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Alexander B. Grannis
Commissioner

April 2, 2010

VIA E-MAIL AND
FIRST CLASS MAIL

Dara F. Gray
Entergy Nuclear Operations, Inc.
Indian Point Energy Center
450 Broadway, Suite 3
Buchanan, New York 10511

Re: Joint Application for CWA § 401 Water Quality Certification
NRC License Renewal – Entergy Nuclear Indian Point Units 2 and 3
DEC Nos.: 3-5522-00011/00030 (IP2) and 3-5522-00105/00031 (IP3)
Notice of Denial

Dear Ms. Gray:

On April 6, 2009, the New York State Department of Environmental Conservation (Department or DEC) received a Joint Application for a federal Clean Water Act (CWA) § 401 Water Quality Certificate (WQC) on behalf of Entergy Indian Point Unit 2, LLC, Entergy Indian Point Unit 3, LLC, and Entergy Nuclear Northeast (collectively Entergy). The Joint Application for § 401 WQC was submitted to the Department as part of Entergy's federal license renewal and 20-year extension request to the Nuclear Regulatory Commission (NRC) for Indian Point nuclear Unit 2 and Indian Point nuclear Unit 3 (collectively, the Indian Point facilities). Pursuant to the CWA, a state must determine whether to issue a certification verifying that an activity which results in a discharge into navigable waters–such as operation of the Indian Point facilities–meets state water quality standards before a federal license or permit for such activity can be issued.

Entergy is seeking a 20-year license extension from the NRC for the continued operation of the Indian Point facilities (Units 2 and 3). It is undisputed that the operation of the facilities involves the withdrawal from, and discharge into, a navigable surface water of the State, namely the Hudson River. Consequently, Entergy has requested the Department to issue a § 401 WQC to run concurrently with any renewed nuclear licenses for the Indian Point facilities.

Over the last 12 months, Entergy has supplemented its original Joint Application for § 401 WQC at various times (a summary of those occasions is provided in Table 1 below). Based on a thorough review and consideration of the original Joint Application and all of Entergy's supplemental submissions, the Department has determined that the facilities, whether operated as they have for the last 35 years (as proposed in the original Joint Application) or

operated with the addition of a cylindrical wedge-wire screen system (as proposed in Entergy's February 12, 2010, submission), do not and will not comply with existing New York State water quality standards. Accordingly, pursuant to 6 NYCRR Part 621 (Uniform Procedures), the Department hereby provides notice to Entergy that its request for a § 401 WQC is denied. As further required by 6 NYCRR Part 621, a statement of the Department's reasons for the denial is provided below.

Background

The Facilities

As indicated, Entergy filed a Joint Application with the Department for a § 401 WQC for the continued operation of Indian Point nuclear Units 2 and 3 in April 2009.[1] Indian Point Units 2 and 3 are both Westinghouse four-loop pressurized water reactors (PWRs) with net capacities of 1078 MWe and 1080 MWe of electrical power, respectively. The facilities are located on the east bank of the Hudson River in the Village of Buchanan, Westchester County. Each Unit utilizes a once-through cooling water intake system, with the intake structures in, and a shared discharge canal to, the Hudson River. The design rate of the cooling water intake system for each Unit is 840,000 gallons of water per minute (GPM)–for a combined intake capacity of approximately 2.5 billion gallons of Hudson River water per day.

PWRs are designed to produce electrical energy by creating thermal energy from a nuclear reaction which, in turn, produces steam for steam generators. A nuclear reaction (fission) inside the reactor vessel creates heat, and pressurized water in the primary coolant loop carries the heat to steam generators. Inside the steam generators, heat from the steam is directed to the main turbine, causing it to turn the turbine generator, where it is converted into electricity. The unused steam is exhausted into the condenser where it is condensed into water. That water is then pumped out of the condenser with a series of pumps, reheated and pumped back to the reactor vessel.

Cooling water is a critical component of the nuclear plant operating system, both to create the steam for generating electricity and for cooling the reactor and associated components. Indian Point Units 2 and 3 utilize a once-through cooling water system, and each Unit has its own cooling water intake structure (CWIS) located in the Hudson River. A once-through cooling system operates by withdrawing water from its source, in this case the Hudson River, where it is passed through a steam condenser one time, and then discharged to the source at a higher temperature (*i.e.*, thermal discharge).

Units 2 and 3 have separate CWISs, and both CWISs are located along the shoreline of the Hudson River. The withdrawal of up to 2.5 billion gallons of water per day from the Hudson River by Indian Point Units 2 and 3 results in an adverse environmental impact upon aquatic organisms (a discussion of the adverse environmental impact caused by Indian Point's operations is included in greater detail below). Since the original construction and operation of the Indian Point facilities in the 1970s, the CWISs have been retrofitted with certain technologies in order

1 Indian Point Unit 1 ceased operation in 1974 and, as such, was not included as part of Entergy's Joint Application.

to mitigate some adverse environmental impact to aquatic organisms.

In that regard, both Units 2 and 3 are equipped with modified Ristroph-type traveling screens, fish handling and return systems, and low pressure screenwash systems intended to reduce the number of aquatic organisms injured and killed by being impinged by the facilities' CWISs each year.[2] The facilities have also, on occasion, reduced flow as an operational measure in an attempt to reduce, but not minimize, the adverse environmental impact of entrainment from their CWISs.[3] These flow reductions have been achieved by the operation of dual/variable-speed pumps on the CWISs and from limited outage periods for the purpose of maintaining and/or refueling the Indian Point facilities. The reductions in flow have resulted in some limited entrainment reductions, however, because Units 2 and 3 operate as baseloaded units, the reduction in water use afforded by these operational modifications is minimal, thereby resulting in only a small reduction in the number of aquatic organisms entrained by the facilities' CWISs each year.

Operation and Permitting

Nuclear Licenses

Indian Point Unit 2 was initially licensed by the Atomic Energy Commission (AEC), the predecessor to the NRC, on September 28, 1973. The AEC issued a 40-year license for Unit 2 that will expire on September 29, 2013. Unit 2 was originally licensed to the Consolidated Edison Company, which sold that facility to Entergy in September 2001.

Indian Point Unit 3 was initially licensed on December 12, 1976, for a 40-year period that will expire in December 2015. While the Consolidated Edison Company of New York originally owned and operated Unit 3, it was later conveyed to the Power Authority of the State of New York (PASNY–the predecessor to the New York Power Authority [NYPA]). PASNY/NYPA operated Unit 3 until November 2000 when it was sold to Entergy.

The licenses issued by the AEC for Units 2 and 3 initially allowed for the operation of those facilities with once-through cooling systems. However, the Final Environmental Statements issued by the AEC and NRC for Units 2 and 3, respectively, called for installation of closed-cycle cooling systems at the facilities, by certain dates, because of the potential for long term environmental impact from the once-through cooling systems on aquatic biota inhabiting the Hudson River which would result in permanent damage to and severe reduction in the fishery, particularly striped bass. *See Final Environmental Statement Related to Operation of Indian Point Nuclear Generating Plant Unit No. 2, Consolidated Edison Company of New York, Inc., September 1972 – Docket No. 50-247* [AEC, Directorate of Licensing]; and *Final Environmental Statement Related to Operation of Indian Point Nuclear Generating Plant Unit*

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2 Impingement occurs when larger aquatic organisms, like fish, are trapped and are injured or killed by the pressure from the flow of large volumes of water against a CWIS.

3 Entrainment occurs when smaller aquatic organisms, like plankton, eggs, and larvae, are drawn into a CWIS by the flow of water and are injured or killed in the process.

No. 3, Consolidated Edison Company of New York, Inc., February 1975 – Docket No. 50-286 [NUREG-75/002].

Subsequently, the NRC sought to amend the licenses for Units 2 and 3 to terminate the use of once-through cooling and to require the facilities to construct and operate wet closed-cycle cooling systems[4] due to "the unacceptability of long-term impacts of entrainment and impingement on the Hudson River fishery." Thus, the license for Unit 2 was amended by the NRC in 1975, and the license for Unit 3 was amended by the NRC in 1976, to include requirements for the installation and operation of wet closed-cycle cooling systems at the facilities.

