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November 6, 2015

Fred Dacimo, Vice President
Operations License Renewal
Entergy Nuclear Northeast Indian Point
450 Broadway, GSB
P.O. Box 249
Buchanan, NY 10511-0249

Re: F-2012-1028
Coastal Zone Management Act Consistency Determination
Indian Point Nuclear Generating Unit Nos. 2 & 3
NRC License Nos. DPR-26 and DPR-64
NRC Docket Nos. 50-247 and 50-286

Dear Mr. Dacimo:

The New York State Department of State (DOS or the Department) has completed its evaluation of the Federal Consistency Assessment Form, certification, project information, public comments and publicly available information in connection with the application submitted by Entergy Nuclear Operations, Inc., Entergy Nuclear Indian Point 2, LLC, and Entergy Nuclear Indian Point 3, LLC (collectively Entergy) to the Nuclear Regulatory Commission (NRC) to renew Facility Operating Licenses DPR-26 and DPR-64 for Indian Point Nuclear Generating Unit 2 and Unit 3, respectively, for an additional 20 years. Entergy's certification states that the above referenced Project complies with, and will be conducted in a manner consistent with, the enforceable policies of the New York State Coastal Management Program (NYS CMP). Pursuant to the Coastal Zone Management Act (CZMA) and its implementing regulation at 15 C.F.R. §930.63, the Department of State disagrees and objects to Entergy's consistency certification for the 20-year operating licenses for the Indian Point facilities on the basis that the renewal of the operating licenses is not consistent with Policies 8, 9, 10, 18, 27, 30, 36, 38, 39 and 40 of the NYS CMP.

As a result of this objection, the NRC is prohibited from relicensing the Indian Point facilities unless this objection is overridden on appeal by the U.S. Secretary of Commerce. Pursuant to 15 C.F.R. Subpart H and § 930.63(e), the applicant has the opportunity to appeal this objection to the U.S. Secretary of Commerce within 30 days after receipt of this letter. A copy of the request and supporting information must be sent to the New York State Coastal Management Program and the federal permitting or licensing agency. The US Secretary of Commerce may collect fees from you for administering and processing your request.

Executive Summary

For over 40 years, Entergy's Indian Point nuclear facilities have been damaging the coastal resources of the Hudson River estuary. As the State's largest industrial water user, Indian Point Units 2 and 3 together withdraw up to 2.5 billion gallons of water every day from the Hudson River through its cooling water intake structures. In the process of extracting such a large volume of water from this biologically important estuary, at least a billion fish, juvenile fish, fish eggs, fish larvae, and other organisms are sucked into the plant's intake pipes or against its screens and are killed each year. Included among the fish deaths are the endangered Atlantic and shortnose sturgeon, which use that ecologically important segment of the Hudson River as spawning and juvenile nursery areas.

New York is home to four (4) commercial nuclear facilities.[1] When properly located and safely functioning, these facilities are regarded as important generators of electricity. In fact, the Department has reviewed and found consistent three (3) of these facilities with the state's coastal policies. However, by virtue of its location as well as its operations, the Department cannot make the same finding as to Indian Point.[2] . In addition to the fact that Indian Point is located within an ecologically important area, with approximately 17 million people currently living within 50 miles of the facility, no other operating reactor site in the country comes close to Indian Point in terms of surrounding population.[3]

The Indian Point facility sits extremely close to the intersection of two active seismic features. The NRC recently confirmed that Indian Point Units 2 and 3 are in the highest category of seismic hazard evaluation in the nation relative to the original plant seismic design basis as well as ground motion.[4] Additionally, the NRC reported that Indian Point Unit 3 nuclear reactor has the highest risk of serious damage to its core in the event of an earthquake.[5] In the event of an earthquake, the reactor core could sustain damage Such an event would potentially expose millions of people to harmful levels of radiation.

Leaks of radioactive liquids from the Indian Point Unit 2 spent fuel pools have already reached the Hudson River. The reactors and fuel pools are 6 miles west of the New Croton Reservoir in Westchester County, which is part of the New York City reservoir system and provides drinking water to New York City residents. Future leaks to groundwater or airborne radiological releases have the potential to affect the drinking water supply in the nearby New Croton Reservoir, affecting millions of people. Replacing radionuclide-contaminated drinking water resources for millions of City residents would likely represent a substantial cost. In addition, radiological releases from a severe accident have the potential to destabilize the real estate market, infrastructure, and the economy in New York City and surrounding municipalities.

Indian Point's location and operations are incompatible uses in New York's Coastal Area. Relicensing the Indian Point facilities for an additional 20 years without substantial modification of the facilities will continue the environmental harms to the estuary and increase the threats to the public. Therefore, the Department objects to the certification of this activity.

Legal Context

This consistency determination is rendered in the context of certain background legal matters.

On March 13, 2013, Entergy filed suit in New York Supreme Court, Albany County seeking a declaratory order that it is "exempt" from federal consistency review because of certain exemption provisions in the NYS CMP.[6] On December 13, 2013, in Entergy Nuclear Operations, Inc. v. New York State Dept. of State,[7] Supreme Court Justice Michael Lynch determined that the "exemption" provisions do not apply to Entergy's application for the

license renewal and upheld the DOS's conclusion that Entergy's Indian Point facility was subject to federal consistency review. On December 11, 2014, the New York Appellate Division, Third Department, reversed the Supreme Court's decision and held that Entergy's license renewal application is exempt from federal consistency review under the NYS CMP text. The State of New York moved for leave to appeal to the Court of Appeals. On June 4, 2015, the Court of Appeals granted the Department's motion to hear the appeal in this case.[8] On September 17, 2015, the State's appellate brief was filed with the Court of Appeals.

Also, on November 5, 2014, Entergy attempted to withdraw its consistency certification. By letter dated November 21, 2014, DOS notified Entergy that the CZMA regulations do not support unilateral withdrawal of the certification while its renewal application before the NRC remains pending and, in particular, while either of its plants continues to operate beyond the plant's initial license period, as is the case now for Unit 2. DOS maintains the position that the consistency review remains active and that it must render a decision by November 6, 2015 to avoid a deemed concurrence under the CZMA.

Accordingly, DOS submits this objection letter: (1) to preserve its right to do so should it prevail in its position that Entergy's November 5, 2014, withdrawal was ineffective, and (2) in the event that DOS is ultimately successful in its opposition to Entergy's state court action and Entergy's attempts in other forums to evade consistency review for Indian Point altogether.

Statutes and Regulations

The Atomic Energy Act (AEA) authorizes the NRC to issue licenses to operate nuclear power plants for a period not to exceed 40 years. The statute also provides that operating licenses "may be renewed."[9] The AEA grants NRC authority over nuclear power plant safety and waste management. The AEA delegates to the NRC authority to determine applicable rules and regulations for license renewal.[10] Various requirements for renewal of operating licenses for nuclear power facilities are set forth in 10 C.F.R. Part 54 and Part 51. The process by which NRC can renew an operating license renewal involves a review of various safety and environmental issues.[11] A renewed operating license supersedes the original operating license.[12]

In addition, the CZMA (16 U.S.C. § 1451 et. seq.) authorizes a coastal state to review federal agency activities affecting any land or water use or natural resource of the coastal zone for their consistency with the enforceable policies of the state's approved Coastal Management Program (CMP).[13] The NYS CMP specifically identifies and lists licensing and certification of the siting, construction, and operation of nuclear power facilities as activities that are subject to the coastal consistency provisions.[14] Additionally, the CZMA regulations specifically provide that license renewals not previously reviewed by a state are subject to coastal consistency review.[15] Under the CZMA regulatory framework, the state coastal agency can concur with, conditionally concur with, or object to the consistency certification for a project. The US Secretary of Commerce may sustain or overrule the State's determination upon appeal.

Indian Point Licensing and Procedural History

Soon after the passage of the AEA in 1954, the federal government authorized the Consolidated Edison Company (Con Edison) to construct one of the very first nuclear power reactors in the Nation on the east bank of the Hudson River at river mile 43 in the Village of Buchanan at the Indian Point park site.[16] At that time, the Atomic Energy Commission (AEC) did not have siting regulations or restrictions for nuclear reactors that addressed site-specific issues such as nearby hazards, seismicity, sabotage, and population risks. In the 1960s, the AEC authorized Con Edison to construct two additional nuclear reactors at the Indian Point site.[17]

According to AEC and NRC documents, the Indian Point nuclear facilities received the following construction permits and operation licenses on the following dates:

	Construction Permit Issued	Operating License Issued
IP Unit 1[18]	May 4, 1956	March 26, 1962
IP Unit 2	October 14, 1966	September 28, 1973
IP Unit 3	August 13, 1969	December 12, 1975

Source: Federal Register and NRC Information Digest.[19]

Indian Point Unit 2. The Atomic Energy Commission issued operating license DPR-26 to Indian Point Unit 2 under the AEA for commercial operation for 40 years on September 28, 1973. That 40 year period in DPR-26 expired on September 28, 2013. NRC staff has allowed Unit 2 to continue to operate under the expired existing license while a decision is pending on the facility's application to renew its operating license.

Indian Point Unit 3. The Nuclear Regulatory Commission issued Indian Point Unit 3 operating license DPR-64 on December 12, 1975, for a 40-year period that will expire on December 12, 2015. Entergy purchased Unit 1 and Unit 2 in 2001 and Unit 3 in 2000. At that time, the operating licenses DPR-5, DPR-26, and DPR-64 were transferred to Entergy.

Application for Renewal Licenses. On April 23, 2007, Entergy filed an application with the NRC, pursuant to 10 C.F.R. Part 51 and 10 C.F.R. Part 54, to renew the commercial operating licenses for Units 2 and 3 for an additional twenty (20) years beyond the expiration dates contained in the initial operating licenses for those facilities. In accordance with NRC regulations, 20 years is the maximum extension period. 10 C.F.R. § 54.31(b).

On December 17, 2012, nine months before the expiration of operating license DPR-26 for Indian Point Unit 2, Entergy submitted to DOS a consistency certification and supporting information in connection with the operating license renewal application for Units 2 and 3. DOS deemed the certification incomplete because NRC had not yet issued the Supplemental Environmental Impact Statement (SEIS) for Aquatic Impacts of the facilities. On June 20, 2013, DOS received the SEIS and commenced consistency review of the application for renewal of the commercial operating licenses for the nuclear facilities.
DOS's decision was originally due on or before December 20, 2013. DOS and Entergy then entered into a series of stay agreements staying the running of the consistency review period pending issuance of this decision:

- On October 9, 2013, a stay went into effect ending on January 9, 2014.
- On January 9, 2014, a second stay went into effect ending on October 20, 2014 and then extended to December 31, 2014.
- On December 24, 2014, another stay went into effect ending on July 7, 2015.
- On June 30, 2015, a further stay went into effect ending on September 28, 2015.

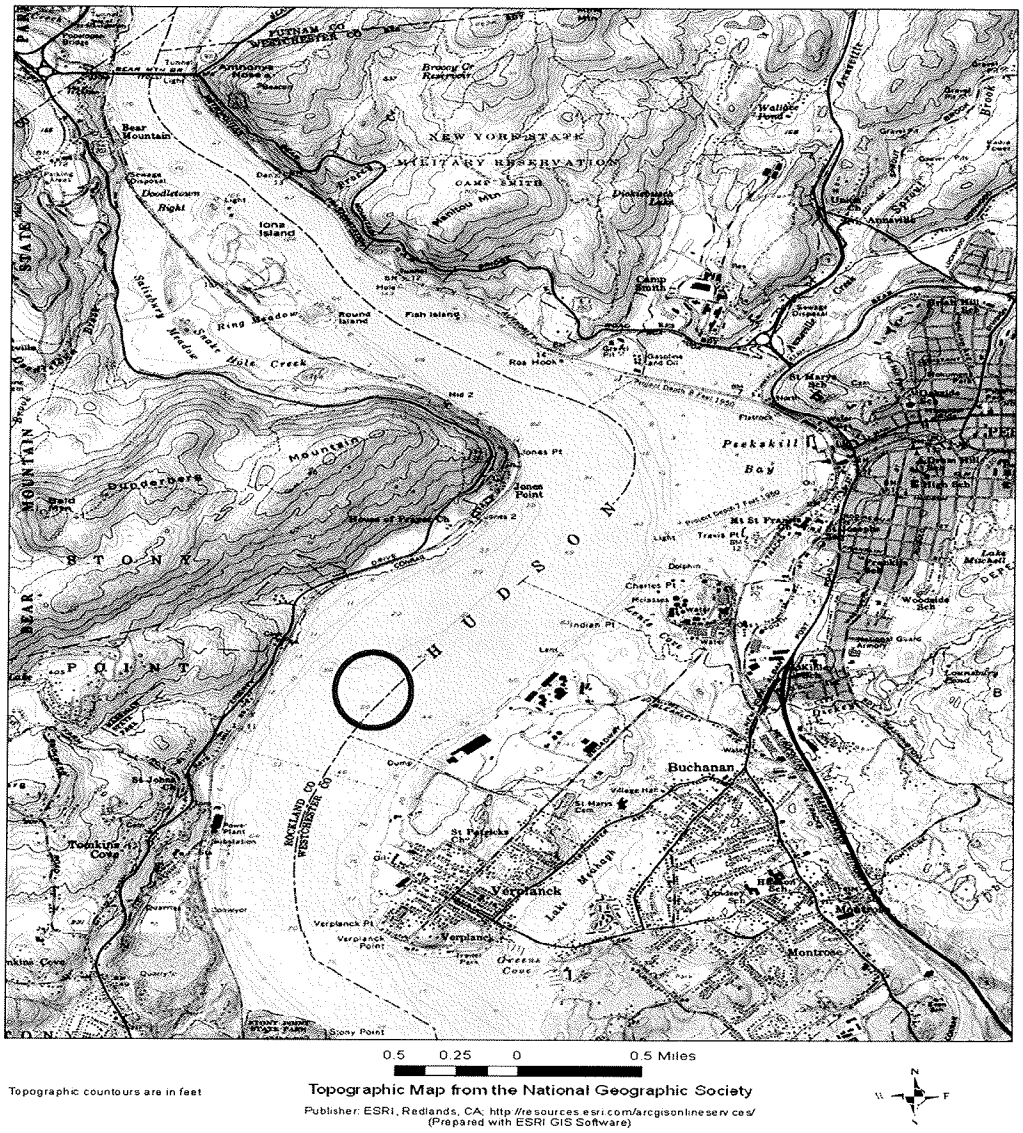
Indian Point Setting and Geographic Location

Entergy Indian Point Units 1, 2 and 3 are located on approximately 239 acres of land on the east bank of the Hudson River at river miles ("RM") 42-43[20] in the Village of Buchanan, Town of Cortlandt, in Westchester County, New York. The site is about 24 miles north of the New York City boundary line and about two miles southwest of the city of Peekskill. Approximately 90% of the area within six miles of the facilities is residential

with the remainder occupied by commercial properties.[21] As of 2007, more than 17 million people live or work within 50 miles of the plant.[22] In its Generic Environmental Impact Statement for License Renewal of Nuclear Plants, the NRC confirmed that substantially more people live within 10 and 50 miles of the Indian Point reactors, spent fuel pools, and waste storage facilities than at any other operating power reactor in the nation.

> "Typically, nuclear power plant sites and the surrounding area are flat-to-rolling countryside in wooded or agricultural areas. More than 50 percent of the sites have 80-km (50-mile) population densities of less than 200 persons per square mile, and over 80 percent have 80-km (50-mile) densities of less than 500 persons per square mile. The most notable exception is the Indian Point Station, located within 80 km (50 miles) of New York City, which has a projected 1990 population density within 80 km (50 miles) of almost 2000 persons per square mile."[23]

The Indian Point facilities were constructed within the Hudson River estuary watershed boundaries, and lie completely within New York's Coastal Zone. This area is a very narrow and deep (up to 200 feet deep) section of the Hudson River estuary, with strong currents and a rocky bottom substrate. Deep water is flanked in places by narrow shallow benches that stretch to the shoreline. The inputs of three major tributaries (Wappinger, Fishkill, and Moodna Creeks) contribute to the development of strong currents within the narrow, deep river channel. This reach of the Hudson River is unique and ecologically significant, and is the narrowest and deepest segment of the Hudson River estuary.[24]



The Croton drainage basin, located within the Town of Cortlandt, lies east of the Indian Point site. It empties into the New Croton Reservoir that supplies drinking water to nine million people in New York City and other regional municipalities. New York City does not currently filter its drinking water before it is consumed, and natural watershed protection is the sole practice used to ensure that drinking water quality is maintained. New York City contemplates using water directly from the Hudson River as a backup water supply.[25] The communities of Poughkeepsie, Wappingers Falls, Highland, Port Ewen, the Village of Rhinebeck, East Fishkill and parts of Hyde Park use the Hudson River to supply drinking water.

The Hudson River Estuary and Watershed

The Hudson River estuary is tidal and flows in both directions between New York City and Troy. The Native American name for the Hudson River, Mahicantuck, means "great waters in constant motion" or "river that flows two ways." This name highlights the fact that this waterway is more than a river -- it is a tidal estuary. The Hudson River is an important regional resource of significant aesthetic value in addition to providing transportation, recreation, and water supply. More than 200 species of fish are found in the Hudson and its

tributaries. Bald eagles, herons, waterfowl, and other birds feed from the river's bounty. Tidal marshes, mudflats, and other significant habitats in and along the estuary support a diversity of life. Tidal freshwater wetlands near Indian Point support this life web. The Hudson River is one of the Nation's fourteen American Heritage Rivers.

The Indian Point nuclear reactors are located about 24 miles north of the New York City boundary line. The Hudson River estuary watershed covers 5,300 square miles and 153 river miles. Upriver tributaries provide the freshwater flows that mix with downriver ocean saltwater of the Atlantic Ocean and Long Island Sound to create a dynamic brackish estuary with a shifting salt front. Ocean tidal action forces the Hudson River and its tributaries to flow upstream twice each day. This moves the salt front back and forth, creating internal waves that oscillate to mix the estuary's waters and nutrients, creating an especially productive habitat for many species. "The net downstream flows due to freshwater inflow have been reported to be in excess of 11,700,000 gallons per minute (gpm) 20% of the time, 6,800,000 gpm 40% of the time, 4,710,000 gpm 60% of the time, 3,100,000 gpm 80% of the time, and 1,800,000 gpm 98% of the time."[26] The estuary waters, coastal shores and wetlands are home to a diverse array of fish, birds, plants and other wildlife that depend on the estuary's productive waters for essential activities, such as feeding, nesting, spawning and wintering. This biodiversity includes more than 200 species of fish, 19 species of rare birds, and 140 species of rare plants.

As one of the most biologically diverse estuaries in North America, the Hudson River estuary has been recognized and designated as a valuable national, state, and local resource. In 1998, the Hudson was designated an American Heritage River by the U.S. Environmental Protection Agency. The Hudson River Valley and estuary are listed on the National Register of Historic Places. Federal, state, and local governments and taxpayers have invested millions of dollars in protecting, restoring and revitalizing the Hudson River estuary. For example, the U.S. Department of Commerce's National Oceanic and Atmospheric Administration (NOAA) provided $806,017 in funding in 2013 to help protect critical Hudson River estuarine habitat to preserve and permanently protect key migratory fish spawning and nursery areas for the Hudson River's migratory fish including blueback herring, alewife, American shad, American eel, striped bass, and the federally endangered short-nosed sturgeon. The investment also enables tidal wetlands to migrate landward with sea level rise and builds resilience to climate change in the Hudson River estuary.[27]

Water salinity throughout the habitat is variable, as the salt front migrates up and down the river through this area, depending on tidal conditions and the amount of freshwater inflows from upriver. The salt front can shift on a daily basis from as far south as the Battery (RM 0) to north of Poughkeepsie (RM 77), but usually drifts between River Miles 30-70. As the salt front moves up through this area, a variety of marine species, such as bluefish, anchovy, silversides, and blue claw crab may also enter the area.

