



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

July 15, 2022

Mr. David P. Rhoades  
Senior Vice President  
Constellation Energy Generation, LLC  
President and Chief Nuclear Officer  
Constellation Nuclear  
4300 Winfield Road  
Warrenville, IL 60555

SUBJECT: BRAIDWOOD STATION, UNITS 1 AND 2 – ENVIRONMENTAL ASSESSMENT  
AND FINDING OF NO SIGNIFICANT IMPACT RELATED TO A REQUESTED  
INCREASE IN ULTIMATE HEAT SINK TEMPERATURE  
(EPID L-2022-LLA-0082)

Dear Mr. Hanson:

Enclosed is a copy of the Environmental Assessment and Finding of No Significant Impact related to your application for amendment dated June 3, 2022. The proposed amendment would raise the maximum ultimate heat sink temperature from 102 degrees Fahrenheit (°F) to 102.8 °F.

The assessment is being forwarded to the Office of the Federal Register for publication. If you have questions contact me at [Joel.Wiebe@nrc.gov](mailto:Joel.Wiebe@nrc.gov) or 301-415-6606.

Sincerely,

/RA/

Joel S. Wiebe, Senior Project Manager  
Plant Licensing Branch III  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-456 and 50-457

Enclosure:  
Environmental Assessment

cc: Listserv

**ENCLOSURE**

**FEDERAL REGISTER NOTICE**

**NUCLEAR REGULATORY COMMISSION**

**[Docket Nos. 50-456 and 50-457; NRC-2022-0141]**

**Constellation Energy Generation, LLC;**

**Braidwood Station, Units 1 and 2**

**AGENCY:** Nuclear Regulatory Commission.

**ACTION:** Environmental assessment and finding of no significant impact; issuance.

**SUMMARY:** The U.S. Nuclear Regulatory Commission (NRC) is considering issuance of amendments to Renewed Facility Operating License Nos. NPF-72 and NPF-77, which authorize Constellation Energy Generation, LLC, (licensee) to operate Braidwood Station (Braidwood), Units 1 and 2. The proposed amendments would change Technical Specification (TS) Surveillance Requirement (SR) 3.7.9.2 to allow an ultimate heat sink (UHS) temperature of less than or equal to 102.8 degrees Fahrenheit (°F) through September 30, 2022.

**DATES:** The environmental assessment and finding of no significant impact referenced in this document is available on **[INSERT DATE OF PUBLICATION IN THE *FEDERAL REGISTER*]**.

**ADDRESSES:** Please refer to Docket ID **NRC-2022-0141** when contacting the NRC about the availability of information regarding this document. You may obtain publicly available information related to this document using any of the following methods:

- **Federal Rulemaking Website:** Go to <https://www.regulations.gov> and search for Docket ID **NRC-2022-0141**. Address questions about Docket IDs in Regulations.gov to Stacy Schumann; telephone: 301-415-0624; email: [Stacy.Schumann@nrc.gov](mailto:Stacy.Schumann@nrc.gov). For technical questions, contact the individual listed in the "For Further Information Contact" section of this document.

- **NRC's Agencywide Documents Access and Management System**

**(ADAMS):** You may obtain publicly available documents online in the ADAMS Public Documents collection at <https://www.nrc.gov/reading-rm/adams.html>. To begin the search, select "Begin Web-based ADAMS Search." For problems with ADAMS, please contact the NRC's Public Document Room (PDR) reference staff at 1-800-397-4209, 301-415-4737, or by email to [PDR.Resource@nrc.gov](mailto:PDR.Resource@nrc.gov). For the convenience of the reader, instructions about obtaining materials referenced in this document are provided in the "Availability of Documents" section.

- **NRC's PDR:** You may examine and purchase copies of public documents, by appointment, at the NRC's PDR, Room P1 B35, One White Flint North, 11555 Rockville Pike, Rockville, Maryland 20852. To make an appointment to visit the PDR, please send an email to [PDR.Resource@nrc.gov](mailto:PDR.Resource@nrc.gov) or call 1-800-397-4209 or 301-415-4737, between 8:00 a.m. and 4:00 p.m. Eastern Time (ET), Monday through Friday, except Federal holidays.

**FOR FURTHER INFORMATION CONTACT:** Joel S. Wiebe, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, telephone: 301-415-6606, email: [Joel.Wiebe@nrc.gov](mailto:Joel.Wiebe@nrc.gov).

