ENCLOSURE 5 TO NL-09-036

Applied Science Associates, Inc. Report dated March 16, 2009,
"Review of Thermal Discharge Issues to the Hudson River in NRC Draft SEIS for Indian Point 2 and 3"

ENTERGY NUCLEAR OPERATIONS, INC
INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2 and 3
DOCKETS 50-247 and 50-286

Review of Thermal Discharge Issues to the Hudson River in NRC Draft SEIS for Indian Point 2 and 3

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16 March 2009

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1. Introduction

The United States Nuclear Regulatory Commission (NRC) issued Draft Supplement 38 to the Generic Environmental Impact Statement (DSEIS) regarding units 2 and 3 of the Entergy Indian Point generating facilities located in Buchanan, NY. These units use once-through cooling technology which results in a discharge of heated water to the adjacent Hudson River.

Applied Science Associates, Inc. (ASA) was contracted to review the DSEIS with a focus on the thermal discharge issues discussed. ASA has extensive experience in both the development and application of computer models that simulate the hydro- and thermo-dynamics of cooling water discharges into surface waters such as rivers, lakes and estuaries. The models have been extensively reviewed in the professional literature and well received by regulatory agencies at both the state and federal level.

The specific sections of the DSEIS that were found relevant during the review by ASA included the following:

Volume 1:

- The Hydrodynamics and Flow Characteristics of Section 2.2.5.1 The Hudson River Estuary (page 2-35, lines 5-42; page 2-36, lines 1-3)
- Section 4.1.4.3 Thermal Studies and Conclusions (page 4-25, lines 38-45; page 4-26, lines 1-3)
- Section 4.1.4.5 NRC Staff Assessment of Thermal Impacts (page 4-27, lines 14-30)

Volume 2:

- Section 4.3.3 Thermal Impacts of Biological Assessment in Appendix E (page E-99, lines 21-26)

The comments on these sections are related to two major issues: (1) a basic misunderstanding of the tidal processes in the Hudson River adjacent to the Indian Point facility; and (2) an error in the application of the CORMIX model and misinterpretation of the model results. Each section is discussed below in terms of a specific comment, identification of the change in the section sought and a summary of the basis for the change.

2. Draft SEIS: The Hydrodynamics and Flow Characteristics of Section 2.2.5.1 The Hudson River Estuary (page 2-35, lines 5-42; page 2-36, lines 1-3)

ASA Comment on Draft SEIS Section

The draft SEIS contains very little information about tidal conditions in the Hudson River except for mention of 40-rrrr-AE

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"Hydrodynamics and flow characteristics are controlled by a complex series of interactions that include...the influence of tides and currents in downstream portions of the river..." (page 2-35, lines 8-11)

and

"The typical tidal excursion in the lower Hudson River is generally 3 to 6 mi (5 to 10 km), but can extend up to 12 mi (19 km) upstream" (page 2-35, lines 35-36).

The importance of tidal processes on the location and extent of the thermal plume cannot be underestimated since these processes defined the controlling conditions under which the New York State Department of Environmental Conservation (NYSDEC) required Lawler Matusky and Skelly Engineers (LMS) to perform CORMIX modeling for the applicant. This modeling was reported in CHGEC et al., (1999).

NYSDEC required an assumption of a tidal condition defined as near slack water (specifically the lowest 10th percentile current during the flood tide) at mean-low water, considered by NYSDEC to be the most conservative condition for thermal dispersion. However, near the Indian Point site, slack water conditions occur near mid tide and not at mean low water. Thus the condition imposed by NYSDEC as environmental forcing is not possible for this site.

ASA Suggested Change to Draft SEIS Section

The following paragraphs are suggested for insertion to the draft SEIS at page 2-35 before line 26.

> Tides in the Hudson River exhibit a complex relationship between the tidal elevation and the tidal currents. Blumberg and Hellweger (2006) note that at the Battery, essentially the mouth of the Hudson River at the southern tip of Manhattan Island, maximum flood currents occur at the same time as high tide and maximum ebb currents occur the same time as low tide. At the George Washington Bridge, they note that that the maximum flood occurs 30 minutes before high tide and maximum ebb occurs 30 minutes before low tide. The slack water condition occurs closer to high and low waters only at Albany.
>
> Measurements taken along the entire Hudson River by Schureman (1934) confirm that maximum floods occur 15 minutes before high tide, while the maximum ebb occurs 45 minutes before low tide and the slack water occurs closer to the mid-tide at Peekskill, the closest station to the Indian Point facility. The reason for the variation in the phasing between water level and currents is due to the fact that the tidal wave is considered a progressive wave at the Battery, a standing wave in Albany, with a combination of the wave types along the River between the Battery and Albany.

Basis for Suggested Change to Draft SEIS Section

Tidal processes in the Hudson River adjacent to the Indian Point facility are critical to the accurate understanding of the strength (temperature increase over ambient conditions) and extent of the thermal plume. A condition which never occurs in the River at the site is not representative of even a worst case extreme scenario. The appropriate extreme scenario must rely on conditions that can actually occur. ASA conducted an independent review (Swanson, 2008) of the information describing the

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tides in the Hudson River and found a consistent explanation of the tidal conditions. The following paragraph explains why the tidal conditions in the Hudson River occur as they do and the relationship between tidal elevation and tidal velocity.

The reason for the variation in the phasing between water level and currents is due to the fact that the tides are considered a progressive wave at the Battery, a standing wave in Albany, with variation along the River. In the case of progressive tidal waves, the tides and currents are in phase, with maximum flood currents occurring during high tide and maximum ebb currents occurring during low tide. Standing tidal waves can be considered to be composed of two progressive tidal waves with the same period, but traveling in opposite directions. The primary wave that enters the estuary (Hudson River) from the open ocean and the secondary wave, caused by the reflection of the primary wave at the head of the estuary or at a dam, combine together to form a standing wave. In the case of a standing tidal wave, the tides and currents are out of phase by about 3 hours, with slack currents occurring close to high and low tides. The friction, cross-sectional geometry, and wave reflection influence whether progressive or standing tidal waves are formed in estuaries.

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Although not typical, the tidal characteristics of the Hudson River are not unique. Many estuaries have similar conditions. For instance, in the eastern end of the central San Francisco Bay, the tides are standing waves due to reflection from the shore. The tides in San Pablo Bay, north of central San Francisco Bay, are nearly progressive with a 30-45 minute phase difference between the tides and currents (Cheng and Casulli, 1993). Wong (1993) showed that the tides and currents at the Fire Island Inlet in the New York Bight at the entrance to Great South Bay on Long Island are out of phase by 40 minutes, indicating a near progressive wave pattern. Wong's modeling results showed the phase difference between tides and currents inside Great South Bay to be 2.75 hours, with the wave characteristics changing from a progressive wave in Fire Island Inlet to a standing wave in Great South Bay. In the Hudson River, the tidal wave is progressive near the Battery and changes to standing in Albany, due to the reflection at the dam at Troy (Blumberg and Hellweger, 2006).

3. Draft SEIS: Section 4.1.4.3 Thermal Studies and Conclusions (page 4-25, lines 38-45; page 4-26, lines 1-3)

ASA Comment on Draft SEIS Section

The draft SEIS section discusses the thermal studies with specific reference to the modeling studies presented in CHGEC et al., (1999). A description of the models used and the results obtained are summarized in this section. The draft SEIS concludes:

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> These results suggest that the 4 degrees F (2 degrees C) lateral extent and cross-sectional criteria may sometimes be exceeded at IP2 and IP3. Exceedences generally occurred under scenarios that the applicants indicated may be considered quite conservative (maximum operation of three electrical generation facilities simultaneously for long periods of time, tidal conditions promoting maximum thermal impacts, atypical river flows). The steady-state assumptions of

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> CORMIX are also important because, although the modeled flow conditions in the Hudson River would actually occur for only a short period of time when slack water conditions are replaced by tidal flooding, CORMIX assumes this condition has been continuous over a long period of time. CHGEC et al. (1999) found that this assumption can result in an overestimate of the cross-river extent of the plume centerline. (page 4-25, lines 38-45; page 4-26, lines 1-3).

The application of the CORMIX model was sufficiently flawed to invalidate results obtained from its use. A close inspection of the modeling presentation in the CHGEC et al., (1999) would clearly show that the supplementary work using the CORMIX 3.2 model does more than over-estimate the cross-river extent of the plume, i.e., it was incorrectly applied and its results incorrectly interpreted.

ASA Suggested Change to Draft SEIS Section

The above paragraph should be modified to read as follows:

> These results suggest that the 4 degrees F (2 degrees C) lateral extent and cross-sectional criteria may sometimes be exceeded at IP2 and IP3. Exceedences generally occurred under scenarios that the applicants indicated are too conservative (maximum operation of three electrical generation facilities simultaneously for long periods of time, atypical river flows). The steady-state assumptions of CORMIX are critically important because the modeled flow conditions in the Hudson River would not actually occur. Therefore, the results presented for the supplementary modeling and reported in CHGEC et al. (1999) provide no reasonable basis for estimating the cross-river extent of the plume centerline.

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Basis for Suggested Change to Draft SEIS Section

As is noted by the draft SEIS the steady state CORMIX model runs provide results under the assumption that the slack water condition lasts indefinitely (or at least long enough for the thermal plume to extend across most of the river). In fact slack water conditions likely last for only 15 minutes totally invalidating the CORMIX results. This short time period for slack water conditions, or more precisely the 10th percentile of currents surrounding slack water, can be determined using the Tides and Currents software (Nobeltec, 2001) based on NOAA tidal data. Details of the analysis can be found in Swanson (2008).

The CORMIX model was used by LMS to estimate the extent of the thermal plume relative to the width of the Hudson River. Since the CORMIX model is steady state it cannot accept time varying current speeds as input. It assumes that whatever current is used that it is constant over time. The LMS results using the NYSDEC required tidal conditions indicated that essentially the entire width (99-100%) of the Hudson River would exceed 4°F under the four summer months, June through September, modeled. The CORMIX results presented by LMS could not provide information on the time for the plume to travel from the discharge across the river based on the CORMIX version used (3.2). This information is critical since the plume will encounter significantly changing tidal currents in the river if it takes an appreciable amount of time to cross the river.

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To determine the plume travel time, updated CORMIX runs were made using CORMIX-GI Version 4.1G, a newer version, using the same input parameters used by LMS and documented in Swanson (2008). The updated CORMIX simulations matched the LMS simulations and predicted that the plume would occupy the whole width of the river, but only if the 10th percentile flood current speed of 0.29 fps (0.088 m/s) were to last for 2.93 hours, which is the travel time of the plume across the river. However the 10th percentile current speed lasts less than 15 minutes as the flood tide starts from slack water. What will actually occur is that while the plume is traveling across the river it will encounter increasing currents as the flood tide increases. The steady state assumption of 0.29 fps (0.088 m/s) constant flood current speed used in the CORMIX model grossly overestimates the cross-river travel distance of the plume and hence is totally unrepresentative of actual conditions in the river.

The use of the steady state model cannot be used without analysis of the plume travel time to determine the applicability of the model for this specific purpose. As the travel time is significant relative to the duration of the flood tide then the modeling results described in the draft SEIS should not be used.

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4. Draft SEIS: Section 4.1.4.5 NRC Staff Assessment of Thermal Impacts (page 4-27, lines 14-30)

ASA Comment on Draft SEIS Section

The NRC staff assessment of thermal impacts concludes:

> In the absence of the thermal study proposed by NYSDEC (or an alternative proposed by Entergy and accepted by NYSDEC), existing information must be used to determine the appropriate thermal impact level to sensitive lifestages of important aquatic species. Since NYSDEC modeling in the FEIS (NYSDEC 2003a) indicates that discharges from IP2 and IP3 could raise water temperatures to a level greater than that permitted by water quality criteria that are a component of existing NYSDEC permits, the staff must conclude that adverse impacts are possible. The NRC staff, after a review of available information on aquatic life in the Hudson River Estuary, did not find evidence of adverse effects on aquatic life that are clearly noticeable and sufficient to destabilize important attributes of an aquatic resource (the criteria for a LARGE finding). In the absence of specific studies, and in the absence of effects sufficient to make a determination of a LARGE impacts, the NRC staff concludes that thermal impacts from IP2 and IP3 could thus range from SMALL to MODERATE depending on the extent and magnitude of the thermal plume, the sensitivity of various aquatic species and lifestages likely to encounter the thermal plume, and the probability of an encounter occurring that could result in lethal or sublethal effects. Additional thermal studies—as proposed by NYSDEC and Entergy—will generate data that could further refine or modify this impact level. For the purposes of this draft SEIS, the NRC staff concludes that impacts could range from SMALL to MODERATE. (page 4-27, lines 14-30)

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NRC argues that existing information must be used even though it was pointed out (Swanson, 2008) that the thermal modeling previously performed was flawed based on two premises: 1) the hypothetical conditions chosen by NYSDEC for modeling (slack water at low tide) never exist in the Hudson River at the IP site; and 2) the duration of the slack water condition assumed in the previous CORMIX modeling at the site is completely incorrect (it is closer to 15 minutes, not the almost 3 hours presented). The modeling results presented are erroneous and therefore cannot be used to draw any conclusions, specifically that adverse impacts are possible.

In addition, NRC cites the NYSDEC contention (NYSDEC, 2003) that the modeling shows that discharges from IP2 and IP3 could raise water temperatures to a level greater than that permitted by water quality criteria. ASA conducted an independent review of the historic thermal assessments (Swanson, 2008) and found that the supplemental modeling presented in CHGEC et al. (1999) is fundamentally flawed for the reasons stated in the previous paragraph and is therefore no reasonable basis for suggesting thermal non-compliance based on this modeling. Although the modeling may predict thermal non-compliance, the critical fact that the modeling is fundamentally flawed disallows any interpretation as to the effects of the discharges. The three dimensional (tri-axial) thermal study, which was proposed by NYSDEC, along with more up-to-date three dimensional modeling is the preferred approach to assess the thermal distribution in the Hudson River from the discharges from IP1 and IP2. This procedure is typically used as the standard in these types of studies.

ASA Suggested Change to Draft SEIS Section

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The above paragraph should be modified to read as follows:

> Although a thermal study as proposed by NYSDEC (or an alternative proposed by Entergy and accepted by NYSDEC) is preferred, existing information may be used to estimate the appropriate thermal impact level to sensitive lifestages of important aquatic species. The NRC staff, after a review of available information on aquatic life in the Hudson River Estuary, did not find evidence of adverse effects on aquatic life that are clearly noticeable and sufficient to destabilize important attributes of an aquatic resource (the criteria for a LARGE finding). Based on available information, the NRC staff concludes that thermal impacts from IP2 and IP3 would be SMALL due to the small extent and magnitude of the thermal plume after discounting the flawed modeling, but including the sensitivity of various aquatic species and lifestages when exposed to the small thermal plume, and the low probability of an encounter occurring that could result in lethal or sublethal effects. Additional thermal studies—as proposed by NYSDEC and Entergy—will generate data that could further refine or modify this impact level. For the purposes of this draft SEIS, the NRC staff concludes that impacts would be SMALL.

Basis for Suggested Change to Draft SEIS Section

The basis for the suggested change to this section is that the plume extent would be small when the CORMIX modeling is correctly implemented and interpreted. This was performed with CORMIX-GI Version 4.1G, a newer version, using the same input parameters used by LMS and reported in CHGEC et al., (1999). If one incorrectly

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assumed that the plume would be affected by a constant 10th percentile flood current speed of 0.29 fps (0.088 m/s) the updated CORMIX simulations reproduced the earlier results that the plume would occupy the whole width of the river, but only if the that current speed were to last for 2.93 hours, the travel time of the plume across the river. However the 10th percentile current speeds lasts less than 15 minutes as the flood tide starts from slack water. What will actually occur is that while the plume is traveling across the river it will encounter increasingly large currents as the flood tide increases. In fact the cross-river travel distance of the plume decreases from 1510 m to 51 m, as flood current speed increases from the 10th percentile level to 2.0 fps (0.61 m/s) (90th percentile). The steady state assumption of constant flood current speed by the CORMIX model grossly overestimates the cross-river travel distance of the plume and hence is inaccurate.

The NRC staff say that no evidence was found of adverse effects on aquatic life that are "clearly noticeable and sufficient to destabilize important aspects of an aquatic resource" thus eliminating a LARGE finding yet, without any evidence, conclude that thermal impacts could range from SMALL to MODERATE. If no evidence was found for LARGE impacts and no evidence was found for SMALL to MODERATE impacts it cannot be rationally concluded that somehow the SMALL to MODERATE significance levels are reasonable. To the contrary, based on the known data and conditions discussed in this report, no finding above SMALL is warranted.

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5. Draft SEIS: Section 4.3.3 Thermal Impacts of Biological Assessment in Appendix E (page E-99, lines 21-26)

ASA Comment on Draft SEIS Section

Appendix E of the draft SEIS contains Indian Point Nuclear Generating Unit Numbers 2 and 3 compliance status and consultation correspondence. Within the Appendix is a Biological Assessment spanning pages E-87 to E-102 with the following:

> The final environmental impact statement (FEIS) associated with the SPDES permit for IP2 and IP3 (NYSDEC 2003) concludes that "Thermal modeling indicates that the thermal discharge from Indian Point causes water temperatures to rise more than allowed." The thermal modeling referred to in the FEIS appears to represent a worst-case scenario. Available modeling indicates the potential for the discharges from IP2 and IP3 to violate the conditions of the IP2 and IP3 SPDES permit, which could result in a negative impact on the shortnose sturgeon. (page E-99, lines 21-26)

The thermal modeling is not a "worst-case scenario" since that designation implies that it is theoretically possible. In fact, the scenario is impossible to achieve based on the fundamental tidal processes occurring in the river at the site as detailed above.

ASA Suggested Change to Draft SEIS Section

The above paragraph should be modified to read as follows:

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The final environmental impact statement (FEIS) associated with the SPDES permit for IP2 and IP3 (NYSDEC 2003) concludes that "Thermal modeling indicates that the thermal discharge from Indian Point causes water temperatures to rise more than allowed." The thermal modeling referred to in the FEIS is, however, flawed and should not be used to infer impacts. Without further modeling or instream plume mapping it is not possible to conclude that the discharges from IP2 and IP3 violate the conditions of the IP2 and IP3 SPDES permit, nor that a negative impact on the shortnose sturgeon would occur.

Basis for Suggested Change to Draft SEIS Section

The basis for the suggested change is that the CORMIX modeling is in error as has been documented in the discussion above.

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6. References

Blumberg, A. F., and F. L. Hellweger (2006). Hydrodynamics of the Hudson River Estuary, In: *Hudson River Fishes and their Environment,* Waldman, J., K. Limburg, and D. Strayer, Eds. American Fisheries Society, Bethesda, Maryland, 51: 9-28, 2006.

Cheng, R. T., V. Casulli, and J. W. Gartner, (1993). Tidal, Residual, Intertidal Mudflat (TRIM) model and its application to San Francisco Bay, California, Estuarine, Coastal and Shelf Science, Vol. 36, pp. 235-280.

CHGEC et al. (Central Hudson Gas and Electric Corporation; Consolidated Edison Company New York, Inc.; New York Power Authority; and Southern Energy New York). (1999). "Draft Environmental Impact Statement for State Pollutant Discharge Elimination System Permits for Bowline Point, Indian Point 2 and 3, and Roseton Steam Electric Generating Stations." 18 December 1999. ADAMS Accession No. ML083400128.

Nobeltec (2001). Tides and Currents Pro for Windows, Version 3.0, Nautical Software Inc., Beaverton, Oregon.

Schureman, P. (1934). Tides and currents in Hudson River, Coast and Geodetic Survey, Special Publication No., 189, .U.S. Department of Commerce, Washington, DC.

Swanson, J.C., (2008). Review of thermal modeling relative to discharge from Indian Point 2 and 3 to the Hudson River. Submitted to Goodwin Procter LLP, Boston, MA.

Wong, K-C., (1993). Numerical simulation of exchange process within shallow bar-built estuary, Estuaries, Vol.16, No.2, pp. 335-345.

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ENCLOSURE 6 TO NL-09-036

Fisheries Expert's Report dated March 16, 2009, "Review of NRC's Impingement and Entrainment Impact Assessment for IP2 and IP3"

ENTERGY NUCLEAR OPERATIONS, INC
INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2 and 3
DOCKETS 50-247 and 50-286

Review of NRC's Impingement and Entrainment Impact Assessment for IP2 and IP3

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Executive Summary

This report provides an in-depth review of the entrainment and impact assessment prepared by Nuclear Regulatory Commission (NRC) staff and contractors for the Draft Supplemental Environmental Impact Statement (DSEIS) for Indian Point Units 2 and 3. Entergy recognizes that the NRC staff and contractors were asked to evaluate more than 30 years worth of environmental data and assessment studies, with limited resources, under very short time constraints. The comments provided here are intended to aid NRC in revising the DSEIS to eliminate any errors and inconsistencies that may have been introduced due to the complexity of the data sets and the difficulties engendered by the need to analyze such large quantities of data.

The review covers NRC's treatment of impingement vs. entrainment impacts, impacts on shortnose sturgeon and Atlantic sturgeon, NRC's lines of evidence concerning impacts of IP2 and IP3, and the NRC's application of the weight-of-evidence (WOE) approach. In addition, the review documents a modification to the WOE approach that eliminates inconsistencies and errors found in the NRCs analyses and incorporates additional information concerning potential impacts of impingement and entrainment. Finally, the review compares the WOE approach to the approach used in Entergy's Adverse Environmental Impact (AEI) report.

Revisions to the DSEIS in response to these comments would substantially change the conclusions, and in particular would reduce the impact conclusions to SMALL or SMALL to MODERATE for all but one of the fish species for which an impact conclusion is possible. Even with these revisions, a revised assessment would still be less rigorous, accurate, and scientifically defensible than the Entergy's AEI report.

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1. Overview

This report provides an in-depth review of the entrainment and impact assessment prepared by Nuclear Regulatory Commission (NRC) staff and contractors for the Draft Supplemental Environmental Impact Statement (DSEIS) for Indian Point Units 2 and 3. The review focuses on Section 4 of the DSEIS (Environmental Impacts of Operation) and more particularly on Appendices H and I of the DSEIS, which provide the detailed assessment summarized in Section 4.

Entergy recognizes that the NRC staff and contractors were asked to evaluate more than 30 years worth of environmental data and assessment studies, with limited resources, under very short time constraints. The comments provided here are intended to aid NRC in revising the DSEIS to eliminate any errors and inconsistencies that may have been introduced due to the complexity of the data sets and the difficulties engendered by the need to analyze such large quantities of data. Making the suggested changes would also improve the consistency of the conclusions with current understanding of the processes influencing the Hudson River fish community.

