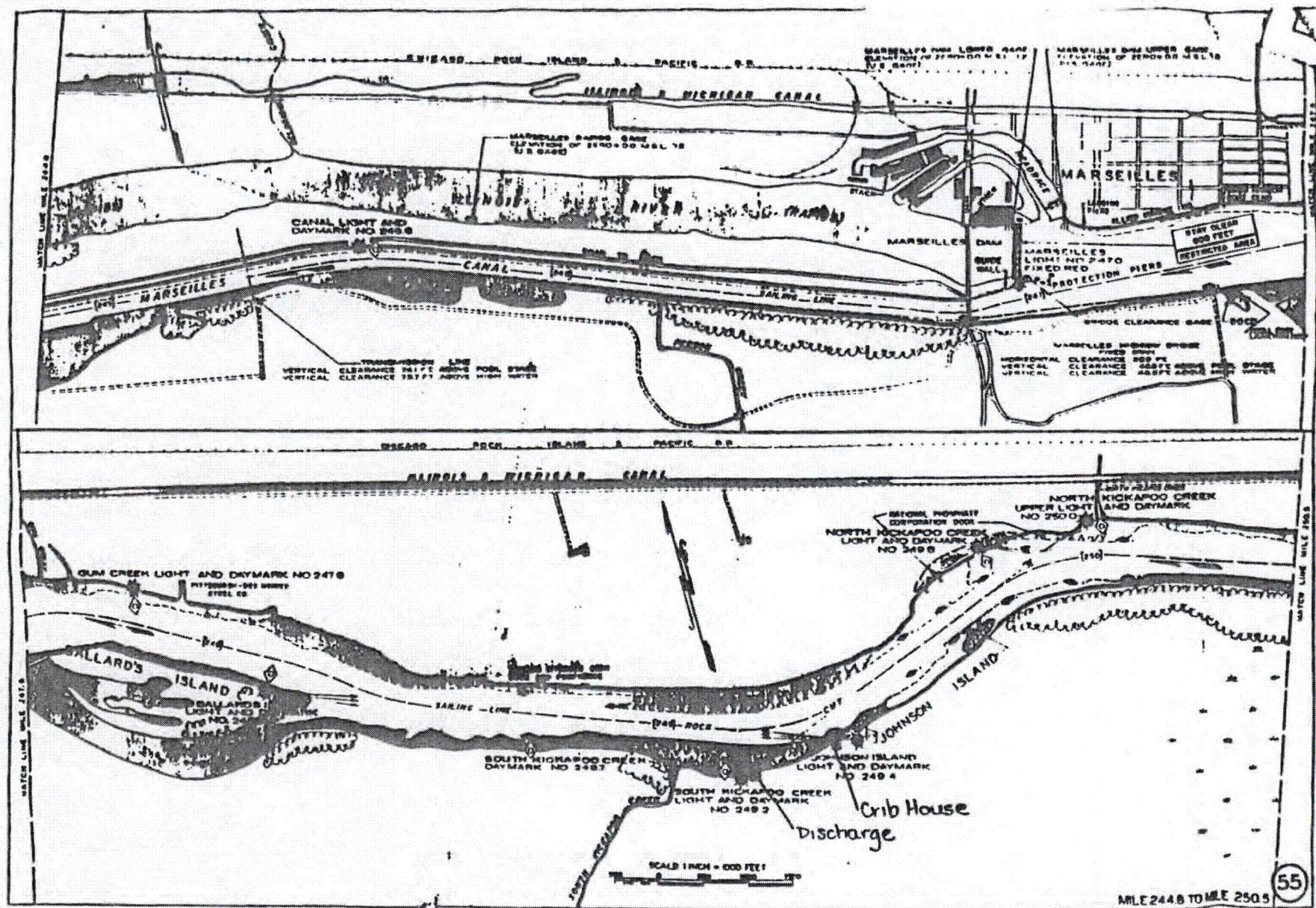


FIGURE 1: ILLINOIS RIVER MAP SHOWING STUDY LOCATION