**SUPPLEMENTARY INFORMATION:**

**I. Introduction**

The NRC is considering issuance of amendments to Renewed Facility Operating License Nos. NPF-72 and NPF-77, which authorize Constellation Energy Generation, LLC, (Constellation) to operate Braidwood Station, Unit Nos. 1 and 2, located in Will County, Illinois. Constellation submitted its license amendment request in accordance with section 50.90 of title 10 of the *Code of Federal Regulation* (10 CFR), by letter dated June 3, 2022. If approved, the license amendments would revise TS SR in TS 3.7.9.2 to

allow a temporary increase in the allowable UHS average temperature of less than or equal to ( $\leq$ ) 102.8°F (39.3 degrees Celsius (°C)) through September 30, 2022.

Therefore, as required by 10 CFR 50.21, the NRC performed an environmental assessment (EA). Based on the results of the EA that follows, the NRC has determined not to prepare an environmental impact statement for the proposed amendments and is issuing a finding of no significant impact (FONSI).

## **II. Environmental Assessment**

### *Description of the Proposed Action*

The proposed action would revise the Braidwood TS to allow a temporary increase in the allowable average temperature of water withdrawn from the UHS and supplied to the plant for cooling from  $\leq 102^{\circ}\text{F}$  (38.9°C) to  $\leq 102.8^{\circ}\text{F}$  (39.3°C) through September 30, 2022. Specifically, the proposed action would revise TS SR 3.7.9.2, which currently states, “Verify average water temperature of UHS is  $\leq 102.8^{\circ}\text{F}$  until September 30, 2021. After September 30, 2021, verify average water temperature of UHS is  $\leq 102^{\circ}\text{F}$ ” to state “Verify average water temperature of UHS is  $\leq 102.8^{\circ}\text{F}$  until September 30, 2022. After September 30, 2022, verify average water temperature of UHS is  $\leq 102^{\circ}\text{F}$ .”

Under the current TS, if the average UHS temperature as measured at the discharge of the operating essential service water system pumps is greater than 102°F (38.9°C), TS 3.7.9 Required Actions A.1 and A.2 would be entered concurrently and would require the licensee to place Braidwood in hot standby (Mode 3) within 12 hours and cold shutdown (Mode 5) within 36 hours. The proposed action would allow Braidwood to continue to operate during times when the UHS indicated average water temperature exceeds 102°F (38.9°C) but is less than or equal to 102.8°F (39.3°C) through September 30, 2022. The current TS’s UHS average water temperature limit of

102°F (38.9°C) would remain applicable to all other time periods beyond September 30, 2022.

The proposed action is nearly identical to previously approved license amendments that allowed for the average water temperature of the UHS to be  $\leq 102.8^{\circ}\text{F}$  until September 30, 2020, and September 30, 2021. The NRC issued EAs for the 2020 and 2021 UHS amendments in the *Federal Register* on September 10, 2020, (85 FR 55863) and July 7, 2021, (86 FR 35831) respectively. The NRC issued the amendments on September 24, 2020, and July 13, 2021, respectively. The only difference between the previously approved amendments to SR 3.7.9.2 and the proposed action is that the proposed action would replace “2020” or “2021” with “2022.” The proposed action is in accordance with the licensee’s application dated June 3, 2022.

#### *Need for the Proposed Action*

The licensee has requested the proposed amendments in connection with historical meteorological and atmospheric conditions that have resulted in the TS UHS temperature being challenged. These conditions included elevated air temperatures, high humidity, and low wind speed. Specifically, from July 4, 2020, through July 9, 2020, northern Illinois experienced high air temperatures and drought conditions, which caused sustained elevated UHS temperatures. In response to these conditions in 2020, the licensee submitted license amendment requests contained in the licensee’s letter dated July 15, 2020, as supplemented by letter dated August 14, 2020. The NRC subsequently granted the licensee’s request in September 2020. A similar request was granted by NRC letter dated July 13, 2021. In February of 2022, the license for Braidwood Units 1 and 2 was transferred to Constellation by Exelon Generation Company, LLC (Exelon). Constellation projects that similar conditions are likely this year.

The proposed action would provide the licensee with operational flexibility until September 30, 2022, during which continued high UHS temperatures are likely so that the plant shutdown criteria specified in the TS are not triggered.

#### *Plant Site and Environs*

Braidwood is in Will County, Illinois approximately 50 miles (mi); 80 kilometers (km) southwest of the Chicago Metropolitan Area and 20 mi (32 km) south-southwest of Joliet. The Kankakee River is approximately 5 mi (8 km) east of the eastern site boundary. An onsite 2,540-acre (ac); 1,030-hectare (ha) cooling pond provides condenser cooling. Cooling water is withdrawn from the pond through the lake screen house, which is located at the north end of the pond. Heated water returns to the cooling pond through a discharge canal west of the lake screen house intake that is separated from the intake by a dike. The pond typically holds 22,300 acre-feet (27.5 million cubic meters) of water at any given time. The cooling pond includes both "essential" and "non-essential" areas. The essential cooling pond is the portion of the cooling pond that serves as the UHS for emergency core cooling, and it consists of a 99 ac (40-ha) excavated area of the pond directly in front of the lake screen house. The essential cooling pond's principal functions are to dissipate residual heat after reactor shutdown and to dissipate heat after an accident. It is capable of supplying Braidwood's cooling system with water for 30 days of station operation without additional makeup water. For clarity, use of the term "UHS" in this EA refers to the 99-ac (40-ha) essential cooling pond, and use of the term "cooling pond" or "pond" describes the entire 2,540-ac (1,030-ha) area, which includes both the essential and non-essential areas.

