

NPDES Permit No. IL0048313  
Notice No.KPM:16010601.docx

Public Notice Beginning Date: **April 23, 2020**

Public Notice Ending Date: **May 25, 2020**

National Pollutant Discharge Elimination System (NPDES)  
Permit Program

Draft Modified NPDES Permit to Discharge into Waters of the State

Public Notice/Fact Sheet Issued By:

Illinois EPA  
Bureau of Water  
Division of Water Pollution Control  
Permit Section  
1021 North Grand Avenue East  
Post Office Box 19276  
Springfield, Illinois 62794-9276  
217/782-0610

Name and Address of Discharger:

Exelon Generation Company, LLC  
4300 Winfield Road  
Warrenville, Illinois 60555-5701

Name and Address of Facility:

Exelon Generation Company, LLC  
Byron Nuclear Generating Station  
4450 North German Church Road  
Byron, Illinois 6101  
(Ogle County)

The Illinois Environmental Protection Agency (IEPA) has made a tentative determination to issue a NPDES Permit to discharge into the waters of the state and has prepared a draft Permit and associated fact sheet for the above named discharger. The Public Notice period will begin and end on the dates indicated in the heading of this Public Notice/Fact Sheet. The last day comments will be received will be on the Public Notice period ending date unless a commentor demonstrating the need for additional time requests an extension to this comment period and the request is granted by the IEPA. Interested persons are invited to submit written comments on the draft permit to the IEPA at the above address. Commentors shall provide his or her name and address and the nature of the issues proposed to be raised and the evidence proposed to be presented with regards to those issues. Commentors may include a request for public hearing. Persons submitting comments and/or requests for public hearing shall also send a copy of such comments or requests to the permit applicant. The NPDES permit and notice number(s) must appear on each comment page.

The application, engineer's review notes including load limit calculations, Public Notice/Fact Sheet, draft permit, comments received, and other documents are available for inspection and may be copied at the IEPA between 9:30 a.m. and 3:30 p.m. Monday through Friday when scheduled by the interested person.

If written comments or requests indicate a significant degree of public interest in the draft permit, the permitting authority may, at its discretion, hold a public hearing. Public notice will be given 45 days before any public hearing. Response to comments will be provided when the final permit is issued. For further information, please call Keegan MacDonna at 217/782-0610.

The applicant is engaged in operating a nuclear power station with a nuclear fueled steam electric generating facility (SIC 4911). Two pressurized water nuclear fission reactors provide steam to turbine generators with a maximum generating capacity of 2470 MW (net) and 3,645 MWt. Plant operation in an average discharge of 22.35 MGD of cooling system blowdown from outfall 001, 0.042 MGD of reverse osmosis backwash from internal outfall A01, 0.006 MGD of sewage treatment effluent from internal outfall B01, 0.022 MGD of wastewater treatment effluent from internal outfall C01, 0.03 MGD of radwaste treatment system effluent from internal outfall D01, 0.29 MGD of stormwater runoff basin from internal outfall E01, an intermittent discharge of intake screen backwash from internal outfall F01, an intermittent discharge of steam generator cleaning waste from internal outfall G01, an intermittent discharge of stormwater runoff basin overflow from outfall 002, an intermittent discharge of east station area runoff from outfall 003, and an intermittent discharge of west station area runoff from outfall 004.

The following modification is proposed:

Approval of the facility's Entrainment Characterization Study.

Application is made for the existing discharges which are located in Ogle County, Illinois. The following information identifies the discharge point, receiving stream and stream classifications:

<u>Outfall</u>	<u>Receiving Stream</u>	<u>Latitude</u>		<u>Longitude</u>		<u>Stream Classification</u>	<u>Integrity Rating</u>
001	Rock River	42° 04' 55"	North	89° 19' 41"	West	General Use	Not Rated
002	Woodland Creek	42° 04' 37"	North	89° 16' 46"	West	General Use	Not Rated
003	Woodland Creek	42° 04' 45"	North	89° 16' 38"	West	General Use	Not Rated
004	Unnamed Tributary to the Rock River	42° 04' 26"	North	89° 17' 48"	West	General Use	Not Rated

To assist you further in identifying the location of the discharge please see the attached map.

