Exelon Generation®

Michael P. Gallagher
Vice President, License Renewal
Exelon Nuclear

200 Exelon Way
Kennett Square, PA 19348

610 765 5958 Office
610 765 5956 Fax
www.exeloncorp.com

michaelp.gallagher@exeloncorp.com

10 CFR 50
10 CFR 51
10 CFR 54

RS-15-174

June 17, 2015

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

Byron Station, Units 1 and 2
Facility Operating License Nos. NPF-37 and NPF-66
NRC Docket Nos. 50-454 and 50-455

Subject: Revisions to Byron and Braidwood Stations, Units 1 and 2 License Renewal Application, Byron Station Applicant's Environmental Report, Sections 3.1.3, 3.1.3.1 and 4.1

References: Exelon Generation Company, LLC letter from Michael P. Gallagher to NRC Document Control Desk, "Application for Renewed Operating Licenses", dated May 29, 2013

In the referenced letter, Exelon Generation Company, LLC (Exelon Generation) submitted the License Renewal Application (LRA) for the Byron and Braidwood Stations, Units 1 and 2, including Appendix E, Item E-1 to the LRA, which is the Byron Station Applicant's Environmental Report.

The enclosure to this letter provides revised versions of pages from Sections 3.1.3, 3.1.3.1 and 4.1 in the Byron Station Applicant's Environmental Report.

This letter and its enclosure contain no regulatory commitments.

If you have any questions, please contact Ms. Nancy Ranek, Environmental Lead, Exelon Generation License Renewal, at 610-765-5369.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on: 06-17-2015

Respectfully,

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

Enclosure – Revisions to Byron Station Applicant's Environmental Report, Sections 3.1.3, 3.1.3.1, and 4.1

cc: Regional Administrator- NRC Region III
NRC Project Manager (Environmental Review), NRR-DLR
NRC Project Manager (Safety Review), NRR-DLR
NRC Project Manager, NRR-DORL Byron Station
NRC Senior Resident Inspector, Byron Station
Illinois Emergency Management Agency- Division of Nuclear Safety

ENCLOSURE

Revisions to Byron Station Applicant's Environmental Report, Sections 3.1.3, 3.1.3.1, and 4.1

Purpose and Description of Revisions

The purpose of revising the Byron and Braidwood Stations, Units 1 and 2 License Renewal Application, Byron Station Applicant's Environmental Report (Byron ER), Sections 3.1.3, 3.1.3.1, and 4.1, is to improve consistency with respect to how the Station's maximum potential rate of makeup water withdrawal from the Rock River is characterized in the Byron ER and documentation submitted to other regulatory agencies (e.g., documentation submitted to the Illinois Environmental Protection Agency in accordance with 40 CFR §122.21(r)). The following table summarizes the revisions to the Byron ER. Replacement pages showing these revisions in the Byron ER are also provided in this Enclosure. The replacement pages supersede the pages in the originally filed version of the Byron ER.

ER Page #	ER Section #	Description of Revision
3-5	3.1.3	Add the number (i.e., two) and rated capacity of the essential service water makeup pumps (i.e., 94.6 L/s or 1,500 gpm) to their description. Clarify the routing of makeup water from the circulating water makeup pipeline to the mechanical draft cooling tower basin during normal operation and the routing of makeup water from the essential service water makeup pumps to the mechanical draft cooling tower basin.
3-6	3.1.3.1	Change the anticipated maximum gross withdrawal rate from the Rock River to include not only the pumping rate of the CWS makeup water pumps, but also the pumping rate of the two essential service water makeup pumps because, although the essential service water makeup pumps operate only as emergency backup sources of makeup to the essential service water system, they are capable of operating at maximum capacity simultaneously with the two CWS makeup water pumps. Under such circumstances, the maximum gross withdrawal rate from the Rock River could be as high as the sum of the rated capacity of all four pumps (i.e., 3,218 L/s, 113.6 cfs or 51,000 gpm).
4-10	4.1	Add the essential service water system and its associated mechanical draft cooling towers to the description of systems that receive makeup water from the Rock River.
4-11	4.1	Change the anticipated maximum gross withdrawal rate from the Rock River to include not only the pumping rate of the CWS makeup water pumps, but also the pumping rate of the two essential service water makeup pumps because, although the essential service water makeup pumps operate only as emergency backup sources of makeup to the essential service water system, they are capable of operating at maximum capacity simultaneously with the two CWS makeup water pumps. Under such circumstances, the maximum gross withdrawal rate from the Rock River could be as high as the sum of the rated capacity of all four pumps (i.e., 3,218 L/s, 113.6 cfs or 51,000 gpm).