The cooling pond is part of the Mazonia-Braidwood State Fish and Wildlife Area, which encompasses the majority of the non-UHS area of the cooling pond as well as Illinois Department of Natural Resources (IDNR) owned lands adjacent to the Braidwood

site to the south and southwest of the cooling pond. The licensee and the IDNR have jointly managed the cooling pond as part of the Mazonia-Braidwood State Fish and Wildlife Area since 1991 pursuant to a long-term lease agreement. Under the terms of the agreement, the public has access to the pond for fishing, waterfowl hunting, fossil collecting, and other recreational activities.

The cooling pond is a wastewater treatment works as defined by section 301.415 of Title 35 of the Illinois Administrative Code (35 IAC 301.415). Under this definition, the cooling pond is not considered waters of the State under Illinois Administrative Code (35 IAC 301.440) or waters of the United States under the Federal Clean Water Act (40 CFR 230.3(s)), and so the cooling pond is not subject to State water quality standards. The cooling pond can be characterized as a managed ecosystem where IDNR fish stocking and other human activities primarily influence the species composition and population dynamics.

Since the beginning of the lease agreement between the licensee and IDNR, the IDNR has stocked the cooling pond with a variety of game fish, including largemouth bass (*Micropterus salmoides*), smallmouth bass (*M. dolomieu*), blue catfish (*Ictalurus furcatus*), striped bass (*Morone saxatilis*), crappie (*Pomoxis* spp.), walleye (*Sander vitreum*), and tiger muskellunge (*Esox masquinongy x lucius*). IDNR performs annual surveys to determine which fish to stock based on fishermen preferences, fish abundance, different species' tolerance to warm waters, predator and prey dynamics, and other factors. Because of the warm water temperatures experienced in the summer months, introductions of warm-water species, such as largemouth bass and blue catfish, have been more successful than introductions of cool-water species, such as walleye and tiger muskellunge. Since annual surveys began in 1980, IDNR has collected 47 species in the cooling pond. In recent years, bluegill (*Lepomis macrochirus*), channel



catfish (*Ictalurus punctatus*), threadfin shad (*Dorosoma petenense*), and common carp (*Cyprinus carpio*) have been among the most abundant species in the cooling pond. Gizzard shad (*Dorosoma cepedianum*), one of the most frequently affected species during periods of elevated pond temperatures, have decreased in abundance dramatically in recent years, while bluegills, which can tolerate high temperatures with relatively high survival rates, have noticeably increased in relative abundance. IDNR stocked warm water game species, such as largemouth bass and blue catfish, continue to persist in small numbers, while cooler water stocked species, such as walleye and tiger muskellunge, no longer appear in IDNR survey collections. No federally listed species or designated critical habitats protected under the Endangered Species Act (ESA) occur within or near the cooling pond.

The Kankakee River serves as the source of makeup water for the cooling pond. The river also receives continuous blowdown from the cooling pond. Water is withdrawn from a small river screen house located on the Kankakee River, and liquid effluents from Braidwood are discharged into the cooling pond blowdown line, which subsequently discharges into the Kankakee River.

The plant site and environs are described in greater detail in Chapter 3 of the NRC's November 2015 Generic Environmental Impact Statement for License Renewal of Nuclear Plants: Regarding Braidwood Station, Units 1 and 2, Final Report (NUREG 1437, Supplement 55) (herein referred to as the "Braidwood FSEIS" (Final Supplemental Environment Impact Statement)). Figure 3-5 on pages 3-7 of the Braidwood FSEIS depicts the Braidwood plant layout, and Figure 3-4 on pages 3-6 depicts the cooling pond, including the portion of the pond that constitutes the essential cooling pond (or UHS) and the blowdown line to the Kankakee River.

### *Environmental Impacts of the Proposed Action*

Regarding radiological impacts, the proposed action would not result in any changes in the types of radioactive effluents that may be released from the plant offsite. No significant increase in the amount of any radioactive effluent released offsite or significant increase in occupational or public radiation exposure is expected from the proposed action. Separate from this EA, the NRC staff is evaluating the licensee's safety analyses of the potential radiological consequences of an accident that may result from the proposed action. The results of the NRC staff's safety analysis will be documented in a safety evaluation (SE). If the NRC staff concludes in the SE that all pertinent regulatory requirements related to radiological effluents are met by the proposed UHS temperature limit increase, then the proposed action would result in no significant radiological impact to the environment. The NRC staff's SE will be issued with the license amendments, if approved by the NRC. If the NRC staff concludes that all pertinent regulatory requirements are not met by the proposed UHS temperature limit increase, the requested amendment would not be issued.