The stream segment P-20 receiving the discharge from outfall 001 is on the draft 2016 303(d) list of impaired waters and is not a biologically significant stream on the 2008 Illinois Department of Natural Resources Publication – *Integrating Multiple Taxa in a Biological Stream Rating System*.

The following parameters have been identified as the pollutants causing impairment:

Potential Cause:

Mercury, PCBs, Ethanol, and Fish Kills

Designated Use:

Fish Consumption and Aquatic Life Use

The stream segments receiving the discharge from outfalls 002 - 004 are not on the draft 2016 303(d) list of impaired waters and are not biologically significant streams on the 2008 Illinois Department of Natural Resources Publication – *Integrating Multiple Taxa in a Biological Stream Rating System*.

The discharges from the facility shall be monitored and limited at all times as follows:

PARAMETER	LOAD LIMITS lbs/day		REGULATION	CONCENTRATION		REGULATION
	30 DAY AVERAGE	DAILY MAXIMUM		30 DAY AVERAGE	DAILY MAXIMUM	
<u>DAF (DMF)</u> <u>LIMITS mg/l</u>						
<u>Outfall 001:</u>						
Flow (MGD)						
pH					6 – 9 s.u.	35 IAC 304.125
Temperature					120°F	35 IAC 302.211
Total Residual Chlorine/ Total Residual Oxidant					0.05	35 IAC 302.208 & 40 CFR 125.3
Zinc (Total)				0.213	0.433	35 IAC 302
Hydrazine				0.011	0.027	35 IAC 302
Copper (Total)				Monitor Only		
Chromium (Total)					0.2	40 CFR 423.13
126 Priority Pollutants				No Detectable Amount		40 CFR 423.13
Oil/Grease				15	20	40 CFR 423.12

**Outfall F01:**

There shall be no intentional discharge of collected debris.

PARAMETER	LOAD LIMITS lbs/day		REGULATION	CONCENTRATION		REGULATION
	30 DAY AVERAGE	DAILY MAXIMUM		LIMITS mg/l		
<u>Outfall G01:</u>						
Flow (MGD)						
Total Suspended Solids				15	30	35 IAC 304.124
Oil/Grease				15	20	40 CFR 423.12
Chromium (Hexavalent)				0.1	0.2	35 IAC 304.124
Chromium (Total)				1	2	35 IAC 304.124
Copper				0.5	1	35 IAC 304.124
Iron (Total)					1	40 CFR 423.13
Lead				0.2	0.4	35 IAC 304.124
Nickel				1	2	35 IAC 304.124
Zinc (Total)				1	2	35 IAC 304.124

Outfall 002:

Flow (MGD)						
Oil/Grease				15	20	40 CFR 423.12
Total Suspended Solids				15 / 30	30 / 100	35 IAC 304.124 & 40 CFR 423.12

Outfall 003:

SWPPP

Outfall 004:

SWPPP

Load Limit Calculations:

Outfall B01 load limit calculations for the following pollutant parameters were based a design average and maximum flow of 0.008 MGD and 0.021 MGD and using the formula of average or maximum (MGD) X concentration limit (mg/l) X 8.34 = the average or maximum load limit (lbs/day): BOD<sub>5</sub> and Total Suspended Solids.

The following explain the conditions of the proposed permit:

The special conditions clarify flow measurement and reporting, pH, monitoring location, total residual chlorine/oxidant, temperature, stormwater, additives, 316(b), class K operator, copper, and hydrazine.

The issuance of this modified permit will include the continued approved usage of water treatment additives as identified in the permit renewal application and submitted during the renewal process.

The facility has a year round disinfection exemption for Outfall B01, which was granted on February 14, 1996.

The facility does not have any PCB containing electric equipment on-site. Labels on transformers and sampling of site transformers performed in 1984 and 1994 show transformers do not contain PCBs above 50 ppm.

