

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

July 3, 2012

Exelon Generation Company, L.L.C. )  
Quad Cities Nuclear Power Station )  
 )  
Petitioner, )  
 )  
v. )  
 )  
ILLINOIS ENVIRONMENTAL )  
PROTECTION AGENCY, )  
 )  
Respondent. )

13-2  
IEPA - ~~12-19~~  
(Provisional Variance-Water)

Re: Provisional Variance From Discharge Limits Contained in NPDES Permit IL0005037

Dear Mr. Hanley:

The Illinois Environmental Protection Agency (Agency) has completed its technical review of the attached provisional variance request, dated July 3, (Attachment A), for Exelon Generation Company, L.L.C.'s Quad Cities Nuclear Power Station (Quad Cities). Quad Cities is seeking a provisional variance from July 5, 2012 through July 15, 2012, that would allow it to exceed the maximum temperature limit in Special Condition 7B of NPDES Permit IL0005037 by no more than 5° (91° for July), or 2° above ambient river temperature, whichever is greater.

Based on its review, the Agency GRANTS Quad Cities a provisional variance subject to the specific conditions set forth below.

Background

Quad Cities is a base load nuclear-fueled steam electric generating facility located near Cordova, Illinois, on the Mississippi River at River Mile 506.8. The station operates two boiling water reactors which have a combined maximum generating capacity of 5,914 megawatts thermal. The station is currently operating at 100% capacity. The station's capacity factor January 1, 2012 through May 31, 2012 was 89%. Quad Cities generation output is transmitted to the PJM Interconnection Grid. PJM Interconnection is a regional transmission organization (RTO) that coordinates the movement of wholesale electricity in all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia and the District of Columbia.

Circulating water used to cool and condense the steam from the generating process is withdrawn from, and discharged to, the Mississippi River (Receiving Stream Water ID- IL\_M-02). The Mississippi River flow on July 3, 2012, was 93,000 cfs and the 7Q10 was 13,700 cfs. The incoming water is currently listed as impaired (2012 listing) due to Mercury, Polychlorinated biphenyls, and Manganese. These impaired waters have a designated use of public and food processing water as well as fish consumptions.

Quad Cities 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 through diffusers into the Mississippi River. The maximum design flow is 2,253 cfs or 1,011,000 gpm. The maximum temperature rise of the station from intake to effluent is 28°F at design flow of 2,253 cfs. Open cycle operation with the diffusers was initially permitted by the Agency on December 22, 1983.

Special Condition 7B of NPDES Permit IL00005037 (Attachment B) limits the temperature at the edge of the mixing zone to 86°F in July, except when Quad Cities is using excursion hours, during which time the temperatures at the edge of the mixing zone may be 3°F warmer than these limits.

The available temperature data shows that the Mississippi River water temperature at the station's intake is approaching and may exceed the non-excursion hour July temperature standard of 86°F based on latest weather forecasts. The upstream Mississippi River temperature was measured at 83°F on July 3, 2012. As a result of these conditions, Quad Cities expects to exceed the non-excursion hour temperature limit for July of 86°F on July 5, 2012. Based on current weather forecast of daily maximum air temperatures in the upper 90's°F for the next five days, ambient Mississippi River water temperature may reach 85°F. Mississippi River flow is currently 93,000 cfs and is forecast to decrease to 85,000 cfs by July, 9, 2012. The maximum Mississippi River ambient temperature the station will be able to comply with during the provisional variance period without the use of excursion hours is 85°F.

As a consequence of the unusually warm weather, high ambient river temperatures, and the absence of cooling during the evening hours, the capacity of the Mississippi River to dissipate heat has been reduced beyond its normal capabilities. Even at current flow rates of 93,000 cfs, the river is not cooling off during the evening hours as is typical this time of year. Without nighttime cooling, the river retains the heat introduced to it during the daytime hours, both upstream and downstream of the station.

