Appendix E

Microbiological Correspondence

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Table of Contents

Letter Page

Michael P. Gallagher, Exelon Generation, to David W. Culp, Ph.D., Illinois Department of Public Health E-1

Ken McCann, MA, LEHP, Illinois Department of Public Health, to Michael P. Gallagher, Exelon Generation E-5

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January 23, 2013

David W. Culp, Ph.D , Deputy Director
Illinois Department of Public Health
Office of Health Protection
525 W. Jefferson St., 2nd Floor
Springfield, Illinois 62761-0001

SUBJECT: Exelon Generation, LLC – Braidwood Station Units 1 and 2 License Renewal Project. Request for information on Thermophilic Pathogens – Will County

Dear Dr. Culp:

In May 2013, Exelon Generation Company, LLC (Exelon Generation; a subsidiary of Exelon Corporation) plans to apply to the Nuclear Regulatory Commission (NRC) for renewal of the operating licenses for Braidwood Station (Braidwood), Units 1 and 2. Both Braidwood Units began commercial operation in 1988. The existing operating license for Braidwood Unit 1 expires October 17, 2026, and the existing operating license for Braidwood Unit 2 expires December 18, 2027. License renewal will extend the license terms to October 17, 2046 and December 18, 2047, respectively.

The NRC requires that the license renewal application include an environmental report assessing potential impacts from license renewal activities, including continued operations. One such impact is the "impact of the proposed action [license renewal] on public health from thermophilic organisms in the affected water" (10 CFR 51.53(c)(3)(ii)(G)). Accordingly, we are contacting you to obtain input regarding potential public health concerns associated with the enteric pathogens *Salmonella* spp and *Shigella* spp as well as *Pseudomonas aeruginosa* bacterium, thermophilic fungi, *Legionella* spp in unusually high concentrations, and the free-living amoeba of the genera *Naegleria* and *Acanthomoeba*. Of greatest concern is the genus *Naegleria*, comprising four species. To date only one species, *N. fowleri*, has been determined to be pathogenic in humans.

Project Features

Braidwood is located in north-eastern Illinois in southwest Will County, approximately 50 miles (mi) southwest of the Chicago metropolitan area, and 20 mi south-southwest of Joliet. The property is approximately 1 mi from the town of Godley, 2 mi from the town of Braidwood, and 6 mi from the town of Wilmington. The Kankakee River is approximately 5 mi east of the eastern site boundary.

The following paragraphs provide background information on the Braidwood cooling system, and Exelon Generation's assessment of potential effects on the public. We are requesting your help to identify issues regarding thermophilic organisms that we may have overlooked, but that should be addressed in the Braidwood license renewal environmental report. We are particularly interested in learning of any information your staff believes could expedite the NRC's review of the Braidwood license renewal application.

Cooling Pond

Braidwood Units 1 and 2 have circulating water systems for condenser cooling that withdraw water from an approximately 2,537-acre cooling pond through an intake structure (the lake screen house). Heated cooling water returns to the pond via a discharge canal that is separated from the lake screen house intake by a dike. Dikes are used throughout the cooling pond to slow circulation and increase residence time of cooling water between discharge and intake (and thus lower the water temperature at the intake). To protect plant components, the 24-hour-average water temperature in an excavated area located within the cooling pond directly in front of the lake screen house is limited by Braidwood Technical Specifications to temperatures not exceeding 100 °F.

The Braidwood cooling pond is open to the public for fishing from March 1st until ten days prior to the opening of waterfowl season, which typically occurs in late October. Cooling pond locations near the lake screen house and cooling water discharge structure are off-limits to boaters, as demarcated with buoys and signs. Swimming in the cooling pond is prohibited.

Braidwood water systems that discharge into the cooling pond are treated with biocides, including chlorine, to control bio-fouling. With the exception of these biocides, the water in the cooling pond contains the same chemical constituents as the makeup water pumped into the cooling pond from the Kankakee River to replace water lost to evaporation, seepage, and blowdown, but at higher concentrations because of evaporative water losses from the cooling pond.

Kankakee River

Blowdown water from the cooling pond is released to the Kankakee River through an NPDES-permitted (IL0048321) outfall (Outfall 001) for the purpose of reducing dissolved mineral concentrations in the cooling pond water via a pipeline that discharges through a submerged 7-port diffuser to mid-river. Blowdown flow rates range between 55.7 cubic feet per second (cfs) and 66.8 cfs, depending on water chemistry (concentrations of mineral solids) in the cooling pond. Based on the results of thermal modeling used to determine the best diffuser configuration, the 7-port diffuser results in a thermal plume consistent with Illinois EPA regulations at Illinois Administrative Code (IAC) Title 35, Section 301.102 (mixing zones) and Section 302.211 (water quality standards for temperature). The maximum surface area of the thermal mixing zone was estimated to be 35 meters wide and to extend 25 meters downstream of the diffuser, for a total area of about 0.22 acre. Under IAC Title 35, Section 302.102, "a [temperature] mixing zone must not contain more than 25 percent of the cross-sectional area or volume of flow of a stream." The Braidwood plume size in relation to the cross sectional area of the river varies seasonally but does not exceed 25 percent of the river cross section.