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PUBLIC NOTICE

Cooling Water Intake Structure (CWIS) Description and Operation Discussion provided by the facility:*Circulating Water Intake Structure Configuration*

The circulating water makeup intake structure is located on the east bank of the Rock River near River Mile 115. The river intake structure consists of the following major components:

**Screenhouse Structure**

- 2 intake bays
- 2 vertical bar grills/bar racks (one each, per bay)
- 4 through-flow traveling water screen (2 each, per bay)
- 3 Makeup water pumps (one each, per bay, and one spare)
- 2 Essential Service water makeup pumps (one each, per bay)

The intake structure and pump house is oriented parallel to the shoreline. The structure is approximately 72 feet wide by 138 feet long. The intake structure has 2 operating levels including a lower "wetted" are and upper level that provides housing for the screen drive mechanisms, pumps, and support equipment. The structure occupies the water column from the surface down to the level of the bottom of the trash rack at an elevation of 663'6". The operating floor level of the screen house is at elevation 686'6". Normal water elevation is 672'0" and low water elevation is 671'0".

The bays housing the pumps are protected from ice and debris by bar racks or grill equipped with trash rakes, followed by traveling water screen. Debris removed from the traveling screens and trash racks at the river screen house is collected in a trash basket and disposed of off-site at a permitted landfill.

There are two intake bays, each consisting of two through-flow traveling screens, for a total of four screens. Each screen is 8 feet wide with a 3/8 inch square opening mesh.

Operation	Number of Installed Pumps	Design Flow per Pump (gpm)
Circulating Water Makeup	2 operating, 1 spare	24,000
Essential Service Water Makeup	2	1,500

*Circulating Water Pump Operations*

The facility operates at all times of the year except in the case of scheduled maintenance. Planned outage occur approximately once every 18 months per unit, for approximately 19 to 20 days on average, during which time one unit is shut down for refueling and maintenance. The CWIS operates to provide a continuous supply of water for:

1. Makeup water to the facilities cooling system to replace consumptive and non-consumptive losses;
2. Non-contact service cooling water for normal and emergency component cooling; and
3. Wash and sluice water to maintain the traveling screens located in the CWIS in a clean condition and sluice away debris.

The river intake pumps that operate continuously consists of the 2 circulating water makeup pumps that replace water losses from the 2 closed-cycle cooling tower systems resulting from evaporation and blowdown. The river intake also houses essential service water makeup pumps, which provide emergency backup sources of makeup water.

A separate cooling tower basin pump and screen house is located at the plant, which houses the circulated water pumps and nonessential service water system pumps. The circulating water pumps and nonessential service water pumps take their suction from the circulating water pump house forebay. The bay is fed by a flume that connects the basins of the 2 natural draft cooling towers.

The total Design Intake Flow (DIF) with all river water intake pumps in operation is 73.4 MGD (51,000 gpm). The Average Intake Flow (AIF), calculated as the average daily flow from September 2011 through September 2014, is approximately 54.8 MGD (38,056 gpm).

Operation	Design Intake Flow (MGD)
Circulating Water Makeup	69.1
Essential Service Water Makeup	4.3
Total Design Intake Flow	73.4

*Cooling Water System Operation Description*

The cooling water system at Byron consists of:

1. Circulating Water System (CWS)
2. Makeup Water System (MWS) (The CWIS is part of the MWS)
3. Blowdown System

### *Circulating Water System*

Byron employs 2 re-circulating water natural draft cooling towers, one tower per unit, for cooling the circulating water supply of the turbine condensers. The CWS includes six 214,500 gpm circulating water pumps (3 per unit). The main condenser of each unit requires 693,000 gpm of circulating water flow to remove waste heat at 100% load. One cooling tower per unit is used to dissipate waste heat to the environment. Following cooling in the tower, water is directed from the tower basin through an open flume to a basin pump and screen house servicing both units. From this point, 3 circulating water pumps per unit pump water to the main condensers. Water chemistry is controlled by continuous blowdown to the Rock River and simultaneous makeup from the Rock River to the open flume between the two towers.

