

## Appendix B

# NPDES Permit

### *Braidwood Station Environmental Report*

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This Appendix contains a copy of Braidwood Station's Illinois National Pollutant Discharge Elimination System (NPDES) Permit IL0048321, which authorizes the discharge of wastewater to the Kankakee River and stipulates the conditions of the permit. Also attached are (1) the cover letter dated February 29, 2000 transmitting an application to the Illinois Environmental Protection Agency for renewal of the Braidwood Station NPDES permit, (2) correspondence to the Illinois Environmental Protection Agency dated July 10, 2002 and March 24, 2004 concerning an increase in the circulating water blowdown flow and (3) the application to the Illinois Environmental Protection Agency dated March 28, 2009 for a permit to install a river diffuser at Outfall 001.

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State of Illinois

ENVIRONMENTAL PROTECTION AGENCY

Mary A. Gade, Director  
217/782-0610

1021 North Grand Ave. East, Springfield, IL 62794-9276

August 28, 1997

Commonwealth Edison Company  
Post Office Box 767, 35 FNW  
Chicago, Illinois 60690-0767

Re: Commonwealth Edison Company  
NPDES Permit No. IL0048321  
Modification of NPDES Permit (After Public Notice)

Gentlemen:

The Illinois Environmental Protection Agency has reviewed the request for modification of the above-referenced NPDES Permit and issued a public notice based on that request. The final decision of the Agency is to modify the Permit as follows:

The monitoring frequency for oil and grease is being reduced from 1/week to 1/month for Outfalls 001(a) and 001(c). Additional monitoring requirements are being added to Outfall 001, concerning the usage of bromine based biocides. The elimination of fecal coliform monitoring at Outfall 001(b) due to the facility being granted a year-round disinfection exemption in July, 1995.

Enclosed is a copy of the modified Permit. You have the right to appeal this modification to the Illinois Pollution Control Board within a 35 day period following the modification date shown on the first page of the permit.

Should you have any question or comments regarding the above, please contact Darin LeCrone of my staff.

Very truly yours,

Thomas G. McSwiggin, P.E.  
Manager, Permit Section  
Division of Water Pollution Control

TGM:SFN:DEL:97041003.dlk

Attachment: Modified Permit

cc: Records  
Compliance Assurance Section  
Facility  
NIPC  
USEPA

RECEIVED  
ENVIRONMENTAL SERVICES DEPT.

SEP 04 1997  
AM 7 8 9 10 11 12 1 2 3 4 5 6 PM  
Q'

NPDES Permit No. IL0048321

Illinois Environmental Protection Agency

Division of Water Pollution Control

1021 North Grand Avenue East

Post Office Box 19276

Springfield, Illinois 62794-9276

**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM**

Modified (NPDES) Permit

Expiration Date: September 1, 2000

Issue Date: August 24, 1995

Effective Date: September 1, 1995

Modification Date: August 28, 1997

Name and Address of Permittee:

Commonwealth Edison Company  
Post Office Box 767, 35 FNW  
Chicago, Illinois 60690-0767

Facility Name and Address:

Commonwealth Edison Company  
Braidwood Nuclear Power Station  
Rural Route #1, Box 84  
Braceville, Illinois 60407  
(Will County)

Discharge Number and Name:

No. 001 Cooling Pond Blowdown Line  
No. 001(a) Wastewater Treatment Plant Effluent  
No. 001(b) Sewage Treatment Plant Effluent  
No. 001(c) Radwaste Treatment System Effluent  
No. 001(d) Demineralizer Regenerant Wastes  
No. 001(e) Intake Screen Backwash

Receiving Waters:

Kankakee River

No. 002 North Site Stormwater Runoff Basin  
No. 003 South Site Stormwater Runoff Basin  
No. 004 Switchyard Area Runoff

Mazon River

In compliance with the provisions of the Illinois Environmental Protection Act, Subtitle C, Rules and Regulations of the Illinois Pollution Control Board, and the FWPCA the above-named permittee is hereby authorized to discharge at the above location to the above-named receiving stream in accordance with the standard conditions and attachments herein.

Permittee is not authorized to discharge after the above expiration date. In order to receive authorization to discharge beyond the expiration date, the permittee shall submit the proper application as required by the Illinois Environmental Protection Agency (IEPA) not later than 180 days prior to the expiration date.



Thomas G. McSwiggin, P.E.  
Manager, Permit Section  
Division of Water Pollution Control

TGM:DEL97041003.DLK

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Modification Date: August 28, 1997

NPDES Permit No. IL0048321

Effluent Limitations and Monitoring

PARAMETER	LOAD LIMITS lbs/day		CONCENTRATION LIMITS mg/l		SAMPLE FREQUENCY	SAMPLE TYPE
	30 DAY AVG.	DAILY MAX.	30 DAY AVG.	DAILY MAX.		

1. From the effective date of this permit until September 1, 2000, the effluent of the following discharge(s) shall be monitored and limited at all times as follows:

Outfall(s): 001 Cooling Pond Blowdown Line\*

This discharge consists of:

	Approximate Flow
1. Condenser cooling water	11.31 MGD
2. House service water	1.3 MGD
3. Essential service water	1.3 MGD
4. Demineralizer regenerant waste	0.028 MGD
5. Wastewater treatment plant effluent	0.079 MGD
6. Radwaste treatment system effluent	0.032 MGD
7. House service water strainer backwash	0.03 MGD
8. Essential service water strainer backwash	0.017 MGD
9. Sewage treatment plant effluent	0.017 MGD
10. Water treatment system filter backwashes	0.03 MGD
11. River intake screen backwash	0.112 MGD
12. Cooling pond intake screen backwash	0.4 MGD

		Daily	Continuous
Flow		Daily	Continuous
pH	See Special Condition No. 1	1/Week	Grab
Temperature	See Special Condition No. 3	Daily	Continuous
Total Residual Chlorine**	0.2	1/Month	Grab**
Total Residual Oxidant**	0.05	1/Month	Grab**

\*See Special Condition No. 12

\*\*See Special Condition No. 4

NPDES Permit No. IL0048321

Effluent Limitations and Monitoring

PARAMETER	LOAD LIMITS lbs/day		CONCENTRATION LIMITS mg/l		SAMPLE FREQUENCY	SAMPLE TYPE
	30 DAY AVG.	DAILY MAX.	30 DAY AVG.	DAILY MAX.		

1. From the effective date of this permit until September 1, 2000, the effluent of the following discharge(s) shall be monitored and limited at all times as follows:

Outfall(s): 001(a) Wastewater Treatment Plant Effluent

This discharge consists of:

Approximate Flow

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>1. Turbine building fire and oil sump*                             <ul style="list-style-type: none"> <li>a. Turbine building floor drain tank*                                     <ul style="list-style-type: none"> <li>i. Turbine building floor drain sumps</li> <li>ii. Essential service water drain sumps</li> <li>iii. Condensate pit sumps</li> </ul> </li> <li>b. Turbine building equipment drain tank*</li> <li>c. Units 1 and 2 tendon tunnel sumps</li> <li>d. Auxiliary boiler blowdown</li> <li>e. Units 1 and 2 diesel fuel storage tank sumps</li> <li>f. Oil-water separator No. 1 effluent</li> <li>g. Secondary-Side Drain Water</li> </ul> </li> <li>2. Water treatment area floor and equipment drain sumps</li> <li>3. Water treatment lime-softening clarator blowdown</li> <li>4. Wastewater treatment system sand filter backwash</li> <li>5. Condensate polisher regenerant wastes (Alternate Route)</li> <li>6. Demineralizer Regenerant Waste Drains (Alternate Route)</li> </ul> | <ul style="list-style-type: none"> <li>0.079 MGD</li> <li>Intermittent</li> <li>Intermittent</li> <li>0.002 MGD</li> <li>Intermittent</li> <li>Intermittent</li> </ul> |
|---|--|

<p>Flow</p> <p>Total Suspended Solids</p> <p>Oil and Grease</p>	<p>Daily</p> <p>15.0</p> <p>15.0</p>	<p>24 Hour Total</p> <p>30.0</p> <p>20.0</p>	<p>1/Week</p> <p>1/Month</p>	<p>24 Hour Composite</p> <p>Grab</p>
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\*These wastestreams may be directed to the Radwaste Treatment System depending on the results of the process radiation monitors.

NPDES Permit No. IL0048321

Effluent Limitations and Monitoring

PARAMETER	LOAD LIMITS lbs/day		CONCENTRATION LIMITS mg/l		SAMPLE FREQUENCY	SAMPLE TYPE
	30 DAY AVG.	DAILY MAX.	30 DAY AVG.	DAILY MAX.		
1. From the effective date of this permit until September 1, 2000, the effluent of the following discharge(s) shall be monitored and limited at all times as follows:						
Outfall(s): 001(b) Sewage Treatment Plant Effluent**						
					Approximate Flow 0.017 MGD (DMF 0.078 MGD)	
Flow					Daily	Continuous
pH	See Special Condition No. 1				1/Week	Grab
Total Suspended Solids	19.5	39.0	30.0	60.0	1/Week	24 Hour Composite
BOD <sub>5</sub>	19.5	39.0	30.0	60.0	1/Week	24 Hour Composite

Outfall(s): 001(c) Radwaste Treatment System Effluent

This discharge consists of:			Approximate Flow: 0.032 MGD			
1. Steam generator condensate blowdown					Intermittent	
2. Cooling jacket blowdown					Intermittent	
3. Auxiliary building and turbine building floor drains					Intermittent	
4. Laundry waste treatment system drains				0.001 MGD	Intermittent	
5. Chemical and volume control system drains					Intermittent	
6. Boron recycle system blowdown					Intermittent	
7. Radwaste demineralizer regenerant wastes and filter backwash				0.002 MGD	Intermittent	
8. Reactor building floor and equipment drains					Intermittent	
9. Turbine building floor drain tank (Alternate Route)					Intermittent	
10. Turbine building fire and oil sump (Alternate Route)					Intermittent	
11. Turbine building equipment drain tank (Alternate Route)					Intermittent	
12. Evaporator wastewater					Intermittent	
Flow					Daily	Continuous
Total Suspended Solids			15.0	30.0	1/Week	Discharge Tank Composite
Oil and Grease			15.0	20.0	1/Month	Grab

\*\*Outfall No. 001(b) Sewage Treatment Plant Effluent will normally be discharged to the Kankakee River via the cooling pond blowdown line. The existing outfall to the Mazon River will be maintained as an emergency backup. The permittee shall give notice to the Agency of any emergency discharge to the Mazon River. Applicable effluent limitations shall apply.

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Effluent Limitations and Monitoring

PARAMETER	LOAD LIMITS lbs/day		CONCENTRATION LIMITS mg/l		SAMPLE FREQUENCY	SAMPLE TYPE
	30 DAY AVG.	DAILY MAX.	30 DAY AVG.	DAILY MAX.		

1. From the effective date of this permit until September 1, 2000, the effluent of the following discharge(s) shall be monitored and limited at all times as follows:

Outfall(s): 001(d) Demineralizer Regenerant Wastes

This discharge consists of

Approximate Flow  
0.028 MGD

1. Make-up demineralizer regenerant waste\*\*\*
2. Condensate polisher regenerate waste\*\*\*
3. Regenerant chemical area drains
4. Portable Demineralizer Regenerant Wastes

Flow

Daily                      Continuous

Total Suspended Solids

15.0                      30.0

1/Week                      8 Hour  
Composite

\*\*\*This wastestream may be alternately routed to the wastewater treatment system.

Outfall(s): 001(e) River Intake Screen Backwash

There shall be no discharge of collected debris.

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Effluent Limitations and Monitoring

PARAMETER	LOAD LIMITS		CONCENTRATION		SAMPLE FREQUENCY	SAMPLE TYPE
	lbs/day		LIMITS mg/l			
	30 DAY AVG.	DAILY MAX.	30 DAY AVG.	DAILY MAX.		

1. From the effective date of this permit until September 1, 2000, the effluent of the following discharge(s) shall be monitored and limited at all times as follows:

Outfall(s): 002 North Site Stormwater Runoff Basin

This discharge consists of:

1. Parking lot runoff
2. Transformer area runoff
3. North station area runoff
4. Turbine building, auxiliary building and waste treatment building roof drains

Approximate Flow:

- Intermittent
- Intermittent
- Intermittent
- Intermittent
- Intermittent

See Special Condition No. 8

Outfall(s): 003 South Site Stormwater Runoff Basin

Approximate Flow

Intermittent

See Special Condition No. 8

Outfall(s): 004 Switchyard Area Runoff

Approximate Flow

Intermittent

See Special Condition No. 8

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Special Conditions

SPECIAL CONDITION 1. The pH shall be in the range 6.0 to 9.0.

SPECIAL CONDITION 2. Samples taken in compliance with the effluent monitoring requirements shall be taken at a point representative of the discharge, but prior to entry into the receiving stream.

SPECIAL CONDITION 3. Discharge of wastewater from this facility must not alone or in combination with other sources cause the receiving stream to violate the following thermal limitations at the edge of the mixing zone which is defined by Section 302.211, Illinois Administration Code, Title 35, Chapter 1, Subtitle C, as amended:

- A. Maximum temperature rise above natural temperature must not exceed 5°F (2.8°C).
- B. Water temperature at representative locations in the main river shall not exceed the maximum limits in the following table during more than one (1) percent of the hours in the 12-month period ending with any month. Moreover, at no time shall the water temperature at such locations exceed the maximum limits in the following table by more than 3°F (1.7°C). (Main river temperatures are temperatures of those portions of the river essentially similar to and following the same thermal regime as the temperatures of the main flow of the river.)

	<u>Jan.</u>	<u>Feb.</u>	<u>Mar.</u>	<u>Apr.</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug.</u>	<u>Sept.</u>	<u>Oct.</u>	<u>Nov.</u>	<u>Dec.</u>
°F	60	60	60	90	90	90	90	90	90	90	90	60
°C	16	16	16	32	32	32	32	32	32	32	32	16

SPECIAL CONDITION 4. Chlorine or bromine may not be discharged from each unit's main cooling condensers for more than two hours per day. The reported mean concentration and maximum concentration of Total Residual Chlorine/Total Residual Oxidant (TRC/TRO) shall be based on a minimum of three grab samples taken at approximately five minute intervals at Outfall 001. The time samples were collected, the time and duration of oxidant dosing period plus the monthly average and daily maximum amount of oxidant applied shall be reported on the Discharge Monitoring Reports. The reported average concentration of TRC/TRO is the average of all values measured for a sampling event and the reported maximum concentration is the highest value measured for a single grab sample. Discharge Monitoring Reports shall indicate whether bromine and/or chlorine compounds were used during the month. A discharge limit, as measured at the blowdown to the Kankakee River, of 0.05 mg/l (instantaneous maximum) shall be achieved for total residual oxidant (total residual chlorine/total residual halogen) when bromine biocides are used for condenser biofouling control.

SPECIAL CONDITION 5. There shall be no discharge of polychlorinated biphenyl compounds.

SPECIAL CONDITION 6. There shall be no discharge of complexed metal bearing wastestreams or associated rinses from chemical metal cleaning unless this permit has been modified to include the new discharge.

SPECIAL CONDITION 7.

- A. Intake impacts will be reduced by limiting pumping from the river during the peak entrainment period. For a four-week period (last three weeks in May and first week in June), pumping will be allowed only during the day (between one hour after sunrise and one hour before sunset). In addition, during the four-week period, pumping will be minimized during the day. Pumping will occur when needed to fill the freshwater holding pond and to maintain efficient operation of the cooling pond. In an extreme emergency, and upon immediate notification of the Agency, pumping could occur at night. Such pumping would cease as soon as the emergency was over. Records of all pumping during the four-week period will be maintained. Such records will include dates, number of pumps operating and start and end times.

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Special Conditions

SPECIAL CONDITION 8.

STORM WATER POLLUTION PREVENTION PLAN (SWPPP)

- A. A storm water pollution prevention plan shall be developed by the permittee for the storm water associated with industrial activity at this facility. The plan shall identify potential sources of pollution which may be expected to affect the quality of storm water discharges associated with the industrial activity at the facility. In addition, the plan shall describe and ensure the implementation of practices which are to be used to reduce the pollutants in storm water discharges associated with industrial activity at the facility and to assure compliance with the terms and conditions of this permit.
- B. The plan shall be completed within 180 days of the effective date of this permit. Plans shall provide for compliance with the terms of the plan within 365 days of the effective date of this permit. The owner or operator of the facility shall make a copy of the plan available to the Agency at any reasonable time upon request. [Note: If the plan has already been developed and implemented, it shall be maintained in accordance with all requirements of this special condition.]
- C. The permittee may be notified by the Agency at any time that the plan does not meet the requirements of this condition. After such notification, the permittee shall make changes to the plan and shall submit a written certification that the requested changes have been made. Unless otherwise provided, the permittee shall have 30 days after such notification to make the changes.
- D. The discharger shall amend the plan whenever there is a change in construction, operation, or maintenance which may affect the discharge of significant quantities of pollutants to the waters of the State or if a facility inspection required by paragraph G of this condition indicates that an amendment is needed. The plan should also be amended if the discharger is in violation of any conditions of this permit, or has not achieved the general objective of controlling pollutants in storm water discharges. Amendments to the plan shall be made within the shortest reasonable period of time, and shall be provided to the Agency for review upon request.
- E. The plan shall provide a description of potential sources which may be expected to add significant quantities of pollutants to storm water discharges, or which may result in non-storm water discharges from storm water outfalls at the facility. The plan shall include, at a minimum, the following items:
  - 1. A topographic map extending one-quarter mile beyond the property boundaries of the facility, showing: the facility, surface water bodies, wells (including injection wells), seepage pits, infiltration ponds, and the discharge points where the facility's storm water discharges to a municipal storm drain system or other water body. The requirements of this paragraph may be included on the site map if appropriate.
  - 2. A site map showing:
    - i. The storm water conveyance and discharge structures;
    - ii. An outline of the storm water drainage areas for each storm water discharge point;
    - iii. Paved areas and buildings;
    - iv. Areas used for outdoor manufacturing, storage, or disposal of significant materials, including activities that generate significant quantities of dust or particulates.
    - v. Location of existing storm water structural control measures (dikes, coverings, detention facilities, etc.);
    - vi. Surface water locations and/or municipal storm drain locations
    - vii. Areas of existing and potential soil erosion;
    - viii. Vehicle service areas;
    - ix. Material loading, unloading, and access areas.

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Special Conditions

3. A narrative description of the following:
    - i. The nature of the industrial activities conducted at the site, including a description of significant materials that are treated, stored or disposed of in a manner to allow exposure to storm water;
    - ii. Materials, equipment, and vehicle management practices employed to minimize contact of significant materials with storm water discharges;
    - iii. Existing structural and non-structural control measures to reduce pollutants in storm water discharges;
    - iv. Industrial storm water discharge treatment facilities;
    - v. Methods of onsite storage and disposal of significant materials;
  4. A list of the types of pollutants that have a reasonable potential to be present in storm water discharges in significant quantities.
  5. An estimate of the size of the facility in acres or square feet, and the percent of the facility that has impervious areas such as pavement or buildings.
  6. A summary of existing sampling data describing pollutants in storm water discharges.
- F. The plan shall describe the storm water management controls which will be implemented by the facility. The appropriate controls shall reflect identified existing and potential sources of pollutants at the facility. The description of the storm water management controls shall include:
1. Storm Water Pollution Prevention Personnel - Identification by job titles of the individuals who are responsible for developing, implementing, and revising the plan.
  2. Preventive Maintenance - Procedures for inspection and maintenance of storm water conveyance system devices such as oil/water separators, catch basins, etc., and inspection and testing of plant equipment and systems that could fail and result in discharges of pollutants to storm water.
  3. Good Housekeeping - Good housekeeping requires the maintenance of clean, orderly facility areas that discharge storm water. Material handling areas shall be inspected and cleaned to reduce the potential for pollutants to enter the storm water conveyance system.
  4. Spill Prevention and Response - Identification of areas where significant materials can spill into or otherwise enter the storm water conveyance systems and their accompanying drainage points. Specific material handling procedures, storage requirements, spill clean up equipment and procedures should be identified, as appropriate. Internal notification procedures for spills of significant materials should be established.
  5. Storm Water Management Practices - Storm water management practices are practices other than those which control the source of pollutants. They include measures such as installing oil and grit separators, diverting storm water into retention basins, etc. Based on assessment of the potential of various sources to contribute pollutants, measures to remove pollutants from storm water discharge shall be implemented. In developing the plan, the following management practices shall be considered:
    - i. Containment - Storage within berms or other secondary containment devices to prevent leaks and spills from entering storm water runoff;
    - ii. Oil & Grease Separation - Oil/water separators, booms, skimmers or other methods to minimize oil contaminated storm water discharges;
    - iii. Debris & Sediment Control - Screens, booms, sediment ponds or other methods to reduce debris and sediment in storm water discharges;

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Special Conditions

- iv. Waste Chemical Disposal - Waste chemicals such as antifreeze, degreasers and used oils shall be recycled or disposed of in an approved manner and in a way which prevents them from entering storm water discharges.
  - v. Storm Water Diversion - Storm water diversion away from materials manufacturing, storage and other areas of potential storm water contamination;
  - vi. Covered Storage or Manufacturing Areas - Covered fueling operations, materials manufacturing and storage areas to prevent contact with storm water.
- 6. Sediment and Erosion Prevention - The plan shall identify areas which due to topography, activities, or other factors, have a high potential for significant soil erosion and describe measures to limit erosion.
  - 7. Employee Training - Employee training programs shall inform personnel at all levels of responsibility of the components and goals of the storm water pollution control plan. Training should address topics such as spill response, good housekeeping and material management practices. The plan shall identify periodic dates for such training.
  - 8. Inspection Procedures - Qualified plant personnel shall be identified to inspect designated equipment and plant areas. A tracking or follow-up procedure shall be used to ensure appropriate response has been taken in response to an inspection. Inspections and maintenance activities shall be documented and recorded.
- G. The permittee shall conduct an annual facility inspection to verify that all elements of the plan, including the site map, potential pollutant sources, and structural and non-structural controls to reduce pollutants in industrial storm water discharges are accurate. Observations that require a response and the appropriate response to the observation shall be retained as part of the plan. Records documenting significant observations made during the site inspection shall be submitted to the Agency in accordance with the reporting requirements of this permit.
  - H. This plan should briefly describe the appropriate elements of other program requirements, including Spill Prevention Control and Countermeasures (SPCC) plans required under Section 311 of the CWA and the regulations promulgated thereunder, and Best Management Programs under 40 CFR 125.100.
  - I. The plan is considered a report that shall be available to the public under Section 308(b) of the CWA. The permittee may claim portions of the plan as confidential business information, including any portion describing facility security measures.
  - J. The plan shall include the signature and title of the person responsible for preparation of the plan and include the date of initial preparation and each amendment thereto.