Regarding potential nonradiological impacts, temporarily raising the maximum allowable UHS temperature from  $\leq 102^{\circ}\text{F}$  ( $38.9^{\circ}\text{C}$ ) to  $\leq 102.8^{\circ}\text{F}$  ( $39.3^{\circ}\text{C}$ ) could cause increased cooling pond water temperatures until September 30, 2022. Because the proposed action would not affect Braidwood's licensed thermal power level, the temperature rise across the condensers as cooling water travels through the cooling system would remain constant. Thus, if water in the UHS were to rise to  $102.8^{\circ}\text{F}$  ( $39.3^{\circ}\text{C}$ ), heated water returning to the cooling pond through the discharge canal, which lies west of the river screen house, would also experience a corresponding  $0.8^{\circ}\text{F}$  ( $0.4^{\circ}\text{C}$ ) increase. That additional heat load would dissipate across some thermal gradient as discharged water travels down the discharge canal and through the 99-ac (40-ha) UHS.

Fish kills are likely to occur when cooling pond temperatures rise above 95°F (35°C), the temperature at which most fish in the cooling pond are thermally stressed. For example, section 3.7.4 of the Braidwood FSEIS describes six fish kill events for the period of 2001 through 2015. The fish kill events, which occurred in July 2001, August 2001, June 2005, August 2007, June 2009, and July 2012, primarily affected threadfin shad and gizzard shad, although bass, catfish, carp, and other game fish were also affected. Reported peak temperatures in the cooling pond during these events ranged from 98.4°F (36.9°C) to over 100°F (37.8°C), and each event resulted in the death of between 700 to as many as 10,000 fish. During the July 2012 event, cooling pond temperatures exceeded 100°F (37.8°C), which resulted in the death of approximately 3,000 gizzard shad and 100 bass, catfish, and carp. This event coincided with the NRC's granting of Enforcement Discretion to allow Braidwood to continue to operate above the TS limit of  $\leq 100^{\circ}\text{F}$  (37.8°C). The IDNR attributed this event, as well as four of the other fish kill events, to high cooling pond temperatures resulting from Braidwood operation. Appendix B, section 4.1, of the Braidwood renewed facility operating licenses, requires Constellation to report to the NRC the occurrence of unusual or important environmental events, including fish kills, causally related to plant operation. Since the issuance of the Braidwood FSEIS in November 2015, the licensee has not reported any additional fish kill events to the NRC. Although not causally related to plant operation, fish kills have occurred since this time, the most recent of which occurred in August 2018 and July 2020.

In section 4.7.1.3 of the Braidwood FSEIS, the NRC staff concluded that thermal impacts associated with continued operation of Braidwood during the license renewal term would result in SMALL to MODERATE impacts to aquatic resources in the cooling pond. MODERATE impacts would primarily be experienced by gizzard shad and other

non-stocked and low-heat tolerant species. As part of its conclusion, the NRC staff also noted that because the cooling pond is a highly managed system, any cascading effects that result from the loss of gizzard shad (such as reduction in prey for stocked species, which in turn could affect those stocked species' populations) could be mitigated through IDNR's annual stocking and continual management of the pond. At that time, the UHS TS limit was  $\leq 100^{\circ}\text{F}$  ( $37.8^{\circ}\text{C}$ ).

In 2016, the NRC granted license amendments that increased the allowable UHS average water temperature TS limit from  $\leq 100^{\circ}\text{F}$  ( $37.8^{\circ}\text{C}$ ) to  $\leq 102.0^{\circ}\text{F}$  ( $38.9^{\circ}\text{C}$ ). In the EA associated with these amendments, the NRC staff concluded that increasing the TS limit to  $\leq 102.0^{\circ}\text{F}$  ( $38.9^{\circ}\text{C}$ ) would have no significant environmental impacts, and the NRC issued a FONSI with the EA.

In 2020 and 2021, the NRC granted license amendments that temporarily increased the allowable UHS average water temperature TS limit from  $\leq 102.0^{\circ}\text{F}$  ( $38.9^{\circ}\text{C}$ ) to  $\leq 102.8^{\circ}\text{F}$  ( $39.3^{\circ}\text{C}$ ) until September 30, 2020, and September 30, 2021, respectively. In the EA associated with these amendments, the NRC staff concluded that temporarily increasing the TS limit to  $\leq 102.8^{\circ}\text{F}$  ( $39.3^{\circ}\text{C}$ ) would have no significant environmental impacts, and the NRC issued a FONSI with the EA.