In addition to the two natural draft cooling towers used for closed-cycle cooling of the condensers, Byron has two banks of mechanical-draft cooling towers for cooling of the essential service water. These cooling towers remove heat from safety-related equipment and serve as the ultimate heat sink for the reactors. Normally, the Rock River intake CWS provide makeup water required to replace evaporative and blowdown losses from the mechanical cooling towers. Essential service water makeup pumps located in the Rock River intake provide emergency backup makeup water when required.

The CWS and service water system (essential and nonessential) are treated for scaling, fouling, and corrosion control. CWS makeup water is treated with a low concentration of copper ions to prevent zebra mussel infestation.

Two service water systems support the Station; the nonessential service water system supplies non-safety related systems and the essential service water system supplies cooling water to the reactor safeguard and auxiliary systems. The nonessential service water system has 3 dedicated 35,000 gpm pumps in the circulating water pumphouse. Normally 2 pumps are in operation, one per unit, with the third available to provide full capacity backup for either unit. The pumps take their suction from the circulating water pumphouse forebay. This bay is fed by a flume approximately 32 feet wide and 22 feet deep which connects the basin of the two natural draft cooling towers servicing the two units.

The non-essential service water is treated to control corrosion, scale, and organic slime buildup. Two 100% capacity essential service water pumps are associated with each unit. All 4 pumps, which are located in the auxiliary building, remove water from the essential service water cooling towers. Each pump is rated at 24,000 gpm. Corrosion and scale inhibitors are used to control water chemistry in the system. Makeup from the river is treated with a low concentration of copper ions to prevent zebra mussel infestation.

### *Makeup Water System*

The MWS consists of the river screen house at the Rock River intake and has 3 circulating water makeup pumps, 2 for normal operations and one for backup. Each pump's rated capacity is 24,000 gpm (34.6 MGD).

The river screen house also has 2 essential service water makeup pumps that are used for emergency purposes only. Each pump's rated capacity is 1,500 gpm (2.2 MGD).

### *Blowdown System*

The blowdown system is provided to control the dissolved solids concentrations in the circulating water. Blowdown is measured and discharged to the Rock River approximately 200 feet downstream of the river screen house. Blowdown is discharged from the outfall structure via a 275 foot rip-rapped channel to the river.

The average makeup withdrawal rate from the Rock River at 100% load is 36,750 gpm, out of which 13,000 to 17,000 gpm is returned to the river as blowdown. Based on flow records from September 2011 through September 2014 the average and maximum discharge rates to the river are 13,915 gpm and 16,783 gpm respectively. Therefore, approximately 1 to 1.3% of the total circulating water is discharged as blowdown to control the solids buildup and to minimize scale formation in the system. Solid concentrations in the circulating cooling tower water are maintained between two-and-a-half and three times the river concentration.

### *Through-Screen Velocity*

The through-screen velocity has been calculated at the screen under normal and low water elevations for DIF.

	<b>Normal Water Elevation</b>	<b>Low Water Elevation</b>
Water Elevation	672'0" MSL	671'0" MSL
Screenhouse Floor Elevation	663'6" MSL	663'6" MSL
Water Depth	8'6"	7'6"
Through-Screen Velocity DIF	0.7 fps	0.79 fps

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*Percent Reduction in Cooling Water Intake Flow*

Due to operation of the cooling tower, cooling water intake flow reductions are achieved through minimized makeup water withdrawals when compared to plant circulating water flows. Additional flow reduction is recognized during plant outages and planned maintenance activities. The cooling towers are typically operated at two-and-a-half to three cycles concentrations.

Total Makeup Water	Percent Flow Reduction
DIF – 73.4 MGD	96.5%
AIF – 54.8 MGD	97.4%

*Impingement Analysis*

The cooling towers constitute a closed-cycle recirculating system, which is one of the BTA standards for impingement mortality, as defined under 40 CFR 125.94(c)(1).

Agency Discussion on 316(b):

40 CFR 122.21(r)(1)(ii) states that all existing facilities must submit for review the information required under paragraphs (r)(2) – (8). The permittee has previously fulfilled these requirements through the submittal of the document entitled 40 CFR 122.21(r) NPDES Application Requirements for Facilities with Cooling Water Intake Structures. The facility withdraws less than 125 MGD therefore they are not required to submit the information required by (r)(9) – (13).