REPORTING

- K. The facility shall submit an annual inspection report to the Illinois Environmental Protection Agency. The report shall include results of the annual facility inspection which is required by Part G of the Storm Water Pollution Prevention Plan of this permit. The report shall also include documentation of any event (spill, treatment unit malfunction, etc.) which would require an inspection, results of the inspection, and any subsequent corrective maintenance activity. The report shall be completed and signed by the authorized facility employee(s) who conducted the inspection(s).
- L. The first report shall contain information gathered during the one year time period beginning with the effective date of coverage under this permit and shall be submitted no later than 60 days after this one year period has expired. Each subsequent report shall contain the previous year's information and shall be submitted no later than one year after the previous year's report was due.
- M. Annual inspection reports shall be mailed to the following address:

NPDES Permit No. IL0048321

Special Conditions

Illinois Environmental Protection Agency  
Division of Water Pollution Control  
Compliance Assurance Section  
Annual Inspection Report  
1021 North Grand Avenue East  
P.O. Box 19276  
Springfield, Illinois 62794-9276

- N. If the facility performs inspections more frequently than required by this permit, the results shall be included as additional information in the annual report.

**SPECIAL CONDITION 9.** Discharge of station cooling pond water to adjacent impoundments owned by the permittee, to replace water which is withdrawn from these impoundments for station operations during periods of low flows in the Kankakee River when the station must decouple its operations from the river, is hereby permitted for these emergency periods. No monitoring is required for this permitted activity. The IEPA shall be promptly notified during such operations.

**SPECIAL CONDITION 10.** The permittee shall record monitoring results on Discharge Monitoring Report Forms using one such form for each discharge each month.

The completed Discharge Monitoring Report forms shall be submitted to IEPA no later than the 28th of the following month, unless otherwise specified by the the permitting authority.

Discharge Monitoring Reports shall be mailed to the IEPA at the following address:

Illinois Environmental Protection Agency  
Division of Water Pollution Control  
1021 North Grand Avenue East  
Springfield, Illinois 62706

Attention: Compliance Assurance Section

**SPECIAL CONDITION 11.** The "upset" defense provisions of Title 40, Section 122.41(n) of the Federal Regulations are hereby incorporated into this permit by reference.

**SPECIAL CONDITION 12.** An emergency cooling pond overflow exists tributary to an unnamed drainage ditch which is tributary to the Mazon River. Discharges from this overflow shall be subject to the bypass provisions of 40 CFR 122.41(m).

**SPECIAL CONDITION 13.** The permittee shall submit a completed Form 2F as soon as conditions allow, for Outfall 002 and Outfall 003. Based on the new information the Agency may choose to modify the permit after public notice and opportunity for hearing.

**SPECIAL CONDITION 14.** For Discharge No. 001(b), any use of chlorine to control slime growths, odors or as an operational control, etc. shall not exceed the limit of 0.05 mg/l (daily maximum) total residual chlorine in the effluent. Sampling is required on a daily grab basis during the chlorination process. Reporting shall be submitted on the (DMR's) on a monthly basis.

**SPECIAL CONDITION 15.** Flow shall be reported as a daily maximum and a monthly average, and shall be reported in Million Gallons per Day.

ATTACHMENT H

Standard Conditions

Definitions

Act means the Water Environmental Protection Act, Ch. 111-1-2 Ill. Rev. Stat., Sec. 1001.119, as amended.

Agency means the Illinois Environmental Protection Agency.

Board means the Illinois Pollution Control Board.

Clean Water Act (formerly referred to as the Federal Water Pollution Control Act) means Title 33 U.S.C. 1251, as amended.

NPDES (National Pollutant Discharge Elimination System) means the national program for issuing, modifying, revoking and renewing, terminating, monitoring and enforcing permits, and enforcing and enforcing pretreatment requirements, under Sections 301, 402, 318 and 405 of the Clean Water Act.

USEPA means the United States Environmental Protection Agency.

Daily Discharge means the discharge of a pollutant measured during a calendar day in any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurements, the "daily discharge" is calculated as the average measurement of the pollutant over the day.

Maximum Daily Discharge Limitation (daily maximum) means the highest allowable daily discharge.

Average Monthly Discharge Limitation (30 day average) means the highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

Average Weekly Discharge Limitation (7 day average) means the highest allowable average of daily discharges over a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

Best Management Practices (BMP's) means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the State. BMP's also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Aliquot means a sample of specified volume used to make up a total composite sample.

Grab Sample means an individual sample of at least 100 milliliters collected at a randomly selected time over a period not exceeding 15 minutes.

24 Hour Composite Sample means a combination of at least 8 sample aliquots of at least 100 milliliters, collected at periodic intervals during the operating hours of a facility over a 24-hour period.

8 Hour Composite Sample means a combination of at least 3 sample aliquots of at least 100 milliliters, collected at periodic intervals during the operating hours of a facility over an 8-hour period.

Flow Proportional Composite Sample means a combination of sample aliquots of at least 100 milliliters collected at periodic intervals such that either the time interval between each aliquot or the volume of each aliquot is proportional to either the stream flow at the time of sampling or the total stream flow since the collection of the previous aliquot.

- (1) **Duty to comply.** The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action, permit termination, revocation and reissuance, modification, or for denial of a permit renewal application. The permittee shall comply with effluent standards or prohibitions established under Section 301(a) of the Clean Water Act in the case of pollutants within the time provided in the regulations that establish these standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.
- (2) **Duty to reapply.** If the permittee wishes to continue an activity regulated by this permit after the expiration date of the permit, the permittee must apply for and obtain a new permit. If the permittee submits a proper application as required by the Agency no later than 180 days prior to the expiration date, this permit shall continue in full force and effect until the final Agency decision on the application has been made.
- (3) **Need to halt or reduce activity not a defense.** It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of the permit.
- (4) **Duty to mitigate.** The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.
- (5) **Proper operation and maintenance.** The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate operating staffing and training, and adequate laboratory and process controls, including appropriate quality assurance procedures. The provision requires the operation of back up, or auxiliary facilities, or similar systems only when necessary to achieve compliance with the conditions of the permit.

(6) **Permits continue.** This permit may be modified, revoked and reissued, or terminated for cause by the Agency pursuant to 40 CFR 122.62. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

(7) **Property rights.** This permit does not convey any property rights of any sort, or any exclusive privilege.

(8) **Duty to provide information.** The permittee shall furnish to the Agency within a reasonable time, any information which the Agency may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with the permit. The permittee shall also furnish to the Agency, upon request, copies of records required to be kept by the permit.

(9) **Inspection and entry.** The permittee shall allow an authorized representative of the Agency, upon the presentation of credentials and other documents as may be required by law, to

- (a) Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of the permit;
- (b) Have access to and copy, at reasonable times, any records that must be kept under the conditions of the permit;
- (c) Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under the permit; and
- (d) Sample or monitor at reasonable times, for the purpose of assuring permit compliance, or as otherwise authorized by the Act, any substances or parameters at any location.

(10) **Monitoring and records.**

- (a) Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.
- (b) The permittee shall retain records of all monitoring information, including all calibration and maintenance records, and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by the permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the permit, measurement, report or application. This period may be extended by request of the Agency at any time.

(c) Records of monitoring information shall include:

- (1) The date, exact place, and time of sampling or measurements;
- (2) The individual(s) who performed the sampling or measurements;
- (3) The details analyses were performed;
- (4) The individual(s) who performed the analyses;
- (5) The analytical techniques or methods used; and
- (6) The results of such analyses.

(d) Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in the permit. Where no test procedures under 40 CFR Part 136 have been approved, the permittee must submit to the Agency a test method for approval. The permittee shall calibrate and perform maintenance procedures on all monitoring and analytical instrumentation at intervals to ensure accuracy of measurements.

(11) **Signatory requirement.** All applications, reports or information submitted to the Agency shall be signed and certified:

(a) **Application.** All permit applications shall be signed as follows:

- (1) For a corporation by a principal executive officer of at least the level of vice president or a person or position having overall responsibility for environmental matters for the corporation;
- (2) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or
- (3) For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official.

(b) **Reports.** All reports required by permits, or other information requested by the Agency shall be signed by a person described in paragraph (a) or by a duly authorized representative of that person. A person is a duly authorized representative only if:

- (1) The authorization is made in writing by a person described in paragraph (a), and
- (2) The authorization specifies either an individual or a position responsible for the overall operation of the facility, from which the discharge originates, such as a plant manager, superintendent or person of equivalent responsibility; and
- (3) The written authorization is submitted to the Agency.

- (k) Changes of Authorization If an authorization under (b) is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of (b) must be submitted to the Agency prior to or together with any reports, information, or applications to be signed by an authorized representative.
- (12) Reporting requirements
- (a) Planned changes The permittee shall give notice to the Agency as soon as possible of any planned physical alterations or additions to the permitted facility.
- (b) Anticipated noncompliance The permittee shall give advance notice to the Agency of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.
- (c) Compliance schedules Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date.
- (d) Monitoring reports Monitoring results shall be reported at the intervals specified elsewhere in this permit.
- (1) Monitoring results must be reported on a Discharge Monitoring Report (DMR).
- (2) If the permittee monitors any pollutant more frequently than required by the permit, using test procedures approved under 401 CFR 136 or as specified in the permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR.
- (3) Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Agency in the permit.
- (e) Twenty-four hour reporting The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause, the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue, and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance. The following shall be included as information which must be reported within 24 hours:
- (1) Any unanticipated bypass which exceeds any effluent limitation in the permit;
- (2) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Agency in the permit to be reported within 24 hours.
- The Agency may waive the written report on a case by case basis if the oral report has been received within 24 hours.
- (f) Other noncompliance The permittee shall report all instances of noncompliance not reported under paragraphs (12)(c), (d), or (e), at the time monitoring reports are submitted. The reports shall contain the information listed in paragraph (12)(e).
- (g) Other information Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application, or in any report to the Agency, it shall promptly submit such facts or information.
- (13) Transfer of permits A permit may be automatically transferred to a new permittee if:
- (a) The current permittee notifies the Agency at least 30 days in advance of the proposed transfer date;
- (b) The notice includes a written agreement between the existing and new permittees containing a specific date for transfer of permit responsibility coverage and liability between the current and new permittees; and
- (c) The Agency does not notify the existing permittee and the proposed new permittee of its intent to modify or revoke and reissue the permit. If that notice is not received, the transfer is effective on the date specified in the agreement.
- (14) All manufacturing, commercial, mining, and silvicultural dischargers must notify the Agency as soon as they know or have reason to believe:
- (a) That any activity has occurred or will occur which would result in the discharge of any toxic pollutant identified under Section 307 of the Clean Water Act which is not limited in the permit, if that discharge will exceed the highest of the following notification levels:
- (1) One hundred micrograms per liter (100 ug/l);
- (2) Two hundred micrograms per liter (200 ug/l) for acetone and acrylonitrile, five hundred micrograms per liter (500 ug/l) for 2,4-dichlorophenol and for 2-methyl-4,6-dichlorophenol, and one milligram per liter (1 mg/l) for polystyrene;
- (3) Five (5) times the maximum concentration value reported for that pollutant in the NPDES permit application; or
- (4) The level established by the Agency in the permit.
- (b) That they have begun or expect to begin to use or manufacture as an intermediate or final product or byproduct any toxic pollutant which was not reported in the NPDES permit application.
- (15) All Publicly Owned Treatment Works (POTWs) must provide adequate notice to the Agency of the following:
- (a) Any new introduction of pollutants into that POTW from an indirect discharge which would be subject to Sections 301 or 306 of the Clean Water Act if it were directly discharging those pollutants; and
- (b) Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of issuance of the permit.
- (c) For purposes of this paragraph, adequate notice shall include information on (1) the quality and quantity of effluent introduced into the POTW and (2) any anticipated change in the quantity or quality of effluent to be discharged from the POTW.
- (16) If the permit is subject to a publicly owned or publicly regulated treatment works, the permittee shall ensure any industrial use of such treatment works, in compliance with federal requirements, is complying:
- (1) That changes pursuant to Section 214(b) of the Clean Water Act and applicable regulations appearing in 401 CFR 25;
- (2) Toxic pollutant effluent standards and pretreatment standards pursuant to Section 307 of the Clean Water Act; and
- (3) Inspection, monitoring and entry pursuant to Section 308 of the Clean Water Act.
- (17) If an applicable standard or limitation is promulgated under Section 301(b)(1)(C) and (D), 304(b)(2), or 307(a)(2) and that effluent standard or limitation is more stringent than any effluent limitation in the permit, or controls a pollutant not limited in the permit, the permit shall be promptly modified or revoked, and reissued in conformance with that effluent standard or limitation.
- (18) Any authorization to construct issued to the permittee pursuant to 26 M. Adm. Code 309.154 is hereby incorporated by reference as a condition of this permit.
- (19) The permittee shall not make any false statement, representation or certificate in any application, record, report, plan or other document submitted to the Agency or the USEPA or required to be maintained under this permit.
- (20) The Clean Water Act provides that any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Clean Water Act is subject to a civil penalty not to exceed \$10,000 per day of such violation. Any person who willfully or negligently violates permit conditions implementing Sections 301, 302, 306, 307, or 308 of the Clean Water Act is subject to a fine of not less than \$2,500 nor more than \$75,000 per day of violation, or by imprisonment for not more than one year, or both.
- (21) The Clean Water Act provides that any person who fabricates tampered with, or knowingly renders inaccurate any monitoring device or method required to be maintained under permit shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.
- (22) The Clean Water Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit shall, including monitoring reports or reports of compliance or non-compliance shall, upon conviction, be punished by a fine of not more than \$10,000 per violation, or by imprisonment for not more than 6 months per violation, or by both.
- (23) Collected reasoning, sludges, and other solids shall be disposed of in such a manner as to prevent any of those wastes from runoff from the watershed into waters of the State. The proper authorization for such disposal shall be obtained from the Agency and is incorporated as part hereof by reference.
- (24) In case of conflict between these standard conditions and any other conditions included in this permit, the latter conditions shall govern.
- (25) The permittee shall comply with, in addition to the requirements of the permit, all applicable provisions of 26 M. Adm. Code, Subtitle C, Subtitle D, Subtitle E, and all applicable orders of the Board.
- (26) The provisions of the permit are severable, and if any provision of the permit, or the application of any provision of the permit is held invalid, the remaining provisions of the permit shall continue in full force and effect.

Rev 12-1-86

Commonwealth Edison Company  
1400 Opus Place  
Downers Grove, IL 60515-5701



February 29, 2000

CERTIFIED MAIL

Mr. Thomas G. McSwiggin, P. E.  
Manager, Permit Section  
Water Pollution Control, Permit Section #15  
Illinois Environmental Protection Agency  
1021 North Grand Avenue East  
P.O. Box 19276  
Springfield, Illinois 62794-9276

Subject:       Renewal of NPDES Permit No. IL0048321  
                  Braidwood Nuclear Generating Station

Dear Mr. McSwiggin:

Commonwealth Edison Company hereby submits two copies of Consolidated Permit Application Forms 1 and 2C for the renewal of the subject permit. As confirmed by your letter dated July 24, 1997, the only Form 2C, Part V-A pollutants reported are those required by the station's existing NPDES permit, and no analytical data is presented for outfalls 001(e) – Intake Screen Backwash, 002 – North Site Stormwater Runoff Basin, 003 – South Site Stormwater Runoff Basin, and 004 – Switchyard Area Runoff. Additionally, pollutants categorized as GC/MS Fraction Compounds in Part V-C are not reported for any outfalls, as per your letter received on February 4, 1998.

Pollutant levels for all permit-required parameters were derived from station data reported from June 1998 through May 1999. In most cases, only one analysis was conducted for all other pollutant data. All color analyses were performed as "true" (i.e., the samples were centrifuged prior to analysis). Mass load values were calculated using long term average flows.

Form 2C, Part IIB requires descriptions of wastewater treatment processes. In addition to this requirement, we are listing the water treatment additives that have the potential of being discharged by way of various outfalls. Material Safety Data Sheets (MSDS) have been enclosed where available.

Outfall 001 – Cooling Pond Blowdown, receives no treatment as wastewater, however, the circulating water and service water systems are treated for scale inhibition, silt dispersion, corrosion inhibition and biofouling control as follows:

A Edison Company

Mr. Thomas G. McSwiggin, P. E.  
February 29, 2000  
Page 2 of 3

DeposiTrol BL5400, a liquid acidic scale inhibitor consisting of 60% 1-Hydroxyethylidene-1, 1-DiPhosphonic Acid (HEDP), is applied to the cooling systems at a concentration of approximately 10 to 65 parts per billion (ppb) as product to minimize the risk of calcium carbonate scale formation. Either DeposiTrol PY5203, a 50% active blend of polyacrylic acid (PAA), or Dianodic DN2300, a 30% active blend of the polyacrylic acid based copolymer HPS-1, is applied to the service water systems to aid in silt dispersion. FloGard POT6102, a polyphosphate corrosion inhibitor containing 35% sodium hexametaphosphate, is applied to the service water systems to inhibit corrosion. Lastly, the circulating water and service water systems are treated with sodium hypochlorite and sodium bromide for biofouling control.

Outfall 001(a) – Wastewater Treatment Plant Effluent, may be treated with cationic and anionic polymers to aid coagulation/flocculation. There also exists a slight possibility that a small amount of nitrite may be discharged from outfall 001(a) when the station's closed cycle bearing cooling water system is drained for service. This system is treated with 400 mg/L nitrite, but occurrences of release are expected to be very rare. In the past, the system's 5000 gallon holding tank has discharged, at most, once per year. Due to the fact that this system discharges into outfall 001(c) and that nitrites degrade rapidly under aerobic conditions, we believe that the environmental impact of such a discharge is minimal.

Outfall 001(b) – Sewage Treatment Plant Effluent, may be treated with sodium bicarbonate for pH adjustment and carbonate addition during the treatment process.

Outfall 001(d) – Demineralizer Regenerant Wastes, consists of excess sulfuric acid, excess caustic, and rinse water used to regenerate the ion exchange resin beds that supply ultra-pure water required by the generating process. Additionally, please note that the station utilizes a portable demineralizer system to supplement demineralized water make-up. This portable system utilizes reverse osmosis (RO), electrodialysis reversal (EDR), and ultra-filtration (UF) technologies. Reject from the EDR and UF systems are recycled. Reject from the RO unit combines with regenerant wastes from the demineralizer system and is discharged via outfall 001(d).

In addition to the chemicals listed above, secondary-side steam water (non-radioactive) containing hydrazine is discharged to the Kankakee River via Outfall 001 during unit outages. These outages typically result in the semi-annual discharge of about 200,000 gallons of a 100 mg/l hydrazine solution. This solution is discharged to the cooling pond at approximately 55 GPM via the station's wastewater treatment plant - Outfall 001a, resulting in a maximum possible hydrazine concentration of 2.7 ug/l in the cooling pond blowdown (Outfall 001). Please note that this concentration is overly conservative as no dilution from other sources is considered; hydrazine readily undergoes a degradation reaction to ammonia in the presence of oxygen; and this discharge must travel the entire length of the cooling pond prior to reaching the blowdown point (approximately 4.5 days travel time). Also, the station has the ability to utilize Nalco Elimin-Ox, a carbonylhydrazide-based product, in place of hydrazine to lay up the steam generators during unit outages.

