

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

In the Matter Of:)	
)	
EXELON GENERATION LLC,)	
Petitioner,)	
)	
v.)	PCB NO. -
)	
ILLINOIS ENVIRONMENTAL)	
PROTECTION AGENCY,)	
Respondent.)	

NOTICE OF FILING

TO: Office of the Clerk of the
Illinois Pollution Control Board
James R. Thompson Center
100 West Randolph Street, Suite 11-500
Chicago, Illinois 60601

Office of Legal Services
Illinois Department of Natural Resources
One Natural Resources Way
Springfield IL 62702-1271

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

PLEASE TAKE NOTICE that on the 2nd day of April, 2014, on behalf of Exelon Generation LLC, a **Petition to Approve Alternative Thermal Effluent Limitations**, an **Appearance of Alan Bielawski**, an **Appearance of William Dickett**, and an **Appearance of Katharine Newman**, were filed with the Office of the Clerk of the Illinois Pollution Control Board.

Respectfully submitted,

EXELON GENERATION LLC

By: Alan P. Bielawski
One of its attorneys

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PROTECTION AGENCY,)
Respondent.)

APPEARANCE

I hereby file my appearance in this proceeding, on behalf of Exelon Generation LLC.

Dated: April 2, 2014



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Dated: April 2, 2014



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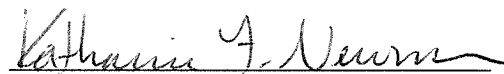
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Dated: April 2, 2014


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PETITION TO APPROVE ALTERNATIVE THERMAL EFFLUENT LIMITATIONS

Pursuant to 35 Ill. Adm. Code § 304.141(c), Section 316(a) of the Clean Water Act and 35 Ill. Adm. Code Part 106, Subpart K, Exelon Generation LLC (“Exelon”) requests that the Illinois Pollution Control Board (“Board”) determine that the alternative thermal effluent limitations set forth in this petition should apply to discharges from Exelon’s Quad Cities Nuclear Generating Station (“Quad Cities Station” or the “Plant”) in lieu of those imposed by 35 Ill. Adm. Code §§ 302.102(b)(8) and 303.331.

I. INTRODUCTION

Section 316(a) of the Clean Water Act (“Section 316(a)”) grants a discharger of heated effluent the right to obtain specific effluent limits for its discharge that differ from generally applicable limits that would otherwise be imposed. Specifically, Section 316(a) provides:

With respect to any point source otherwise subject to the provisions of Section 301 or Section 306 of the [Clean Water] Act, whenever the owner or operator of any such source, after opportunity for public hearing, can demonstrate to the

satisfaction of the Administrator (or, if appropriate, the State) that any effluent limitation proposed for the control of the thermal component of any discharge from any such source will require effluent limitations more stringent than necessary to assure the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife in and on the body of water into which the discharge is to be made, the Administrator (or, if appropriate, the State) may impose an effluent limitation under such section on such plant, with respect to the thermal component of such discharge (taking into account the interaction with other pollutants), that will assure the protection and propagation of a balanced indigenous population of shellfish, fish and wildlife in and on that body of water.

In Illinois, Section 316(a) is implemented through 35 Ill. Adm. Code § 304.141(c) and 35 Ill. Adm. Code 106, Subpart K. Section 304.141(c) authorizes the Board to determine that specific thermal standards should apply to a particular discharger in lieu of those imposed by the Board's generally applicable rules. Specifically, Section 304.141(c) provides as follows:

The standards of this Chapter shall apply to thermal discharges unless, after public notice and an opportunity for public hearing, in accordance with section 316 of the CWA, applicable federal regulations, and procedures in 35 Ill. Adm. Code 106, Subpart K, the Board has determined that different standards shall apply to a particular thermal discharge.

Part 106, Subpart K sets forth the procedures for obtaining alternative thermal effluent limitations under Section 316(a) from the Board. Subpart K was recently adopted by the Board in part in response to requests by Exelon that the Board conduct proceedings to consider a demonstration prepared by Exelon pursuant to Section 316(a) (the "316(a) Demonstration").¹ The 316(a) Demonstration shows that certain thermal limits that apply to the Quad Cities Station are more stringent than necessary to assure the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife in the receiving waters of the Plant's discharge—Pool 14 of the Mississippi

¹ The 316(a) Demonstration is attached hereto as Exhibit 1.

River. The 316(a) Demonstration also shows that the alternative thermal limits proposed by Exelon for the Quad Cities Station assure the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife in Pool 14. Exelon is submitting its 316(a) Demonstration and petitioning for alternative thermal effluent limits for Quad Cities Station in accordance to the new Subpart K rules.

In addition to addressing the Section 316(a) criteria, this petition also explains how Exelon has fully considered and planned for impacts to endangered species which possibly could result from the proposed alternate thermal limits. In coordination with the United States Fish and Wildlife Service (“USFWS”), Exelon prepared a Habitat Conservation Plan (“HCP”) to address endangered species concerns. As explained herein, USFWS approved the HCP and issued an Incidental Take Permit to cover possible (though not anticipated) impacts to individual animals.

This petition first summarizes the legal standards applicable to the issuance of alternative thermal limits under Section 316(a). The petition then presents the information required by Part 106, Subpart K of the Board’s rules for requests for alternative thermal limits under Section 316(a) and 35 Ill. Adm. Code § 304.141(c).