To comply with the impingement standard, facilities are required to comply with one of the seven alternatives as outlined in 40 CFR 125.04(c). The facility uses cooling towers which constitute closed-cycle cooling, which is one of the seven BTA alternatives for impingement mortality, as defined under 40 CFR 125.94(c)(1).

For entrainment, the facility had not previously conducted studies on entrainment at this facility, therefore there was no historical entrainment data. 40 CFR 125.94(d) states that the Agency must make a BTA determination for existing facilities on a site specific basis. Given that the facility had not collected entrainment data in the past, in order for the Agency to make a BTA determination the facility at a minimum must submit sufficient data to characterize the potential impacts due to entrainment for this facility. The Agency required the facility to conduct an Entrainment Characterization Study as required by 40 CFR 122.21(r)(9), which was submitted to the Agency for review on March 23, 2018.

The facility utilizes a closed-cycle cooling system that recirculates water through two natural draft cooling towers. Make-up water and blow down flows are supplied to the system via the cooling water intake structure located on the east bank of the Rock River, approximately 3 miles away. The intake structure is protected by a single bar rack with 3-inch gaps. The screen house has two intake bays (one for each unit), with two conventional traveling water screens (3/8-inch square mesh screen panels) per intake bay. The entrainment characterization study consisted of 24 separate weekly sampling events that occurred each Monday from April 10, 2017 through September 18, 2017. Samples were collected mid-depth at the river screen house within the north intake bay at a location behind the trash racks and immediately upstream of the traveling screens. During each 24-hour sampling event, separate daytime and nighttime samples were collected. Upon collection, organisms were categorized by life stage and identified to the lowest practical taxon, which ranged from family level down to species. Sample densities for each organism and life stage (expressed as number per 100 m<sup>3</sup>) were calculated from entrainment data for each daytime and nighttime sample within a 24-hour sampling event. Monthly densities were calculated as the average of all interval sample densities in each calendar month. Monthly sample densities were then multiplied by actual intake flows (and design flow conditions) recorded during April 1 through September 30, in 2015, 2016, and 2017, to estimate the total numbers of organisms entrained under AIF and DIF conditions.