Fish and Wildlife Resources

The Hudson River supports a rich array of ecological resources that interact in complex ways. The twenty mile stretch of the Hudson River between RM 40 and 60 is an especially critical habitat for most estuarine-dependent fisheries originating from the Hudson River. This area contributes directly to the production of in-river and ocean populations of food, game, and forage fish species. Commercial and recreational fisheries throughout the Atlantic Coast benefit from these biological inputs from the Hudson River estuary.

In her analysis of the Hudson River's fisheries, Professor Karin E. Limburg and fellow researchers wrote the following about the storied history of fishing in the Hudson River:

> "Commercial fishers in the eighteenth and nineteenth centuries harvested a wide variety of finfish species from the Hudson, many of which were documented by Mitchill (1815) who made numerous observations in the public markets. Among the species most heavily exploited in the 19th century were

American shad and the two sturgeons. Sturgeons were valued for both their roe and flesh. Harvests were so great in the tidal Hudson that the fish was popularly known as "Albany beef," because it was shipped upriver to a hungry market. Shad could be taken in great numbers in the spring spawning runs by stake- or driftnets, then salted for later consumption. In 1895, it was the number one inland fish harvested (Cheney 1896), valued at almost $185,000 – equivalent to over $3,900,000 today."[28]

Several other important commercial fish species in the Hudson River estuary were striped bass, river herring (alewife and blueback herring), bluefish, weakfish, Atlantic mackerel, Atlantic butterfish, Atlantic menhaden, Atlantic sea herring, black sea bass, red hake, scup, summer flounder, winter flounder, windowpane flounder, and blue crab.[29]

The historic commercial and recreational fisheries resources within the Hudson River estuary were substantial contributors to the region's economy. In recent decades, however, the commercial and recreational fisheries in the Hudson River have exhibited an alarming decline and have effectively collapsed. The commercial fishery for most finfish species was closed in 1976. Only American shad, striped bass and Blue crab supported important commercial fisheries after that time.[30] Since then, American shad stocks have fallen to historically low levels and river herring stocks are also extremely low. The American shad fishery finally closed in 2010 because of population decline.[31]

Despite these declines, the National Marine Fisheries Service (NMFS) has designated the Hudson River an Essential Fish Habitat (EFH), in recognition of the role the river plays in maintaining 34 commercially important fish species.[32] In 2010, NMFS specified that: "For the immediate Indian Point area, designated EFH includes acreage that produces organisms that are under direct federal stewardship as well as prey items for species further downriver and offshore. The Hudson River is an important regional source for both harvested stocks and prey species that support those stocks, so reductions in its productivity are of great significance to fishery ecology and fishery management."[33]

In addition to the commercial fishery, the Hudson River estuary supported an important recreational fishery. The concentrations of diadromous fishes in this area provides excellent recreational fishing opportunities, attracting visitors from throughout the lower Hudson Valley. The most popular recreational fish species included striped bass, black bass (largemouth bass and smallmouth bass), American shad, alewife, blueback herring, white perch, sunfishes, catfishes, crappies, yellow perch, bluefish, weakfish, and Atlantic tomcod. Blue claw crabs were also an important recreational fishery species. Historically, American shad and American eel have supported important recreational fisheries, but stock decline has forced closure of the shad fishery, and PCB contamination has ended the harvesting of eel for human consumption.[34]

Tidal shallows in the Hudson River adjacent to the Indian Point facilities are significant habitat for the fry (young) of many fish species that spawn in the Hudson River estuary, and for the species that feed on the fry. Submerged aquatic vegetation (SAV) beds occurring along the eastern shore of the estuary form important habitat, and some fish are much more abundant in SAV beds as opposed to in bare areas. The predominant native SAV species is water celery.[35] Water celery SAV beds generate oxygen, and large plant beds can super-saturate the water with oxygen for as long as 12 hours per day.[36]

This tidally-dominated reach of the Hudson River serves as a migratory corridor, spawning habitat, and nursery area for an unusually diverse species assemblage of resident or diadromous fishes, crustaceans, shellfish, and many lower trophic level prey species.[37] The combination of swift currents, rocky substrates, and freshwater inflow during spring runoff in this area creates highly favorable conditions for reproduction by coastal migratory fishes. In this protected habitat area adjacent to the Indian Point facilities, the estuary serves as spawning and nursery ground for important fish and shellfish species, such as striped bass, American shad,

Atlantic sturgeon, shortnose sturgeon, river herring, white perch, bluefish, anchovy, silversides, hogchoker, and blue claw crab.[38] Deepwater areas of the Hudson River in this vicinity are also used by concentrations of species that spawn elsewhere in the Hudson River estuary. In particular, these deep areas are used as migration routes by endangered Atlantic sturgeon and endangered shortnose sturgeon, and are important nursery areas and summering areas for juvenile Atlantic sturgeon and summering areas for post-spawn adults.

The shortnose sturgeon has been listed as an endangered species since 1967.[39] The largest concentration of shortnose sturgeon live in the Hudson River and are well documented to inhabit the waters in the RM 40-60[40]adjacent to the Indian Point facilities. This fish species rely on areas within the Hudson River estuary adjacent to the facilities during portions of their lifecycle.[41] NOAA has developed a Shortnose Sturgeon Recovery Plan as directed by the Endangered Species Act.[42]

In 1996, stocks of Atlantic sturgeon had dropped to such low levels that the Department of Environmental Conservation (DEC) and Atlantic States Marine Fisheries Commission established a moratorium on fishing for Atlantic sturgeon,[43] and this moratorium remains in place at this time. On January 31, 2012, the Hudson River Atlantic Sturgeon population was listed as an endangered species by the NMFS.[44] Atlantic sturgeon depend upon this section of the Hudson River in the vicinity of Indian Point as a primary nursery and summering area, so this area is essential for the Atlantic sturgeon to survive and propagate.[45] NMFS biological reports, as well as the historical biological data for the Indian Point facilities, confirm that a great number of young Atlantic sturgeon have been impinged on the screens of the cooling water intake structures (CWIS) of Units 2 and 3.[46]

Adult Atlantic sturgeon have long been known to also use River Miles 40-60, and research in the 1990s firmly established that adults aggregate in this reach.[47] This is further supported by more recent NYS Department of Environmental Conservation (DEC) sonic tracking data where 42 adults were tagged in 2006-2008 and were tracked annually. Tagged fish were found in River Miles 42-87 in spring, River Miles 42-89 in summer, and River Miles 42-58 in the fall, the latter occurring entirely in this portion of the estuary.[48]

Studies on the life stages and habits of Hudson River Atlantic sturgeon show they are commonly found in water depths of 30 to 120 feet.[49] Scientists using sonic tracking and gill net sampling found that early juveniles use River Miles 42-66 from April to October as summer rearing habitat,[50] with a concentration of late juveniles and post spawning adults at River Mile 48.[51] In April to October, early juveniles were found at depths of 30-75 feet in River Miles 42-66; in October to March, early juveniles were found at depths of 60-120 feet in River Miles 12-46; and in June to September late juveniles and adults were found at depths of 48-105 feet at River Mile 48.[52] In the spring of 2004, DEC Hudson River Fisheries Unit staff captured, sonic tagged, and released 9 juvenile Atlantic sturgeon from Haverstraw Bay. DEC staff tracked these fish for several months in 2004 and 2005, and found all were concentrated in waters adjacent to Indian Point and the deeper parts of Haverstraw Bay during summer and early fall.[53]

Survey data indicate that River Miles 40-60 of the Hudson River, along with the deeper parts of Haverstraw Bay, is the primary aggregation area of juvenile Atlantic sturgeon during the summer in the entire estuary.[54] These fish are present at a vulnerable point in their life cycle, living in the unique combination of conditions found in the Hudson River estuary, primarily in the channel and deep waters. This aggregation indicates that the habitat is highly and uniquely suited to meeting their life needs for feeding and growth, at a sufficiently low cost in terms of energy expenditures for finding food and outrunning predators. The important habitat attributes likely include a combination of water salinity range, food resources, sediment type (sturgeon feed on invertebrate organisms in the sediment), water currents, bottom structure, and depth.[55]

River Miles 40 to 60 are also essential for the Hudson River striped bass population, and particularly so for larvae and very young fish. Though striped bass eggs and larvae are typically found throughout a large portion of the this stretch of the estuary, some of the highest densities of striped bass larvae in the entire Hudson River are found in the vicinity of the Indian Point facility.[56] It is also one of two areas of high striped bass egg deposits in the estuary. Generally, adult striped bass enter the area to spawn between mid-May and mid-June, and then leave the area shortly after spawning. Within several weeks, the eggs have hatched and larval fish begin moving downstream to nursery areas in the brackish area of the Hudson River estuary. Striped bass eggs are carried by the ebb and flow of the tide downriver. By the time the larvae mature to the post yolk sac stage, they are found in the highest densities between River Mile 40 and 55.[57]

From mid-September to late October, the relative abundance of striped bass young-of-the-year was listed as "high" at River Mile 44, high (east side) and "medium high" (west side) at River Mile 40, and "medium high" at River Miles 43, 52, and 59.[58] Striped bass larva density sampled in the channel was transitional, highly productive area for survival. In response to the severe declines in populations listed as "high" at River Miles 41, 43, 47, 53, 54, 55, 57, 58, and 60 and "medium high" at River Miles 40, 42, 46, 48, 49, 50, 56, and 59.[59] This section of high striped bass larva density is not exceeded anywhere else within the Hudson River estuary.[60]

River herrings and American shad are also present in this stretch of the Hudson River estuary and rely on this fresh to salt water of many Hudson River fish species, New York State and the federal government have developed population conservation and recovery plans for a number of species. NMFS has adopted a Recovery Plan for the Shortnose Sturgeon.[61] American shad, and river herring.[62] DEC has implemented, a fishing moratorium on American shad since 2010.[63] DEC has a New York State River Herring Sustainable Fishing Plan and an American Shad Recovery Plan.[64] A principal recommendation in all of these recovery plans for the Hudson River points to reduction or elimination of take as of primary importance in allowing populations to recover.

The Hudson River estuary in the vicinity of the Indian Point nuclear facilities is home to a significant concentration of wintering bald eagles, a threatened species in the State of New York.[65] From December through March, this stretch of the Hudson River serves as a forage area, nesting area and breeding area for these eagles. The land area bordering this stretch of the Hudson River is predominantly steep, rocky, hillsides with a variety of land uses including undeveloped forestland, and bald eagles use the steep slopes along the river for perching and then feed on fish in nearby open water.[66] Because this reach of the estuary is fast moving and deep, it rarely freezes in winter and it provides a dependable forage habitat and food source for these birds. Located just upriver from the Indian Point facility is Iona Island, an area dedicated to environmental research and education and part of the Hudson River National Estuarine Research Reserve. Iona Island has been designated as an eagle sanctuary by the Palisades Interstate Park Commission. Iona Island is a primary roosting area for the bald eagles, and they feed throughout the entire River Mile 40 - 60 area. Other bald eagle roosting areas include the undisturbed woodlands along both sides of the river, especially near sheltered coves.

Seismic Issues

Indian Point Units 2 and 3 are in the highest category of seismic hazard evaluation in the nation.[67] NRC staff has placed the Indian Point Unit 2 and Indian Point Unit 3 facilities in priority "Group 1", which are "generally those that have the highest re-evaluated hazard relative to the original plant seismic design basis (GMRS to SSE) as well as ground motions in the 1-10Hz range that are generally higher in absolute magnitude. Group 1 plants are expected to conduct a seismic risk evaluation and submit it by June 30, 2017."[68] In June 2014, Entergy proposed reclassifying the Indian Point Unit 3 facility from a high priority Group 1 plant to a lower priority Group 3 category. NRC rejected Entergy's request.[69]

In 2004, the U.S. Geological Survey, the federal seismological agency, reported to NRC new seismic hazard estimates for the nation's nuclear reactor sites.[70] Based upon those estimates, in August 2010, the NRC published new estimates of earthquake damage and concluded that the Indian Point Unit 3 nuclear reactor has the highest risk of serious damage to its core in the event of an earthquake.[71] Updated seismic hazard information also showed that the Indian Point Unit 2 nuclear reactor has the 25th highest seismic core damage frequency out of 104 nuclear power reactors in the United States.[72]

Earthquake activity in the vicinity of Indian Point coupled with other simultaneously occurring events may in fact exceed the earthquake design for some components of the facilities. On May 13, 2011, the NRC issued seismic vulnerability inspection reports of Indian Point Unit 2 and Unit 3. The inspection reports were written "to capture the need to evaluate the beyond design basis aspect of simultaneous 8.5.b events on both units." These "8.5.b events" are simultaneous external natural events and consequences beyond the original plant design basis, such as large fires, explosions on site or flooding conditions on site which test the licensee's capability to mitigate station blackout (SBO) conditions and identify the potential that the equipment's function could be lost during seismic events possible for the site.[73] The NRC Staff reported that Entergy identified a number of potential vulnerabilities at Units 2 and 3 regarding firefighting following a safe shutdown earthquake (SSE). The potential vulnerabilities stem from the fact that the fire protection system in non-safety related buildings, buried/underground fire headers, fire pumps, and the city water makeup supply are not seismically designed which could result in a loss of portions of the fire protection system following a SSE.[74] The NRC inspectors also identified conditions that are outside the design and licensing basis that could present a challenge during a seismic or other event, to wit:

> 1. Generally, reactor sites were not required and did not implement mitigating actions to cope with an SBO [station blackout conditions resulting from a loss of all alternating current power] in conjunction with a seismic event; and
> 2. During beyond design basis events, in which the SAMGs [Severe Accident Management Guidelines] direct depressurizing the PWR containment, conditions could exist in which mitigation equipment is damaged due to elevated containment pressures and potentially prevent containment depressurization and/or isolation.[75]

The NRC's inspection of Unit 3 also found that:

> An additional vulnerability identified for Unit 3, is that carbon dioxide tanks used for fire mitigation, are not seismically qualified. This vulnerability could result in the loss of fire suppression in various non-safety and safety-related areas, such as the turbine building, the EDG rooms, and the vital 480V switchgear room, following a design basis SSE.[76]

The risk of earthquakes occurring near the Indian Point nuclear reactors is substantially greater than what was determined at the time the federal government granted the original operating licenses.[77] The ground at Indian Point was thought to be seismically static at that time. [78] New information has shown that the opposite is true.

In 2008, a peer-reviewed report by Columbia University seismologists disclosed that the Indian Point nuclear facilities are located in close proximity to two distinct earthquake faults - the Ramapo Seismic Zone and the Stamford-Peekskill Seismic Zone.[79] The Ramapo Seismic Zone runs from eastern Pennsylvania to the mid-Hudson Valley, passing within about a mile northwest of Indian Point. The Ramapo system is comprised of a braid of smaller single fractures. The recently discovered Stamford-Peekskill fault line is an active seismic zone that runs approximately 25 miles from Stamford, Connecticut to Peekskill and passes less than a mile north of the Indian Point nuclear power plant. The Stamford-Peekskill fault line may belong to a series of earthquake

fault lines that run east and south of the Ramapo Seismic Zone. This series also includes the Dobbs Ferry fault in suburban Westchester, which generated a 4.1 magnitude earthquake in.[80] Problematically, these earthquake lines intersect.

The Columbia University report concluded:

> Indian Point is situated at the intersection of the two most striking linear features marking the seismicity and also in the midst of a large population that is at risk in case of an accident to the plants. This is clearly one of the least favorable sites in our study area from an earthquake hazard and risk perspective.[81]

Magnitude

Many earthquakes in New York occur near the surface in the hard, rigid rocks underlying much of the lower Hudson Valley. According to these Columbia University seismologists, there have been 383 known earthquakes from 1677 to 2007 in a 15,000-square-mile area around New York City.[82] Earthquakes with a magnitude of 5 occurred in 1737, 1783 and 1884. Researchers say these larger earthquakes can be routinely expected every 100 years.[83] Small earthquakes in New York occur every few years. On July 5, 2014, a 2.5 magnitude "micro earthquake" occurred; the epicenter was near the town of Peekskill in the vicinity of Indian Point.[84]

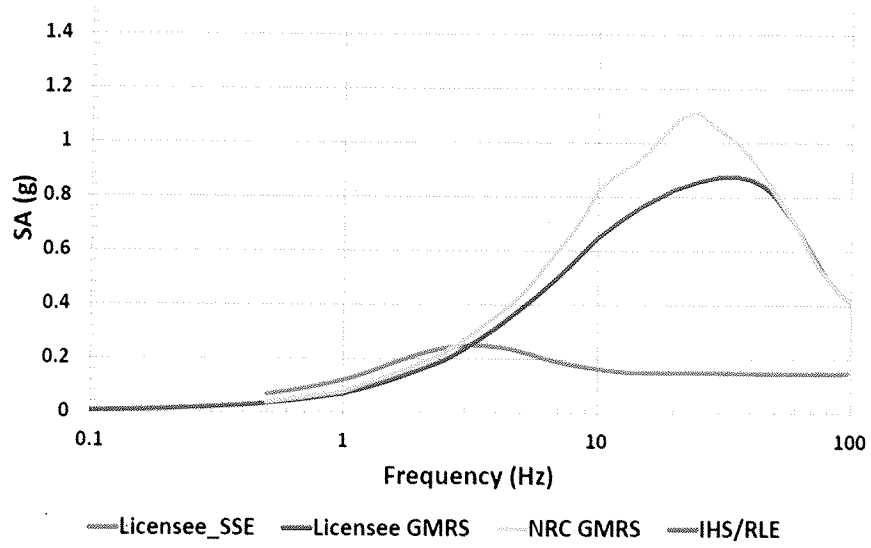
Gravitational Acceleration

The *gravitational acceleration* associated with an earthquake is an important risk factor in nuclear reactor safety. The ground motion of earthquakes can critically damage nuclear facilities. On January 31, 2012, the NRC, the US Department of Energy, and Electric Power Research Institute released a new seismic study, revealing significantly higher earthquake risks in the central and eastern United States. According to NRC, "Calculations with the new model are expected to result in a higher likelihood of a given ground motion compared to calculations done using previous models."[85]

In 2014, Entergy provided an updated seismic hazard analysis for the Indian Point Unit 2 and Unit 3 facilities. That analysis shows that the anticipated ground motion is larger for higher frequency earthquake events than was understood when the Indian Point Unit 2 and Unit 3 facilities received their initial operating licenses in the 1970s. After receiving the Entergy updated analysis, NRC Staff performed its own analysis. As shown in the chart below, the NRC's ground motion curves appear to be higher than the Safe Shutdown Earthquake (SSE) design curves that resulted from licensing hearings in the 1970s and were adopted by the Commission. In the following figures,[86] the blue line labeled "Licensee SSE" depicts the seismic design curves from the 1970s the red and green lines reflect the updated 2014 seismic analysis.