The review covers NRC's treatment of impingement vs. entrainment impacts, impacts on shortnose sturgeon and Atlantic sturgeon, NRC's lines of evidence concerning impacts of IP2 and IP3, and the NRC's application of the weight-of-evidence (WOE) approach. In addition, the review documents a modification to the WOE approach that eliminates inconsistencies and errors found in the NRCs analyses and incorporates additional information concerning potential impacts of impingement and entrainment. Finally, the review compares the WOE approach to the approach used in Entergy's Adverse Environmental Impact (AEI) report (Barnthouse et al. 2008).

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2. Unbalanced characterization of impingement and entrainment impacts

On p. 4-10, lines 6-8, the DSEIS states that "Because impingement and entrainment are fundamentally linked, the NRC staff determined that the effects of each should be assessed using an integrated approach." Although Entergy agrees that an integrated approach is needed to assess the combined effects of impingement and entrainment on Hudson River fish populations, the approach to integration taken in the DSEIS mischaracterizes both the available information concerning the relative importance of impingement and entrainment and the magnitude of effort initiated by the owners of IP2 and IP3 to develop and install state-of-the-art impingement mitigation technologies. Whereas the DSEIS treats impingement and entrainment as if they are equally important from an impact perspective, available information clearly demonstrates that impingement impacts are, even under worst-case assumptions (i.e., no survival of impinged fish) relatively insignificant and that advanced screening technologies installed at IP2 and IP3 have substantially reduced even those small impacts.

The DSEIS consistently mischaracterizes the studies performed to support the development of the mitigation technologies installed at IP2 and IP3 as "pilot" studies. In fact, installation of the Ristroph screens and fish return system at IP2 and IP3 was completed only after full-scale field studies were conducted at the site to determine the optimal configuration of all system components. These studies clearly demonstrate the effectiveness of this system at preventing injuries and mortality to impinged fish. The impingement mortality estimates derived from these studies and published in the peer-reviewed scientific literature should be used by NRC to assess potential future impingement losses at Indian Point. Properly evaluated, impacts due to impingent should be classified as SMALL for all RIS. Support for this revised conclusion is provided in the following subsections. 40-vvvv-AE

2.1 Relative importance of impingement and entrainment

On p. 4-8, lines 38-41, the DSEIS characterizes NYSDEC's FES for the Hudson River (NYSDEC 2003) as concluding that "…the millions of fish killed by impingement,

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entrainment, and thermal effects at the HRSA power plants represent a significant source of mortality and stress on the Hudson River's fish community and must be taken into account when assessing the observed fish population declines." In fact, the "millions of fish" referred to in the FES and summarized in Tables 1 and 2 of the FES, are combined entrainment losses for the Indian Point, Roseton, and Bowline plants. These losses are almost entirely of fish eggs and larvae, not the YOY fish that are the focus of the DSEIS. Losses of YOY and older fish due to impingement are far lower. Moreover, quantitative impact assessments developed by CHGEC et al. (1999) show that potential impacts of impingement at IP2 and IP3 are small for all RIS, even when no adjustments are made to account for the survival of impinged fish. Conflating the assessments of entrainment and impingement, as is done in the DSEIS, substantially overstates the impacts of impingement on the Hudson River fish community. 40-vvvv-AE contd.

2.2 History of impingement impact mitigation at IP2 and IP3

The DSEIS accurately characterizes the methods used to monitor impingement losses at IP2 and IP3, but does not fairly characterize the efforts made at IP2 and IP3 to develop, demonstrate, and install effective technologies for minimizing impingement losses. A more complete history of these efforts is provided here.

The original IP2 CWIS had six fixed 3/8 inch standard mesh intake screens located in the CWIS bulkhead at the river's edge and six 3/8 inch standard mesh (Rex) traveling screens in recessed forebays behind the fixed screens, with one set of screens servicing each intake pump. The fixed screens at IP2 were washed by spraying the screens as they were lifted with a crane, so that the contents were collected on the accompanying traveling screens. The original IP3 CWIS had six 3/8 inch standard mesh traveling screens located in recessed forebays in the CWIS bulkhead, but no fixed screens, with one traveling screen servicing each intake pump. 40-wwww-AE

As part of the 1980 Hudson River Settlement Agreement (i.e., "HRSA"), the owners of IP2 and IP3 agreed to conduct a study to determine the feasibility of installing angled screens as an impingement mitigation measure. A subsequent report (Fletcher 1984) and peer-reviewed scientific publication by Fletcher (1985) demonstrated that an angled screen installation of the size required to protect the intake structures of both IP2

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and IP3, while allowing sufficient intake flow, would not be effective at reducing impingement mortality. Continuously rotating (Ristroph) traveling screens with fish conservation structures and a return system were recommended by Fletcher as an alternative to the angled screen system.

Ristroph modified traveling screens were evaluated for impingement mitigation at Indian Point beginning in 1985, and continuing through 1994, under the direction of Dr. Ian Fletcher. Dr. Fletcher directed this evaluation independently under contract to the Hudson River Fishermen's Association. Normandeau Associates, Inc. (i.e., "Normandeau") supported Dr. Fletcher's evaluation by providing field, laboratory and analytical services under his direction while being reimbursed for the work under contract to Indian Point.

A single Ristroph traveling screen (Royce Equipment Company of Houston, Texas, Version 1) was installed in screen well slot 26 located at the north end of the IP2 CWIS on 16 January 1985 to begin an evaluation of impingement survival at Indian Point. Fish impingement survival studies were conducted daily throughout 1985 by comparing the survival of fish impinged on the Ristroph screen with the survival of fish impinged on the conventional (Rex) traveling screens simultaneously operating in screen wells 21-25 of the IP2 CWIS. The goal was to determine the improvement in survival of impinged fish if the conventional (Rex) traveling screens were all replaced with Ristroph-modified traveling screens and a state of the art fish return system at IP2 and IP3. These survival studies observed fish survival at 0, 6, 12, 24, 36, 48, 60, 72, 84 and 96 hours after impingement (Con Edison 1985).

In 1986, additional impingement survival studies were conducted to compare Royce Version 1 and Version 2 screens using mortality observations at time 0 and after eight hours of holding time. The Version 2 screens exhibited much improved fish survival compared to the Version 1 screens (Fletcher 1986; 1992), based on the eight-hour (i.e., "latent") mortality rates used by Dr. Fletcher. Peer reviewed scientific publications by Fletcher (1986; 1990) selected eight hour estimates as the most reliable time period for quantifying survival rates of impinged fish at IP2 and IP3 without the potential confounding effects of increased control mortality due to longer holding times, and reported these rates for abundant fish species impinged at Indian Point.

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Ristroph screen evaluations continued annually through November 1994, under the direction of Dr. Fletcher, testing the fish survival, the debris handling characteristics, and the interaction between fish survival and debris handling for various modifications to the Ristroph screen mesh panels, spray headers, spray header alignment, and fish transfer bucket system (Con Edison and NYPA 1992; Normandeau 1996). The goal of these studies was to customize the construction, installation, and operation of the Ristroph screens and fish return system for the optimum survival of impinged fish. Beginning in 1989, and continuing into 1991, full scale prototypes of the fish return sluice system for the IP2 and IP3 CWISs were built near the quarry adjacent to the Indian Point site (Con Edison and NYPA 1992). Each full scale return sluice system was tested to determine the best configuration of pipes and sluice flow to minimize the mortality of impinged fish during transfer from the Ristroph screens to the river. After the installation of the present Ristroph modified traveling screens at IP3 in 1991 and at IP2 in 1992, testing of the installed full scale sluice system continued through 1993 to determine the best configuration to minimize the recirculation and re-impingement of surviving fish that were released back into the Hudson River near the IP2 and I{3 CWISs (Normandeau 1993). Earlier studies to determine the distribution of fish near the IP2 and IP3 CWISs (Ross et al. 1987) formed the basis for these 1993 evaluations.

Following the completion of these final field-scale demonstration studies, NYSDEC, and USEPA accepted the Ristroph screens and fish return system as Best Technology Available (i.e., "BTA") for minimizing impingement at IP2 and IP3. A formal agreement that would have included verification monitoring was drafted and signed by all signatories to the HRSA except the Hudson Riverkeeper. Without the Riverkeeper signature, the agreement could not be implemented. In the absence of a formal agreement, the facility owners were under no obligation to perform a verification monitoring program, and relied on the thorough testing performed from 1985 through 1994, and documented in numerous peer-reviewed scientific publications, as the measure of the reductions in impingement mortality of the installed Ristroph screen and fish return system. Since its installation, the impingement mitigation system has been operated in the manner that was found to be optimal during the full-scale demonstration study, and the impingement mortality estimates derived from that study should still be applicable.

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2.3 Conservatism of the impingement loss estimates in the DSEIS

The published (Fletcher 1990), peer-reviewed, impingement survival estimates for the Ristroph screens and fish return system installed and operated at IP2 and IP3 are listed in the DSEIS (Table H-1 on page H-2), but were not used to adjust annual total impingement mortality. The rationale provided in the DSEIS was that there was no verification monitoring or validation of the installed system. However, these survival estimates were obtained from full-scale field testing under normal operating conditions. Application of these survival estimates to the impingement loss totals used by NRC would reduce the estimated impingement losses by factors ranging from 48% (alewife) to 91% (striped bass).

The consequences of NRC's conservative assessment approach are illustrated in Table 1. To construct this table, the mortality estimates from Fletcher (1990) for eight commonly-impinged species, as reported in Table H-1 of the DSEIS, were applied to the historical impingement data for IP2 (1974-1990) and IP3 (1976-1990) supplied to NRC in response to RFI #17. In most years between 1974 and 1990, these eight species accounted for more than 90% of all fish impinged at IP2 and IP3. Table 1 shows that if the estimated survival rates for the Ristroph screens and fish return system, currently in place at IP2 and IP3, were applied to the historical estimates of numbers of fish impinged, the overall species-weighted average reduction in impingement mortality would be 82% at both units. Assuming no changes in the species composition of impinged fish after 1990, the expected average reduction in impingement mortality for years after 1990 would, presumably, also be 82%. 40-xxxx-AE

These results support the conclusion that the levels of historical and future impingement mortality at IP2 and IP3 are far lower than the losses assumed by NRC in the DSEIS. Since, even without accounting for survival of impinged fish, impacts of impingement at IP2 and IP3 have historically been small, impacts during the next licensing period, with the impingement mitigation that is currently in place, should be characterized as SMALL.

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3. Overstatement of uncertainty concerning impacts on shortnose sturgeon and Atlantic sturgeon

In the DSEIS, impacts of impingement and entrainment on shortnose sturgeon and Atlantic sturgeon are classified as SMALL to LARGE (p. 4-19, lines 37-39) due to lack of data on YOY life stages. However, the DSEIS did not incorporate all available data concerning the status of shortnose sturgeon and Atlantic sturgeon in the Hudson River, and in particular failed to consider data summarized in the Biological Assessment attached as Appendix E to the DSEIS. Appendix A to this report summarizes aspects of the life histories of these two species in the Hudson River that indicate that both should have low susceptibilities to impingement and entrainment. Appendix A also identifies errors in NRC's analysis of impingement data for these two species that led to inflated estimates of the numbers impinged from 1981 to 1990.

As demonstrated in Appendix A and recognized in the DSEIS (Section 2 and Appendix E), sturgeon larvae are not susceptible to entrainment at IP2 and IP3. The susceptibility of shortnose sturgeon and Atlantic sturgeon to impingement is low based on known characteristics of habitat preferences and migratory patterns. This low susceptibility to impingement is confirmed by the facts that only 31 shortnose sturgeon were impinged at IP2 or IP3 from 1975 through 1990 (approximately 2 per year, see Table A-1 in Appendix A) and only 515 Atlantic sturgeon were impinged over this same period (approximately 32 per year; see Table A-1 in Appendix A). Even under the unrealistically conservative assumption that no impinged sturgeon survive, impingement of approximately two shortnose sturgeon per year is negligibly small compared to the annual "take" of 82 juvenile and adult fish authorized by NMFS Permit No. 1580 for the utilities monitoring programs. In contrast to these very low impingement counts, approximately 60,000 juvenile and adult shortnose sturgeon now inhabit the Hudson River, and this population has grown by more than 400% since the startup of IP2 and IP3. 40-yyyy-AE

According to the criteria provided on p. H-46 of the DSEIS, impacts of IP2 and IP3 on a growing population must be characterized as SMALL, irrespective of the

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strength of connection of that population to IP2 and IP3. Impacts of IP2 and IP3 on a declining population must be characterized as SMALL if there is little evidence exists of a connection between that population and cooling system operations at IP2 and IP3. Based on these criteria, impacts of IP2 and IP3 on shortnose sturgeon should be characterized as SMALL because the shortnose sturgeon is clearly growing, is not susceptible to entrainment, and has only a low susceptibility to impingement. Impacts on Atlantic sturgeon should also be characterized as SMALL, because, even though the population has declined, Atlantic sturgeon are not susceptible to entrainment at IP2 and IP3 and have only a low susceptibility to impingement.

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4. Inconsistencies and errors in NRC's lines of evidence

This section provides a detailed evaluation of the two lines of evidence used in the DSEIS: a population trends analysis (LOE-1), and a "strength-of-connection (SOC) analysis (LOE-2). The purpose of LOE-1 was to determine whether fish populations in the Hudson River were declining in abundance over the period during which IP2 and IP3 have been operating. A finding that a particular population had declined was assumed to indicate a potential adverse impact on that population. The purpose of LOE-2 was to determine whether fish belonging to each of the RIS had been entrained and impinged in proportion to their abundance in the river segment from which IP2 and IP3 withdraw cooling water. A finding that a particular RIS was being entrained or impinged at a disproportionately high rate compared to its abundance in the river was assumed to indicate a strong connection to IP2 and IP3 and, therefore, a high potential for impact.

The emphasis in these comments is on identification of inconsistencies and errors in LOE-1 and LOE-2 that would be likely to change the conclusions stated in the DSEIS. As discussed below, some of the inconsistencies and errors identified in NRC's approach are substantial and correcting them would change the impact conclusions for many RIS.

4.1 LOE-1 – Trends Analysis

In Appendices H and I, NRC conducted analyses of the fisheries abundance data sets provided by Entergy in order to determine the potential for adverse impacts of entrainment and impingement on individual species. For each data set, NRC estimated a trend and classified the result as indicating a Small, Moderate, or Large potential for adverse environmental impact. In brief, data sets with an upward or no significant trend would have Small potential, and data sets with significant declining trends would have Moderate or Large potential, however no analyses were attempted to establish causation between the trend and actual levels of impingement or entrainment mortality.

Due to the large amount of data available, NRC had to make decisions about which data sets to use and how to conduct the classification analysis. Most of those decisions appear to have a logical basis, but some of them appear to have been made without exploring the potential consequences of the decision on the outcome of the analysis. The decisions that are most in need of examination are discussed below.

4.1.1 Selection of RIS species

The "RIS" analyzed in the DSEIS appear to have been selected as the species whose abundance and distribution were detailed in the DEIS prepared by the generators in 1999. This is a broader list than the original "Resident Important Species" list used in impact analyses for the Hudson River facilities. The decision to expand the analysis to a broader list of species is understandable, but in some cases there is relatively little involvement of the species with IP2 and IP3 operations, for instance the two sturgeon species, bluefish, and weakfish. Expansion of the analysis to include additional species that are not typically subject to impingement and entrainment at IP2 and IP3 increases the probability of false positive instances of "large potential impact," because the impact classification is based on abundance trends rather than actual involvement with IP2 and IP3.

Bluefish is an especially obvious example of a false positive. As noted in Section 2 of the DSEIS, bluefish have never been found in entrainment collections at IP2 or IP3 and bluefish are impinged only in very low numbers. Yet, the bluefish impact score for LOE-1 is classified as "large," simply because the abundance of this species appears to have declined. Elimination of species with minimal susceptibility to IP2 and IP3 would significantly alter the conclusions from the assessment.

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4.1.2 Redundant use of data

The analyses NRC conducted using densities, CPUE, and abundance indices, on a riverwide and nearfield (river segment 4) basis, are not independent because the same data are involved in all the analyses. Each of these metrics is derived from the same underlying sampling data, but somewhat different calculations are done. One would expect the three indices calculated by NRC from these data to show the same general trends.

Use of the same data sets to calculate multiple trends indices presents a false impression of the amount of evidence available concerning trends in population abundance. Moreover, all of these indices are subject to sampling errors and other

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sources of variability. Performing statistical analyses on three different trends indices derived from the same data set, instead of only one, increases the likelihood that at least one index, purely by chance, will suggest a potentially "moderate" or "large" impact.

The river Segment 4 metrics are particularly suspect, because they are based on sampling from only a small region near IP2 and IP3. Annual variations in abundance in river segment 4 would be affected by the overall abundance of a species, but also are much more sensitive to shifts in spatial distribution than the riverwide metrics would be. When riverwide metrics are available for a species with widespread distribution in the estuary, it is difficult to understand why a metric based on spatially limited sampling would be used at all.

Elimination of redundant metrics, in particular reliance on riverwide trends metrics rather than the segment 4 trends metrics, could significantly alter the conclusions from the assessment.

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4.1.3 Definition of the instability criterion

NRC used the percent of observations for each trend metric falling outside ± 1 standard deviation from the mean value for the first five years of data as an index of population instability. If more than 40% of the observations fell outside this bound, a population trend was classified as either "moderate" or "large," depending on the direction and statistical significance of the trend. However, even in the case of a population that is stable and for which there is no long-term trend in abundance, a substantial fraction of observations could still fall outside one standard deviation from the mean. The actual percentage falling outside that boundary would depend on the type and magnitude of year-to-year variability in that population, but could easily exceed 40%, especially when the influence of sampling errors is taken into account. Defining instability in a different way, e.g., as an increase in variability between the first half and the second half of the observations, could significantly alter the conclusions from the assessment.

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4.1.4 Influence of population variability on the classification procedure for LOE-1

For LOE-1, NRC developed a set of decision rules to classify fish abundance data sets into indicators of Small, Moderate, or Large Potential Impacts. The classification

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was based on the direction and statistical significance of trends, and on the frequency of annual trends indices falling outside the pre-determined noise boundary discussed above. NRC's classification scheme, like any classification scheme based on statistical analysis of trends data, is sensitive to variability in the underlying trends indices resulting from a combination of the natural variability of fish populations and the sampling error associated with survey data. The DSEIS provided no discussion of the potential for misclassification of abundance trends. Without such an analysis, the accuracy of the NRC's classifications cannot be assessed.

Because of natural variability, there will always be some probability of misclassifying a population. In an ideal classification scheme, probabilities of misclassification would be low, and would occur only within narrow ranges of "borderline" growth rates. There would be some probability that a population trend that should be classified as Small is actually classified as Moderate, or that a population that should be classified as Moderate is actually classified as Large, but there should be no probability that a population that should be classified as Small is actually classified as Large.

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Appendix B documents an analysis that was undertaken to evaluate the reliability of NRC's trends classification scheme. NRC's scheme was applied to simulated data from populations with known rates of annual population growth ranging from a 70% decline to a 330% increase over a 30-year period. For each population growth rate, 1000 simulated abundance time trends were simulated, with random variations applied to each annual abundance value. Each of the resulting simulated trends data sets were then analyzed and classified as Small, Moderate, or Large using NRC's scheme. The analysis was performed for two different types of variability, and two levels of random variation.

Classification probabilities for an "ideal" procedure are illustrated in figure 1a, and the probabilities calculated for NRC's classification procedure are illustrated in figure 1b. In Figure1a, the ranges of population change over which more than one classification is possible are small (~0.65 to ~0.85 and ~0.95 to ~1.1), and there are no rates of population change for which more than two classifications are possible. As shown in Figure 1b, probabilities of misclassification are high using NRC's procedure. There is a 20%-40% chance that a trend will be classified as Moderate for population

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changes ranging from a 50% decline to a 330% increase. Moreover, a population that declines by 25% over 30 years has a roughly equal probability of being classified into any of the three categories.

To illustrate the potential for improvement of the classification process, a simpler set of rules was applied to the simulated data (Appendix A). This scheme produced Large, Moderate, and Small classifications that were much more distinct than those produced by NRC's rules (Figure 1c). Separation of the Large and Small categories was nearly complete, and a Moderate category centered on relative change = 1, where the probability of Large and Small was very low. The zones of overlap of two categories, either Large with Moderate or Moderate with Small, are much smaller than with the classification rules used by NRC. This alternate classification is still conservative, because population that are growing, but at a relatively low rate (up to about a 120% increase over 30 years) have a higher probability of being incorrectly classified as Moderate than of being correctly classified as Small.

Changing the classification procedure used in the DSEIS could significantly alter the conclusions.

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4.1.5 Other statistical issues

A number of the procedures used in NRC's statistical analysis of trends data are unclear or inadequately justified. It is unclear whether the conclusions reached by NRC would be altered by changing these procedures, however, for the sake of transparency all of them should be explained in the DSEIS.

Data set truncation: All data sets were truncated to a length of 27 years, even when additional years of data were available. Although at most five years of data were discarded, the analyses employed had no inherent need for a standardized length of the time series. No rationale was provided for this decision.

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Pre- and post-1985 analyses for FSS data: NRC used a visual inspection of the pre- and post-1985 FSS data, and relative agreement with the BSS data, to determine whether the FSS data set was analyzed as a whole or as two separate time periods. The differences in patterns between the data sets analyzed as a whole (blueback herring, striped bass, white perch, hogchoker in Figure I-12, Atlantic tomcod in Figure I-13), and

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those data sets analyzed in segments (alewife, American shad, bay anchovy and bluefish in Figure I-14) are not readily apparent. 40-eeeee-AE contd.

Discarding outlying data values: When NRC's regression methods were not able to converge to a solution, NRC sometimes attempted to achieve convergence by discarding data points deemed to be "outliers," even though there was no independent reason to suspect that the data point was not a valid observation of abundance. Many fish populations exhibit wide fluctuations in abundance as their natural pattern of population dynamics.

Exclusion of data on the basis of having a value that is higher or lower than the rest creates the potential to bias the analysis of potential adverse environmental impact. Discarding the "outlier" point may help the algorithm to converge to a solution that appears to be statistically significant even though in reality a significant trend is not present. 40-fffff-AE

Methodology for estimating Segmented Regression trendlines: This issue points to the choice of analytical software used to estimate the trendlines. The Prism software apparently provides little opportunity to adjust the solution algorithm by changing initial values, search methods, step sizes, or convergence criteria. If fine-tuning of the algorithm had been possible, that would have been far preferable to unjustifiably discarding data points in order to achieve convergence. 40-ggggg-AE

A related issue is that the trend estimates, MSE, and statistical probabilities for the segmented regression are not necessarily unique. An attempt to duplicate the analysis for the abundance index data set produced the same results as NRC achieved for some data sets, but not for others. These differences suggest that NRC's selection of either the Linear Regression, or Segmented Regression based on which method achieved the lowest MSE, may not have always been correct. It's not clear that this would have lead to different impact classifications for any of the data sets, but there is a potential for different results. 40-hhhhh-AE

4.2 LOE-2 Strength-of-Connection Analysis

In Appendices H and I, NRC conducted analyses of the impingement and entrainment data sets provided by the Entergy in order to determine the strength-of-

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connection (SOC) between water withdrawals by IP2 and IP3 and the Hudson River fish community. The analysis was performed using a comparative ranking method. Estimates of the abundance of each RIS in the vicinity of IP2 and IP3 over the period 1979-1990 were calculated using a method explained on pp. I-40 and I-41 of the DSEIS. These abundance values were then summed, and each RIS was assigned a rank according to its contributions to the total abundance of all RIS. Similarly, impingement losses of all RIS over this same period were estimated using a method explained on pp. I-40 and I-41. These loss values were summed, and each RIS was assigned a rank according to its contribution to the total losses. Ratios of ranks were then computed, i.e., the abundance rank of each species was divided by its impingement rank. A high rank ratio was interpreted as indicating that a species was impinged at a disproportionately high rate compared to its abundance in the vicinity of IP2 and IP3. Such a species would be assigned a high SOC. On the other hand, a low rank ratio was interpreted as indicating that a species was impinged at a disproportionately low rate compared to its abundance in the vicinity of IP2 and IP3. Such a species would be assigned a low SOC.