The NRC staff finds that the proposed action would not result in significant impacts to aquatic resources in the cooling pond for the same reasons that the NRC staff made this conclusion regarding the 2020 and 2021 amendments. The staff's justification for this conclusion follows.

The proposed increase in the allowable UHS average water temperature limit by  $0.8^{\circ}\text{F}$  ( $0.4^{\circ}\text{C}$ ) would not increase the likelihood of a fish kill event attributable to high cooling pond temperatures because the current TS limit for the UHS of  $102.0^{\circ}\text{F}$  ( $38.9^{\circ}\text{C}$ ) already allows cooling pond temperatures above those at which most fish species are

thermally stressed (95°F (35°C)). In effect, if the UHS temperature rises to the current TS limit, fish within or near the discharge canal, within the flow path between the discharge canal and UHS, or within the UHS itself would have already experienced thermal stress and possibly died. Thus, an incremental increase in the allowable UHS water temperature by 0.8°F (0.4°C) and the corresponding temperature increases within and near the discharge canal and within the flow path between the discharge canal and UHS would not significantly affect the number of fish kill events experienced in the cooling pond. Additionally, the proposed action would only increase the allowable UHS average water temperature until September 30, 2022. Thus, any impacts to the aquatic community of the cooling pond, if experienced, would be temporary in nature, and fish populations would likely recover relatively quickly.

While the proposed action would not affect the likelihood of a fish kill event occurring during periods when the average UHS water temperature approaches the TS limit, the proposed action could increase the number of fish killed per high temperature event. For fish with thermal tolerances at or near 95°F (35°C), there would likely be no significant difference in the number of affected fish per high temperature event because, as already stated, these fish would have already experienced thermal stress and possibly died, and the additional temperature increase would not measurably affect the mortality rate of these individuals. For fish with thermal tolerances above 95°F (35°C), such as bluegill, increased mortality is possible, as described in this EA.

The available scientific literature provides conflicting information as to whether incremental temperature increases would cause a subsequent increase in mortality rates of bluegill or other high-temperature-tolerant fish when temperatures exceed 100°F (37.8°C). For instance, in laboratory studies, Banner and Van Arman (1973) demonstrated 85 percent survival of juvenile bluegill after 24 hours of exposure to 98.6°F

(37.0°C) water for stock acclimated to 91.2°F (32.9°C). At 100.0°F (37.8°C), survival decreased to 25 percent, and at 100.4°F (38.0°C) and 102.0°F (38.9°C), no individuals survived. Even at one hour of exposure to 102.0°F (38.9°C) water, average survival was relatively low at between 40 to 67.5 percent per replicate. However, in another laboratory study, Cairns (1956 in Banner and Van Arman 1973) demonstrated that if juvenile bluegill were acclimated to higher temperatures at a 3.6°F (2.0°C) increase per day, individuals could tolerate water temperatures up to 102.6°F (39.2°C) with 80 percent survival after 24 hours of exposure.

Although these studies provide inconsistent thermal tolerance limits, information from past fish kill events indicates that Cairns' results better describe the cooling pond's bluegill population because the licensee has not reported bluegill as one of the species that has been affected by past high temperature events. Thus, bluegills are likely acclimating to temperature rises at a rate that allows those individuals to remain in high temperature areas until temperatures decrease or that allows individuals time to seek refuge in cooler areas of the pond. Alternately, if Banner and Van Arman's results were more predictive, 75 percent or more of bluegill individuals in high temperature areas of the cooling pond could be expected to die at temperatures approaching or exceeding 100°F (37.8°C) for 24 hours, and shorter exposure time would likely result in the death of some reduced percentage of bluegill individuals.

Under the proposed action, fish exposure to temperatures approaching the proposed UHS TS average water temperature limit of 102.8°F (39.3°C) and those exposed to the associated discharge, which would be 0.8°F (0.4°C) higher than under the current TS limit, for at least one hour would result in observable deaths. However, as stated previously, the licensee has not reported bluegill as one of the species that has been affected during past fish kills. Consequently, the NRC staff assumes that bluegill

and other high-temperature-tolerant species in the cooling pond would experience effects similar to those observed in Cairn's study. Based on Cairn's results, the proposed action's incremental and short-term increase of 0.8°F (0.4°C) could result in the death of some additional high-temperature-tolerant individuals, especially in cases where cooling pond temperatures rise dramatically over a short period of time (more than 3.6°F (2.0°C) in a 24-hour period).