Mr. Thomas G. McSwiggin, P. E.  
February 29, 2000  
Page 3 of 3

Lastly, no chemical treatment is applied to outfall 001(e) – Intake Screen Backwash.

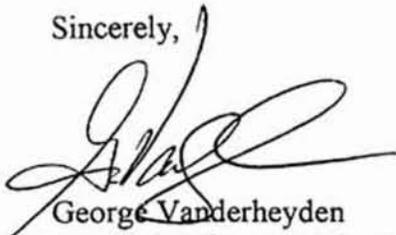
Agency guidance relative to previous NPDES permit applications for ComEd nuclear generating stations indicated a need to provide additional detail on the contributing wastestreams for each outfall. As such, we request that the new permit be amended to reflect that the following systems discharge via outfall 001(a) – Wastewater Treatment Plant Effluent:

Under 1. Turbine building fire and oil sump; please add:

h. Miscellaneous non-contaminated auxiliary building drains

Should you have any questions, or require additional information, please call Kevin K. Hersey at (630) 663-3094.

Sincerely,



George Vanderheyden  
Generation Support Vice President

k/sheila/letters/braidwood renewal.doc

Enclosure (2 copies)

Form Approved, U.S.G. No. 2040-0085 Approval expires 7-31-88

<b>FORM 1</b> <b>GENERAL</b>				<b>U.S. ENVIRONMENTAL PROTECTION AGENCY</b> <b>GENERAL INFORMATION</b> <i>Consolidated Permits Program</i> <i>(Read the "General Instructions" before starting.)</i>		<b>I. EPA NUMBER</b> <b>F</b> ILD000800505																																																					
<b>II. POLLUTANT CHARACTERISTICS</b> INSTRUCTIONS: Complete A through J to determine whether you need to submit any permit application forms to the EPA. If you answer "yes" to any questions, you must submit this form and the supplemental form listed in the parenthesis following the question. Mark "X" in the box in the third column if the supplemental form is attached. If you answer "no" to each question, you need not submit any of these forms. You may answer "no" if your activity is excluded from permit requirements; see Section C of the instructions. See also, Section D of the instructions for definitions of bold-faced terms.		<table border="1"> <thead> <tr> <th rowspan="2">SPECIFIC QUESTIONS</th> <th colspan="3">MARK 'X'</th> <th rowspan="2">SPECIFIC QUESTIONS</th> <th colspan="3">MARK 'X'</th> </tr> <tr> <th>YES</th> <th>NO</th> <th>FORM ATTACHED</th> <th>YES</th> <th>NO</th> <th>FORM ATTACHED</th> </tr> </thead> <tbody> <tr> <td>A. 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<b>IV. FACILITY CONTACT</b> A. NAME & TITLE (last, first, & title) 2 TIDMORE JOSEPH ENV. ANALYST B. PHONE (area code & no.) 815 458 2801																																																											
<b>V. FACILITY MAILING ADDRESS</b> A. STREET OR P.O. BOX 3 RURAL ROUTE 1 Box 84 B. CITY OR TOWN 4 BRACEVILLE C. STATE IL D. ZIP CODE 60407																																																											
<b>VI. FACILITY LOCATION</b> A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER 5 Rural Route 1, Box 84 B. COUNTY NAME Will C. CITY OR TOWN 6 Braceville D. STATE IL E. ZIP CODE 60407 F. COUNTY CODE (If known)																																																											

CONTINUED FROM THE FRONT

VII. SIC CODES (4-digit, in order of priority)

A. FIRST				B. SECOND			
7	4	9	1	7			
Electrical Generation & Distribution							
C. THIRD				D. FOURTH			
7				7			

VIII. OPERATOR INFORMATION

A. NAME  
Commonwealth Edison Company

B. Is the name listed in Item VIII-A also the owner?  
 YES  NO

C. STATUS OF OPERATOR (Enter the appropriate letter into the answer box: (if "Other", specify.)  
F = FEDERAL M = PUBLIC (other than federal or state)  
S = STATE O = OTHER (specify)  
P = PRIVATE

D. PHONE (area code & no.)  
A 630 663 3094

E. STREET OR P.O. BOX  
1400 OPUS PLACE SUITE 500

F. CITY OR TOWN  
DOWNERS GROVE

G. STATE  
IL

H. ZIP CODE  
60515

I. INDIAN LAND  
Is the facility located on Indian lands?  
 YES  NO

X. EXISTING ENVIRONMENTAL PERMITS

A. NPDES (Discharges to Surface Water)		D. PSD (Air Emissions from Proposed Sources)	
9	N IL0048321	9	P
B. UIC (Underground Injection of Fluids)		E. OTHER (specify)	
9	U	8	2110055 (specify) Air-Radwaste Vol. Educt System
C. RCRA (Hazardous Wastes)		E. OTHER (specify)	
9	R	9	79020011 (specify) Air-Aux. Boilers, Tanks Diesel Generator

XI. MAP  
Attach to this application a topographic map of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in the map area. See instructions for precise requirements.

XII. NATURE OF BUSINESS (provide a brief description)  
Generation and Distribution of Electric Power

XIII. CERTIFICATION (see instructions)  
I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME & OFFICIAL TITLE (Type or print)  
GENERATION SUPPORT  
VICE PRESIDENT

SIGNATURE  


C. DATE SIGNED  
2-29-00

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Exelon Generation Company, LLC      www.exeloncorp.com  
Braidwood Station  
35100 South Rt 53, Suite 84  
Braceville, IL 60407-9619  
Tel. 815-458-2801

CERTIFIED MAIL

July 10, 2002  
Bw/020067

Mr. Darin LeCrone  
Industrial Unit, Permit Section  
Illinois Environmental Protection Agency  
Water Pollution Control, Permit Section #15  
1021 North Grand Avenue East  
P.O. Box 10276  
Springfield, Illinois 62794-9276

Dear Mr. LeCrone:

The purpose of this letter is to outline a proposal to increase Cooling Pond Blowdown flow, NPDES Outfall 001, to approximately 30,000 gallons per minute (gpm) from the present blowdown flow of approximately 15,000gpm at the Exelon Braidwood Nuclear Generating Station.

The Cooling Pond Blowdown flow has been limited in the past due to inherent design deficiencies related to low circulating water system pressure. The low circulating water system pressure prevents the blowdown flow from reaching designed flowrates assumed in the original plant design. Installation of a booster pump(s) will allow the station to achieve a higher rate of blowdown resulting in better pond chemistry and lower pH for the Cooling Pond Blowdown, NPDES Outfall 001. Calculations show that the BTU input to the Kankakee River, as a result of this increase, will remain within the NPDES Permit discharge limits. We believe that no NPDES permit modification is necessary for the increase in flow in the Cooling Pond Blowdown to the Kankakee River. No Illinois water quality standard will be exceeded and no adverse environmental consequence will result from this increase.

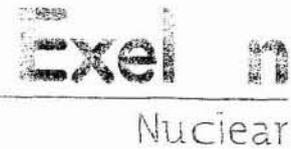
We are requesting Agency review and approval to implement design changes to achieve the desired blowdown flowrate. Should you have any questions or require further information to process this request, please contact Brent Schramer, Chemistry Manager at (815) 417-3200.

Respectfully,

A handwritten signature in black ink, appearing to read "James D. von Suskil".

James D. von Suskil  
Site Vice President

JDV/JT/tp



Exelon Nuclear Generating Station (NPDES Permit No. IL0048321)  
Braidwood Station  
200 West 15th Street  
Braidwood, Illinois 60412-9001  
Tel: 815-458-2801

**CERTIFIED MAIL**



March 24, 2004  
BW040032

Mr. Al Keller  
Manager, Industrial Unit, Permit Section  
Illinois Environmental Protection Agency  
Division of Water Pollution Control  
1021 North Grand Avenue East  
P.O. Box 19276  
Springfield, Illinois 62794-9276

Subject: Braidwood Station (NPDES Permit No. IL0048321) Circulating Water  
Blowdown Flow Increase

Dear Mr. Keller:

On July 10, 2002, in a letter sent to Darin LeCrone, we informed the Illinois Environmental Protection Agency (IEPA) of Braidwood Nuclear Generating Station's need to increase the blowdown flow rate from the Braidwood cooling pond to the Kankakee River. The purpose of the letter was to notify IEPA that the planned change in operations would increase the blowdown flow rate above the original design rate for the cooling pond. In the letter to Mr. LeCrone, we also informed the Agency that the planned flow rate increase would not cause any exceedences of discharge limits specified in the NPDES Permit, nor would it cause or contribute to any violations of water quality standards in the Kankakee River.

The Braidwood Station has yet to implement the planned flow rate increase. As we explain below, as each day passes the need to increase the flow rate becomes more imperative, both for operational and environmental reasons. This letter also explains that there are no regulatory or legal impediments to allowing the plant to increase the flow rate as planned, without any further delay.

**Background**

The Braidwood Station cooling pond is a closed cycle cooling system. To make up for evaporative losses from the cooling pond and maintain suitable water chemistry in the pond, it is necessary to provide make-up water to the pond from the Kankakee River and to discharge (i.e. blow down) water from the pond back to the Kankakee River. The design blowdown flow rate for the cooling pond (to maintain optimal water chemistry) is about

21,000 gallons per minute (gpm). The Station's NPDES permit does not establish a maximum blowdown rate from the pond. Rather, the permit lists approximate flow rates for various internal waste streams that contribute to the blowdown discharge.

From about the time the Station came on line in 1987 until September 2003, the Station had not been able to achieve the 21,000 gpm design blow down flow rate on a consistent basis. As a result, the concentrations of constituents in the cooling pond and pH levels in the pond have increased over time, above the levels that were expected based on design blowdown flow rates. As the concentrations of chemical constituents in the cooling water used by the Station have increased, the plant's operating efficiency has decreased correspondingly, due principally to scaling that occurs on piping systems that reduces the heat exchange capabilities of the systems.

It is important to note that, even though the concentrations of constituents in the cooling pond and blowdown water have increased beyond those that were expected based on assumed design blowdown flow rates, the concentrations remain at or below the numeric water quality standards for those constituents. Thus, blowdown discharges to the Kankakee River, after allowance for mixing, are well within the applicable water quality standards for the River. Nevertheless, unless and until the blowdown flow rate is increased, constituent concentrations in the cooling pond will continue to increase, as will the concentrations of constituents that are discharged to the Kankakee River. The discussion below, Cooling Pond Chemistry, contains specifics regarding constituent concentrations in the cooling pond.

#### **Circulating Water Blowdown Booster Pump Installation**

To address the concerns related to the increased concentrations of chemical constituents and high pH levels, the Station installed booster pumps that would allow the Station to discharge at a rate between 25,000 to 30,000 gpm to the Kankakee River. The Station plans to operate the pumps at higher flow rates to lower the concentrations of constituents in the pond to optimal levels. These concentrations in the water discharged from the cooling pond to the Kankakee River will remain within the applicable water quality standards. The mass loading of constituents discharged from the pond will not exceed any mass load limits included in the NPDES Permit at the higher flow rates.

#### **Environmental Considerations**

Further delaying the Station's plans to discharge at the higher average flow rate would be environmentally counterproductive. As previously stated, the concentrations of constituents in the cooling pond will continue to increase as long as the Station continues to operate as it presently does. Constituent concentrations in the blowdown will begin decreasing almost immediately after the Station begins discharging at higher flow rates. In addition, as pH levels in the cooling pond decrease (following the blowdown flow rate increase) the Station will ultimately be able to reduce the amount of sulfuric acid it is required to add to the pond to control pH, thereby reducing associated environmental concerns. Use of other treatment chemicals will also be reduced over time. There are no environmental benefits achieved as a result of delay.

### Regulatory Considerations

Given that the NPDES Permit does not prescribe a maximum blowdown flow rate, and in view of the fact that the Station is not proposing to discharge water from the pond at concentrations that would cause exceedences of water quality standards or exceed the load limits set forth in the Permit, there is no need to modify the NPDES Permit before the Station begins discharging at the higher flow rate. Antidegradation review requirements are triggered by "any proposed increase in pollutant loading that necessitates a new, renewed or modified NPDES permit...". The increased discharge flow rate does not require that the permit be modified; thus, an antidegradation review related to the planned blowdown flow rate increase is not required.

### Cooling Pond Chemistry

As you requested, attached is a Table that sets forth the current values of constituent concentrations in the cooling pond and the calculated stabilized values that will be achieved following operations at the higher blowdown rate. As previously stated, the concentration of constituents in the cooling pond are currently sufficiently low so as not to present any risk that either water quality standards applicable to the Kankakee River or that the load limits set forth in the Station's NPDES Permit will be exceeded as a result of increasing the average blowdown flow rate.

Due to the significant operational and environmental factors described above, and consistent with the above regulatory considerations, Exelon is prepared to implement the increased blowdown flow rate as soon as possible.

Please contact Joe Tidmore at (815) 417-2299 if you would like any additional information or if you have any comment regarding the above.

Respectfully,



Keith J. Polson  
Plant Manager  
Braidwood Generating Station

Attachment



1520 Kensington Road, Suite 204  
Oak Brook, Illinois 60523-2139  
Phone 630-993-2100  
Fax 630-993-9017  
[www.mostardiplatte.com](http://www.mostardiplatte.com)

October 28, 2009

Mr. Darin LeCrone P.E.  
Acting Unit Manager, Permits Section  
Illinois Environmental Protection Agency  
1021 North Grand Avenue East  
Springfield, IL 62794

**RE: Exelon Nuclear Braidwood Generating Station,  
NPDES Permit No. IL0048321  
USACE Project LRC-2008-340**

Dear Mr. LeCrone:

As a follow-up to our meeting on August 13, 2009, MOSTARDI PLATT ENVIRONMENTAL (MPE) has prepared the attached application for a construction permit to install a river diffuser at Outfall 001. Two (2) copies are being submitted—one original and one duplicate copy. The design details are based on information previously provided to the US Army Corps of Engineers (USACE). An electronic copy of that application is included as Appendix E to the attached application.

The information attached to this letter includes a completed IEPA Application for Permit or Construction Approval, form WPC-PS-1, with all necessary certifications and approvals provided. As discussed with your department, no application fees are associated with the planned changes to the existing NPDES permitted outfall since the source is already subject to operating fees.

The USACE had issued a project number for the Exelon River Diffuser project during the original meetings that took place in 2008 (LRC-2008-340). In 2009, when the application was submitted, another project number was inadvertently issued (LRC-2009-269). To eliminate confusion, the USACE has deleted the 2009 project number and is now using LRC-2008-340.

Mostardi Platt Environmental

Illinois Environmental Protection Agency  
October 28, 2009  
Page 2

Should you have any questions or require further information, please contact me at 630-993-2127.

Respectfully submitted:

**MOSTARDI PLATT ENVIRONMENTAL**



Joseph J. Macak III  
Principal Consultant

Enclosures: 1 original, 1 copy

cc:

Ms. Kate Bliss, U.S. Army Corps of Engineers  
Mr. Joseph Macak III, Mostardi Platt Environmental  
Mr. Raymond Hall, Exelon Nuclear  
Mr. Dominic Imburgia, Exelon Nuclear  
Mr. Bryan Risley, Exelon Nuclear

**APPLICATION FOR A CONSTRUCTION PERMIT  
FOR THE INSTALLATION OF A RIVER  
DIFFUSER AT OUTFALL 001**

Prepared For  
**EXELON NUCLEAR**

For The  
**Braidwood Generating Station  
35100 South Route 53  
Braceville, Illinois 60407**

**IEPA NPDES Permit No. IL0048321**

**September 1, 2009**





1520 Kensington Road, Suite 204  
Oak Brook, Illinois 60523-2139  
Phone 630-993-2100  
Fax 630-993-9017  
www.mostardiplatten.com

**APPLICATION FOR A CONSTRUCTION PERMIT  
FOR THE INSTALLATION OF A  
RIVER DIFFUSER AT OUTFALL 001**

Prepared For  
**EXELON NUCLEAR**

For The  
**Braidwood Generating Station  
35100 South Route 53  
Braceville, Illinois 60407**

**IEPA NPDES Permit No. IL0048321**

**September 1, 2009**

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Mostardi Platt Environmental

**MPE PROJECT M082513**

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**APPENDICES**

Appendix A – IEPA Application for Permit or Construction Approval WPC-PS-1 (Application Form)

Appendix B – IEPA NPDES Permit Modification Request (as submitted in US Army Corps of Engineers Application)

Appendix C – Outfall Location Calculation

Appendix D – Engineering Drawings (as submitted in US Army Corps of Engineers Application)

Appendix E – “Application for an Individual Permit for a River Diffuser” (as submitted May 8, 2009 to US Army Corps of Engineers Application)



1520 Kensington Road, Suite 204  
Oak Brook, Illinois 60523-2139  
Phone 630-993-2100  
Fax 630-993-9017  
www.mostardiplattenv.com

**APPLICATION FOR A CONSTRUCTION PERMIT  
FOR THE INSTALLATION OF A  
RIVER DIFFUSER AT OUTFALL 001**

Prepared For  
**EXELON NUCLEAR**  
For The  
**Braidwood Generating Station**  
35100 South Route 53  
Braceville, Illinois 60407

**IEPA NPDES Permit No. IL0048321**  
**September 1, 2009**

---

**INTRODUCTION**

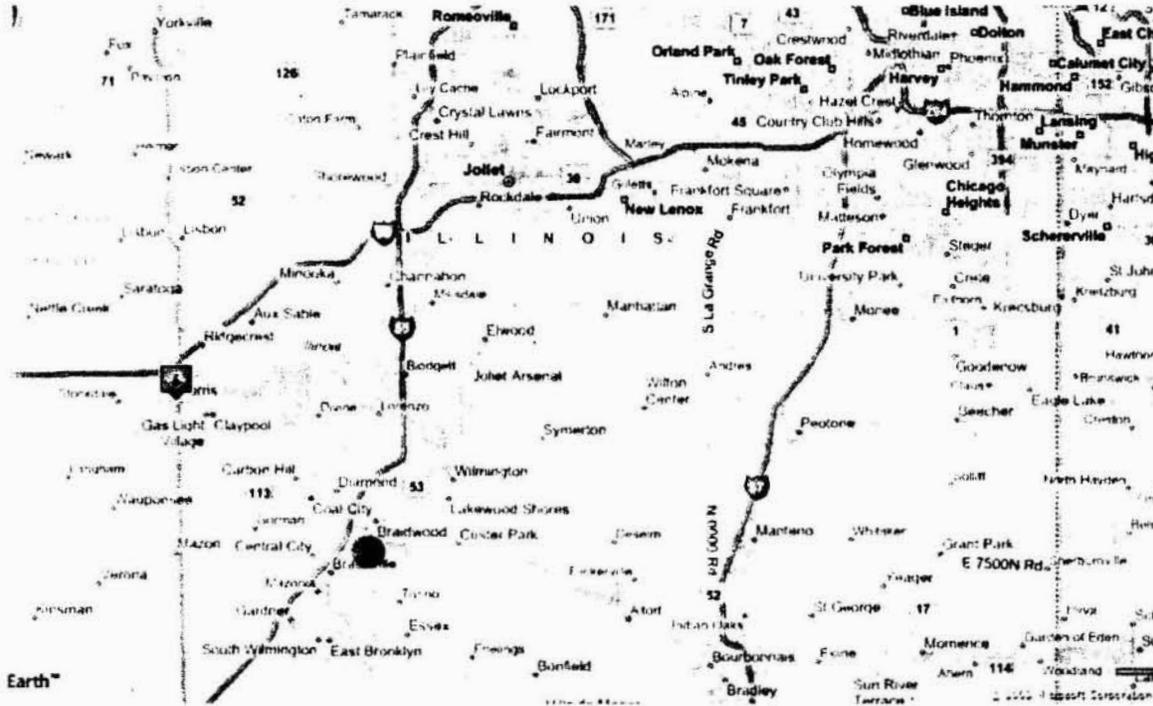
The Braidwood Generating Station (Braidwood) is a nominal 2,362 MW base load generating facility located in Will County, Illinois, approximately 20 miles south of Joliet, Illinois (see Figure 1). The facility, which serves northeastern Illinois, consists of two Westinghouse pressurized water reactors. Unit 1 began operation on July 2, 1987, and Unit 2 began operation on May 5, 1988. Commercial operation began in May and October, 1988, respectively. The license expiration date is October 17, 2026 for Unit 1, and December 18, 2027 for Unit 2.

Braidwood is owned by Exelon Corporation, and operated by one of its business units—Exelon Nuclear. Braidwood is built on a 4,457-acre site, and its 2,537 acre cooling pond was formed from scarred farming land and an old strip mine. Figure 2 is an aerial photograph of the Braidwood site, showing the actual site, the cooling pond, and the Kankakee River intake and discharge locations.