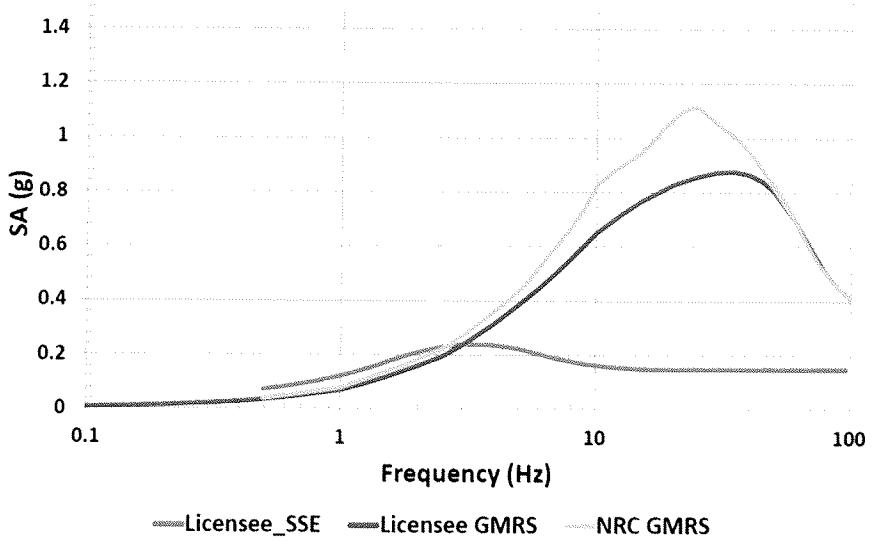
U.S.NRC
Protecting People and the Environment

Indian Point 2



U.S.NRC
Protecting People and the Environment

Indian Point 3



Professor Emeritus Dr. Lynn Sykes of the Lamont-Doherty Earth Observatory at Columbia University studied the geologic terrain and earthquakes in the area around Indian Point. He wrote:

> Probabilistic calculations for Indian Point reactors 2 and 3, such as those used by USGS for their national earthquake hazard maps and those now required by NRC for newer nuclear power reactors, need to be debated and evaluated by wide scientific and policy communities.
>
> That approach necessitates the inclusion of rates of earthquake activity for periods longer than the historic record, which was not required under the regulations that existed when the Indian Point reactors were originally licensed. If 20-year license extensions are granted, 60 years of operation of the two reactors is a sizable fraction of the 270-year historic record of earthquakes. The chance that the reactors

could be shaken by intensities greater than VII and/or subjected to accelerations larger than 0.15 g can be calculated and is not negligible.[87]

The unexpected confluence of emergency conditions at Indian Point with an earthquake event could create a catastrophe that overwhelms the protections intended to protect against nuclear reactor accidents. If, during such a catastrophe, a reactor core or spent fuel pool is damaged, it could potentially expose millions of people and their homes, businesses, communities, drinking water reservoirs, and farms to harmful levels of radiation.

Flooding and Sea Level Rise

The Indian Point facilities were constructed close to the river bank and are located at a relatively low point in the valley formed by the Hudson River. During Hurricane Sandy, the Hudson River water level adjacent to the Indian Point facilities reached 9 feet 8 inches, and Indian Point did not experience flooding as a result of Hurricane Sandy's storm surge. However, because Indian Point is located along a stretch of the Hudson River shoreline that is at risk of flooding during extreme storm events, there is a threat of possible shutdown of cooling water intake pumps, loss of electrical power, and dispersal of contaminants into the floodwaters that drain into the Hudson River estuary. Projected future flood maps in the vicinity of Indian Point show that the water intake structures, pier, and low lying structures may experience flooding during an extreme flooding event.

Normal flood stages of the Hudson River are primarily influenced by tidal flows and secondarily by runoff. Storm surges and sea level rise as a result of climate change are also major contributors to flooding threats and risk within the Hudson River estuary. Earthquakes may also trigger water level rise. Grade elevation for the Indian Point facility is approximately 15 feet. [88]

In its Response to New York State Department of State Request for Supplemental Information Regarding Potential Impacts of Extreme Flooding Conditions at Indian Point, Entergy described its assessment of Indian Point flood risk:

> "In response to NRC Fukushima Recommendation 2.1 (Flood Hazard Reevaluation), Entergy evaluated the impact of numerous extreme flooding scenarios on Indian Point based on state-of-the art knowledge in hurricane science, hydrology, and probabilistic methods. Entergy determined that in a combined external flood event (postulated to occur once every 500,000 years) associated with a storm surge, 25-year storm-related flooding, 10 percent exceedance tide, and coincided wind generated wave activity, water levels could potentially exceed Indian Point grade by 2.7 ft. (References 1 and 2). Surge duration is expected to be approximately 3 hours."[89]

As climate change effects continue to unfold, rising sea levels and higher storm surges are expected because higher sea levels provide a higher foundation of water for the storm surge to build upon, which also prevents low-lying areas from draining floodwaters, causing an additional flood risk.

Electric Transmission Lines and Electromagnetic Issues

Indian Point uses two main transformers to increase electric generator output voltage from 22 kilovolts (kV) to 345 kV. This high voltage electricity is transmitted through two double-circuit 345-kilovolt ("kV") high powered transmission lines--feeder W95 from Unit 2 and feeder W96 from Unit 3--that physically connect the Indian Point facility to the Buchanan electrical substation located across Broadway near the entrance to the Indian Point facility. The electrical power lines that connect Indian Point transformers to the substation are each about 2000 feet in length, nearly all of which are located within the Indian Point property except the final 100

feet where the power lines cross over the public road to enter the substation. These are the only transmission lines available to connect the site to the Consolidated Edison electrical transmission grid.[90] The offsite (standby) auxiliary electrical power necessary for startup and normal shutdown of Indian Point reactors is supplied by additional 138-kV electricity transmission input lines that use the same transmission towers as the W95 and W96 output transmission lines.[91]

The Indian Point facility relies on the electric grid to power their cooling systems. From the Buchanan electricity substation, the high-powered electricity transmission lines diverge, running overhead in a southeasterly direction parallel the Hudson River, and also in a westerly direction just south of the Indian Point facility where they cross the Hudson River. The Buchanan substation and the regional transmission system to which it connects were designed and constructed before Indian Point was sited in its current location. During Superstorm Sandy, Indian Point 3 automatically shut down in response to electrical grid disturbances caused by the storm.[92]

As discussed above, electromagnetic interference can occur between electrical power lines and adjacent gas pipelines in shared right-of-ways with potentially disastrous consequences. "Since the 1960's, electromagnetic interference between high voltage transmission lines and metallic pipelines has been a topic of major concern. Due to the sharing of the right-of-way, overhead power line may induce voltages on the metallic pipelines running in close vicinity leading to serious adverse effects," especially corrosion effect on metal pipelines.[93]

II. Description of Facility Operations

Water Withdrawals

The Indian Point facilities are by far the state's largest industrial water users and far exceed the amount of water withdrawn by any other industrial facility located on the Hudson River.[94] Equipped with Westinghouse four-loop pressurized water reactors and nuclear steam supply systems, Indian Point Units 2 and 3 draw approximately 2.5 billion gallons of Hudson River estuary water each day to cool its pressurized-water nuclear reactors using a "once through cooling" process.[95] The design rate of the cooling water intake system for each of the Indian Point Units is 840,000 gallons of water per minute. That withdrawal is nearly double the 1.3 billion gallons used to support the industries, businesses and nine million residents and visitors to New York City and Westchester County each day.

As described by NMFS, the Indian Point facilities' water withdrawals impact the Hudson River and its biota:

> "Indian Point relies upon the Hudson River as a cooling water source and heat sink. Water is withdrawn directly from the-river through batteries of seven intake bays into each generating unit and distributed to once-through condensers and auxiliary cooling systems. Cooling water is drawn into the plants by variable- or dual-speed pumps. As it first enters, the withdrawn water is skimmed of floating debris and subsequently passed over modified, vertical Ristroph traveling screens designed to protect aquatic life by retaining water and minimizing vortex stress. These modified screens attempt to reduce, but do not eliminate, impingement mortality. A high pressure spray-wash system removes debris from the front of the traveling screen mechanism and a low pressure spray-wash system flushes impinged fishes off the screen and into a sluice system that returns them (along with the heated effluent water) to the Hudson River"[96]

In the process of extracting such a large volume of water and organisms from the Hudson River estuary, billions of young fish, fish eggs, fish larvae, and other organisms are forcibly sucked into the plant's intake pipes and are killed. This process is called "entrainment." In this manner, the cooling water intake structures (CWIS) of

Units 2 and 3 are responsible for the mortality of nearly one billion aquatic organisms per year from the operation.

Those fish that are too large to be drawn through the screens of the intake mechanism are often forcibly pinned against the screens there and killed by the power of Indian Point's CWIS. This process is called "impingement." The facilities' adverse impacts upon aquatic organisms from impingement and entrainment in the water intake systems is well-documented.

DEC's 2003 FEIS for the Indian Point SPDES permit renewal demonstrates the annual scale of the mortality of entrained fish eggs and larvae by the CWIS of Indian Point:[97]

	Indian Point
American shad	13,380,000
Bay anchovy	326,666,667
River herring	466,666,667
Striped bass	158,000,000
White perch	243,333,333
Total	*1,208,046,667*

DEC determined that the impingement and entrainment caused by Indian Point's once-through CWISs cause significant mortality at all life stages of fish. "The operation of the Indian Point cooling water intakes results in an adverse environmental impact" and "excessive fish kills."[98]
Entergy's license renewal application for Indian Point Units 2 and 3 was the subject of an Endangered Species Act (ESA) § 7 consultation with NMFS. On October 14, 2011, NMFS issued its Final Biological Opinion, addressing the impacts of license renewal on the endangered shortnose sturgeon (including an Incidental Take Statement). Specifically, the Biological Opinion

- referenced NMFS's shortnose sturgeon recovery plan[99] that identifies habitat degradation and mortality as principal threats to the species survival;
- identified impingement of shortnose sturgeon on the screens covering cooling water intake structures as a prime reason for mortality; and
- stated that while levels of entrainment and impingement for shortnose sturgeon at the power plants on the Hudson River "are relatively small...the fact remains that these (and other plants) have previously impinged shortnose sturgeon and may have impacted the Hudson River population."

On May 16, 2012, NRC Staff wrote to NMFS requesting re-initiation of consultations under ESA § 7 to address Indian Point's impacts on the Atlantic sturgeon, which was listed as endangered on February 6, 2012. On January 30, 2013, NMFS issued a new Biological Opinion, that superseded its October 2011 Biological Opinion. The NMFS Biological Opinion addressed both shortnose sturgeon and Atlantic sturgeon including an Incidental Take Statement. The Incidental Take Statement exempted a large number of endangered shortnose and Atlantic sturgeon likely to be impinged the Indian Point screens and bars. NMFS recognized that endangered Atlantic sturgeon occur in the Hudson River near Indian Point. In the Opinion, NMFS "conclude[d] that the continued operation of IP2 and IP3 are likely to adversely affect but is not likely to jeopardize the continued existence of endangered shortnose sturgeon or the Gulf of Maine, New York Bight or Chesapeake Bay Distinct Population Segment (DPS) of Atlantic sturgeon."[100] The Biological Opinion recommended a number of mitigative and monitoring measures to try to reduce impingement and mortality. Thus far, Entergy has not committed to mitigate or monitor sturgeon deaths.

Water Quality

The Hudson River in the vicinity of Indian Point is designated as Class SB Saline Surface Waters.[101] In order to demonstrate compliance with New York's water quality regulations a facility must demonstrate compliance with both the standards and designated uses found in these regulations. As the best usage of Class SB waters are primary and secondary contact recreation and fishing, and Indian Point's water withdrawals effects fishing, the best use of these waters are not being met.

In accordance with Clean Water Act (CWA) § 401, 33 U.S.C. 1341, DEC 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. In a final decision dated April 2, 2010, DEC denied Entergy's §401 WQC application, finding that the existing Indian Point facilities, including the retrofitted cylindrical wedge-wire screen system, "do not and will not comply with existing New York State water quality standards."[102] The Denial Letter concluded that the "location, design, construction and capacity" of the cooling water intake structures did not "reflect the best technology available ["BTA"] for minimizing adverse environmental impact," due to the cooling structures' entrainment and impingement of aquatic organisms in the Hudson River.[103] Among the reasons the DEC offered for its denial were:

> 1. The continued commercial operation of Indian Point Units 2 and 3 would continue to exacerbate the adverse environmental impacts upon aquatic organisms caused by the CWISs, and would therefore be inconsistent with the best usage of the Hudson River designated in 6 NYCRR § 701.11 for fish, shellfish and wildlife propagation and survival. The Denial Letter stated that "[i]n 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."
>
> 2. Leaks of radiological material have the potential to impair the "best use" of the Hudson River designated in 6 NYCRR § 701.11.
>
> 3. The Indian Point's cooling water intake structures do not minimize the adverse environmental impacts of entrainment, and therefore the facilities are not in compliance with the State's water quality standards.
>
> 4. The "taking" of endangered species (shortnose sturgeon) and threatened species (Atlantic sturgeon) is unlawful and impairs the best usage of the waters of the Hudson River for propagation and survival of these species. Therefore, Units 2 and 3 are not in compliance with ECL Article 11 nor in accordance with 6 NYCRR § 608.9(a)(6).[104]

In April 29, 2010, Entergy requested an adjudicatory hearing on the State's denial of the water quality certification pursuant to 6 NYCRR §621.10. That administrative hearing process, which also includes adjudication of DEC's draft Indian Point SPDES permit, is ongoing.

Spent Fuel Storage and Leaks

Indian Point creates large quantities of hazardous nuclear waste (spent fuel) in the process of generating nuclear energy. Following its use in a nuclear reactor, the spent fuel is transferred from the reactor to a nearby facility that houses the spent fuel pool, where it is stored temporarily until it is cooled.[105] After cooling, the nuclear waste is then transferred to dry cask storage and stored on a concrete pad onsite. DEC has observed that "The pools of spent fuel at Indian Point, which store significant volumes of radioactive material -- far more than inside the active nuclear reactors -- have no containment structure."[106]

Entergy's current practice for managing Indian Point's spent nuclear fuel waste onsite is to pack the existing spent fuel pools to their maximum capacity and to remove older, cooler spent fuel to dry cask storage that will remain onsite indefinitely because the federal government has not yet established a permanent repository. The storage facilities were initially designed and constructed in the 1960's to prevent leakage of radioactive materials. At that time, the storage facilities were considered "temporary" and, therefore, were not designed to accommodate indefinite on-site storage of nuclear waste. When the federal government first licensed the operation of Indian Point Unit 2 and Indian Point Unit 3 it authorized each unit's single spent fuel pool to hold 241 spent fuel assemblies. NRC subsequently authorized the pools to hold five times (5x) the original limit. The following charts summarize how NRC has authorized increasing amounts of spent nuclear fuel to be stored in the spent fuel pools for Unit 2 and Unit 3:

IP2 Spent Fuel Pool Storage Limits	
Date	Fuel Assemblies
1973	264
1980	482
1985	980
1989	1,376

IP3 Spent Fuel Pool Storage Limits	
Date	Fuel Assemblies
1975	264
1978	840
1989	1,345

The NRC has described spent fuel pools at Indian Point as "leak tight."[107] However, plumes of radioactive releases have been detected at the Indian Point facility. In 2005, Indian Point identified leakage of radionuclide-contaminated water from cracks in two different spent fuel pools and subsequently discovered tritium, strontium, and other radionuclides in groundwater underneath the site.[108] Strontium and tritium from Indian Point's spent fuel pools have also reached the Hudson River.[109]

The GZA GeoEnvironmental, Inc. report "*Hydrogeologic Site Investigation Report for the Indian Point Energy Center*", discusses the high probably of on-site underground retention of radioactive spent fuel pool water due to local topography, and that the retained spent fuel pool water is likely to continue to discharge to groundwater for an indeterminate amount of time. Since the discovery of these radionuclide leaks, Entergy has made a concerted effort to search for, identify, and mitigate unanticipated and unpermitted releases of spent fuel pool discharges. Currently, the Indian Point discharge plumes are measured and monitored through an on-site well network. Despite assurances in the GZA report that all leaks had been addressed, subsequent leaks have been identified, and radionuclide releases into the groundwater have experienced periodic spikes in concentration.[110] Although Entergy has stated that specific discharges from the spent fuel pools have been remedied, Indian Point consultants admit that only the readily accessible portions of the spent fuel pool at Unit 2 have been inspected and that, without full inspection of Unit 2, additional unidentified small leaks from cracks in the spent fuel pool liners may still exist.[111]

Changes in Facility Operations

Entergy's license renewal application indicates its intention to continue the commercial operation of the Indian Point facilities for an additional 20 years beyond the expiration of its current licenses. Significant changes in operation have taken place at Indian Point since the nuclear generating stations were originally licensed in the 1970s, in conjunction with Entergy's relicensing application and Atomic Safety Licensing Board (ASLB) review.[112] As explained in DEC's denial of Entergy's 401 Water Quality Certification:

> [s]ince the original construction and operation of the Indian Point facilities in the 1970s, the CWISs [cooling water intake structures] have been retrofitted with certain technologies in order 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. 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. 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.[113]

Other operational changes have occurred at the Indian Point facility since its original licensing. As discussed previously, the Indian Point facility has associated spent nuclear fuel pools that already contain 40 years of nuclear waste. This long-term storage regime was neither contemplated nor reviewed in the original licensing. Moreover, in submissions to the ASLB, Entergy has acknowledged that the spent fuel pools leaked and the waste plume has reached the Hudson River.[114] Were Entergy to be successful in its license renewal efforts, the storage of an additional 20 years of spent fuel will require substantial and significant changes in petitioners' waste storage practices, if only to safely accommodate the additional waste. Entergy's license renewal application does not address the long term (or even permanent) on-site storage of spent fuel at Indian Point, or attendant environmental and public health risks.

History of Accidents at Indian Point

During its 40 years of operation, Indian Point has had many incidents, reactor scrams, operational errors and equipment malfunctions. Some of these events have resulted in radioactive releases to the air, leaks to groundwater and the Hudson River and unplanned plant shutdowns. The NRC has well-documented the problems with these reactors.[115]

The list of significant events at Indian Point includes (but is not limited to) the following:

Indian Point 2:

- In 1980, 100,000 gallons of Hudson River water leaked into the containment building from the fan cooling unit.[116]
- On October 25, 1997, Indian Point Unit 2 was shut down for an unscheduled maintenance outage. On August 5, 1998 Unit 2 restarted operation after being in cold shutdown condition for 304 days.
- On February 3, 2000, the main steam line radiation monitors registered leakage from steam generator number 24. Later, on February 6, 2000, the leakage monitor alarms indicated a 1.5 gallons per day (gpd) leak rate from steam generator number 24. On February 10, 2000, the leak rate trend showed leakage had increased to 3.5 gpd.[117]
- On February 15, 2000, Indian Point Unit 2 experienced an "Alert"[118] after a steam generator tube ruptured which allowed an estimated 19,197 gallons of radioactive water to mix with nonradioactive water in the steam generator, resulting in a huge release of radioactive steam to the atmosphere. In addition, approximately 200 gallons of treated radioactive water was released into the Hudson River one week after the accident. Unit 2 was closed for nearly 11 months that year.