Nonetheless, the discharge canal, flow path between the discharge canal and the UHS, and the UHS itself is a small portion of the cooling pond. Thus, while the incremental increase would likely increase the area over which cooling pond temperatures would rise, most of the cooling pond would remain at tolerable temperatures, and fish would be able to seek refuge in those cooler areas. Therefore, only fish within or near the discharge canal, within the flow path between the discharge canal and UHS, or within the UHS itself at the time of elevated temperatures would likely be affected, and fish would experience such effects to lessening degrees over the thermal gradient that extends from the discharge canal. This would not result in a significant difference in the number of fish killed per high temperature event resulting from the proposed action when compared to current operations for those species with thermal tolerances at or near 95°F (35°C) and an insignificant increase in the number of individuals affected for species with thermal tolerances above 95°F (35°C), such as bluegill. Additionally, the cooling pond is a managed ecosystem in which fish stocking, fishing pressure, and predator-prey relationships constitute the primary population pressures.

Fish populations affected by fish kills generally recover quickly, and thus, fish kills do not appear to significantly influence the fish community structure. This is demonstrated by the fact that the species that are most often affected by high

temperature events (threadfin shad and gizzard shad) are also among the most abundant species in the cooling pond. Managed species would continue to be assessed and stocked by the IDNR on an annual basis in accordance with the lease agreement between Constellation and IDNR. Continued stocking would mitigate any minor effects resulting from the proposed action.

Based on the foregoing analysis, the NRC staff concludes that the proposed action would not result in significant impacts to aquatic resources in the cooling pond. Some terrestrial species, such as birds or other wildlife, rely on fish or other aquatic resources from the cooling pond as a source of food. The NRC staff does not expect any significant impacts to birds or other wildlife because, if a fish kill occurs, the number of dead fish would be a small proportion of the total population of fish in the cooling pond. Furthermore, during fish kills, birds and other wildlife could consume many of the floating, dead fish. Additionally, and as described previously, the NRC staff does not expect that the proposed action would result in a significant difference in the number or intensity of fish kill events or otherwise result in significant impacts on aquatic resources in the cooling pond.

With respect to water resources and ecological resources along and within the Kankakee River, the Illinois Environmental Protection Agency imposes regulatory controls on Braidwood's thermal effluent through Title 35, Environmental Protection, section 302, "Water Quality Standards," of the Illinois Administrative Code (35 IAC 302) and through the National Pollutant Discharge Elimination System (NPDES) permitting process pursuant to the Clean Water Act. Section 302 of the Illinois Administrative Code stipulates that "[t]he maximum temperature rise shall not exceed 2.8°C (5°F) above natural receiving water body temperatures," (35 IAC 302.211(d)) and that "[w]ater temperature at representative locations in the main river shall at no time exceed 33.7°C



(93°F) from April through November and 17.7°C (63°F) in other months" (35 IAC 302.211(e)). Additional stipulations pertaining to the mixing zone further protect water resources and biota from thermal effluents. The Braidwood NPDES permit contains special conditions that mirror these temperature requirements and that stipulate more detailed temperature requirements at the edge of the mixing zone. Under the proposed action, Braidwood thermal effluent would continue to be limited by the Illinois Administrative Code and the Braidwood NPDES permit to ensure that Braidwood operations do not create adverse effects on water resources or ecological resources along or within the Kankakee River. Occasionally, the licensee has applied for a provisional variance to allow higher-than-permitted temperatures at the edge of the discharge mixing zone. For instance, Exelon, the license holder at the time, applied for and the IEPA granted one provisional variance in 2012 during a period of extremely warm weather and little to no precipitation. Exelon reported no fish kills or other events to the IEPA or the NRC that would indicate adverse environmental effects resulting from the provisional variance. The details of this provisional variance are described in section 4.7.1.3 of the Braidwood FSEIS.

Under the proposed action, Constellation would remain subject to the regulatory controls described in this notice. The NRC staff finds it reasonable to assume that Constellation's continued compliance with, and the State's continued enforcement of, the Illinois Administrative Code and the Braidwood NPDES permit would ensure that Kankakee River water and ecological resources are protected. Further, the proposed action would not alter the types or amounts of effluents being discharged to the river as blowdown. Therefore, the NRC staff does not expect any significant impacts to water resources or ecological resources within and along the Kankakee River from temporarily increasing the allowable UHS average water temperature TS limit.