In cooperation with the Agency's request that Exelon explore long-term thermal relief options for Quad Cities, Exelon commissioned extensive studies of the Station's thermal output and impacts. Exelon has shared those studies and its draft long-term regulatory relief proposal with both Federal and State regulators. Additionally, Quad Cities submitted a draft of its 316(a) thermal report which demonstrates no harm to indigenous aquatic populations to the Agency, obtained comments, revised the report and then resubmitted the document for the Agency's final review and comment. At this time, the Agency's technical review of the Draft 316 (a) Report is nearing completion. The Agency will be presenting its technical comments on the Draft 316 (a)

Report to Exelon and the Director of the Agency. Exelon is working on finalizing the Draft Adjusted Thermal Standard (ATS) petition to the Illinois Pollution Control Board (IPCB) which will be submitted to the Agency for their internal review before the end of the week.

#### Relief Requested

Condition 7B of the NPDES Permit limits the number of excursion hours to 1% (87.6 hours) of the hours in a 12-month period ending with any month. Specifically, Special Condition 7B provides that the Station shall not cause water temperatures in the Mississippi River (beyond the mixing zone) to exceed by more than 3°F the non-excursion hour temperature limit for July of 86°F.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
F°	45	45	57	68	78	85	86	86	85	75	65	52

Quad Cities is requesting a provisional variance that allows it to exceed the non-excursion hour temperature limit for July of 86°F stated in Special Condition 7B of NPDES Permit No. IL0005037, for the period of July 5, 2012 through July 15, by no more than 5°F (*91°F for July*) or 2°F above ambient river temperature, whichever is greater.

#### Necessity for Request

In its request, Exelon states that when the ambient river temperatures approach or exceed the non-excursion hour limits, Quad Cities has no option other than to use excursion hours, and once its allotment of excursion hours is depleted, Quad Cities must cease operating altogether to maintain compliance with the NPDES Permit. According to Exelon, partial deratings or adding cooling facilities (such as cooling towers) will not allow Quad Cities to achieve compliance with a limit that already is exceeded even before any heat is added as a result of station operations.

Special Condition 7B of NPDES Permit limits the temperature at the edge of the mixing zone to 86°F in July, except when Quad Cities is using excursion hours, during which time the temperatures at the edge of the mixing zone may be 3°F warmer than these limits. As a rule, Quad Cities has been able to operate within its permitted thermal limits due to the fact that the ambient temperatures of the River (measured upstream of the discharge) generally remain below the non-excursion hour limit. It is only during periods when the ambient river temperatures are very close to or exceed the non-excursion hour limits or during periods of extreme low flows that Quad Cities uses its excursion hour allowance.

Illinois and the Upper Mississippi River basin are experiencing a long stretch of hot weather, which is resulting in high ambient river temperatures. In 2012 Quad Cities first began using excursion hours on Sunday, March 18<sup>th</sup> when upstream Mississippi River temperature matched the station's effluent limitation of 57°F. The permitted excursion hours were subsequently exhausted in March as a result of continued record breaking warm weather recorded throughout the mid-western states. Quad Cities submitted a request to the Agency on March 20, 2012, for relief from Special Condition 7(b) of NPDES Permit No. IL0005037 for the period of March 21,

2012 to April 1, 2012. The Agency subsequently issued Provisional Variance IEPA 12-11 to Quad Cities on March 21, 2012 allowing the station to exceed the non-excursion hour temperature limit for March of 57°F stated in Special Condition 7(b) of NPDES Permit No. IL0005037 for the period of March 21, 2012 to April 1, 2012 by no more than 5°F (62°F for March) or 2°F above ambient river temperature, whichever is greater. During March of 2012, Quad Cities accumulated a total of 223.5 excursion hours.

Quad Cities also submitted a request to the Agency on May 24, 2012, for relief from Special Condition 7(b) of NPDES Permit No. IL0005037, for the period of May 26, 2012, through May 29, 2012. The Agency subsequently issued Provisional Variance IEPA 12-17 to Quad Cities on May 25, 2012, allowing the station to exceed the non-excursion hour temperature limit for May of 78°F stated in Special Condition 7(b) of NPDES Permit No. IL0005037 for the period of May 26, 2012, through May 29, 2012, by no more than 5°F (78°F for May) or 2°F above ambient river temperature, whichever is greater. During the May Provisional Variance period, the Quad Cities did not exceed its effluent limitation of 78°F. Quad Cities currently has 33 excursion hours that became available July 1, 2012, when the 33 hours accumulated during July 2011 rolled off the rolling 12-month calendar.

