Dropping by the Millions: NRC Downgrades Indian Point Fish Kills

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By Roger Witherspoon

In a stunning change of position, federal regulators have downgraded by a factor of 1,000 the 31-year-old data assessing the fish killed annually by the Indian Point nuclear power plant. In addition, the regulators assert the plants' thermal plume causes minimal damage to the Hudson River environment and may fit state requirements for a hot water discharge permit.

The direct impact of the change by the Nuclear Regulatory Commission will play out over the next few months in the ongoing fight between the New York State Department of Environmental Conservation and Entergy Nuclear, owners of the plants, over the continuing use of Hudson River water to cool its massive equipment. The state has been insisting that Indian Point construct a closed cycle cooling system – sort of an industrial radiator recycling water – rather than suck in enormous amounts of river water, pass it through a heat exchanger, and dump the heated water back into the river. A closed cycle system would use

95 percent to 98 percent less water than the current once-through system, and would end the dumping of hot water into the river.

Entergy is the largest water user of 40 power plants around the state which the DEC is targeting for cooling system changes in an effort to bring them into compliance with the Clean Water Act and end the annual destruction of billions of river fish (http://bit.ly/NXlt8s). If the twin nuclear plants do not obtain a discharge permit from DEC, it will not be able to operate even if the NRC grants its request to extend its 40-year operating licenses another 20 years.

The conflict stems from the enormous amounts of water used and the heat dumped back into the river. The plants draw 2.5 billion gallons of water daily, about double the water used each day by the nine million residents of, and visitors to, New York City and adjacent Westchester County. That influx of water into a 40-foot-wide siphon sucks in fish of all sizes, trapping larger ones against internal screens and sucking smaller ones and hatchlings fatally into the heat sink. The plants dump some 30 billion BTUs of heat per hour into the river. That is the equivalent of the heat that would be generated by exploding a nuclear bomb the size of the one which leveled Hiroshima approximately every two hours day in and day out.

The change in the assessment of Indian Point fish kills was made to a formula in a new Supplement (http://bit.ly/MQSq1O) to Volume 2 of the NRC's barely two-year-old, 700-page Environmental Impact Assessment (http://bit.ly/x0VqQN) of the plants' massive water drain on what is termed the Essential Fish Habitat of the Hudson River. The count of fish killed by being trapped against the screens, and the far larger number of hatchlings – less than a half inch in diameter – which are "entrained," or sucked through the screens and into the system were based on surveys taken by Consolidated Edison, the plants' original owners, from 1981 to 1987. The figures have been accepted the company and state as accurate since then.

For the larger fish, the study found about two billion fish per year were trapped against the screens and killed. But according to the NRC study the 1981 death toll for small fish had been 3.3 *trillion* per year. But with the advent of new screens, "the total number of identified fish entrained has decreased at a rate of 187 billion fish per year since 1984," and leveled off at an annual toll of *300 billion* baby fish.

At the time, NC spokesman Neil Sheehan stated in an email exchange that the huge numbers of small fish occurred because "The entrained fish are generally not mature fish, because mature fish don't fit through the plant intake screens. Also, the mostly juvenile or young-of-year fish are only capable of weakly swimming against a current.

“Staff looked at overall entrainment data, produced by previous Indian Point owners in the 1980s, and observed a declining trend for entrainment over the years of monitoring. It’s difficult to say whether such a trend would continue or where it would be today, but it is the best data available.”

The numbers drew the attention of the National Marine Fisheries Service (NMFS), which stated fish stocks along the North Atlantic seaboard (http://bit.ly/h4GEIM) “are not currently over fished, but fall below historic levels. This observation suggests that the Hudson River’s ability to support and produce living aquatic organisms has been compromised over the years by lost habitat quality and quantity as humans have dredged, filled, and withdrawn river water for a myriad of uses, resulting in conflicts of use with fishery resources.”

The assessment of the numbers of fish killed stemmed from counting the numbers of dead fish in samples and extrapolating it to the volume of water sucked into the plant. Indian Point siphons the entire, 183-mile, lower Hudson River, from the New York Harbor upriver to Troy, twice each year. The formula was based on the number of dead fish counted per 1,000 cubic meters of water per minute, which is how the intake flow rate has always been measured.

But Michael Wentzel, a microbiologist, veteran of the nuclear Navy, and the NRC’s License Renewal Project Manager for Indian Point said the death toll should have been counted per one cubic meter of water.

“Entergy looked at the analysis that we had,” Wentzel said in an interview, “and said that our data seemed too high. They took a look at it further and came to the conclusion that we were using the wrong units.”