**1.0 PROPOSED RIVER DIFFUSER PROJECT**

By this submittal the facility is requesting that a construction permit be issued for the installation of a river diffuser to be located at Exelon's Effluent Outfall 001. The diffuser will be designed as specified in the "Application for an Individual Permit for a River Diffuser" submitted to the US Army Corps of Engineers (USACE) on May 8, 2009. This Illinois Environmental Protection Agency (IEPA) permit application is provided to address the details associated with the proposed installation of a river diffuser in the Kankakee River. This project will provide significant environmental benefits over the existing river outfall. It is also proposed that the existing outfall will remain in service only as a back-up to the diffuser.

This application includes the WPC-PS-1 form, all of the appropriate certifications as required by the IEPA WPC-PS-1 form, copies of design documents as provided to the USACE, and an electronic copy of the may 8, 2009 USACE application.



**Figure 1. Braidwood Station Location Map.**

## **2.0 PROJECT TEAM**

### **2.1 BRAIDWOOD STATION PLANT MANAGER**

The authorized site representative is:

Mr. Lawrence Coyle  
Plant Manager  
Braidwood Station – Exelon Nuclear  
35100 S. Route 53  
Braceville, IL 60407  
Phone: (815) 417-3700  
Email: [Lawrence.coyle@exeloncorp.com](mailto:Lawrence.coyle@exeloncorp.com)

## 2.2 BRAIDWOOD STATION PROJECT MANAGER

The Braidwood Station project manager for the proposed river diffuser is:

Mr. Bryan Risley  
Project Manager  
Braidwood Station – Exelon Nuclear  
35100 S. Route 53  
Braceville, IL 60407  
Phone: (815) 417-4009  
Email: [bryan.risley@exeloncorp.com](mailto:bryan.risley@exeloncorp.com)

## 2.3 ENVIRONMENTAL CONSULTANT

The environmental permitting consultant lead professional in charge of this application is:

Mr. Joseph J. Macak III  
Principal Consultant  
Mostardi Platt Environmental  
1520 Kensington Road – Suite 204  
Oak Brook, IL 60523  
Phone: (630) 993-2127  
Email: [jmacak@mostardiplattenv.com](mailto:jmacak@mostardiplattenv.com)

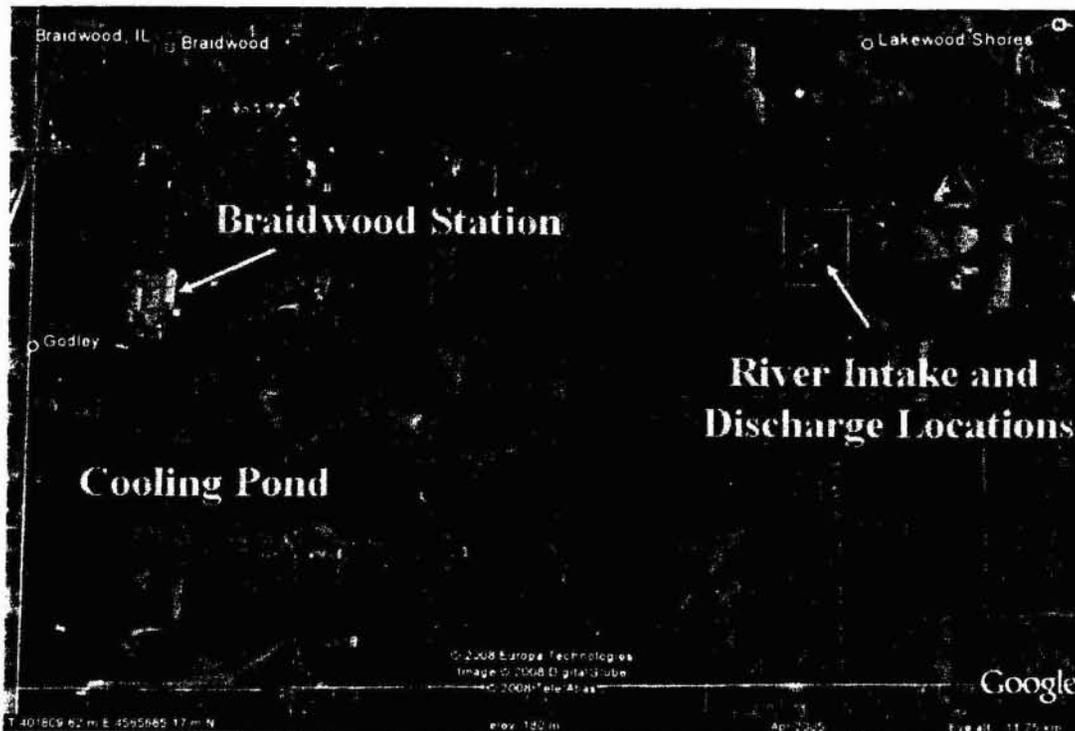


Figure 2. Braidwood Station Aerial Photograph (April 2005).

### **3.0    OUTFALL 001 LOCATIONS**

The distance from the planned location of the river diffuser outfall compared to the existing 001 outfall is within 0 degrees, 0 minutes, and 15 seconds in distance. Appendix C provides a calculation of this proposed change.

The locations of the two (2) outfalls are provided in the following table.

Existing 001 Outfall Location	Planned River Diffuser 001 Outfall Location
Latitude: 41° 15' 6.45"	Latitude: 41° 15' 8.70"
Longitude: 88° 8' 5.49"	Longitude: 88° 8' 0.35"

**Appendix A**

**IEPA Application for Permit or  
Construction Approval WPC-PS-1**



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

For IEPA Use:

**Application for Permit or Construction Approval  
WPC-PS-1**

1. Owner Name: Braidwood Nuclear Power Station  
 Name of Project: Installation of Braidwood Station Proposed River Diffuser  
 Township: Wilmington County: Will

2. Brief Description of Project:  

Install a new 7-port diffuser system at Outfall 001. Diffuser discharge would be below surface in the Kankakee River. The river diffuser would be fitted with Tideflex diffuser valves; prevent backflow, intrusion of sediment or aquatic life, and enhance the hydraulic performance of the diffuser. No changes to existing Outfall 001 - back-up.

3. Documents Being Submitted: If the Project involves any of the items listed below, submit the corresponding schedule, and check the appropriate boxes.

	<u>Schedule</u>		<u>Schedule</u>
Private Sewer Connection/Extension	A/B <input type="checkbox"/>	Spray Irrigation	H <input type="checkbox"/>
Sewer Extension Construct Only	C <input type="checkbox"/>	Septic Tanks	I <input type="checkbox"/>
Sewage Treatment Works	D <input type="checkbox"/>	Industrial Treatment/Pretreatment	J <input type="checkbox"/>
Excess Flow Treatment	E <input type="checkbox"/>	Waste Characteristics	N <input type="checkbox"/>
Lift Station/Force Main	F <input type="checkbox"/>	Erosion Control	P <input type="checkbox"/>
Fast Track Service Connection	FTP <input type="checkbox"/>	Trust Disclosure	T <input type="checkbox"/>
Sludge Disposal	G <input type="checkbox"/>		

Plans: Title "Application for an Individual Permit for a River Diffuser", dated May 8, 2009. Binder provided to IEPA,  
several hundred of pages, with appendices. No. of Pages: NA

Specifications: Title Appendix C - River Diffuser Modeling Study - HydroQual Report  
Appendix D - Engineering Drawings No. of Books/Pages: NA

Other Documents: \_\_\_\_\_  
 (Please Specify)

3.1 Illinois Historic Preservation Agency approval letter: Yes  No

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

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

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

- A. Joint Construction and Operating Permit
- B. Authorization to Construct (See Instructions) NPDES Permit No. IL00 48321
- C. Construct Only Permit (Does Not Include Operations)
- D. Operate Only Permit (Does Not Include Construction)

6. Certifications and Approval:

6.1 Certificate by Design Engineer (When required: refer to instructions)

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

Engineer Name: Dinesh C. Patel - Certification letter attached dated 10/7/2009

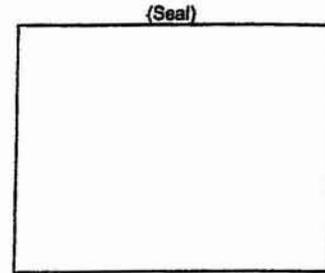
Registration Number: see attached  
(3 digits) (6 digits)

Firm: Sargent & Lundy, LLC

Address: 55 East Monroe Street

City: Chicago State: IL Zip: 60603 Phone No: (312) 269-2033

Signature X ----see attached certification letter Date: -----



7. Certifications and Approvals for Permits:

7.1 Certificate by Applicant(s)

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

7.1.1 Name of Applicant for Permit to Construct: Braidwood Generating Station

Address: 35100 South Route 53

City: Braceville State: IL Zip Code: 60407

Signature X \_\_\_\_\_ Date: \_\_\_\_\_

Printed Name: Lawrence M. Coyle Phone No: (815) 417-3700

Title: Plant Manager

Organization: Exelon Generation Company

7.1.2 Name of Applicant for Permit to Own and Operate: Braidwood Generating Station

Address: 35100 South Route 53

City: Braceville State: IL Zip Code: 60407

Signature X Lawrence M Coyle Date: 10/21/09

Printed Name: Lawrence M. Coyle Phone No: (815) 417-3700

Title: Plant Manager

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

Signature X \_\_\_\_\_ Date: \_\_\_\_\_

Title: NA  
(City Clerk, Village Clerk, Sanitary District Clerk, Etc.)

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

7.4 Certificate By Intermediate Sewer Owner

I hereby certify that (Please check one):

- 1. The sewers to which this project will be tributary have adequate reserve capacity to transport the wastewater that will be added by this project without causing a violation of the environmental Protection Act or Subtitle C, Chapter I, or
- 2. The Illinois Pollution Control Board, in PCB \_\_\_\_\_ dated \_\_\_\_\_ granted a variance from Subtitle C, Chapter I to allow construction of facilities that are the subject of this application.

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

NA

Sewer System Owner: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Signature X \_\_\_\_\_ Date: \_\_\_\_\_

Printed Name: \_\_\_\_\_ Phone No: \_\_\_\_\_

Title: \_\_\_\_\_

7.4.1 Additional Certificate By Intermediate Sewer Owner

I hereby certify that (Please check one):

- 1. The sewers to which this project will be tributary have adequate reserve capacity to transport the wastewater that will be added by this project without causing a violation of the environmental Protection Act or Subtitle C, Chapter I, or
- 2. The Illinois Pollution Control Board, in PCB \_\_\_\_\_ dated \_\_\_\_\_ granted a variance from Subtitle C, Chapter I to allow construction facilities that are the subject of this application.
- 3. Not applicable

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

NA

Sewer System Owner: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Signature X \_\_\_\_\_ Date: \_\_\_\_\_

Printed Name: \_\_\_\_\_ Phone No: \_\_\_\_\_

Title: \_\_\_\_\_

**7.5 Certificate By Waste Treatment Works Owner**

I hereby certify that (Please check one):

- 1. The waste treatment plant to which this project will be tributary has adequate reserve capacity to treat the wastewater that will be added by this project without causing a violation of the Environmental Protection Act or Subtitle C, Chapter I, or
- 2. The Illinois Pollution Control Board, in PCB \_\_\_\_\_ dated \_\_\_\_\_ granted a variance from Subtitle C, Chapter I to allow construction and operation of the facilities that are the subject of this application.
- 3. Not applicable

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

Name of Waste Treatment Works: NA \_\_\_\_\_

Waste Treatment Works Owner: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip Code: \_\_\_\_\_

Signature X \_\_\_\_\_ Date: \_\_\_\_\_

Printed Name: \_\_\_\_\_ Phone No: \_\_\_\_\_

Title: \_\_\_\_\_

Please return completed form to the following address:

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

This Agency is authorized to require this information under Illinois Revised Statutes, 1979, Chapter 111 ½, Section 1039. Disclosure of this information is required under that Section. Failure to do so may prevent this form from being processed and could result in your application being denied. This form has been approved by the Forms Management Center.

IL 532-0010  
WPC 150

**Sargent & Lundy LLC**

D. C. Patel  
Senior Manager  
312-269-2625  
312-269-6530 (FAX)  
dinesh.c.patel@sargentlundy.com

October 7, 2009  
Project No. 11329-124  
S&L Ltr. No. 2009-BRW-194

Exelon Nuclear  
Braidwood Station – Units 1 and 2

Design Engineer Certification Regarding Application for Construction  
Permit from Illinois Environmental Project Agency (IEPA) for the  
Braidwood River Diffuser Installation

Mr. B. Risley  
Exelon Nuclear  
Braidwood Station  
35100 S. Route 53  
Braceville, Illinois 60407-9619

Dear Mr. Risley:

At your request in support of the construction permit application to the IEPA for "Installation of a River Diffuser at Outfall 001" being prepared by Mostardi Platt Environmental, we are providing this letter to certify that Sargent & Lundy LLC (S&L) is the consulting engineer contracted by Exelon to prepare the design documentation required to implement the river diffuser installation. Sargent & Lundy prepared a conceptual design of the river diffuser installation for Exelon, which included Detail A, Detail 1, Sections B-B, C-C, D-D, E-E, H-H and J-J shown on sketches in Appendix D of the permit application. Sargent & Lundy is currently preparing the detail design documentation which will be used for installation of the river diffuser described in the permit application. S&L will complete the detail design documentation by December 31, 2009.

I hereby certify that I am familiar with the conceptual design documentation described above contained in Appendix D of the construction permit application. The detailed design documentation is being prepared under my direction.

Firm	Sargent & Lundy LLC
Address	55 E. Monroe Street
City, Station, Zip Code	Chicago, Illinois 60603
Telephone No.	312-269-2625



(SEAL)

*D. C. Patel*

Mr. B. Risley  
Exelon Nuclear

October 7, 2009  
Project No. 11329-124  
S&L Ltr. No. 2009-BRW-194

If you need any additional assistance in preparation of the construction permit application, please contact me or Mr. M. J. Krueger at 630-821-7365.

Yours very truly,



D. C. Patel  
Senior Manager

DCP:MJK:iwm  
Original:  
J. Macak – Mostardi Platt  
Copies:  
B. Risley - Exelon  
T. J. Behringer  
M. J. Krueger  
SNL3C\DATA3\MMWROG\11329-124\4.02\09BRW194.DOC

**Appendix B**  
**IEPA NPDES Permit Modification Request**  
**(Dated May 8, 2009)**



Exelon Generation Company, LLC  
Braidwood Station  
35100 South Route 53, Suite 84  
Braidwood, IL 60407-9619

www.exeloncorp.com

May 8, 2009  
Bw090044

Illinois Environmental Protection Agency  
Division of Water Pollution Control  
Permit Section #15  
1021 Grand Ave.  
PO Box 19276  
Springfield, IL 62794-9276

Subject: Braidwood Nuclear Power Station, NPDES Permit No. IL 0048321

The purpose of this correspondence is to notify the Illinois Environmental Protection Agency (IEPA) of a planned upgrade to Outfall No. 001 Cooling Pond Blowdown Line. Braidwood Nuclear Power Station (Braidwood) is currently undergoing permitting through the U.S. Army Corps of Engineers (USACE) to obtain an Individual Permit for the installation of a multi-port river diffuser in the Kankakee River. The IEPA will be receiving a complete copy of that application when it is filed. Modeling of the river diffuser using CORMIX demonstrates that there are environmental benefits to use of the diffuser over the existing above ground outfall. An excerpt copy of the modeling report performed by HyrdoQual can be found in Appendix A.

The multi-port river diffuser will be installed parallel to the existing Outfall No. 001, and monitoring and sampling will be performed upstream of the tie-in to the blowdown line. Figure 1 illustrates the new river diffuser, and Figure 2 shows the changes to the NPDES water flow diagram.

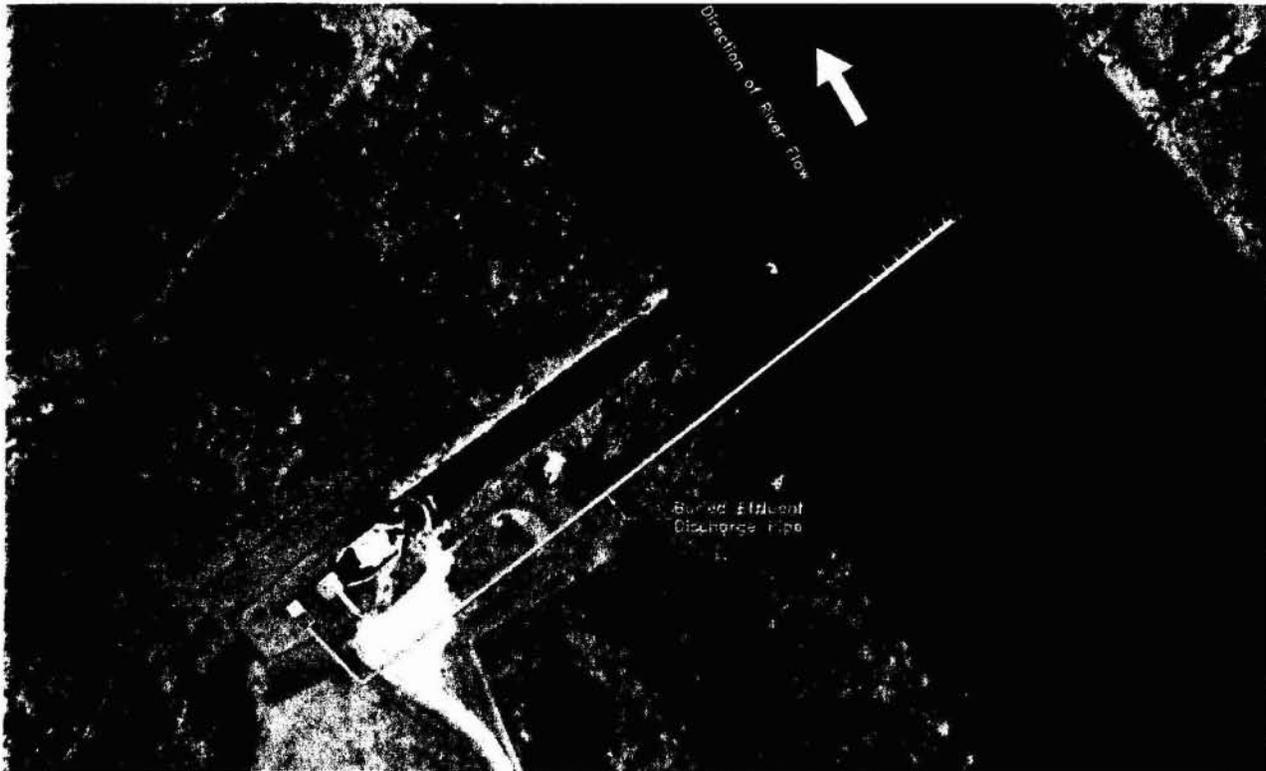
Braidwood is not requesting any change to the discharge limitations in the current NPDES Permit No. IL 0048321. However, we request written authorization to utilize the proposed multi-port river diffuser as the main outfall location, while retaining the ability to use the existing outfall as a backup to the river diffuser. The river diffuser permit application will be filed with USACE in May, 2009, and the system should be operational by December, 2010. Until that time, the current above ground outfall (see Figures 3 and 4) will remain in operation. Both the river diffuser and the above ground outfall will continue to be called Outfall No. 001 in the permit.

Should you have any questions, please contact Raymond Hall at (815) 417-3203.

Respectfully,

A handwritten signature in black ink, appearing to read "Lawrence M. Coyle".