II. LEGAL STANDARDS APPLICABLE TO 316(A) RELIEF

Congress determined that discharges of heat should be treated differently than discharges of other pollutants. Therefore, with respect to thermal discharges, Section 316(a) of the Clean Water Act establishes a flexible, case-by-case alternative to the uniform application of standards based on either a prescribed technology or water quality

criteria.² Since its enactment, USEPA has consistently interpreted Section 316(a) to mean that a discharger will be granted relief from otherwise applicable federal or state limits on its thermal discharge if the discharger provides “reasonable assurance” that would satisfy a “reasonable person” that a proposed alternative thermal limit will be consistent with the protection and propagation of a balanced indigenous community (“BIC”)³ of biota in or on the receiving waterbody.

A. Petitioner’s Burden of Proof

Thus, to obtain relief under Section 316(a), Exelon must demonstrate that Quad Cities Station’s operation under Exelon’s proposed alternative limits will be protective of the BIC. Numerous USEPA documents make clear that the Section 316(a) standard does not require proof to a mathematical certainty that the BIC will be protected.⁴ Instead, the standard is one of “reasonable assurance” of a “reasonable person” based on the best information “reasonably obtainable.” The mere fact that there may be unanswered questions in the scientific record does not mean the discharger’s demonstration is unsuccessful.⁵

² See A Legislative History of the Water Pollution Control Act Amendments of 1972, *reprinted by* Congressional Research Service (“Legislative History”) at 263 (1973) (Statement of Rep. Clausen); *id.* at p. 227 (Statement of Rep. Harsha) (Section 316 is “[i]ntended to provide modifications of effluent limitations or standards of performance under these other Sections [301, 302 and 306] because heat should be treated in a different manner than other pollutants”).

³ The statute uses the term “population”; the EPA regulations use the term “community.” See 40 C.F.R. § 125.71. Recognizing that the biological term “community” consists of populations, EPA uses the terms “population” and “community” interchangeably.

⁴ EPA, Draft 316(a) Technical Guidance, September 30, 1974 (“1974 Draft 316(a) Technical Guidance”), at 8 (“Mathematical certainty regarding a dynamic biological situation is not obtainable.”); EPA, Draft Advanced NPDES Permit Writer’s Course, #1, Power Plant Permitting, Instructor Manual (“1995 Permit Writer’s Instruction Manual”), at IV-5 (“EPA recognizes some speculation may be necessary due to the uncertainties in the field of predictive aquatic biology.”); Information Document on Section 316 of the Clean Water Act, October 26, 1999 (“Region I Draft Guidance”).

⁵ 1974 Draft 316(a) Technical Guidance at 8. *In the Matter of Public Service Co. of New Hampshire, Seabrook Station* (“*Seabrook I*”) (NPDES Permit No. NH0020338), 1 E.A.D. 332, 346-47 (June 10, 1977) (lack of information about the thermal tolerance of certain life stages of RIS not determinative); *Pilgrim (Boston Edison), EPA Region I* (Determination re: Issuance of Proposed NPDES Permit No. MA025135) (“*Pilgrim*”), at p. 15 (March 11, 1977) (inability to define with precision the size and distribution of affected populations does not preclude issuance of variance).

Exelon's burden is to provide "enough specificity" regarding the likely effects of its proposed thermal discharge "to permit qualified experts to draw conclusions upon which regulatory judgment may appropriately be based." Seabrook II.⁶ Where a discharger "has presented all relevant and reasonably obtainable data, accounted for any significant deficiencies, utilized available prospective methodologies effectively, and provided a reasonable basis for evaluating biological impacts," that burden is satisfied. *Pilgrim*.⁷

B. Prospective and retrospective aspects of the 316(a) Demonstration

In addition to showing that proposed alternative limits are protective of the BIC, the regulations implementing Section 316(a) allow an existing discharger to support alternative thermal limits based on the absence of prior appreciable harm related to historical thermal discharges. Specifically, such a demonstration must show:

- (i) That no appreciable harm has resulted from the normal component of the discharge, taking into account the interaction of such thermal component with other pollutants and the additive effect of other thermal sources to [the BIC]; or
- (ii) That despite the occurrence of such previous harm, the desired alternative effluent limitation (or appropriate modifications therefore) will nevertheless assure the protection and propagation of a [BIC].

35 Ill. Adm. Code § 106.1160(d); 40 C.F.R. § 125.73(c)(1).

Because Exelon's proposed alternative limits are only incrementally different from the limits that have applied to the Quad Cities Station since December 1983, and because past thermal discharges from the Plant (authorized pursuant to grants of

⁶ *In the Matter of Public Service Co. of New Hampshire, Seabrook Station Units 1 and 2 ("Seabrook II")* (NPDES Permit No. NH0020338) (Decision of Administrator on Remand), 1 E.A.D. 455, 485-86 (Aug. 4, 1978).

⁷ *(Boston Edison), EPA Region I* (Determination re: Issuance of Proposed NPDES Permit No. MA025135) ("*Pilgrim*") at p. 16 (March 11, 1977).

temporary emergency relief) are similar to those that would be allowed under the proposed alternative limits, the 316(a) Demonstration conducted for Quad Cities Station examined whether historical operations have caused any appreciable harm to the BIC, in addition to prospectively examining the predicted future effects of the Quad Cities Station's thermal discharge under the proposed alternate thermal limits.