An analogous procedure was used to assign SOC scores for entrainment. As a means of assessing indirect impacts of entrainment and impingement, food habits of the RIS were evaluated. For those RIS that feed on other RIS, the entrainment rank ratio of prey RIS was included as an additional SOC metric. The SOC scores for each metric were averaged, and the averages assigned to categories of Low, Medium, and High.

The use of relative ranks in computing the SOC scores implies that the scores for different species are not independent from each other. If one RIS is assigned a high score, another RIS must necessarily be assigned a low score, regardless of the actual impacts of entrainment or impingement on that RIS. The consequences of this lack-of-independence are summarized in section 4.2.1 below, and fully documented in Appendix C. Moreover, the rank ratios are sensitive to errors and inconsistencies in the methods used to analyze the Hudson River data sets. Errors and inconsistencies in NRC's analyses are summarized in Section 4.2.2 below, and fully documented in Appendix C. Appendix C also documents an alternative method that eliminates all errors and inconsistencies. When the alternative method is applied to the data used in the DSEIS, all RIS receive the same SOC score ("medium"). Correction of these errors and inconsistencies would significantly change the conclusions from the assessment.

4.2.1 Lack-of-Independence

Two aspects of the SOC method may lead to erroneous results. First, the scoring method relies on ranks of the 17 finfish RIS (blue crab is the 18th RIS, but was not included in the rankings). If one species has an elevated abundance in the river, with no corresponding elevation in impingement or entrainment (which should be viewed as a positive situation), then the river abundance rank (see DSEIS Table I-30) assigned to it would be increased. However, because there are always 17 ranks, the rank for one or more other species must be decreased (even though they experienced no decline in abundance in the river) to accommodate the increase in rank for the one species.

Another aspect of the SOC method that may lead to erroneous results is that the method does not explicitly account for sampling error reflected in the data. Although the use of ranks was selected in recognition of the presence of sampling error, no statistical tests were reported that could be used to judge the possible effects of sampling error on the results.

To examine the possible effects of these two aspects of the Strength of Connection method on resulting scores, a Monte Carlo simulation analysis was conducted, using impingement as an example. The analysis generated sets of simulated data, including simulated sampling error, for all weeks of river abundance sampling from 1979 through 1990. The Monte Carlo simulation was run 300 times generating 300 simulated data sets. 40-iiiii-AE

The analysis started with the null hypothesis that the annual density in Segment 4, for each of the 17 finfish RIS, was identical to the corresponding annual impingement density (from DSEIS Table I-28). To implement the analysis, the annual average density in Region 4 was set to be equal to the corresponding impingement density. The allocation of annual density among sampled weeks and between sampling programs was based on historical data, and density estimates from the two riverwide YOY sampling programs (FSS and BSS) were combined using the same assumptions and computational methods used in the DSEIS. Sampling variability was simulated using the average

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coefficients of variation, by species and sampling program, from the actual FSS and BSS datasets

For each run, Region 4 density ranks were computed using the methods described in Appendices H and I of the DSEIS. Impingement density ranks were taken directly from DSEIS Table I-30. Strength of Connection scores were assigned based on the ratio of Rank of Impingement to Rank of Fish Density (DSEIS, Appendix H, page H-33). :

Ratio < 0.5: Score=1

0.5<=Ratio<1.5: Score=2

Ratio>=1.5: Score=4

To address the possible effects of elevated densities for some species on the ranks and scores of other species, a sequence of modifications was made to the null hypothesis scenario. First, the Region 4 density for one species (chosen independently at random in each random draw of the Monte Carlo simulation) was increased by a factor of 2, but the impingement density for that species, and all other species, did not change. In five separate analyses, the same procedure was used to address the effects of 1, 2, 3, 4, and 5 species having elevated Region 4 density (with no change in impingement).

Under the null hypothesis, if there was no sampling error all RIS would have a rank ratio of 1.0, and all would be assigned a score of 2 (medium). Sampling error would decrease the rank ratios for some RIS and increase the rank ratios for others, so that some species could receive erroneously high or low scores. If one or more species had elevated Region 4 densities, so that the rank ratios of these species were reduced, the rank ratios of others would necessarily increase, even though their impingement densities were still exactly equal to their Region 4 densities.

The results from the Monte Carlo simulation analysis are listed in Table 2. The analysis demonstrates that, because the SOC scores for different RIS are not independent from each other, changes in abundance of one species that reduce its rank ratio and SOC score necessarily increase the rank ratio and SOC scores for other species. Under the null hypothesis, for the levels of sampling variability estimated directly from the BSS and FSS survey data, there is at least a 26% chance that one or more of 17 RIS species will be scored as having a "high" SOC, even though all 17 species should be scored as "medium." If one or more species are impinged at disproportionately low rates relative

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to their abundance in the river, there is an even greater chance that one or more species will be erroneously assigned "high" SOC scores.

The rank-based SOC metric used in the DSEIS also has a fundamental flaw in that it is highly sensitive to rank differences of rare species and insensitive to rank differences of common species. For example, if the rarest species in the river rankings was also the rarest in the impingement rankings, the ratio of ranks would be 1.0, indicating a Medium SOC. If, however, because of sampling error or other sources of variability the rarest species in the river was only the second rarest in the impingement rankings, the ratio would be 2.0, indicating a High SOC. On the other hand, if the most abundant species in the river ranked anywhere between 9th and 17th in the impingement rankings, the ratio of ranks would be between 0.5 and 1.0, indicating a Medium SOC. If the ranks had been ordered in the opposite direction, from most abundant to least abundant, the sensitivities would be exactly the opposite. In that case, the scores would be highly sensitive to the ranks of the most abundant species, and insensitive to the ranks of the rare species. This asymmetrical sensitivity to rank differences makes this metric a questionable indicator of SOC, whichever way the ranking is done. 40-iiiii-AE contd.

4.2.2 Inconsistencies and Inappropriate Use of Data

According to the DSEIS, the impingement SOC analysis was based on comparisons of impingement densities and Region 4 river densities of the RIS. Similarly, the entrainment SOC analysis was based on comparisons of entrainment densities and Region 4 river densities of the RIS. For the analyses to be meaningful, the measure of impingement density should be directly comparable to the measure of Region 4 river density, and the measure of entrainment density should be directly comparable to the measure of Region 4 river density. However, as documented in Appendix C, the measures of density are not directly comparable due to inconsistencies in the methods. Furthermore, individual measures (entrainment density, impingement density, Region 4 river density) used in the analyses are not valid metrics of density due to inappropriate uses of the data. 40-jjjjj-AE

Tables C-2 and C-4 of Appendix C summarize key properties (i.e., types of input data, summary statistics used, years of data included, life stages included, and any

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taxonomic substitutions) of the density metrics used in the SOC analysis. These tables also list inconsistencies and inappropriate uses of data. Major categories of inconsistencies and inappropriate uses include the treatment of input data, summary statistics used for comparisons, years of data used, life stages included, and (for entrainment) allocation of unidentified larvae to different taxonomic groups.

Appendix C documents an alternative method for computing SOC scores in which all of the inconsistencies and inappropriate uses were rectified. In the alternative analysis, metrics for impingement density, entrainment density, and river density are all expressed in comparable units and are based on the same life stages and years of data. The key properties of the alternative method are summarized in Appenix C, Tables C-3 and C-5.

Tables C-6 through C-9 of Appendix C compare the results from application of the alternative method to the results documented in Appendix I of the DSEIS. In the DSEIS, High SOC scores for impingement were assigned to bluefish and hogchoker, and a Low SOC score was assigned to spottail shiner. In the DSEIS, a High score for entrainment was assigned to rainbow smelt and a Low score was assigned to spottail shiner. In contrast, using the alternative method, Medium scores for both entrainment and impingement were assigned to all RIS.

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5. Additional comments on NRC's application of the Weight-of Evidence approach

NRC did not use the population dynamics-based impact assessment approaches used in previous entrainment and impingement impact assessments for Hudson River power plants. Instead, in the DSEIS NRC used a weight-of-evidence (WOE) approach derived from an approach originally developed by the Massachusetts Weight-of-Evidence Work Group for use in risk assessments performed at sites contaminated with hazardous chemicals (Menzie et al. 1996). This section summarizes the key features of the original WOE approach, identifies changes made by NRC, and compares the approach used in the DSEIS to the approach used by Entergy in its AEI report (Barnthouse et al. 2008).

5.1 Overview of the Massachusetts WOE approach

This section provides a brief overview of the WOE approach, which is necessary for understanding the limitations inherent in NRC's use of this approach in the DSEIS. According to Menzie et al. (1996), the WOE approach is intended to provide a rational and transparent framework for evaluating the strengths and weaknesses of different types of scientific evidence used to determine whether a particular stressor has caused, or could cause, a harmful ecological effect. The approach includes evaluation of the nature of uncertainty associated with each line of evidence.

The WOE approach was designed to be consistent with the ecological risk assessment process defined in the U.S. Environmental Protection Agency (EPA)'s Framework for Ecological Risk Assessment (USEPA 1992), Guidelines for Ecological Risk Assessment (USEPA 1998), and Ecological Risk Assessment Guidance for Superfund (USEPA 1997). These documents define the two key elements of an ecological risk assessment as being "assessment endpoints" and "measurement endpoints." Assessment endpoints are "explicit expressions of the actual environmental value that is to be protected." The abundance of a valued fish population, the productivity of a benthic invertebrate community that serves as a prey base for fish, and the viability of an endangered or threatened species are examples of assessment endpoints. Measurement endpoints are the specific lines of evidence that are used to

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determine whether assessment endpoints have been or could be adversely affected by a stressor. Measurement endpoints could include field data on the abundance and other characteristics of populations or communities chosen as assessment endpoints, measurements of concentrations of hazardous substances in environmental media, results from laboratory studies, mathematical modeling studies, or other kinds of relevant information. The WOE approach, in essence, is a set of procedures intended to provide consistent, logical, and transparent evaluations of the applicability, strengths, and weaknesses of the various measurement endpoints that could be used to assess the likelihood that a stressor of concern is affecting or may have affected an assessment endpoint.

The Massachusetts WOE approach includes three major components:

1. Weight assigned to each measurement endpoint, based on the degree to which they relate to the assessment endpoint, on the quality of the data, or on the manner in which they were applied,

2. Magnitude of response in each measurement endpoint, with strong or obvious responses being typically assigned greater weight than marginal or ambiguous responses, and

3. Concurrence among measurements, with more weight or confidence being attributed to findings in which there is agreement among multiple measurement endpoints and less weight or confidence being attributed to findings in which lines of evidence contradict one another.

Menzie et al. (1996) defined 11 attributes for use in evaluating the utility of individual lines of evidence, grouped into categories related to strength of association between assessment and measurement endpoints, data quality, and study design. These authors also provide a table of scaling values intended to account for the relative importance of each attribute. The relative utilities of different lines of evidence relating to a particular assessment endpoint are determined by scoring each line of evidence

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according to the 11 attributes, multiplying each attribute score by the applicable scaling value, and then summing the adjusted scores.

The magnitude of the response for each measurement endpoint is evaluated by determining (1) whether the measurement endpoint indicates the presence or absence of harm, and (2) whether the response is low or high. Determinations of what response would indicate a presence of harm, and of what values of the response would be considered "low" or "high," involve subjective judgments and should be made prior to the assessment. Menzie et al. (1996) suggest that the weighting scores, evidence of harm determinations, and magnitude of harm determinations for each measurement endpoint should be presented in matrix form rather than being aggregated into a combined score. With respect to concurrence, Menzie et al. (1996) developed a graphical method for displaying and comparing WOE determinations for different lines of evidence with different utility weights and magnitude determinations but did not recommend aggregation of the results into a combined score.

5.2 Modifications made by NRC

In the DSEIS, NRC adopted the overall framework of the WOE approach from Menzie et al. (1996), but simplified many of the evaluation procedures. The 18 RIS identified in Table 2-4 of the DSEIS were selected as assessment endpoints for the WOE evaluation. More specifically, the WOE evaluation addressed the potential impacts of entrainment and impingement at IP on the abundance of YOY and yearling fish belonging to each RIS, either through entrainment and impingement mortality imposed on the species themselves or through entrainment and impingement of prey species. Two general lines of evidence were defined: the abundance of the RIS, as determined from analysis of population trends (LOE-1), and the "strength of connection" between the operation of the IP2 and IP3 cooling systems and the aquatic resources of the Hudson River, as determined from analysis of impingement and entrainment losses (LOE-2). Only 7 of the 11 attributes defined by Menzie et al. (1996) were used by NRC, and all 7 were given equal weight.

Determination of whether the response of a particular measure is "low" or "high" can be highly subjective, especially in the case of measures for which an objective measure of harm (e.g., a water quality criterion or a fishing mortality threshold) does not

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exist. The NRC's guidance on determining magnitudes of environmental impacts (DSEIS, page 1-3) specifies that impacts on an environmental resource should be designated SMALL, MODERATE, or LARGE depending on whether they are detectable and whether they are large enough to destabilize important attributes of that resource. In the DSEIS, magnitudes of impacts for the population line of evidence are assigned based on the slopes, statistical significance, and variance from trends analyses. Magnitudes of impact for the strength-of-connection line of evidence are assigned based on the rankings of impingement and entrainment losses of RIS species relative to rankings of abundance of RIS in river survey data. Objective measures of harm do not exist for any of these measures, consequently, the resulting magnitudes of impact are necessarily subjective and are not directly related to the definitions of SMALL, MODERATE, and LARGE defined in NRC guidance. For example, in LOE-1, an impact is defined as "large" if the population trend has a slope significantly different from zero and had greater than 40% of annual abundance indices more than one standard deviation away from the mean of the first five years of observation. In LOE-2, a strength of connection for an RIS is defined as "high" if that RIS appears to be disproportionately represented in entrainment or impingement samples relative to its abundance in the river in the vicinity of IP2 and IP3. These operational definitions are at best indirectly related to the definition of LARGE provide in NRC's guidance, i.e., "environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource."

Assignments of final NRC impact levels (SMALL, MODERATE, or LARGE) are based on qualitative consideration of the WOE conclusions for both lines of evidence. For example, if the conclusion from the population line of evidence is "small," then SMALL overall impact level is assigned regardless of the outcome of the strength-of-evidence analysis. If the conclusion from the population line of evidence is large, then the final impact level can be SMALL or LARGE depending on the strength-of-evidence conclusion.

The outcome of NRC's WOE approach is dependent on the subjective attribute weightings and definitions of levels of impact and, consequently, the conclusions from the assessment are subjective and sensitive to changes in weightings and definitions. Moreover, whether the levels of impingement or entrainment mortality imposed on an

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RIS are actually sufficient to have caused an observed level of decline, whether alternative causes could more easily explain changes observed in the RIS, or whether additional mitigation could appreciably improve the status of an RIS, cannot be addressed using NRC's WOE approach. These issues are, in contrast, addressed in the AEI approach developed by Entergy.

The above considerations do not imply that the WOE approach lacks value and should not be used, however, they imply that use of the terms SMALL, MODERATE, and LARGE to characterize the conclusions conveys a much higher degree of confidence than is actually warranted. The following section demonstrates how NRC's conclusions would be different using an alternative WOE approach that is more closely aligned to the approach described by Menzie et al. (1996), corrects some errors made by NRC in interpreting the Hudson River data, and utilizes more of the available evidence concerning potential impacts of IP2 and IP3 on the Hudson River fish community. Application of the alternative approach produces conclusions that are substantially different from the conclusions reached in the DSEIS.

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5.3 Demonstration of an alternative WOE approach

An alternative WOE approach is documented in Appendix D to this report. A summary of the key changes, together with the results obtained from application of the alternative approach, are provided here.

Key changes made include:

1. Elimination of inconsistencies and errors in NRC's strength-of-connection analysis (Section 3.2 above) and correction of errors in assumptions made concerning diets of some fish species (Appendix D)
2. Reweighting of the lines of evidence used in the population trends analysis, to account for the fact that riverwide abundance trends are more relevant measures of population status than are abundance trends in the immediate vicinity of IP2 and IP3.
3. Adjustment of the population trends WOE scores for marine species to account for the fact that many or most members of these populations never enter the Hudson and are not susceptible to entrainment or impingement at IP and IP3.

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4. Reweighting of the lines of evidence used in the SOC analysis to account for the low impact of impingement relative to entrainment (section 2 of this report) and the high uncertainty associated with predictions concerning the importance of indirect effects (Appendix D).
5. Inclusion of the attribute scaling factors developed by Menzie et al. (1996) to accord more weight to attributes that are closely related to determination of causation.
6. Inclusion of the "availability of objective measures" attribute from Menzie et al. (1996) to accord more weight to attributes that directly measure quantities of interest for impact assessment.
7. Modification of the impact category assignment scheme to eliminate a bias inherent in the scheme used in the DSEIS.
8. Addition of two additional lines of evidence to the SOC analysis, to more directly address direct and indirect impacts of entrainment and impingement on Hudson River fish populations.

Of these changes, the most important are the elimination of inconsistencies in LOE-2 and the inclusion of estimates of conditional mortality rates (CMRs) as additional lines of evidence. As shown in Section 4.2.2, when inconsistencies in LOE-2 analysis are eliminated, the rank-based strength-of-connection scores are equal for all RIS and provide no information concerning the impact of IP2 and IP3 on these species. The CMRs, in contrast, are empirically-based estimates of the actual mortality imposed on fish populations by entrainment and impingement, and provide objective measures of potential harm to populations that are lacking in NRC's WOE approach.

The revised WOE approach was applied to 14 of the 17 RIS fish species. For the remainder (Atlantic menhaden, Atlantic sturgeon, and gizzard shad) there was insufficient information to apply either the original or the revised WOE approach. Shortnose sturgeon population studies reviewed in Appendix E to the DSEIS and discussed in Section 3 of this report clearly demonstrate that the Hudson River population of species has greatly increased in abundance since the 1970s. In addition, impingement and entrainment data summarized in Section 3 clearly demonstrate that shortnose sturgeon are rarely impinged, and either rarely or never entrained at IP2 and IP3.

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Shortnose sturgeon feed exclusively on invertebrates, therefore, indirect effects of entrainment or impingement of sturgeon prey should be no higher than for any other fish species that feed on invertebrates. For these reasons, shortnose sturgeon was included in the revised assessment.

An impact summary analogous to the summary provided in Table H-17 of the DSEIS is provided in Table 3 .Impacts on all RIS except Atlantic tomcod are classified as SMALL or SMALL to MODERATE. The impact on bluefish, which was classified as LARGE in the DSEIS, is classified as SMALL in Table 3.

Although these conclusions are more realistic than the conclusions drawn in the DSEIS, they are still conservative and still suffer from many of the inherent deficiencies of the WOE approach. Like any WOE approach, conclusions from the alternative WOE are sensitive to changes in subjectively defined attribute weightings and definitions of impact levels. Moreover, no estimates of actual impacts of entrainment or impingement on the abundance or reproductive capacity of potentially affected populations are provided, and the fundamental issue of causality is only indirectly addressed. The approach used in Entergy's AEI report (Barnthouse et al. 2008) does not suffer from these deficiencies and is a superior basis for environmental decision-making.

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5.4 Comparison of the WOE to the AEI approach

The NRC is required under NEPA to conduct an independent analysis of the potential impacts of IP2 and IP3 on the Hudson River ecosystem. The NRC cannot simply adopt the conclusions from the applicant's ER or other published assessment studies. However, where other studies contain data or analyses that are relevant, it would seem reasonable to review this information and, if possible, use it to inform the assessment. Use of all available and relevant information is especially appropriate for a WOE-based assessment, because the WOE approach was explicitly designed to incorporate multiple, independent lines of evidence concerning the potential impacts of stressors on valued environmental resources (Menzie et al. 1996).

Entergy's ER, the utilities' draft environmental impact statement for the Hudson River (CHGEC 1999) and the NYSDEC Final Environmental Statement (NYSDEC 2003), and Entergy's AEI report (Barnthouse et al. 2008) were cited in Sections H.1.1.2

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and H.1.1.3 of the DSEIS. However, only the conclusions of these reports were discussed. The analyses that supported the conclusions were not discussed, and none of these analyses was used in the DSEIS. Some of these analyses are relevant to the DSEIS and could provide additional lines of evidence. Arguably, some of them are more relevant and more directly related to the impacts of IP2 and IP3 than are the lines of evidence used in the DSEIS.

The AEI report (Barnthouse et al. 2008) synthesized all of the information contained in earlier assessments, and also included new data not evaluated in CHGEC (1999) and NYSDEC (2003). This report evaluated whether entrainment and impingement by the respective cooling-water intake structures IP2 and IP3 have caused an adverse environmental impact ("AEI"), using biologically-based definitions of AEI that are consistent with established definitions and standards of ecological risk assessment and fisheries management.

The approach involved three independent investigations. First, it used the extensive Hudson River fisheries data sets to determine (1) whether changes in the status of species of interest identified by DEC have occurred since IP2 and IP3 began commercial operation, (2) whether cooling-water withdrawals by IP2 and IP3 during this period could have been responsible for any such changes, or (3) whether alternative stressors including striped bass predation, zebra mussels, and harvesting are more probable cause of perceived changes. Second, it used a widely-accepted method for quantifying the impacts of harvesting on the sustainability of fish populations, termed the Spawning Stock Biomass per Recruit (SSBPR) model, to determine whether entrainment and impingement at IP2 and IP3 could have adversely affected the sustainability of the Hudson River striped bass and American shad populations. Third, it examined long-term trends in the abundance of all Hudson River fish species for which adequate trends data sets can be developed to determine whether species with high susceptibility to entrainment at IP2 and IP3 are more likely to have declined in abundance over the past 30 years than are species with low susceptibility to entrainment.