- In September 2005, Entergy discovered that a crack in the spent fuel pool wall was leaking tritium and strontium-90 into groundwater which migrated by the groundwater flow path to the Hudson River. Nickel-63, and cesium-137 were later discovered in the flow path to the Hudson River.[119]
- On January 7, 2010, NRC inspectors reported that an estimated 600,000 gallons of radioactive water turned into radioactive steam and was vented to the atmosphere after an automatic shutdown of Unit 2.[120]
- On November 7, 2010, an explosion occurred in a main transformer for Unit 2, spilling approximately 50-100 gallons of oil from the transformer into the Hudson River. The incident was classified as an "Alert".[121] Entergy later agreed to pay a $1.2 million civil penalty for the transformer explosion.[122]

Indian Point Unit 3

- On March 25, 1982, Indian Point Unit 3 experienced an "Unusual Event" when its steam generator tubes ruptured. Further inspection revealed girth weld problems. Unit 3 was shut down for more than a year.[123]
- On June 18. 1983, the main electrical generator for Unit 3 experienced a massive failure, resulting in a seven month unscheduled outage.[124]
- On February 27, 1993, Unit 3 was shut down after ATWS Mitigating System Actuation Circuitry system was found out of compliance. Plant workers and NRC inspectors identified numerous surveillance testing deficiencies, fire protection program deficiencies, and design errors. Unit 3 was shut down for two years, until its restart on July 2, 1995.[125]
- On April 6, 2007, an automatic reactor trip occurred in Unit 3 due to a turbine-generator trip as a result of a fault on the 31 main transformer. Notified of a visible explosion and fire at the 31 main transformer, the control room operators declared a Notice of "Unusual Event." The plant fire brigade responded to the fire and applied foam. Significant corrective actions included replacement of 31 main transformer, and repair and replacement of damaged components as required associated with the 32 main transformer.[126]
- On April 23, 2007, the NRC fined Entergy $130,000 for failing to meet a deadline for a new emergency siren plan. The 150 sirens at the plant meant to alert residents within 10 miles to a plant emergency.[127]
- On October 29, 2012, Unit 3 automatically shut down in response to electrical grid disturbances caused by Hurricane Sandy. The disturbances resulted in a turbine load reject, turbine trip and reactor trip.[128]
- On May 9, 2015, Unit 3 experienced a fire on the Main Transformer, causing the automated shutdown of the reactor. The failed transformer contained about 24,000 gallons of dielectric fluid, which is used as an insulator and coolant when the transformer is energized. The U.S. Coast Guard estimates that about 3,000 gallons of dielectric fluid entered the Hudson River following the failure.[129]

As Indian Point ages and components degrade, additional events may occur. Given to its history of equipment problems, its proximity to the world's financial center and the severe consequences of a major accident on public health, the environment and the economy, Indian Point is a nuclear facility that remains a coastal concern.

COASTAL POLICY ANALYSIS

In conducting federal consistency review of this project, DOS analyzed and assessed the impacts of the Indian Point facilities and operations on New York's coastal zone uses and resources. The Indian Point facilities were reviewed for their affects and impacts upon New York's important ecosystems, habitats, fish, wildlife, and aquatic life, and also affect human health, safety and quality of life.

Coastal effects include both direct and indirect effects which result from the activities and occur at the same time and place as the activities. Indirect, cumulative and secondary effects include those that are reasonably foreseeable and result from the activities either through a combination or chain or of events, build up incrementally over time, occur at a future time, occur at different scales, or are farther removed in distance. One impact may not by itself be significant, however, the addition of many impacts over time can cause cumulative effects and have potentially significant coastal effects. Effects include the product of past, present and/or future anticipated activities, and can vary in intensity as well as spatial and temporal extent.

Coastal Policy 9 - *Expand recreational use of fish and wildlife resources in coastal areas by increasing access to existing resources, supplementing existing stocks, and developing new resources.*

Coastal Policy 10 - *Further develop commercial finfish, shellfish, and crustacean resources in the coastal area by encouraging the construction of new, or improvement of existing on-shore commercial fishing facilities, increasing marketing of the state's seafood products, maintaining adequate stocks, and expanding aquaculture facilities.*

These coastal policies promote development, protection, and maintenance of fishery resources for recreational and commercial users in the State's coastal area. Historically, the Hudson River estuary has supported a wide variety of significant fisheries. The current status of the fisheries reflects population declines in most commercially important fish species.

Policy 9 applies to any federal activity, including permitting or licensing activities, and all applicants for these federal licenses or permits whose actions may affect New York State's recreational fisheries. Policy 10 also seeks to maintain adequate stocks of commercial fish species by managing and protecting the State's renewable fishery populations.

The fish resources of the Hudson River, while in their natural element and unconfined, are *ferae naturae* and are owned by the people of the State in common.[130] These fishery resources are held in trust by the State for the benefit of the public and are subject to State regulation.[131] Preservation of fish resources is a matter of public interest. New York State determined that the fish mortality caused by utilities is not a legitimate use of the State's fishery resources[132] and has refused to allocate portions of the States' fishery resources for these purposes. The public has suffered incalculable natural resource losses from the cooling water intake systems of Indian Point. This practice of huge water withdrawals is not consistent with either Coastal Policy 9 or 10 and cannot continue.

The Indian Point nuclear facilities constitute the state's largest industrial water user, having a combined intake capacity of approximately 2.5 billion gallons of Hudson River water each day.[133] In the course of their operations, the Indian Point facilities entrain over 1 billion individual fish of various life stages each year, the majority of which cannot lawfully be harvested by commercial and recreational users because of stock depletion.[134] The CWISs of Units 2 and 3 are responsible for the mortality of nearly one billion aquatic organisms per year from this entrainment. Those fish that are too large to be drawn through the screens of the intake mechanism are often forcibly pinned or impinged against the screens and killed by the power of Indian Point's CWIS. The facilities' adverse impacts upon aquatic organisms from impingement and entrainment in the water intake systems is well-documented.[135] As noted by a DEC Administrative Law Judge: "The operation of the Indian Point cooling water intakes results in an adverse environmental impact and 'excessive fish kills.'"[136]

Shortly after Units 2 and 3 commenced operations, beginning in February 1976, all commercial fishing was banned in the Hudson River between the Troy Dam and the Battery in New York City, with the exceptions for baitfish, Atlantic sturgeon greater than four feet, American shad, blue crab and goldfish used for ornamental purposes.[137] Subsequently, the shad fishery was closed. Also federal law now prohibits the commercial and recreational take of Atlantic and short-nosed sturgeon. The commercial fishing ban, with periodic adjustments for certain species, has remained in effect to the present. As evidenced by the multiple closures and restrictions placed on commercial fishing in the Hudson River, stocks of commercial fish species are not adequate and therefore, the continued large scale removal of numerous individuals significantly detracts from the maintenance of adequate stocks.

In its consistency certification, Entergy contends that continued operations of the Indian Point facilities for an additional 20 years will have no effect on commercial fisheries. Entergy points out that since the construction of the nuclear generating stations in the 1970s, the facilities have been retrofitted with Ristroph-type modified traveling water screens, fish handling and return systems, and variable speed pumps in an attempt to mitigate some of the fishery impacts.[138] However, even with these technological innovations, annual entrainment and impingement mortality at Indian Point remains in the order of billions and hundreds of thousands respectively.

Based on documented field surveys and data analysis, DEC has estimated that the Indian Point's CWIS alone destroys more than 150,000,000 striped bass larvae each year through entrainment.[139] River herrings and American shad are entrained in large numbers in the CWIS at Indian Point.[140] Hudson River fish studies, conducted by the utility operators under the Hudson River Settlement Agreement, concluded that the CWISs at Indian Point entrains approximately 13,380,000 American shad and nearly 500,000,000 river herring larvae and small juvenile fish each year.[141] Documentation shows that both sturgeon species have been impinged and killed at Indian Point. Based in part on Indian Point historical data, NMFS estimated that between 1975 and 1990, over 1,100 Atlantic and shortnose sturgeon have been impinged and killed on the Indian Point CWISs.[142] In addition to effects on these fish species, impingement/entrainment affects a broad array of other aquatic organisms, all integral components of the Hudson River ecosystem. DEC's concern over the impact to both sturgeon species at Indian Point was shared by NMFS and was raised in NRC's license renewal process.

Investigations by fishery biologists have shown that a broad range of ecosystem stressors, operating over a long period of time, have combined to exert substantial cumulative stress on Hudson River estuary fisheries resources, resulting in population declines and shifts in community structure. Stressors include such factors as water withdrawals, overharvest, water quality impairments, navigational dredging, and wetland and habitat loss. Substantial reduction or elimination of important system stressors is a necessary component of fish population recovery.

The operation of Indian Point's CWISs stresses current fish populations and will continue to present an ongoing ecosystem stressor as its CWIS removes enormous numbers of commercially and recreationally important fish species. Additionally, continued operation of the CWISs would not supplement existing stocks but continue the current situation of taking large numbers of larvae and juvenile fish. These impacts are further exacerbated by the fact that the area of the river where Indian Point withdraws cooling water has long been recognized as a transition zone between fresh and salt water in the Hudson River estuary which makes it an area of great biological productivity and importance.[143]

Given the significant and direct loss to populations of numerous fish species as a result of impingement and entrainment, and the indirect population losses due to alterations of the food web and other ecosystem parameters, license renewal for an additional 20 years contravenes the intent of the coastal policies to promote and maintain healthy recreational and commercial fish stocks and is therefore not consistent with Coastal Policies 9 and 10.

Policy 18 - *Proposed major actions in the coastal area must give full consideration to safeguarding the vital economic, social and environmental interests of the State and of its citizens, and to the safeguards which the State has established to protect valuable coastal resource areas.*

The vital economic, social and environmental interests that may be affected by major actions in the State's coastal area are varied, numerous and intertwined. The State's vital economic interests include the provision of jobs with fair wages and powered by low cost, clean energy; they also include the protection of occupations and industries tied to commercial and recreational fishing. The State's vital social interests include a healthy and safe populace. The State's vital environmental interest are numerous. New York's air, water and terrestrial resources are of incalculable value.

The Hudson River is unique and of great importance to the region, the State and the nation.
Reviews of major actions affecting the Hudson River must necessarily focus on the coastal context. The explanation following Policy 18 in the NYS CMP states:

> Proposed major actions may be undertaken in the coastal area if they will not significantly impair valuable coastal waters and resources, thus frustrating the achievement of the purposes of the safeguards which the State has established to protect those waters and resources. Proposed actions must take into account the social, economic and environmental interests of the State and its citizens in such matters that would affect natural resources, water levels and flows, shoreline damage, hydro-electric power generation, and recreation.[144]

In its Consistency Certification, Entergy contends that license renewal of the Indian Point nuclear operating licenses for an additional 20 years is consistent with the vital interests expressed in Policy 18. It sets forth reasons why each interest - economic, social and environmental - has been met. There are however countervailing arguments against the relicensing of these nuclear facilities based on these same interests in Policy 18. Each interest will be addressed in turn.

Vital economic interests of the State

In support of its argument that it serves the vital economic interests of the State, Entergy highlights that:

- Indian Point is a lower cost source of baseload electricity.
- Indian Point's operations maintain the reliability of New York State's power system in terms of resource adequacy, transmission security, voltage support and performance, and location in the supply-constrained Southeastern New York Control Area.
- Loss of Indian Point as a system resource could result in violations of the transmission line reliability criteria and compromise the reliability of the electricity grid.
- Entergy makes substantial contributions to State and local tax revenues and to charities.
- Entergy is a major employer in the region with approximately 1100 employees and many secondary workers.

Employing aging infrastructure, Indian Point seeks to renew its licenses for an additional 20 years. Indian Point's history of accidents, chemical spills, and radiological leaks, and prolonged shutdowns, detailed earlier, belies its reliability, economic costs and coastal compatibility.

The NYS CMP addresses the importance of energy generating and transmission facilities and appropriate siting of them to avoid other competing objectives and conflicts. A discussion of the "Energy Facility Planning

Process" in the NYS CMP includes the following to help characterize circumstances and the State's visions of the process over time:

> "Because of the need to develop a fully adequate national nuclear waste disposal program, and a need to clarify substantial uncertainties associated with economic, safety and regulatory issues related to the nuclear option, new nuclear power plants should not be included in the State's electricity supply plan at this time."[145]

Entergy touts the lower cost of electricity production associated with nuclear fuels as compared with such sources as coal, natural gas, and oil.[146] It argues that in order to increase the competitiveness of the New York State economy, lower cost energy resources, such as nuclear, are needed.

Indian Point's contributions however are not unique in providing low cost energy. Indian Point is a "price taker," accepting the hourly market price for the electricity it injects into the electric grid.[147] The average cost of wholesale electricity in New York in fact closely correlates with the market clearing price of natural gas.[148] Due to plentiful supply and projected low prices, natural gas remains the standard fuel for new and retrofitted generation units. Rather than setting the clearing price, Entergy is paid the price offered by the highest cost generator of electricity chosen by NYISO. It is therefore incorrect that Indian Point may be a lower cost provider than a gas generator.

According to Entergy's consistency certification, in 2010, electricity generation from Indian Point represented approximately ten percent of the total electricity consumed in New York State. Its supply of reactive capability to support energy transfers into the downstate region from upstate and from the neighboring electric systems currently helps to ensure that energy movement is balanced between sources of generation and points of demand. The NYISO analyzed the impact of the unavailability of the Indian Point facilities in its 2012 Reliability Needs Assessment (RNA) as a possible scenario. In his testimony to the NYS Senate Energy and Telecommunications Committee discussing the 2012 RNA, NYISO's then Vice-President Thomas Rumsey stated: "Consistent with past findings, the NYISO determined if Indian Point is not available in the fall of 2015, there would be a need for new resources on the bulk power system by summer 2016."[149] In other words, "[c]losure of the Indian Point facilities, without replacement resources in service beforehand, would jeopardize the reliability of the New York bulk electric grid."[150]

Initiatives are being undertaken to ensure there will be adequate resources available to replace Indian Point's electricity by that time. On November 30, 2012, the PSC issued an order and instituted a proceeding calling for the development of an "Indian Point Retirement Contingency Plan" to address the potential closure of Indian Point upon the expiration of its existing licenses by the end of 2015.[151] On November 4, 2013, the PSC issued its Order accepting the Reliability Contingency Plan for retiring the Indian Point facilities, with a focus on electric system reliability. PSC provided a detailed explanation of the plan:[152]

> This proceeding was commenced through a November 2012 Order that directed the development of utility plans to address the reliability concerns that may arise from the retirement of electric generating facilities.[153] In particular, the November 2012 Order recognized the significant reliability needs which could occur if the 2,040 MW of generating capacity at the Indian Point Energy Center (IPEC) were retired upon the expiration of IPEC's existing licenses. Given the uncertainty regarding "whether Entergy will be able to obtain the necessary permits and approvals to keep [IPEC] operational over the long-term," the Commission sought a reliability contingency plan addressing those potential reliability needs. The November 2012 Order directed Consolidated Edison Company of New York, Inc. (Con Edison), as the transmission owner most directly affected by the closure of the IPEC, to develop such a

plan in consultation with the New York Power Authority (NYPA), Department of Public Service Staff (DPS Staff), and other appropriate agencies.

In response to the November 2012 Order, Con Edison and NYPA jointly submitted a filing on February 1, 2013 (Con Edison/NYPA February Filing). The Con Edison/NYPA February Filing, as described in more detail below, proposed an IPEC Reliability Contingency Plan whereby Con Edison, New York State Electric and Gas Corporation (NYSEG), and NYPA would pursue the initial development of three Transmission Owner Transmission Solution (TOTS) projects, while concurrently soliciting generation and transmission proposals (other than the TOTS projects) through a Request for Proposals (RFP) to be issued by NYPA. The Con Edison/NYPA February Filing further described an Energy Efficiency (EE)/Demand Reduction (DR) program to obtain 100 MW of peak demand reduction. The TOTS upgrades, the 100 MW from EE and DR programs, and any projects accepted through the RFP process, were proposed as a portfolio to address a potential reliability need of approximately 1,450 MW that could arise in the 2016 summer period. Specifically, a June 1, 2016 reliability need date, when peak summer conditions could be expected to arise, was identified as an in-service date for projects that was consistent with the analysis performed as part of the 2012 Reliability Needs Assessment (RNA) conducted by the New York Independent System Operator, Inc. (NYISO).

***

In this Order, we address, in part, the third and final requested action item in the Con Edison/NYPA February Filing by accepting a portfolio for inclusion in the IPEC Reliability Contingency Plan consisting of: 1) the three TOTS projects; and 2) the development of approximately 125 MW of EE/DR/CHP resources through the 125 MW Revised EE/DR/CHP Program. This portfolio, along with 60 MW from on-going EE, DR, and CHP activities, makes a total contribution of 185 MW from EE, DR, and CHP programs towards the potential reliability need for 1450 MW in June 2016.11 We anticipate that the TOTS will contribute at least an additional 600 MW towards that need.

***

At the same time, there are several merchant generating units, with a combined capacity of approximately 1,500 MW, which could serve this market, but have either been mothballed and are waiting to return to service if economic conditions improve, or have been subject to a forced outage or have been derated and require repair. With the potential to participate in a higher revenue stream, some of the owners of these units could decide in the near future to bring their units back into service. If so, these units would contribute to meeting the reliability needs, thus reducing the amount of resources necessary to include in the IPEC Reliability Contingency Plan portfolio.

As discussed below, we agree with DPS Staff's recommendation to include the TOTS projects and the EE, DR, and CHP projects described above in the portfolio of projects accepted for inclusion in the IPEC Reliability Contingency Plan. If accepted now and, if timely implemented, the TOTS projects and the 125 MW Revised EE/DR/CHP Program provide a significant portion of the resources needed to address the potential reliability needs in the event IPEC is retired in December 2015. ***This Order accepts this limited suite of projects as the appropriate least-cost and least-risk portfolio for the IPEC Reliability Contingency Plan at the present time.***

On November 14, 2014, Con Edison and other New York Transmission Owners ("NYTOs") formed New York Transco, a state-wide transmission company, to develop, build and own new transmission facilities. The TOTS and other electric system infrastructure improvements have an expected in service date of June 1, 2016.

In addition to providing replacement power to the Southeastern New York area, New York Transco facilities will counter losses in jobs and State and local tax revenues. As stated in New York Transco's Motion to Examine Alternating Current Transmission Upgrades:

> [T]he overall investment of approximately $1.3 billion in these Projects will stimulate the creation of an estimated 6,000 direct jobs and nearly 17,000 total jobs. It is estimated that on an annual basis the Projects will result in approximately $176 million in statewide production cost savings. In addition these projects offer a reduction in annual Installed Capacity ("ICAP") costs estimated in the range of $50 million to $200 million, which could vary year to year. An important benefit of this proposal is the positive environmental impact that these Projects will bring to New York State. ... As explained herein, the Projects for the most part are upgrades of or additions to existing transmission facilities. As such, the Projects will impact only approximately two square miles of land not currently occupied by transmission facilities and most, if not all, of this land will be adjacent to existing utility corridors. Because the NY Transco will be able to leverage the rights of-way ("ROW") assets of the NYTOs, the impact of the transmission additions is minimized.
>
> Further, the Projects will allow for a large reduction in CO_2 and NO_X emissions annually, equal to approximately 227,000 tons and 83 tons, respectively by allowing more efficient generation to be dispatched across the state. An additional benefit is that these Projects can be developed relatively quickly with most being able to be in service between 2016 and 2018.[154]

In April 2015, NYISO issued the "Gold Book" which forecasts wholesale electrical "load and capacity data" for the years 2015-2025. The Gold Book factors in the retirement of the Indian Point Contingency Plan in its projections, stating:

> The Transmission Owner Transmission Solutions (TOTS) listed in Table VII consist of three distinct transmission projects approved by the PSC as part of the Indian Point Contingency Plan in October 2013 and are projected by the Transmission Owners to be in service by summer 2016. (FN 10: The Indian Point Contingency Plan also included 125 MW of additional demand response and combined heat and power resources to be implemented by Consolidated Edison, some of which is already in effect.) The objective of the plan is to increase transfer capability into Southeast New York. The Marcy South Series Compensation project includes adding compensation to the Marcy South transmission corridor through the installation of series capacitors, and includes re-conductoring the Fraser – Coopers Corners 345 kV line. The Rock Tavern – Ramapo project will add a second Rock Tavern – Ramapo 345 kV line and create a Sugarloaf 345/138 kV connection to the Orange and Rockland system. The Marcy South Series Compensation and Rock Tavern – Ramapo projects together will increase the transfer capability from upstate to downstate New York. The Staten Island Unbottling project will relieve transmission constraints between Staten Island and the rest of New York City through the reconfiguration of two substations and the forced cooling of four existing 345 kV feeders.

The implementation of a "new capacity zone" in the NYISO's installed capacity market is projected by the NYISO to increase the capacity revenues that would be available to resources locating in any of New York zones G, H, I or J. These infrastructure improvements include demand-side measures, including energy efficiency, demand response, and combined heat and power resources that will lower the peak load on the Con Edison transmission system.