C. Nature of 316(a) Relief

If the discharger meets its burden under Section 316(a), the discharger is entitled to effluent limits for its thermal discharges that are consistent with Section 316(a). Long-standing USEPA precedent holds that relief under Section 316(a) must be granted if the requisite showing has been made. This interpretation was first adopted in 1973, shortly after Section 316(a) was enacted, in an opinion of USEPA's General Counsel, Robert Zener.⁸ The Zener Memo recognized that Congress enacted Section 316(a) precisely to ensure that thermal discharges would not be subject to effluent limitations more stringent than necessary to protect the relevant aquatic populations:

There is nothing in the legislative history of section 316(a) to indicate that, once an applicant has made a demonstration sufficiently convincing to satisfy a reasonable person that a proposed thermal effluent limitation is inordinately stringent to assure the protection of the relevant aquatic population, the Administrator or the State may nevertheless insist on that level of control. For example, Rep. Wright stated during the House debates on the Conference Committee Report: 'Section 316(a) modifies the requirements of both sections 301 and 306 as they pertain to the thermal components of discharges from point sources, and authorizes the imposition of less stringent effluent limitations than would otherwise be imposed. Those limitations will apply whenever the owner or operator can satisfy the appropriate certifying or permitting agency that they will assure the protection and propagation of a balanced indigenous population.' Zener Memo, at p. 3 (emphasis in original). In order to give effect to Congress' intent, it is necessarily the case that, "if the

⁸ See Memorandum from Deputy General Counsel Robert V. Zener to the Deputy Assistant Administrator for Water Planning and Standards ("Zener Memo"), EPA, Dec. 28, 1973.

applicant [has] presented substantial evidence that the [otherwise applicable] limitations are excessively stringent and this evidence has not been rebutted” the grant of a variance becomes a “mandatory duty.”

Zener Memo at pp. 2-3.

The interpretation adopted in the Zener Memo was reaffirmed by USEPA in 1995,⁹ and consistently applied in practice. For example, USEPA’s Technical Guidance Manual¹⁰ states that if the applicant’s rationale is convincing, and not “convincingly negated by outside evidence, the applicant’s 316(a) demonstration is successful.”

By its express terms, Section 316(a) establishes that a successful applicant is entitled to relief from “any effluent limitation” that is more stringent than necessary. The statute makes no distinction between technology—or water quality-based limitations. Nor does the statute distinguish between limitations proposed by USEPA or a state. (Zener Memo at p. 2.) The superseding effect of relief provided by Section 316(a) is also dictated by Section 303(g) of the Clean Water Act, which specifically requires that “[w]ater quality standards relating to heat shall be consistent with the requirements of Section 316” (emphasis supplied.) As recently as 1997, USEPA confirmed that “316(a) applies to both technology-based thermal effluent limitations and to water quality-based effluent limitations under § 303.”¹¹

As discussed below, the 316(a) Demonstration provides ample evidence that generally applicable thermal limits for the Quad Cities Station discharge are more

⁹ See, NPDES Permit Writer’s Instruction Manual at p. IV-3-5 (1995); EPA, Review of Water Quality Standards, Permit Limitations and Variances for Thermal Discharges at Power Plants (“1992 Thermal Permitting Review”), p. 14 (October 1992).

¹⁰ EPA Interagency 316(a) Technical Guidance Manual and Guide for Thermal Effects Sections of Nuclear Facilities Environmental Impact Statements 17 (1977).

¹¹ May 20, 1997 Letter of Chief of EPA Surface Water Permits and Facilities Branch Douglas F. Mundrick to James Coles, Alabama Department of Environmental Management (“Mundrick Letter”); see also Zener Memo at pp. 7-8.

stringent than necessary to protect the BIC and should be superseded by the alternative thermal limitations proposed herein.

III. PETITION

Pursuant to 35 Ill. Adm. Code § 106.1130 (a) – (c), Exelon submits the following information regarding Quad Cities Station and the 316(a) Demonstration.

A. General Plant Description

1. Generating Capacity and Type of Fuel Used

Quad Cities Station is a dual unit nuclear-fueled steam electric generating plant, designed to operate 24 hours a day, seven days a week. Both the Unit-1 and Unit-2 nuclear reactors are boiling water reactors. Each unit's maximum power level is 2,957 megawatts thermal ("MWt"), resulting in a combined output of 5,914 MWt for the plant.

2. Operating Characteristics of the Condenser Cooling System

Circulating water used to cool and condense steam from the Quad Cities Station electrical generating process is withdrawn from, and discharged to, the Mississippi River. The Plant operates a condenser cooling water system in open cycle mode. In this mode, cooling water is drawn from the Mississippi River into an intake canal, passes through the plant systems, and is discharged via a diffuser piping system into the Mississippi River. The Cooling Water Intake Structure (CWIS) is divided into six individual bays (three per unit). Each intake bay has one circulating water pump, rated at 157,000 gpm, and five of the six intake bays have one service water pump, each rated at 13,800 gpm. The Plant's maximum design cooling water flow is 2253 cfs or 1,011,000 gallons per minute ("gpm"). The cooling water system operates at or near design flow except during

refueling and maintenance outages and during the winter period, when one circulating water pump per unit is turned off.

3. History of the Load Factor for the Past 5 Years

The load factor for Quad Cities Station for the past 5 years was as follows:

- 2009: 94.7%
- 2010: 94.2%
- 2011: 94.3%
- 2012: 94.4%
- 2013: 94.9%

4. Projected Load Factor for the Next 5 Years

The load factor for Quad Cities Station projected for the next 5 years is as follows:

- 2014: 94%
- 2015: 95%
- 2016: 95%
- 2017: 95%
- 2018: 95%

5. Estimated Retirement Dates for Quad Cities Station

The NRC licenses for both Quad Cities Station units expire in December 2032.

There are no plans to add any additional units at the site.