Lawrence M. Coyle  
Plant Manager  
Braidwood Generating Station



**Figure 1. Braidwood Station Proposed River Diffuser, NPDES Outfall No. 001.**

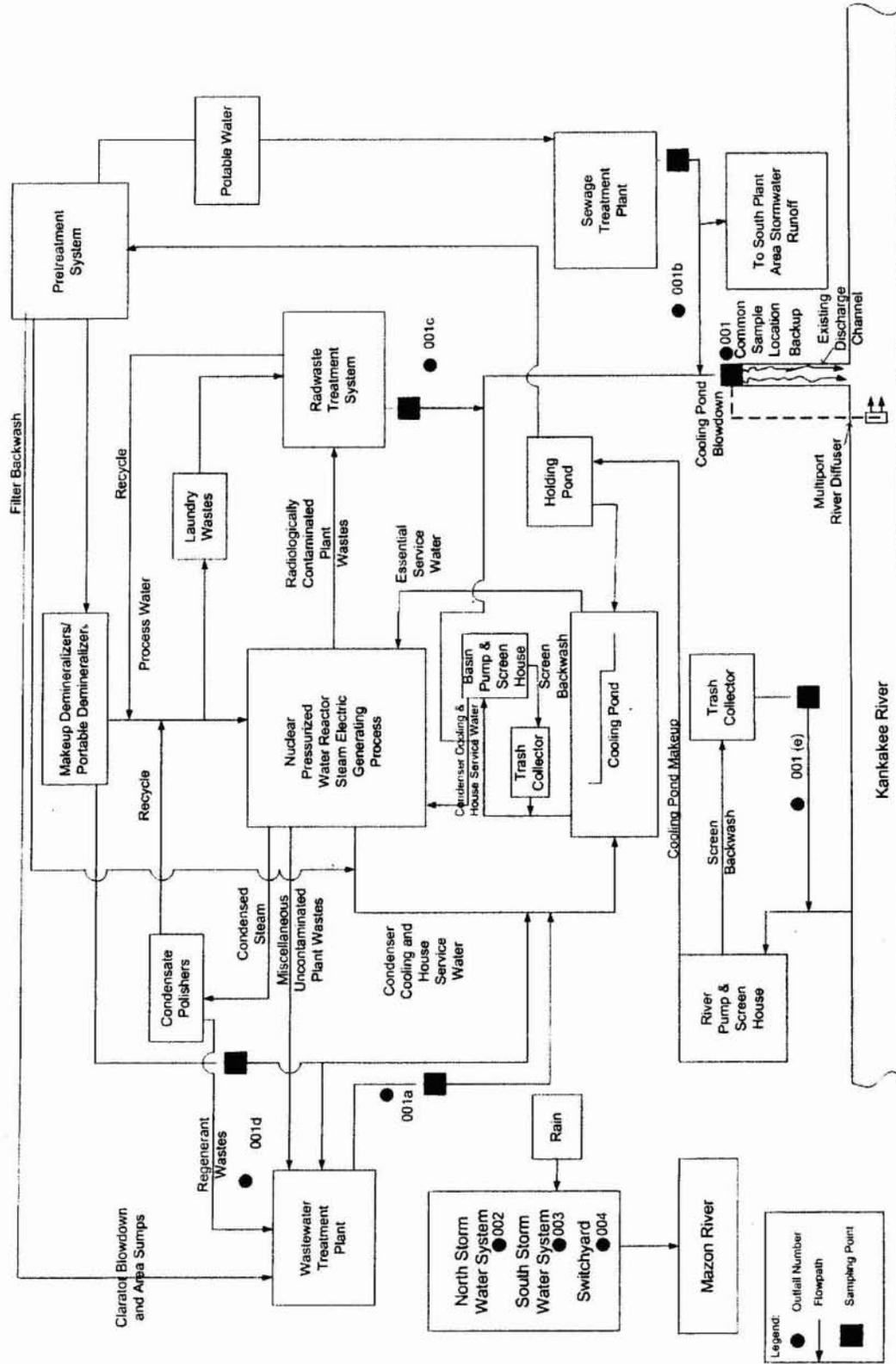


Figure 2. Braidwood NPDES Water Flow Diagram with Diffuser.



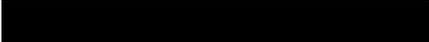
**Figure 3. Existing Braidwood Station River Outfall Pipes.**



**Figure 4. Existing Braidwood Station River Outfall Canal, View from River.**

## **Appendix A**

*HydroQual Modeling Study  
Thermal Impact and Mixing Zone Analysis  
May 4, 2009*



May 4, 2009

Bryan L. Risley  
Project Manager  
Braidwood Station  
Exelon Nuclear  
Rural Route #1, Box 84  
Braceville, IL 60407

EXCO.003

Re: Thermal Impact and Mixing Zone Analysis

Dear Brian:

The following letter summarizes our efforts in regards to assessing the thermal impacts and developing a mixing zone for the Exelon Braidwood facility discharge (existing and proposed) to the Kankakee River. Currently, the Exelon Braidwood Nuclear Station discharges heated blowdown water to the Kankakee River through a surface, side bank discharge canal. The facilities heated cooling water is first discharged to a cooling lake near the facility that allows opportunity for atmospheric cooling before being reused for cooling water. The blowdown water from the cooling lake that is discharged to the Kankakee River is needed to maintain proper constituent levels in the cooling lake. Makeup intake water to balance the blowdown water is withdrawn from the Kankakee River about 0.1 miles upstream from the discharge canal. The following sections present the study objective, relevant regulations, background information, procedure and analysis.

### **Objective**

The goal of this study was to gather, compile and analyze river and effluent data for use in assessing the thermal impact of the Braidwood discharge in the Kankakee River and to determine the size of a thermal mixing zone that is required to be in compliances with ILEPA regulations under critical river and discharge conditions on a monthly basis.

### **Mixing Zone and Temperature Regulations**

Section 302.102 of Title 35, subtitle C, chapter I, part 302, subpart A, states the regulations pertaining to the allowed mixing, mixing zones and zones of initial dilution (ZIDs). The full citation is contained in Attachment 1. Section 302.100 of the same subpart defines the mixing zone as “a

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portion of the waters of the State identified as a region within which mixing is allowed pursuant to Section 302.102(d)” and the ZID as “a portion of a mixing zone, identified pursuant to Section 302.102(e) of this Part, within which acute toxicity standards need not be met”. Some of the mixing zone limitations and requirements are as follows:

1. Mixing is not allowed in waters which include a tributary stream;
2. Mixing is not allowed in waters adjacent to bathing beaches, bank fishing areas, boat ramps, dockages or other public access areas;
3. Mixing is not allowed in waters containing mussel beds, endangered species habitat, fish spawning areas, areas of important aquatic life habitat, or any other natural features vital to the well being of aquatic life in such a manner that the maintenance of aquatic life in the body of water as a whole would be adversely affected;
4. Mixing is not allowed in waters which contain intake structures;
5. Mixing must allow for a zone of passage;
6. The area and volume in which mixing occurs must not contain more than 25% of the cross-sectional area of volume of flow;
7. No mixing is allowed where the water quality standards for the constituent in question is already violated; and
8. The area and volume in which mixing occurs must be as small as is practicable under the limitations prescribed and in no circumstance may the mixing encompass a surface area larger than 26 acres.

Section 302.211 of Title 35, subtitle C, chapter I, part 302, subpart A states the water quality standards for temperature. The full citation is contained in Attachment 2. These temperature criteria apply to all months of the year and limit the amount of heat rise above background river temperatures and also the maximum temperature levels in the river. The applicable temperature regulations for the Braidwood facility discharge are as follows:

1. Normal daily and seasonal temperature fluctuations which existed before the addition of heat shall be maintained;
2. The maximum temperature rise above natural temperatures shall not exceed 2.8°C (5°F); and
3. The water temperature at representative locations in the main river shall not exceed the maximum limits (see below) during more than 1 percent of the hours in the 12-month period ending with any month. Moreover, at no time shall the water temperature at such locations exceed maximum limits (below) by more than 1.7°C (3°F);
  - a. Maximum limits between December-March: 16°C (60°F); and
  - b. Maximum limits between April-November: 32°C (90°F).

The maximum temperature rise and maximum temperature limits will be assessed at the edge of the thermal mixing zone developed for this analysis.

#### **Habitat Survey (Unionids - Mussels)**

In order to comply with the regulations, both habitat surveys and thermal dilution modeling of the Kankakee River were conducted near the Braidwood nuclear station discharge canal. The area near the proposed diffuser location was surveyed by HDR Engineering Inc. in 2008 (HDR, 2008<sup>1</sup>) to determine the state-listed species of fish and fresh-water mussels in the Kankakee River near the

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discharge canal. This study was followed by another detailed survey by Ecological Specialists, Inc. (ESI, 2008<sup>3</sup>) to study the mussels within the potential impact area of the proposed diffuser location. Figure 1 presents the results of the ESI survey, which showed diverse but low-density mussel populations within the near-field region of the proposed discharge location (transects 2 and 3, about 50 meters downstream). The maximum number of live mussels in transects 2 and 3, within 50 meters from the proposed diffuser, was 5 with an average number of about 1. The following paragraph from the ESI 2008 Unionid Study summarizes the findings.

“Although the survey area harbors a relatively species-rich unionid community, unionid density is relatively low and no recruitment was observed. The low abundance of unionids may be due to the general lack of suitable substrate. By and large, substrate throughout the site appeared stable but did not contain much area with finer particles (i.e., sand and gravel) into which the unionids can burrow. Also of note, no juvenile unionids were observed suggesting little or no recruitment occurring within the survey area. Therefore, it is likely a denser, stable, and reproducing unionid community upstream, probably in a riffle habitat, seeds the study area. However, Illinois listed unionid species were present, and therefore impacts to unionids by construction and operation of the diffuser within the area should be minimized.”

**Thermal Dilution Modeling**

Previously, near-field and far-field dilution analyses were performed (HydroQual, 2007<sup>3</sup>) in order to determine discharge alternatives that improve mixing and dilution of the Braidwood facility discharge in the Kankakee River. Based on this study, the following three discharge scenarios in addition to the existing shoreline discharge were chosen for further thermal impact analysis:

- Submerged 3-port diffuser;
- Submerged 5-port diffuser; and
- Submerged 7-port diffuser.

The above scenarios were designed as submerged, multi-port diffusers placed perpendicular to the main river flow in the deeper eastern side of the river. Table 1 presents the diffuser design details.

**Table 1. Diffuser Design Details**

# of Ports	Port Dia. (in)	Port Velocity (m/s) <sup>a</sup>	Port Spacing (m)	Diffuser Length (m)
3	18	2.4	10.0	20
5	14	2.4	5.0	20
7	12	2.3	3.3	20

Note: Main discharge line to the river diffuser is a 30-inch diameter pipe.

a – Based on discharge flow rate of 19,000 gpm

The USEPA supported CORMIX (Version 4.2GT) initial dilution model (Jirka et al, 1996<sup>4</sup>) was used to calculate the near-field mixing and dilution of the Braidwood facility discharge to the river. The

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CORMIX initial dilution model can analyze mixing and dilution associated with discharges from surface or submerged diffusers due to both jet and buoyancy momentum in addition to ambient mixing. The CORMIX initial dilution model package contains three different CORMIX programs to analyze submerged single- and multi-port diffusers (CORMIX1 and CORMIX2, respectively) and surface discharges (CORMIX3). Since the CORMIX model can only represent an idealized cross-section of the river, the resulting calculations are typically only valid in the near-field. The near-field is generally limited to the area where the river cross-section is similar or roughly within 100-500 meters downstream from the discharge.

Based on the previous analysis and information gathered, various CORMIX inputs such as the Manning's 'n' of 0.03, river geometry and outfall characteristics were developed. Information from the USGS stations in the river also provided limited information on depth, width and velocity variation as a function of flow. This variation was built into the modeling analyses. Figure 2 presents river depth transects in the river along with the model grid. The cross-sections near the discharge were used to develop river geometry information for the near-field analyses.

In addition to the above, CORMIX requires the river flow, discharge flow rate, ambient temperature, discharge temperature, and discharge temperature rise above ambient to be specified. The thermal analysis was performed on a monthly basis in order to incorporate the seasonal variability in river flow and ambient and discharge temperatures. In order to be conservative, low river flow, maximum discharge temperatures, and minimum river (intake) temperatures were used. In order to estimate the ambient and discharge temperature, upstream river flow and temperature, effluent discharge flow and temperature from all months of the year were analyzed. This data is compiled in an EXCEL file that is included as Attachment 3.

### **Model Input Development**

Daily effluent flow, intake and discharge temperature from 2005-2008 were obtained from Exelon when available. The data are presented in Figure 3 with the discharge flow in the top panel, intake temperature (green line) in the middle panel and the discharge temperature (blue line) in the bottom panel. The intake and discharge temperatures were limited to the months of April to September in 2005, 2006 and 2008, so additional data was analyzed to develop the model discharge inputs. Historical river temperature data (1966-2001) from the upstream USGS station at Momence (#05520500) were used to define the intake temperatures during the missing months. For this analysis, the historical minimum monthly river temperature for the months when river intake temperatures were unavailable from Exelon was used. The minimum monthly temperatures are shown by the black circles in the middle panel of Figure 3. This figure also presents the intake temperature at the cooling lake (red solid line) in the bottom panel along with the blowdown temperature in the discharge canal to the Kankakee River. Discharge (blowdown) temperature at the river discharge was unavailable for October through March and, therefore, additional data were analyzed to develop the model inputs. Intake temperature at the cooling lake (red line) was used since it was very similar to the discharge temperature (blue line) when the data overlapped. Based on these data, the minimum monthly intake and maximum monthly discharge temperatures were developed for model inputs. Although this may not represent actual conditions because of the similarity between the cooling lake and river temperature dynamics, it was analyzed to represent a worst case condition for the thermal assessment. The bottom panel in Figure 3 also presents the temperature rise (grey line) in 2006 and 2008. Figure 3 also highlights that the discharge temperature

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follows the natural river temperature (intake data), which suggests that no abnormal temperature changes will occur and that natural seasonal temperature fluctuations will be maintained. For this analysis, a discharge flow rate of 19,000 gpm was used that represents a long term operating condition. In order to be consistent with the permitted discharge flow and pump operating conditions, discharge flow rates of 12,500, 25,000 and 30,000 gpm were also analyzed for the thermal mixing zone assessment for the controlling month as discussed below.

River flow data was obtained for the last 42 years (1966-2008) for the USGS station at Wilmington (#05527500) and used to develop monthly upstream low river flow conditions. EPA recommends using the hydrologically based 7Q10 design low-flow for water quality standards and toxic wasteload allocation studies relating to chronic effects on aquatic life. The 7Q10 low-flow is defined as “the lowest 7-day average flow that occurs on average once every 10 years”. Figure 4 presents the monthly minimum 7-day moving average flow for each of the 42 years as a probability distribution with the red vertical line representing the 10<sup>th</sup> percentile and the associated flow equal to the 7Q10. The resulting monthly 7Q10 low-flow is tabulated in each panel with September having the lowest flow and April the highest. These monthly 7Q10 low-flows were used for the thermal analysis and also to estimate the river geometry (depth and width). Table 2 summarizes the monthly river model inputs for flow, width, depth and velocity.

**Table 2. Monthly Model River Inputs**

<b>Month</b>	<b>River Flow (cfs)</b>	<b>Width (m)</b>	<b>Average Depth (m)</b>	<b>Velocity (m/s)</b>
January	1,011	109	1.55	0.17
February	1,159	111	1.57	0.19
March	2,166	122	1.70	0.30
April	2,535	125	1.74	0.33
May	2,176	122	1.70	0.30
June	1,333	113	1.60	0.21
July	783	104	1.51	0.14
August	650	101	1.49	0.12
September	641	101	1.49	0.12
October	702	103	1.50	0.13
November	921	107	1.54	0.16
December	976	108	1.55	0.17

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### **Compliance with Temperature Criteria**

Using the above river and discharge information, the CORMIX model was applied for the 3-, 5- and 7-port diffuser alternatives in addition to the existing discharge canal. For the 3 diffuser alternatives, the single port program (CORMIX1) was used because the area of interest for the thermal analysis is not properly represented using the multi-port CORMIX2 program since the CORMIX2 analysis assumes that the plumes from the ports have completely merged. This is not the case in the near-field region applicable for the thermal analysis. The port diameters analyzed with the model for the 3-, 5- and 7-port diffusers were 18, 14 and 12 inches, respectively, with a port height of 0.5 meters. In addition to the proposed diffuser scenarios, the existing discharge scenario was modeled using the CORMIX3 surface discharge program. The discharge was modeled as a flush, side-bank release from the left bank, entering the river perpendicular to the bank with a bottom slope of 2°. The width of the discharge channel was assumed to be 5.44 meters wide and 1 meter deep (HydroQual, 2007<sup>3</sup>). All CORMIX model output is presented in Attachment 4.

The maximum temperature rise above natural temperatures is 5°F per ILEPA regulations. The required effluent dilution to meet this criterion is the discharge temperature rise divided by maximum allowable temperature rise of 5°F. Using the CORMIX model calculated effluent dilutions, the distances to achieve the maximum allowable temperature rise for all months was determined and are presented in Table 3. This table also summarizes the river 7Q10 low-flow, river intake and discharge temperatures, discharge temperature rise and required effluent dilution. In general, all the multi-port diffusers reduced the distance to achieve the required effluent dilution needed to meet the maximum temperature rise above natural river temperatures as compared to the existing discharge. The maximum required effluent dilution (8.3:1) occurs in March and, therefore, the distance to meet the maximum temperature rise in the river was the greatest. In March, the 3-, 5- and 7-port diffusers decreased the required distance from 257 meters for the existing discharge to 25.1, 21.6 and 19.6 meters, respectively. The maximum reduction in distance occurred in September, from about 12,000 meters for the existing discharge to between 15.5 and 20.3 meters for the proposed diffuser configurations. The maximum distances to achieve the required effluent dilution to meet the maximum temperature rise for the existing discharge, 3-, 5-, and 7-port diffusers was 12,006, 25.1, 21.6 and 19.6 meters, respectively.

Table 3 also presents the model results for discharge flow rates of 12,500 gpm (1 pump operation), 25,000 gpm (2 pump operation), and 30,000 gpm (NPDES permitted flow rate) for the controlling month of March. In general: the 12,500 gpm flow rate decreases the required distance to meet the temperature rise criteria; the 25,000 gpm flow rate increases the distance slightly for the 3- and 7-port diffusers, and decreases the distance for the 5-port diffuser; and the 30,000 gpm flow rate increases the distance slightly for the 3-port diffuser, and decreases the distance for the 5- and 7-port diffusers. At the 30,000 gpm flow rates, the required distances to meet the temperature rise criteria are 25.9 meters for 3-port diffuser, 20.1 meters for the 5-port diffuser, and 17.3 meters for the 7-port diffuser.

The second component to the temperature criteria are the maximum allowable temperatures at a representative location in the river (edge of the thermal mixing zone). In order to complete this assessment, the discharge temperature was first compared to the maximum temperature limits (Table 4). For the months of January, February, April, May, October and November, the discharge temperature was less than the maximum temperature limits and, therefore, dilution of the effluent in

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the river is not needed. In the remaining months, the allowable temperature rise was determined from the maximum allowable temperature and the intake or river temperature. This allowable temperature rise was compared to the effluent temperature rise and a required effluent dilution calculated that will meet the maximum allowable temperature rise and, therefore, the maximum temperature limits. The maximum required effluent dilution is 1.5 in March with a minimum dilution of 1.1 in June, September and December. For all of the 6 months, the effluent dilution required to meet the maximum temperature limits is less than that needed to meet the maximum temperature rise criterion and, therefore, the latter controls the required distance to achieve the temperature criteria. Therefore, the maximum allowable temperature criteria will be met for all months at distance closer than that required to meet the maximum temperature rise criteria.

**Compliance with Mixing Zone Regulations**

The CORMIX plume calculations for the proposed 7-port diffuser also showed that the resulting thermal plumes, at the distance where the temperature criteria were achieved, were confined in an area less than 25% of the cross-sectional area of the Kankakee River. Using the cross-sectional area from measured transects near the outfall, the lateral mixing area of the proposed diffuser (20 meter diffuser length plus the additional spreading of the plume and plume thickness), the monthly cross-sectional areas of the effluent plume are presented in Table 5. All of the monthly plume cross-sectional areas are less than the required 25% cross-sectional area limitation and will allow for an adequate zone of passage for aquatic life. In addition, the surface area of the thermal mixing zone is much less than the required 26 acres and is 875 m<sup>2</sup> based on a 25 meter downstream and 35 meter wide (maximum plume width) proposed thermal mixing zone, or about 0.22 acres. For the existing side canal discharge, the maximum surface area required to meet the temperature criteria is greater than 26 acres, which occurs in September at 19,000 gpm.

**Table 5. River and Plume Monthly Cross-Sectional Areas**

<b>Month</b>	<b>River CSA (m<sup>2</sup>)</b>	<b>Plume CSA (m<sup>2</sup>)</b>	<b>Plume/River CSA (%)</b>
January	210	43.0	20.5%
February	213	41.1	19.3%
March	230	25.2	10.9%
April	235	21.8	9.3%
May	230	51.8	22.5%
June	216	46.2	21.4%
July	204	45.9	22.4%
August	201	45.0	22.4%
September	201	42.6	21.2%
October	202	46.3	22.9%
November	208	51.5	24.8%
December	209	43.3	20.7%

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May 4, 2009

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As presented in Figure 1 and summarized in the ESI Study report (ESI, 2008<sup>2</sup>), the mussel population density is extremely sparse in the mixing zone region (less than 25 meters downstream from the diffuser). Therefore, based on the mussel information gathered by HDR and ESI, during the post-construction operating period the proposed diffuser discharges should not interfere with endangered species habitat, fish spawning areas or areas of important aquatic life habitat.