Generation supply increases from new merchant plants or existing resources are also expected. In the Gold Book, NYISO projected significant net capacity additions to the electric system and generation capacity for the New York Control Area (NYCA).[155] The Gold Book stated:

> The total resource capability in the NYCA for the summer of 2015 is 41,610 MW, which is an increase of 312 MW from summer 2014 due to the net impact of additions, uprates, revised unit ratings, retirements, changes in Special Case Resources (SCR), and changes in net purchases of capacity from other control areas. The total resource capability for 2015 includes:
>
> - existing NYCA generating capacity (38,665 MW);
> - SCR (1,124 MW);
> - additions and uprates (374 MW); and
> - net long-term purchases with neighboring control areas (1,446 MW).
>
> The existing NYCA capability includes wind generation (1,461 MW) and non-wind renewable generation (511 MW, including 32 MW of large-scale solar PV).
>
> ***
>
> ***There is a general trend of generating capacity returning to service in Southeast New York and other parts of the New York Control Area.***[156]

After the new capacity zone was established, two existing power plants in the lower Hudson Valley, Danskammer Generating Station and Bowline #2, went on-line and with a total capacity of about 870 megawatts of power. Bowline #3 is expected to return to service and add its electricity supplies in the near future.

The combined effect of these projects is to relieve reliability concerns by some combination of increasing capacity resources, reducing load, or allowing existing capacity resources to be better utilized through the presence of additional transmission system infrastructure. To the extent there is a deficiency, wholesale market supply resources are available to make up the remainder of reliability needs that exist after the implementation of transmission and demand-side measures. For these reasons, the New York electric power system can be expected to operate reliably without Indian Point Unit 2 and Unit 3 at the time or soon after their licenses expire.

Vital Social Interests of the State

Policy 18 ensures that the vital social interests of the State in its coastal area are considered when a major action is proposed. A major action will be judged based on compatibility in the societal context of its waterfront location and on its environmental impacts. Such analysis ensures a healthy and safe populace as well as the protection of coastal resources. NYS CMP Policy 18 explanation states:

> ***Proposed major actions may be undertaken in the coastal area if they will not significantly impair valuable coastal waters and resources, thus frustrating the achievement of the purposes of the safeguards which the State has established to protect those waters and resources. Proposed actions must take into account the social, economic and environmental interests of the State and its citizens in such matters that would affect natural resources, water levels and flows, shoreline damage, hydro-electric power generation, and recreation.***[157]

Contending that operating license renewal for an additional 20 years will advance the vital social interests of the State, Entergy lists the following benefits:

- Indian Point contributes substantially to State, county and local taxes, and makes major contributions to the Hendrick Hudson Central School system;
- Entergy participates in a wide range of discretionary corporate giving programs that address a variety of civic, health, environmental and safety issues;
- Employee donations and matching company contributions to United Way campaigns, educational institutions, and local nonprofit agencies provide assistance to those in need within the community;
- Entergy pays about $1 million to lease the discharge canal structure and underlying land from New York State Energy Research and Development Authority (NYSERDA), which owns the property; and
- Entergy pays fees to NYSERDA associated with the Low-Level Radioactive Waste Management Act.

Entergy's contributions to the local and school tax base, jobs and charities are indeed substantial and important to the regional economy. However, the social interests that Entergy claims Indian Point Energy Center serves – making tax payments, corporate and employee donations to charity, and lease fees on real property – are not peculiar to its waterfront location or to the vital social interests in protecting coastal waters and resources. Even if such payments were protective of the values that society places on preserving coastal waters and resources, Entergy's contentions must be viewed in a broader factual context.

Unlike other existing nuclear energy generating facilities in New York, the Indian Point facilities, a mere 24 miles north of the New York City boundary line, lie in one of the most densely populated regions of the United States. Approximately 90% of the area within six miles of the station is residential with the remainder occupied by commercial properties. As of 2007, more than 17 million people live or work within 50 miles of the plant. NRC confirmed that substantially more people live within 10 and 50 miles of the Indian Point reactors, spent fuel pools, and waste storage facilities than at any other operating power reactor in the nation. It is and always has been a poor location to site a nuclear facility. In 1979, NRC's Director of State Programs Robert Ryan said of the Indian Point site "I think it is insane to have a three-unit reactor on the Hudson River in Westchester County, 40 miles from Times Square, 20 miles from the Bronx... [Indian Point is] one of the most inappropriate sites in existence."[158] Were Entergy applying for a license to build a new nuclear power plant where Indian Point is now located, it is unlikely that federal regulations would allow it, based on its proximity to such a highly populated area. [159]

From an earthquake hazard perspective, the Indian Point's facilities are poorly situated. The site lies at the intersection of two striking linear features marking earthquake activity, in the midst of the large population that is at risk in case of an accident to the nuclear plants. The Indian Point facility is located near significant metropolitan area water supplies and water supply infrastructure that would be jeopardized by accidents at the facility. The reactors and fuel pools are 6 miles west of the New Croton Reservoir in Westchester County, which is part of the New York City reservoir system and provides drinking water to New York City residents.

An accidental release of radiation from the facilities could contaminate drinking water supplies and render uninhabitable large swaths of property in the NYC Metropolitan region. Such a catastrophe would cause dramatic human as well as economic losses. Replacing radionuclide-contaminated drinking water resources for millions of City residents would likely be at an unimaginable expense.

In particular, Entergy claims that Indian Point's tax payments to State, county and local governments and school districts will be lost if their operating license is not renewed for an additional 20 years. A 2013 compliance filing for PSC's Indian Point Contingency Plan indicated that the TOTS projects would provide substantial tax revenues to the State and localities.

> "As set forth in the January 25th Filing, the RRT Line and the MSSC Project, together with the other NY Transco projects, will provide significant public policy benefits to New York State, including production cost savings, job growth, increased local tax revenues, and emissions reductions. Due to their nature and location, these two projects are also highly effective solutions to the deficiency that would result from the closure of IPEC, and they can meet the In-Service Deadline requirement." [160]

Relicensing Indian Point would not safeguard the vital social interests of NYS but place a large segment of the population, their livelihood and their drinking water in jeopardy.

Vital environmental interests of the State

In its discussion of Policy #18, Entergy explains that nuclear operating license renewal will have significant positive impacts on the environment by reducing the causes of global warming, preserving air quality for New York's citizens, and fighting the formation of acid rain because fossil fuel-fired power plants otherwise must operate to replace some portion of Indian Point's baseload energy production. It postulates:

- Since nuclear power plants operate virtually emission-free for air pollutants such as NOx, SO2, CO, CO2, PM10, PM2.5, and volatile organic compounds, Indian Point plays a vital role in addressing State and federal air quality standards in New York, especially throughout the Hudson Valley and New York City.
- If Indian Point generation were no longer available, fossil fuel-fired facilities in some form would be used to replace its baseload energy supplies. Replacement of Indian Point's electricity production by primarily fossil-fired units would lead to an increase in emissions of approximately 13.5 million metric tons for CO2, 6,400 tons for SO2, and 3,300 tons for NOx over the period from 2016 to 2025.
- Without Indian Point, the emission of acid rain precursors would increase and the problems of acidic deposition in New York State would be further exacerbated. [161]
- Indian Point contributes to environmental justice by working to combat climate change and drastically reduce air pollution from NOx, SOx, and CO2.[162]
- Indian Point cooling water withdrawals have no adverse impact on the Hudson River aquatic environment or its indigenous fish populations as the result of entrainment and impingement and that Indian Point's operations have not affected recreational or commercial fisheries.

Entergy calls attention to the fact that its core and essential nuclear generation is virtually emissions free for air pollutants that contribute to global warming and acid rain. This emissions free electricity generation is said to contribute to the ability of New York State to meet key climate change and air quality goals. Although Indian Point's nuclear facilities do not contribute air pollutants or greenhouse gasses as part of their operations, these are not environmental benefits. The nuclear facilities neither harm nor enhance air quality; they have a neutral effect on air quality.

Policy 18 contains an explanation of policy that states that major actions in the coastal area may only be undertaken:

> "...if they will not significantly impair valuable coastal waters and resources, thus frustrating the achievement of the purposes of the safeguards which the State has established to protect those waters and resources, water levels and flows, shoreline damage hydroelectric power generation, and recreation".

The Indian Point facilities have caused tremendously harmful impacts to coastal waters and resources. DEC denied Entergy's §401 WQC application stating that "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 the process of extracting such a large volume of water and organisms from the Hudson River estuary, the CWISs have destroyed tens of billions of aquatic organisms in their 40 years of operation. Each year, at least one billion fish, juvenile fish, fish eggs, fish larvae, and other organisms are forcibly sucked into the plant's intake pipes and are either entrained in the plant's intake pipes or impinged against its water intake screens.

This enormous loss of life has negatively affected the coastal area for the last 40 years. The facilities operate in a portion of the Hudson River that serves as critical habitat for most estuarine-dependent fisheries originating from the Hudson River and contributes directly to the production of in-river and ocean populations of food, game, and forage fish species. Among the fish deaths are the endangered Atlantic and shortnose sturgeon, which spawn and nursery in that segment of the Hudson River. Ironically, the fish and other aquatic organisms in the Hudson River, as well as the water itself, is owned by the State of New York, which holds them in trust for all the people.[163] Entergy has no superior rights to these public resources, yet has tremendously abused them. In recent decades, the commercial and recreational fisheries in the Hudson River have effectively collapsed. The commercial fishery for most finfish species has been closed. The operations of the existing Indian Point nuclear facility and its relicensing for an additional 20 years ensures that the enormous waste and destruction of fishery resources will continue.

These adverse effects on commercially and recreationally important migratory fisheries reach beyond the Hudson River coastal area, and affect activities in New York's Atlantic Ocean coastal area, the coastal areas of other states, and the territorial seas of the United States. The continuation of these and other adverse effects over longer terms and their adverse effects on and significant hindrance to achieving important national CZMA coastal objectives and State coastal policy objectives embodied in the NYS CMP, over the longer term, is not and would not be consistent with this policy and all of the related NYS CMP policies that are meant to achieve the objectives of Policy 18.

The Indian Point facility sits extremely close to the intersection of two active seismic features. The NRC recently confirmed that Indian Point Units 2 and 3 are in the highest category of seismic hazard evaluation in the nation relative to the original plant seismic design basis as well as ground motion. [164] Additionally, the NRC reported that Indian Point Unit 3 nuclear reactor has the highest risk of serious damage to its core in the event of an earthquake.[165] In the event of an earthquake, the reactor core could sustain damage Such an event would potentially expose millions of people to harmful levels of radiation.

An earthquake scenario is even more troublesome since Indian Point creates large quantities of hazardous nuclear waste in the process of generating electricity and that waste continues to be stored in spent fuel pools and in casks on-site at Indian Point. Radioactive releases have been detected at the Indian Point facility from cracks in two different spent fuel pools. Leaks of radioactive liquids from the Indian Point Unit 2 spent fuel pools have reached the Hudson River and have been detected in the groundwater beneath the Indian Point facility. Future leaks or other radiological releases have the potential to affect drinking water supplies serving 9 million people in New York City and other regional municipalities. Replacing radionuclide-contaminated drinking water resources for millions of City residents would represent an enormous cost. Additional radiological releases could destabilize the real estate, infrastructure, and the economy in New York City and other regional municipalities.

The neutral air quality "benefits" of nuclear power operations must be viewed in light of the overwhelmingly negative environmental effects the operation of Indian Point visits upon the Hudson River ecosystem, aquatic habitats, public waters, and commercially and recreationally important fisheries.

In addition, both Indian Plant Unit 2 and Unit 3 have a long and disturbing history of accidents and incidents which call into question their reliability and safety. Relicensing Indian Point would not safeguard the environmental interests of NYS.

Entergy contends that if Indian Point generation were no longer available, fossil fuel-fired facilities would be used to replace its baseload energy supplies which would greatly increase emissions of CO2, SO2, NOx and acid rain precursors. This contention is disproved by the three TOTS transmission line improvements, none of which involves generation of additional fossil fuel emissions. Clean energy replacements for Indian Point exist and will be available in 2016.

On May 20, 2013, NYPA and New York State Electric & Gas Corporation filed a "Submission of Comparable Information Pursuant to the April 19, 2013 Public Service Commission Order Case 12-E-0503" which discussed the Marcy South Series Compensation (MSSC) and Fraser to Coopers Corners Reconductoring Project. In regard to the environmental benefits of the project, they wrote:

> The MSSC project has tremendous environmental benefits. It does not contribute to water pollution or generate any hazardous waste. The project increases the power flow across the existing transmission system. Because the MSSC project transmits power from existing, in-state resources, it can be considered an environmental pollution avoidance project. Instead of having to construct a new power plant which would generate pollution, the MSSC project transmits existing electricity more efficiently.
>
> The MSSC project increases our capability to bring more power, including that from clean renewable sources, from upstate New York. This project does not require the acquisition of additional real estate for the series capacitors, and the transmission line reconductoring utilizes existing ROW.
>
> There are no direct additional air emissions created as a result of this project, as opposed to those from new generation units. The MSSC project will have the necessary environmental permits in hand for the project to ensure construction is performed in an environmentally acceptable manner.
>
> As identified in the New York Energy Highway Blueprint, this project is a significant component of the transmission upgrades in Northern New York that help facilitate renewable energy development.[166]

Another of the TOTS projects is the Staten Island Unbottling (SIU) Project. It is a new resource that will be in service by June 2016 and is located in NYISO Zone J. The SIU project will unbottle generation and transmission resources on Staten Island. It will be completed in two phases. The first phase will split two legs (called the L&M legs) of the existing Con Edison G23 345 kV feeder. The G23 Feeder connects the Con Edison 345 kV Goethals substation with the 345 kV Linden substation in New Jersey. The second phase includes the addition of forced cooling on four existing 345 kV feeders. The SIU project will produce transfer increases of approximately 440 MW.

The SIU will not involve new generation. Rather, ensuring the efficient transmission of power by reducing bottlenecks and developing advanced smart technologies will improve overall electric system operation and optimize the use of existing assets in New York by allowing lower-cost and cleaner power to reach consumers. Investments in the transmission and distribution systems can reduce customer costs over the long-term, improve safety and reliability, and protect the environment while immediately creating jobs and economic development.

The Projects will allow for a significant amount of constrained wind energy to be delivered as well as allow for other potentially cleaner upstate resources to be dispatched. The estimated net statewide benefit of the Projects is a reduction in CO_2 emissions of more than 227,000 tons and NO_X emissions of more than 83 tons annually.[167]

Entergy has argued that Indian Point serves the interests of environmental justice and has included letters from civil rights leader to support its claim. Although environmental justice is not specifically listed as a factor in the CZMA, the Department is sensitive to the needs of those families and individuals living in environmental justice areas. The actual beneficial relationship between Indian Point and minority communities is not self-evident, except to the extent that lower electricity prices help low- and moderate- income families and individuals. The New York Transco TOTS and other electric system infrastructure improvement projects as well as the re-powered generating stations are geared towards keeping rates low, reliability strong and environmental impacts negligible. Sections 5 and 6 of the Final Environmental Impact Statement for the Reliability Contingency Plan extensively focus on environmental justice issues in the context of the retirement of Indian Point and its replacement by the NY Transco's transmission initiatives. Since the routing of the transmission lines utilizes existing transmission right of ways, new impacts are minimal and were determined not likely to adversely affect environmental justice communities. Additionally, with respect to the MSSC project, NYPA and NYSEG, "compared the location for the series capacitors and the 21.8 mile section of the FCC33 line to the NYSDEC's data file of the Potential Environmental Justice Areas (PEJAs). This data file is comprised of sites that have met one or more of the NYS DEC criteria in the 2000 U.S. Census. According to this dataset, the closest PEJA to the Marcy substation is approximately 3 miles away. The closes PEJA to the Fraser Substation is approximately 13 miles away."

Entergy has not shown that Indian Point's contribution to the economy and society and putative contribution to the environment outweighs its environmental impacts and threats to public health and safety. Indeed, given its environmental and accident record over the 40 years of operations, it has harmed New York's vital interests and has the potential to inflict even worse harm if allowed to operate an additional 20 years.

Coastal Policy 27 - *Decisions on the siting and construction of major energy facilities in the coastal area will be based on public energy needs, compatibility of such facilities with the environment, and the facility's need for a shorefront location.*

In 1976, the CZMA was amended to require state coastal management programs to provide for:

> **orderly processes for siting major facilities related to** national defense, **energy,** fisheries development, recreation, ports and transportation, and the location, to the maximum extent practicable, of new commercial and industrial developments in or adjacent to areas where such development already exists.[168]

In requiring a planning process for energy facilities likely to be located in or affect the coastal zone, states needed to identify existing energy facilities, procedures for assessing the suitability of sites for such facilities, establish enforceable state policies and procedures to manage energy facilities and their impacts. Accordingly, NOAA regulations explained that:

> . . . The requirement should not be construed as compelling the States to propose a program which accommodates certain types of facilities, but to assure that such national concerns are included at an early stage in the State's planning activities and that such facilities not be arbitrarily excluded or unreasonably restricted in the management program without good and sufficient reasons. . . . No separate national interest "test" need be applied and submitted other than evidence that the listed national interest facilities have been considered in a manner similar to all other uses, and that appropriate consultation with the Federal agencies listed has been conducted.[169]

William Matuszeski, Acting Assistant Administrator for Coastal Zone Management, specifically found that "[t]he NYSCMP has developed 'a planning process for energy facilities likely to be located in, or which may significantly affect, the coastal zone, including but not limited to, a process for anticipating and managing the impacts from such facilities."[170]

Entergy construes the listing of energy facilities in preparing New York's CMP as an approval or a federal consistency review of the existing energy facilities in the state's coastal area.[171] It was not. The inventory was generated for planning and policy purposes (Policy 27 was the result). A failure to acknowledge the existence of nuclear facilities in the state would have presented an incomplete energy picture.

Policy 27 does not accord preferential treatment to major energy facilities. Energy facilities are entitled to no greater consideration in their operations than the protection and preservation of ecologically important natural resources or other appropriate land and water uses in the nation's coastal zone. Energy facilities are evaluated for federal consistency in the context of other applicable enforceable coastal policies.

The NYS CMP lists the presence of nuclear plants within the coastal zone:

> Many energy facilities are already situated in the State's coastal area, including steam-electric generating plants, transmission lines, oil storage tanks and LNG facilities. The Program's policies on energy are in accord with existing State laws and plans which address energy needs and environmental quality in a comprehensive manner. The State has demonstrated its recognition of the national interest in energy facilities by the number and scope of facilities already located in or planned for New York's coastal area. . . . [including] nuclear – 5 units.[172]

The NYS CMP is silent on the question of whether New York favors the relicensing of existing nuclear facilities. However the NYS CMP clearly states that, in the absence of a plan to dispose of nuclear wastes, new nuclear facilities should not be included in the program. The NYS CMP (p. 107) states:

> "6. Because of the need to develop a fully adequate national nuclear waste disposal program, and a need to clarify substantial uncertainties associated with economic, safety and regulatory issues related to the nuclear option, new nuclear power plants should not be included in the State's electricity supply plan at this time."

For the purposes of this policy, it is important to recognize that DOS has not reviewed the Indian Point facilities since the inception of the NYS CMP. The operations of existing facilities have also changed in significant respects since they were originally licensed but the modifications were never submitted to DOS for consistency review.[173]

The absence of a national nuclear waste disposal plan is problematic for both new and existing facilities. Indian Point creates large quantities of hazardous nuclear waste in the process of generating nuclear energy. Entergy's current practice for managing Indian Point's spent nuclear fuel waste onsite is to pack the existing spent fuel pools to their maximum capacity and to remove older, cooler spent fuel to dry cask storage that will remain onsite indefinitely, precisely because the federal government has not yet established a permanent repository. Moreover, in 2005, Indian Point identified leakage of radionuclide-contaminated water from cracks in two different spent fuel pools and subsequently discovered tritium, strontium, and other radionuclides in groundwater underneath the site. Strontium and tritium from Indian Point's spent fuel pools have also reached the Hudson River. The retained spent fuel pool water is likely to continue to discharge to groundwater for an indeterminate amount of time.