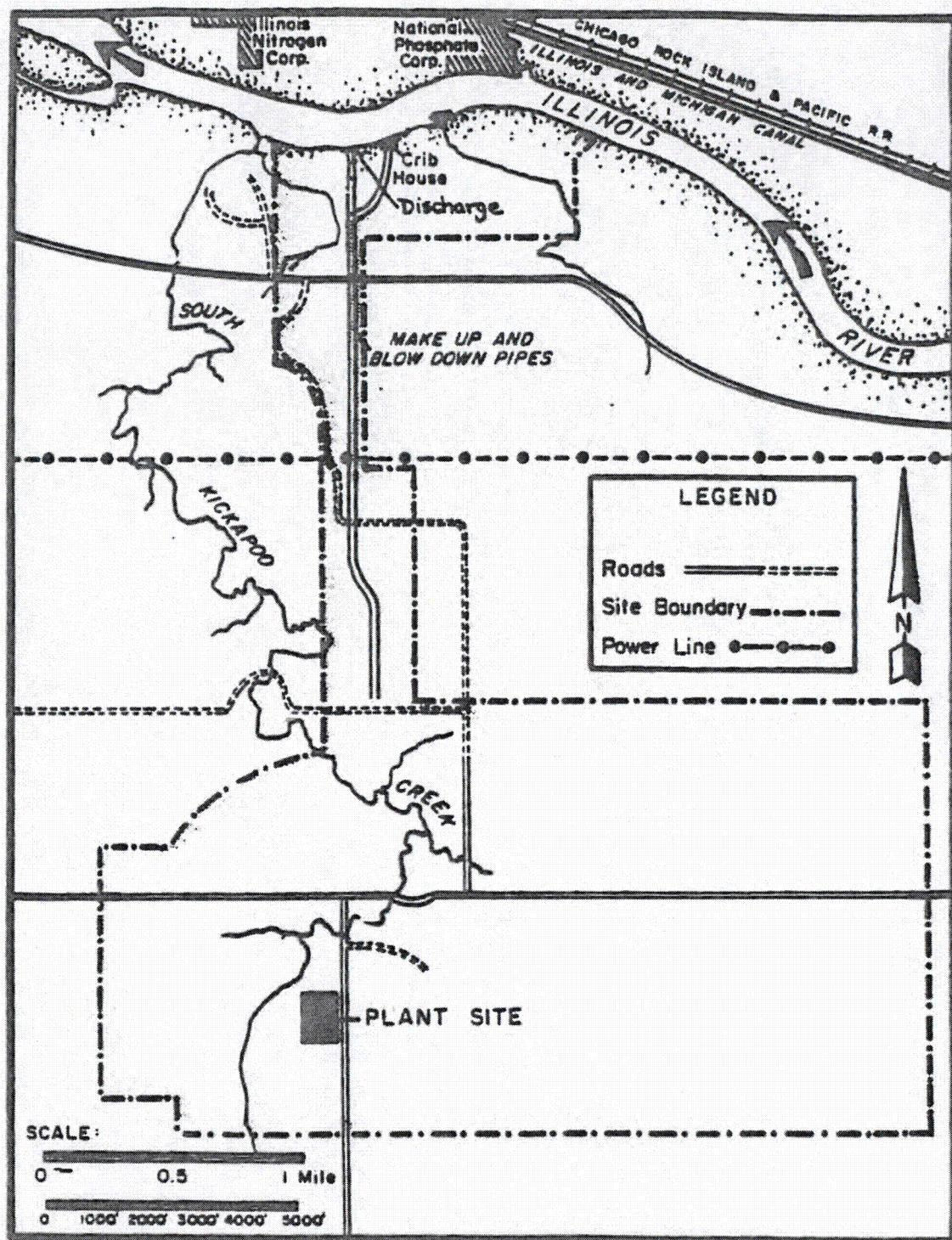


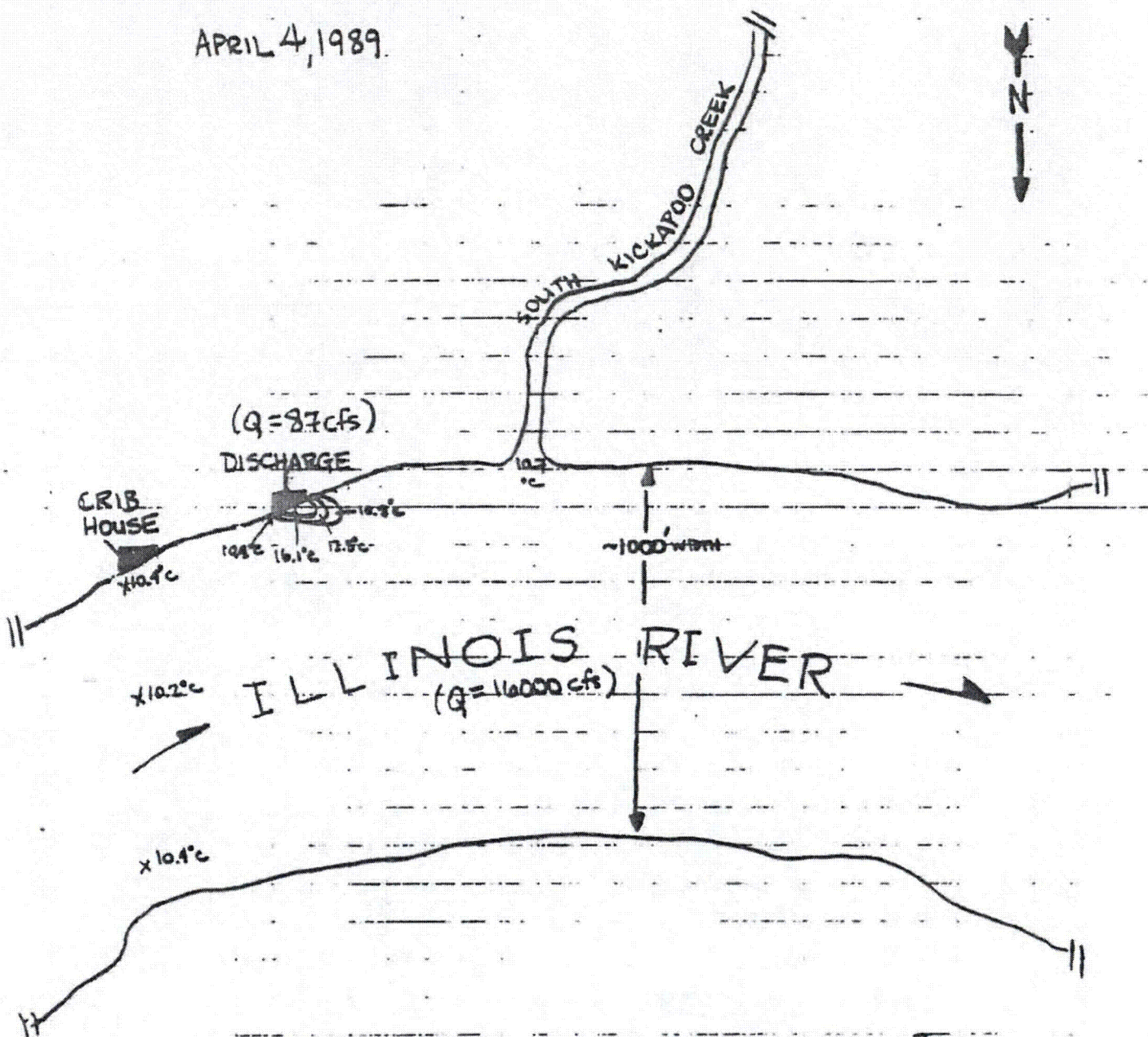
FIGURE 2: STUDY LOCATION IN RELATION TO STATION



FIGURE 3

LASALLE COOLING POND BLOWDOWN  
THERMAL PLUME SURVEY

APRIL 4, 1989.