In conjunction with the license amendments, the NRC prepared Environmental Statements for Units 2 and 3 (based upon detailed reports filed by the licensees) in which various alternative closed-cycle cooling systems for the facilities were evaluated from an environmental and economic standpoint. See *NRC's Final Environmental Statement Related to Selection of the Preferred Closed Cycle Cooling System at Indian Point Unit 2, Consolidated Edison Company of New York, Inc., August 1976 – Docket No. 50-247* [NUREG-0042]; and *NRC's Final Environmental Statement Related to Selection of the Preferred Closed Cycle Cooling System at Indian Point Unit 3, Consolidated Edison Company of New York, Inc., and Power Authority of the State of New York, December 1979 – Docket No. 50-286* [NUREG-0574]; see also *Economic and Environmental Impacts of Alternative Closed-Cycle Cooling Systems for Indian Point Unit No. 2, Consolidated Edison Company of New York, Inc., December 1974 – Docket No. 50-247;* and *Economic and Environmental Impacts of Alternative Closed-Cycle Cooling Systems for Indian Point Unit No. 3, Consolidated Edison Company of New York, Inc., January 1976 – Docket No. 50-286.*

On the basis of the evaluation and analysis set forth in the NRC's Final Environmental Statements for Units 2 and 3, and after weighing the environmental, economic, technical, and other benefits against environmental costs and risks and considering available alternatives, the NRC concluded that the operating licenses for the facilities should be amended to authorize construction of natural draft cooling towers (*i.e.,* a closed-cycle cooling system) at each Unit. See *id.* Prior to the respective deadlines for installation of closed-cycle cooling at the Indian Point facilities, however, the NRC's authority to require the retrofit under federal nuclear licenses was superseded by comprehensive amendments to the federal Water Pollution Prevention and Control Act (a/k/a the Clean Water Act [CWA]) and creation of the National Pollutant Discharge Elimination System (NPDES) program. See 33 U.S.C. §§ 1251 to 1387.

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4 Wet closed-cycle cooling systems re-circulate water, after allowing it to cool off in a reservoir or tower before being reused, and add water to the system only to replace that which is lost through evaporation. Wet closed-cycle cooling systems, therefore, withdraw far less water than once-through systems. In fact, wet closed-cycle cooling systems use approximately 90 to 96 percent less water than similarly situated once-through systems. Thus, use of a wet closed-cycle cooling system substantially reduces the number of aquatic organisms impinged and entrained by a CWIS.

NPDES/SPDES Permits

Much like NRC's nuclear licenses, the U.S. Environmental Protection Agency (USEPA) issued separate NPDES permits for Units 2 and 3, pursuant to provisions of the CWA, chiefly § 316 (33 U.S.C. § 1326), that required both facilities to discontinue discharging heated effluent from the main condensers. The NPDES permits provided that "heat may be discharged in blowdown from a re-circulated cooling water system." The intent of these conditions was to require the facilities to install closed-cycle cooling systems in order to reduce the thermal and adverse environmental impact from the operation of Indian Point's CWISs upon aquatic organisms in the Hudson River. In 1977, the facilities' owners, Consolidated Edison Company of New York and PASNY/NYPA, requested administrative hearings with the USEPA to overturn these conditions.

In October 1975, the Department received approval from the USEPA to administer and conduct a State permit program pursuant to the provisions of the federal NPDES program under CWA § 402. Since then, the Department has administered that program under the State Pollutant Discharge Elimination System (SPDES) permit program. See Environmental Conservation Law (ECL) Article 17, Title 8; and implementing regulations at 6 NYCRR Part 750. As a result, the Department has the authority, under the CWA and independent State law, to issue SPDES permits for the withdrawal of cooling water for operations at the Indian Point facilities and for the resulting discharge of waste heat and other pollutants into the Hudson River. See id. In order to obtain a SPDES permit from the Department, the facilities must demonstrate that their CWISs use the best technology available to minimize environmental harm. See *Matter of Entergy Nuclear Indian Point v New York State Dept. of Envtl. Conservation,* 23 AD3d 811 (3d Dept. 2005), *appeal dismissed in part and denied in part* 6 NY3d 802 (2006); see also *Hudson Riverkeeper Fund, Inc. v Orange and Rockland Utilities, Inc.,* 835 F.Supp. 160 (S.D.N.Y. 1993).

As previously noted, in 1977 the then-owners of the Indian Point nuclear facilities sought an adjudicatory proceeding to overturn the USEPA-issued NPDES permit determinations that limited the scope of the facilities' cooling water intake operations. The USEPA's adjudicatory process lasted for several years before culminating in a multi-party settlement known as the Hudson River Settlement Agreement (HRSA).[5] The HRSA was initially a ten-year agreement (from December 1980 to December 1990) whereby the owners of certain once-through cooled electric generating plants on the Hudson River, including Indian Point, would collect biological data and complete analytical assessments to determine the scope of adverse environmental impact caused by those facilities.

The intent of the HRSA was that, based upon the data and analyses provided by the facilities, the Department could determine, and parties could agree upon, the best technology available (BTA) to minimize adverse environmental impact on aquatic organisms in the Hudson River from these facilities in accordance with 6 NYCRR § 704.5. The terms of the 1980 HRSA

5 . The signatory parties to the HRSA were USEPA, the Department, the New York State Attorney General, the Hudson River Fishermen's Association, Scenic Hudson, the Natural Resources Defense Council, Central Hudson Gas & Electric Co., Consolidated Edison Co., Orange & Rockland Utilities, Niagara Mohawk Power Corp., and PASNY. Entergy was not a party to the HRSA because it did not own the Indian Point facilities at any time during the period covered by the HRSA.

were extended through a series of four separate stipulations of settlement and judicial consent orders that were entered in Albany County Supreme Court [Index No. 0191-ST3251]. The last of these stipulations of settlement and judicial consent orders, executed by the parties in 1997, expired on February 1, 1998. Consequently, as a result of the HRSA and subsequent consent orders, final compliance determinations for the BTA requirement of 6 NYCRR § 704.5 for the facilities subject to the HRSA, including Indian Point, were effectively postponed for nearly 20 years.

In accordance with the provisions of the HRSA, in 1982 the Department issued a SPDES permit for Indian Point Units 2 and 3, and other Hudson River electric generating facilities, as well as a § 401 WQC for the facilities. The 1982 SPDES permit for Units 2 and 3 contained special conditions for reducing some of the adverse environmental impact from the facilities' CWISs but, based upon provisions of the HRSA, the permit did not require the installation of any technology for minimizing the number of organisms entrained by the facilities each year. Similarly, based upon provisions of the HRSA, the 1982 § 401 WQC did not make an independent determination that the facilities complied with certain applicable State water quality standards at that time, including 6 NYCRR Part 704–Criteria Governing Thermal Discharges.

In accordance with the provisions of the HRSA, the Department renewed the SPDES permit for the Indian Point facilities in 1987 for another 5-year period. *See* ECL § 17-0817. As with the 1982 SPDES permit, the 1987 SPDES permit for Units 2 and 3 contained certain measures from the HRSA that were intended to mitigate, but not minimize, the adverse environmental impact caused by the operation of the facilities' CWISs. The 1987 SPDES permit expired on October 1, 1992. Prior to the expiration date, however, the owners of the facilities at that time, Consolidated Edison and NYPA, both submitted timely SPDES permit renewal applications to the Department and, by operation of the State Administrative Procedure Act (SAPA), the 1987 SPDES permit for Units 2 and 3 is still in effect today. Entergy purchased Units 2 and 3 in 2001 and 2000, respectively, and the 1987 SAPA-extended SPDES permit for the facilities was subsequently transferred to Entergy.

In November 2003, the Department issued a draft SPDES permit for Units 2 and 3 that required Entergy, among other things, to retrofit the Indian Point facilities with closed-cycle cooling or an equivalent technology in order to minimize the adverse environmental impact caused by the CWISs in accordance with 6 NYCRR § 704.5 and CWA § 316(b).[6] In 2004, Entergy requested an adjudicatory hearing with the Department on the draft SPDES permit. That SPDES permit adjudicatory process is presently ongoing.