Indian Point's withdrawals of Hudson River water to cool its reactors and generate steam warrants its classification as a water dependent use. That classification does not mean the massive withdrawals of water are consistent with its coastal location. Indeed, the original operating licenses for Units 2 and 3[174]as well as its NPDES permit[175]recognized the problems of once-through cooling water withdrawals and required that Indian Point construct closed-cycle cooling towers. It has not taken that action and its massive water withdrawals have continued unabated.

As discussed earlier, Indian Point's role in servicing public energy needs in the southeastern New York area was extensively considered. Undertaking actions outlined in contingency plans formulated under the auspices of the PSC, projects are being put in place to relieve reliability concerns by some combination of increasing capacity resources, reducing load, or allowing existing capacity resources to be better utilized through the presence of additional transmission system infrastructure. The New York electric power system can be expected to operate reliably without Indian Point Unit 2 and Unit 3 at the time or soon after their licenses expire.

Entergy contends that if Indian Point generation were no longer available, fossil fuel-fired facilities would be used to replace its baseload energy supplies which would greatly increase emissions of CO2, SO2, NOx and acid rain precursors. This contention is disproved by the three TOTS transmission line improvements, none of which involves generation of additional fossil fuel emissions. Clean energy replacements for Indian Point exist and will be available in 2016.

The many environmental impacts of Indian Point's operations have also been extensively discussed. DEC denied Entergy's §401 WQC application because of the fish kills resulting from its water withdrawals. Each year, at least one billion fish, juvenile fish, fish eggs, fish larvae, and other organisms are forcibly sucked into the plant's intake pipes and are either entrained in the plant's intake pipes or impinged against its water intake screens. Commercial and recreational fishing opportunities have been sharply curtailed as a result of reduced fish populations.

By continuing to operate the once-through CWIS, Entergy perpetuates the significant coastal resource and use impacts already occurring in this ecologically and culturally unique part of the state's coastal area. As such, the proposed relicensing contravenes the goals of policy 27 and therefore, is not consistent with the policy.

Coastal Policy 8 - ***Protect fish and wildlife resources in the coastal area from the introduction of hazardous wastes and other pollutants which bio-accumulate in the food chain or which cause significant sublethal or lethal effect on those resources.***

Coastal Policy 36 - ***Activities related to the shipment and storage of petroleum and other hazardous materials will be conducted in a manner that will prevent or at least minimize spills into coastal waters; all practicable efforts will be undertaken to expedite the cleanup of such discharges; and restitution for damages will be required when these spills occur.***

Coastal Policy 39 - ***The transport, storage, treatment and disposal of solid wastes, particularly hazardous wastes, within coastal areas will be conducted in such a manner so as to protect groundwater and surface water supplies, significant fish and wildlife habitats, recreation areas, important agricultural lands and scenic resources.***

Policies 8, 36 and 39 speak to the issues surrounding hazardous material and hazardous waste generation and management, focusing on natural resource protection in general and spill and leak risk reduction and management specifically. As discussed earlier in this decision, Indian Point operations have generated and amassed significant radioactive wastes that have been the source of known radioactive contamination, including planned, permitted levels of airborne emissions and water effluent emissions, and unplanned, unpermitted

accidental leaks into soil, groundwater, and Hudson River estuarine waters. Similar to other nuclear energy generation facilities throughout the U.S. with few or no other alternatives, Indian Point currently maintains spent nuclear fuel waste onsite in perpetuity.

The NRC determined that it is possible for spent nuclear fuel waste to be safely stored without significant environmental impacts for a period of time after the end of the licensed life of a nuclear power plant. Pursuant to a June 2012 US Court of Appeals DC Circuit decision, the NRC in its licensing proceedings must now consider, among other effects, the environmental impacts of spent fuel storage in the event that permanent offsite disposal of the national supply of nuclear fuel waste is not realized. The NRC issued a new Continued Storage final rule (with former iterations known as the Waste Confidence Rule)[176]addressing the environmental effects of continued storage of spent nuclear fuel wastes. The rule considers the possibility that a geologic repository for permanent disposal of spent nuclear fuel waste might never be built, and also considers the risk of additional spent fuel pool leaks and fires. The corresponding Generic Environmental Impact Statement (GEIS)[177] analyzes the environmental impact of storing spent nuclear fuel waste beyond the licensed operating life of reactors over three timeframes: for 60 years (short-term), 100 years after the short-term scenario (long-term) and indefinitely. In terms of ongoing nuclear waste generation and storage, implications for an additional 20 years of Indian Point facility operation can be summarized under three major concerns: (1) additional quantities of hazardous nuclear waste stored indefinitely onsite, (2) additional risk of accidental spill or leak during more vulnerable onsite waste material transfer and conveyance procedures during the period of relicensed operations, and (3) extended time delay before full cleanup of leaked nuclear waste in the groundwater underneath the facility can commence.

The current Indian Point strategy for managing its spent nuclear fuel waste onsite is to pack the existing spent fuel pools to their maximum capacity and to remove older, "cooler" spent fuel waste to dry cask storage that will remain onsite until such time that an alternative permanent geologic repository is designed and constructed. It is reasonable to assume that spent nuclear fuel waste will maintained on site at the Indian Point facility for an extended period of time, and possibly even in perpetuity. An additional twenty years of operation of the Indian Point nuclear plant would add to the volume of spent nuclear fuel waste stored onsite at Indian Point, and will require increased dry cask storage as the existing spent fuel pools are nearing their practical limitations.

Approximately 1,500 tons of spent nuclear fuel waste is currently stored in densely packed spent fuel pools at the Indian Point facility. Two of the spent fuel pools, in addition to an unknown number of other pipes, have already exhibited structural failures that have resulted in the leakage of unplanned, unpermitted quantities of radioactive waste that have flowed into the groundwater beneath the Indian Point facility. Some amount of this leaked radioactive waste has already flowed into the waters of the Hudson River. These leaks of radioactive material were only discovered inadvertently by Indian Point personnel as a result of onsite construction activity that uncovered the leaks. It has not been determined the exact source of all leaks, the length of time the leaks have been transmitting radioactive material into the groundwater and the waters of the Hudson River, and the quantities of latent radioactive waste distributed throughout the groundwater underneath the Indian Point facility. Full assessment and clean-up of the radioactive leaks cannot commence until the plant has been shut down.

Reliance on tightly packed fuel pools presents a hazard to New York's coastal area. They present a potential risk of leakage into the Hudson River estuary, which could impact aquatic, avian and mammal life. This method of storage prevents adequate internal inspection of the fuel pools and presents an unacceptable risk of release of radioactive materials to the coastal area. The existence of measurable levels of radioactive releases from the Indian Point facility demonstrates that such storage solutions do not prevent nor minimize spills into coastal waters.

While DOS recognizes that there are federal numerical standards that pertain to thresholds for certain human health impacts, it is important to note that these standards do not take into account broader ecosystem impacts and cumulative effects on the health of the Hudson River ecosystem. In fact, scientific research has shown that radiation from hazardous nuclear waste has no "safe" exposure levels for the environment, including fish, eggs, larvae, benthic macroinvertibrates, insects, birds, small mammals, leaves and seeds that make up the Hudson River estuary food web. A New York DEC study found that radionucludes do bioaccumulate, and that chronic effects of radiation increase egg mortality, embryo mortality, chromosome aberrations, mutations, and abnormalities.[178] Furthermore,

- The primary means of strontium uptake in most aquatic organisms is directly from the water.[179]
- Radionuclides enter the food webs not only from water, but also from bottom sediments, from which they bioaccumulate in benthic invertebrates. Fishes may accumulate radionuclides indirectly from bottom sediment by ingestion of benthic invertebrates and also directly by incidental ingestion of sediment with prey.[180]
- Bioaccumulation of radionuclides like Strontium-90, detected near Indian Point in 2007, is a concern for aquatic life. Strontium-90 behaves similarly to calcium and can concentrate in fish tissues and the bones of animals and people, and can also accumulate in sediments. [181]
- Even low levels of chronic radiation can increase fish egg mortality.[182]
- Several studies have detected chronic effects such as increased egg mortality, increased embryo mortality, and increased number of abnormal embryos.[183]

Some of the older spent fuel waste is transferred from the short-term storage of spent fuel pools into long-term dry cask storage. The dry casks are placed on an open air concrete pad with no protective barriers or containment structures. Long term temporary storage of spent nuclear fuel waste in any containment medium within the coastal area proximate to the Hudson River does not minimize spills into coastal waters. The NRC has raised concerns about dry cask storage design flaws with the cask model currently being used at Indian Point and about the cask manufacturer's inadequate quality assurance program.[184] In the event of a design and/or manufacturing flaw that results in even a hairline fracture in the steel casing and/or concrete casing of the dry cask, an undetermined amount of radiation may leak from the storage units. There is as of yet no safe mitigation procedure to transfer the nuclear waste from a faulty dry cask storage unit to a new safe dry cask storage unit, and there would be no room to place the spent nuclear fuel waste back into the spent fuel pools for temporary safe storage.[185]

While dry cask storage remains a storage mechanism encouraged by the NRC and in some cases may be a lesser risk option than wet pool storage, other methodologies exist that would further minimize the risk of spills to the coastal area. Spent nuclear fuel waste enjoys no inherent advantage of being stored and stockpiled in the coastal area and can be stored offsite and outside of the coastal area thus minimizing spills of radioactive wastes into New York's coastal waters.

In summary, DOS has determined that the Indian Point facility license renewal impacts and effects on coastal waters are not consistent with Coastal Policies 8, 36, and 39.

Coastal Policy 30 - *Municipal, industrial, and commercial discharge of pollutants, including but not limited to, toxic and hazardous substances, into coastal waters will conform to State and National water quality standards.*

Coastal Policy 38 - *The quality and quantity of surface water and groundwater supplies will be conserved and protected, particularly where such waters constitute the primary or sole source of water supply.*

Entergy's application to the NRC requests a continuation of its existing operations. No change is expected in the water quality impacts. As discussed previously, the operation of Indian Point continues to operate as a severe stressor that has led to significant water quality impacts as a result of its extremely large withdrawals in an ecologically critical location.

According to DEC's June 2003 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, significant impacts on aquatic organisms, notably fish eggs, larvae, and adults of various species are attributable to the withdrawal of cooling water at Indian Point. The 2.5 billion gallons of water withdrawn per day at Indian Point results in the death of approximately 1 billion aquatic organisms per year. The impact of one billion deaths on Hudson River fisheries is incompatible with the public's continued utilization of these waters for recreational and commercial fishing.

The Hudson River in the vicinity of Indian Point is designated as Class SB Saline Surface Waters.[186] In order to demonstrate compliance with New York's water quality regulations a facility must demonstrate compliance with both the standards and designated uses found in these regulations. As the best usage of Class SB waters are primary and secondary contact recreation and fishing, and Indian Point's water withdrawals effects fish populations, the best use of these waters are not being met. On April 2, 2010, DEC denied Entergy's request for a §401 water quality certification. The Department of State cannot find that continued operation of Indian Point conforms to state water quality standards and as a result, the 20 year operating license renewal is not consistent with NYS Coastal Policies 30 and 38.

Coastal Policy 40 *Effluent discharged from major steam electric generating and industrial facilities into coastal waters will not be unduly injurious to fish and wildlife and shall conform to State water quality standards*

In its license renewal application, Entergy acknowledged that the spent fuel pools of Units 1 and 2 have leaked and caused groundwater radionuclide contamination.[187] The composition of radioactive material includes Tritium, Strontium-90, Cesium-137, Cobalt-60, and Nickel-63.[188] The GZA Site Investigation Report discussed the probable underground retention of radioactive spent fuel pool water on site due to local topography and the mass of retained spent fuel pool water that is likely to continue to discharge to groundwater for an indeterminate amount of time. It cannot be accurately quantified and may also be affected by future site development activities or accidents. Importantly, the radioactive contamination plume has migrated to the Hudson River.[189]

As DEC noted in its 401 Denial: "2. Leaks of radiological material have the potential to impair the 'best use' of the Hudson River designated in 6 NYCRR § 701.11."[190] The Hudson River in the vicinity of Indian Point is designated as Class SB Saline Surface Waters.[191] The best usages of Class SB waters are primary and secondary contact recreation and fishing. In addition, these waters are suitable for fish, shellfish and wildlife propagation and survival.[192] The nature of this migration of this spent fuel water to the Hudson River and its potential to impair the best use of those waters contributes to DOS's inability to find this action consistent with this policy.

Additionally, site remediation activities which could rectify these spent fuel pool releases would likely not be implemented until electric generation activities cease. Any license extension would lengthen the amount of time in which these discharges would continue to affect the groundwater under the Indian Point facility which is contrary to the State's goals of expeditiously containing and remediating illicit discharge (also see policy 36).

Finally, NYS classifies the highest and best use of groundwater as potable water supply. In order to comply with NYS's water quality standards any discharge to groundwater cannot impair its use as potable water, regardless of its location or the actual present use or lack thereof of said groundwater as a potable water supply. The irradiated groundwater beneath the Indian Point property impairs its use as a drinking water supply.

To summarize, DOS is unable to find continued operation of the Indian Point facility consistent with this policy due to: the continued uncertainty of spent fuel pool leaks due to the inability to completely inspect the structure following discharges; the unknown rate of release of spent fuel pool water from a natural underground containment mechanism; the inability to remediate said spent fuel pool discharge for at least the duration of the license extension, the impairment of groundwater for its highest and best use, potable water; and the discharges of radioactive water to the Hudson River.

Conclusion

Based on the foregoing, the DOS objects to Entergy's consistency certification for the Indian Point license renewal application with New York's federally approved Coastal Management Program's enforceable policies 8, 9, 10, 18, 27, 30, 36, 38, 39 and 40.

Pursuant to 15 C.F.R. Part 930, Subpart H, and within 30 days from receipt of this letter, you may request that the U.S. Secretary of Commerce override this objection. In order to grant an override request, the Secretary must find that the activity is consistent with the objectives or purposes of the Coastal Zone Management Act, or is necessary in the interest of national security. A copy of the request and supporting information must be sent to the New York Department of State, which administers the New York Coastal Management Program, and to the federal permitting or licensing agency. The Secretary may collect fees from you for administering and processing your request.

Given that the appeal process can be a lengthy one, if you would like to continue discussions with this office while pursuing an appeal, please call Linda M. Baldwin, General Counsel at the Department of State at (518) 474-6740.

The U.S. Department of Commerce and the Nuclear Regulatory Commission are being notified of this decision by copy of this letter.

Sincerely,

Cesar A. Perales
Secretary of State
Department of State

cc:

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[1] The other three nuclear facilities are R.E. Ginna Nuclear Power Plant, Nine Mile Point Nuclear Station Units 1 & 2 and James A. FitzPatrick Nuclear Power Plant. At the time the NYS CMP was approved in 1982, the Shoreham Nuclear Power station was under construction and near completion. In 1989, the plant was decommissioned. https://www.iaea.org/PRIS/CountryStatistics/ReactorDetails.aspx?current=659

[2] As the US Supreme Court wisely observed in Lucas v. South Carolina Coastal Council, 505 U.S. 1003, 1029-1030 (1992) in analyzing why a private owner is not entitled to compensation when the State prevents certain dangerous activities: "On this analysis, the owner of a lakebed, for example, would not be entitled to compensation when he is denied the requisite permit to engage in a landfilling operation that would have the effect of flooding others' land. **Nor the corporate owner of a nuclear generating plant, when it is directed to remove all improvements from its land upon discovery that the plant sits astride an earthquake fault.** Such regulatory action may well have the effect of eliminating the land's only economically productive use, but it does not proscribe a productive use that was previously permissible under relevant property and nuisance principles. The use of these properties for what are now expressly prohibited purposes was *always* unlawful, and (subject to other constitutional limitations) it was open to the State at any point to make the implication of those background principles of nuisance and property law explicit." (Emphasis added).

[3] *See* NUREG-1437 (1996) at §2.2 & Table 2.1 (based on 1990 census); NUREG-1437, Rev. 1 (2013) §3.1, Figure 3.1.1, Table 3.1.1 (based on 2000 census). Indian Point's current operator projects that the population living within 50 miles of the plant will grow to 19.2 million people by 2035. *See* Environmental Report for License Renewal of Indian Point Unit 2 and Unit 3 (2007), p.2-35 ("The total population (including transient populations) within a 50-mile radius of the site is projected to be 19,228,712 in 2035.").

[4] Screening and Prioritization Results Regarding Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Seismic Hazard Re-evaluations for Recommendation 2.1 of the Near-term Task Force Review of Insights from the Fukushima Dai-ichi Accident (May 9, 2014). http://pbadupws.nrc.gov/docs/ML1411/ML14111A147.pdf

[5] "Generic Issue 199 (GI-199), Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants, Safety/Risk Assessment," August 2010.

[6] The exemption language appears at NYS CMP, p. II-9-1.

[7] 42 Misc.3d 896 (Sup. Ct. Albany Co. 2013).

[8] Mo. No. 2015-438.

[9] 42 U.S.C. §§ 2133, 2134(b); 10 CFR Part 50

[10] 42 U.S.C. §§ 2133, 2134(b).

[11] *See e.g.*, 10 C.F.R. §§ 54.21, 54.23, 54.29., 51.53(c), 51.95. The NRC did not begin to promulgate regulations for the renewal of operating licenses until 1991. Nuclear Power Plant License Renewal, 56 Fed. Reg. 64943 (Dec. 13, 1991). NRC then amended that regulation in 1995. Nuclear Power Plant License Renewal; Revisions, 60 Fed. Reg. 22461 (May 8, 1995). This rulemaking process was not completed until 1996 when the NRC promulgated regulations concerning various environmental issues associated with license renewal. Environmental Review for Renewal of Nuclear Power Plant Operating Licenses, 61 Fed. Reg. 28467 (June 5, 1996). NRC did not renew an operating license until 2000. NRC Information Digest 2012-2013, NUREG-1350, Volume 24, Appendix A.

[12] 10 C.F.R. § 54.31(c).

[13] 16 U.S.C. § 1456(c)(3)(A).

[14] NYS CMP II-9 at p. 20. The issuance of an operating license for a nuclear facility is a "listed" activity in the NYS CMP, requiring the submission of a federal consistency certification to DOS. Table 2, NYS CMP, p. II-9-20 (labeled, at Section II, "Licensing and certification of the siting, construction, and operation of nuclear power plants, pursuant to Atomic Energy Act of 1954, Title II of the Energy Reorganization Act of 1974 and the National Environmental Policy Act of 1969.").

[15] 15 CFR §930.51 (b).

[16] 21 Fed. Reg. 3,085 (May 9, 1956) (Indian Point Unit 1).

[17] 31 Fed. Reg. 13,616-17 (Oct. 21, 1966) (Indian Point Unit 2); 34 Fed. Reg. 13,437 (Aug. 20, 1969) (Indian Point Unit 3).