The first investigation evaluated the strength of evidence concerning the causation of changes in Hudson River fish populations since the initiation of the utilities' riverwide monitoring program in 1974. Criteria for determining causation derived from the

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ecological risk assessment literature (Suter 2007) provided the basis for evaluating alternative causes:

1. *Co-occurrence*: An effect occurs where and when its cause occurs and does not occur in the absence of its cause.
2. *Sufficiency*: The intensity or frequency of a cause should be adequate to produce the observed magnitude of effect.
3. *Temporality*: A cause must precede its effect.
4. *Manipulation*: Changing the cause must change its effect.
5. *Coherence*: The relationship between a cause and effect must be consistent with scientific knowledge and theory.

The co-occurrence criterion is similar to the strength-of-association criterion used in the NRC's WOE approach. The sufficiency and temporality criteria are superficially similar to the stressor-response correlation and temporal representativeness attributes of the NRC's WOE approach, but are stronger. The sufficiency criterion demands not only that there should be a relationship between the intensity of a stressor and the magnitude of a response, but that that the intensity of the stressor in question must be high enough to have reasonably caused the observed response. The temporality criterion demands not only that the measurements of the stressor and the response should have occurred over the same time period, but that the stressor should have appeared or increased in intensity prior to the occurrence of the response. In the AEI report these criteria were applied in a consistent manner to four stressors that could plausibly be affecting Hudson River fish populations.

The second investigation used the SSBPR model (Goodyear 1993) to evaluate the impacts of IP2 and IP3 on the two RIS fish species managed by the Atlantic States Marine Fisheries Commission (ASMFC): striped bass and American shad. The SSBPR model is the most widely used approach for establishing biological reference points for use in protecting fish populations from overharvesting (Rosenberg et al. 1994). In the AEI report, the SSBPR model was used to compare the impact of IP2 and IP3 to the impact of fishing at the rates established in ASMFC management plans for these populations, and also compared the combined effects of IP2, IP3, and harvesting to

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biological reference points for these populations documented in ASMFC stock assessments.

The third investigation used data on long-term trends of all species included in the riverwide survey data base to test hypotheses concerning impacts of cooling-water withdrawals on the Hudson River fish community. If entrainment at IP2 and IP3 were having an adverse impact on the Hudson River fish community, then species with high susceptibility to entrainment would be more likely to have declined in abundance over the past 30 years than would species with low susceptibility. Among those species that declined in abundance, the magnitude of the decline should have been greater for species with high susceptibility than for species with low susceptibility. Among species that increased in abundance, the magnitude of the increase should have been lower for species with high susceptibility than for species with low susceptibility.

All three investigations focused directly on the magnitude of the impact IP2 and IP3 on the Hudson River fish community, using objective hypothesis tests and quantitative relationships between causes (e.g.,, entrainment) and effects (e.g., decline in abundance or exceedence of a biological threshold).

Two key types of evidence used in the AEI report, but not in NRC's WOE approach, are especially relevant and important: CMRs and fisheries management agency stock assessments.

CMRs are estimates of the direct impacts of entrainment and impingement on YOY fish populations, expressed as the fraction by which the abundance of YOY fish would be reduced because of entrainment or impingement. These estimates are empirically-based and account for natural mortality, for the durations of susceptible life stages, for the differential impact of entraining or impinging fish at different ages, for the riverwide distributions of susceptible life stages, and for the location and withdrawal rates of IP2 and IP3. The CMR metric allows impingement and entrainment impacts to be expressed in the same units, so that they can be compared and combined. Both the methods used to calculate CMRs and results of applications to Hudson River fish populations have been documented in the peer-reviewed scientific literature (Boreman et al. 1981, Boreman and Goodyear 1988, Barnthouse and Van Winkle 1988). CMR-based

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analyses provided the technical basis for the Hudson River Settlement Agreement (Barnthouse et al. 1984, Barnthouse et al. 1988).

The DSEIS states that the CMR was not used in the DSEIS because it is "model-dependent" and "…a source of controversy." Neither of these statements is true. Life stage durations and natural mortality rates are the only parameters of CMR models that are not estimated directly from site-specific field data. Controversies concerning CMR estimates relate to the use of the CMR as a measure of the potential long-term impacts of entrainment and impingement, not as a measure of short-term impacts on YOY fish (Barnthouse et al. 2008, Section 2.3). The CMR is a direct measure of the mortality imposed on RIS by entrainment or impingement. Although not suitable as a predictor of long-term impacts, the CMR provides a direct measure of the strength-of-connection of IP2 and IP3 to RIS populations. A low CMR is clear evidence that there is little or no connection, and a high CMR is clear evidence of a high connection. The CMR is, therefore, a much stronger indicator of potential impacts of entrainment or impingement than is the rank-based method used in the DSEIS.

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The DSEIS relies on commercial and recreational landings estimates as measures of coastwide population abundance for harvested species. However, for the most important of these species, including American shad, Atlantic menhaden, striped bass, and bluefish, the Atlantic States Marine Fisheries Commission and the National Marine Fisheries Service have performed quantitative stock assessments that include estimates of annual recruitment, spawning stock size, and fishing mortality (ASMFC 1989, 2001, 2002). Landings estimates are at best an indirect measure of abundance, because (1) they are not estimates of absolute population size, and (2) landings are influenced by socioeconomic factors unrelated to population size. The stock assessments, in contrast, provide population estimates that can be compared directly to loss estimates, and fishing mortality estimates that can be compared directly to entrainment and impingement mortality (as estimated using CMRs).

CMRs and stock assessment outputs could be used as lines of evidence in the WOE approach. Inclusion of these lines of evidence would provide better support for the conclusions from the assessment, however, the limitations relating to subjectivity, lack of quantitative impact estimates, and inadequate consideration of causality would remain.

The quantitative, hypothesis-linked approach used in the AEI report is more scientifically rigorous and defensible, and provide a stronger foundation for environmental decision-making. 40-lllll-AE contd.

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6. Conclusions

This review identified inconsistencies and errors in NRC's analyses of entrainment and impingement impacts that should be corrected in the Final Supplemental Environmental Impact Assessment. In addition, the review identified fundamental deficiencies in NRC's use of the weight-of-evidence approach as the conceptual framework for the assessment. NRC's assessment could be significantly improved through proper recognition of the relative impacts of impingement and entrainment, correction of errors in data analysis, adjustment of weighting factors, and inclusion of additional lines of evidence.

Making these changes would significantly alter the conclusions of the DSEIS.

1. Impacts of impingement would be clearly distinguished from impacts of entrainment, and would be characterized as SMALL for all species.

2. Impacts of the IP2 and IP3 cooling systems on shortnose sturgeon and Atlantic sturgeon would be characterized as SMALL.

3. Impacts of impacts of the IP2 and IP3 cooling systems on all other RIS except Atlantic tomcod would be characterized as SMALL or SMALL to MODERATE.

Even with the above changes, a revised assessment would still suffer from many of the inherent deficiencies of the WOE approach, which was developed for application to hazardous waste sites, not to power plant cooling systems. The approach taken in the AEI report (Barnthouse et al. 2008) is more rigorous, accurate, and scientifically defensible than the WOE approach used in the DSEIS.

7. References

Atlantic States Marine Fisheries Commission (ASMFC) 1989. Fishery management plan for the bluefish fishery. Fisheries Management Report No. 14 of the Atlantic States Marine Fisheries Commission, Washington, D.C.

ASMFC 2001. Amendment 1 to the Interstate Fishery Management Plan for Atlantic menhaden. Fisheries Management Report No. 37 of the Atlantic States Marine Fisheries Commission, Washington, D.C.

ASMFC 2002. Amendment 4 to the Insterstate Fishery Management Plan for weakfish. Fishery Management Report no. 39 of the Atlantic States Marine Fisheries Commission, Washington, D.C.

Barnthouse, L.W., and W. Van Winkle. 1988. Analysis of impingement impacts on Hudson River fish populations. *American Fisheries Society Monograph* 4:182-190.

Barnthouse, L.W., J.Boreman, S.W. Christensen, C.P. Goodyear, W. Van Winkle, and D.S. Vaughan. 1984. Population biology in the courtroom: the Hudson River controversy. *Bioscience* 34:14-19.

Barnthouse, L.W., J. Boreman, T.S. Englert, W.L. Kirk, and E.G. Horn. 1988. Hudson River settlement agreement: technical rationale and cost considerations. *American Fisheries Society Monograph* 4:267-273.

Barnthouse, L. W., D. G. Heimbuch, W. Van Winkle, and J. R. Young. 2008. Entrainment and impingement at IP2 and IP3: A biological assessment. Prepared for Entergy Nuclear Operations, Inc.

Boreman, J., C. P. Goodyear, and S. W. Christensen. 1981. An empirical methodology for estimating entrainment losses at power plants sited on estuaries. Transactions of the American Fisheries Society 110:253-260.

Boreman, J., and C. P. Goodyear. 1988. Estimates of entrainment mortality for striped bass and other fish species in the Hudson River estuary. American Fisheries Society Monograph 4:152-160.

Central Hudson Gas and Electric Corporation; Consolidated Edison Company of New York, Inc.; New York Power Authority; and Southern Energy New York (DEIS). 1999. Draft Environmental Impact Statement for State Pollutant Discharge Elimination System Permits for Bowline Point, Indian Point 2 and 3, and Roseton Steam Electric Generating Stations. December 1999.

Con Ed. 1985. Biological evaluation of a Ristroph screen at Indian Point Unit 2. A report prepared for the Office of Environmental affairs of Consolidated Edison Company of New York, Inc. June 1985.

Con Ed and NYPA. 1992. Supplement I. Indian Point Units 2 and 3 Ristroph screen fish return system prototype evaluation and siting study. November 1992.

1

EA Engineering, Science, and Technology. (EA) 1991. Final Hudson River ecological study in the area of Indian Point 1990 annual report. A report prepared for Consolidated Edison Company of New York, Inc. and New York Power Authority. EA Report No. 11867.01. October 1991.

Fletcher, R. I. 1984. A survey and analysis of fish conservation devices for water-pumping facilities having high volumetric rates. HRF Report # 1984-1. Prepared for the Hudson River Foundation.

Fletcher, R. I. 1985. Risk analysis for fish diversion experiments: pumped intake systems. Transactions of the American Fisheries Society 114: 652-694.

Fletcher, R. I. 1986. On the reconfiguration and empirical evaluation of a prototype screening device at Indian Point Nuclear Unit 2. Final report to Hudson River Fishermen's Association. 1 December 1986.

Fletcher, R. I. 1990. Flow dynamics and fish recovery experiments: water intake systems. Transactions of the American Fisheries Society 119: 393-415.

Fletcher, R. I. 1992. The failure and rehabilitation of a fish-conserving device. Transactions of the American Fisheries Society 121: 678-679.

Goodyear, C.P. 1993. Spawning stock biomass per recruit in fisheries management: foundation and current use p. 67-81. In: S. J. Smith, J. J. Hunt and D. Rivard [ed.] Risk evaluation and biological reference points for fisheries management. Canadian Special Pubilication in Fisheries and Aquatic Sciences. 120

Mattson, M. T., J. B. Waxman, and D. A. Watcon. 1988. Reliability of impingement sampling designs: an example from Indian Point Station. American Fisheries Society Monograph 4: 161-169.

Menzie, C., M. H. Henning, J. Cura, K. Finkelstein, J. Gentile, J. Maughan, D. Mitchell, S. Petron, B. Potocki, S. Svirsky, and P. Tyler. 1996. Special report of the Massachusetts Weight-of-Evidence Workgroup: A weight-of-evidence approach for evaluating ecological risks. Human and Ecological Risk Assessment 2:277-304.

Normandeau 1993. Winter-time recirculation of white perch from two potential discharge sites for the Indian Point Unit No. 2 Fish Return System. Attachment A. A report prepared for Consolidated Edison Company of New York, Inc. as a supplement to Con Ed and NYPA 1992. February 1993.

Normandeau 1996. Evaluation of durability, debris retention, and cleanability of fine mesh panels on a Ristroph-modified through-flow traveling water intake screen at Indian Point Unit No. 2. A report prepared for Consolidated Edison Company of New York, Inc., Orange and Rockland Utilities, Inc., Central Hudson Gas & Electric Corporation, and New York Power Authority. February 1996.

New York State Department of Environmental Conservation (NYSDEC). 2003. Final Environmental Statement concerning the Application to Renew New York State Pollutant Discharge Elimination System (SPDES) permnits for the Roseton 1 & 2, Bowline 1 & 2, and Indian Point 2 & 3 steam electric generating stations, Orange, Rockland, and Westchester Counties. NYS Department of Environmental Conservation, Albany, NY.

Rosenberg, A., P. Mace, G. Thompson, G. Darcy, W. Clark, J. Collie, W. Gabriel, A. MacCall, R. Methot, J. Powers, V. Restrepo, T. Wainwright, L. Botsford, J. Hoenig, and K. Stokes. 1994. Scientific review of definitions of over-fishing in U.S. fishery management plans. NOAA Technical Memorandum NMFS/F-SPO-17. National Marine Fisheries Service, Silver Spring, MD.

Ross, Q.E., D.J. Dunning, W.A. Karp, and W.R. Ross. 1987. Fish abundance and distribution in the vicinity of the Indian Point Power Plant. Final report March 24, 1987.

Suter, G. W. II. 2007. *Ecological Risk Assessment*, 2nd Edition. CRC Press, Boca Raton, FL.

U.S. Environmental Protection Agency (USEPA). 1992. Framework for ecological risk assessment. EPA/630/R-92/001. Risk Assessment Forum, U.S. Environmental Protection Agency, Washington, D.C.

USEPA 1997. Ecological Risk Assessment Guidance for Superfund. EPA 540-R-97-006. Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Edison, NJ.

USEPA 1998. Guidelines for Ecological Risk Assessment. EPA/630/R-95/002F. Risk Assessment Forum, U.S. Environmental Protection Agency, Washington, D.C.

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Table 1. Projected reductions in annual average impingement losses at IP2 and IP3 if Ristroph screens and a fish return system had been installed and had been operating from 1974 through 1990, based on impingement mortality estimates from Fletcher (1990).

		Annual Average losses		Annual Average Losses - with Mitigation	
Taxon	**Ristroph Screens Percent Mortality[a]**	**IP2 1974-1990**	**IP3 1976-1990**	**IP2 1974-1990**	**IP3 1976-1990**
Alewife	62.0%	11,474	10,936	7,114	6,780
American shad	35.0%	22,112	9,571	7,739	3,350
Atlantic tomcod	17.0%	276,567	109,014	47,016	18,532
Bay anchovy	23.0%	190,510	50,440	43,817	11,601
Blueback herring	26.0%	220,289	64,305	57,275	16,719
Hogchoker	13.0%	40,303	17,533	5,239	2,279
Striped bass	9.0%	31,506	14,897	2,836	1,341
Weakfish	12.0%	25,698	6,419	3,084	770
White perch	14.0%	838,972	332,175	117,456	46,504
Total		1,657,432	615,290	291,577	107,878
% Reduction with mitigation				**82%**	**82%**

[a]Mortality values from DSEIS Table H-1.

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Table 2. Summary of simulation analysis results regarding operating characteristics of SOC test.

Number of Species with Increased Region 4 Abundance (with No Change in Impingement)	Estimated Probability			
	1 Species Receives a Score of 4	2 Species Receive a Score of 4	3 Species Receive a Score of 4	At Least One Species Receives a Score of 4
0 (null hypothesis)	21.7	4.7		26.3%
1	29.7	5.7		35.3%
2	35.7	7.7		43.3%
3	38.7	7.7	0.7	47.7%
4	40.7	10.3	1.0	52.0%
5	41.7	12.0	0.7	54.3%

Table 3. Impact Summary for Hudson River RIS, using an alternative WOE approach.

Species	Population Line of Evidence	Strength of Connection Line of Evidence	Impacts of IP2 and 3 Cooling Systems on Aquatic Resources
Bluefish	Small	Low to Medium	Small
White perch	Large	Low to Medium	Small to Moderate
Hogchoker	Moderate to Large	Low to Medium	Small to Moderate
Rainbow smelt	Large	Low to Medium	Small to Moderate
Striped bass	Small	Medium	Small
Atlantic tomcod	Moderate to Large	Medium to High	Moderate to Large
Bay anchovy	Small to Moderate	Medium to High	Small to Moderate
Alewife	Large	Low to Medium	Small to Moderate
Blueback herring	Large	Low to Medium	Small to Moderate
American shad	Large	Low to Medium	Small to Moderate
Spottail shiner	Moderate to Large	Low to Medium	Small to Moderate
White catfish	Large	Low to Medium	Small to Moderate
Weakfish	Small	Medium	Small
Shortnose sturgeon	Small	Low	Small

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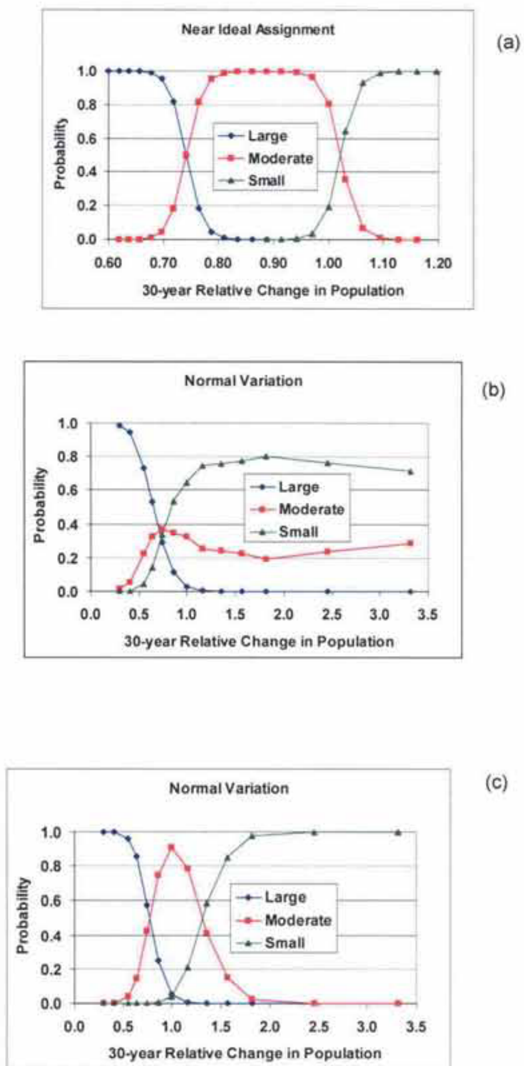
Figure 1. Monte Carlo analysis of population growth classification methods. (a) hypothetical example of nearly ideal scheme. Misclassification probabilities are low for most population growth rates (b) NRC's classification scheme. Misclassification probabilities are high for most population growth rates. (c) An alternative scheme that is closer to the ideal.



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Appendix A

Impacts of IP2 and IP3 on Shortnose Sturgeon and Atlantic Sturgeon in the Hudson River

Introduction

This appendix summarizes published information on shortnose sturgeon and Atlantic sturgeon in the Hudson River and corrects errors in NRC's analysis of impingement data for these species. Much of this information was discussed in Appendix E to the DSEIS (Biological Assesment), however, it was not used in the impact assessment documented in Appendices H and I of the DSEIS.

Life History of Shortnose Sturgeon in the Hudson River

From late fall to early spring, adult shortnose sturgeon concentrate in a few overwintering areas (Dovel et al. 1992, Geoghegan et al. 1992, Bain 1997). Spawning adults concentrate in deep, channel habitats considerably upstream from Indian Point (i.e., "IP") Unit 2 and IP Unit 3 near Kingston (RM 94) and another group of juveniles and adults that will not be in reproductive condition the following spring concentrate in brackish water downstream between RM 33-38 in Haverstraw Bay (Bain 1997). In the spring, these non reproductive fish migrate upstream and disperse throughout the tidal portion of the river in deep, channel habitats. When water temperatures reach approximately 8°C, typically in early to mid-April, reproductively active adults begin a rapid migration from their overwintering areas near Kingston upstream in the channel to spawning grounds from Coxsackie (RM 125) to the Federal Dam in Troy (RM 151) and thus are not exposed to water withdrawal at IP2 and IP3 located at RM 42. Spawning typically occurs in the upstream spawning grounds until water temperatures reach 15°C (late April through May) after which adults disperse down throughout their broad summer range in deep channel habitats from approximately RM 27 to RM 112. The deep channel waters and the turbulent spawning reach just downriver of the Federal Dam in Troy are beyond the influence of water withdrawal at IP2 or IP3.

Shortnose sturgeon eggs adhere to solid objects on the river bottom and newly hatched embryos remain on the bottom near their upriver spawning grounds and are therefore not typically exposed to entrainment at IP2 or IP3. Larvae gradually disperse downstream and occur in deep water, channel areas with strong currents (Bain 1997) and are therefore not likely to be entrained along the shoreline at IP2 and IP3 because they generally avoid shoreline habitats where the CWIS is located. Figure 1 demonstrates that early life stages of shortnose sturgeon, those most susceptible to entrainment and impingement, are rarely observed in the vicinity of IP2 and IP3, and primarily occur upriver. Only one larval shortnose sturgeon and one unidentified larval sturgeon (probably an Atlantic sturgeon) were observed in the Indian Point nearfield region among 11,051 Long River Ichthyoplankton Survey samples collected there from 1979 through 2006 (Table 1), and this species has never been observed in entrainment collections at Indian Point.

Age 1 and older shortnose sturgeon are distributed throughout the river in the summer, however their relatively large size and strong swimming ability, and pronounced preference for deep, channel areas considerably reduces their exposure risk to impingement at IP 2 and IP3. Furthermore, the complex migration patterns described above demonstrate that shortnose sturgeon are transient seasonal residents in the vicinity of IP2 and IP3, passing through this portion of the Hudson River only during the late spring through early fall as juveniles and adults disperse from upstream habitat to the lower tidal portions of the River.

Mark-recapture population estimates performed for the National Marine Fisheries Service (NMFS) indicate a late 1990s shortnose sturgeon population of about 60,000 fish with adults comprising more than 90% of the population (Bain et al. 2007). Compared to population estimates in the late 1970s, the Hudson River population has increased by more than 400% (Bain et al. 2007). Secor and Woodland (2005) also confirmed the recovery of the shortnose sturgeon population in the Hudson River during the late 1990's, and suggest that this recovery was driven by strong recruitment of juveniles during the period from 1986 through 1992, 8 to 12 years following recovery of the spawning and nursery habitat in the Albany Pool of the upper Hudson River to normoxia. Independent data analyzed by Secor and Woodland (2005) from a mark-recapture program and catch per unit effort (density) data from the utilities monitoring program referred to as the Hudson River Fall Juvenile Fish Survey (I.e., "HRFJS") were analyzed for the period 1985 through 2003. Secor and Woodland (2005) confirmed the usefulness of the HRFJS as an index of shortnose sturgeon abundance in the Hudson River ecosystem by finding a significant ($p = 0.01$) positive correlation ($r_s = 0.58$) with mark-recapture estimates lagged by six years.