With respect to federally listed species, the NRC staff consulted with the U.S. Fish and Wildlife Service (FWS) pursuant to section 7 of the ESA during its license renewal environmental review for Braidwood. During that consultation, the NRC staff found that the sheepsnose (*Plethobasus cyphus*) and snuffbox (*Epioblasma triquetra*) mussels had the potential to occur in the areas that would be directly or indirectly affected by license renewal (i.e., the action area). In September 2015, Exelon transmitted the results of a mussel survey to the NRC and FWS. The survey documented the absence of federally listed mussels near the Braidwood discharge site in the Kankakee River. Based on this survey and other information described in the Braidwood FSEIS, the NRC concluded that the license renewal may affect, but is not likely to adversely affect the sheepsnose mussel, and the NRC determined that license renewal would have no effect on the snuffbox mussel. The FWS concurred with the NRC's "not likely to adversely affect" determination in a letter dated October 20, 2015. The results of the consultation are further summarized in the Record of Decision for Braidwood license renewal.

As previously described, impacts of the proposed action would be confined to the cooling pond and would not affect water resources or ecological resources along and within the Kankakee River. The NRC's previous ESA, section 7, consultation confirmed that no federally listed aquatic species occur within or near the cooling pond. The NRC has not identified any information indicating the presence of federally listed species in the area since that consultation concluded, and the FWS has not listed any new aquatic species that may occur in the area since that time. The proposed action would not result in any disturbance or other impacts to terrestrial habitats, and thus, no federally listed terrestrial species would be affected. Accordingly, the NRC staff concludes that the proposed action would have no effect on federally listed species or designated critical

habitat. Consultation with the FWS regarding the proposed action is not necessary because Federal agencies are not required to consult with the FWS if the agency determines that an action will have no effect on listed species or critical habitat.

The NRC staff has identified no foreseeable land use, visual resource, noise, or waste management impacts given that the proposed action would not result in any physical changes to Braidwood facilities or equipment or changes any land uses on or off site. The NRC staff has identified no air quality impacts given that the proposed action would not result in air emissions beyond what would be experienced during current operations. Additionally, there would be no socioeconomic, environmental justice, or historic and cultural resource impacts associated with the proposed action since no physical changes would occur beyond the site boundaries and any impacts would be limited to the cooling pond.

Based on the foregoing analysis, the NRC staff concludes that the proposed action would have no significant environmental impacts.

#### *Environmental Impacts of the Alternatives to the Proposed Action*

As an alternative to the proposed action, the staff considered denial of the proposed action (i.e., the “no-action” alternative). Environmental Impacts of the Alternatives to the Proposed Action

As an alternative to the proposed action, the NRC staff considered the denial of the proposed action (i.e., the “no action” alternative). Denial of the proposed action would result in no changes to the current TS. Thus, under the proposed action, the licensee would continue to be required to place Braidwood in hot standby (Mode 3) if average UHS water temperatures exceed 102°F (38.9°C) for the temporary period of July 2022 through September 2022. The no-action alternative would result in no change in current environmental conditions or impacts at Braidwood.

### *Alternative Use of Resources*

There are no unresolved conflicts concerning alternative uses of available resources under the proposed action.

### *Agencies and Persons Consulted*

No additional agencies or persons were consulted regarding the environmental impact of the proposed action.

## **III. Finding of No Significant Impact**

The NRC is considering issuing amendments for Renewed Facility Operating License Nos. NPF-72 and NPF-77, issued to Constellation for operation of Braidwood that would revise the TS for the plant to temporarily increase the allowable average temperature of the UHS.

On the basis of the EA included in Section II and incorporated by reference in this finding, the NRC concludes that the proposed action would not have significant effects on the quality of the human environment. The NRC's evaluation considered information provided in the licensee's application as well as the NRC's independent review of other relevant environmental documents. Section IV lists the environmental documents related to the proposed action and includes information on the availability of these documents. Based on its finding, the NRC has decided not to prepare an environmental impact statement for the proposed action.

This FONSI and other related environmental documents are available for public inspection and are accessible online in the ADAMS Public Documents collection at <https://www.nrc.gov/reading-rm/adams.html>. Persons who do not have access to ADAMS or who encounter problems in accessing the documents located in ADAMS should contact the NRC's PDR reference staff by telephone at 1-800-397-4209 or 301-415-4737, or by email to [PDR.Resource@nrc.gov](mailto:PDR.Resource@nrc.gov).

#### IV. Availability of Documents

The documents identified in the following table are available to interested persons through one or more of the following methods, as indicated.