Currently, the facilities are still subject to the provisions of the 1987 SAPA-extended

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6 6 NYCRR § 704.5, a State water quality standard enacted by the Department in 1974, provides: "The location, design, construction and capacity of cooling water intake structures, in connection with point source thermal discharges, shall reflect the best technology available for minimizing adverse environmental impact."

For comparison, CWA § 316(b), enacted in 1972, provides: "Any standard established pursuant to section 301 [33 U.S.C. § 1311] or section 306 [33U.S.C. § 1316] of this Act and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact."

SPDES permit. As previously noted, however, the 1987 SPDES permit did not assess the need for, nor did it require the installation of, any technology for minimizing the adverse environmental impact (*i.e.*, entrainment) caused by the facilities' CWISs each year. *See Final Environmental Impact Statement Concerning the Applications to Renew New York State Pollutant Discharge Elimination System (SPDES) Permits for the Roseton 1 & 2, Bowline 1 & 2, and Indian Point 2 & 3 Steam Electric Generating Stations, Accepted by the New York Department of Environmental Conservation; June 25, 2003.* Therefore, as a result of the now-expired HRSA, the 1987 SPDES permit does not contain the "best technology available" (BTA) determination that is required by 6 NYCRR § 704.5 and CWA § 316(b).[7]

§ 401 WQC

As indicated, the Department, in accordance with CWA § 401, is required to certify that a facility meets state water quality standards prior to a federal agency issuing a federal license or permit in conjunction with its proposed operation. At the time Indian Point Units 2 and 3 were proposed for operation and went through the initial federal nuclear license processes in the 1970s, the Department did issue a § 401 WQC for both facilities. The combined § 401 WQC for Unit 1 (now closed) and Unit 2 was issued on December 7, 1970, with limited conditions. The Department issued a revised § 401 WQC in 1973 that encompassed only Unit 2, and on May 2, 1975, the Department issued a revised § 401 WQC to also encompass Unit 3. The 1975 § 401 WQC incorporated by reference the NPDES permit previously issued by the USEPA that required retrofitting of the facilities with a closed-cycle cooling system.

In 1982, in accordance with provisions of the HRSA, the Department issued a modified § 401 WQC that incorporated by reference the SPDES permit that had been issued, also in accordance with provisions of the HRSA, that same year. The 1982 § 401 WQC for Units 2 and 3 did not include a determination that the facilities' complied with certain applicable State water quality standards at that time, including 6 NYCRR Part 704–Criteria Governing Thermal Discharges. Moreover, the 1982 § 401 WQC for Units 2 and 3 did not assess whether any technology for minimizing the adverse environmental impact (*i.e.*, entrainment) caused by the facilities' CWISs each year was needed and, as such, did not render a "best technology available" (BTA) determination required by 6 NYCRR § 704.5 and CWA § 316(b). The 1982 § 401 WQC is the last WQC that was issued by the Department for Units 2 and 3.

The Hudson River Resource

The Hudson River is one of the most biologically diverse estuarine water bodies in North America. It has long been recognized as a valuable national, state, and local resource, as well as an integral part of the North Atlantic coastal environment. Traditionally, the Hudson River has functioned as an abundant temperate estuary, rich in high fish biodiversity–with more than 210 species recorded from its entire watershed; 140 of which live within the estuary. The estuary, particularly the area around the Indian Point facilities, serves as a spawning and nursery ground for important fish and shellfish species, such as striped bass, American shad, Atlantic and

7 "Adverse environmental impact" is the number of organisms killed or injured through entrainment or impingement by cooling water intakes structures (CWISs). *See Riverkeeper, Inc., et al. v U.S. Envtl. Protect. Agency,* 358 F.3d 174 (2d Cir. 2004).

shortnose sturgeon, and river herring. As a result, the Hudson has been a popular and, at times, prosperous commercial and recreational fishing environment.

While the Hudson once supported rich commercial fisheries throughout its tidal waters, today its commercial fisheries are almost extinct. Because of the historical significance and importance of the Hudson River, it has been designated an American Heritage River by the USEPA in accordance with Executive Order 13061 issued by President Clinton on September 11, 1997. *See http://www.epa.gov/rivers/initiative.html.* The Hudson has also been afforded numerous special protections in State law, in addition to those for other water bodies of the State. *See e.g.*, ECL § 11-0306, and ECL Art. 44.

Cooling Water Intake Structures

Like the Department, the USEPA has found that CWISs cause multiple types of undesirable and unacceptable adverse environmental impacts, including entrainment and impingement; reductions of threatened, endangered or other protected species; damage to critical aquatic organisms, including important elements of the food chain; diminishment of a population's compensatory reserve; losses to populations including reductions of indigenous species population, commercial fisheries stocks, and recreational fisheries; and stresses to overall communities and ecosystems as evidenced by reductions in diversity or other changes in system structure and function. *See* 66 Fed. Reg. 65,256, 65,292 (Dec. 18, 2001); 69 Fed. Reg. 41,576, 41,586 (July 9, 2004). The USEPA has recognized that the loss of large numbers of aquatic organisms may affect not only stocks of various species and their compensatory reserve, but also the overall health of ecosystems. *See* 66 Fed.Reg. 65,292 (Dec. 18, 2001).

Significantly, in 2004, the USEPA approvingly cited the Department's analysis of such ecosystem effects in connection with the permitting of three Hudson River power plants, including the Indian Point nuclear facilities. *See* 69 Fed.Reg. 41,587-88 (July 9, 2004) *(citing the Final Environmental Impact Statement Concerning the Applications to Renew New York State Pollutant Discharge Elimination System (SPDES) Permits for the Roseton 1 & 2, Bowline 1 & 2, and Indian Point 2 & 3 Steam Electric Generating Stations, Accepted by the New York Department of Environmental Conservation; June 25, 2003)*. The Department's FEIS found that entrainment not only reduces the number of adult fish species whose eggs and larvae are entrained by a CWIS, but also depletes the species' ability to survive unfavorable environmental conditions and, perhaps most significantly, diminishes the forage base, which disrupts the food chain, transferring energy from higher to lower trophic levels and compromising the health of the entire aquatic community.[8] *See id.*

Entergy's Current § 401 WQC Application

Entergy initiated the § 401 WQC application review process by submitting a Joint Application and supporting documentation received by the Department on April 6, 2009. Pursuant to the CWA, the Department must act upon the Joint Application within a reasonable amount of time, but not to exceed one year. *See* 33 U.S.C. § 1341(a)(1). Since April 6, 2009, Entergy has supplemented its Joint Application for a § 401 WQC at various times in conjunction

8 "Trophic" refers to the feeding habits or food relationship of different organisms in a food chain.

with requests for additional information from the Department. *See* ECL Article 70 and 6 NYCRR Part 621 (Uniform Procedures). For ease of reference, the Department provides a list and brief summary of the correspondence, requests, and submittals associated with the Joint Application over the last 12 months in Table 1 below.