The Hudson River supports by far the largest population of shortnose sturgeon throughout its range, and the current population has expanded from the 1970's through the 1990's (Bain et al. 2007). Based on the index of abundance developed by Secor and

Woodland (2005) from 1985 through 2003 from the HRFJS, this abundance index was calculated for the most recent four years (2004 through 2007), and confirmed the shortnose sturgeon population has remained stable at recovered levels since the 1992 through 1996 period of peak abundance (Figure 2). Although the shortnose sturgeon currently is listed as a federally endangered species, the National Oceanic and Atmospheric Administration ("NOAA") has concluded that a shortnose sturgeon population composed of 10,000 spawning adults is large enough to be at a low risk of extinction and adequate for delisting under the U.S. Endangered Species Act (NOAA 1996). Following the criteria used by NOAA for shortnose sturgeon, the total and spawning population estimates in the Hudson River exceed the safe level established by NOAA by more than 500%, clearly indicating that this population merits designation as "recovered" and qualifies for delisting from the U.S. Endangered Species Act protection (Bain et al. 2007).

Life History of Atlantic Sturgeon in the Hudson River

Atlantic sturgeon is currently under consideration to determine whether listing as threatened or endangered under the federal Endangered Species Act is warranted. It is not presently listed as endangered, threatened, or a species of special concern by New York. Atlantic sturgeon are anadromous; spawning occurs in freshwater, but adults reside for many years in marine waters outside the Hudson River. Spawning females enter the Hudson River in mid-May and migrate along deep channel areas directly to freshwater spawning grounds upriver near Hyde Park (RM 81) and Catskill (RM 113, Bain 1997). Females return to marine waters quickly after spawning. Atlantic sturgeon are unlikely to spawn in the Indian Point region because Atlantic sturgeon eggs, embryos and larvae are intolerant of saline conditions and some significant length of river habitat is needed downstream of a spawning site to accommodate dispersal of embryos and larvae (Bain 1997). This observation is supported by empirical data obtained from the Longitudinal River Surveys (Figure 3) which demonstrates that Atlantic sturgeon eggs, larvae and young of the year rarely occur below the West Point region (RM 47) which is consistent with their limited salinity tolerance. In fact, only one young of the year Atlantic sturgeon and one unidentified larval sturgeon (probably an Atlantic sturgeon) were observed in the Indian Point nearfield region among 11,051 Long

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River Ichthyoplankton Survey samples collected there from 1979 through 2006 (Table 1), and this species has never been observed in entrainment collections at Indian Point.

Spawning male Atlantic sturgeon enter the Hudson River starting in April and some may remain as long as November. During their upstream migration, male sturgeon reside in channel areas in water greater than 25 ft (Dovel and Berggren 1983, Bain 1997). Juvenile Atlantic sturgeon are distributed over much of the Hudson River from July through September and they use deep channel habitats as in other life intervals (Bain 1997). The largest numbers of juveniles appears to be located from RM 39 to 87 (Bain 1997) thus there is some overlap with the Indian Point region at the downriver extent of their range. Figure 2 demonstrates that some Atlantic sturgeon juveniles occur from the Tappan Zee (RM 24) to the Indian Point (RM 46) regions, however the greatest numbers occur from the West Point (RM 47) region upriver to Saugerties (RM 106). In the fall, juveniles overwinter in brackish water between RM 12-46, however they remain in deep, channel areas and the majority of the population is therefore not expected to be exposed to impingement at IP2 or IP3.

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Although published mark-recapture population estimates are not presently available for the Atlantic sturgeon population during the period of its life when it inhabits the Hudson River estuary, the index of abundance developed by Secor and Woodland (2005) from 1985 through 2003 from the HRFJS for shortnose sturgeon was calculated for the Atlantic sturgeon caught during the period 1985 through 2007 (Figure 4). This Atlantic sturgeon abundance index reveals that, after a period of comparatively high abundance during 1985 through 1989, abundance of Atlantic sturgeon in the Hudson River estuary has remained stable at lower levels during the period 1990 through 2007.

Impingement of Shortnose Sturgeon and Atlantic Sturgeon at Indian Point, 1975 through 1990

Shortnose sturgeon and Atlantic sturgeon impingement at Indian Point was described in the DSEIS in Section 4.6.1. Table 4-11 (page 4-52) of the DSEIS reports the annual total number of shortnose sturgeon and Atlantic sturgeon impinged at IP2 and IP3 for each year of sampling, 1975-1990. Several facts should be noted to clarify and correct the content of Table 4-11. First, a "-" (i.e., "dash") symbol represents "zero catch", and not the more ambiguous "not indicated in sample", except for 1975 at IP3, which was not in operation

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until 1976. The field Standard Operating Procedures used to collect and process impingement samples at IP2 and IP3 specifically required that all fish collected in each sample be separated from the debris, taken to the laboratory, identified to species, counted, measured and weighed. Each shortnose or Atlantic sturgeon collected was identified, weighed, measured for total length, and its status at the time of collection (alive or dead) was recorded on a separate "Sturgeon Log" along with a written comment describing its final disposition. All alive Atlantic and shortnose sturgeon observed in each IP2 or IP3 impingement sample were released into the river after processing. Dead sturgeon were frozen and retained for delivery to the resource agencies if requested. Second, impingement sampling provided a total census of all fish impinged at IP2 and IP3 for each day of CWIS operation in each year beginning in 1974 (Unit 2) or 1976 (Unit 3) and continuing through 1980 (EA 1990). Beginning in 1981, and continuing through 1990, impingement abundance at IP2 and IP3 was determined based on a stratified random design (Mattson et al. 1988; EA 1990), resulting in the collection of impingement samples from 110 randomly selected days in each year at Unit 2 and Unit 3. Therefore, the number of shortnose sturgeon reported in Table 4-11 from 1975 through 1980 represent a total census of all sturgeon impinged. The much larger numbers of shortnose sturgeon impinged in years from 1981 through 1990 represent extrapolated numbers expanded from an actual catch among the 110 days sampled upward to represent yearly estimates. At IP2, the 176 shortnose sturgeon reported as being impinged in 1984 (DSEIS Table 4-11) was derived from just one fish impinged actually impinged in one scheduled sampling date (1999 DEIS Table V-36). One impinged shortnose sturgeon at IP3 in 1984 was expanded to represent an annual total of 154 fish. Similarly, the large numbers of shortnose sturgeon reported as impinged in 1987 (IP2 and IP3) and 1988 (IP3) were each represented by just one fish impinged among 110 days sampled. The stratified random sampling design was not effective in extrapolating relatively rare events like the impingement of one shortnose sturgeon among 110 days of sampling into accurate annual estimates, and the impingement data shown in Table 4-11 of the DSEIS for years after 1980 should be considered as gross overestimates. The possibility of extrapolation error from relatively rare events was anticipated for Atlantic and shortnose sturgeon in the Indian Point Standard Operating Procedures for Impingement sampling and required a total census of both species of sturgeon from both sample day and from non-sample days, making the

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correct number of sturgeon impinged during the period 1981 through 1990 equal to the actual number enumerated in each year as presented in Table VI-35 (Atlantic sturgeon) and Table VI-36 (shortnose sturgeon) of the DEIS (1999). Table 4-11 of the DSEIS was corrected using the data from Tables VI-35 and VI-36 of the DEIS and is reproduced below as Table A-1. The resulting corrections reduced the number of shortnose sturgeon impinged at IP2 and IP3 (combined) during the period 1975 through 1990 from 724 to 31. Similarly, the resulting corrections reduced the number of Atlantic sturgeon impinged at IP2 and IP3 (combined) during the period 1975 through 1990 from 3,935 to 515. 40-nnnnn-TS contd.

Conclusions

The life history information summarized in this appendix demonstrates that, because of their spawning behavior and habitat preferences, both sturgeon species should have a low susceptibility to entrainment and impingement at IP2 and IP3. In fact, as acknowledged in Section 2 of the DSEIS, no sturgeon larvae have ever been collected in entrainment samples at IP2 or IP3. The abundance of the Hudson River shortnose sturgeon population has increased by 400% since IP2 and IP3, a fact that has been demonstrated in published scientific literature and was acknowledged by NRC in Appendix E to the DSEIS. The impingement data for shortnose sturgeon and Atlantic sturgeon, after correction of errors in NRC's analysis, support this inference and demonstrate that rates of impingement of sturgeon at IP2 and IP3 are very low, even under the very conservative assumption that no impinged sturgeon survive. 40-ooooo-TS

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Table A-1. Table 4-11 (corrected) Impingement data for Shortnose and Atlantic Sturgeon at IP2 and IP3.

	IP2			IP3			
Study Year	**Shortnose Sturgeon**	**Atlantic Sturgeon**	**IP2 Total**	**Shortnose Sturgeon**	**Atlantic Sturgeon**	**IP3 Total**	**Grand Total**
1975	1	118	119	NS*	NS	NS	119
1976	2	8	10	0	8	8	18
1977	6	44	50	1	153	154	204
1978	2	16	18	3	21	24	42
1979	2	32	34	2	38	40	74
1980	0	9	9	1	10	11	20
1981	0	3	3	0	5	5	8
1982	0	1	1	0	1	1	2
1983	0	3	3	0	0	0	3
1984	1	3	4	1	5	6	10
1985	0	8	8	0	17	17	25
1986	0	2	2	0	4	4	6
1987	2	2	4	1	1	2	6
1988	3	1	4	1	0	1	5
1989	0	0	0	1	0	1	1
1990	1	0	1	0	2	2	3
Grand Total	20	250	270	11	265	276	546

*NS = not sampled, unit not in operation

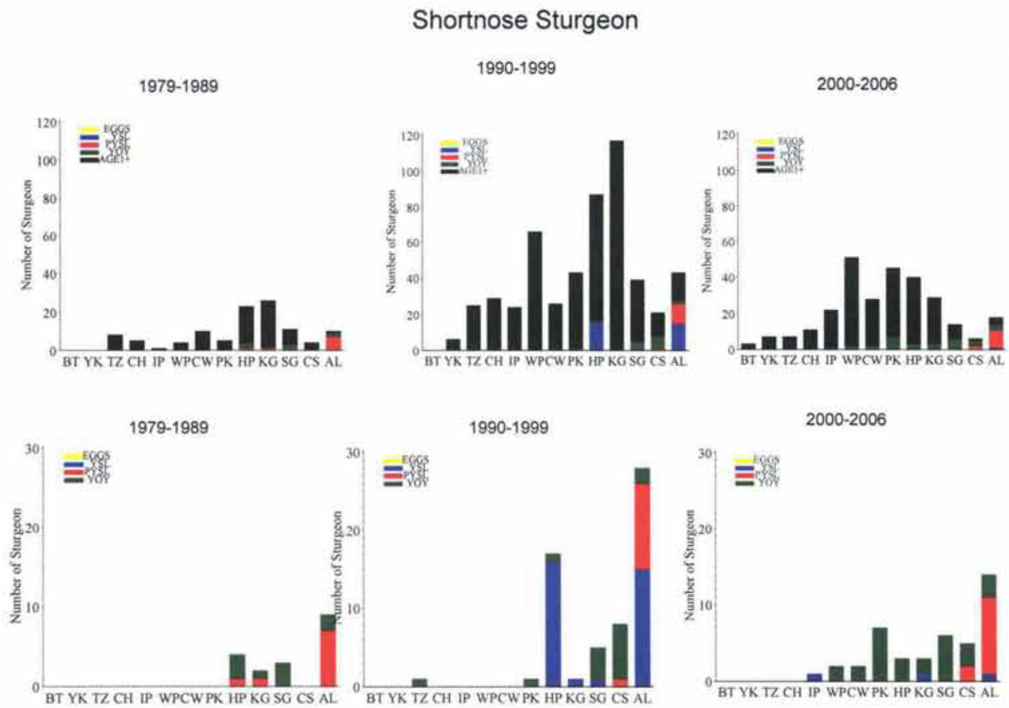

Figure 1. Number of shortnose sturgeon caught in the Hudson River by decade (1979-1989, 1990-1999, 2000-2006) in each of 13 geographic regions sampled between the Battery (BT) at New York City and Albany (AL) by the Hudson River Biological Monitoring Program (171,357 total samples). Note that the Indian Point region where IP2 and IP3 are located is labeled "IP", and is represented by 16,948 samples collected and examined for shortnose sturgeon from 1979 through 2006.

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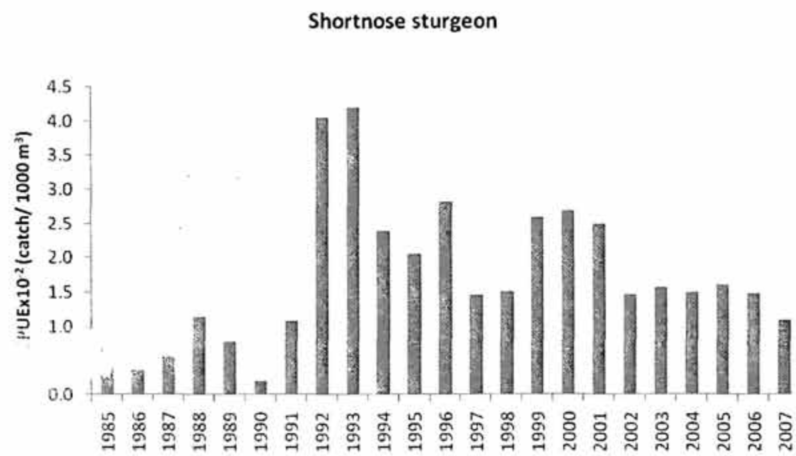

Fig... al catch per unit of effort (CPUE) index for shortnose sturgeon in the Hudson River estuary based on density data obtained from the utilities Fall Juvenile Fish Survey (Tucker trawl and beam trawl samples combined), 1985 through 2007.

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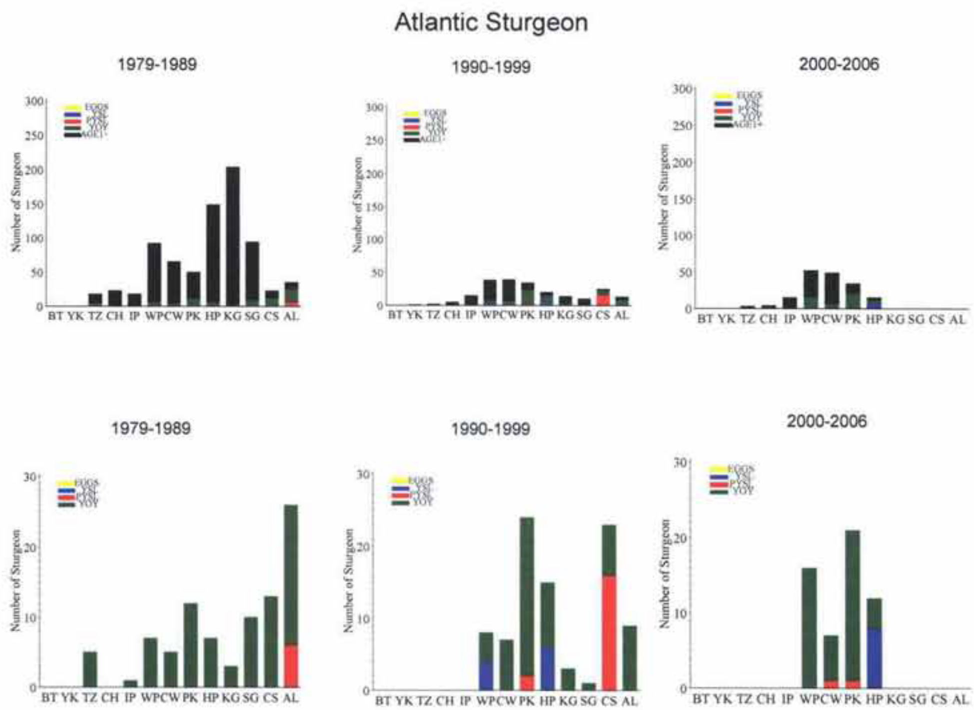

Figure 3. Number of Atlantic sturgeon caught in the Hudson River by decade (1979-1989, 1990-1999, 2000-2006) in each of 13 geographic regions sampled between the Battery (BT) at New York City and Albany (AL) by the Hudson River Biological Monitoring Program (171,357 total samples). Note that the Indian Point region where IP2 and IP3 are located is labeled "IP", and is represented by 16,948 samples collected and examined for Atlantic sturgeon from 1979 through 2006.

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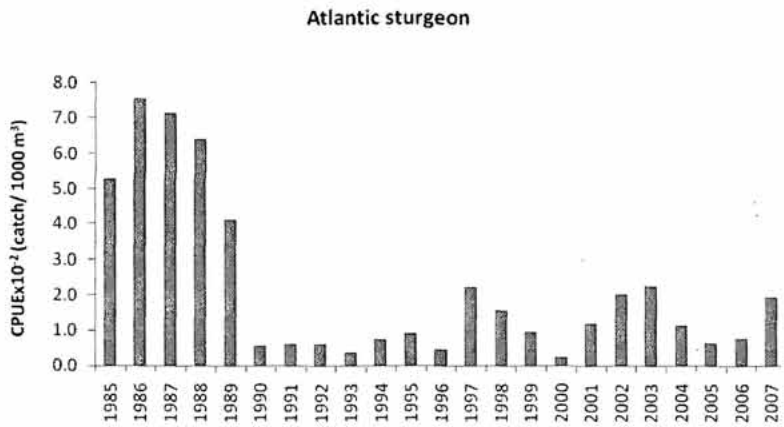

Figure 4. Annual catch per unit of effort (CPUE) index for Atlantic sturgeon in the Hudson River estuary based on density data obtained from the utilities Fall Juvenile Fish Survey (Tucker trawl and beam trawl samples combined), 1985 through 2007.

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REFERENCES

Bain, M.B. 1997. Atlantic and shortnose sturgeons of the Hudson River: common and divergent life history attributes. Environmental Biology of Fishes 48:347-358.

Bain, M.B., Haley, N., Peterson, D.L., Arend, K.K., Mills, K.E. and P.J. Sullivan. 2007. Recovery of a US endangered fish. PLoS ONE 2(1): e168. doi:10.1371/journal.pone.0000168

Central Hudson Gas and Electric Corporation; Consolidated Edison Company of New York, Inc.; New York Power Authority; and Southern Energy New York (DSEIS). 1999. Draft Environmental Impact Statement for State Pollutant D'scharge Elimination System Permits for Bowline Point, Indian Point 2 and 3, .. Roseton Steam Electric Generating Stations. December 1999.

Dovel, W.L., and Berggren, T.J. 1983. Atlantic sturgeon of the Hudson Estuary, New York. New York Fish and Game Journal 30(2):142-172.

T., Pekovitch, A.W. and T.J. Berggren. 1992. Biology of the shortnose :eon (*Acipenser brevirostrum*) in the Hudson River estuary, New York. Pp. 187-216. *In*: C.L.

Geoghegan, P., Mattson, M.T., and R.G. Keppel. 1992. Distribution of the shortnose sturgeon in the Hudson River Estuary, 1984-1988. Pages 217-227 *in* C.L. Smith, ed. Estuarine research in the 1980's. Hudson River Environmental Society seventh symposium on Hudson River ecology. State University of New York Press, Albany.

NOAA National Marine Fisheries Service. 1996. Status review of shortnose sturgeon in the Androscoggin and Kennebec Rivers. Gloucester (Massachusetts): Northeast Regional Office, National Marine Fisheries Service.

Secor, D. H. and R.J. Woodland. 2005. Recovery and status of shortnose sturgeon in the Hudson River. Final Report to Hudson River Foundation for Science and Environmental Research, Inc. August 2005. 108 pages.

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Appendix B

Influence of Population Variability on the Probability of Trend Misclassification

The NRC needed a methodology for classifying available abundance data sets for the potential for adverse environmental impact. The methodology they devised, described on pages H-32 and H-33 of the DSEIS, is based on simple linear regression, segmented regression, and percentage of observations lying outside a +/- one standard deviation band around the mean of the first 5 observations (Table B-1):

Table B-1 NRC decision rules for classifying abundance data sets to Small, Moderate, or Large Potential Impact.

Classification	Characteristics
Small Potential	Slope not significantly different from 0 <= 40% of observations outside +/- SD
Moderate Potential	Slope not significantly different from 0 > 40% of observations outside +/- SD or Slope significantly different from 0 <= 40% of observations outside +/- SD
Large Potential	Slope significantly different from 0 > 40% of observations outside +/- SD

Although some aspects of the methodology, α-level (probability of Type I error) for test of significance, whether the test was one-sided or two sided, or whether a significant positive slope would be classified differently than a significant negative slope, were unclear in the written description, these details were clarified during a conference call with NRC staff and consultants.

Although their classification process seems for the most part logical, in that it considers both population trend and variability, there is no indication that NRC has evaluated its performance when applied to simulated data with known population parameters. Similar to statistical significance testing, an impact classification procedure is subject to two types of errors that must be considered, and minimized to the extent possible. One type of error is to identify a potential impact when in actuality none exists, i.e. to classify a data set as indicating Moderate or Large Potential when the true potential is Small. The second type of error is failure to identify a potential impact when one in fact

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does exist, i.e. to classify a data set as Small Potential when it actually has Moderate or Large Potential.

The NRC provided no discussion of these types of errors, which may exist in any classification scheme, or the relative degree of protection the classification process provides against each type. In designing a classification process, it is not possible to simultaneously minimize both error types, so tradeoffs are inevitable, even if they are not explicitly considered. We cannot determine which type of error NRC considers more serious, and presumably tried harder to avoid.

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To evaluate the NRC classification process for LOE-1, a Monte Carlo simulation analysis was conducted. Annual rates of population change r ranging from -0.04 to +0.04 were selected for evaluation. Each rate was used to describe a trend of expected abundance over 30 years (Figure B-1). The trends ranged from a decrease to 30 percent of initial abundance to an increase to 330 percent of initial abundance over 30 years. This range in population abundance trends would likely encompass Small, Moderate and Large Potential Impacts.

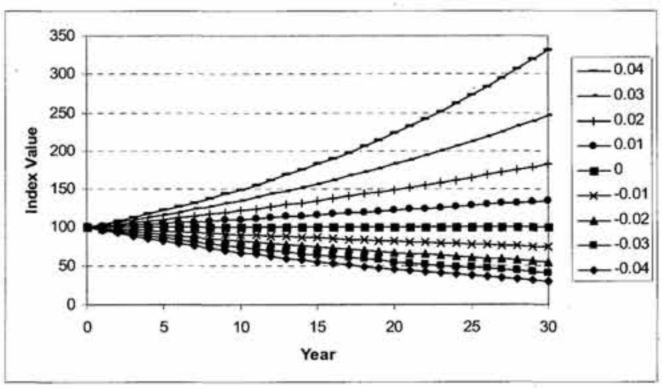

Figure B-1 Expected simulated population abundance (N_0e^{rt}) change over 30 years. Values in legend are the annual instantaneous growth rate *r*.