6. History of Plant Shutdowns for the Past 5 Years – Planned and Emergency

The planned and emergency shutdowns of Quad Cities Station, Units 1 and 2, for the past 5 years were as follows:

- 2009:
 - Unit-1 - 4/27/09 - 5/24/09 (27 days) – Planned
 - Unit 1 - 5/25/09 - 5/26/09 (1 day) – Emergency
 - Unit-1 - 5/26/09 – 5/30/09 (4 days) – Planned
 - Unit -1 - 9/9/09 - 9/12/09 (3 days) – Emergency
- 2010:
 - Unit 2 - 3/15/10 - 4/14/10 (31 days) – Planned
 - Unit 2 - 4/14/10 - 4/18/10 (4 days) – Emergency
 - Unit 1 - 8/12/10 - 8/14/10 (3 days) – Emergency
 - Unit 2 - 8/17/10 – 8/20/10 (3 days) – Emergency
- 2011:
 - Unit 1 - 5/8/11 – 6/9/11 (32 days) – Planned
 - Unit 1 - 6/9/11 – 6/10/11 (1 day) – Emergency
 - Unit 1 - 6/11/11 – 6/12/11 (1 day) – Emergency
 - Unit 1 - 6/13/11 – 6/15/11 (2 days) – Emergency
 - Unit 2 - 12/10/11 – 12/11/11 (1 day) – Planned
- 2012:
 - Unit 2 - 3/19/12 – 4/18/12 (30 days) – Planned
 - Unit 2 - 4/18/12 – 4/20/12 (2 days) – Planned
- 2013:

- Unit 2 - 1/26/13 – 1/28/13 (2 days) – Planned
- Unit 1 - 3/11/13 – 4/8/13 (28 days) – Planned

7. Planned and Projected Shutdowns for the Next 5 Years

The planned and projected shutdowns for Quad Cities Station, Units 1 and 2, for the next 5 years are as follow:

- 2014:
 - Unit 2 - Refuel Outage¹²
- 2015:
 - Unit 1 - Refuel Outage
- 2016:
 - Unit 2 - Refuel Outage
- 2017:
 - Unit 1 - Refuel Outage
- 2018:
 - Unit 2 - Refuel Outage

B. Description of Method for Heat Dissipation

1. Type of Cooling System

Quad Cities Station utilizes once through cooling supplemented by a diffuser piping system. Cooling water is withdrawn from the intake canal which is fed by the Mississippi River, passes through the Plant's steam condensers and is discharged to the discharge bay. The discharge bay is immediately south of the intake canal. The intake canal and the discharge bay are separated by a concrete retaining wall. The discharge bay

¹² Refueling outages typically last 15 to 20 days.

is approximately 700 feet long by 150 feet wide. The effluent from the discharge bay is then distributed across the Mississippi River through a diffuser pipe system. The diffuser pipe system consists of two 16-foot diameter pipes buried in the river bed; the north pipe extends approximately 2,100 feet across the river, while the south pipe terminates about 390 feet before the end of the north pipe. Each diffuser pipe is fitted with 20 discharge risers of 36-inch diameter spaced at 19 feet 8 inches in the deep portion of the river, and 14 discharge risers (9 of which presently are closed) of 24-inch diameter spaced at 78 feet 8 inches in the shallow zone of the river. The diffuser pipe system is designed to achieve complete mixing of the condenser water with the river flow within a short distance downstream of the diffuser pipe.

2. Summary Information on Temperature of Discharge

With both Station units operating at full power, the discharge temperature differential from ambient inlet river temperature ranges from 28° F during summer months, when each unit operates with three circulating water pumps, to 48° F during winter months, when each unit has two circulating water pumps operating. Heated condenser cooling water is discharged into the Mississippi River by means of a diffuser pipe system which was designed to distribute the condenser cooling water across the river approximately in proportion to the transverse distribution of the ambient river discharge to achieve complete mixing within a short distance downstream of the diffuser pipes. No heated water is discharged to the shallow portions of the river because the lower velocity of the shallow portion of the river does not provide effective dilution. Blind flanges close off the first nine 24-inch risers from the Illinois side of the river. The operational

diffusers begin approximately 840 feet from the Illinois shore and proportionately distribute the discharge 1,200 feet across the deeper portion of the river.

C. Summary of Thermal Compliance History

The following is a history of Quad Cities Station's use of excursion hours over the past 5 years.¹³ To the extent the Plant used more than its 12-month allocation of excursion hours, that use was authorized pursuant to provisional variances issued by Illinois EPA.

- 2009:
 - 5 excursion hours used in June
- 2010:
 - 36 excursion hours used in May
- 2011:
 - 33 excursion hours used in July
- 2012:
 - 223.5 excursion hours used in March and 219 excursion hours used in July
- 2013:
 - Zero excursion hours used

D. Plan of Study for 316(a) Demonstration

Beginning in the early 1970s and continuing through the present day, the Plant has worked closely with a Technical Advisory Committee ("TAC"), comprised of interested regulatory agencies and other interested parties, on matters related to the

¹³ "Excursion hours" are defined infra at fn. 16.

Plant's NPDES permit.¹⁴ The TAC meets annually to consider water-related environmental issues concerning Quad Cities Station, and reviews the results of environmental data collection efforts conducted during the prior year.

In 2003, Illinois EPA requested that Exelon investigate measures to reduce the need for provisional variances related to thermal discharges for Quad Cities Station. In response, Exelon developed plans to conduct studies aimed at determining whether existing thermal limits could be relaxed without causing unacceptable environmental impacts. These plans were presented in TAC meetings and to Illinois EPA and Illinois DNR to obtain their input. The related studies commenced in 2003.

As the studies progressed, USEPA was informed by Illinois EPA that Exelon planned to seek thermal relief for Quad Cities Station based on the results of the studies. USEPA responded that if Exelon's plan was to obtain alternative thermal limitations under Section 316(a), USEPA believed additional data needed to be collected and studied to satisfy the requirements of Section 316(a).