Table 1		
Prepared By	**Date**	**Summary**
Entergy	April 6, 2009[1]	§ 401 WQC Joint Application and Attachments
DEC	May 13, 2009	Request For Information #1 (RFI)
Entergy	June 12, 2009	Partial Response to RFI #1: Thermal Study Protocol
DEC	July 3, 2009	RFI #2: Thermal Study & Demonstration of Thermal Standards
Entergy	July 9, 2009	Partial Response to RFI #1: Permission to Inspect Property Form
Entergy	September 9, 2009	Partial Response to RFI #1: Table of Documents to be Submitted
DEC	September 23, 2009	RFI #3: Clarification of Information
Entergy	October 19, 2009	Partial Response to RFI #1: Delivery of Information
DEC	October 28, 2009	Letter regarding hand delivery of documents at 625 Broadway
Entergy	November 3, 2009	Partial Response to RFI #2: Thermal Study response
Entergy	November 13, 2009	Partial Response to RFI #1: Submission of historical Documents in accordance with previous WQC
DEC	December 4, 2009	RFI #3: Comment regarding thermal study
DEC	December 10, 2009	RFI #4: Comment on November 13, 2009 submission
Entergy	December 23, 2009	Partial Response to RFI #1 and #4: 1982 WQC
DEC	December 30, 2009	RFI #5: Comment on 1982 WQC
Entergy	February 12, 2010	Response to RFI #1: Letter and Attachment (Detailed Responses to DEC RFI #1 dated May 13, 2009)
Entergy	February 12, 2010	Engineering Feasibility and Costs of Conversion of Indian Point Units 2 and 3 to a Closed-Loop Condenser Cooling Water Configuration[2]
Entergy	February 12, 2010	Evaluation of Alternative Intake Technologies at Indian Point Units 2 and 3[3]
Entergy	March 15, 2010	Partial Response to RFI #2: Tri-axial thermal study requirement at Indian Point Units 2 and 3
Entergy	March 22, 2010	Partial Response to RFI #1 and #2: Hydrothermal Modeling of the Cooling Water Discharge from the Indian Point Energy Center to the Hudson River

[1] Cover letter dated April 3, 2009. Document received by DEC on April 6, 2009.

[2] Incorporated by reference as Appendix L in the document titled Detailed Responses to DEC RFI #1 dated May 13, 2009.

[3] Incorporated by reference as Appendix M in the document titled Detailed Responses to DEC RFI #1 dated May 13, 2009.

Statement of Reasons for Denial

Pursuant to 6 NYCRR § 621.10, should it decide to deny an application, the Department must provide an explanation for the denial with the notice to the applicant. Provided below are the Department's reasons for the denial of Entergy's application for a § 401 WQC for the relevant and applicable sections of New York State's environmental laws, regulations or standards related to water quality.

6 NYCRR Part 701–Classifications–Surface Waters and Groundwaters;
and 6 NYCRR Part 703–Surface Water and Groundwater Quality Standards

6 NYCRR § 701.11 Class SB Saline Surface Waters

The Department's May 13, 2009 Request for Information (RFI) stated that the § 401 WQC for Units 2 and 3 must address compliance with 6 NYCRR Parts 701 and 703. Accordingly, the facilities must demonstrate compliance with the standards and designated uses set forth in regulations to maintain the best usage of the waters. Pursuant to 6 NYCRR § 701.11, the area of the Hudson River where the Indian Point facilities are located is classified as an SB saline surface water. See 6 NYCRR § 864.6. The "best usages of Class SB waters are primary and secondary contact recreation and fishing. These waters shall be suitable for fish, shellfish, and wildlife propagation and survival." See 6 NYCRR § 701.11.

"Primary contact recreation" means "recreational activities where the human body may come in direct contact with raw water to the point of complete body submergence. Primary contact recreation includes, but is not limited to, swimming, diving, water skiing, skin diving and surfing." See 6 NYCRR § 700.1(a)(49). "Secondary contact recreation" means "recreational activities where contact with the water is minimal and where ingestion of the water is not probable. Secondary contact recreation includes, but is not limited to, fishing and boating." See 6 NYCRR § 700.1(a)(56).

The historical data that has been collected on the Hudson River by the owners of the Indian Point facilities (and others) over the past 35 years demonstrates that the withdrawal of cooling water by Units 2 and 3 cause significant adverse environmental impact upon aquatic organisms, particularly fish eggs, larvae, and fish. See *Final Environmental Impact Statement Concerning the Applications to Renew New York State Pollutant Discharge Elimination System (SPDES) Permits for the Roseton 1 & 2, Bowline 1 & 2, and Indian Point 2 & 3 Steam Electric Generating Stations, Accepted by the New York Department of Environmental Conservation on June 25, 2003*; see also *Final Environmental Statement Related to Operation of Indian Point Nuclear Generating Plant Unit No. 2, Consolidated Edison Company of New York, Inc., September 1972 – Docket No. 50-247* [AEC, Directorate of Licensing]; and *Final Environmental Statement Related to Operation of Indian Point Nuclear Generating Plant Unit No. 3, Consolidated Edison Company of New York, Inc., February 1975 – Docket No. 50-286* [NUREG-75/002].

The continued operation of Units 2 and 3 in once-through cooling mode for an additional

20 years, as proposed by Entergy in its Joint Application, would continue to exacerbate the adverse environmental impact upon aquatic organisms caused by the facilities' CWISs. Consequently, the continued operation of Units 2 and 3 would be inconsistent with the best usage of the Hudson River in 6 NYCRR § 701.11 for fish, shellfish, and wildlife propagation and survival.

6 NYCRR § 703.2 Narrative Water Quality Standards

More recently, Entergy has acknowledged that radioactive material (including tritium, strontium-90, cesium, and nickel) from spent fuel pools, pipes, tanks, and other systems, structures, and components at Indian Point has reached the Hudson River via groundwater flow from the site and, moreover, continues to do so. The Department is aware of previous and ongoing leaks from spent fuel pools and other systems, structures, and components at the Indian Point site that have been referenced in Entergy's submissions filed in conjunction with its pending NRC relicensing proceeding for Units 2 and 3 (including two distinct radionuclide plumes mapped by Entergy).

While Entergy maintains that radiological assessments of ongoing radioactive leaks to the Hudson River have not yielded an indication of potential adverse environmental or health risk, the discharge of radiological substances (including, but not limited to, radioactive liquids, radioactive solids, radioactive gases, and stormwater) from the Indian Point site into a water of the State, here the Hudson River, are "deleterious substances" and could impair the water for their best usage. See 6 NYCRR § 703.2. In addition, noncompliant "thermal discharges" (6 NYCRR Part 704–see further discussion below) into a class SB water also impair the water for its best usage, particularly where, as here, primary and secondary contact recreation is concerned. See *id*.

Based upon all of this information, the Department has determined that the adverse environmental impact from the operation of Indian Point's CWISs to the Hudson River impair the best use of the water designated in 6 NYCRR § 701.11. In particular, the withdrawal of approximately 2.5 billion gallons of Hudson River water per day and the mortality of nearly one billion aquatic organisms per year from the operation of Units 2 and 3 are inconsistent with fish propagation and survival. In addition, radiological leaks have the potential to impair the best use of the water designated in 6 NYCRR § 701.11. Accordingly, the Department has made a determination to deny the § 401 WQC application for Units 2 and 3 based upon a failure to comply with this State water quality standard and designated best use of the water. See *PUD No. 1 of Jefferson Cty v Washington Dept. of Ecology*, 511 U.S. 700 (1994).

6 NYCRR Part 704–Criteria Governing Thermal Discharges

6 NYCRR § 704.1 Water Quality Standards for Thermal Discharges; and 6 NYCRR § 704.2 Criteria Governing Thermal Discharges

The Department's May 13, 2009 RFI stated that Entergy's § 401 WQC application must demonstrate compliance with the thermal discharge water quality standards and criteria set forth in 6 NYCRR Part 704, including §§ 704.1 and 704.2. Section 704.1 requires that "All thermal

discharges to the waters of the State shall assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on the body of water." *See* 6 NYCRR §704.1(1). Section 704.2 contains special criteria for estuaries or portions of estuaries such as the Hudson River. *See* 6 NYCRR §704.2(b)(5)(i)-(iv).

The Department indicated in its May 13, 2009 RFI that the only means to demonstrate compliance with these standards and criteria for purposes of the Joint Application was for Entergy to submit the results of a current, completed triaxial thermal study. Entergy initially objected to this requirement based upon a previous agreement entered with the Department in conjunction with the administrative proceeding for the 2003 draft SPDES permit (commenced in 2004) whereby a triaxial study would be deferred until after a final SPDES permit for the facilities was issued by the Department.

The Department rejected Entergy's assertion because the § 401 WQC application is subject to a separate and distinct process that requires an entirely independent evaluation and regulatory determination from the SPDES permit proceeding. Furthermore, given the length of the ongoing SPDES permit proceeding (commenced in 2004, with no final SPDES permit decision in the near future) and the applicable one-year time period under the CWA for the Department to render a decision on the Joint Application, the Department needed a triaxial thermal study of current conditions to make all of the necessary findings or determinations required by law.