In each year of the simulation, an observed abundance level N_t was randomly generated:

$$N_t = N_0 e^{rt} + \sigma_t \varepsilon_t$$

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where N_t = abundance level at time t

N_0 = initial abundance level = 100

r = population growth rate

σ_t = standard deviation of abundance at time t ; $= \delta N_0 e^{rt}$

δ = level of variability in abundance; = 0.10 or 0.25

ε_t = independent Normal(0,1) random variate

Because fishery abundance data are often log-normally distributed, a second set of abundances was generated to simulate log-normal variation of abundance around its expected value. The same annual values of ε_t were used for both sets. For the log-normal data, the simulation parameters were adjusted to maintain the same overall mean and variance (Law and Kelton 1982).

Once the four 30-year data sets, normal and log-normal variation each at δ = 0.10 and 0.25, were generated, the annual abundances were transformed by subtracting the initial abundance (100) and dividing the result by the standard deviation of the entire series. Then a simple linear regression and a 2-segment linear regression were fit to the data, and the proportion of data points lying outside +/- 1 standard deviation (of the whole data set) band around the mean of the first 5 years was determined. Because some of the data sets in Appendix I of the DSEIS were fit with a 3-year moving average prior to analysis, a 3-year moving average was fit to each data set and the linear regression and variability analysis was repeated on the averaged data.

Based on the results of the regression and variability analysis, the data sets were classified by the NRC process into Small, Moderate, and Large potential impact categories (Table B-1). A two-sided test with α = 0.05 was used to test significance of the slopes. Significant positive slopes, if no significant negative slope for the segmented regression, were classified as Small. This process was repeated 1000 times for each value of population growth rate.

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Ideally, a classification process would be able to delineate distinct classes based on true values of population parameters. An ideal classification process would have large ranges of population change where only one of the classes is possible, and small ranges where probabilities for two classes overlap (Figure B-2). The nearly ideal hypothetical classification depicted has uncertainty in classification only when 30-year relative change in the population is near 0.75 or 1.05. In each case the uncertainty is only between two of the three classes.

The NRC process, for a population with normal variation in annual abundance and $\delta = 0.25$, departs substantially from the ideal (Figure B-3). The delineation between the Large and Small categories of potential impact was relatively distinct, with overlap of the categories occurring only in the range of 0.5 to 1.0 relative change in population size. However, the probability that a population could be classified as Moderate potential impact was between 0.2 and 0.4 for population change ranging from 0.5 to 3.3, i.e. a population that had declined to 50% of its original abundance and a population that had grown to more then 3 times its original abundance have essentially the same probability of being classified as Moderate potential impact. The probability that a population would be classified as having a Large potential impact was also non-trivial for populations that had declined relatively little: 0.32 for a trend resulting in 0.7 of initial abundance, 0.12 for a trend resulting in 0.9 of initial abundance, and 0.03 for a population with unchanged abundance. The 0.6 to 0.9 range in population change is a zone in which discrimination is highly uncertain as the probabilities of the Large potential impact category range from 0.53 to 0.11; probabilities of the Moderate category range from 0.33 to 0.37; and probabilities of the Small category range from 0.14 to 0.65.

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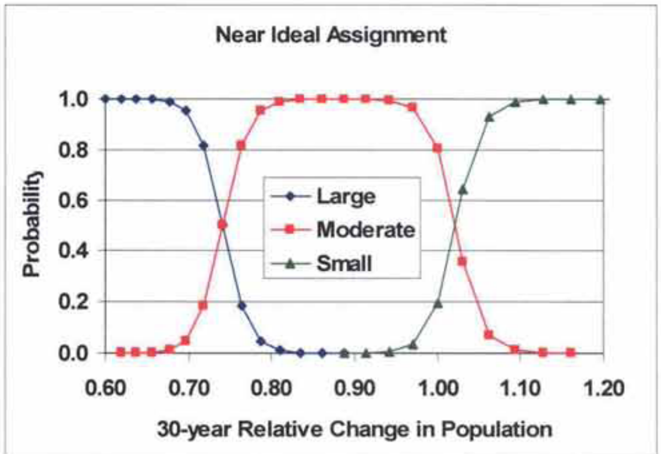

Figure B-2 Hypothetical example of a nearly ideal classification into Small, Moderate, and Large Potential Impact categories. The ranges of population change over which more than one classification is possible are small (~0.65 to ~0.85 and ~0.95 to ~1.1), and there is no range where more than two classifications are possible. Probabilities for the three classifications always sum to unity.

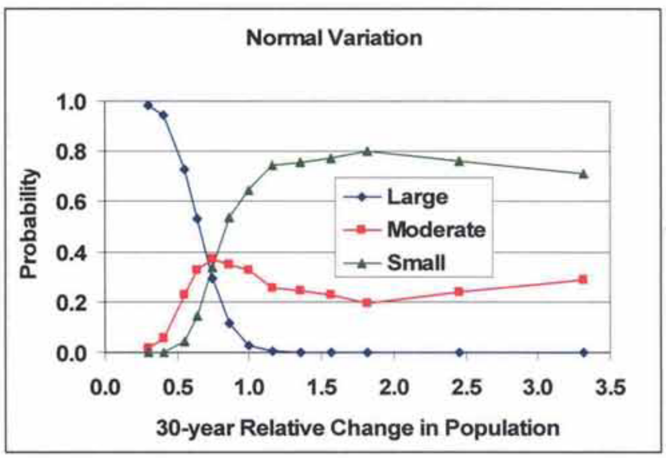

Figure B-3 Classification under NRC decision rules of simulated population abundance data with normal variation around the expected value, δ = 0.25. Probabilities for the three classifications always sum to unity.

If population variation is lognormal rather than normal, the operating characteristics of the NRC classification are essentially the same (Figure B-4), although

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between relative population change from about 1.2 to 2.5 the probability of a population being classified as Moderate impact declines slightly below 0.2.

Smoothing the data series with a 3-year moving average prior to analysis resulted in the classification process being even less able to distinguish Moderate from Small impact. Populations that increased in abundance (population change greater than 1.0) had nearly equal likelihood of being classified Small or Moderate (Figure B-5).

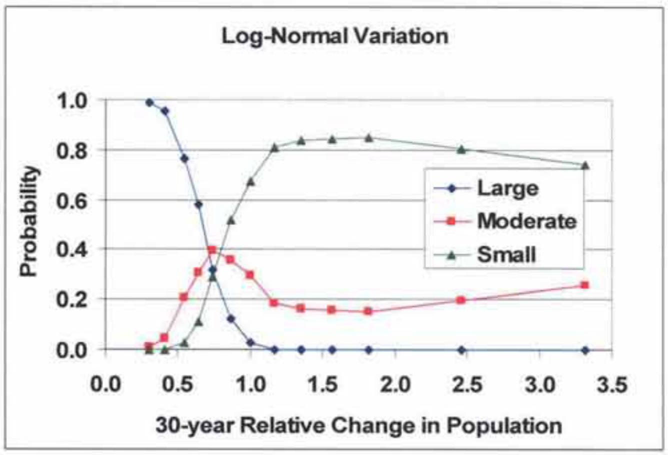

Figure B-4 Classification under NRC decision rules of simulated population abundance data with log-normal variation around the expected value, $\delta = 0.25$. Probabilities for the three classifications always sum to unity.

Simulation results for less variable population abundances, $\delta = 0.10$, were also qualitatively similar although the probability of a Moderate classification began to drop below 0.2 at population changes above 2.5 (Figure B-6).

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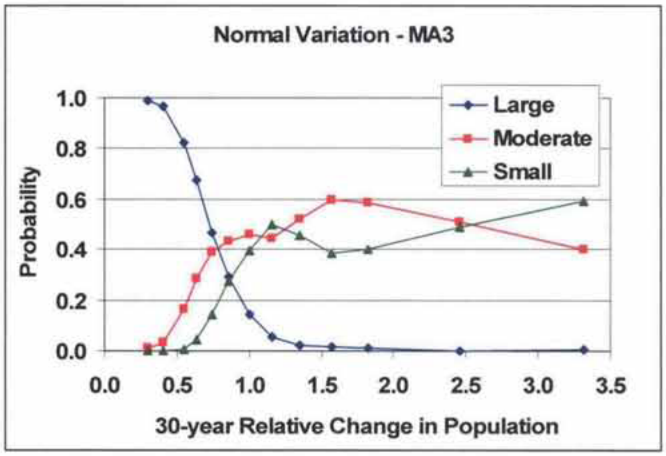

Figure B-5 Classification under NRC decision rules of simulated population abundance data with normal variation around the expected value, $\delta = 0.25$, after applying a 3-year moving average. Probabilities for the three classifications always sum to unity.

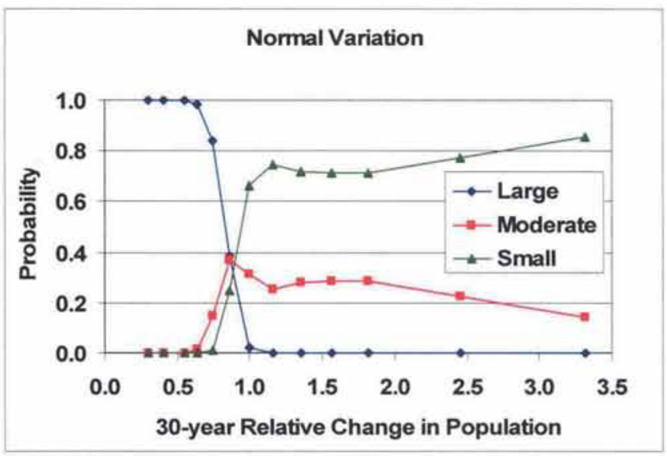

Figure B-6 Classification under NRC decision rules of simulated population abundance data with normal variation around the expected value, $\delta = 0.10$. Probabilities for the three classifications always sum to unity.

It is not possible to eliminate classification errors in an analysis such as the one NRC conducted, and it may be very difficult to develop a classification process that provides the desired degree of protection against both types of errors. However, a

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simulation analysis such as this can aid in evaluating alternative decision rules and can at least quantify classification probabilities so that appropriate consideration of errors can be made. As an example of an alternative scheme, the simulated data were also classified by a simple rule based only on the significance of the estimated slope of the linear regression:

Small Potential	-	slope > 0 and $p < 0.10$
Large Potential	-	slope < 0 and $p < 0.10$
Moderate Potential	-	otherwise

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This rule resulted in nearly complete separation of the Large and Small categories, and a Moderate category centered on relative change = 1, where the probability of Large and Small was very low (Figure B-7). The zones of overlap of two categories, either Large with Moderate or Moderate with Small, are much smaller than with the classification rules used by NRC. This classification scheme may or may not be preferable for NRC's purpose, but it illustrates that different sets of rules can produce very different classifications for the same data, and that no classification scheme should be used without first testing its performance on data with known characteristics.

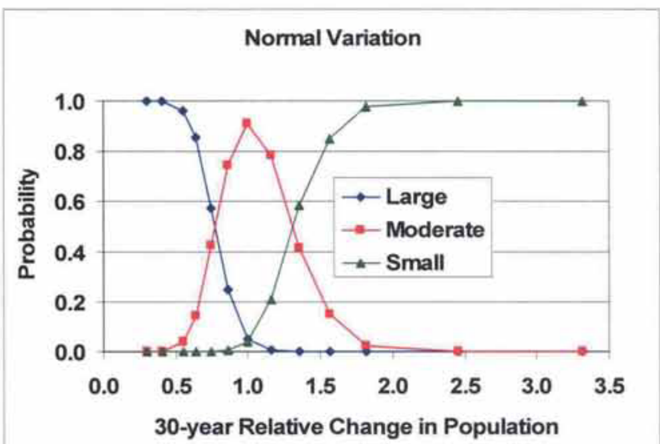

Figure B-7 Classification of simulated population abundance data with normal variation around the expected value, $\delta = 0.25$, under rules based on significant positive or negative slopes, each considered significant if $p < 0.10$. Probabilities for the three classifications always sum to unity.

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References

Law, A. M. and W. D. Kelton. 1982. Simulation Modeling and Analysis. McGraw-Hill Book Company. New York.

Appendix C

Review of Strength of Connection Analysis Presented in 2008 NRC DSEIS for Indian Point Nuclear Power Plant

Introduction

The objective of this report was to provide a technical review of key elements of the Strength of Connection (SOC) method used for impingement and entrainment in the DSEIS. As reported in the DSEIS, the SOC analysis was based on comparisons of ranks assigned to the RIS:

> "The analysis of effects of impingement was based on the concordance of ranked proportions of the number of YOY and yearling fish of each species impinged in relation to the sum of all fish impinged and the ranked proportions of each species abundance in the river near IP2 and IP3 relative to the total abundance of the18 RIS. Likewise, the effects of entrainment were based on the concordance of ranked proportions of the estimated number entrained for all life stages for a given species in relation to the abundance of all fish entrained and the ranked proportion of each species abundance in the river near IP2 and IP3 relative to the total abundance of the RIS." (DSEIS, Appendix I, page I-40)

The following section of this report addresses possible unintended consequences of using ranks for comparing in-river fish densities to impingement (or entrainment) densities. In the last section of this report, methodological details of the implementation of the SOC assessment are reviewed for possible inconsistencies or inappropriate uses of the Hudson River data.

Operating Characteristics of SOC Method

Ranks of fish densities were used to compare impingement and entrainment to the abundance of RIS in the river region (Region 4) adjacent to IPEC. The purpose for comparing the ranks was to determine whether some species were more vulnerable to impingement or entrainment than would be expected under the null hypothesis that fish were impinged or entrained in proportion to their abundance in Region 4:

> "The null hypothesis was that the proportional representation of RIS obtained from the fishery studies should be equal to the proportional

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> representation evident from the impingement and entrainment samples." (DSEIS, Appendix H, page H-37)

Species that were underrepresented in impingement or entrainment (in comparison to abundance in Region 4) were assigned a lower score for SOC, and species that were overrepresented were assigned a higher SOC score:

> "Low Strength of Connection: The ratio of ranked proportions of impinged or entrained RIS or RIS prey relative to total impingement or entrainment and the ranked proportion of the population size in the river relative to the total RIS abundance is less than 0.5. The species is considered underrepresented in the cooling system impingement or entrainment samples, and thus, there is minimal evidence to suggest the IP2 and IP3 cooling systems are affecting the RIS. Measurements satisfying this description were assigned a result score of 1.
>
> Medium Strength of Connection: The ratio of ranked proportions of impinged or entrained RIS or RIS prey relative to total impingement or entrainment and the ranked proportion of the population size in the river relative to the total RIS abundance is greater than or equal to 0.5 and less than 1.5. The species is considered proportionally represented in the cooling system impingement or entrainment samples, and thus, there is some evidence to suggest the IP2 and IP3 cooling systems are affecting aquatic resources. Measurements satisfying this description were assigned a result score of 2.
>
> High Strength of Connection: The ratio of ranked proportions of impinged or entrained RIS or RIS prey relative to total impingement or entrainment and the ranked proportion of the population size in the river relative to the total RIS abundance is greater than or equal to 1.5. The species is considered overrepresented in the cooling system impingement or entrainment samples, and thus, there is strong evidence to suggest the IP2 and IP3 cooling systems are affecting the RIS. Measurements satisfying this description were assigned a result score of 4." (DSEIS, Appendix H, page H-33)

Two aspects of the SOC method may lead to erroneous results. The scoring method relies on ranks of the 17 finfish RIS (blue crab is the 18th RIS, but was not included in the rankings). If one species has an elevated abundance in Region 4, with no corresponding elevation in impingement or entrainment (which should be viewed as a positive situation), then the Region 4 density rank (see DSEIS Table I-30) assigned to it would be increased. However, because there are always 17 ranks, the rank for one or more other species must be

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decreased (even though they experienced no decline in abundance in Region 4) to accommodate the increase in rank for the one species.

Another aspect of the SOC method that may lead to erroneous results is that the method does not explicitly account for sampling error reflected in the data. Although the use of ranks was selected in recognition of the presence of sampling error:

> "Because of the error and bias in estimation of each of these parameters, only the ranks of each 17 ratio were considered a reliable measure of connection." (DSEIS, Appendix I, page I-41)

No statistical tests were reported that could be used to judge the possible effects of sampling error on the results.

To examine the possible effects of these two aspects of the Strength of Connection method on resulting scores, a Monte Carlo simulation analysis was conducted (using impingement as an example). The simulation analysis generated sets of simulated data for all weeks of FSS and BSS sampling from 1979 through 1990. The Monte Carlo simulation was run 300 times generating 300 simulated data sets. 40-rrrrr-AE contd.

The analysis started with the null hypothesis that the annual density in Region 4, for each of the 17 finfish RIS, was identical to the corresponding annual impingement density (from DSEIS Table I-28). The allocation of annual density among sampled weeks and between the two sampling programs (FSS and BSS) was based on historical densities from the FSS and BSS datasets. As was done in the DSEIS, the FSS density and BSS catch per haul were assumed to be additive for this analysis. The annual average density in Region 4 was set to be equal to the corresponding impingement density:

$$E\left(A_{FSS,y,w,i} \mid H_0\right) = IMP_{y,i} \times P_{FSS,y,i} \times Q_{FSS,y,w,i}$$

$$E\left(A_{BSS,y,w,i} \mid H_0\right) = IMP_{y,i} \times \left(1 - P_{FSS,y,i}\right) \times Q_{BSS,y,w,i}$$

where:

$E\left(A_{FSS,y,w,i} \mid H_0\right)$ = expected density of species, i, in the FSS sampling strata of Region 4 during week, w, of year, y, under the null hypothesis,

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$E\left(A_{BSS,y,w,i} \mid H_0\right)$ = expected density of species, i, in the BSS sampling stratum of Region 4 during week, w, of year, y, under the null hypothesis,

$IMP_{y,i}$ = annual impingement density (from DSEIS Table I-28) of species, i, in year, y,

$P_{FSS,y,i}$ = proportion of the annual Region 4 density of species, i, in year, y, that occurred in the FSS sampling strata (and not in the BSS sampling stratum),

$Q_{FSS,y,w,i}$ = proportion of the annual Region 4 FSS Density of species, i, in year, y, that occurred during week, w, and

$Q_{BSS,y,w,i}$ = proportion of the annual Region 4 BSS Density of species, i, in year, y, that occurred during week, w.

Some species were not collected in all years by both sampling programs. In those cases average values of the proportion of total density by week (Q) and program (P) were based on average values. For species that were not reported collected by a sampling program in a particular year, average values of P and Q for that species from other years of collection were used. For species that were not collected by a sampling program in any year, average values of P and Q from all other species were used.

Sampling variability was simulated using the average coefficients of variation, by species and sampling program, from the actual FSS and BSS datasets:

$$\sigma_{FSS,y,w,i} = CV_{FSS,i} \times E\left(A_{FSS,y,w,i} \mid H_0\right)$$

$$\sigma_{BSS,y,w,i} = CV_{BSS,i} \times E\left(A_{BSS,y,w,i} \mid H_0\right)$$

where:

$\sigma_{FSS,y,w,i}$ = standard error of the estimate of mean density of species, i, in the FSS strata of Region 4 during week, w, in year, y,

$\sigma_{BSS,y,w,i}$ = standard error of the estimate of mean density of species, i, in the BSS stratum of Region 4 during week, w, in year, y,

$CV_{FSS,i}$ = average coefficient of variation for historical estimates of mean density of species, i, in the FSS strata of Region 4, and

$CV_{BSS,i}$ = average coefficient of variation for historical estimates of mean density of species, i, in the BSS stratum of Region 4.

The simulation analysis assumed that sampling variability, at the level of weekly average catch rates, could be approximated by a normal probability distribution:

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$$\widetilde{A}_{BSS,y,w,i} = E\left(A_{BSS,y,w,i} \mid H_0\right) + \varepsilon_{BSS,y,w,i}$$

$$\varepsilon_{BSS,y,w,i} \approx N\left(0, \sigma^2_{BSS,y,w,i}\right)$$

and

$$\widetilde{A}_{FSS,y,w,i} = E\left(A_{FSS,y,w,i} \mid H_0\right) + \varepsilon_{FSS,y,w,i}$$

$$\varepsilon_{FSS,y,w,i} \approx N\left(0, \sigma^2_{FSS,y,w,i}\right)$$

where:

$\widetilde{A}_{FSS,y,w,i}$ = simulated estimate of FSS density of species, *i*, during week, *w*, in year *y*,
$\widetilde{A}_{BSS,y,w,i}$ = simulated estimate of BSS density of species, *i*, during week, *w*, in year *y*,
$\varepsilon_{FSS,y,w,i}$ = simulated error term for FSS density of species, *i*, during week, *w*, in year *y*,
$\varepsilon_{BSS,y,w,i}$ = simulated error term for BSS density of species, *i*, during week, *w*, in year *y*,

Based on the simulated FSS and BSS density estimates, Region 4 density ranks were computed using the methods described in Appendices H and I of the DSEIS, based on 75 percentiles of weekly densities from the BSS and FSS. Impingement density ranks were taken directly from DSEIS Table I-30. Strength of Connection scores were assigned based on the ratio of Rank of Impingement to Rank of Fish Density (DSEIS, Appendix H, page H-33):

Ratio < 0.5 Score=1
0.5<=Ratio<1.5 Score=2
Ratio>=1.5 Score=4

To address the possible effects of elevated densities for some species on the ranks and scores of other species, a sequence of modifications were made to the null hypothesis scenario. First, the Region 4 density for one species (chosen independently at random in each random draw of the Monte Carlo simulation) was increased by a factor of 2, but the impingement density for that species, and all other species, did not change. In five separate

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analyses, the same procedure was used to address the effects of 1, 2, 3, 4, and 5 species having elevated Region 4 density (with no change in impingement).

The results from the Monte Carlo simulation analysis are listed in Table C-1. Even under the null hypothesis (the density of each species in Region 4 was identical to the impingement density) there is a 26% chance that at least one species would erroneously be assigned a score of 4. As the number of species with elevated abundance in Region 4 increased (and no change in impingement), the probability of having species erroneously assigned scores of 4 also increased.

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Inconsistencies and Inappropriate Use of Data in SOC Test

According to the DSEIS, the impingement SOC analysis was based on comparisons of impingement densities and Region 4 river densities of the RIS. Similarly, the entrainment SOC analysis reportedly was based on comparisons of entrainment densities and Region 4 river densities of the RIS. For the analyses to be meaningful, the measure of impingement density should be directly comparable to the measure of Region 4 river density, and the measure of entrainment density should be directly comparable to the measure of Region 4 river density. As noted below the measures of density are not directly comparable due to inconsistencies in the methods. Furthermore, individual measures (entrainment density, impingement density, Region 4 river density) used in the analyses are not valid metrics of density due to inappropriate uses of the data.

The following paragraphs summarize the methods used in the DSEIS to produce an overall density estimate for each of the 17 finfish RIS for river abundance in Region 4, for impingement, and for entrainment. Standardizing the final species-specific density measures for Region 4 and for impingement to the sum (over all species) of the final species-specific density measures does not affect the ranks of the species. Therefore, that step for Region 4 density and impingement density was not addressed in this assessment.