There are also no bathing beaches, bank fishing areas, boat ramps or dockages or any other public access areas within 25 meters of the proposed discharge. There is an intake structure for the Wilmington water supply below the Wilmington dam, which is about 5 miles downstream from the proposed discharge location. The nearest tributaries to the proposed discharge are: Horse Creek, 0.25 miles upstream; and three unnamed tributaries 1, 1.2 and 1.6 miles downstream, respectively. These tributaries are all outside of the proposed thermal mixing zone area (25 meters downstream from the proposed discharge). Based on the river temperature data available from the upstream USGS station at Momence, historical monthly river temperatures are always less than the maximum allowed river temperatures of 63°F (December to March) and 93°F (April to November). Finally, the normal daily and seasonal temperature fluctuations in the river are not expected to be altered as a result of the proposed thermal discharge to the Kankakee River. The discharged blowdown water originates from the Braidwood cooling lake and, therefore, already exhibits normal daily and seasonal temperature fluctuations that are similar to those observed in the Kankakee River.

#### Summary

In summary, the proposed diffuser alternatives all achieve the applicable temperature criteria within a short distance (less than 25 meters from the discharge and also comply with the applicable mixing zone regulations). The proposed diffuser alternatives all represent a significant improvement in dilution and environmental benefit as compared to the existing side canal discharge to the river. Therefore, a thermal mixing zone of 25 meters downstream by 35 meters wide is recommended for the 7-port diffuser under preliminary design by Exelon. The 7-port diffuser analyzed is 20 meters in length with a port diameter of 12 inches. If there are any questions or if you would like to discuss this effort further, please do not hesitate to call.

Very truly yours,

HYDROQUAL, INC.



Andrew J. Thuman, P.E.

AJT/lkj  
EXCO.003\RISLEY\04MAY09\LTR\_b

cc: Biswarup Guha, HydroQual

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**References:**

<sup>1</sup> HDR Engineering, Inc. 2008. Investigations to Determine Presence of State-Listed Species of Fish and Freshwater Mussels in the Kankakee River Near the Braidwood Nuclear Station Warmwater Discharge Channel. Prepared for Exelon Nuclear. 21pp.

<sup>2</sup> Ecological Specialists, Inc., 2008, Draft Report: Characterization of Unionid Communities near the Braidwood Nuclear station Kankakee River Discharge Location, (ESI Project No. 08-023)

<sup>3</sup> HydroQual, Inc. Letter Report, 2007a., Letter report to Ms. Sharon Neal on August 2, 2007 regarding discharge alternative study (EXCO.001)

<sup>4</sup> Jirka, G.H., R.L. Doneker and S.W. Hinton, 1996. User's Manual for CORMIX: A Hydrodynamic Mixing Zone Model and Decision Support System for Pollutant Discharges into Surface Waters. DeFrees Hydraulic Laboratory, School of Civil and Environmental Engineering, Cornell University, Ithaca, NY.

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**Table 3. Distance to Achieve 5°F Temperature Rise (Discharge of 19,000 gpm)**

Month	Monthly 7Q10 River Flow (cfs)	Maximum Temperature (°F) <sup>1</sup>	Blowdown <sup>2</sup>	Minimum Temperature (°F) <sup>1</sup>	Intake <sup>3</sup>	Temperature Rise (°F) <sup>4</sup>	Dilution Required <sup>5</sup>	Distance to Achieve Required Dilution (m) <sup>6</sup>			
								Existing (CORMIX3)	3-port (CORMIX1)	5-port (CORMIX1)	7-port (CORMIX1)
January	1,011	59.9		30.2		29.7	5.9	347	18.0	14.0	12.0
February	1,159	59.4		32.0		27.4	5.5	296	16.5	12.8	11.0
March	2,166	74.4		32.9		41.5	8.3	257	25.1	21.6	19.6
April	2,535	73.7		52.9		20.8	4.2	85	12.3	9.5	8.2
May	2,176	88.3		51.5		36.8	7.4	248	22.6	19.1	16.9
June	1,333	92.9		63.2		29.6	5.9	284	20.5	17.2	15.1
July	783	95.3		72.1		23.2	4.6	830	19.5	16.1	9.1
August	650	95.8		71.5		24.3	4.9	6,264	19.7	16.4	14.4
September	641	92.2		60.5		31.6	6.3	12,007	20.3	17.4	15.5
October	702	82.5		46.4		36.1	7.2	6,275	21.9	19.1	17.3
November	921	70.3		32.9		37.4	7.5	396	22.7	21.3	18.9
December	976	62.3		32.0		30.3	6.1	361	18.4	14.3	12.3

**Distance to Achieve 5°F Temperature Rise (Discharge of 12,500 gpm, 25,000 gpm and 30,000 gpm)**

March (12,500 gpm Effluent)	2,166	74.4		32.9		41.5	8.3	202	19.9	17.5	14.8
March (25,000 gpm Effluent)	2,166	74.4		32.9		41.5	8.3	335	26.0	20.3	22.0
March (30,000 gpm Effluent)	2,166	80.7		32.9		41.5	8.3	339	25.9	20.1	17.3

**Notes:**

1. Monthly maximum of daily average temperatures
2. Blowdown temperatures at the river discharge canal were unavailable for October-March and assumed to equal the cooling lake intake temperatures during this period. Blowdown temperatures from April-September are the monthly maximum of daily average temperature
3. River temperatures at the intake were unavailable for October-March and assumed to be equal to the historical (1966-2001) minimum monthly temperatures from the USGS station (05520500), Kankakee River at Momonco, which is upstream of the discharge location
4. Temperature Rise = Blowdown Temperature - Intake Temperature
5. Dilution required = (Temperature rise) / (Maximum temperature rise above natural temperatures as per Illinois Pollution Control Board (IPCB), Environmental Regulations for the State of Illinois, Title 35 of the Illinois Administrative Code, Subtitle C, Chapter I, Part 302, Subpart B, Section 302.211)
6. Results from CORMIX simulations

**Table 4. Dilution Required to Meet Maximum Temperature (Discharge of 19,000 gpm)**

Month	Monthly 7Q10 River Flow (cfs)	Maximum Temperature (°F) <sup>1</sup> Blowdown <sup>2</sup>	Minimum Temperature (°F) <sup>1</sup> Intake <sup>3</sup>	Allowable Maximum Temperature at the Edge of Mixing Zone <sup>4</sup>	Temperature Rise (°F) <sup>5</sup>	Allowable Temperature Rise (°F) <sup>6</sup>	Dilution Required <sup>7</sup>
January	1,011	59.9	30.2	60	29.7	--	--
February	1,159	59.4	32.0	60	27.4	--	--
March	2,166	74.4	32.9	60	41.5	27.1	1.5
April	2,535	73.7	52.9	90	20.8	--	--
May	2,176	88.3	51.5	90	36.8	--	--
June	1,333	92.9	63.2	90	29.6	26.8	1.1
July	783	95.3	72.1	90	23.2	17.9	1.3
August	650	95.8	71.5	90	24.3	18.5	1.3
September	641	92.2	60.5	90	31.6	29.5	1.1
October	702	82.5	46.4	90	36.1	--	--
November	921	70.3	32.9	90	37.4	--	--
December	976	62.3	32.0	60	30.3	28.0	1.1

**Notes:**

1. Monthly maximum or minimum of daily average temperatures
2. Blowdown temperatures at the river discharge canal were unavailable for October-March and assumed to equal the cooling lake intake temperatures during this period. Blowdown temperatures from April-September are the monthly maximum of daily average temp
3. River temperatures at the intake were unavailable for October-March and assumed to be equal to the historical (1966-2001) minimum monthly temperatures from the USGS station (05520500), Kankakee River at Momonce, which is upstream of the discharge locat
4. As per Illinois Pollution Control Board (IPCB), Environmental Regulations for the State of Illinois, Title 35 of the Illinois Administrative Code, Subtitle C, Chapter I, Part 302, Subpart B, Section 302.211
5. Temperature Rise = Blowdown Temperature - Intake Temperature
6. Allowable temperature rise = Maximum allowable temperature as per regulations - Intake temperature
7. Dilution required = (Temperature rise) / (Allowable temperature rise)

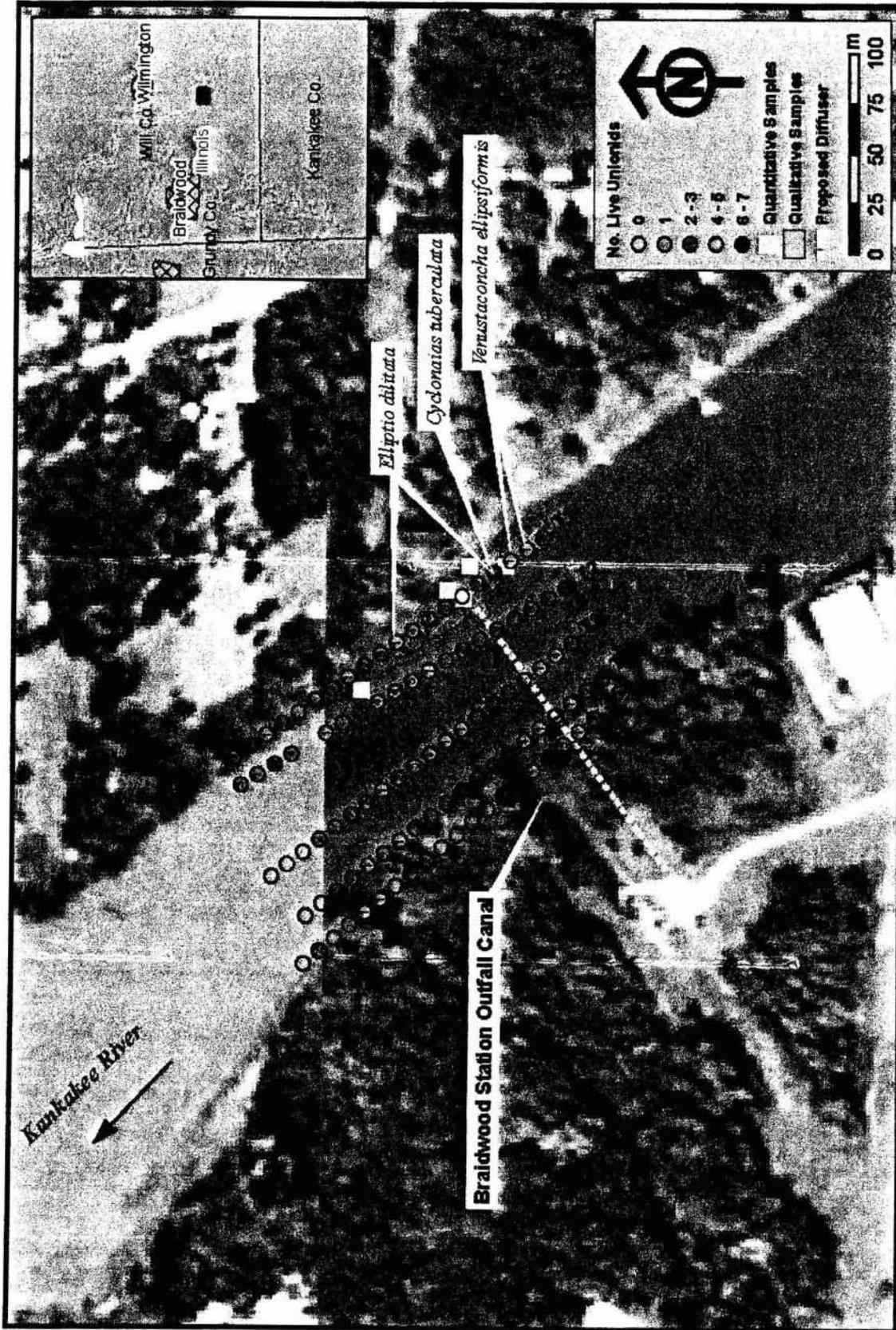


Figure 1. Live unionids collected along sampling transects and quantitative and qualitative sample location in the Kankakee River near the Braidwood Nuclear Station discharge location (Ecological Specialists, 2008).

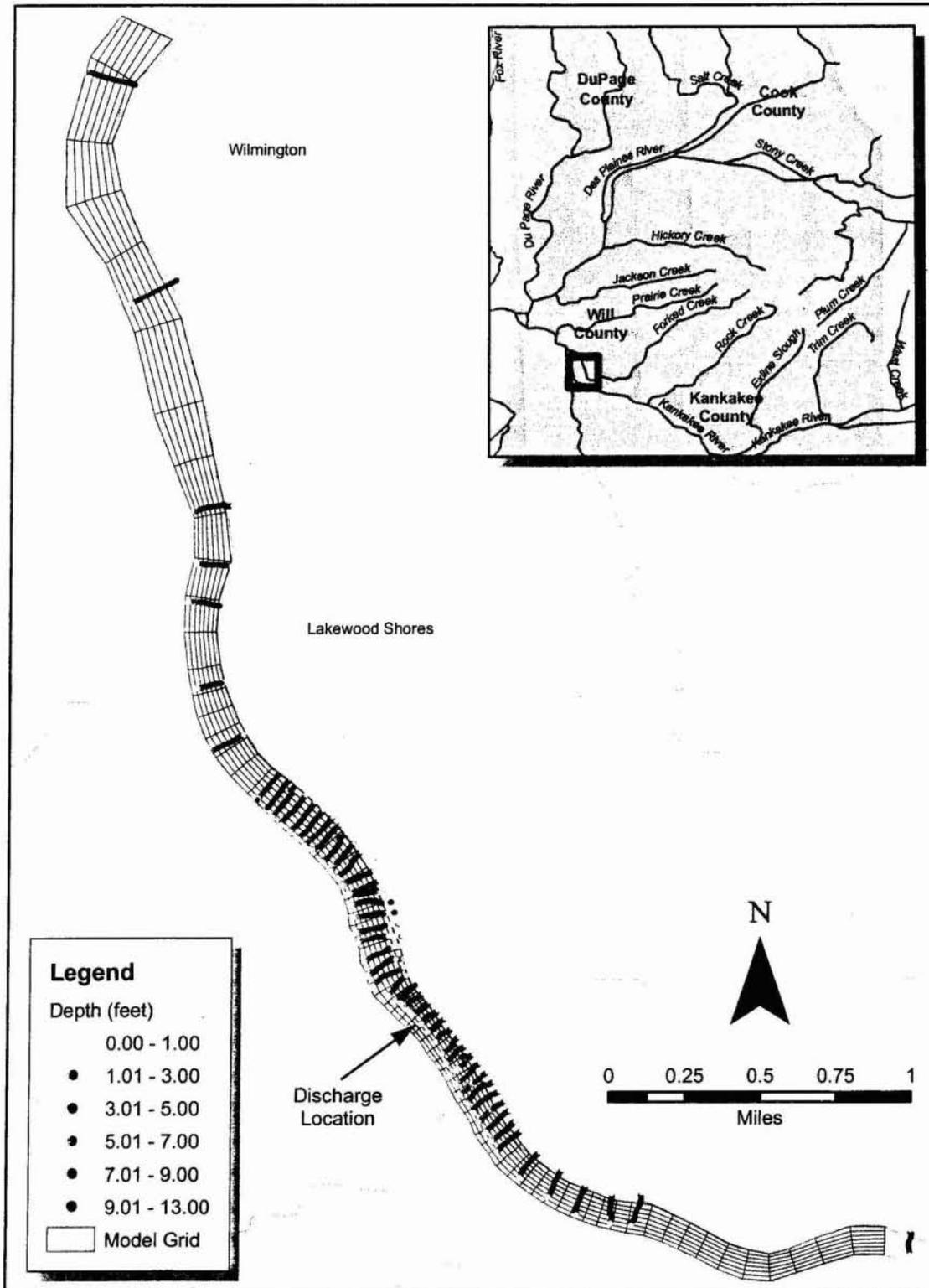


Figure 2. ECOM Far-Field Model Grid and River Depths

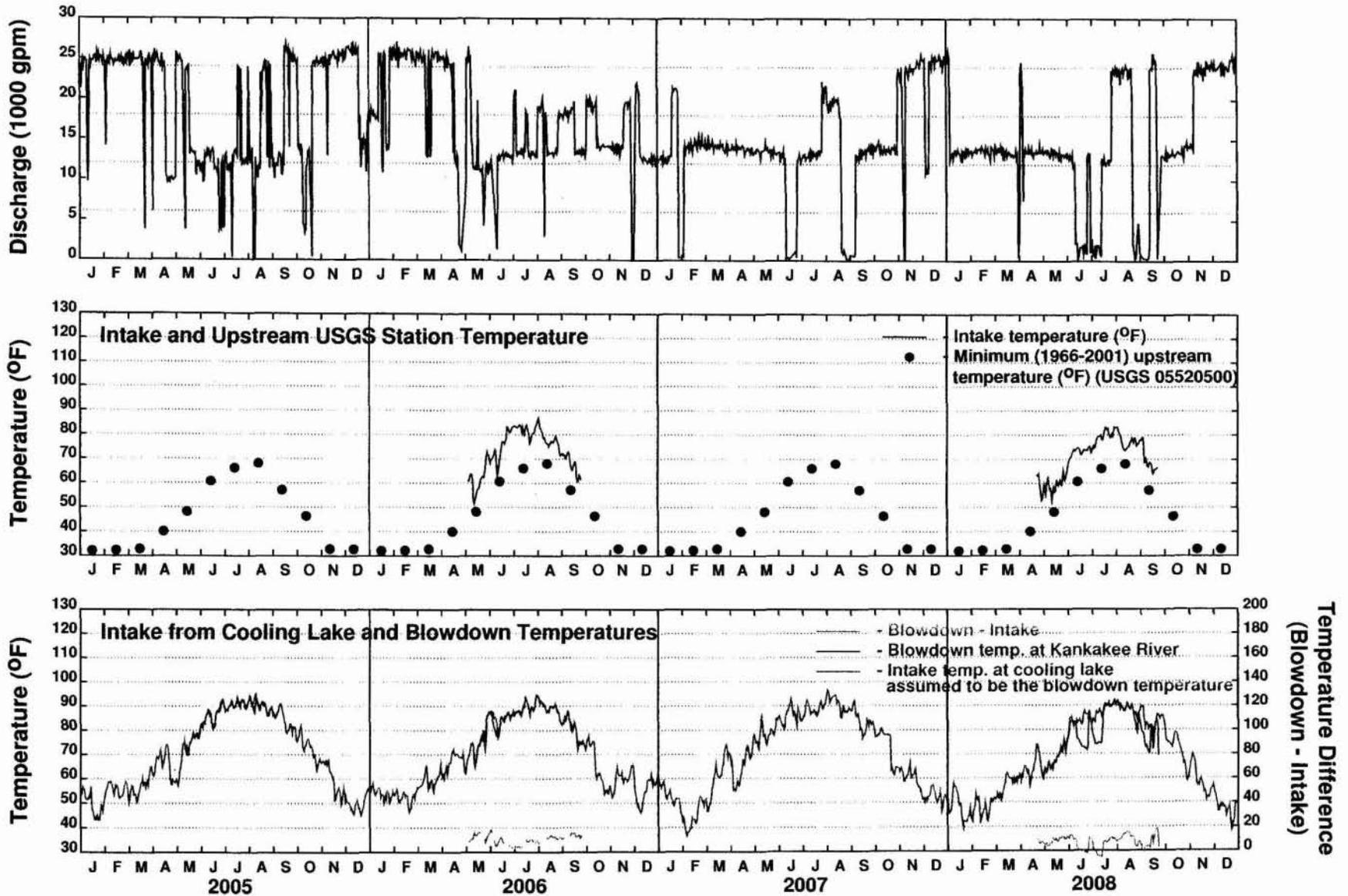


Figure 3. Exelon Braidwood Nuclear Facility, Kankakee River Discharge, Upstream River Temperature, River Intake and Blowdown Temperatures

Privileged and Confidential  
 Client Work Product

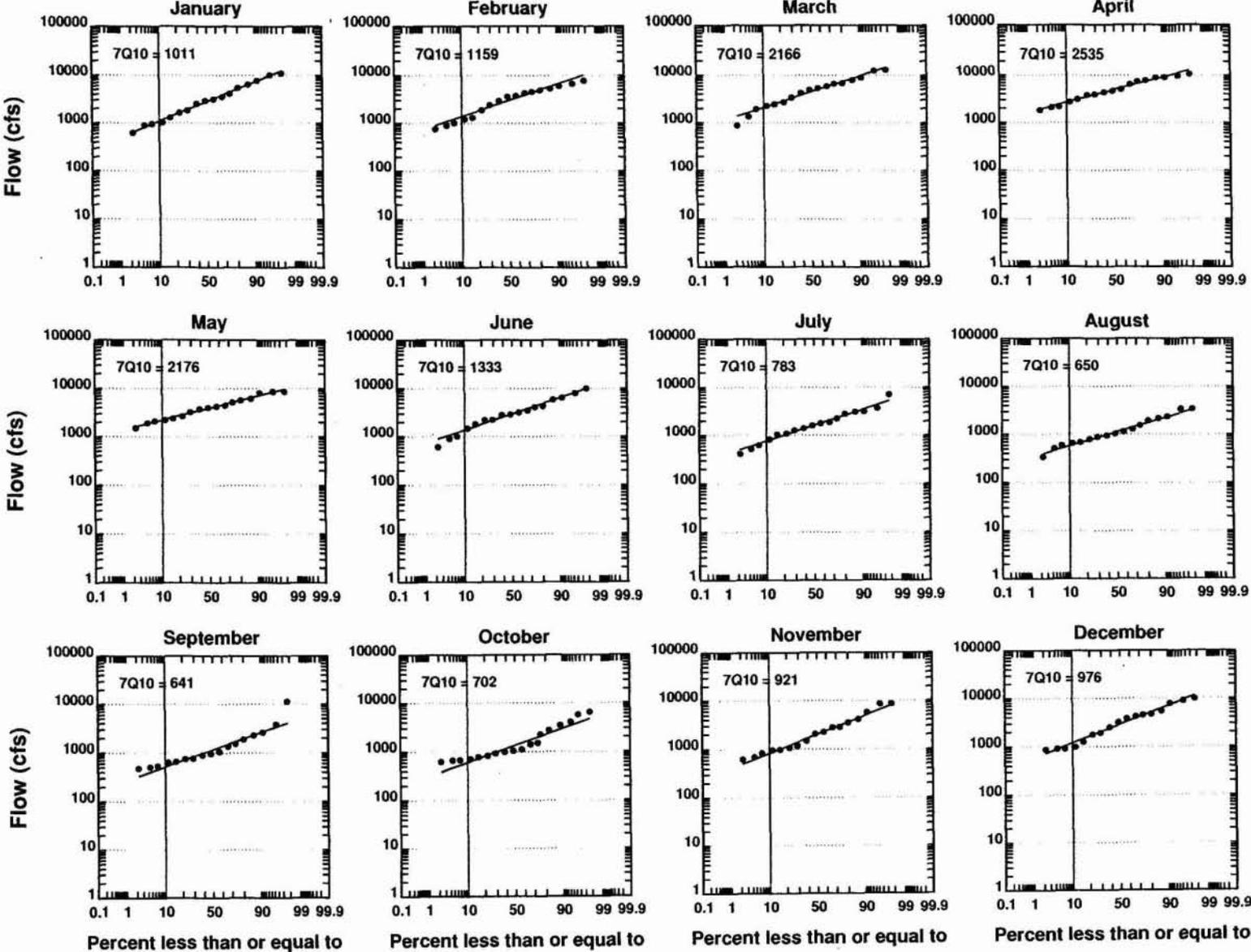


Figure 4. Monthly Minimum 7-Day Average Flow (1966-2008), USGS station 05527500, Kankakee River near Wilmington, IL

## **Attachment I**

### **Section 302.102 of Title 35, Subtitle C, Chapter I, Part 302, Subpart A**

**Section 302.102      Allowed Mixing, Mixing Zones and ZIDs**

- a) Whenever a water quality standard is more restrictive than its corresponding effluent standard, or where there is no corresponding effluent standard specified at 35 Ill. Adm. Code 304, an opportunity shall be allowed for compliance with 35 Ill. Adm. Code 304.105 by mixture of an effluent with its receiving waters, provided the discharger has made every effort to comply with the requirements of 35 Ill. Adm. Code 304.102.
  