Entergy, in contravention of the Department's recommendation, completed a collection of Hudson River thermal data outside of the known, critical environmental period. While the Department understands that factors beyond Entergy's control may have prevented the mobilization of field work during the summer months, nevertheless, the Detailed Responses submitted February 12, 2010, included only the raw thermal data collected in the river from September through November 2009. Entergy had yet to develop a model from the data to demonstrate compliance with the thermal standards and criteria during the warm summer months. Even if Entergy had included the model it would still need to be verified through the collection of additional thermal data during the summer of 2010. This is consistent with how the Department has handled other facilities that have collected initial thermal data outside the critical environmental period.

On March 22, 2010, Department staff met with representatives from Entergy and its consultants, and were provided with a presentation on a report submitted that day entitled 'Hydrothermal Modeling of the Cooling Water Discharge from the Indian Point Energy Center to the Hudson River' (Thermal Report). The Thermal Report, prepared by Applied Science Associates, Inc., consists of in-stream data that were collected from the Hudson River between September 24, 2009, and November 3, 2009, as well as a discussion of the BFHYDRO model used to predict thermal discharge characteristics from the Indian Point Energy Center. The data used to calibrate the BFHYDRO model was taken well past the typical high-temperature season of the Hudson River (July-August).

The scenario simulation presented in the Thermal Report for the 'worst-case scenario' used a joint probability analysis of data in the vicinity. The conservative approach used by Department staff to predict 'worst-case' is the MA7CD10 (7 day, 10 year low flow) and the lowest flow for the available record period, background temperature in the river of 90 degrees

Fahrenheit (at "slack ebb begin" and "slack flood begin" tide conditions), and during thermal stratification periods. This was discussed at the meeting on March 22, 2010. Moreover, and as noted in its July 3, 2009 letter to Entergy, the Department requires the model to be run at these critical conditions, and the results compared to the thermal criteria in 6 NYCRR § 704.2. Furthermore, in-stream data must be gathered during July-September critical periods and used to verify correct calibration of the model. All predictions are to be performed at All Plants at Capacity (APAC) conditions.

Based on the foregoing, the Department has determined to deny Entergy's application for a § 401 WQC because the supporting materials do not currently demonstrate compliance with the referenced thermal standards and criteria. The Department could reconsider its position on this issue should Entergy provide a verified thermal model that demonstrates compliance with the applicable thermal standards and criteria.

6 NYCRR § 704.5 Intake Structures (BTA Requirement)

As indicated previously, 6 NYCRR § 704.5 states that "[t]he location, design, construction and capacity of cooling water intake structures, in connection with point source thermal discharges, shall reflect the best technology available for minimizing adverse environmental impact." *See also* CWA § 316(b) [33 U.S.C. § 1326(b)].

As currently licensed and operated, Indian Point Units 2 and 3 both utilize once-through cooling water systems. Collectively, Units 2 and 3 withdraw nearly 2.5 billion gallons of water per day from the Hudson River, constituting the greatest single industrial use of water in New York State, and far exceeds the amount of water withdrawn by any other industrial facility located on the Hudson River. While Units 2 and 3 do employ certain technological measures to reduce impingement mortality from operations of the CWISs at Indian Point, the facilities have not, consistent with 6 NYCRR § 704.5, installed any technology to minimize the amount of entrainment caused by the CWISs. Consequently, it is well documented that operation of the facilities' CWISs results in the entrainment mortality of approximately one billion aquatic organisms each year.[9]

Entergy's Joint § 401 WQC Application submitted to the Department in April 2009 sought approval for the continued operation of Units 2 and 3 as they have for the last 35 years, namely, in once-through cooling mode. Given that current measures and operations at Indian Point do not minimize the adverse environmental impact of entrainment from the CWISs, the facilities are currently not in compliance with, and do not meet the BTA requirements of, 6 NYCRR § 704.5.

With regard to addressing the facilities' compliance with 6 NYCRR § 704.5, there were three submissions by Entergy that the Department considered to be critical in its determination for purposes of the § 401 WQC application. These three documents consisted of the following:

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9 Based on in-plant abundance sampling from 1981-1987. *See Final Environmental Impact Statement Concerning the Applications to Renew New York State Pollutant Discharge Elimination System (SPDES) Permits for the Roseton 1 & 2, Bowline 1 & 2, and Indian Point 2 & 3 Steam Electric Generating Stations, Accepted by the New York Department of Environmental Conservation on June 25, 2003.*

(i) Entergy's initial § 401 WQC application received by the Department on April 6, 2009; (ii) Entergy's December 23, 2009, letter which included a 1982 § 401 WQC issued by the Department for Indian Point Units 1, 2 and 3; and (iii) Entergy's February 12, 2010, report entitled "Detailed Responses to the New York State Department of Environmental Conservation's Request for Information, dated May 13, 2009" (Detailed Responses).[10]

Relying primarily upon these documents, Entergy maintains that Units 2 and 3 have demonstrated compliance with the BTA requirement of 6 NYCRR § 704.5 through the following: (1) compliance with the provisions of the 1987 SAPA-extended SPDES permit;

(2) compliance with the 1982 § 401 WQC for the facilities; (3) a February 12, 2010, report entitled "Engineering Feasibility and Costs of Conversion of Indian Point Units 2 and 3 to a Closed-Loop Condenser Cooling Water Configuration" that concluded conversion to a closed-cycle cooling system was a feasible, but not reasonable, alternative [Exhibit "L" to Detailed Responses]; and (4) a February 12, 2010, report entitled "Evaluation of Alternative Intake Technologies at Indian Point Units 2 and 3" that concluded a cylindrical wedge-wire screen intake technology existed that could potentially reduce, but not minimize, entrainment by the facilities' CWISs and should be considered as BTA under 6 NYCRR § 704.5 [Exhibit "M" to Detailed Responses]. The Department understands that the Detailed Responses (including the two reports noted as Exhibits here) were submitted by Entergy to the NRC on February 12, 2010, but is not aware of whether Entergy has formally amended its pending nuclear license application with the NRC to include consideration of an alternative CWIS technology for Units 2 and 3 in order to reduce, but not minimize, the adverse environmental impact caused by their operations.

Based upon its review of these documents, the Department has concluded that Entergy has not demonstrated compliance with the BTA requirement of 6 NYCRR § 704.5 and CWA § 316(b) and, therefore, denial of the § 401 WQC is warranted. Below is a brief discussion of the Department's response to each of Entergy's points referenced above concerning Indian Point's proposed demonstration of compliance with 6 NYCRR § 704.5:

(1) Compliance with 1987 SPDES permit. The Department previously indicated in its May 13, 2009 RFI, and its December 30, 2009, letter to Entergy that compliance with the 1987 SAPA-extended SPDES permit does not, and cannot, demonstrate compliance with the BTA requirement of 6 NYCRR § 704.5. That 5-year SPDES permit is now nearly 25 years old and, because of the provisions of the now-expired HRSA, does not mandate the installation of any technology to reduce the adverse impact of entrainment from the operation of the CWISs for Units 2 and 3. Thus, the provisions of, and continued operation under, the 1987 SPDES permit for Indian Point do not comply with existing legal requirements.