The Agency also issued Provisional Variances to Exelon's Braidwood Station (IEPA-12-12), Dresden Station (IEPA-12-14), and LaSalle Station (IEPA-12-15) for thermal effluent relief during the March 2012 heat wave.

With the current forecast, Quad Cities says it expects to exceed the non-excursion hour temperature limit for July of 86°F starting July 5, 2012, and going through July 15, 2012, if it is to be able to continue to provide safe reliable power to the grid.

Based on current weather forecasts it is expected that the Mississippi River will approach or exceed Quad Cities' permitted effluent limitation. Therefore, unless relief is granted by way of this provisional variance request, Quad Cities states that will be forced to shut down for correspondingly significant durations.

Because derating the units will not ensure compliance with the effluent limitations, Quad Cities says that shutting the units down may be the only alternative. Removing both units from operation will not only reduce the available power supply to the grid but will also result in the need for power from the grid to operate key nuclear safety systems. The time required to return nuclear generating units to full power can require 18-24 hours, meaning the electricity generated from these systems will not be readily available in the event of an emergency. Furthermore, under normal conditions only one of the two reactors would be removed from service at any given time, to allow the operating unit to be the primary backup power source for the non-operating unit. Removing both units from service will also eliminate this redundancy and will increase the Quad Cities' reliance on off-site power to support safety related systems. With both units offline and unable to immediately return to service, the power that Quad Cities could generate as a result of the requested provisional variance would not be available to support the voltage requirements that could occur under changing grid conditions. PJM has issued a Hot Weather Alert for the entire PJM RTO through July 5, 2012, with the potential for the alert to be

extended through the weekend. PJM predicts an anticipated Peak Load >147, 000 MW on Friday, July 6, 2012.

#### Assessment of Environmental Impacts

Quad Cities has provided details on the environmental impact during the requested variance period from July 5, 2012, through July 15, 2012. Quad Cities has determined that there should not be any significant environmental impact during the course of this three-day variance.

#### Alternatives to Requested Relief

Based on river temperatures recorded so far this summer and long range weather projections for the balance of the season, it is likely that there will be a number of extended periods during which ambient river temperatures will be at or above these limits. As previously explained, neither the option of derating the units nor of obtaining additional temporary cooling capacity will allow Quad Cities to maintain compliance if the ambient river temperatures exceed the applicable temperature limits. The only option is for Quad Cities to shut down once the ambient river temperatures are at or exceed the NPDES permit monthly limit.

In 2006, Quad Cities investigated the feasibility of installing cooling towers. Exelon states that based on analytical evaluation of historical plant, river, and meteorological data, the proposed towers performance and the resulting reduction in downstream river temperature could be quantified. When Exelon evaluated the actual days when excursion hours occurred in the last six year period (2000-2005), it found there was no appreciable reduction in the number of days when excursion hours would have occurred with the cooling towers in operation. According to Exelon, the reason for this is the high upstream river temperatures experienced on most of the days when actual excursion hours were recorded. For ~80% of the days when excursion hours were recorded, the plant intake temperature was at the permit limited temperature or above ( $\geq 86^{\circ}\text{F}$ ), and for the remaining 20% of the days, the intake temperature was within half a degree of the permit limits. For most of these occurrences, even if adequate cooling tower capacity was in operation to achieve a zero thermal impact on the river (i.e., the plant discharge temperature equaled the intake temperature), excursion hours nonetheless would have been recorded. Estimated cost in 2006 for installation of cooling towers ranged from \$48 to \$61 million.