- APPROXIMATED TOTAL SURFACE AREA OF PLUME = 2000 ft<sup>2</sup>

PERFORMED BY: J. P. WOZNIAK / H. F. BERNHARD

(APPROX. TO SCALE)



L'ASALLE COOLING POND BLOWDOWN

THERMAL PLUME SURVEY

APRIL 4, 1989

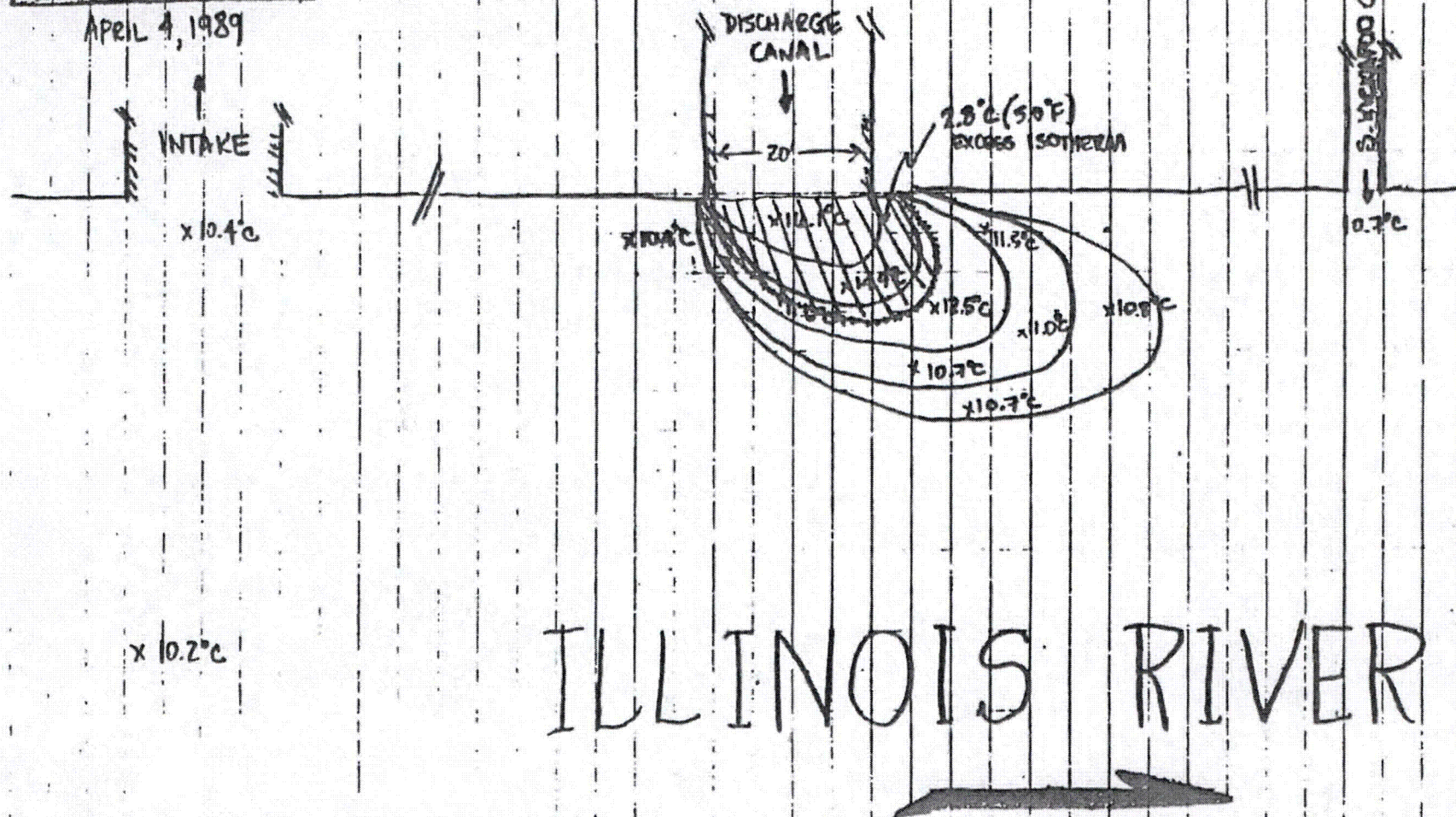


FIGURE 4: (ENLARGEMENT OF FIGURE 3)