REPLACEMENT PAGES FOR

Byron Station Applicant's Environmental Report

Page Number in Original ER	Replacement Page Number
3-5	3-5
3-6	3-6
4-10	4-10
4-11	4-11

NOTE: The replacement pages listed in the table, above, are provided as the last four (unnumbered) pages in this Enclosure to RS-15-174.

Pursuant to the general license issued in 10 CFR 72.210, Exelon Generation operates an ISFSI at the Byron site. The general license allows Exelon Generation, as a reactor licensee under 10 CFR Part 50, to store spent fuel at the ISFSI, provided that such storage occurs in pre-approved casks in accordance with the requirements of 10 CFR Part 72, subpart K (General License for Storage of Spent Fuel at Power Reactor Sites). Spent fuel transfers to the ISFSI began in September, 2010 (Exelon Nuclear 2010f).

The 1996 GEIS (NRC 1999a) noted that 10 CFR 51.23 codifies the NRC's generic determination that storage and disposal of spent fuel during the licensed life for operation of nuclear power plants (which may include the term of a renewed license) can be accomplished safely and without significant environmental impact. In accordance with this determination, the 1996 GEIS concluded that no discussion of environmental impacts of spent fuel storage for the period following the term of a reactor operating license, including a renewed license was required. In 2010, the Commission updated and continued the provisions in 10 CFR 51.23 (referred to as the Waste Confidence Decision Update and Temporary Storage Rule, or WCD Update and Rule) based on experience in the storage of spent nuclear fuel and the increased uncertainty in the siting and construction of a permanent geologic repository for the disposal of spent nuclear fuel (75 FR 81031; December 23, 2010). On June 8, 2012, the D.C. Circuit Court of Appeals vacated and remanded the WCD Update and Rule (New York v. NRC, 681 F.3d 471 (D.C. Cir. 2012)). In response, the NRC Commissioners suspended the issuance of licenses for which the NEPA review would depend on the WCD Update and Rule (NRC 2012b). Because the Commissioners consider responding to the D.C. Circuit Court's concerns to be a generic issue, they further directed the NRC staff to conduct a rulemaking (NRC 2012c). This effort by the NRC staff is ongoing. The updated rule and supporting EIS will provide the NEPA analyses of waste-confidence-related human health and environmental impacts needed to support renewal of the Byron operating license.

3.1.3 Cooling and Auxiliary Water Systems

The Byron circulating water system uses two natural draft cooling towers (see Figure 3.1-2), one tower per unit, to dissipate excess heat from condenser cooling water and nonessential service water. Water chemistry in this closed cycle system is controlled by continuous blowdown from the condenser supply water and makeup to an open flume between the two natural draft cooling towers. Makeup water comes from the Rock River and blowdown water is directed back to the Rock River.

In addition to the two natural draft cooling towers, Byron also has two mechanical draft cooling towers to cool essential service water, which removes heat from safety-related equipment, and to serve as the ultimate heat sink for the reactors. Because of their safety function, the mechanical draft cooling towers operate continuously when the reactors are operating, and they also must have a makeup water supply that is capable of supporting 30 days of continuous operation in support of safe shutdown. Normal makeup water to replace evaporation and blowdown from the mechanical draft cooling towers is supplied from the Rock River via a line from the circulating water system makeup water pipeline to the mechanical draft cooling tower basin. Emergency backup sources of makeup water are also available via: (1) two 12-in. (0.3-m) pipelines, one each from the two essential service water makeup pumps, each of which is rated at 94.6 L/s (1,500 gpm) and located at the Rock River intake structure (river screen house); and (2) two on-site deep wells described in Section 3.1.3.2 (NRC 1982; Exelon Nuclear 2010a). Blowdown from the mechanical draft cooling towers is routed to the flume between the two natural draft cooling towers. 6/17/15

The following subsections describe the water systems at Byron in greater detail.