- b) The portion, volume and area of any receiving waters within which mixing is allowed pursuant to subsection (a) shall be limited by the following:
  - 1) Mixing must be confined in an area or volume of the receiving water no larger than the area or volume which would result after incorporation of outfall design measures to attain optimal mixing efficiency of effluent and receiving waters. Such measures may include, but are not limited to, use of diffusers and engineered location and configuration of discharge points.
  - 2) Mixing is not allowed in waters which include a tributary stream entrance if such mixing occludes the tributary mouth or otherwise restricts the movement of aquatic life into or out of the tributary.
  - 3) Mixing is not allowed in water adjacent to bathing beaches, bank fishing areas, boat ramps or dockages or any other public access area.
  - 4) Mixing is not allowed in waters containing mussel beds, endangered species habitat, fish spawning areas, areas of important aquatic life habitat, or any other natural features vital to the well being of aquatic life in such a manner that the maintenance of aquatic life in the body of water as a whole would be adversely affected.
  - 5) Mixing is not allowed in waters which contain intake structures of public or food processing water supplies, points of withdrawal of water for irrigation, or watering areas accessed by wild or domestic animals.
  - 6) Mixing must allow for a zone of passage for aquatic life in which water quality standards are met.

- 7) The area and volume in which mixing occurs, alone or in combination with other areas and volumes of mixing, must not intersect any area of any body of water in such a manner that the maintenance of aquatic life in the body of water as a whole would be adversely affected.
  - 8) The area and volume in which mixing occurs, alone or in combination with other areas and volumes of mixing must not contain more than 25% of the cross-sectional area or volume of flow of a stream except for those streams where the dilution ratio is less than 3:1. Mixing is not allowed in receiving waters which have a zero minimum seven day low flow which occurs once in ten years.
  - 9) No mixing is allowed where the water quality standard for the constituent in question is already violated in the receiving water.
  - 10) No body of water may be used totally for mixing of single outfall or combination of outfalls.
  - 11) Single sources of effluents which have more than one outfall shall be limited to a total area and volume of mixing no larger than that allowable if a single outfall were used.
  - 12) The area and volume in which mixing occurs must be as small as is practicable under the limitations prescribed in this subsection, and in no circumstances may the mixing encompass a surface area larger than 26 acres.
- c) All water quality standards of this Part must be met at every point outside of the area and volume of the receiving water within which mixing is allowed. The acute toxicity standards of Sections 302.208 and 302.210 must be met within the area and volume within which mixing is allowed, except as provided in subsection (e).
- d) Pursuant to the procedures of Section 39 of the Act and 35 Ill. Adm. Code 309, a person may apply to the Agency to include as a condition in an NPDES permit formal definition of the area and volume of the waters of the State within which mixing is allowed for the NPDES discharge in question. Such formally defined area and volume of allowed mixing shall constitute a "mixing zone" for the purposes of 35 Ill. Adm. Code: Subtitle C. Upon proof by the applicant that a proposed mixing zone conforms with the requirements of Section 39 of the Act, this Section and any additional limitations as may be imposed by the Clean Water Act (CWA) (33 U.S.C 1251 et seq.), the Act or Board regulations, the Agency

shall, pursuant to Section 39(b) of the Act, include within the NPDES permit a condition defining the mixing zone.

- e) Pursuant to the procedures of Section 39 of the Act and 35 Ill. Adm. Code 309, a person may apply to the Agency to include as a condition in an NPDES permit a ZID as a component portion of a mixing zone. Such ZID shall, at a minimum, be limited to waters within which effluent dispersion is immediate and rapid. For the purposes of this subsection, "immediate" dispersion means an effluent's merging with receiving waters without delay in time after its discharge and within close proximity of the end of the discharge pipe, so as to minimize the length of exposure time of aquatic life to undiluted effluent, and "rapid" dispersion means an effluent's merging with receiving waters so as to minimize the length of exposure time of aquatic life to undiluted effluent. Upon proof by the applicant that a proposed ZID conforms with the requirements of Section 39 of the Act and this Section, the Agency shall, pursuant to Section 39(b) of the Act, include within the NPDES permit a condition defining the ZID.
- f) Pursuant to Section 39 of the Act and 35 Ill. Adm. Code 309.103, an applicant for an NPDES permit shall submit data to allow the Agency to determine that the nature of any mixing zone or mixing zone in combination with a ZID conforms with the requirements of Section 39 of the Act and of this Section. A permittee may appeal Agency determinations concerning a mixing zone or ZID pursuant to the procedures of Section 40 of the Act and 35 Ill. Adm. Code 309.181.
- g) Where a mixing zone is defined in an NPDES permit, the waters within that mixing zone, for the duration of that NPDES permit, shall constitute the sole waters within which mixing is allowed for the permitted discharge. It shall not be a defense in any action brought pursuant to 35 Ill. Adm. Code 304.105 that the area and volume of waters within which mixing may be allowed pursuant to subsection (b) is less restrictive than the area or volume or waters encompassed in the mixing zone.
- h) Where a mixing zone is explicitly denied in a NPDES permit, no waters may be used for mixing by the discharge to which the NPDES permit applies, all other provisions of this Section notwithstanding.
- i) Where an NPDES permit is silent on the matter of a mixing zone, or where no NPDES permit is in effect, the burden of proof shall be on the discharger to demonstrate compliance with this Section in any action brought pursuant to 35 Ill. Adm. Code 304.105.

(Source: Amended at 14 Ill. Reg. 2899, effective February 13, 1990)

## **Attachment II**

### **Section 302.211 of Title 35, Subtitle C, Chapter I, Part 302, Subpart A**

- a) Temperature has STORET number (F°) 00011 and (C°) 00010.
- b) There shall be no abnormal temperature changes that may adversely affect aquatic life unless caused by natural conditions.
- c) The normal daily and seasonal temperature fluctuations which existed before the addition of heat due to other than natural causes shall be maintained.
- d) The maximum temperature rise above natural temperatures shall not exceed 2.8° C (5° F).
- e) In addition, the water temperature at representative locations in the main river shall not exceed the maximum limits in the following table during more than one percent of the hours in the 12-month period ending with any month. Moreover, at no time shall the water temperature at such locations exceed the maximum limits in the following table by more than 1.7° C (3° F).

	° C	° F		° C	° F
JAN.	16	60	JUL.	32	90
FEB.	16	60	AUG.	32	90
MAR.	16	60	SEPT.	32	90
APR.	32	90	OCT.	32	90
MAY	32	90	NOV.	32	90
JUNE	32	90	DEC.	16	60

- f) The owner or operator of a source of heated effluent which discharges 150 megawatts (0.5 billion British thermal units per hour) or more shall demonstrate in a hearing before this Pollution Control Board (Board) not less than 5 nor more than 6 years after the effective date of these regulations or, in the case of new sources, after the commencement of operation, that discharges from that source have not caused and cannot be reasonably expected to cause significant ecological damage to the receiving waters. If such proof is not made to the satisfaction of the Board appropriate corrective measures shall be ordered to be taken within a reasonable time as determined by the Board.
- g) Permits for heated effluent discharges, whether issued by the Board or the Illinois Environmental Protection Agency (Agency), shall be subject to revision in the event that reasonable future development creates a need for reallocation of the assimilative capacity of the receiving stream as defined in the regulation above.

- h) The owner or operator of a source of heated effluent shall maintain such records and conduct such studies of the effluents from such sources and of their effects as may be required by the Agency or in any permit granted under the Illinois Environmental Protection Act (Act).
- i) Appropriate corrective measures will be required if, upon complaint filed in accordance with Board rules, it is found at any time that any heated effluent causes significant ecological damage to the receiving stream.
- j) All effluents to an artificial cooling lake must comply with the applicable provisions of the thermal water quality standards as set forth in this Section and 35 Ill. Adm. Code 303, except when all of the following requirements are met:
  - 1) All discharges from the artificial cooling lake to other waters of the State comply with the applicable provisions of subsections (b) through (e).
  - 2) The heated effluent discharged to the artificial cooling lake complies with all other applicable provisions of this Chapter, except subsections (b) through (e).
  - 3) At an adjudicative hearing the discharger shall satisfactorily demonstrate to the Board that the artificial cooling lake receiving the heated effluent will be environmentally acceptable, and within the intent of the Act, including, but not limited to:
    - A) provision of conditions capable of supporting shellfish, fish and wildlife, and recreational uses consistent with good management practices, and
    - B) control of the thermal component of the discharger's effluent by a technologically feasible and economically reasonable method.
  - 4) The required showing in subsection (j)(3) may take the form of an acceptable final environmental impact statement or pertinent provisions of environmental assessments used in the preparation of the final environmental impact statement, or may take the form of showing pursuant to Section 316(a) of the Clean Water Act (CWA) (33 U.S.C. 1251 et seq.), which addresses the requirements of subsection (j)(3).
  - 5) If an adequate showing as provided in subsection (j)(3) is found, the Board shall promulgate specific thermal standards to be applied to the discharge to that artificial cooling Lake.

**Appendix C**  
**Outfall Location Calculation**

Exelon River Diffuser Project  
Appendix C  
Net Change - Location of Outfalls

Geographic System					
Reference	Existing Outfall (seconds only)	Proposed Outfall (seconds only)	Difference (seconds only)	Square of the Difference (seconds only)	Calculated Distance (sec)
Latitude: 41° 15'	6.450	8.700	2.250	5.063	
Longitude: 88° 8'	5.490	0.350	(5.140)	26.42	
Calculated distance is based on the square root of the sum of the squares.				31.48	5.611
Latitude and longitude based on observations taken from Google Earth.					

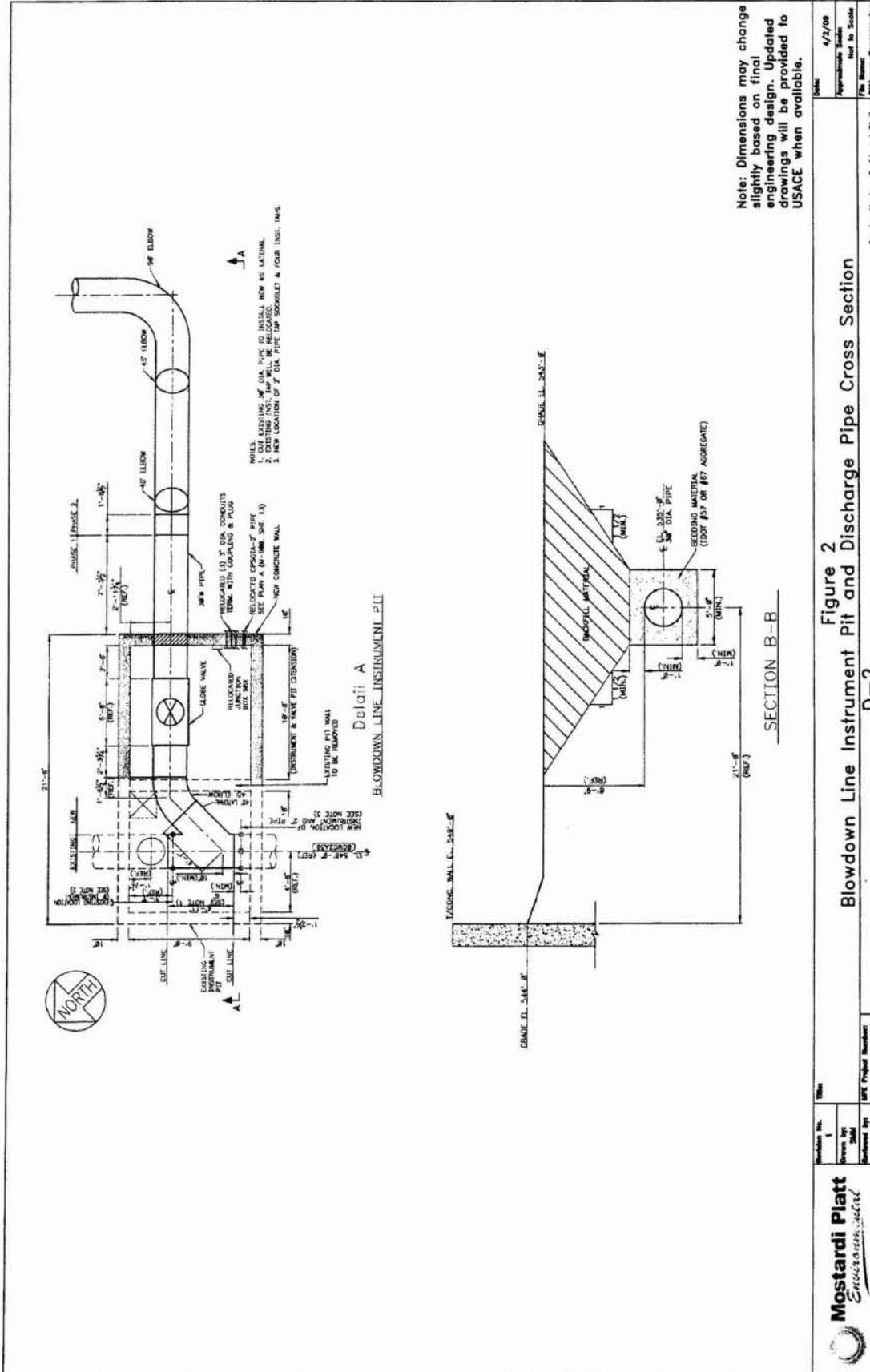
**Appendix D**  
**Engineering Drawings**  
**(As Submitted May 8, 2009)**



**Figure 1**  
 Potential Kankakee River Diffuser  
 D-1

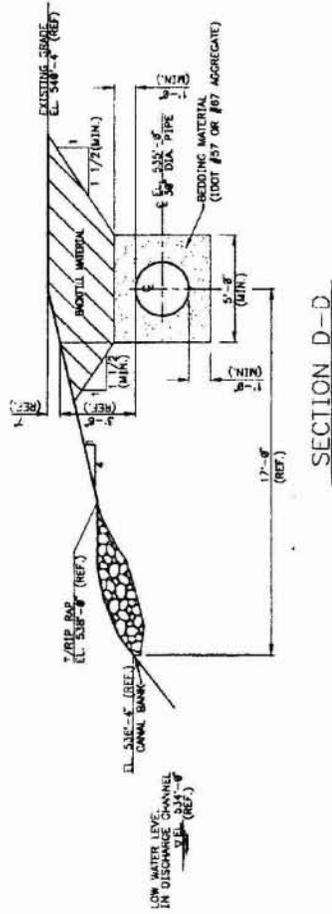
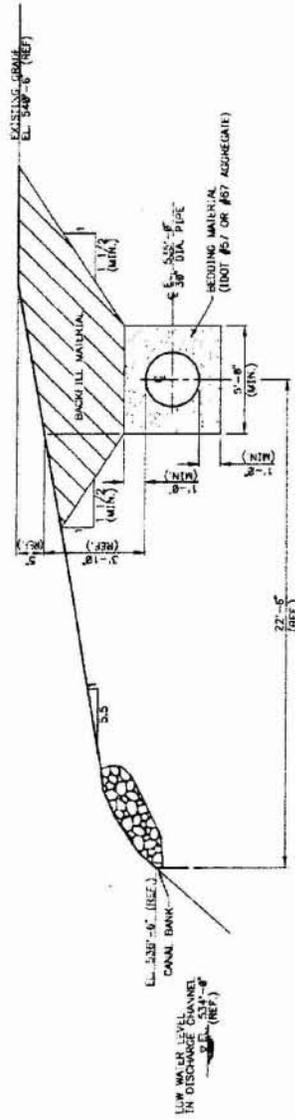
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Drawn by	DAK	Approximate Scale	1" = 50'
Reviewed by	JAM	File Name	0402213diffuser.dwg
Project Number	0402213	Eaton Nuclear Braidwood Station	