[18] The Atomic Energy Commission issued a provisional 18-month operating license DPR-5 to Indian Point Unit 1 in 1962. AEC renewed DPR-5 from time to time during the 1960s. Plagued by design and operational problems, Unit 1 ceased commercial electrical generation operations in 1974. *Consolidated Edison Company of New York, Inc.* (Indian Point Unit 1 and Unit 2) & *Power Authority of the State of New York* (Indian Point Unit 3), Director's Decision Under 10 C.F.R. § 2.206, 11 N.R.C. 351, DD-80-05 (Feb. 11, 1980) (H.R. Denton). By 1976, spent nuclear fuel was removed from the Unit 1 reactor and transferred to its spent fuel pool. [*Indian Point No. 1 Safety Analysis Report* (submitted with April 2007 License Renewal Application to NRC), *Decommissioning Plan for Indian Point Unit 1* (Oct. 1980) at p. 2. *Consolidated Edison Co.*, 11 N.R.C. 351, DD-80-05 (Feb. 11, 1980); *Consolidated Edison Company of New York, Inc.* (Indian Point Unit 1 and Unit 2), Commission Order Revoking Authority to Operate Facility, -- N.R.C. -- (June 19, 1980).] In 1980, NRC revoked the authority to operate the Unit 1 reactor under DPR-5, but authorized the continued possession of nuclear material at the site.[18] By 2008, the spent nuclear fuel was removed from the pool and placed in dry storage casks at the site. In late 2008, the Unit 1 spent fuel pool was drained and residue and sludge from pool was flushed into the Hudson River. [Operating License DPR-5, Amendment 54, Issuance of Amendment to Operating License (DPR-5) and Technical Specifications Regarding the Removal of Spent Fuel From Unit 1 and Drain Down of the Spent Fuel Pool (May 29, 2009) ML083430424.] Indian

Point Unit 1 shares various common systems with Indian Point Unit 2. The decommissioning of Indian Point Unit 1 has been deferred while the Indian Point Unit 2 reactor continues to operate.

[19] *See* 21 Fed. Reg. 3,085 (May 9, 1956); 31 Fed. Reg. 13,616-17 (Oct. 21, 1966); 34 Fed. Reg. 13,437 (Aug. 20, 1969); NUREG-1350, Volume 20, *2008 - 2009 Information Digest*, at 103, 113 (Aug. 2008).

[20] Entergy explains: "For purposes of this Consistency Certification, Indian Point is referred to as within RM 42, based upon the 1975 NOAA navigational chart. If one were to redefine RM segments with modern GIS techniques, the results would be technically more accurate, but such a methodology would be inconsistent with the methodology used in prior environmental reports addressing the Hudson River. As a result of the use of different measurement methodologies, some other reports, including the 2010 USNRC FSEIS and Entergy's 2007 ER, identify Indian Point as being located at RM 43." (Entergy Consistency Certification at I-8 and I-9). For purposes of this determined, the nuclear facilities will be described as located at RM 42-43.

[21] Indian Point Energy Center Applicant's Environmental Report Operating License Renewal Stage, p.2-1.

[22] Following the 1979 Three Mile Island meltdown, the NRC requires a 50-mile radiological ingestion exposure pathway Emergency Planning zone around U.S. nuclear facilities. See 10 CFR § 50.47.

[23] NRC's Generic Environmental Impact Statement for License Renewal of Nuclear Plants: Main Report. §2.2.1, NUREG-1437 (1996) at p. 2-2. http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1437/v1/

[24] Nitsche et al. 2010, Nitsche et al. 2007. Fig. 5 at p. 265 as quoted in Affidavit of William C. Nieder, December 18, 2012, Entergy v. NYS Department of State, NYS Supreme Court – Albany County.

[25] City of New York, Department of Environmental Protection "Drought Management and Contingency Plan" (October, 2012). A pumping station in Chelsea, New York, which is capable of drawing water from the Hudson River, may be available to augment the water supply by 100 MGD under emergency conditions. http://www.nyc.gov/html/dep/pdf/droughtp.pdf

[26] Indian Point Unit 3 UFSAR, Section 2.5

[27] National Oceanic and Atmospheric Administration, "NOAA $800,000 grant helps protect critical Hudson River estuarine habitat: New land purchase preserves key New York migratory fish spawning, nursery areas," June 13, 2013. http://www.noaanews.noaa.gov/stories2013/20130613_newyorklandpurchasegrant.html

[28]Karin E. Limburg, Kathryn A. Hattala, Andrew W. Kahnle, and John R. Waldman, Chapter 14, Fisheries of the Hudson River estuary, The Hudson River estuary (2006) (edited by Jeffrey S. Levinton, John R. Waldman), p.189.

[29] Appendix B: Aquatic Ecology of the Hudson River, Entergy CZMA Consistency Certification, p. B-12 (16).

[30] Strayer, 2012. See also The Status of Fish Populations and the Ecology of the Hudson, Pisces Conservation Ltd, April 2008. Of the 13 fish species studied in the Pisces Report, ten have declined in abundance since the 1980s: shad, tomcod, bay anchovy, alewife, blueback herring, rainbow smelt, hogchoker, white catfish, weakfish and white perch Rainbow smelt, an important forage fish, has been extirpated from the Hudson River estuary. Limburg and Waldman 2009; Daniels et al 2005. Only three species — striped bass, bluefish and spottail shiner — have increased in abundance, mostly due to regulations. http://www.riverkeeper.org/wp-content/uploads/2009/06/Status-of-Fish-in-the-Hudson-Pisces.pdf

[31] 6 N.Y.C.R.R. §§§ 11.2, 36.3 and 40.1. See also Hudson River American Shad: An Ecosystem-Based Plan for Recovery (January 2010) http://www.dec.ny.gov/docs/remediation_hudson_pdf/shadrecoveryplan.pdf

[32] Summary of Essential Fish Habitat Designations. http://www.greateratlantic.fisheries.noaa.gov/hcd/ny3.html

[33] U.S. Department of Commerce - NMFS - Indian Point EFH Consultation Letter October 12, 2010.

[34] Appendix B: Aquatic Ecology of the Hudson River, Entergy CZMA Consistency Certification, p. B-12 (16).

[35] Cary Institute of Ecosystem Studies, "Hudson River Habitats: Submersed Aquatic Vegetation," www.caryinstitute.org/science-program/research-projects/hudson-river-habitats-submersed-aquatic-vegetation.

[36] Findlay, S. E. G., W. C. Nieder, and D. T. Fischer. 2006. Multi-scale controls on water quality effects of submerged aquatic vegetation in the tidal freshwater Hudson River. Ecosystems 9:84-96.

[37] Smith and Lake 1990, as quoted in U.S. Department of Commerce - NMFS - Indian Point EFH Consultation Letter October 12, 2010.

[38] NYS Department of Environmental Conservation Notice of Denial Letter for 401 Water Quality Permit to Entergy Nuclear Indian Point Units 2 and 3, April 2, 2010 (hereafter "DEC 401 Denial Letter").

[39] Endangered Species List - 1967, NMFS, 32 FR 4001 (March 11, 1967) https://ecos.fws.gov/docs/federal_register/fr18.pdf.

[40] Bain 1998 as quoted in Affidavit of William C. Nieder, December 18, 2012, Entergy v. NYS Department of State, NYS Supreme Court – Albany County; see also U.S. Department of Commerce - National Oceanic and atmospheric Administration - NMFS, *Final Recovery Plan for the Shortnose Sturgeon (Acipenser brevirostrum)*, December 1998. http://www.nmfs.noaa.gov/pr/pdfs/recovery/sturgeon_shortnose.pdf.

[41] Waldman 2005, Bain 2001, Bain 1998, Bain 1997 as quoted in Affidavit of William C. Nieder, December 18, 2012, Entergy v. NYS Department of State, NYS Supreme Court – Albany County.

[42] U.S. Department of Commerce - National Oceanic and Atmospheric Administration - NMFS, *Final Recovery Plan for the Shortnose Sturgeon (Acipenser brevirostrum)*, December 1998. http://www.nmfs.noaa.gov/pr/pdfs/recovery/sturgeon_shortnose.pdf

[43] NYS Department of Environmental Conservation, "Adult Atlantic Sturgeon." http://www.dec.ny.gov/animals/3712l.html

[44] 16 U.S.C. 1531, et seq. See February 6, 2012, Federal Register (77 FR 5880). The effective date of the listing was April 6, 2012.

[45] Affidavit of William C. Nieder, December 18, 2012, Entergy v. NYS Department of State, NYS Supreme Court – Albany County, pp 9-10 and 20-21.

[46]For recent data, see NMFS's Endangered Species Act Section 7 Consultation Biological Opinion "Continued Operations of the Indian Point Nuclear Generating Station, Units 2 and 3, pursuant to existing and proposed renewed operating licenses NER-2012-2252" (January 30, 2013). NMFS stated at pp. 80-81: "A total of 601 Atlantic sturgeon were observed during impingement monitoring at IP2 and IP3 from 1974-1990. Adjusting for collection efficiency, it is estimated that a total of 1,334 Atlantic sturgeon were impinged at IP2 and IP3 during this period. For this period, the average number of Atlantic sturgeon impinged per year at IP2 and IP3 was 78.5 Atlantic sturgeon/year...." For historical data, 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.

[47] Bain et al. 2000b, referenced in Affidavit of William C. Nieder, December 18, 2012, Entergy v. NYS Department of State, NYS Supreme Court – Albany County at pp 8- 9.

[48] Affidavit of Elizabeth A. Blair, December 18, 2012, *Entergy v. NYS Department of State,* NYS Supreme Court – Albany County, p. 22 (also referred to hereafter as "Blair Affidavit").

[49] Bain et al. 2000b, as referenced in Affidavit of William C. Nieder, December 18, 2012, Entergy v. NYS Department of State, NYS Supreme Court – Albany County.

[50] Bain et al. 1999, as referenced in Affidavit of William C. Nieder, December 18, 2012, Entergy v. NYS Department of State, NYS Supreme Court – Albany County.

[51] Bain et al. 2000b, as referenced in Affidavit of William C. Nieder, December 18, 2012, Entergy v. NYS Department of State, NYS Supreme Court – Albany County.

[52] Bain et al. 2000b, Table II at p 49, as referenced in Affidavit of William C. Nieder, December 18, 2012, Entergy v. NYS Department of State, NYS Supreme Court – Albany County; numbers converted from meters to feet for consistency.

[53] Affidavit of Elizabeth A. Blair, *December 18, 2012, Entergy v. NYS Department of State,* NYS Supreme Court – Albany County.

[54] See footnotes 43 and 44.

[55] Affidavit of Elizabeth A. Blair, *December 18, 2012, Entergy v. NYS Department of State,* NYS Supreme Court – Albany County.

[56] Englert and Sugarman 1988, Boreman and Klauda 1988 as referenced in Final Environmental Impact Statement by the New York State Department of Environmental Conservation as Lead Agency 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, Orange, Rockland and Westchester Counties Hudson River Power Plants FEIS (June 25, 2003) (hereafter "DEC SPDES FEIS 2003"), p.3.

[57] Englert and Sugarman 1988 as referenced in DEC SPDES FEIS 2003, p. 3.

[58] AKRF Fish Distribution Summaries 2010 pp 100-101, as referenced in Blair Affidavit.

[59] AKRF Fish Distribution Summaries 2010 pp 96-97, as referenced in Blair Affidavit.

[60] AKRF Fish Distribution Summaries 2010 pp 96-97 as referenced in Blair Affidavit.

[61] NMFS Final Recovery Plan for the Shortnose Sturgeon, December 1998 http://www.nmfs.noaa.gov/pr/pdfs/recovery/sturgeon_shortnose.pdf.

[62] NYS Department of Environmental Conservation, *Hudson River American Shad: An Ecosystem-Based Plan for Recovery*, Revised January 2010. http://www.dec.ny.gov/docs/remediation_hudson_pdf/shadrecoveryplan.pdf; and Hattala, Kathryn A., Andrew W. Kahnle and Robert D. Adams. September 2011. *Sustainable Fishing Plan for New York River Herring Stocks*, NYS Department of Environmental Conservation. http://www.dec.ny.gov/docs/fish_marine_pdf/rhsustplan0811.pdf.

[63] See http://www.dec.ny.gov/press/63619.html.

[64] NYS Department of Environmental Conservation, *Hudson River American Shad: An Ecosystem-Based Plan for Recovery*, Revised January 2010. http://www.dec.ny.gov/docs/remediation_hudson_pdf/shadrecoveryplan.pdf; and Hattala, Kathryn A., Andrew W. Kahnle and Robert D. Adams. September 2011. *Sustainable Fishing Plan for New York River Herring Stocks*, NYS Department of Environmental Conservation. http://www.dec.ny.gov/docs/fish_marine_pdf/rhsustplan0811.pdf.

[65] See NUREG-1437 Generic Environmental Impact Statement for License Renewal of Nuclear Plants Supplement 38 Regarding Indian Point Nuclear Generating Unit Nos. 2 and 3 ("NUREG-1437, Supplement 38") (December 2010) pp. 2-87 and 2-89.

[66] Affidavit of Stephanie Wojtowicz, December 20, 2012, Entergy v. NYS Department of State, NYS Supreme Court – Albany County, p. 46.

[67] Screening and Prioritization Results Regarding Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Seismic Hazard Re-evaluations for Recommendation 2.1 of the Near-term Task Force Review of Insights from the Fukushima Dai-ichi Accident (May 9, 2014). http://pbadupws.nrc.gov/docs/ML1411/ML14111A147.pdf

[68] *Ibid.* at p. 5.

[69] Screening and Prioritization Results Regarding Seismic Hazard Reevaluations for Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Daiichi Accident Based on Individual Plant Examination of External Events Evaluation (Nov. 21, 2014) ML14246A428 at p. 3 ("NRC affirms that Indian Point, Unit 3 remains in priority Group 1"). http://pbadupws.nrc.gov/docs/ML1424/ML14246A428.pdf

[70] In 2005, NRC staff acknowledged that earthquake risk for reactors and spent fuel storage in the central and eastern United States may be greater than NRC assumed when it approved operating licenses for these facilities. *See, e.g.,* May 26, 2005 NRC Staff memorandum re: Identification of a Generic Seismic Issue, ML051450456. See generally U.S. Geological Survey, available at http://earthquake.usgs.gov.

[71] "Generic Issue 199 (GI-199), Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants, Safety/Risk Assessment," August 2010.
[72] NRC Staff Memorandum from Patrick Hiland to Brian Sheron, *Safety/Risk Assessment Results for Generic Issue 199, Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants*, (Sept. 2, 2010) . ML100270582 (The memorandum attaches an assessment and appendices, the last of which reports an updated seismic core damage frequency of 1.0E-04 for Indian Point Unit 3 and seismic core damage frequency of 3.3E-05 for Indian Point Unit 2); *see also,* Bill Dedman, *What are the odds? US nuke plants ranked by quake risk; So much for San Andreas: Reactors in the East, Midwest, South have highest chance of damage*, MSNBC.com (March 17, 2011). See also footnote 63.
[73] US Nuclear Regulatory Commission, Indian Point Nuclear Generating Unit 2 - NRC Temporary Instruction 2515/183 Inspection Report 05000247 /2011009. May 13, 2011, p. 11.
[74] *Ibid.* at p. 13 and US Nuclear Regulatory Commission, Indian Point Nuclear Generating Unit 3 - NRC Temporary Instruction 2515/183 Inspection Report 05000286 /2011009. May 13, 2011, p. 11.
[75] US Nuclear Regulatory Commission, Indian Point Nuclear Generating Unit 2 - NRC Temporary Instruction 2515/183 Inspection Report 05000247 /2011009. May 13, 2011, p. 13 and US Nuclear Regulatory Commission, Indian Point Nuclear Generating Unit 3 - NRC Temporary Instruction 2515/183 Inspection Report 05000286 /2011009. May 13, 2011, p. 12.
[76] *Ibid.* at p. 12.
[77] Based on current information, the risk of earthquakes in the Indian Point area appears substantially greater than what was examined in the review for the initial operating licenses3. Indian Point Unit 1, which received a construction permit in 1956, was constructed without reference to a seismic spectra. In a submission about an Indian Point Unit 1 spent fuel crane, Entergy acknowledged: "[n]o response spectra were specifically generated for the Unit 1 site during original design." Entergy Reply to Request for Additional Information (RAI) Regarding Indian Point 1 License Amendment Request for Fuel Handling Building Crane, p. 12 of 24 (Oct. 3, 2007) ML073050247.
[78] When NRC issued the 40-year operating license for Indian Point Unit 3 in 1975, NRC assumed that the peak ground acceleration at the site would not exceed 0.15 g . *See, e.g.,* Indian Point Unit 3 Updated Final Safety Evaluation Report (submitted with April 2007 License Renewal Application to NRC) §§ 2.8, 5.1.2.2 (noting 0.15g was the seismic design basis ground acceleration value developed for Indian Point Unit 3 in mid-1970s); Consolidated Edison Co. of New York, Inc., Power Authority of the State of New York (Indian Point Units 1, 2, and 3), 6 N.R.C. 547, 550, ALAB-436 (Oct. 12, 1977) (recognizing that Indian Point Unit 1 did not satisfy the 0.15g standard).
[79] L. Sykes, et al, "Observations and Tectonic Setting of Historic and Instrumentally Located Earthquakes in the Greater New York City Philadelphia Area" Bulletin of the Seismological Society of America, Vol. 98, August 2008, No. 4, pp. 1696–1719. http://www.earth.columbia.edu/sitefiles/file/pressreleases/1696.pdf
[80] *Id.*
[81] *Id.* at 1717. Reference to Fig. 3 omitted.
[82] L. Sykes, et al, "Observations and Tectonic Setting of Historic and Instrumentally Located Earthquakes in the Greater New York City Philadelphia Area" Bulletin of the Seismological Society of America, Vol. 98, August 2008, No. 4, pp. 1696–1719.
[83] Lamont-Doherty Cooperative Seismographic Network, Earth Institute, Columbia University http://www.earthinstitute.columbia.edu/articles/view/2235. On August 23, 2011, a 5.8 magnitude earthquake occurred in the Central Virginia Seismic Zone with a maximum perceived intensity of VII (very strong) on the Mercalli intensity scale. http://earthquake.usgs.gov/earthquakes/eqinthenews/2011/se082311a/#summary The 5.8 magnitude earthquake is the largest to have occurred in the U.S. east of the Rocky Mountains since a New York earthquake in 1944. http://earthquake.usgs.gov/earthquakes/states/events/1944_09_05.php The Virginia earthquake's tremors were felt in various northeast cities, including New York.
[84] United States Geological Survey (USGS), Earthquake Hazards Program http://earthquake.usgs.gov/ and http://earthquaketrack.com/quakes/2014-07-05-14-46-39-utc-2-5-5
[85] Nuclear Regulatory Commission, Press Release: New Seismic Model Will Redefine Hazard Analysis at U.S. Nuclear Plants, No. 12-010 (Jan. 31, 2012). http://pbadupws.nrc.gov/docs/ML1203/ML120330098.pdf
[86] Near-Term Task Force Recommendation 2.1, Seismic Hazard Evaluation, Entergy, slides 6-7 (June 19, 2014). http://pbadupws.nrc.gov/docs/ML1516/ML15160A214.pdf
[87] Dr. Lynn Sykes, Statement in Support of New York State Contentions and in Response to the April 30, 2007 License Renewal Application Submitted by Entergy for Indian Point Units 2 and 3 In re: License Renewal Application Submitted by Entergy Nuclear Indian Point 2, LLC, Entergy Nuclear Indian Point 3, LLC, and Entergy Nuclear Operations, Inc., Docket Nos. 50-247-LR, 50-286-LR, ASLBP No. 07-858-03LR-BD01, DPR-26, DPR-64 at pp. 8-9. (Underline added).
[88] Indian Point Unit 3 UFSAR, Section 2.5; Indian Point Unit 2 UFSAR, Section 2.5
[89] Response to New York State Department of State Request for Supplemental Information Regarding Potential Impacts of Extreme Flooding Conditions at Indian Point, March 13, 2014, p. 2.
[90] Entergy Consistency Certification, p. I-7.
[91] NUREG-1437, Supplement 38 p. 2-24 (December 2010).
[92] http://pbadupws.nrc.gov/docs/ML1230/ML12305A460.pdf