3.1.3.1 Surface Water

Byron has an agreement with the Illinois DNR to limit consumption of water from the Rock River for makeup to the Byron cooling systems to no more than 9 percent of total river flow during times when the river flow rate drops below 19,200 L/sec (679 cfs). To maintain compliance, Byron would adjust the CWS makeup and blowdown flows, and if necessary, would reduce the power output from the units. The makeup water required by the essential service water and condenser cooling systems varies seasonally. The maximum gross withdrawal rate capability from the Rock River, which would occur only with two CWS makeup pumps and both essential service water makeup pumps operating simultaneously at their rated flows, is 3,218 L/sec (113.6 cfs or 51,000 gpm) (Exelon Nuclear 2010a). The average makeup withdrawal rate from the Rock River at 100 percent load is 2,320 L/sec (81.9 cfs or 36,750 gpm), out of which 821 to 1,070 L/sec (29 to 38 cfs or 13,000 to 17,000 gpm) is returned to the river as blowdown (Exelon Nuclear 2005). 6/17/15

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." In Special Condition 3 of NPDES permit IL0048313, IEPA has determined that Byron meets this criteria as well as the thermal water quality standard in Title 35, Section 302.211. The NPDES Permit requires Byron to monitor and report to IEPA the flow and temperature of its blowdown discharge each month. (IEPA 2011b).

As specified in Special Condition 12 of NPDES permit IL0048313, Byron must also explicitly demonstrate compliance with the thermal water quality standard on a daily basis during times when the Rock River flow is less than 67,944 L/sec (2,400 cfs), or the temperature difference between the main river temperature and the water quality standard is less than 3°F. (IEPA 2011b).

Blowdown is discharged to the Rock River about 61 m (200 ft) downstream of the river screen house. Blowdown is discharged from the outfall structure via an 84-m (275-ft) rip-rapped channel to the river (Exelon Nuclear 2005).

The surface water drainage system at Byron directs storm water runoff from areas associated with industrial activities in four ways, as described in the Byron Storm Water Pollution Prevention Plan (Exelon Nuclear 2003a). First, general drainage within the immediate vicinity of the protected area is into a large oil separator that discharges to an on-site retention pond referred to as the Construction Runoff Pond (CROP). Water collected in the CROP is normally sampled and pumped to the Unit 2 natural draft cooling tower basin where it mixes with circulating water, but in exceptional circumstances, the CROP can overflow directly to Woodland Creek, a tributary of the Rock River north and east of Byron. Second, runoff from the area collectively designated as the East Area is directed to Woodland Creek through permitted Outfall 003. The East Area includes the area east of the natural draft cooling towers and the mechanical draft essential service water cooling towers as well as areas around the east half of the main site. Third, runoff from the area collectively designated as the West Area is directed to an unnamed tributary of the Rock River through permitted Outfall 004. The West Area, which is mostly outside the protected area, includes the areas around the west portion of the main site and the 345 kV switchyard. Finally, sheet flow drains from a small area north of the protected area into Woodland Creek, and from a small area adjacent to the river screen house directly to the Rock River. All storm water discharge paths are subject to the storm water pollution prevention provisions in Special Condition 16 of NPDES Permit IL0048313 and the Byron Storm Water Pollution Prevention Plan (Exelon Nuclear 2003a).

4.1. Water Use Conflicts (Plants Using Cooling Towers or Cooling Ponds and Withdrawing Makeup Water From A Small River With Low Flow)

NRC

"If the applicant's plant utilizes cooling towers or cooling ponds and withdraws make-up water from a river whose annual flow rate is less than 3.15x10^{12} ft^3/year (9x10^{10} m^3/year), an assessment of the impact of the proposed action on the flow of the river and related impacts on in-stream and riparian ecological communities must be provided…" 10 CFR 51.53(c)(3)(ii)(A).

"…The issue has been a concern at nuclear power plants with cooling ponds and at plants with cooling towers. Impacts on instream and riparian communities near these plants could be of moderate significance in some situations…" 10 CFR Part 51, Subpart A, Appendix B, Table B-1, Issue 13

The water-use issue associated with operation of cooling towers is the availability of adequate stream flows to provide makeup water, particularly during droughts or in the context of increasing in-stream or off-stream uses (NRC 1996b). Because water use circumstances necessarily vary from site to site, the NRC made surface water use conflicts a Category 2 issue. According to SECY-12-0063, Enclosure 1, the final rule supported by the updated GEIS will modify this issue by making it applicable to any plant that withdraws make-up water from a river, regardless of the river's flow rate.