River Density in Region 4

In the DSEIS, the ranks for river density in Region 4 were based on a combination of weekly density measures from the Fall Shoals Survey (FSS) and Beach Seine Survey (BSS):

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"An estimate of the population abundance (S_i) for a given species in the vicinity of IP2 and IP3 was estimated as the maximum over all years (1979–1990) of the annual 75th percentile of weekly density measures from all habitats. Thus, Si for each species was the maximum annual sum of the FSS and BSS 75th percentile of weekly densities from the river segment near IP2 and IP3 (Table I-27)." (DSEIS, Appendix I, page I-40).

That formulation can be represented algebraically as:

$$S_i = MAX_{years}\left\{\left(Q75_{weeks,y}\left(CPH_{BSS,y,w,i}\right) + Q75_{weeks,y}\left(DEN_{FSS,y,w,i}\right)\right)\right\}$$

where:

MAX_{years} is the maximum of annual values (of the term within brackets), over the years, $y=1979\text{-}1990$,

$Q75_{weeks,y}$ is the 75th percentile of the weekly values (of the term within parentheses) for species, *i*, over weeks, *w*, within year, *y*,

$CPH_{BSS,y,w,i}$ is the average catch per haul of young-of-year (YOY) fish of species, *i*, collected during week, *w*, in year, *y*, by the beach seine survey (BSS), and

$DEN_{FSS,y,w,i}$ is the average density (number per 1000 m^3) of young-of-year (YOY) fish of species, *i*, collected during week, *w*, in year, *y*, by the fall shoals survey (FSS).

Impingement Density

The ranks for impingement density in the DSEIS were based on a combination of seasonal estimates of numbers of fish impinged and on the seasonal number of impingement samples:

"The density of each species impinged (Imp_i) was estimated by the 75th percentile of the annual (1975–1990) density impinged at IP2. IP2 typically had 2.8 times more fish impinged than IP3. The annual density impinged was the sum of the seasonal (January–March, April–June, July–September, October–December) densities calculated as the estimated number impinged divided by the number of samples taken (Table I-28)." (DSEIS, Appendix I, page I-41)

That formulation can be represented algebraically as:

$$IMP_i = Q75_{years}\left\{\sum_{s=1}^{4}\left(\frac{I_{s,y,i}}{n_{I,s,y}}\right)\right\}$$

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where:

$Q75_{years}$ is the 75th percentile of the annual values (of the term within brackets) over the years, $y=1975\text{-}1990$,

$I_{s,y,i}$ is the total number (all ages combined) of species, i, impinged at IP2 during season, s, in year, y, and

$n_{I,s,y}$ is the number of impingement samples taken at IP2 during season, s, in year, y.

Entrainment Density

The ranks for entrainment density in the DSEIS were based on a combination of seasonal estimates of numbers of fish entrained and on the seasonal number of entrainment samples:

> "The density of each species entrained for a given season and year (1981–1987) was calculated as the mean number entrained divided by the number of samples taken (Table I-29). Density estimates were based on the combined entrainment from IP2 and IP3. The estimate of E_i / E_{RIS} was the maximum over years of the ratio of the density of an individual species entrained to the total RIS density."

which algebraically can be represented as:

$$E_i / E_{RIS} = MAX_{seasons,years}\left\{\frac{\dfrac{\sum_w \overline{D}_{y,s,w,i} \times V_{y,s,w}}{\sum_w n_{E,y,s,w}}}{\sum_i\left(\dfrac{\sum_w \overline{D}_{y,s,w,i} \times V_{y,s,w}}{\sum_w n_{E,y,s,w}}\right)}\right\}$$

where:

$MAX_{seasons,\ years}$ is the maximum of season- and year-specific values (of the term within brackets) over the years, $y=1981,\ 1983\text{-}1987$, and over seasons, $s=2$ *and* 3 in all years, and $s=1$ in *1986 only*,

$\overline{D}_{y,s,w,i}$ is the mean entrainment density (number per 1000 m^3) of all lifestages of species, i, at IP2 and IP3 during week, w, in season, s, in year, y,

$V_{y,s,w}$ is the cooling water volume of IP2 and IP3 during week, w, in season, s, in year, y, and

$n_{,E,y,s,w}$ is the number of entrainment samples taken at IP2 and IP3 during week, w, in season, s, in year, y.

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Inconsistencies and Inappropriate Use of Data

Two sets of comparisons (based on ranks) were made in the SOC analysis:

1) Impingement density vs. river density in Region 4, and
2) Entrainment density vs. river density in Region 4.

Both sets of comparisons were made based on the three density metrics described above. For the comparisons to be valid, the metrics being compared should be consistent, i.e., compar[illegible] 'apples to apples". However, as can be seen from the descriptions, [illegible]s exist between the metric of impingement density and the metric of river density, and between the metric of entrainment density and the metric of river density. The years included in the metrics differ, the lifestages differ, and the units of measure differ. [illegible]e metric for river density is based on an inappropriate use of the BSS catch per haul and FSS density data, which are treated as if they were additive measures of abundance. In fact, they are not additive measures: the BSS catch per haul data represent the average number of fish collected within a 450 m^2 area of the shorezone stratum of the river, and the FSS density data represent the average number of fish collected within 1000 m^3 of water in the bottom, channel and shoal strata of the river. Another inappropriate use of the data occurred with entrainment data. Some entrained larvae could not be taxonomically identified to species. To address that data limitation, the DSEIS SOC analysis inappropriately assigned entrainment of "herring family" to alewife, to blueback herring, and to American shad; it also inappropriately assigned striped bass results to white perch as well as striped bass.

Also, the entrainment density metric had internal inconsistencies: 1) the seasons of entrainment vulnerability varied among species (e.g., Atlantic tomcod and rainbow smelt spawn early in the year), 2) not all seasons were sampled in all years (season 1, January-March, was only sampled in 1986), 3) the densities in each season were standardized to the sum of densities over all species (giving season 1 spawners very high values in season 1 because the other species were not present), and 4) the overall metric for each species (the maximum over all seasons and years) was determined independently for each species. Furthermore, the entrainment and impingement density metrics (each computed as the ratio of number of organisms divided number of samples - rather than being divided by water

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withdrawal volume) were confounded by inter-annual variability in sampling effort that was independent of withdrawal volume.

Tables C-2 and C-4 summarize key properties (i.e., types of input data, summary statistics used, years of data included, life stages included, and any taxonomic substitutions) of the density metrics used in the SOC analysis. These tables also list inconsistencies or inappropriate uses of data.

To ascertain the possible effects of the inconsistencies in the DSEIS SOC methods, all identified inconsistencies and inappropriate uses of data were rectified. Based on those corrections, an alternative method was constructed for the impingement SOC analysis (Table C-3) and for the entrainment SOC analysis (Table C-5). The entrainment and impingement SOC analyses were re-run using the alternative methods with the same input datasets as used in the DSEIS analyses.

The results from the DSEIS SOC analysis for impingement are listed in Table C-6, and the results from the DSEIS SOC analysis for entrainment are listed in Table C-8. The results from the alternative SOC analysis for impingement are listed in Table C-7, and the results from the alternative SOC analysis for entrainment are listed in Table C-9. Rectifying all identified inconsistencies and inappropriate uses of data resulted in all RIS receiving a SOC score or 2 for impingement and a SOC score of 2 for entrainment. Therefore, it appears that the SOC scores of 4 for some of the RIS in the DSEIS analyses were due to methodological inconsistencies and inappropriate uses of data. The data indicate that all species are impinged and entrained roughly in proportion to their relative abundance in Region 4 (the null hypothesis).

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Table C-1. Summary of simulation analysis results regarding operating characteristics of SOC test.

Number of Species with Increased Region 4 Abundance (with No Change in Impingement)	Estimated Probability			
	1 Species Receives a Score of 4	2 Species Receive a Score of 4	3 Species Receive a Score of 4	At Least One Species Receives a Score of 4
0 (null hypothesis)	21.7	4.7		26.3%
1	29.7	5.7		35.3%
2	35.7	7.7		43.3%
3	38.7	7.7	0.7	47.7%
4	40.7	10.3	1.0	52.0%
5	41.7	12.0	0.7	54.3%

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Table C-2. DSEIS method used to compute taxon-specific estimates of impingement and Region 4 river densities for SOC analysis.

Property of Method		Impingement Density	Region 4 River Density	Consistency Between Measures of Impingement and River Densities
Input Data	Variables	# of fish impinged at Unit 2 # of impingement samples at Unit 2	BSS average # of fish per seine haul FSS average # of fish per 1000 m3	
	Frequency	Per week of sampling	Per week of sampling	
Summary Statistics	Seasonal (Year-specific)	Ratio of: 1) Total # of fish impinged, over 2) Average # of impingement samples per week	N/A	
	Annual	Sum of season-specific ratios	Sum of: 1) 75th percentile of week-specific BSS values (# of fish per 450 m2), and 2) 75th percentile of week-specific FSS values (# of fish per 1000 m3)	
	Overall statistic used for ranking species	75th Percentile of annual sums	Maximum of annual sums	No
	Units of statistic used for ranking species	# of fish impinged divided by # of impingement samples	# of fish per unspecified (and species-specific) extent of river habitat	No
Years of Data		1975-1990	1979-1990	No
Life Stages		All ages collected	Juveniles only	No

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Table C-3. Alternative method (inconsistencies and inappropriate use of data rectified) for computing taxon-specific estimates of impingement and Region 4 river densities for SOC analysis.

Property of Method		Impingement Density	Region 4 River Density	Consistency Between Measures of Impingement and River Densities
Input Data	Variables	# of fish impinged at Units 2 and 3 Volume of cooling water withdrawn by Units 2 and 3	BSS standing crop (# of fish) FSS standing crop (# of fish) Region 4 river volume	
	Frequency	Per week of sampling	Per week of sampling	
Summary Statistics	Seasonal (Year-specific)	N/A	Sum of: 1) Average weekly BSS standing crop (# of fish) 2) Average weekly FSS standing crop (# of fish)	
	Annual	Ratio of: 1) Total # of fish impinged at Units 2 and 3 over all weeks of sampling, over 2) Sum of volume of cooling water withdrawn by Units 2 and 3 over all weeks of sampling	Ratio of: 1) Average of seasonal standing crop estimates for Region 4, over 2) Region 4 river volume	
	Overall statistic used for ranking species	75th percentile of annual ratios	75th percentile of annual ratios	Yes
	Units of statistic used for ranking species	# of fish per 10^6 m3	# of fish per 10^6 m3	Yes
Years of Data		1979-1990	1979-1990	Yes
Life Stages		All ages collected	All ages collected	Yes

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Table C-4. DSEIS method used to compute taxon-specific estimates of entrainment and Region 4 river densities for SOC analysis.

Property of Method		Entrainment Density	Region 4 River Density	Consistency Between Measures of Impingement and River Densities
Input Data	Variables	Mean density # of organisms entrained at Units 2 and 3 # of entrainment samples	BSS average # of fish per seine haul FSS average # of fish per 1000 m3	
	Frequency	Per week of sampling	Per week of sampling	
Summary Statistics	Seasonal (Year-specific)	Ratio of: 1) Average seasonal entrainment density for a single taxon, over 2) Average seasonal entrainment density for all RIS combined	N/A	
	Annual	N/A	Sum of: 1) 75th percentile of week-specific BSS values (# of fish per 450 m2), and 2) 75th percentile of week-specific FSS values (# of fish per 1000 m3)	
	Overall statistic used for ranking species	Maximum of all year-specific seasonal ratios (note: the January-March season was only sampled in 1986)	Maximum of annual sums	No
	Units of statistic used for ranking species	proportion of seasonal total (over all RIS) entrainment density	# of fish per unspecified (and species-specific) extent of river habitat	No
Years of Data		1981, and 1983-1987	1979-1990	No
Life Stages		Eggs, Larvae, and Juveniles	Juveniles only	No
Taxonomic Substitutions		Herring family results were used for Alewife, American Shad, and Blueback Herring Striped Bass results were used for White Perch and Striped Bass	No substitutions were made	No

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Table C-5. Alternative method (inconsistencies and inappropriate use of data rectified) for computing taxon-specific estimates of entrainment and Region 4 river densities for SOC analysis.

Property of Method		**Entrainment Density**	**Region 4 River Density**	**Consistency Between Measures of Impingement and River Densities**
Input Data	Variables	# of organisms entrained by Units 2 and 3 Volume of cooling water withdrawn by Units 2 and 3	LRS standing crop (# of fish) Region 4 river volume	
	Frequency	Per week of sampling	Per week of sampling	
Summary Statistics	Seasonal (Year specific)	Sum of weekly estimates of number of organisms entrained by Units 2 and 3 Sum of weekly cooling water withdrawal volumes for Units 2 and 3	Average of weekly standing crop estimates	
	Annual	Ratio of: 1) Annual total # of organisms entrained by Units 2 and 3, over 2) Annual total volume of cooling water withdrawn by Units 2 and 3	Ratio of: 1) Average of seasonal standing crop estimates for Region 4, over 2) Region 4 river volume	
	Overall statistic used for ranking species	75th percentile of annual ratios	75th percentile of annual ratios	Yes
	Units of statistic used for ranking species	# of organisms per 10^6 m3	# of organisms per 10^6 m3	Yes
Years of Data		1981, and 1983-1987	1981, and 1983-1987	Yes
Life Stages		Eggs, Larvae and Juveniles	Eggs, Larvae and Juveniles	Yes
Taxonomic Substitutions		Alewife, Blueback Herring, and unidentified Alosids treated collectively as River Herring Unidentified Morone spp allocated to Striped Bass and White Perch	Alewife, Blueback Herring, and unidentified Alosids treated collectively as River Herring Unidentified Morone spp allocated to Striped Bass and White Perch	Yes

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Table C-6. Copy of DSEIS analysis results for Strength of Connection (SOC) for impingement from Tables I-30 and H-16.

Species	DSEIS Measure of Impingement Density (from Table I-30)	DSEIS Impingement Density Rank (from Table I-30)	DSEIS Measure of Region 4 River Density (from Table I-30)	DSEIS Region 4 River Density Rank (from Table I-30)	DSEIS Ratio of Impingement Rank to River Rank (from Table I-30)	DSEIS SOC Score for Impingement (from Table H-16)
ALEWIFE	279	7	6.94	10	0.70	2
BAY ANCHOVY	4475	15	391.41	17	0.88	2
AMERICAN SHAD	426	8	23.27	15	0.83	2
BLUEFISH	669	10	1.66	6	1.67	4
HOGCHOKER	3890	13	4.27	8	1.63	4
ATLANTIC MENHADEN	150	5	0.00	1	.	.
BLUEBACK HERRING	4251	14	38.43	16	0.88	2
RAINBOW SMELT	440	9	3.12	7	1.29	2
SHORTNOSE STURGEON	0	1	0.00	1	.	.
SPOTTAIL SHINER	94	3	5.80	9	0.33	1
ATLANTIC STURGEON	4	2	0.00	1	.	.
STRIPED BASS	1146	11	15.24	13	0.85	2
ATLANTIC TOMCOD	13690	16	11.94	12	1.33	2
WHITE CATFISH	182	6	0.03	5	1.20	2
WHITE PERCH	25599	17	22.56	14	1.21	2
WEAKFISH	1330	12	11.11	11	1.09	2
GIZZARD SHAD	127	4	0.00	1	.	.

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Table C-7. Results from alternative analysis of impingement and Region 4 river densities

Species	Measure of Impingement Density	Impingement Density Rank	Measure of Region 4 River Density	Region 4 River Density Rank	Ratio of Impingement Rank to Density Rank	SOC Score for Impingement
ALEWIFE	8.6	7	665	8	0.88	2
BAY ANCHOVY	142.9	15	179,550	17	0.88	2
AMERICAN SHAD	24.0	10	978	10	1.00	2
BLUEFISH	12.1	9	310	7	1.29	2
HOGCHOKER	47.4	13	46,835	16	0.81	2
ATLANTIC MENHADEN	2.3	3	0	1	.	.
BLUEBACK HERRING	68.6	14	13,285	15	0.93	2
RAINBOW SMELT	11.3	8	927	9	0.89	2
SHORTNOSE STURGEON	< 0.1	1	0	1	.	.
SPOTTAIL SHINER	3.8	4	143	6	0.67	2
ATLANTIC STURGEON	0.3	2	5	4	0.50	2
STRIPED BASS	46.1	12	1,763	11	1.09	2
ATLANTIC TOMCOD	250.0	16	3,494	13	1.23	2
WHITE CATFISH	4.5	5	123	5	1.00	2
WHITE PERCH	995.6	17	3,609	14	1.21	2
WEAKFISH	36.6	11	2,304	12	0.92	2
GIZZARD SHAD	8.3	6	0	1	.	.

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Table C-8. Copy of DSEIS analysis results for Strength of Connection (SOC) for entrainment from Tables I-31, I-30, and H-16.

Species	DSEIS Measure of Entrainment Density (from Table I-31)	DSEIS Entrainment Density Rank (from Table I-31)	DSEIS Measure of Region 4 River Density (from Table I-30)	DSEIS Region 4 River Density Rank (from Table I-30)	DSEIS Ratio of Entrainment Rank to River Rank (from Table I-30)	DSEIS SOC Score for Entrainment (from Table H-16)
ALEWIFE	40.28	13	6.94	10	1.3	2
BAY ANCHOVY	99.10	17	391.41	17	1.0	2
AMERICAN SHAD	40.28	13	23.27	15	0.9	2
BLUEFISH	0.01	5	1.66	6	0.8	2
HOGCHOKER	0.61	8	4.27	8	1.0	2
ATLANTIC MENHADEN	0.32	7	0.00	1	.	.
BLUEBACK HERRING	40.28	13	38.43	16	0.8	2
RAINBOW SMELT	63.72	16	3.12	7	2.3	4
SHORTNOSE STURGEON	0.00	1	0.00	1	.	.
SPOTTAIL SHINER	0.00	4	5.80	9	0.4	1
ATLANTIC STURGEON	0.00	1	0.00	1	.	.
STRIPED BASS	37.94	11	15.24	13	0.8	2
ATLANTIC TOMCOD	33.47	10	11.94	12	0.8	2
WHITE CATFISH	0.10	6	0.03	5	1.2	2
WHITE PERCH	37.94	11	22.56	14	0.8	2
WEAKFISH	2.20	9	11.11	11	0.8	2
GIZZARD SHAD	0.00	1	0.00	1	.	.

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Table C-9. Results from alternative analysis of entrainment and Region 4 river densities

Species	Measure of Entrainment Density	Entrainment Density Rank	Measure of Region 4 River Density	Region 4 River Density Rank	Ratio of Entrainment Rank to Density Rank	SOC Score for Entrainment
BAY ANCHOVY	730,827	16	495,271	16	1.00	2
AMERICAN SHAD	4,037	9	8,137	11	0.82	2
BLUEFISH	14	5	161	7	0.71	2
HOGCHOKER	2,449	8	200	8	1.00	2
ATLANTIC MENHADEN	177	7	0	1	.	.
RAINBOW SMELT	10,773	12	4,813	10	1.20	2
SHORTNOSE STURGEON	0	1	0	1	.	.
SPOTTAIL SHINER	8	4	2	6	0.67	2
ATLANTIC STURGEON	0	1	0	1	.	.
STRIPED BASS	66,607	14	218,162	13	1.08	2
ATLANTIC TOMCOD	9,904	11	63,546	12	0.92	2
WHITE CATFISH	14	6	2	5	1.20	2
WHITE PERCH	61,793	13	220,041	14	0.93	2
WEAKFISH	8,647	10	479	9	1.11	2
RIVER HERRING	503,500	15	295,753	15	1.00	2
GIZZARD SHAD	0	1	0	1	.	.

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Appendix D

Development and Application of a Modified WOE Approach for Assessing Impacts of IP2 and IP3 Cooling Systems on the Hudson River Fish Community

Introduction

The Weight-of-Evidence (WOE) approach used in the DSEIS was originally developed for applications (contaminated site assessments) that differ in many important ways from power plant cooling system assessments. This appendix describes a modified version of the WOE approach documented in Appendix H of the DSEIS, that more accurately characterizes the potential impacts of entrainment and impingement at IP on RIS fish populations.

Documentation of changes to WOE approach

Key changes made include:

1. Elimination of inconsistencies in the trends analysis and in analysis of diet preferences for some RIS.
2. Reweighting of the lines of evidence used in the population trends analysis, to account for the fact that riverwide abundance trends are more relevant measures of population status than are abundance trends in the immediate vicinity of IP2 and IP3.
3. Adjustment of the population trends WOE scores for marine species to account for the fact that many or most members of these populations never enter the Hudson and are not susceptible to entrainment or impingement at IP and IP3.
4. Reweighting of the lines of evidence used in the SOC analysis to account for the low impact of impingement relative to entrainment (section 2 of this report) and the high uncertainty associated with predictions concerning the importance of indirect effects (section 4.3 of this report).
5. Inclusion of the attribute scaling factors developed by Menzie et al. (1996) to accord more weight to attributes that are closely related to determination of causation.
6. Inclusion of the "availability of objective measures" attribute from Menzie et al. (1996) to accord more weight to attributes that directly measure quantities of interest for impact assessment.

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7. Modification of the impact category assignment scheme to eliminate a bias inherent in the scheme used in the DSEIS.
8. Addition of two additional lines of evidence to the SOC analysis, to more directly address direct and indirect impacts of entrainment and impingement on Hudson River fish populations.

Each of these changes is documented below.

Elimination of inconsistencies

As discussed in section 4, the method NRC used to calculate SOC scores contained several significant errors and inconsistences. These scores were recalculated using a corrected method. In addition, assignments of prey species to some RIS in the DSEIS conflict with published information. These assignments were corrected.

Reweighting of the lines of evidence used in the population trends analysis

The attribute weighting scheme used in the DSEIS to evaluate the use and utility of the three long-term trends measures assigns highest weights to river Segment 4 trends (Appendix H, Table H-9). The rationale for this weighting (Page H-30, lines 32-34) was that measurements made close to IP2 and IP3 are the most directly relevant to the assessment. However, all of the RIS addressed in the DSEIS are highly mobile and most conduct extensive seasonal migrations within the Hudson. Moreover, distributions of fish in the immediate vicinity of IP2 and IP3 are affected by shifts in environmental characteristics (e.g., salinity) that are unrelated to changes in abundance. Any impacts of IP2 and IP3 on RIS populations are likely to be spread across the entire riverwide populations, not localized in the vicinity of IP2 and IP3, Therefore, riverwide population trends are more relevant to the impact assessment than are river segment trends. To account for this, the weightings in Table H-9 for river segment trends and riverwide trends were reversed. Entergy agrees that coastal RIS trends are less relevant than either riverwide trends or river segment trends, so this line of evidence continues to receive the lowest weight.