While using calculations based on the standard 1,000 cubic meters per minute was reasonable, Wentzel said “we were wrong. We misinterpreted the data. We made an assumption as to what the units behind the numbers were. When you take a look at it, the simple math that you end up with is an answer that is a factor of 1,000 higher than it should be.”

That changes the death toll of small fish from 300 billion to 300 million. It is still an astonishing figure, but not nearly as daunting as before. Wentzel was quick to point out, however, that because the 1,000 cubic meters was used throughout their analysis, it did not change the agency’s conclusion that the overall impact of the plant on the environment was “moderate,” or affect the conclusions of the NMFS.

The State DEC, which will resume hearings on the contested discharge permit July 31 in

Albany, declined to comment on the NRC changes.

The NRC's environmental study is not an absolute assessment of the nuclear plants' impact on the Hudson River estuary, but an assessment of Indian Point's impact compared to that of any other type of 2,000-megawatt power plant using the river for cooling. It is up to the NY DEC to determine if the use of the Hudson River by Indian Point or any replacement plant of that size is actually detrimental to the fish at that site. It is a distinction usually lost in Entergy's promotional material for the embattled power plants.

"We have just corrected the input," insisted Wentzel. "The end result is it didn't change our determination. With the exception of one species – the spottail shiner – changed from large impact to small impact. But for the entire aquatic impact of the power plants it remains a moderate impact, just like before. It's not like this change got them an overall change in the evaluation. It didn't."

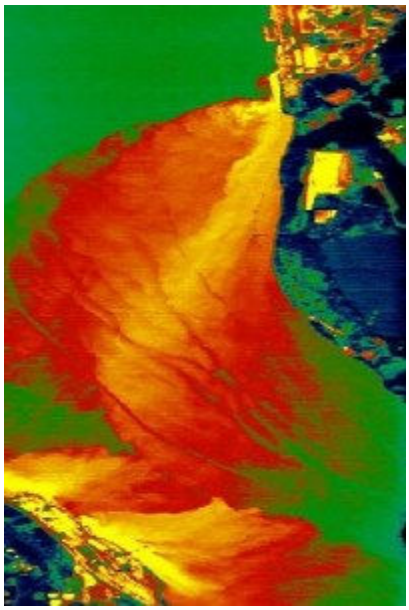
Nor has the NFMS changed its conclusion, that the agency "agrees with New York that a closed-cycle cooling system would significantly limit the amount of intake flow and thereby reduce impacts associated with especially impingement and entrainment. It is our opinion that implementing this measure is in the best interest of fishery resources and also is the most appropriate option for meeting our mutual Essential Fish Habitat mandates while allowing continued electric generation at IP2 and IP3 in an otherwise sensitive ecological area....

"Given the immense natural productive potential of the Hudson River Estuary, and taking into consideration the staggering numbers of organisms that are lost directly, indirectly and cumulatively through continued operation of electric generating stations that continue to use once-through cooling technology in the Mid-Hudson reach, the National Marine Fisheries Service suggests that the current Indian Point relicensing process is an appropriate and opportune time to apply the Clean Water Act provisions regarding large power generation facilities."

Manna Jo Greene, environmental director of the non-profit group Clearwater, which has joined the state Attorney General's office in challenging Indian Point's relicensing application, said her organization is conducting an analysis to determine the accuracy of the NRC's change in formulas.

"But if the impact is less than had been thought then that is a good thing," Greene said. "We are not looking for the worst to happen to the life of the Hudson River. There are enough bad things about the Indian Point plants to warrant closing them without inflating the numbers of fish they kill, which is still significant.

“With 13 of the Hudson River’s signature fish in a state of severe decline the continued impact of the plants’ cooling operation is still not acceptable.”



The NRC’s assessment of the thermal plume, however, was new. The extent of the thermal plume and its impact on fish has always been an understudied and controversial aspect of Indian Point’s use of the river as a free heat sink. For years, the clearest portrait of the extent of thermal pollution has been an infrared photo taken from a helicopter showing the Hudson River (http://bit.ly/nEvEGO) from Indian Point across to Rockland County, the site of the smaller, Bowline coal fired power plant in Haverstraw. The heated water clearly forms a thermal barrier spanning the entire breadth of the river.

But DEC officials cautioned that it was never clear how much of that thermal barrier – which was thought to kill an estimated 500 million fish annually – was due to Indian Point or to Bowline, and how deep the barrier went. The ambiguity is significant.