In response, Exelon submitted to USEPA and other interested agencies, including Illinois EPA, its detailed plans for additional studies to support its 316(a) Demonstration, and thereby satisfied the substantive requirements of 35 Ill. Adm. Code 106.1120(b).¹⁵ Illinois EPA later informed Exelon that Exelon had satisfied the substantive requirements of 35 Ill. Adm. Code 106.1120(f).¹⁶

¹⁴ Among the members of the TAC are Exelon, USEPA Region V, Illinois EPA, US Army Corps of Engineers, USFWS, Illinois DNR, and Iowa DNR.

¹⁵ See April 19, 2007 Letter from A. Bielawski to R. Thompson, attached hereto as Exhibit 2.

¹⁶ See March 11, 2014 Letter from Illinois EPA to Quad Cities Station, attached hereto as Exhibit 3.

E. 316(a) Study Results

3. Background on the Proposed Thermal Standards

The discharge of heated water from Quad Cities Station to the Mississippi River is subject to limits imposed by the Board's regulations. Specifically, 35 Ill. Adm. Code § 303.331 sets forth the maximum monthly temperature standards for the reach of the Mississippi River into which the Plant discharges.¹⁷ Section 303.331 provides that the monthly temperature standards may be exceeded by up to 3° F (1.7° C), for 1% of the hours in any 12 month period.¹⁸ In addition, 35 Ill. Adm. Code § 302.211(d) imposes a separate limit, requiring that a discharger not cause temperatures in the receiving stream to increase by more than 5° F above natural temperatures.

The Plant is authorized to discharge effluent to the Mississippi River pursuant to NPDES Permit IL0005037 (the "Permit"), issued by the Illinois EPA. The Permit provides that the Plant must comply with the applicable limitations of Sections 303.331 and 302.211, measured at the edge of a mixing zone. Pursuant to the Permit, the mixing zone for the Plant's discharge is measured from the Plant's diffuser pipes to a straight line 500 feet down river from the diffuser pipes. 35 Ill. Adm. Code § 302.102(b)(6) requires that a mixing zone must allow for an adequate zone of passage for aquatic life, and Section 302.102(b)(8) specifies that the zone of passage must contain at least 75% of the cross-sectional area or volume of flow of the receiving stream.

¹⁷ The monthly limits are: January -- 45° F; February -- 45° F; March -- 57° F; April -- 68° F; May -- 78° F; June -- 85° F; July -- 86° F; August -- 86° F; September -- 85° F; October -- 75° F; November -- 65° F; and December -- 52° F.

¹⁸ One percent of the hours in a year equates to 87.6 hours. When temperatures in the River are within the 3°F above the monthly limit zone (referred to as the "excursion zone"), the Plant tracks the number of hours its operations contribute to temperatures being in the excursion zone (referred to as "excursion hours") and is required to reduce or cease operations to assure that the number of excursion hours remain within the 1% per 12 month permit limit.

Under certain ambient temperature and river flow conditions Quad Cities Station is unable to comply with the above-referenced limitations. During summer months, as ambient river temperatures rise, river flow rates decrease, and the demand for electricity peaks, the Plant consumes excursion hours to continue to operate. During warmer and drier summers, the Plant frequently depletes its 1% allotment of excursion hours before the end of the summer season. When the allowable excursion hour allotment is depleted the Plant is required to derate, shutdown or seek emergency regulatory relief to allow continued operation.

In addition, if a significant number of excursion hours were consumed during the late summer (August and September) of the prior year, the Plant is unable to regain those hours until the corresponding months of the current year, due to the rolling 12-month method that the regulations require for tracking excursion hours. Thus, in some years, the Plant will not have even the full 1% allotment of excursion hours available to cover the summer season.

Finally, when the Mississippi River flows fall below 16,400 cubic feet per second (“cfs”), and the Quad Cities Station is operating at full capacity, modeling of the Plant’s thermal plume indicates that the mixing zone may occupy more than 25% of the River flow. As a result, under such flow conditions, there is less than 75% of the River flow available for a Zone of Passage.

As mentioned above, the only operational option for maintaining compliance with these generally applicable thermal requirements is to reduce the thermal discharge by reducing electrical generation output. Reducing power often may not be practical or

desirable, because the time of year excursion hours typically are consumed is the same time that the demands for power and electrical grid stability concerns require that the Plant operate at or near maximum capacity. Moreover, during periods that the ambient (i.e., upstream) temperature of the River exceeds the monthly maximum limit, the only option available is to shut the Plant down entirely when available excursion hours are depleted.

As discussed in the following sections of this petition, the studies conducted in connection with the 316(a) Demonstration show that the generally applicable thermal limits for Quad Cities Station are more stringent than necessary to assure the protection and propagation of a balanced, indigenous population of shellfish, fish and wildlife in the waters that receive the Quad Cities Station's discharge. These same studies also support the issuance of the following alternative thermal limits for Quad Cities Station in lieu of the generally applicable requirements:

- (i) The monthly temperature standards set forth in 35 Ill. Adm. Code § 303.331 shall apply to discharges from the Quad Cities Nuclear Station, provided that Quad Cities Nuclear Station may exceed such standards by 3° F for no more than 219 hours (2.5%) per calendar year, except that during July, August and September the temperature standards may be exceeded by up to 5° F for no more than 131.4 hours of the 219 hour annual allotment.
- (ii) The mixing zone for the Quad Cities Nuclear Station shall allow for a zone of passage that includes at least 66% of the cross sectional area and volume of flow of the Mississippi River.

4. The 316(a) Demonstration

The 316(a) Demonstration includes: (1) a detailed description of the characteristics of the receiving waters for Quad Cities Station's thermal discharge—Pool

14 of the Mississippi River—including hydrology, geology, water quality, biology and anthropogenic influences (316(a) Demonstration, Appendix A); (2) a prospective (predictive) analysis of the effects on the BIC of thermal discharges from the plant under the alternate limits proposed by Exelon (316(a) Demonstration, Appendix B); (3) a retrospective evaluation on the BIC of historical thermal discharges from the Quad Cities Station (316(a) Demonstration, Appendix C); (4) a detailed description of Quad Cities Station and its operations (316(a) Demonstration, Appendix D); and (5) Quad Cities Station's Data Collection Programs (316(a) Demonstration, Appendix E).