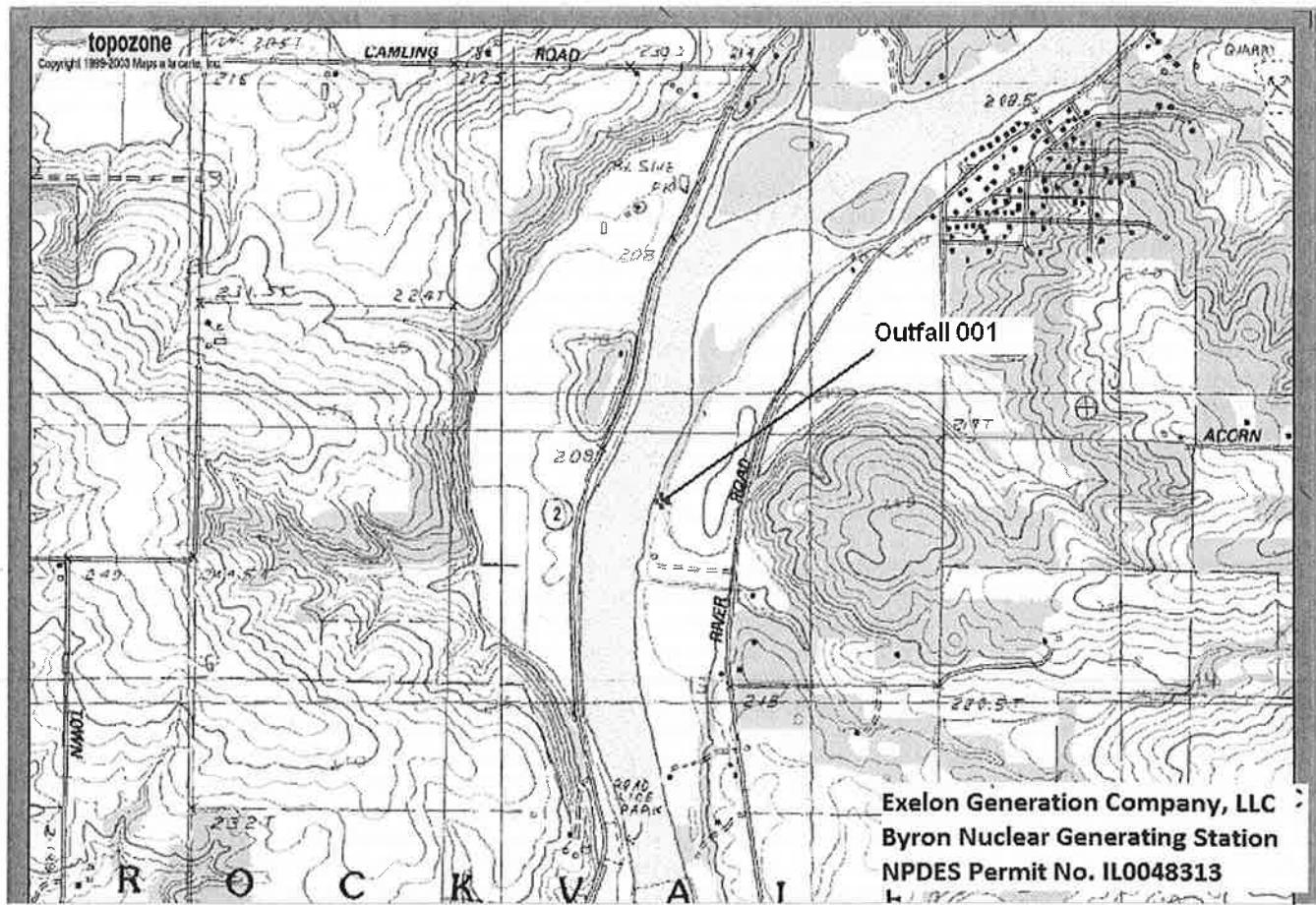
The estimated total entrainment from April through September at Units 1 and 2 under AIF conditions was 13,010,239 fish, which excluded non-viable eggs. The projected number of fish entrained during this period under the DIF scenario was estimated to be 15,093,366. Finfish comprised 100% of the total numbers entrained. Post-yolk-sac larvae and yolk sac larvae dominated the entrainment sample collections, accounting for 55.2% and 44.4%, respectively, of the fish collected. Cyprinids (all minnow species combined excluding common carp), primarily collected as post yolk-sac larvae, were the most abundant fish taxa and accounted for 45.5% of the total number of organisms collected. Unfortunately, overlaps in identifying characteristics among larval cyprinids make identification to the species level particularly difficult, especially at the earliest stages of development. Therefore, most of these larvae were identified only to the genus *Notropis* or the family Cyprinidae. Based on the relatively high numbers of spotfin shiner collected in prior studies and in the ongoing monitoring studies in the Rock River, it is assumed that most of the *Notropis* spp. collected were spotfin shiner or possibly sand shiner. Percids (Family Percidae), which were collected primarily as yolk-sac larvae, accounted for 42.6% of the total collected and were the second most abundant fish taxa collected. Darters and walleye/sauger were believed to comprise a substantial proportion of the percids collected. The high abundance of percids within the entrainment samples may be related to the long-term walleye stocking programs that both Exelon and IDNR have implemented in this stretch of the Rock River. The remaining taxa within the entrainment samples consisted of common carp (3.7%), white bass (2.6%), suckers (2.5%), gizzard shad (1.7%), and other miscellaneous fish taxa (1.4%). No endangered or threatened species were estimated to be entrained. Diel analysis indicated

that peak entrainment occurred at night, with all eggs and juvenile fish being collected during this period. Yolk-sac larval entrainment was highest in the day while post yolk-sac larval entrainment was at peak levels at night.