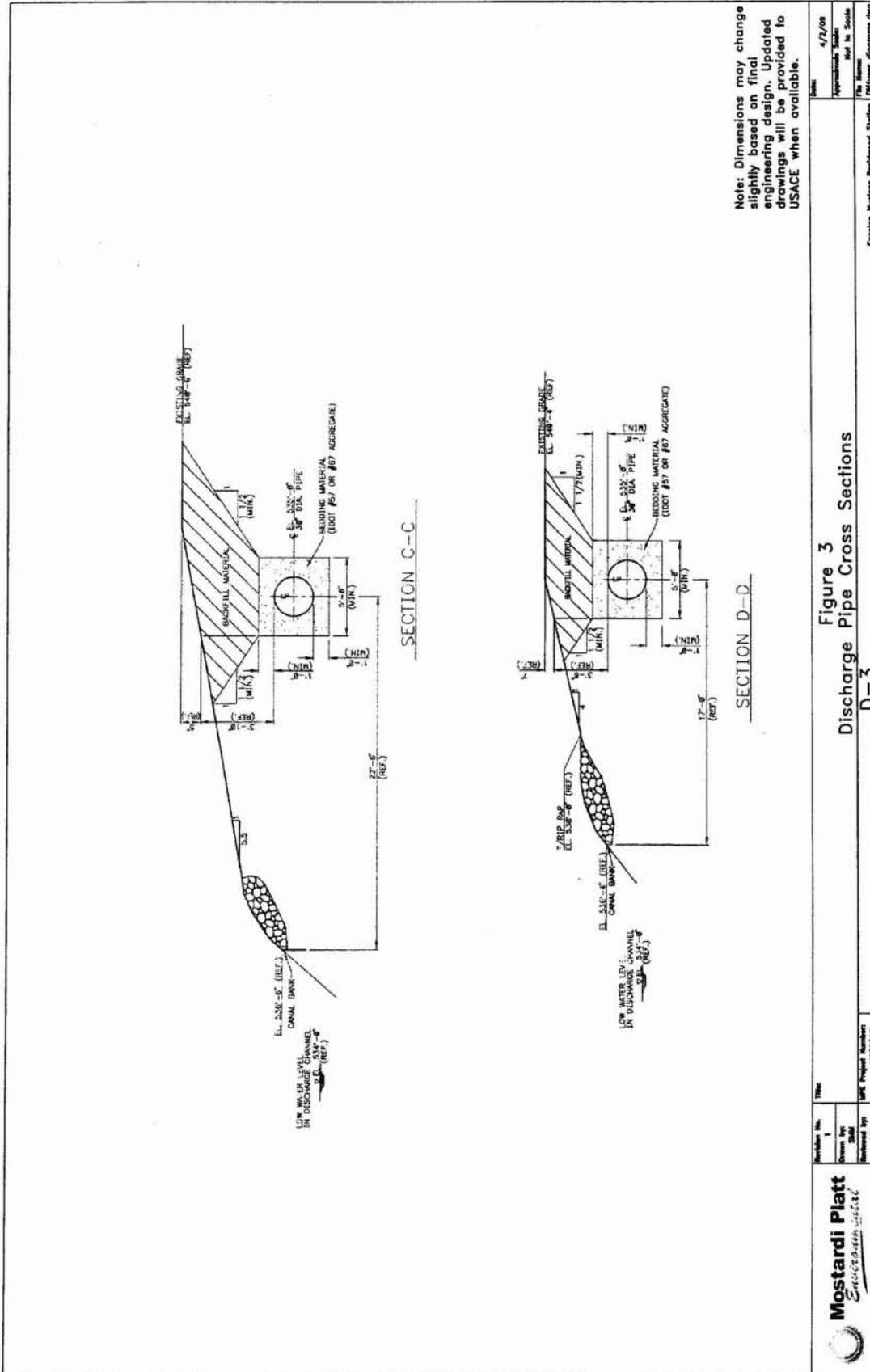




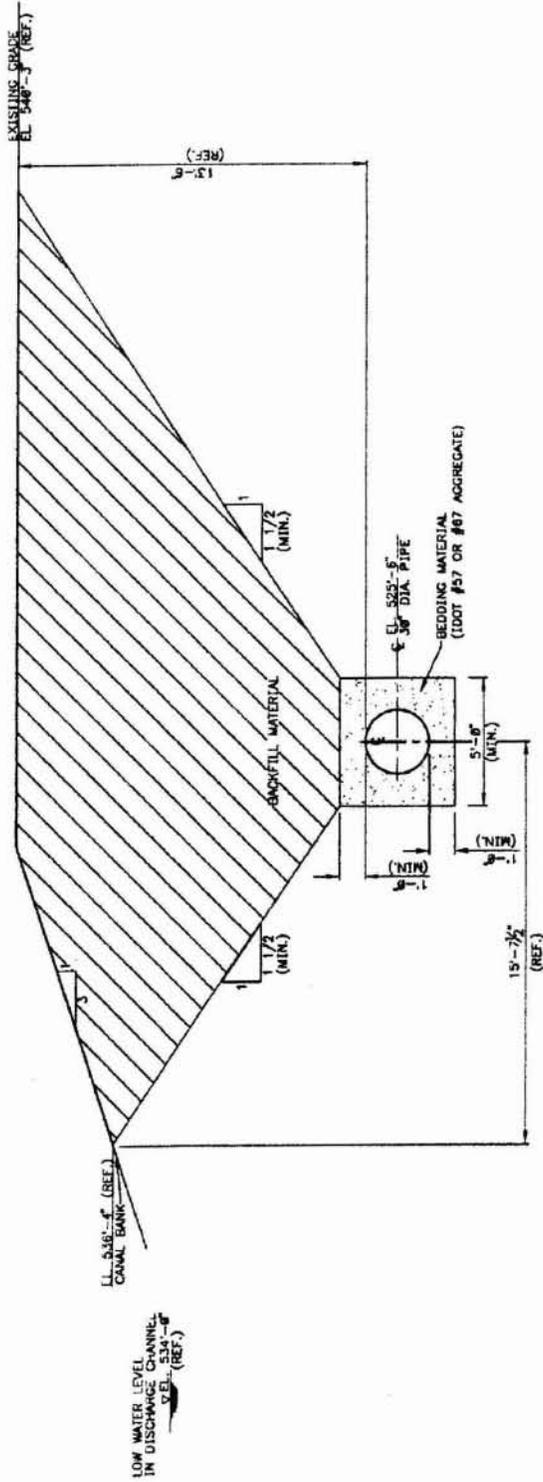
Note: Dimensions may change slightly based on final engineering design. Updated drawings will be provided to USACE when available.

		Title: <b>Blowdown Line Instrument Pit and Discharge Pipe Cross Section</b> Revision: <b>D-2</b> Date: <b>4/2/08</b> Appropriate Scale: <b>Not to Scale</b> File Name: <b>Excision Number Braidwood Station (Diffuser diagrams.dwg)</b>
Designer: <b>JAM</b> Checker: <b>JAM</b> Engineer: <b>JAM</b>	Project Number: <b>W002513</b>	Scale: <b>Not to Scale</b>

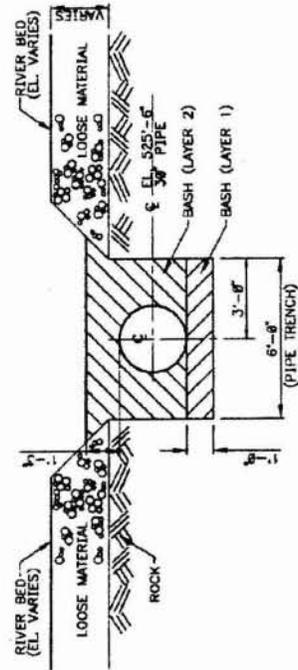




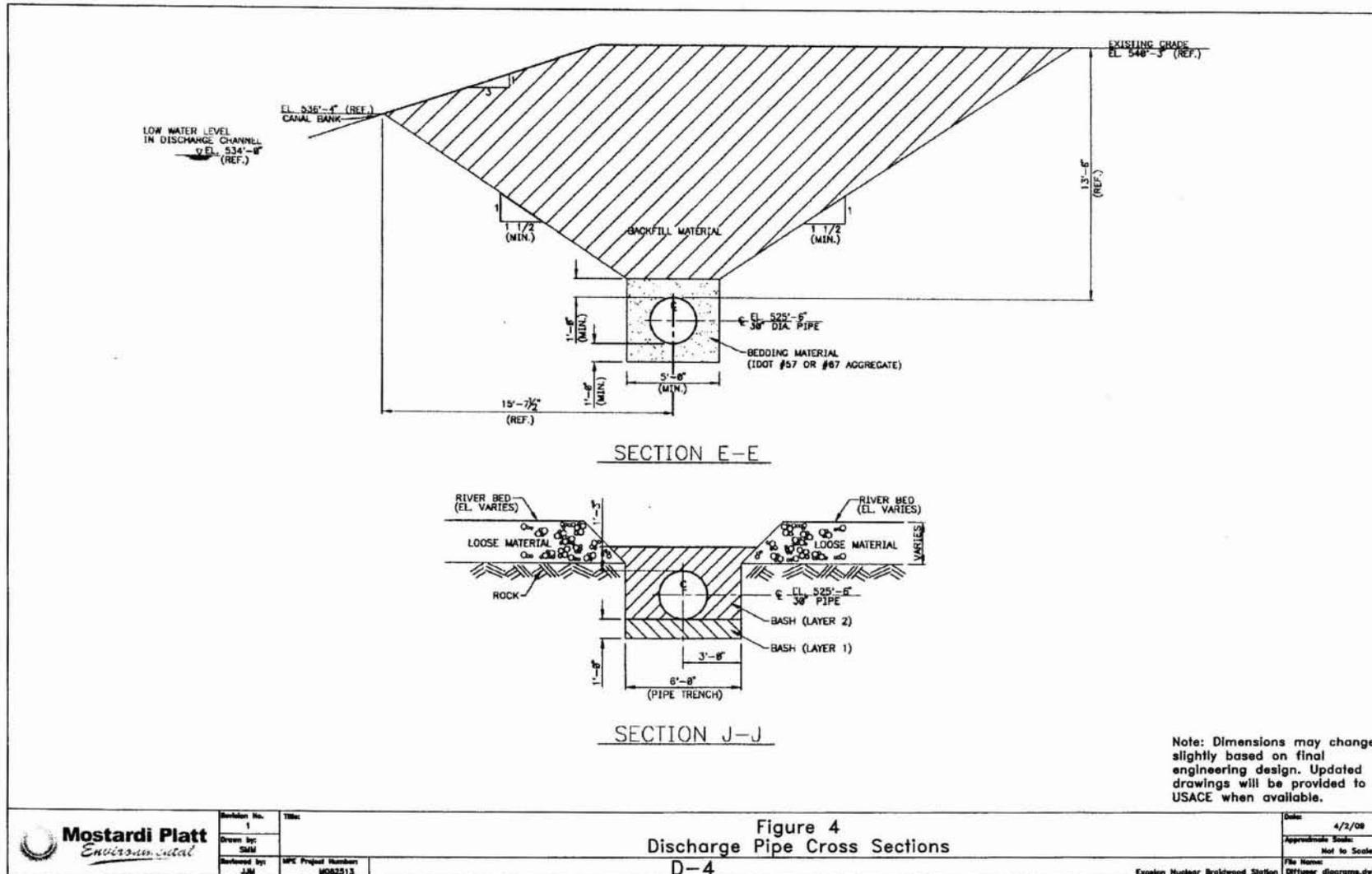
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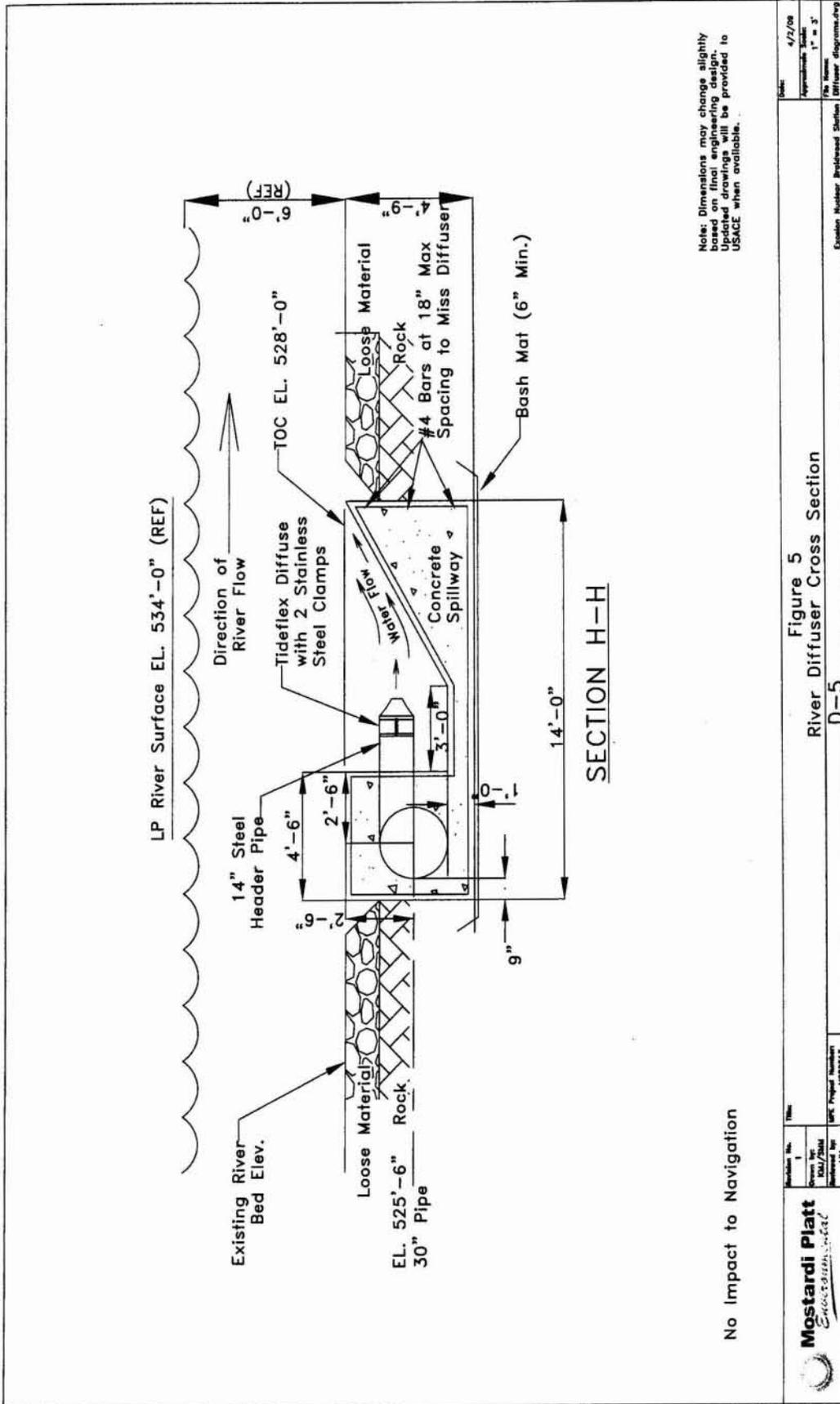


SECTION E-E

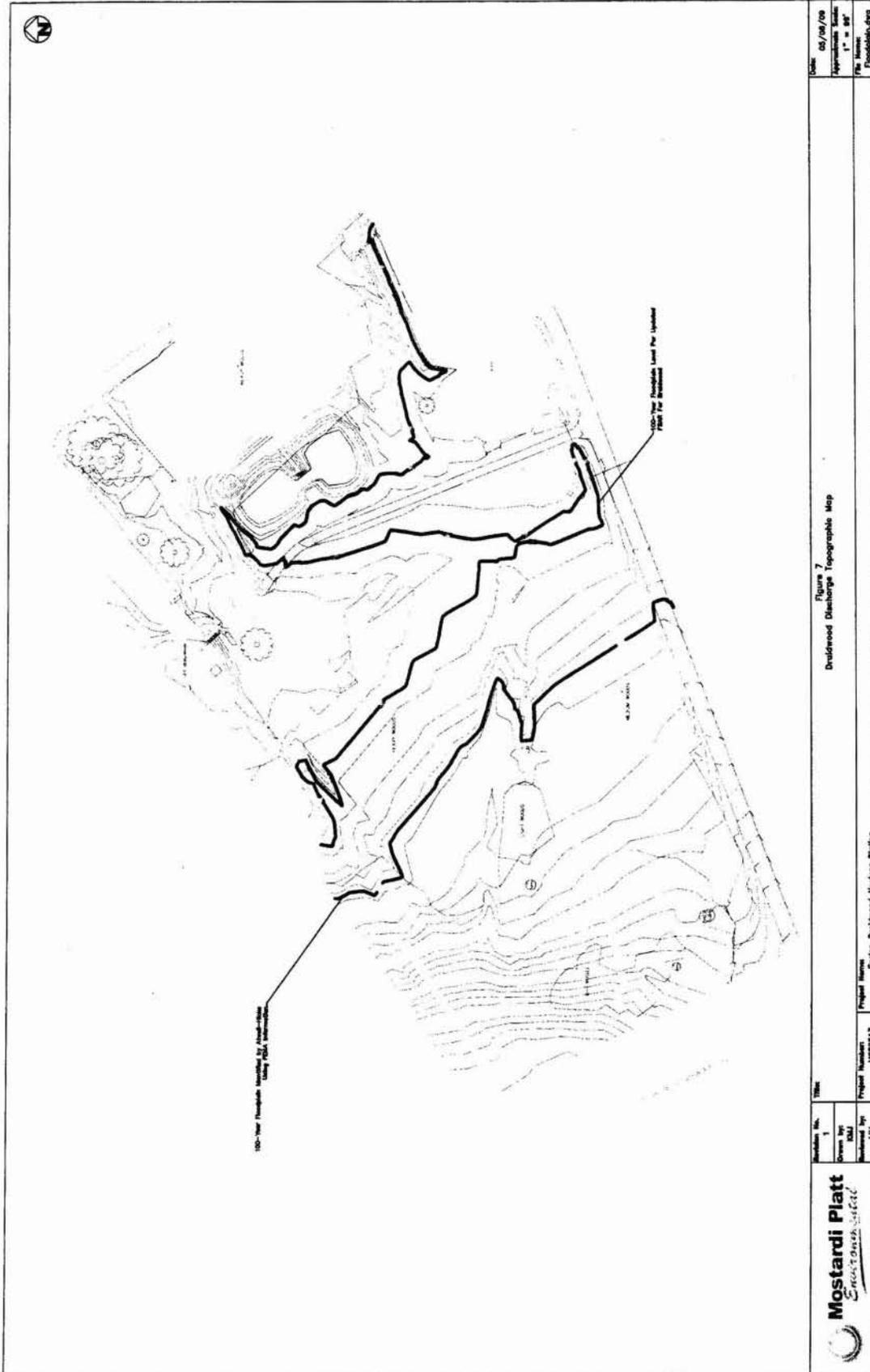


SECTION J-J

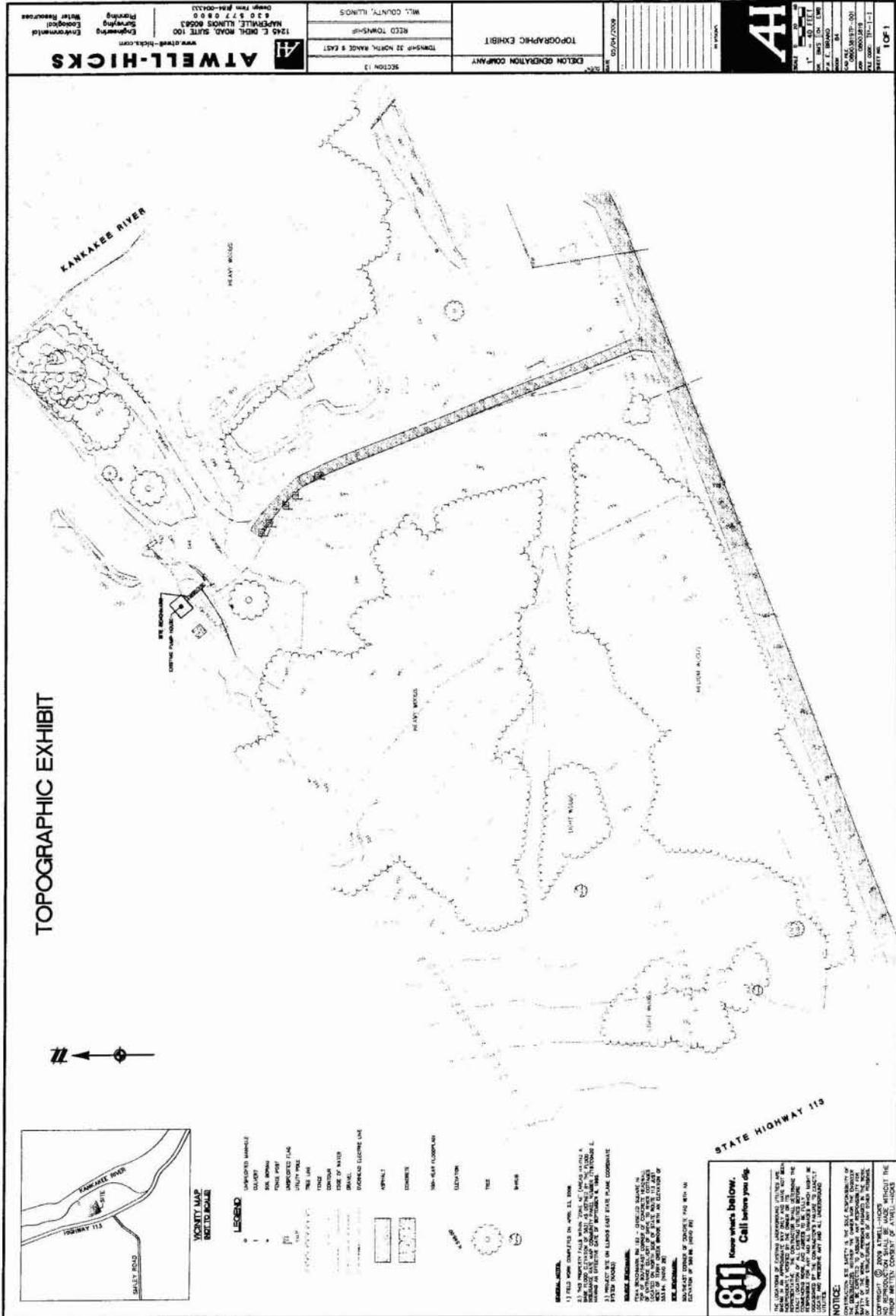








		Revision No. 1 Drawn by: JDL Modified by: JDL	Title: Braidwood Discharge Topographic Map	Date: 05/04/06 Approver: [Signature] File No.: 101 Project: Braidwood Station
Project Name: Braidwood Nuclear Station		Project Number: 0002213	Figure 7	Project: Braidwood Station



**Appendix E**

**Electronic Copy of “Application for an Individual Permit for a River Diffuser” (as submitted May 8, 2009 to US Army Corps of Engineers)**