As summarized below, and as set forth in greater detail in the studies and supporting materials presented in the 316(a) Demonstration, Quad Cities Station's historical operations have not resulted in appreciable harm to the BIC of Pool 14, and operations under the alternate thermal limits proposed by Exelon in this Petition will assure the protection and propagation of the BIC, going forward.

a. Prospective Analysis (316(a) Demonstration, Appendix B)

A prospective assessment of potential effects on the fish community of Pool 14 resulting from the Quad Cities Station discharges under the proposed alternative thermal limits that would allow 262.8 excursion hours (3%) of which 1.5% (131.4) of those hours may be at temperatures between 89° F and 91° F was conducted for Exelon by HDR.¹⁹ As explained in Appendix B of the 316(a) Demonstration, HDR's prospective analysis is based on its evaluation of thermal conditions that will result from Quad Cities Station's operations under Exelon's proposed alternate limits on a set of Representative Important

¹⁹ Exelon originally contemplated a request for an alternate thermal standard that would allow 262.8 excursion hours (3%) and HDR performed the prospective analyses on that basis. Exelon has now reduced the proposed number of excursion hours to 219 (2.5%). The modeling analysis, data interpretation and conclusions presented here and in the 316(a) Demonstration for the 3% case provide a very conservative measure of the effects of the proposed 2.5% limit.

Species (“RIS”) of fish that are part of the indigenous community of fish present in Pool 14. (316(a) Demonstration, Appendix B, Sec. 1.3.) The RIS of fish selected for the prospective assessment were largemouth bass, channel catfish, spotfin shiner, and walleye. (316(a) Demonstration, Appendix B, Sec. 1.3.1.) River and plant operating conditions evaluated by HDR were selected to provide a conservative assessment of potential plant-related effects on fish growth, avoidance behavior and mortality. (316(a) Demonstration, Appendix B, Sec. 1.3.2.)

The results of the prospective assessment indicate that Exelon’s proposed alternate thermal limits will have a negligible impact on largemouth bass, channel catfish, and spotfin shiner. (316(a) Demonstration, Appendix B, Sec. 4.) The assessment indicates that chronic mortality for walleye could be increased by as much 8.5% immediately downstream of the mixing zone, if one assumes (unrealistically) no avoidance behavior by the fish. Of course, HDR recognizes that it is a “very rare” event for fish not to avoid elevated temperatures by leaving the area at issue. However, even assuming the worst case (i.e. no avoidance behavior), this 8.5% impact translates to less than 1% of the overall walleye population in Pool 14.²⁰ On the basis of this assessment, HDR concluded that Plant operations under Exelon’s proposed alternative thermal limits will not impair the successful completion of life cycles of indigenous species of fish in Pool 14, thus assuring the protection and propagation of a balanced, indigenous community of fish.

²⁰ These results were obtained when 262.8 excursion hours were assumed in the prospective analysis. The effects would be even less under the 219 excursion hours now being requested by Exelon.

b. Retrospective Analysis (316(a) Demonstration, Appendix C)

Pursuant to 35 Ill. Adm. Code 106.1160, an existing discharger, such as Quad Cities Station, may base its 316(a) demonstration on the absence of prior appreciable harm. Such a demonstration must show “[t]hat no appreciable harm has resulted from the normal component of the discharge, taking into account the interaction of such thermal component with other pollutants and the additive effect of other thermal sources” to a BIC. 35 Ill. Adm. Code § 106.1160(d).

Quad Cities Station became operational in 1973 and has been operating in its present mode since 1984. As detailed in Appendix A and Appendix E to the 316(a) Demonstration, biological life in the Quad Cities Station receiving waters has been the subject of extensive and continuing sampling, monitoring and analysis during much of the plant’s operating life. As a result, there is a vast amount of data and information available from which to assess the impacts of Quad Cities Station’s operations on the BIC of Pool 14 of the Mississippi River, and to determine whether the Plant’s operations have caused any appreciable harm to the BIC. As summarized below, HDR found no evidence of appreciable harm to any trophic level communities in the Quad Cities Station receiving waters attributable to the Plant’s thermal discharge.

i. Phytoplankton and Zooplankton

In Appendix C to the 316(a) Demonstration, HDR explains that although it evaluated the lower trophic level communities of Pool 14 (phytoplankton and zooplankton), its investigation of these communities did not require the extent of sampling data that HDR reviewed in connection with its investigation of higher trophic level communities (freshwater mussels and fish), principally because the detailed

assessment of the mussel and fish communities would reveal whether the lower trophic level communities (which serve as a source of food for the fish populations) were suffering adverse effects as a result of Quad Cities Station's operations. As discussed below, both the mussel and fish communities are healthy and balanced indigenous communities, which demonstrates that an adequate food supply (of plankton) has been available. Accordingly, HDR concludes that operation of the Plant has not caused appreciable harm to the lower trophic level communities in Pool 14. (316(a) Demonstration, Appendix C, Sec. 2.4.3.)

ii. Freshwater Mussels

In 2007, Heidi Dunn, a preeminent freshwater unionid mussel expert, conducted a study designed to define the balanced indigenous unionid mussel community in Pool 14. As part of the study, extensive sampling was conducted to identify unionid beds upstream and downstream of the Quad Cities Station thermal diffuser. In all, 15 beds were sampled, with a particular focus on the downstream bed most proximate to the Quad Cities Station diffuser (the Steamboat Slough Bed), an upstream bed generally representative of mussel beds in Pool 14, and the Cordova Bed, which is located about a mile downstream of the diffuser and which is listed as an Essential Habitat Area for the federally endangered *Lampsilis higginsii* by the US Fish and Wildlife Service ("USFWS"). (316(a) Demonstration, Appendix C, Sec. 2.6.2.)