The estimated numbers of organisms entrained at BNPS were calculated as the product of the measured entrainment densities and plant flows associated with the closed cycle system. Given that closed cycle flows are typically about 95% lower than those required under once-through cooling operations, the reduction of intake flow achieved through closed cycle operations at BNPS results in a directly proportionate reduction in entrainment. The entrainment characterization study suggests that entrainment at BNPS is comprised predominantly of minnows and percids larvae, followed by common carp, white bass, suckers, and gizzard shad. None of these species, with the possible exception of larval walleye that are the product of IDNR and Exelon walleye stocking, have substantial economic value as part of commercial or recreational fisheries on the Rock River. Based on these considerations, the Agency believes that further measures to reduce entrainment losses at BNPS are not justified and that the current closed cycle recirculating system is BTA for entrainment. Although EPA's Final Rule does not identify specific technological alternatives for achieving compliance with the BTA Standard for Entrainment, USEPA commented that "closed cycle recirculating systems reduce entrainment (and impingement mortality) to the greatest extent and are the most effective performing technology." Thus, the determination that the BNGS closed cycle recirculating system is the equivalent of the BTA for preventing and minimizing entrainment impacts is consistent with the Final Rule.

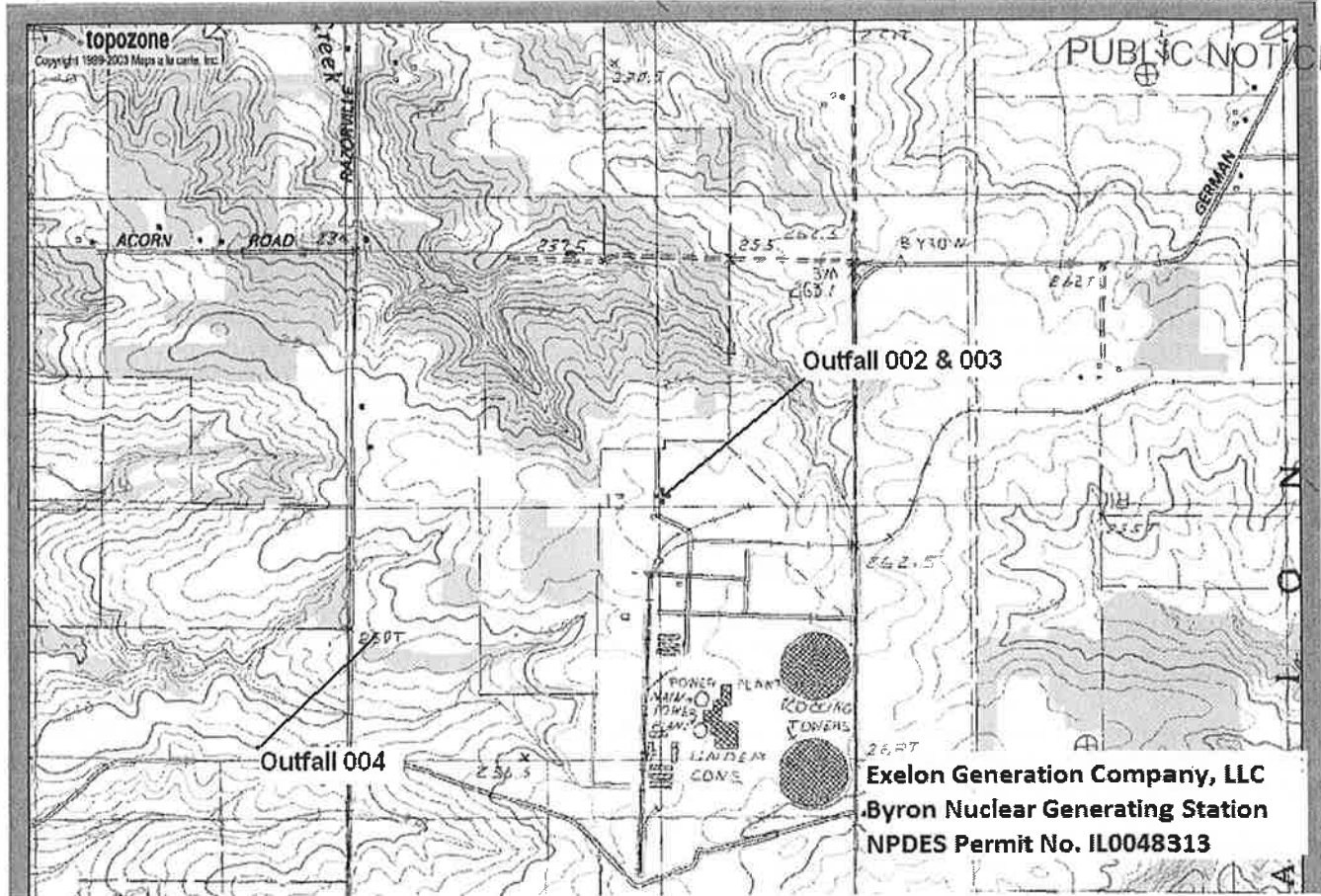
Based on the information provided within the entrainment characterization study, the operation of the cooling water intake structure meets BTA for entrainment.