In November 2003, the Department issued a draft SPDES permit for Units 2 and 3 that included conditions requiring Entergy to evaluate conversion of the existing once-

10 The Detailed Responses included, by reference, two other reports dated February 12, 2010, that were prepared for and submitted by Entergy in accordance with the August 13, 2008 *Interim Decision of the Assistant Commissioner* in the ongoing SPDES permit administrative proceeding entitled: (i) "Engineering Feasibility and Costs of Conversion of Indian Point Units 2 and 3 to a Closed-Loop Condenser Cooling Water Configuration;" and (ii) "Evaluation of Alternative Intake Technologies at Indian Point Units 2 and 3." *See* Exhibits "L" and "M," respectively, attached to Entergy's Detailed Responses dated February 12, 2010.

through cooling system to a closed-cycle cooling system in order for the facilities to comply with the BTA requirement of 6 NYCRR § 704.5. Entergy undertook such an evaluation both in 2003 and, most recently, in 2010 in conjunction with the ongoing SPDES permit administrative proceeding for the 2003 draft permit. See report entitled "Economic and Environmental Impacts Associated with Conversion of Indian Point Units 2 and 3 to a Closed-Loop Condenser Cooling Water Configuration" prepared for Entergy by ENERCON Services in June 2003; and report entitled "Engineering Feasibility and Costs of Conversion of Indian Point Units 2 and 3 to a Closed-Loop Condenser Cooling Water Configuration" prepared for Entergy by ENERCON Services in February 2010 [Exhibit "L" to Detailed Responses].

More than 30 years ago, however, the NRC had already independently evaluated and selected a closed-cycle cooling system as the only appropriate technology for reducing the adverse environmental impact from Indian Point's CWISs. See *Final Environmental Statement Related to Operation of Indian Point Nuclear Generating Plant Unit No. 2, Consolidated Edison Company of New York, Inc., September 1972 – Docket No. 50-247* [AEC, Directorate of Licensing]; and *Final Environmental Statement Related to Operation of Indian Point Nuclear Generating Plant Unit No. 3, Consolidated Edison Company of New York, Inc., February 1975 – Docket No. 50-286* [NUREG-75/002]; see also *NRC's Final Environmental Statement Related to Selection of the Preferred Closed Cycle Cooling System at Indian Point Unit 2, Consolidated Edison Company of New York, Inc., August 1976 – Docket No. 50-247* [NUREG-0042]; *and NRC's Final Environmental Statement Related to Selection of the Preferred Closed Cycle Cooling System at Indian Point Unit 3, Consolidated Edison Company of New York, Inc., and Power Authority of the State of New York, December 1979 – Docket No. 50-286* [NUREG-0574].

Taken together, all of these reports and documents have concluded that conversion from a once-through cooling system to a closed-cycle cooling system, while expensive and involving a potentially lengthy construction process, is nevertheless the only available and technically feasible technology for Units 2 and 3 to completely satisfy the BTA requirement of 6 NYCRR § 704.5 and, therefore, comply with this State water quality standard.

The 2003 draft SPDES permit for Units 2 and 3 accurately reflects the Department's preliminary determination that closed-cycle cooling is the appropriate and available technology for the facilities to comply with 6 NYCRR § 704.5. The 2003 draft SPDES permit is currently the subject of an ongoing adjudicatory proceeding (that began in 2004). In its Detailed Responses, Entergy has proposed to abide by the outcome of the SPDES permit renewal process and any subsequent judicial appeals taken from the Department's final BTA determination in a renewed SPDES permit. Consequently, Entergy requests the Department to issue a qualified § 401 WQC to incorporate an as-yet-undetermined and not-yet-issued SPDES permit by reference.

The Department does not agree with Entergy's approach because the 1987 SPDES permit for Indian Point, now nearly 25 years old, does not contain any provisions for the installation of a technology to minimize the mortality of aquatic organisms in the Hudson River from entrainment by the CWISs for Units 2 and 3. During that time period, Units 2

and 3 have continued to operate and the entrainment of aquatic organisms has continued at Indian Point virtually unabated. The CWA requires the Department to make an independent determination on whether Entergy's pending Joint Application complies with State water quality standards now, and the Department cannot defer making that decision until some future, as-yet-undecided event occurs in a separate and distinct proceeding. *See* CWA § 401(a)(1) [33 U.S.C. § 1341(a)(1)].

(2) Compliance with 1982 WQC. The 1982 WQC issued by the Department indicates that compliance with the joint SPDES permit issued contemporaneously for Units 2 and 3 at that time constituted compliance with the State's water quality standards. In its December 23, 2009 letter, Entergy suggests that the Department should adopt a similar approach now.

The Department reiterates its position on this issue that it raised in its December 30, 2009 letter to Entergy. First, the Department is not required to process Entergy's current § 401 WQC application as it did in 1982, particularly since the Department was required to issue a modified § 401 WQC to the facilities that incorporated by reference the 1982 SPDES permit, both issued in accordance with provisions of the HRSA. Thus, the 1982 § 401 WQC for Units 2 and 3 did not include an independent determination that the facilities complied with applicable State water quality standards at that time. Moreover, the 1982 § 401 WQC for Units 2 and 3 did not assess whether any technology for minimizing the adverse environmental impact (*i.e.*, entrainment) caused by the facilities' CWISs each year was needed and, as such, did not render the "best technology available" (BTA) determination required by 6 NYCRR § 704.5 and CWA § 316(b).

Second, as noted above, the Department cannot defer its determination on the facilities' present compliance with State water quality standards based upon a SPDES permit that was last issued in 1987, particularly since that permit does not conform with existing legal requirements pertaining to BTA. Lastly, the 1982 § 401 WQC does not reference several relevant and applicable State water quality standards to which the facilities are subject and for which the Department must make a determination as part of Entergy's current § 401 WQC application. In particular, compliance with the requirements of 6 NYCRR Parts 701 and 704 is not referenced in the 1982 § 401 WQC for Units 2 and 3. Consequently, Entergy may not rely upon the terms of the 1982 § 401 WQC in order to demonstrate its current compliance with State water quality standards.

(3) A closed-cycle cooling system is an "available" alternative. On February 12, 2010, Entergy submitted a report with its Detailed Responses entitled "Engineering Feasibility and Costs of Conversion of Indian Point Units 2 and 3 to a Closed-Loop Condenser Cooling Water Configuration" that concluded conversion to a closed-cycle cooling system was a feasible, but not reasonable, alternative. *See* Exhibit "L" to Detailed Responses. This report indicated that conversion from a once-through cooling system to a closed-cycle cooling system, while expensive and involving a potentially lengthy construction process, is nevertheless an available and technically feasible technology for Units 2 and 3 to satisfy the BTA requirement of 6 NYCRR § 704.5 and, thereby, comply with this State water quality standard.

Moreover, as discussed previously, the NRC–the federal agency from whom Entergy is currently seeking a 20-year license extension–determined more than 30 years ago that a closed-cycle cooling system was an "available" and appropriate technology for reducing the adverse environmental impact from Indian Point's CWISs. See *Final Environmental Statement Related to Operation of Indian Point Nuclear Generating Plant Unit No. 2, Consolidated Edison Company of New York, Inc., September 1972 – Docket No. 50-247* [AEC, Directorate of Licensing]; and *Final Environmental Statement Related to Operation of Indian Point Nuclear Generating Plant Unit No. 3, Consolidated Edison Company of New York, Inc., February 1975 – Docket No. 50-286* [NUREG-75/002]; see also *NRC's Final Environmental Statement Related to Selection of the Preferred Closed Cycle Cooling System at Indian Point Unit 2, Consolidated Edison Company of New York, Inc., August 1976 – Docket No. 50-247* [NUREG-0042]; *and NRC's Final Environmental Statement Related to Selection of the Preferred Closed Cycle Cooling System at Indian Point Unit 3, Consolidated Edison Company of New York, Inc., and Power Authority of the State of New York, December 1979 – Docket No. 50-286* [NUREG-0574]. The NRC's determination was based upon detailed analyses and assessments of closed-cycle cooling systems conducted by the then-owners of the Indian Point facilities. See *Economic and Environmental Impacts of Alternative Closed-Cycle Cooling Systems for Indian Point Unit No. 2, Consolidated Edison Company of New York, Inc., December 1974 – Docket No. 50-247;* and *Economic and Environmental Impacts of Alternative Closed-Cycle Cooling Systems for Indian Point Unit No. 3, Consolidated Edison Company of New York, Inc., January 1976 – Docket No. 50-286.*

Accordingly, based upon the reports and documents submitted by Entergy in conjunction with its § 401 WQC application, the Department has concluded that conversion from a once-through cooling system to a closed-cycle cooling system, while expensive and involving a potentially lengthy construction process, is nevertheless an available and technically feasible technology for Units 2 and 3 to meet the BTA requirement of 6 NYCRR § 704.5 and comply with this State water quality standard.