As described in Appendix C (Sec. 2.6.2) and Appendix E (Sec. 6.1) of the 316(a) Demonstration, unionid beds were found throughout the study area in a variety of habitats, both upstream and downstream of the Plant diffuser. The study found that mussel density in the Steamboat Slough Bed is similar to beds both upstream and further

downstream of the diffuser which have similar habitat characteristics, and that unionid and fish communities in the Steamboat Slough Bed reflect their habitat conditions, as similar communities were found in similar habitats both upstream and downstream of the diffuser.

Based on the study, Ms. Dunn and HDR conclude that if the Quad Cities Station had not operated, the unionid community in the Steamboat Slough Bed likely would be similar to the community that presently exists in the Bed. Likewise, the community characteristics of the other unionid beds located downstream of the plant are very similar to those observed in upstream beds that have comparable habitats. For these reasons, HDR and Ms. Dunn conclude Quad Cities Station's past operations have not harmed the unionid community in Pool 14.

In addition, HDR and Ms. Dunn conclude that the unionid community in the area of the Plant's discharge, and in Pool 14 generally, is healthy, balanced, and composed of the indigenous species of unionids one would expect to find at this location.

iii. Fish

As previously mentioned, there is an extensive database of fish in Pool 14, as a result of fish sampling and monitoring conducted over the past four decades. HDR's analysis of that database shows the following trends in Pool 14: (1) increases in numbers of freshwater drum, channel catfish, largemouth bass, and bluegill; (2) decreases in the numbers of white crappie, black crappie, and sauger; and (3) flathead catfish abundance has been relatively stable²¹. (316(a) Demonstration, Appendix C, Sec 2.7.3.) These

²¹ Trends in walleye are not monitored in this program because this species is stocked annually in Pool 14.

long-term abundance trends are apparent at locations both upstream and downstream of the diffuser pipes, indicating they are not related to Quad Cities Station operations. In addition, HDR found that neither nuisance nor heat tolerant species are dominant in Pool 14. On the basis of these findings, HDR concludes that the Plant's operations have not caused appreciable harm to the fish community in Pool 14. (316(a) Demonstration, Appendix C, Sec. 3.)

Importantly, the conclusion that past operations have not caused appreciable harm to the BIC of Pool 14 relates not only to historical operations under the Board's generally applicable regulations, but also to operations similar to those that would be authorized by Exelon's proposed limits. As previously mentioned, at various times since the plant began operating, and particularly in recent years, in response to periods of elevated (weather-related) ambient River temperatures and low River flow conditions, Quad Cities Station has operated in a manner that has caused the Plant to exceed the 87.6 hours/year excursion hour limit and the 3° F excursion zone temperature cap set by the Board's generally applicable regulations. For example, during the Summer 2006, the Plant used about 223 excursion hours and exceeded the monthly maximum temperature standard by up to 5° F during a portion of the excursion hour period. In addition, on occasion the Mississippi River flow has been less than 16,400 cfs, when the plant was operating at or near full capacity, which, according to modeling studies would have caused the Zone of Passage related to the Quad Cities mixing zone to be less than 75% of the Mississippi River flow.

Thus, the biological communities in the receiving waters for the Plant's discharges have been exposed to thermal conditions very similar to conditions that would

result from the alternate limits proposed by Exelon in this Petition.²² HDR (and other experts with whom HDR consulted) were able to review *actual* sampling data obtained during these periods and following these periods of increased excursion hour events, elevated temperatures above the 3° F cap, and decreased zone of passage conditions and assessed the effects on the biological communities resulting from these thermal conditions. The fact that HDR's retrospective assessment concludes that the abundance trends of indigenous species at sampling station within Pool 14 provide no evidence of an effect of the thermal discharge over the life of the Plant's operations shows not only that past operations have not caused appreciable harm, but also that the limits proposed in this Petition will not be a threat to the BIC of Pool 14 in the future.

iv. Interaction with Other Pollutants

Finally, HDR assessed the potential for interaction of the Quad Cities Station thermal plume with other pollutants, including other thermal inputs. (316(a) Demonstration Summary, Section 3.3.2.) HDR found that there is no evidence of harmful interactions between the Plant's thermal discharge and other pollutants including dissolved organic carbon, total phosphorus, total nitrogen, biocides, heavy metals, and other thermal discharges located upstream, and there is no reason to expect that the small amount of additional heat that would be permitted to be discharged under the proposed alternative limits would cause such effects.

²² In fact, as explained in the 316(a) Demonstration Report, Exelon limited its request for increased excursion hours to reflect the Plant's past operating history.

c. Protection of Threatened and Endangered Species

In addition to demonstrating that historical operations have not harmed the BIC and that the proposed alternative limits will protect the BIC, the 316(a) Demonstration addresses whether operations under the alternative limits could affect endangered species. There is one federally endangered species of mussel, the Higgins' Eye pearly mussel, in Pool 14. The Higgins' Eye mussel is found in several beds in Pool 14, including, the Cordova Bed, which is located about 1 mile downstream of the Plant. As previously mentioned, the Cordova Bed has been designated an Essential Habitat for the Higgins' Eye mussel.