Exelon Generation Company, LLC submitted, in accordance with Section 316(b) of the Clean Water Act, the required information under 40 CFR 122.21(r)(1)(ii). The Agency has determined that the operation of the cooling towers, which constitute closed-cycle cooling, meets the Best Technology Available (BTA) for impingement mortality, as defined under 40 CFR 125.94(c)(1). The Agency has also determined that the operation of the cooling water intake structure meets the Best Technology Available (BTA) for entrainment, as defined under 40 CFR 125.94(d).



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### Public Notice of Draft Permit

Public Notice Number KPM:16010601.docx is hereby given by Illinois EPA, Division of Water Pollution Control, Permit Section, 1021 North Grand Avenue East, Post Office Box 19276, Springfield, Illinois 62794-9276 (herein Agency) that a draft National Pollutant Discharge Elimination System (NPDES) Permit Number IL0048313 has been prepared under 40 CFR 124.6(d) for Exelon Generation Company, LLC, 4300 Winfield Road, Warrenville, Illinois 60555-5701 for discharge into Rock River, Woodland Creek, and an Unnamed Tributary to the Rock River from the Exelon Generation Company, LLC, Byron Nuclear Generating Station, 4450 North German Church Road, Byron, Illinois 61010 (Ogle County).

The applicant is engaged in operating a nuclear power station with a nuclear fueled steam electric generating facility. Two pressurized water nuclear fission reactors provide steam to turbine generators with a maximum generating capacity of 2240 MW (net). Plant operation results in an average discharge of 22.35 MGD of cooling system blowdown from outfall 001, 0.042 MGD of reverse osmosis backwash from internal outfall A01, 0.006 MGD of sewage treatment effluent from internal outfall B01, 0.022 MGD of wastewater treatment effluent from internal outfall C01, 0.03 MGD of radwaste treatment system effluent from internal outfall D01, 0.29 MGD of stormwater runoff basin from internal outfall E01, an intermittent discharge of intake screen backwash from internal outfall F01, an intermittent discharge of steam generator cleaning waste from internal outfall G01, an intermittent discharge of stormwater runoff basin overflow from outfall 002, an intermittent discharge of east station area runoff from outfall 003, and an intermittent discharge of west station area runoff from outfall 004.

The following modification is proposed:

Approval of the facility's Entrainment Characterization Study.

The application, draft permit and other documents are available for inspection and may be copied at the Agency between 9:30 a.m. and 3:30 p.m. Monday through Friday. A Fact Sheet containing more detailed information is available at no charge. For further information, call the Public Notice Clerk at 217/782-0610.

Interested persons are invited to submit written comments on the draft permit to the Agency at the above address. The NPDES Permit and Joint Public Notice numbers must appear on each comment page. All comments received by the Agency not later than 30 days from the date of this publication shall be considered in making the final decision regarding permit issuance.

If written comments and/or requests indicate a significant degree of public interest in the draft permit, the permitting authority may, at its discretion, hold a public hearing. Public notice will be given 30 days before any public hearing.