(4) Cylindrical wedge-wire screens are not a reasonable alternative intake technology. On February 12, 2010, Entergy submitted a report with its Detailed Responses entitled 'Evaluation of Alternative Intake Technologies at Indian Point Units 2 and 3' that concluded a cylindrical wedge-wire screen intake technology existed that could potentially reduce, but not minimize, entrainment by the facilities' CWISs and should be considered as BTA under 6 NYCRR § 704.5. See Exhibit "M" to Detailed Responses (Alternative Technology Report).

The Alternative Technology Report, developed by Entergy for the ongoing SPDES permit proceeding, was intended to evaluate alternative cooling water intake technologies for the facilities that would result in reductions in impact to aquatic organisms, particularly by entrainment, that were commensurate with the reductions in mortality that could be achieved by the use of a closed-cycle cooling system. Consequently, the Alternative Technology Report discussed numerous intake technologies, including passive intake systems, various screening systems, and barrier technologies. The Alternative Technology Report ultimately concluded that the CWISs for Units 2 and 3 could be retrofitted with a system of cylindrical wedge-wire screens that

would reduce adverse environmental impacts, but not "minimize" them as a closed-cycle cooling system would.

The Department thoroughly reviewed the Alternative Technology Report and has determined that Entergy's proposal to use 2.0 mm cylindrical wedge-wire screens at Units 2 and 3 is not reasonable, primarily because it is still experimental in nature, is an unproven technology on the scale that would be required at Indian Point, is not based on scientifically supported facts, and would not result in entrainment reductions that are commensurate with those that could be obtained by a closed-cycle cooling system. To be sure, the NRC determined more than 30 years ago that closed-cycle cooling was an "available" and feasible technology for minimizing adverse environmental impact from the CWISs at Units 2 and 3. See *Final Environmental Statement Related to Operation of Indian Point Nuclear Generating Plant Unit No. 2, Consolidated Edison Company of New York, Inc., September 1972 – Docket No. 50-247* [AEC, Directorate of Licensing]; and *Final Environmental Statement Related to Operation of Indian Point Nuclear Generating Plant Unit No. 3, Consolidated Edison Company of New York, Inc., February 1975 – Docket No. 50-286* [NUREG-75/002]; see also *NRC's Final Environmental Statement Related to Selection of the Preferred Closed Cycle Cooling System at Indian Point Unit 2, Consolidated Edison Company of New York, Inc., August 1976 – Docket No. 50-247* [NUREG-0042]; *and NRC's Final Environmental Statement Related to Selection of the Preferred Closed Cycle Cooling System at Indian Point Unit 3, Consolidated Edison Company of New York, Inc., and Power Authority of the State of New York, December 1979 – Docket No. 50-286* [NUREG-0574].

Accordingly, the proposal to use cylindrical wedge-wire (CWW) screens at Units 2 and 3, as set forth in the Alternative Technology Report, does not comply with the BTA requirement of 6 NYCRR § 704.5 because such proposal would only reduce, but not minimize, adverse environmental impact to aquatic organisms from operation of the facilities. Briefly below are the Department's reasons for not accepting the Alternative Technology Report's proposal as demonstrating compliance with the State water quality standard and BTA requirement of 6 NYCRR § 704.5 (and CWA § 316[b]):

Adverse Environmental Impact:

The Alternative Technology Report estimates that the use of 2.0 mm cylindrical wedge-wire screens on Units 2 and 3 will result in an 89.7% reduction in mortality of age-1 equivalent organisms. The Department defines adverse environmental impact under 6 NYCRR § 704.5 as the total numbers of aquatic organisms killed by a CWIS, not only age-1 equivalents. Based upon this, the estimated entrainment reductions included in the Alternative Technology Report (Table 10 of Attachment 6, page 32) concludes that the use of wedge-wire screens at Units 2 and 3 will only result in a 72.82 % to 73.5 % reduction in entrainment (2.0 mm–9.0 mm slot width) from the calculation baseline based on total number of eggs and larvae. Therefore, the proposed wedge-wire technology does not provide commensurate minimization benefits as compared to those obtainable with a closed-cycle cooling system (*i.e.*, 90% or greater reductions), particularly when considering

reductions in mortality of individuals.[11]

Through-plant survival of fish larvae:

The Alternative Technology Report claims, and thereby presumes, a "significant" through-plant survival of fish larvae at Units 2 and 3. The Department requires Department-approved, contemporary site-specific studies to clearly demonstrate that through-plant survival actually occurs at a facility. The data used by Entergy to model the estimated through-plant survival in the Alternative Technology Report were taken from studies conducted by Consolidated Edison nearly 30 years ago. The Department did not recognize significant through-plant survival at Indian Point three decades ago, and Entergy has not submitted any new data to indicate that significant change has occurred regarding through-plant survival at Indian Point now. However, even if the Department concurred with the purported amount of through-plant survival, the entrainment reductions estimated by Entergy with the use of wedge-wire screens would still fall short of those that could be obtained by the use of a closed-cycle cooling system and would be needed to meet the BTA requirement of the State water quality standard in 6 NYCRR § 704.5. *See also* fn. 11.

Feasibility of wedge-wire screens at IPEC:

The Alternative Technology Report states that "[t]here are no applications of cylindrical wedge-wire [CWW] screens at nuclear power facilities." In fact, the Department is not aware of any steam electric generating facility similar to the size of Indian Point Units 2 and 3 that operates a once-through cooling water system with 2.0 mm slot width wedge-wire screens. The Department is also not aware of an existing electric generating facility that operates wedge-wire screens in conjunction with a once-though cooling water system where the wedge-wire screen technology has been determined to represent BTA for minimizing entrainment for purposes of complying with the State water quality standard in 6 NYCRR § 704.5 (and CWA§ 316[b]).

The Alternative Technology Report recognizes the experimental and unproven nature of using CWW screens at a facility having water withdrawal volumes such as Indian Point in a biologically diverse estuarine environment like the Hudson River. For instance, the Alternative Technology Report acknowledges that a "pilot" CWW screen project would be required in order to test, among other things, appropriate screen slot width sizes, different screen alloys, the number of screens to be used, potential screen configurations,

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11 On March 10, 2010, the Department released for public comment a draft policy on BTA for CWISs. *See http://www.dec.ny.gov/animals/32847.html*. The policy establishes closed-cycle cooling or its equivalent as the BTA performance goal for facilities to minimize adverse environmental impact in accordance with 6 NYCRR § 704.5. Entergy's proposed cylindrical wedge-wire screen system would not meet the performance goals set forth in this draft BTA policy.

screen monitoring requirements, and screen maintenance functions. Given this, the Department does not concur that wedge-wire screens are a proven, "available" technology for Units 2 and 3 to meet the BTA requirement in 6 NYCRR § 704.5.

Effectiveness of wedge-wire screens in reducing entrainment:

The entrainment reductions estimated in the Alternative Technology Report are based upon the unproven assumption that hydrodynamics, coupled with active larval avoidance behavior, and not screen slot width, are responsible for the majority of the entrainment reduction observed with cylindrical wedge-wire (CWW) screens. Moreover, the wealth of available industry literature on this topic does not support this assumption. *See* Electric Power Research Institute (EPRI) reports of 1998, 2003, and 2005; Taft 2000; Heuer and Tomljanovich 1978; Uziel, *et al.* 1979; Weisberg, *et al.* 1987.

EPRI, an energy industry research organization, has conducted both laboratory and field studies of CWW screens and concluded that, for CWW technology to be effective in reducing entrainment, CWW must be designed with the following: (1) sufficiently small screen slot size to physically block passage of the smallest lifestage to be protected; (2) low through-slot velocity; and (3) relatively high velocity ambient current cross-flow to carry organisms and debris around and away from the screen. "Where all conditions are present, wedge-wire screens can reduce entrainment . . ." (EPRI 1998, Taft 2000).