In response to concerns regarding possible impacts to the Cordova Bed as a result of Station operations under Exelon's proposed alternate limits, Exelon consulted with USFWS, beginning in 2008. With USFWS's guidance, Exelon prepared a Habitat Conservation Plan ("HCP"). The HCP was approved by USFWS and the Incidental Take Permit covering possible impacts associated with the alternate limits was issued by USFWS in August 2010²³. The Incidental Take Permit authorizes possible impacts to individual mussels that might occur as a result of Exelon's proposed alternate thermal limits (the nature of which, is not expected to be acute, but rather, at most, would be non-lethal, temporary stress), provided the Plant complies with and implements the HCP. In addition to requiring implementation of a thorough and comprehensive mussel sampling and monitoring program, the HCP provides for innovative measures designed to propagate the endangered mussels. Thus, through the HCP/Incidental Take Permit process, the Plant has satisfied the requirements of the Endangered Species Act.

²³ The Habitat Conservation Plan and the Incidental Take Permit are attached hereto as Exhibit 4 and Exhibit 5, respectively.

F. Calendar Year Tracking

In addition to requesting alternative limits that would increase the number of available excursion hours and the maximum temperature cap during excursion hour events and decrease the Zone of Passage for the Plant's mixing zone, Exelon also is seeking to modify the method by which excursion hours are tracked. 35 Ill. Adm. Code § 303.331 limits the number of excursion hours to "1% of the hours in the twelve month period ending with any month." The rolling 12-month method is intended to protect against the possibility (inherent in the calendar year method) that periods during which relaxed limits are allowed will occur back-to-back during the months of December and the ensuing January. The concern underlying the calendar year method is that using a calendar year to track excursion hours could increase the length of time biota would be exposed to excursion hour temperatures beyond the allowed annual allotment, if substantial periods of excursion hour operations were conducted in December and the following January.

As explained in the 316(a) Demonstration, the theoretical concern with tracking excursion hours by calendar year does not apply in the case of Quad Cities Station's operations. (316(a) Demonstration, Summary, Sec.1.2.3.) Excursion hours have been used by the Plant only in the March-September timeframe. It is unlikely that circumstances will arise that would require that the Plant use *any* excursion hours in December or January, and it is almost certain that there will not be any extended periods of excursion hour operations during these months. Thus, there is no potential that the harm that the rolling 12-month method is intended to protect against will occur as a result of the Plant's operations.

The requirement that excursion hours be tracked using the rolling 12-month method unnecessarily limits the Plant's ability to operate, with no corresponding environmental benefits. If any excursion hours are used during the summer months of one year, the rolling 12-month method precludes the Plant from having the full allotment of excursion hours available during the subsequent summer season. Thus, for example, if in September of 2011, the Plant had used the entire 12 month allotment of excursion hours, the Plant would not have had any excursion hours available to deal with low flow or high ambient temperature circumstances in June, July or August of 2012. In this example, there would be no biological reason to prevent excursion hours from being used during the summer months before September 2012. Nevertheless, in order to comply with § 303.331, the Plant potentially would have been required to significantly curtail operations. As explained in the 316(a) Demonstration, there is no evidence that the biological community in Pool 14 would be harmed by allowing the Plant to track excursion hours by calendar year. (316(a) Demonstration, Summary, Sec.1.2.3.)

Using the 316(a) criteria, to the extent § 303.331 restricts the Plant from having a full 12 month allotment of excursion hours available for each summer, the restriction is more stringent than necessary to assure the protection of a balanced, indigenous population of shellfish, fish and wildlife. Exelon's proposed alternative calendar year method of tracking excursion hours is sufficient to provide such assurances.

G. Requested Relief

Exelon requests that the Board enter an order finding that the following generally applicable requirements governing thermal discharges from Quad Cities Station are more stringent than necessary to assure the protection and propagation of a balanced,

indigenous community of shellfish, fish and wildlife in the waters that receive the Plant's discharge:

- (i) The limitations of 35 Ill. Adm. Code §303.331 that limit discharges from the Plant from exceeding the monthly maximum temperature standards by (a) no more than 1% of the hours in the 12 month period ending with any month and (b) by no more than 3° F.
- (ii) The limitation of Section 35 Ill. Adm. Code § 302.102(b)(8) that requires that the zone of passage for the Quad Cities Station mixing zone must contain at least 75% of the cross-sectional area or volume of flow of the receiving stream.

In lieu of these generally applicable thermal requirements, Exelon requests that the Board approve the following alternate thermal limits for discharges from the Quad Cities Station:

- (i) The monthly temperature standards set forth in 35 Ill. Adm. Code § 303.331 shall apply to discharges from the Quad Cities Nuclear Station, provided that Quad Cities Nuclear Station may exceed such standards by 3° F for no more than 219 hours (2.5%) per calendar year, except that during July, August and September the temperature standards may be exceeded by up to 5° F for no more than 131.4 hours of the 219 hour annual allotment.
- (ii) The mixing zone for the Quad Cities Nuclear Station shall allow for a zone of passage that includes at least 66% of the cross sectional area and volume of flow of the Mississippi River.

WHEREFORE, for all the foregoing reasons Exelon respectfully requests that its Petition to Approve Alternative Thermal Limits be granted and that the Board provide Exelon the relief requested herein.

Respectfully submitted,

EXELON GENERATION LLC

Dated: April 2, 2014

By: Alan P. Bielawski /wsp
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BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

In the Matter Of:)	
)	
EXELON GENERATION LLC,)	
Petitioner,)	
)	
v.)	PCB NO. -
)	
ILLINOIS ENVIRONMENTAL)	
PROTECTION AGENCY,)	
Respondent.)	

CERTIFICATE OF SERVICE

I, the undersigned, certify that I have filed the attached Petition to Approve Alternative Thermal Effluent Limitations, Appearance of Alan Bielawski, Appearance of William Dickett and Appearance of Katharine Newman, with:


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Dated: April 2, 2014


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