DOCUMENT	ADAMS ACCESSION NO.
<b>License Amendment Request</b>	
Constellation Energy Generation, LLC. License Amendment to Braidwood Station, Units 1 and 2, Technical Specification 3.7.9, "Ultimate Heat Sink," dated June 3, 2022.	ML22154A203
<b>Other Referenced Documents</b>	
Cairns J. 1956. Effects of heat on fish. <i>Industrial Wastes</i> , 1 :180-183.	n/a <sup>(1)</sup>
Banner A, Van Arman JA. 1973. Thermal effects on eggs, larvae and juveniles of bluegill sunfish. Washington, DC: U.S. Environmental Protection Agency. EPA-R3- 73-041.	n/a <sup>(1)</sup>
Ecological Specialists, Inc. Final Report: Five Year Post-Construction Monitoring of the Unionid Community Near the Braidwood Station Kankakee River Discharge, dated September 29, 2015.	ML15274A093 (Package)
Exelon Generation Company, LLC. Byron and Braidwood Stations, Units 1 and 2, License Renewal Application, Braidwood Station Applicant's Environmental Report, Responses to Requests for Additional Information, Environmental RAIs AQ-11 to AQ-15, dated April 30, 2014.	ML14339A044
U.S. Fish and Wildlife Service. Concurrence Letter Concluding Informal Consultation with the NRC for Braidwood License Renewal, dated October 20, 2015.	ML15299A013
Exelon Generation Company, LLC. License Amendment to Braidwood Station, Units 1 and 2, Technical Specification 3.7.9, "Ultimate Heat Sink," dated May 27, 2021.	ML21147A543

Exelon Generation Company, LLC. License Amendment to Braidwood Station, Units 1 and 2, Technical Specification 3.7.9, "Ultimate Heat Sink," dated July 15, 2020.	ML20197A434
Exelon Generation Company, LLC Supplement to License Amendment to Braidwood Station, Unit 1 and 2, Technical Specification 3.7.9, "Ultimate Heat Sink," dated August 14, 2020.	ML20227A375
U.S. Nuclear Regulatory Commission. Generic Environmental Impact Statement for License Renewal of Nuclear Plants: Regarding Braidwood Station, Units 1 and Final Report (NUREG-1437, Supplement 55), dated November 30, 2015.	ML15314A814
U.S. Nuclear Regulatory Commission. Exelon Generation Company, LLC; Docket No. STN 50-456; Braidwood Station, Unit 1 Renewed Facility Operating License, issued on January 27, 2016.	ML053040362
U.S. Nuclear Regulatory Commission. Exelon Generation Company, LLC; Docket No. STN 50-457; Braidwood Station, Unit 2 Renewed Facility Operating License, issued on January 27, 2016.	ML053040366
U.S. Nuclear Regulatory Commission. Record of Decision; U.S. Nuclear Regulatory Commission; Docket Nos. 50-456 and 560-457; License Renewal Application for Braidwood Station, Units 1 and 2, dated January 27, 2016.	ML15322A317
U.S. Nuclear Regulatory Commission. Environmental Assessment and Finding of No Significant Impact Related to Ultimate Heat Sink Modification, dated July 18, 2016.	ML16181A007
U.S. Nuclear Regulatory Commission. Braidwood Station, Units 1 and 2 – Issuance of Amendments Re: Ultimate Heat Sink Temperature Increase, dated July 26, 2016.	ML16133A438

U.S. Nuclear Regulatory Commission. Environmental Assessment and Finding of No Significant Impact Related to Temporary Revision of Technical Specifications for the Ultimate Heat Sink, dated September 3, 2020.	ML20231A469
U.S. Nuclear Regulatory Commission. Braidwood Station, Units 1 and 2 – Issuance of Amendments Re: Temporary Revision of Technical Specifications for the Ultimate Heat Sink, dated September 24, 2020.	ML20245E419
U.S. Nuclear Regulatory Commission. Environmental Assessment and Finding of No Significant Impact Related to Temporary Revision of Technical Specifications for the Ultimate Heat Sink, dated June 30, 2021.	ML21165A041
U.S. Nuclear Regulatory Commission. Braidwood Station, Units 1 and 2 – Issuance of Amendments Re: Temporary Revision of Technical Specifications for the Ultimate Heat Sink, dated July 13, 2021.	ML21154A046
<sup>(1)</sup> These references are subject to copyright laws and are, therefore, not reproduced in ADAMS.	

Dated: July 15, 2022.

For the Nuclear Regulatory Commission.

**/RA/**

Surinder S. Arora, Project Manager,  
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Division of Operating Reactor Licensing,  
Office of Nuclear Reactor Regulation.

SUBJECT: BRAIDWOOD STATION, UNITS 1 AND 2 – ENVIRONMENTAL ASSESSMENT  
AND FINDING OF NO SIGNIFICANT IMPACT RELATED TO A REQUESTED  
INCREASE IN ULTIMATE HEAT SINK TEMPERATURE  
(EPID L-2022-LLA-0082) DATED JULY 15, 2022

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**ADAMS Accession Nos.:**

**Letter (NRR-106) ML22159A174**

**EA FRN (ADM-012) ML22159A176**

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DATE	6/21/22	6/8/22	6/27/22
OFFICE	OGC - NLO	NRR/DORL/LPL3/BC	NRR/DORL/LPL3/PM
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DATE	7/13/22	7/13/22	7/15/22

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