Many laboratory and field studies have identified a positive correlation between screen slot width and the entrainment of fish eggs and larvae. Slot widths of 1.0 mm and less have been demonstrated to be the most effective at reducing entrainment of fish eggs and larvae less than 10.0 mm in length (with 0.5 mm slot widths being the most protective). Slot widths of 2.0 mm (the minimum slot width proposed in the Alternative Technology Report) have been shown to reduce, but not "minimize," the entrainment of fish larvae greater than 10 mm in length but are not that effective on smaller larvae and eggs. In fact, results from a 1985/1986 entrainment study of a 2.0 mm slot width CWW screen system employed at the Charles Point Resource Recovery Center (Charles Point) in Peekskill, New York, indicated that those screens did not have much of an effect with respect to reducing the entrainment of early life stages of important fish species. Larval striped bass, for example, were entrained by the CWW screen system at Charles Point at densities very nearly equal to those entrained by the Indian Point facilities (*see* EA 1986).

The Department is unaware of any laboratory studies conducted on wedge-wire screens with larger slot widths (greater than 3.0 mm) which would support the claim in the Alternative Technology Report that the larger slot size width wedge-wire screens (6.0 mm and 9.0 mm) would provide a similar reduction in entrainment as the smaller slot width screens (1.0 mm to

3.0 mm). The only example of an alleged reduction in entrainment by larger slot width CWW of which the Department is aware is a recent field study at a steam electric facility in Eddystone, Pennsylvania. According to the Alternative Technology Report, the application of CWW with 6.35 mm slot width has resulted in an estimated reduction in entrainment of 60% from baseline at this facility. The Department notes that this claim runs counter to an EPRI report (1998) which found that the 6.4 mm slot width wedge-wire application at Eddystone resulted in no significant entrainment benefits.

Moreover, the application of CWW at the Eddystone facility was specifically chosen to reduce impingement of larger fish, not minimize entrainment. Even if the CWW was responsible for the recently alleged reduction in entrainment, this does not provide sufficient evidence that a similar CWW application at Indian Point Units 2 and 3 would have similar, or more protective, results. In addition, the Eddystone power plant is a fossil fuel facility designed to withdraw only 25% of the amount of cooling water withdrawn by Units 2 and 3. These differences significantly limit any use of the results from Eddystone as a measure for inferring whether or not CWW is an "available" technology at Indian Point or how effective CWW would be at "minimizing" entrainment by the facilities. Finally, even if the levels of entrainment reduction at Eddystone were achievable at Indian Point, those reductions are far short of those that could be achieved by a closed-cycle cooling system.

Relationship to Oak Creek:

The Alternative Technology Report also claims that CWW may be an "available" technology for satisfying 6 NYCRR § 704.5 at Indian Point based on the recent requirement for the Oak Creek Power Plant in Milwaukee, Wisconsin, to install and operate 9.5 mm CWW screens 7,000 ft offshore in the waters of Lake Michigan. The State of Wisconsin selected 9.5 mm CWW screens as BTA for impingement but made no similar claim for entrainment reductions. In fact, any entrainment reductions realized at the Oak Creek plant will be attributed to the location of the intake, not from the CWW technology. The successful operation of CWW screens on a large fossil fuel steam electric facility in a dynamic deepwater oligotrophic ecosystem like Lake Michigan is not analogous to the Indian Point setting an does not in any way demonstrate that this technology would be technically feasible at, or garner the same protective effects on, a nuclear facility of similar size in the Hudson River's highly turbid, estuarine ecosystem.

6 NYCRR § 608.9 – Water Quality Certifications

Pursuant to 6 NYCRR § 608.9, and consistent with the applicable language contained in the CWA, an "applicant for a Federal license or permit to conduct any activity, including but not limited to the construction or operation of facilities that may result in any discharge into

navigable waters as defined in section 502 of the Federal Water Pollution Control Act (33 USC 1362), must apply for and obtain a water quality certification from the department." Section 608.9 provides that an applicant for a § 401 WQC must demonstrate compliance with many of the same statutes and regulations already cited above. In addition, 6 NYCRR § 608.9(a)(6) requires an applicant to demonstrate compliance with all "State statutes, regulations and criteria otherwise applicable to such activities."

ECL Article 11 – § 11-0535 – Endangered and threatened species, species of special concern

Pursuant to ECL Article 11, the "taking, importation, transportation, possession or sale of any endangered or threatened species of fish, shellfish, crustacea or wildlife, or hides or other parts thereof . . . is prohibited, except under license or permit from the department." See ECL § 11-0535(2). "Taking" and "take" are defined as "pursuing, shooting, hunting, killing, capturing, trapping, snaring and netting fish, wildlife, game, shellfish, crustacean and protected insects, and all lesser acts such as disturbing, harrying or worrying, or placing, setting, drawing or using any net or other device commonly used to take any such animal." See ECL § 11-0103 (13).

The shortnose sturgeon is listed as an endangered species in New York. See 6 NYCRR § 182.6(a). The shortnose sturgeon is present in the Hudson River and has been documented to inhabit the waters in the vicinity of Units 2 and 3. In addition, the Atlantic sturgeon, a Federal protected sturgeon species (and protected in New York under a multi-state agreement with the Atlantic States Marine Fisheries Commission), also occurs in the Hudson River by Indian Point and is currently a candidate for listing as threatened or endangered. See *NRC's Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 38 – Regarding Indian Point Nuclear Generating Unit Nos. 2 and 3: Draft Report for Comment/Main Report, December 2008* [NUREG-1437, Vol. 1] at § 4.6 (Threatened or Endangered Species), pp. 4-49 to 4-53; see also Fed. Reg. Vol. 75, No. 3 at p. 838 (January 6, 2010) [*Endangered and Threatened Wildlife; Notice of 90-Day Finding on a Petition to List Atlantic Sturgeon as Threatened or Endangered under the Endangered Species Act*].

The historical biological data for the Indian Point facilities confirms that the operation of Units 2 and 3 harm ("take") both shortnose sturgeon and Atlantic sturgeon by impinging them on the CWISs screens or entraining them in the CWISs. Sampling at Indian Point has not occurred over the past 20 years and, therefore, no recent estimates for the impingement and entrainment of sturgeon are available. However, during limited sampling conducted at Indian Point from 1975 to 1990, numbers of both shortnose sturgeon and Atlantic sturgeon were impinged by Units 2 and 3. See *NRC's Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 38 – Regarding Indian Point Nuclear Generating Unit Nos. 2 and 3: Draft Report for Comment/Main Report, December 2008* [NUREG-1437, Vol. 1] at § 4.6 (Threatened or Endangered Species), p. 4-51.

Given that Entergy is seeking an additional 20-year license to operate Units 2 and 3, and the previous history of unauthorized "take" of both shortnose sturgeon and Atlantic sturgeon, it is reasonable to conclude that the Indian Point facilities continue to cause mortality to the sturgeon species in the Hudson River. See *Final Environmental Impact Statement Concerning the Applications to Renew New York State Pollutant Discharge Elimination System (SPDES)*

Permits for the Roseton 1 & 2, Bowline 1 & 2, and Indian Point 2 & 3 Steam Electric Generating Stations, Accepted by the New York Department of Environmental Conservation; June 25, 2003. The taking of shortnose sturgeon by the operation of the Indian Point facilities is unlawful and also impairs the best usage of the waters of the Hudson River for propagation and survival of sturgeon. See 6 NYCRR § 701.11. Accordingly, the Department has determined that Units 2 and 3 are not in compliance with ECL Article 11 and, therefore, in accordance with 6 NYCRR § 608.9(a)(6), must deny the § 401 WQC application.

Uniform Procedures Regulations, 6 NYCRR § 621.10, provide that the applicant has a right to a public hearing on the denial of a permit, including a § 401 WQC. A request for hearing must be made in writing within 30 days of the date of this letter.

Sincerely,

William R. Adriance

William R. Adriance
Chief Permit Administrator

cc: via e-mail
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T. Rice–DSHM
M. Sanza–OGC
B. Little–OGC
L. Wilkinson–OGC