[93] A.A. Hossam-Eldin, W.Mokhtar, "Electromagnetic Interference between Electrical Power Lines and Neighboring Pipelines", Systems Engineering, 2008. ICSENG 2008 - 19th International Conference on Systems Engineering, Issue 19-21 Aug. 2008, p. 19.
[94] DEC 401 Denial Letter, p. 13.
[95] NYS Department of Environmental Conservation, "Indian Point Nuclear Facility Units 2 and 3 - SPDES Permit NYS DEC's Administrative Proceeding for the Modification of the SPDES Permit: Facility Background (website) http://www.dec.ny.gov/permits/57609.html
[96] U.S. Department of Commerce - NMFS - Indian Point EFH Consultation Letter October 12, 2010
[97] DEC SPDES FEIS 2003 Table 1 at p. 2.
[98] August 13, 2008 Interim Decision of the Asst. DEC Commissioner in SPDES Adjudicatory Proceeding, pp. 16-17.
[99] NMFS Final Recovery Plan for the Shortnose Sturgeon, December 1998 http://www.nmfs.noaa.gov/pr/pdfs/recovery/sturgeon_shortnose.pdf
[100] U.S. Department of Commerce - NMFS - Indian Point Endangered Species Act Section 7 Consultation Biological Opinion, January 30, 2013, p. 1.
[101] See 6 NYCRR § 701.11 - 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.
[102] DEC 401 Denial Letter at p. 2. On June 23, 2011, DEC Commissioner Joe Martens sent a letter to NRC's Director of License Renewal, affirming that the April 2, 2010 denial represents the agency's final decision.
[103] DEC 401 Denial Letter at p.13. Also, on June 23, 2011, DEC Commissioner Joe Martens sent a letter to NRC's Director of License Renewal, re-affirming that the April 2, 2010 denial represents the agency's final decision.
[104] DEC 401 Denial Letter at p. 11.
[105] The dry caste storage structures required a separate NRC approval process from the current re-licensing. The NRC provided Entergy with approval to construct and use dry cast storage structures in 2008 in spite of Entergy's failure to submit a consistency certification for these structures located in the State coastal zone.
[106] State of New York Petition submitted to the U.S. Nuclear Regulatory Commission, November 30, 2007 http://www.dec.ny.gov/docs/permits_ej_operations_pdf/deccontensum.pdf
[107] October 9, 1996 letter to Stephen E. Quinn, Vice President, Nuclear Power Consolidated Edison Company from George Wunder, Acting Project Manager, NRC Project Directorate, Division of Reactor Projects, Office of Nuclear Reactor Regulation attaching a Memo to the Commission, from J. Taylor, "Resolution of Spent Fuel Storage Pool Action Plan Issues," dated July 26, 1996.
[108] Nuclear Regulatory Commission, NRC Talking Points Slide Entitled, "Tritium at Nuclear Power Plants in the United States, Slide 3: Background," ML063260464 (Nov. 7, 2006).
[109] Nuclear Regulatory Commission Office of Nuclear Reactor Regulation, *Ground-Water Contamination Due to Undetected Leakage of Radioactive Water*, NRC Information Notice 2006-13, at 3-4 ("*Ground-Water Contamination*") ML060540038 (July 10, 2006).
[110] See DEC 401 Denial Letter, p. 11; Prefiled Testimony of Matthew J. Barvenik in Support of Entergy Nuclear Indian Point 2, LLC, Entergy Nuclear Indian Point 3, LLC and Entergy Nuclear Operations, Inc., July 11, 2011; and Prefiled Direct Testimony of Arnold Gundersen Regarding Spent Fuel Pool Leaks, December 24, 2011.
[111] GZA GeoEnvironmental, Inc., *Hydrogeologic Site Investigation Report for the Indian Point Energy Center* January 7, 2008, pp. viii-ix.
[112] See NUREG-1930, Supplement 2, Safety Evaluation Report Related to the License Renewal of Indian Point Nuclear Generating Unit Nos. 2 and 3 (November 2014) Appendix A (listing Entergy Commitments).
[113] DEC 401 Denial Letter at pp. 2-3.
[114] Entergy License Renewal Application, App. E, Environmental Report, § 5.1 (April 2007); also GZA Report *Hydrogeologic Site Investigation Report for the Indian Point Energy Center* (January 07, 2008).
[115] http://www.nrc.gov/reading-rm/doc-collections/event-status/
[116] http://www.nrc.gov/reading-rm/doc-collections/gen-comm/bulletins/1980/bl80024.html and http://www.nrc.gov/reading-rm/doc-collections/gen-comm/info-notices/1980/in80037.html The event occurred on October 17, 1980. The flooding, covering the first 9 feet of the reactor vessel, was discovered when technicians entered the building. Two pumps which should have removed the water were found to be inoperative.
[117] NRC'S Response to the February 15, 2000, Steam Generator Tube Rupture at Indian Point Unit 2 Power Plant CASE NO. 00-03S August 29, 2000, Office of the Inspector General (OIG), U.S. Nuclear Regulatory Commission (NRC). http://www.nrc.gov/reading-rm/doc-collections/insp-gen/2000/00-03s.pdf at p. 5.
[118] Ibid.
[119] NUREG-1437, Supplement 38 at p. 2-17 http://pbadupws.nrc.gov/docs/ML1033/ML103350405.pdf; http://pbadupws.nrc.gov/docs/ML1013/ML101390123.pdf; http://www.dec.ny.gov/chemical/61837.html
[120] http://www.nrc.gov/reading-rm/doc-collections/event-status/event/2010/20100112en.html
[121] http://www.nrc.gov/reading-rm/doc-collections/event-status/event/2010/20101108en.html; http://www.nrc.gov/reading-rm/doc-collections/event-status/event/2010/20101109en.html
[122] http://www.dec.ny.gov/press/81164.html
[123] http://pbadupws.nrc.gov/docs/ML0934/ML093410174.pdf

[124] Ibid.
[125] http://pbadupws.nrc.gov/docs/ML1004/ML100490887.pdf; http://pbadupws.nrc.gov/docs/ML1004/ML100490888.pdf
[126] http://pbadupws.nrc.gov/docs/ML0711/ML071150287.pdf; https://lersearch.inl.gov/PDFView.ashx?DOC::2862007002R00.PDF
[127] http://pbadupws.nrc.gov/docs/ML0711/ML071130349.pdf
[128] http://pbadupws.nrc.gov/docs/ML1230/ML12305A460.pdf
[129] http://www.nrc.gov/reading-rm/doc-collections/event-status/event/2015/20150511en.html; http://public-blog.nrc-gateway.gov/2015/05/19/nrc-inspectors-head-to-indian-point-3s-electrical-supply-room
[130] ECL § 11-0105: "State ownership and control: The State of New York owns all fish, game, wildlife, shellfish, crustacea and protected insects in the state, except those legally acquired and held in private ownership. Any person who kills, takes or possesses such fish, game, wildlife, shellfish, crustacea or protected insects thereby consents that title thereto shall remain in the state for the purpose of regulating and controlling their use and disposition." See also Lawton v. Steele, 19 N.Y. 226 (1890) affirmed 152 U.S. 133 (1894).
[131] Sloup v. Town of Islip, 78 Misc.2d 366 (Sup. Ct. Suff. Co. 1974).
[132] April 29, 1991 letter of DEC Commissioner Thomas C. Jorling to New York Power Authority President J. Phillip Bayne quoted in DEC SPDES FEIS 2003, p. 50. "That fish should not be wasted as a part of energy production was made clear by former Commissioner Jorling, in 1991 letters to the generators, in which he stated: 'The inadvertent mortality of fish by utilities is not a legitimate use of fishery resources. Therefore, the Department will not allocate a portion of fishing mortality to utilities and will seek elimination if possible, and otherwise minimization, of mortality caused by utilities.'"
[133] "Indian Point Nuclear Facility Units 2 and 3 - SPDES Permit NYS DEC's Administrative Proceeding for the Modification of the SPDES Permit: Facility Background (website) http://www.dec.ny.gov/permits/57609.html; DEC 401 Denial Letter, p. 13.
[134] DEC SPDES FEIS 2003, Table 1 at p. 2.
[135] See Levinton and Waldman (2006) "Electric generating stations that withdraw water for cooling purposes have caused considerable mortality of young life stages of Hudson River fishes." See also DEC SPDES FEIS 2003 Table 1, p. 2; Moran and Limburg 1985, Goodyear 1988, Barnthouse Klauda & Vaughan 1988, EPA 1977 as well as to the citation to scientific studies in the discussions of Fish and Wildlife Resources, Water Withdrawals and Water Quality.
[136] August 13, 2008 Interim Decision of the Asst. DEC Commissioner in SPDES Adjudicatory Proceeding, p. 17.
[137] 6 NYCRR § 12.19 (repealed in 1977). The closure was due to PCB residues in some species exceeding the Federal allowable limit for interstate commerce of 5 parts-per-million. Now commercial fishing for certain species is permitted but strictly regulated, see. 6 NYCRR § 36.3. See also "Injuries to Hudson River Fishery Resources: Fishery Closures and Consumption Restrictions: Hudson River Natural Resource Damage Assessment, Final Report" by US. Department of the Interior, National Oceanic and Atmospheric Administration and New York State Department of Environmental Conservation (June 2001) http://www.dec.ny.gov/docs/remediation_hudson_pdf/fishinjury.pdf
[138] DEC 401 Denial Letter, p. 3.
[139] DEC SPDES FEIS 2003, at p. 3.
[140] DEC SPDES FEIS 2003, pp. 2-3.
[141] *Ibid.*
[142] U.S. Department of Commerce - NMFS - Indian Point Endangered Species Act Section 7 Consultation Biological Opinion, January 30, 2013, section 7.1.2, pp 61 – 94.
[143] Cooper et al 1988.
[144] NYS CMP p. II-6, p. 44.
[145] NYS CMP p. II-7.
[146] See Entergy's Consistency Certification, p. V-8.
[147] NYISO Installed Capacity Manual, (April 2015) p. 4-38. Price taking resources, such as nuclear, wind and solar, are estimated to bid in at $0/kW-mo.
[148] According to the Indian Point Contingency Plan, Final Generic Environmental Impact Statement (September 2013) § 4.11.3 "Electricity Prices" at p. 4-19. "Although much of New York's electric energy is generated by baseload hydroelectric, coal, and nuclear units, natural gas and oil-fired units are usually the units that set the market clearing prices. Generation owners bid their marginal costs of production, and since most of those costs are fuel costs, the price of fuel directly affects the price of electricity (State Energy Planning Board December 2009). The NYISO dispatches generators in the region starting from the lowest- priced bids progressing to higher-priced bids. The bid price of the last generator used to satisfy the total demand for electricity therefore determines the wholesale price of electricity. The average cost of wholesale electricity in New York closely correlates with the price of natural gas, as shown in Figure 4-3 (NYISO 2012)."
[149] Written Statement of Thomas Rumsey, Vice President - External Affairs, New York Independent System Operator, before the Senate Energy and Telecommunications Committee, Senator George D. Maziarz, Chairman, Public Hearing "Indian Point Power Plant" (September 30, 2013) at p.4. http://www.nyiso.com/public/webdocs/markets_operations/documents/Legal_and_Regulatory/Legislative/2013/Testimony%20-%20T.%20Rumsey%20-%20NYS%20Senate%20Energy%20Committee%20Hearing%20-%20September%2030%202013.pdf
[150] *Ibid* at p. 2.
[151] Case 12 E 0503 Proceeding on Motion of the Commission to Review Generation Retirement Contingency Plans,

Order Instituting Proceeding and Soliciting Indian Point Contingency Plan (Issued and Effective November 30, 2012).
[152] Case 12-E-0503 - Proceeding on Motion of the Commission to Review Generation Retirement Contingency Plans. Order Accepting IPEC Reliability Contingency Plans, Establishing Cost Allocation and Recovery, and Denying Requests for Rehearing, (November 4, 2013) selected passages, pp. 1 to 7.
[153] Case 12-E-0503, Generation Retirement Contingency Plans, Order Instituting Proceeding and Soliciting Indian Point Contingency Plan (issued November 30, 2012) (November 2012 Order). (Some footnotes omitted.)
[154] "Proceeding on Motion to Examine Alternating Current Transmission Upgrades", Case 12-T-0502, Statement of Intent to Construct Transmission Facilities of Central Hudson Gas And Electric Corporation, Consolidated Edison Company of New York, Inc./Orange & Rockland Utilities, Inc., Niagara Mohawk Power Corporation D/B/A National Grid, New York State Electric & Gas Corporation/Rochester Gas and Electric Corporation, New York Power Authority and the Long Island Power Authority On Behalf of The New York Transco
[155] See *NYISO Load and Capacity Data report (Gold Book) 2015*, Table IV-1: Proposed Generator Additions, p. 68.
[156] *Ibid* at p. 3. (Emphasis added.)
[157] NYS CMP p. II-6, p. 44.
[158] Robert Ryan, NRC Director of State Programs, quoted in STAFF REPORTS TO THE PRESIDENT'S COMMISSION ON THE ACCIDENT AT THREE MILE ISLAND (Oct. 1979), Report of the Office of Chief Counsel on Emergency Preparedness, at p. 8.
[159] See 10 C.F.R. sections 100.3 (definition of "low population zone"), 100.10(b) (Population density and use characteristics of the site environs), 100.11 (Determination of exclusion area, low population zone, and population center distance), and 100.21(h) (Non-seismic siting criteria).
[160] Compliance Filing of Consolidated Edison Company of New York, Inc. and New York Power Authority With Respect to Development of Indian Point Contingency Plan , Case 12-E-0503 Contingency Plan (February 1, 2013), p. 16.
[161] Consistency Certification at p. V-13.
[162] Consistency Certification at p. V-14.
[163] Environmental Conservation Law (ECL) § 11-0105; State Law § 7-a.
[164] Screening and Prioritization Results Regarding Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Seismic Hazard Re-evaluations for Recommendation 2.1 of the Near-term Task Force Review of Insights from the Fukushima Dai-ichi Accident (May 9, 2014). http://pbadupws.nrc.gov/docs/ML1411/ML14111A147.pdf
[165] "Generic Issue 199 (GI-199), Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants, Safety/Risk Assessment," August 2010.
[166] Submission of Comparable Information Pursuant to the April 19, 2013 Public Service Commission Order Case 12-E-0503 (May 20, 2013) "Environmental Benefits of the Project" (Section 8.8) at p. 9.
[167] Sources: NY Transco, Projects http://www.nytransco.com/projects.html
[168] 16 U.S.C. § 1452 (2)(D) (bolding added).
[169] 15 C.F.R. § 923.15(b).
[170] Findings of William Matuszeski, Acting Assistant Administrator for Coastal Zone Management, National Oceanic and Atmospheric Administration Regarding Approval of the New York Coastal Management Program, dated September 19, 1982
[171] Indian Point Consistency Certification policy 18, p. V-1, footnote 65; Letter dated August 14, 2012 from Martin Healy, Esq. Goodwin & Proctor to NOAA's Joelle Gore, p.6.
[172] NYS CMP pt. II, § 9, at 3 (Att. 3).
[173] Examples include the NRC's approval of the dry caste storage structures in 2008, installation of two-speed pumps in Unit 2, and variable speed pumps in Unit 3 and the retrofitting of the CWISs with Ristroph modified traveling screens, and a fish handling and return system. Entergy failed to submit a consistency certification for these actions although located in the State's coastal zone.
[174] The Atomic Energy Commission issued the operating licenses for the nuclear facilities subject to the requirement that they cease using Hudson River water for once-through cooling by May 1, 1979. The NRC later amended the operating license for Indian Point Unit 2 to May 1, 1980 to end once-through cooling.
[175] The EPA's NPDES permits contained conditions that effectively required retrofitting of cooling towers at all three of these Hudson River power plants. All the plants were required to cease using Hudson River water for once-through cooling by May 1, 1979.
[176] https://www.federalregister.gov/articles/2014/09/19/2014-22215/continued-storage-of-spent-nuclear-fuel
[177] http://www.regulations.gov/#!documentDetail;D=NRC-2012-0246-1335.
[178] NYS DEC. Assessment of the Risks to Fish and Wildlife from Exposure to Ionizing Radiation - September 26, 2014. http://www.dec.ny.gov/docs/fish_marine_pdf/radriskfw.pdf
[179] G.P. Friday, C.L. Cummins, and A.L. Schwartzman. *1996. Radiological Bioconcentration Factors for Aquatic, Terrestrial, and Wetland Ecosystems at the Savannah River Site. Prepared for U.S. Dept. of Energy, Savannah River Site,* p. 21. http://pbadupws.nrc.gov/docs/ML1016/ML101600579.pdf.
[180] Vanderplog et al. 1975 as quoted in G.P. Friday, C.L. Cummins, and A.L. Schwartzman. *1996. Radiological Bioconcentration Factors for Aquatic, Terrestrial, and Wetland Ecosystems at the Savannah River Site. Prepared for U.S. Dept. of Energy, Savannah River Site,* p.11. http://pbadupws.nrc.gov/docs/ML1016/ML101600579.pdf.

[181] G.P. Friday, C.L. Cummins, and A.L. Schwartzman. *1996. Radiological Bioconcentration Factors for Aquatic, Terrestrial, and Wetland Ecosystems at the Savannah River Site. Prepared for U.S. Dept. of Energy, Savannah River Site, p. 11.* http://pbadupws.nrc.gov/docs/ML1016/ML101600579.pdf.

[182] *Ibid* at p. 9.

[183] *Ibid.*

[184] NRC Inspection Report No. 72-1014/10-201 and Notice of Violations to Holtec International manufacturer of- dry cask storage containers for spent nuclear fuel. (Feb. 24, 2011) http://pbadupws.nrc.gov/docs/ML1104/ML110450157.pdf

[185] United States Nuclear Waste Technical Review Board, "Evaluation of the Technical Basis for Extended Dry Storage and Transportation of Used Nuclear Fuel (December 2010)", § 4.3 Significant Storage Events to Consider, pp. 79-81. http://www.nwtrb.gov/reports/eds-final.pdf On page 81 the Evaluation states: "It is possible that an off-normal or accident condition could lead to a decision being made to repackage the fuel assemblies that reside in a dry-storage container. This transfer may take place 'wet' in a pool. If dried rods are returned to the fuel storage pool and if they are still relatively hot, when they are lowered into the water, the rods will experience a rapid quench cool-down. This may induce high stresses in the cladding and possible fuel-rod failure. It also is unknown what effects rewetting may have on the fuel and its future degradation. A serious accident may lead to several unacceptable situations. A breach of the main canister may allow the release of radioactive material. ...' A breach of the main canister will let helium out and air in. If a breach allows water or humid air to enter the container, then the likelihood of degradation of the cladding, canister, cask, and other components increases significantly. Possible effects of the humid atmosphere include radiolysis of the moisture to create highly oxidizing radicals, corrosion of the cladding and cask components, and enhanced hydrogen ingress into the cladding. Stress corrosion cracking, galvanic corrosion, pitting and other forms of localized corrosion may also occur. Given a breach, the entire cladding and system components will need to be inspected. Severe accidents during transportation of CSNF may induce large impact stresses that could heavily damage aged fuel-rods and fuel assembly containment supports. Again, this possibility needs to be studied in more detail since loss of fuel-rod confinement and assembly containment could make subsequent storage and transport of damaged CSNF unsafe." Since the Indian Point spent fuel pools are at or near capacity, a wet transfer is not likely possible. Nothing states that repackaging a ruptured dry cask is presently feasible.

[186] 6 NYCRR § 701.11. "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."

[187] Entergy License Renewal Application, App. E, Environmental Report, § 5.1 (April 2007); also GZA Report Hydrogeological Site Investigation Report (January 2008).

[188] *Ibid.*

[189] *Ibid.*

[190] DEC Denial letter at 11.

[191] See 6 NYCRR § 701.11.

[192] *Ibid.*