Special Condition 3 of NPDES permit IL0048321 for Braidwood and IAC Title 35, Section 302.211 limit the temperature increase in the river caused by the station (beyond the mixing zone) to 5°F above natural temperatures. In addition, allowable maximum water temperatures at representative locations in the main river are specified in Special Condition 3 of the NPDES permit. The allowable maximum water temperature in the Kankakee River (downstream of the blowdown diffuser) is 63°F during the December-March period and 93°F during the April-November period.

An Environmental Protection Plan is incorporated in the NRC operating licenses for Braidwood. The Environmental Protection Plan incorporates the NPDES permit by reference. The NPDES permit requires continuous monitoring of temperature and flow from Outfall 001 (the blowdown line) to the Kankakee River. Exelon Generation provides monthly monitoring reports to the Illinois EPA.

Braidwood sends its sanitary wastewater to the town of Braidwood's Sewage Treatment Plant, rather than discharging it to the Kankakee River. This reduces the potential of the Station's discharges to introduce pathogenic organisms into the river.

The stream segment (IL_F-16) of the Kankakee receiving the discharge from Braidwood Outfall 001 is identified in the December 2012 *Illinois Integrated Water Quality Report and Section 303(d) List* as fully supporting primary (and secondary) contact. These designations are based on fecal coliform measurements only. Primary contact is "any recreational or other water use in which there is prolonged and intimate contact with the water involving considerable risk of ingesting water in quantities sufficient to pose a significant health hazard such as swimming and water skiing" (IAC Title 35, Section 301.355).

Conclusions

No swimming is allowed in the cooling pond. The discharge area of the cooling pond is off limits to boaters. Discharges to the cooling pond from plant water systems are treated with biocides. For these reasons, Exelon Generation concludes that risk to public health from exposure to thermophilic organisms that may exist in the Braidwood cooling pond is small.

The temperature of the blowdown water discharged from the Braidwood cooling pond to the Kankakee River is monitored and reported to the Illinois EPA to verify compliance with the Station's NPDES permit. The discharge thermal plume (mixing zone) is small, and its size is consistent with Illinois EPA regulatory requirements. Braidwood does not discharge treated sanitary wastewater to the river. For these reasons, Exelon Generation concludes that blowdown water discharges from Braidwood are having little effect on the small risk to public health posed by exposure to thermophilic pathogens possibly present in stream segment IL_F-16 of the Kankakee River.

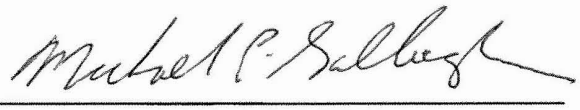
Furthermore, because renewal of the Braidwood Units 1 and 2 operating licenses by NRC will authorize no new construction, refurbishment or operational changes to the circulating water system that would affect thermal characteristics of the discharge, Exelon Generation concludes that the proposed license renewals would not contribute to any increase in adverse effects on public health from exposure to *N. fowleri* or any other thermophilic pathogen in the Kankakee River.

In closing, we would appreciate receiving a response from you detailing issues or information that we may have overlooked and that your staff believes could expedite NRC's review of the Braidwood License Renewal Application. We would also welcome your confirmation of our conclusions that renewing the Braidwood operating licenses would not increase adverse effects on public health from exposure to thermophilic pathogens in the Kankakee River.

Because Exelon Generation will incorporate a copy of your response, as well as this letter, into the environmental report that will be submitted to the NRC as part of the Braidwood License Renewal Application, your response will be most helpful if we receive it by February 13, 2013.

Please call Nancy Ranek (610) 765-5369, Exelon Generation's License Renewal Environmental Lead, if you have questions or require additional information. Thank you in advance for your assistance.

Respectfully,



Michael P. Gallagher
Vice President – License Renewal
Exelon Generation Company, LLC

Illinois Department of
PUBLIC
HEALTH

MPG 3.13.13

Applies to Both
Byron & Braidwood

Pat Quinn, Governor
LaMar Hasbrouck, MD, MPH, Director

525-535 West Jefferson Street • Springfield, Illinois 62761-0001 • www.idph.state.il.us

March 3, 2013

Mr. Michael P Gallagher
Vice President, License Renewal Exelon Nuclear
200 Exelon Way
Kennett Square, PA 19348

Dear Mr. Gallagher:

The Illinois Department of Public Health (IDPH) has received your letter requesting that the Office of Health Protection review part of your application for license renewal for Byron Station Units 1 and 2. The Division of Environmental Health has determined that evaluating and commenting on this license renewal application is outside the scope of our mission and that staff do not have the expertise necessary to adequately evaluate the application.

If you have additional health-related questions, please contact Tiffanie Denny, Environmental Toxicologist, at 217-782-5830 or TTY (for hearing impaired use only) 800-547-0466.

Sincerely,

Ken McCann, MA, LEHP
Chief, Division of Environmental Health

JLP

Improving public health, one community at a time

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