In an interview last year Chuck Nieder, a biologist and head of the DEC Steam Electric Unit which is seeking to bring power plants into compliance with the Clean Water Act, said “fish can sense a temperature change and if they can avoid it, they will. It’s when they can’t avoid it that they get stressed.”

Young fish, who are largely confined to the shallow water along the shoreline, lack the ability to get out of the way of heated water. Larger fish may be able to avoid warm surface zones, but would become stressed if the water was heated to a significant depth. The temperature would alter feeding and migrating patterns, as well as the health and abundance of plants

and small organisms that form the bottom of the river's food chain.

The DEC did determine in May, 2011 that "a thermal mixing zone in the Hudson river near Indian Point not to exceed a maximum of 75 acres in total size during any time of a given year will provide reasonable assurance of compliance with water quality standards and criteria for thermal discharges…"

The NRC report states that during high tide on July 13, 2010, when the river crested at 50 feet in depth and the ambient water temperature was 82 degrees Fahrenheit, the Indian Point thermal plume "was clearly defined and extended about 1,000 feet from shore…Surface water temperatures in the plume reached about 85 degrees Fahrenheit…"

A test at low tide on July 11, 2010, when the river was only 35 feet deep, found "the thermal plume is evident to about 2,000 feet from the eastern shore" or about twice the distance it would reach during high tide. And for the first 250 feet, the bottom temperature of the Hudson rose to 86 degrees though the ambient bottom temperature elsewhere in the river was about 80 degrees.

"The NRC staff notes, however, that these limited-area conditions would not last long, as they would change with the tidal cycle."

As a result of these measurements, the NRC concluded that "IP2 and IP3 are in compliance with NYSDEC water quality standards."

Greene said that in Clearwater's view, the NRC analysis of the thermal plume is deficient in that it looks at the state of the river now, and not as it will evolve over the projected 20 years of the license renewal.

"The Hudson River is a tidal estuary with an influx of salt water coming in each day with the ocean tide," she explained. "With climate change and sea level rise, there will be an influx of more and warmer salt water coming into the Lower Hudson River. The NRC analysis does not take into account what the impact will be of the hot water from Indian Point on the warmer, saltier water coming in from the ocean. An accurate environmental impact assessment needs to look at how this operation will affect the river in the future."

The NRC is already under fire for turning a blind eye to the future when it comes to the long term storage of high level nuclear waste. Last month, a federal court of appeals sitting in Washington, D.C. threw out the NRC's "waste confidence rule" which states that the highly radioactive spent fuel can remain on site indefinitely. The NRC reasoned that since had not caused major problems to date, it would not cause any problems in the future. The Court held that the NRC must conduct long term environmental assessments of the impact and

likelihood of radioactive leaks as the plants' storage facilities age.

State Dec officials will not comment on the conclusion of the federal nuclear regulators in their new environmental assessment. But even if the nuclear plants can meet the state's requirements for hot water discharge, there is still the issue of the massive number of fish killed in their once-through cooling system. DEC has insisted for nearly a decade that if Entergy wants to continue operating the plants past their license expiration dates – 2013 for IP2 and 2015 for IP3 – then they will have to shift to a closed cycle cooling system.

There are several types of industrial cooling systems, and the state DEC narrowed its focus on the top two: mechanical draft and cooling towers. The DEC has recommended use of mechanical draft systems, which resemble four-story radiators and are the type Entergy had used at its Vermont Yankee nuclear power plant (http://bit.ly/ns3RVp). Entergy did not properly maintain the facility, however, and it collapsed. The company is temporarily utilizing once through cooling from the adjacent river.

Entergy has claimed – and the *New York Times* and media outlets such as *Bloomberg News* and *Reuters* have erroneously reported – that the state has ordered the installation of massive cooling towers. The company has not, however, filed any construction permit applications or provided any documents to the state showing that they intend, in fact, to construct cooling towers, which are the most expensive form closed cycle operation. DEC, in evaluating different types of cooling systems, found that cooling towers would reduce fish mortality and water usage by 98 percent and could cost $1.5 billion. That would still be just 5 percent of Entergy's projected profits of more than $20 billion over the 20 year span of their new license, if granted. It would also employ more than 5,000 workers and be the

largest construction project in the region.

The mechanical draft system, on the other hand, would cost less than $500 million, according to federal EPA estimates, and reduce water use and fish mortality by 95 percent. DEC officials decided that the added cost of cooling towers could not be justified for just an increase in efficiency of 3 percent. The DEC recommends the construction of cooling towers as the preferred system for any new power plants, while recommending mechanical draft as the best system to retrofit onto existing power generators.

Entergy, however, seeks to continue using the Hudson River as a free source of coolant.