#### Agency Determinations

The Agency has reviewed the requested provisional variance and has concluded the following:

1. Any environmental impact from the requested relief shall be closely monitored and the Agency shall be immediately notified of any adverse impacts.
2. No reasonable alternatives appear available;
3. No public water supplies should be affected;
4. No federal regulations will preclude the granting of this request; and

5. Quad Cities will face an arbitrary and unreasonable hardship if the request is not granted.

Conditions

The Agency hereby GRANTS Quad Cities a provisional variance from Special Condition 7B of NPDES Permit No. IL0005037, subject to the following conditions:

- A. The term of this provisional begins (1) for excursion hours: when all permitted excursion hours have been exhausted; (2) for maximum temperature limits: when the temperature exceeds 91°F. This provisional variance is granted based on the facts and circumstances described in the request dated July 3, 2012, and the update, including consecutive days of abnormally high temperatures at Quad Cities, and high water temperatures in the Mississippi River. If the facts or circumstances described in the July 3, 2012 request abate before July 15, 2012, the term of this provisional variance will end.
- B. Quad Cities shall provide the best operation of its station to produce the best effluent possible at all times. At no time, during the variance period, shall Quad Cities cause water temperature in the Mississippi River (beyond the mixing zone) to exceed 91°F or 2° F above ambient river temperature, whatever is greater.
- C. During the variance period, Quad Cities must continuously monitor intake, discharge and receiving water temperatures and visually inspect intake and discharge areas at least three times daily to assess any mortalities to fish and other aquatic life.
- D. Quad Cities shall document environmental conditions during the term of the provisional variance, including the activities described in C. above of this Section, and submit the documentation to the Agency and the Department of Natural Resources within 30 days after the provisional variance expires.
- E. Quad Cities shall immediately notify the Agency and the Department of Natural Resources of any unusual conditions, including mortalities to fish or other aquatic life; immediately take action to remedy the problem; investigate and document the cause and seriousness of the unusual conditions while providing updates to the Agency and the Department of Natural Resources as changes occur until normal conditions return; notify the Agency and the Department of Natural Resources when normal conditions return; and submit the documentation to the Agency and the Department of Natural Resources within 30 days after normal conditions return.
- F. Quad Cities shall develop and implement a response and recovery plan to address any adverse environmental impact due to thermal conditions resulting from the provisional variance, including loss and damage to aquatic life.
- G. Quad Cities shall notify Roger Callaway of the Agency by telephone at 217/782-9720 when Quad Cities' discharge first causes or contributes to an exceedence of the applicable permitted excursion hour temperature limit of 86°F in July, and again if the

water temperature exceeds 91°F . Written confirmation of each notice shall be sent within five days to the following address:

Illinois Environmental Protection Agency  
Bureau of Water - Water Pollution Control  
Attention: Roger Callaway  
1021 North Grand Avenue East, MC #19  
Springfield, Illinois 62794-9276

H. Quad Cities shall sign a certificate of acceptance of this provisional variance and forward that certificate to Roger Callaway at the address indicated above within one day of the date of this order. The certification should take the following form:

I (We) \_\_\_\_\_, hereby accept and agree to be bound by all terms and conditions of the provisional variance granted by the Agency in \_\_\_\_\_ dated \_\_\_\_\_.

\_\_\_\_\_  
Petitioner

\_\_\_\_\_  
Authorized Agent

\_\_\_\_\_  
Title

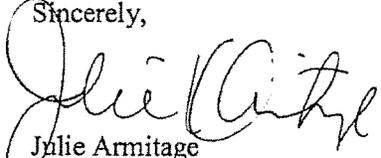
\_\_\_\_\_  
Date

Quad Cities shall continue to monitor and maintain compliance with all other parameters and conditions specified in its NPDES Permit No. IL0005037

*Conclusion*

The Agency grants this provisional variance in accordance with its authority contained in Sections 35(b), 36 (c), and 37(b) of the Illinois Environmental Protection Act (415 ILCS 5/35(b), 36(c), and 37(b) (2010). The decision to grant this provisional variance is not intended to address compliance with any other applicable laws or regulations.

Sincerely,

  
Julie Armitage  
Acting Chief Legal Counsel