As discussed in Section 3.1.3, the Byron essential service water and circulating water systems use two banks of mechanical draft cooling towers and two closed-cycle natural draft cooling towers, respectively, that receive their makeup water from the Rock River. The Rock River drains an approximately 28,270 square kilometers (km^2) (10,915 square miles [mi^2]) area from southeastern Wisconsin through northern Illinois to its confluence with the Mississippi River downstream from Rock Island, Illinois. The drainage area upstream of the plant is approximately 20,700 km^2 (8,000 mi^2) (NRC 1982). 6/17/15

The U.S. Geological Survey (USGS) maintains a gaging station at Como, Illinois, approximately 74 km (46 mi) downstream of the Byron blowdown discharge at River Mile 62.9 (USGS 2011). For water years 1935 - 2010, annual mean flow at the Como gaging station averaged 204,023 L/sec (6,012 cfs) (USGS 2011) or 1.89 x10^{11} ft^3/year. Therefore, the Rock River meets the NRC definition of a small river.

Prior to 2006, there were no comprehensive statewide or regional plans for managing the water supply in Illinois. Signed in January 2006, Executive Order (EO) 2006-1 called for a comprehensive program for state and regional water supply planning and management, a strategic plan for the program's implementation, and development of regional water supply plans in two priority water quantity planning areas: east central Illinois and northeastern Illinois (CMAP 2010a). In 2009, funding allowed for the inclusion of the Kaskaskia region as the third

priority area for water supply planning efforts (ISWS 2012). Byron is not within any of the three priority planning areas.

Fundamental elements of EO 2006-1 include ensuring that water demand and supply result in equitable availability through drought and non-drought conditions, and protecting water quality and in-stream flows. One planning goal of EO 2006-1 is to manage rivers in Illinois to ensure that river flows remain above the interim 1-day, 10-year low (Q1/10) or 7-day, 10-year low (Q7/10) protected flow level.

Byron has an agreement with the Illinois DNR to limit consumption of water from the Rock River for makeup to the Byron cooling systems to no more than 9 percent of total river flow during times when the river flow rate drops below 19,200 L/sec (679 cfs). Fundamental elements of EO 2006-1 include ensuring that water demand and supply result in equitable availability through drought and non-drought conditions, and protecting water quality and in-stream flows. To maintain compliance, Byron adjusts the CWS makeup and blowdown flows, and if necessary, would reduce the power output from the units.

The maximum gross withdrawal rate capability from the Rock River, which would occur only with two CWS makeup pumps and both essential service water makeup pumps operating simultaneously, is 3,218 L/sec (113.6 cfs or 51,000 gpm) (Exelon Nuclear 2010a). The average makeup withdrawal rate from the Rock River at 100 percent load factor is 2,320 L/sec (81.9 cfs or 36,750 gpm), out of which 821 to 1,070 L/sec (29 to 37.9 cfs or 13,000 to 17,000 gpm) is returned to the river as blowdown (Exelon Nuclear 2005). 6/17/15

Based on the Rock River's 75-year average annual mean flow at the Como gaging station of 170,241 L/sec (6,012 cfs; see Section 2.2.2), Byron's average makeup withdrawal rate of 2,320 L/sec (81.9 cfs) represents approximately 1.3 percent of the river's average annual mean flow. However, since 821 to 1,070 L/sec (29 to 37.9 cfs) is returned to the river as blowdown, the net makeup withdrawal from the river ranges from 1,250 to 1,500 L/sec (44 to 53 cfs), which represents 0.73 to 0.88 percent of the average annual mean flow of the river at the intake.

Even at a river flow of 19,200 L/sec (679 cfs), at which point the IDNR agreement prevents withdrawal exceeding 9 percent of total river flow, the plant's net makeup withdrawal of 1,250 to 1,500 L/sec (44 to 53 cfs) represents 6.5 to 7.8 percent of the river flow

Based on the information presented above, withdrawals of surface water for the operation of Byron during low-flow periods would have a SMALL impact on the availability of fresh water downstream of the site and would not warrant further mitigation.

Hypothetical refurbishment in the form of steam generator replacement would not increase water withdrawals from the Rock River and therefore, would not change this conclusion.

Impact to alluvial aquifers caused by the Byron makeup water withdrawal is addressed in Section 4.6.