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Adjustment of the population trends WOE scores for marine species

Bluefish, weakfish, and Atlantic menhaden are marine species that spawn offshore and migrate into estuaries such as the Hudson River as juveniles. These species are managed by the ASMFC as single coastwide populations (ASMFC 1989, 2001, 2002), and utilize the Delaware River, Chesapeake Bay, and many other coastal estuaries in addition to the Hudson. Such species have a much lower exposure to IP2 and IP3 than do anadromous and estuarine species for which all members of the population are susceptible to IP2 and IP3 for at least some portion of their life cycles. To account for this reduced susceptibility, the population trends WOE scores for marine species are multiplied by 0.5.

Reweighting of the lines of evidence used in the SOC analysis to account for the low impact of impingement relative to entrainment and the high uncertainty associated with predictions concerning the importance of indirect effects

In the SOC analysis the DSEIS weights the use and utility of impingement losses equal to, and for some attributes higher than, the weights used for entrainment losses. The rationale for this weighting is that the focus of the assessment is on the abundance of YOY fish, not early life stages of fish. However, since previous assessments have consistently shown that impingement impacts are small relative to entrainment impacts, impingement losses should be accorded a low, rather than a high, weight relative to entrainment losses.

In addition, the attribute weighting scheme used in the DSEIS to evaluate the use and utility of the entrainment and impingement data assigns highest weights to losses of prey caused by entrainment and impingement (Appendix H, Table H-10). The rationale for this weighting (Page H-30, line 39 to Page H-31, Line 1) is that "…the loss of a food base for YOY predators has a greater impact on more individuals than the direct loss of single individuals." However, as demonstrated in Attachment 1 to this appendix, the studies cited by the NRC staff to support the importance of food web-related effects do not support the conclusions drawn by NRC. Moreover, diet studies of Hudson River predators such as bluefish, striped bass, and white perch show that these species feed on a wide variety of prey and can easily switch from one prey species to another in response to changes in prey abundance. To account for this, the weightings in Table H-9 for RIS

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prey impingement and entrainment were reduced so that this line of evidence now has a lower, rather than a higher, aggregate weighting than direct impingement and entrainment losses.

Inclusion of the attribute scaling factors developed by Menzie et al. (1996)

Table 1 of Menzie et al. (1996) lists scaling factors to be applied to the individual attributes used to score different lines of evidence. Although these factors were defined subjectively through a survey of ecological risk assessment practitioners, they reflect a rough consensus among practitioners concerning the relative importance of different attributes. For example, the attribute with the highest weighting according to Menzie et al. (1996) is "degree of association" between the measure of impact being evaluated and the valued environmental component it is intended to address. Menzie et al. (1996) accorded lower weights to attributes related to the details of study design. Because degree of association and other related attributes (e.g., correlation of stressor to response) are key aspects of causality determination, they should receive higher weights than other attributes. To account for this, the attribute weightings provided in Table 1 of Menzie et al. (1996) were used to weight the attributes included in the DSEIS WOE approach.

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Inclusion of the "availability of objective measures" attribute from Menzie et al. (1996)

The WOE approach of Menzie et al. (1996) includes an attribute identified as "availability of an objective measure for judging environmental harm." This attribute relates to the ability to judge measurements against well-accepted standards criteria, or objective measures indicative of harm to biological resources. Examples provided in the text include water quality criteria, sediment quality criteria, biological indices, and toxicity or exposure thresholds recognized by the scientific or regulatory communities as measures of environmental harm. Measures of population abundance or mortality would also be examples of such "objective measures." This attribute was not used in the DSEIS, but it is included in this revised WOE approach.

Modification of the impact category assignment scheme

The impact category definitions used in the DSEIS are listed on Page H-34, lines 13-18. In this scheme, WOE scores of 2.0 are assigned to the category "Moderate-Large"

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and scores greater than 2 are assigned to the category "large." For the population trends LOE, this means that if, for some species, all of the trends analyses were assigned a score of 2 (Moderate impact), then the final WOE score for that species (from the equation on page H-34, line 17) would be 2.0, and that species would be assigned to the impact category "Moderate-Large." With respect to the SOC line evidence, if the rank order of proportions of impinged and entrained species relative to total impingement and entrainment were exactly the same as rank order of abundance of species relative to total abundance in the river, then all species would receive SOC scores of 2 for RIS entrainment, RIS impingement, prey entrainment, and prey impingement. The final WOE scores for all species would be 2.0, and all would be assigned to the impact category "Medium-High."

The lowest possible score for any attribute in the WOE approach used in the DSEIS is 1, and the highest is 4. The value 2 is below the midpoint of the range of possible scores (2.5) and, in the case of the SOC line evidence, is the value that would be assigned to all RIS if all are entrained and impinged in proportion to their abundance in the river. Categorizing the WOE score of 2.0 as "Moderate-Large" or "Medium-High," and categorizing all higher scores as High" or "Large," clearly biases the conclusions of the assessment toward higher impact categories. It appears more reasonable, and still conservative, to classify lines of evidence with a score of 2.0 as "Moderate," and to categorize higher and lower scores according to their deviation from the value of 2.0. The following classification scheme is used in the revised approach:

- Small (low) impact: WOE score <1.5
- Small-moderate (low-medium) impact: WOE score ≥ 1.5 but less than 2.0
- Moderate (medium) impact: WOE score = 2.0
- Moderate-large (medium-high) impact: WOE score >2.0 but <2.5
- Large (high) impact: WOE score ≥ 2.5.

Addition of two additional lines of evidence to the SOC analysis

As noted in section 4.2 of the comment report, all four of the components of the SOC (LOE-2) analysis are based on rankings of relative susceptibility of populations to entrainment and impingement. Rank orders of RIS within entrainment and impingement collections are compared to rank orders in the river. A score of 1 is assigned if a species

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appears to be underrepresented in entrainment or impingement samples, a score of 4 is assigned if a species appears overrepresented in entrainment or impingement samples, and a score of 2 is assigned if a species appears to be proportionally represented in entrainment or impingement samples. In addition to being subject to the biases and inconsistencies discussed in section 4.2 of the comment report, the ranking scheme used in the DSEIS has no direct connection to the absolute magnitude of impacts of entrainment or impingement on any species. The actual magnitude of impingement or entrainment-related impacts on any species depends not on its representation relative to other species in entrainment and impingement collections, but on whether the entrainment and impingement losses significantly affect the ability of the population to sustain itself and perform its normal ecological functions.

As discussed in section 5 of the comment report, the conditional mortality rate (CMR) provides a direct measure of the mortality imposed on fish populations by entrainment or impingement, expressed as the fraction by which the abundance of YOY fish is reduced because of entrainment or impingement. Since YOY and yearling fish are identified on p. H-27 (lines 5-6) as the primary focus for the DSEIS, the CMR is clearly a relevant metric for use in the assessment. Moreover, the CMR is well-documented in peer-reviewed scientific literature (Barnthouse et al. 1984, Boreman et al. 1981, Boreman and Goodyear 1988, Barnthouse and Van Winkle 1988). Although insufficient as a stand-alone indicator of potential long-term impacts because it does not account for biological compensation (AEI report, Section 2.3) the CMR can be used for comparative purposes, to roughly classify populations with low, medium, or high strength of connection to IP2 and IP3.

CMRs for many of the RIS, for the years 1974-1997, are provided in Section V of CHGE et al. (1999) and summarized in Table D-1. This table includes annual and long-term average Indian Point-specific CMRs for both entrainment and impingement. These estimates are consistent with all previous assessments of the impacts of IP2 and IP3 on fish populations in demonstrating that impingement impacts are consistently lower than entrainment impacts. In the revised assessment approach, combined CMRs for impingement and entrainment are used to quantify the strength of connection of IP2 and IP3 to fish populations of the Hudson River. A low strength of connection (score =1)

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was assigned if the long-term combined average CMR for impingement and entrainment (IP2 and IP3 combined) over the period 1974-1997 was less than 0.05. A medium strength of connection (score=2) was assigned if the long-term combined average CMR for impingement and entrainment (IP2 and IP3 combined) was greater than 0.05 but less than 0.1. A high strength of connection (score = 4) was assigned if the long-term combined average CMR for entrainment and impingement (IP2 and IP3 combined) was equal to or greater than 0.1.

These classification criteria are very conservative. As discussed in Section 4.2 of the AEI report (Barnthouse et al. 2008), rates of fishing mortality allowed by the ASMFC and other fisheries management agencies have far greater impacts on the reproductive capacity of fish populations than would be caused by a CMR of 0.1. Moreover, as discussed in Section 2.2 of the AEI report, adult female fish belonging to species that utilize unstable environments like the Hudson River typically spawn 100,000 to 1,000,000 eggs or more per year. Of these, only a very small fraction of 1 % will to survive to become 1-year-old fish. In the case of striped bass, for example, Secor and Houde (1995) estimated that more than 99.99% of young striped bass die within 60 days following spawning. The loss of an additional 10% would likely be impossible to detect through monitoring.

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CMRs for prey species can be used in a similar way to evaluate the strength of connection between IP2 and IP3 and prey RIS. CHGEC (1999) contains CMR values for most of the prey species addressed in the DSEIS, including striped bass, white perch, American shad, blueback herring, alewife, Atlantic tomcod, bay anchovy, and spottail shiner. These values were used to assign SOC scores that account for the potential impacts of IP2 and IP3 on prey species. RIS fish species that feed primarily on invertebrates were assigned a low strength of connection (score=1) for prey impacts. Species that feed primarily on fish were assigned a low strength of connection (score=1) if less than 1/3 of RIS on which they are known to prey had CMR values greater than 0.05, a medium strength of connection (score=2) if between1/3 and 2/3 of the RIS on which they are know to prey had CMR values greater than 0.05, and a high strength of connection (score=4) if more than 2/3 of the RIS on which they are known to prey had CMR values greater than 0.05. This approach is conservative, because the cut-off value

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used 0.05, implies only that the prey species in question had at least a medium strength-of-connection to IP2 and IP3, not that IP2 and IP3 had any actual impact on the abundance of these species.

Application of Revised Approach to RIS

The revised use and utility scores for the attributes used to evaluate the RIS population trends LOE (LOE-1) are listed in Table D-2. As discussed above, differences between the revised weighting approach and the original approach used in the DSEIS result from reweighting of the three trends indices to give higher weight to the riverwide trends data, use of the attribute scaling factors from Menzie et al. (1996), and inclusion of an additional attribute, availability of an objective measure for judging environmental harm. The reweighting simply reversed the attribute utility scores for the riverwide and river segment trends. Because population abundance relates directly to the status of the a population and because objective measures of harm (e.g., abundance thresholds requiring management action) can at least in principle be defined for all three trends measures, all were given the same high score (3) for this attribute.

The use of the attribute scaling factors from Menzie et al. (1996) required a change in the method used to calculate the overall utility score for each measure. To preserve the original 1-3 range of utility scores used in the DSEIS, the following procedure was used. First, the score for each attribute was multiplied by the applicable attribute scaling factor. Next, the scaled attribute scores were averaged. Rescaling to the original 1-3 range was then performed by multiplying each attribute average by a rescaling factor equal to the number of attributes evaluated (8) divided by the sum of the scaling factors (4.5) from Menzie et al. (1996).

The revised use and utility scores for the attributes used to evaluate the measures included in the strength-of-connection LOE (LOE-2) are listed in Table D-3. As discussed above, differences between the revised weighting approach and the original weighting approach used in the DSEIS result from inclusion of the "objective measure" attribute, use of the attribute scaling factors from Menzie et al. (1996), reductions in the relative weights given to prey entrainment and impingement, and inclusion of the RIS CMR and prey CMR as additional measures of SOC. The RIS CMR and prey CMR measures were assigned the maximum score (3) because these measures are directly

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related to the direct (RIS CMR) and indirect (prey CMR) impacts of IP2 and IP3 on Hudson River aquatic communities. The RIS and RIS prey entrainment and impingement measures receive low scores for this attribute because they relate only to relative susceptibility, and not to actual impacts of IP2 and IP3 on RIS populations or prey populations. Weightings for most attributes were reduced to the minimum possible value for RIS impingement and prey impingement, because of the low impact of impingement, relative to entrainment, found in all previous impact assessments for IP2 and IP3. Rescaling of the overall utility score for each measure was performed using the procedure described above for the population trends LOE.

Except where noted, the species-specific scores for each attribute are unchanged from the values used in the DSEIS. Although the impact conclusions reached for each species apply formally to impingement and entrainment combined, it should be recognized that, except for white perch, the conclusions should apply to entrainment alone. As shown in Table D-1, for all other species impingement makes a negligible contribution to overall CWIS mortality at IP2 and IP3.

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The revised WOE approach was applied to 14 of the 17 RIS fish species. For the remainder (Atlantic menhaden, Atlantic sturgeon, and gizzard shad) there was insufficient information to apply either the original or the revised WOE approach. Shortnose sturgeon populations studies reviewed in Appendix E to the DSEIS and discussed in Section 3 of the comment report clearly demonstrate that the Hudson River population of species has greatly increased in abundance since the 1970s. In addition, impingement and entrainment data summarized in Section 3 clearly demonstrate that shortnose sturgeon are rarely impinged, and either rarely or never entrained at IP2 and IP3. Shortnose sturgeon feed exclusively on invertebrates, therefore, indirect effects of entrainment or impingement of sturgeon prey should be no higher than for any other fish species that feed on invertebrates. For these reasons, shortnose sturgeon was included in the revised assessment.

All of these applications should be considered conservative, screening-level assessments because they are qualitative and do not employ the rigorous hypothesis-testing criteria used in the AEI Report (Barnthouse et al. 2008). Declines in population abundance, together with CMR values above the conservative threshold (0.1) used in the

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revised WOE scheme are assumed to provide strong evidence that IP2 and IP3 have adversely affected a population. As in the case of Atlantic tomcod (below), application of the more rigorous approach used in the AEI report could demonstrate that any observed declines are more strongly associated with other stressors.

The following subsections provide summaries of the application to six of these species. Results for all 14 are listed in Tables D-4 through D-6.

Bluefish

Results for the population line of evidence are provided in Table D-4. The unadjusted score for LOE-1 is 2.5, the same value documented in the DSEIS. However, because bluefish is a marine species, this score is multiplied by 0.5, resulting in an adjusted WOE score of 1.2 (Small) for this LOE.

Results for LOE-2 are provided in Table D-5. Scores for this line of evidence are substantially lower than the scores documented in the DSEIS. As discussed in section 4.2, after correction of errors, all RIS received scores of 2 for entrainment and impingement. The DEIS did not provide CMRs for bluefish, however, a comparison of total bluefish impingement losses to the coastwide abundance of bluefish (Attachment 2 to this appendix) shows average annual impingement of bluefish amounts to less than 0.01% of coastwide abundance. As noted in Section 2 of the DSEIS, bluefish are rarely entrained at IP2 and IP3. Therefore, bluefish received a score of 1 for the RIS CMR measure. Published studies of the diets of bluefish in the Hudson River (Juanes et al. 1993, Buckel and Conover 1997) show that this predator consumes a wide variety of prey species present in brackish reaches of the Hudson. Eight of the RIS addressed in the DSEIS (alewife, American shad, blueback herring, bay anchovy, spottail shiner, striped bass, white perch, and Atlantic tomcod) , have been found in stomachs of bluefish collected from the Hudson (Juanes et al. 1993, Buckel and Conover 1997). CMRs for all of these species are available and are listed in Table 3. Of these eight species, four have CMR values greater than 0.05. Therefore bluefish was assigned a score of 2 for the prey CMR measure. The overall WOE score for the LOE-2 of evidence is 1.7 (Low to Medium).

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Impacts of the IP2 and IP3 cooling systems on bluefish are summarized in Table D-6. Because the population line of evidence is categorized as Small and the SOC evidence is categorized as Low to Medium, the final integrated impact is categorized as SMALL.

White perch

Results for LOE-1 are provided in Table D-4. The unadjusted score for the LOE-1 is 3.0, slightly higher than the value documented in the DSEIS. Because white perch is an estuarine species, no adjustment is made to this score and the final value for this LOE is 3.0 (Large).

Scores for LOE-2 are provided in Table D-5. These scores are substantially lower than the scores documented in the DSEIS. As discussed in section 4.2 of the comment report, after correction of errors, all RIS received scores of 2 for entrainment and impingement. Table D-1 provides white perch CMRs for the years 1974 through 1997. The average CMR for IP2 and IP3, for entrainment and impingement combined, was 0.066. Therefore, white perch received a score of 2 for the RIS CMR measure. Bath and O'Connor (1985) showed that, contrary to the diet assumption made in the DSEIS, white perch in the Hudson River consume fish eggs, but otherwise feed primarily on invertebrates. Therefore, white perch received a score of 1 for the prey CMR measure. The final WOE value for this LOE is 1.8 (Low to Medium).

Impacts of the IP2 and IP3 cooling systems on white perch are summarized in Table D-6. Because the population line of evidence is categorized as Large and the SOC line of evidence is categorized as Low to Medium, the final integrated impact is categorized as SMALL to MODERATE.

Hogchoker

Results for LOE-1 are provided in Table D-4. The unadjusted score for the LOE-1 is 2.1, slightly lower than the value documented in the DSEIS. Because hogchoker is an estuarine species, no adjustment is made to this score and the final value for this LOE is 2.1 (Moderate to Large).

Results for LOE-2 are provided in Table D-5. Scores for this line of evidence are substantially lower than the scores documented in the DSEIS. As discussed in section 4.2

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of the comment report, after correction of errors, all RIS received scores of 2 for entrainment and impingement. The DEIS did not provide CMRs for hogchoker. However, Attachment 2 to this appendix compares hogchoker entrainment and impingement, expressed as equivalent abundance of age 1 fish, to the total number of hogchoker present in the river, also expressed as equivalent age 1 fish. This analysis shows that annual average entrainment and impingement losses for hogchoker are less than 1% of the annual average abundance of hogchoker in the Hudson River. Therefore, hogchoker was assigned a score of 1 for the RIS CMR measure. As noted in the DSEIS, hogchokers feed on benthic invertebrates, therefore, hogchoker received a score of 1 for the prey CMR measure. The final WOE value for this LOE is 1.5 (Low to Medium).

Impacts of the IP2 and IP3 cooling systems on hogchoker are summarized in Table D-6. Because the population line of evidence is categorized as Moderate to Large and the SOC line of evidence is categorized as Low to Medium, the final integrated impact is categorized as SMALL to MODERATE.

Rainbow smelt

Results forLOE-1 are provided in Table D-4. The unadjusted score for the LOE-1 is 2.7, slightly lower than the value documented in the DSEIS. Because rainbow smelt is an anadromous species, no adjustment is made to this score and the final value for this LOE is 2.7 (Large).

Results for LOE-2 are provided in Table D-5. Scores for this line of evidence are substantially lower than the scores documented in the DSEIS. As discussed in section 4.2 of the comment report, after correction of errors, all RIS received scores of 2 for entrainment and impingement. The DEIS did not provide CMRs for rainbow smelt, so this measure is not scored. As noted in the DSEIS, rainbow smelt feed on invertebrates, therefore, rainbow smelt received a score of 1 for the prey CMR measure. The final WOE value for this LOE is 1.7 (Low to Medium).

Impacts of the IP2 and IP3 cooling systems on rainbow smelt are summarized in Table D-6. Because the population line of evidence is categorized as Large and the SOC line of evidence is categorized as Low to Medium, the final integrated impact is categorized as SMALL to MODERATE.

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Striped bass

Results for LOE-1 are provided in Table D-4. The unadjusted score for the LOE-1 is 1.0, the same value documented in the DSEIS. Because striped bass is an anadromous species, no adjustment is made to this score and the final value for this LOE is 1.0 (Small).

Scores for the LOE-2 are provided in Table D-5. These scores are substantially lower than the scores documented in the DSEIS. As discussed in section 4.2 of the comment report, after correction of errors, all RIS received scores 2 for entrainment and impingement. Table D-1 provides striped bass CMRs for the years 1974 through 1997. The average CMR for IP2 and IP3, for entrainment and impingement combined, was 0.080. Therefore, striped bass received a score of 2 for the RIS CMR measure. Striped bass like bluefish, are piscivorous. Striped bass feed on a variety of prey species, including blueback herring, alewife, American shad, Atlantic tomcod, white perch, and spottail shiner (Gardinier and Hoff 1982). Of these seven RIS prey species, three had long-term average CMRs greater than 0.05. Therefore, striped bass was assigned a score of 2 for the prey CMR measure. The overall WOE score for the SOC line of evidence is 2.0 (Medium).

Impacts of the IP2 and IP3 cooling systems on striped bass are summarized in Table D-6. Because the population line of evidence is categorized as Small and the SOC line of evidence is categorized as Medium, the final integrated impact is categorized as SMALL.

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Atlantic tomcod

Results for LOE-1 are provided in Table D-4. The unadjusted score for the LOE-1 is 2.2, slightly larger than the value documented in the DSEIS. Because Atlantic tomcod is an estuarine species, no adjustment is made to this score and the final value for this LOE is 2.2 (Moderate to Large).

Scores for LOE-2 are provided in Table D-5. These scores are substantially lower than the scores documented in the DSEIS. As discussed in section 4.2 of the comment report, after correction of errors, all RIS species received scores of 2 for entrainment and impingement. Table D-1 provides Atlantic tomcod CMRs for the years 1974 through 1997. The average CMR for IP2 and IP3, for entrainment and impingement combined,

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was 0.127. Therefore, Atlantic tomcod received a score of 4 for the RIS CMR measure. Atlantic tomcod feed on invertebrates, therefore they were assigned a score of 1 for the prey CMR measure. The overall WOE score for the SOC line of evidence is 2.4 (Medium to High).

Impacts of the IP2 and IP3 cooling systems on Atlantic tomcod are summarized in Table D-6. Because LOE-1 is categorized as Moderate to Large and LOE-2 is categorized as Medium to High, the final integrated impact is categorized as MODERATE to LARGE. It should be noted that the Atlantic tomcod assessment included in the AEI report considered all of the lines of evidence used here, as well as lines of evidence relating to other potential causes of the recent decline in abundance of Atlantic tomcod in the Hudson River. The AEI report found that striped bass predation is a more likely cause of the decline than are entrainment and impingement at IP2 and IP3.

40-ttttt-AE contd.

References

Atlantic States Marine Fisheries Commission (ASMFC) 1989. Fishery management plan for the bluefish fishery. Fisheries Management Report No. 14 of the Atlantic States Marine Fisheries Commission, Washington, D.C.

ASMFC 2001. Amendment 1 to the Interstate Fishery Management Plan for Atlantic menhaden. Fisheries Management Report No. 37 of the Atlantic States Marine Fisheries Commission, Washington, D.C.

ASMFC 2002. Amendment 4 to the Insterstate Fishery Management Plan for weakfish. Fishery Management Report no. 39 of the Atlantic States Marine Fisheries Commission, Washington, D.C.

Barnthouse, L.W., and W. Van Winkle. 1988. Analysis of impingement impacts on Hudson River fish populations. *American Fisheries Society Monograph* 4:182-190.

Barnthouse, L.W., J.Boreman, S.W. Christensen, C.P. Goodyear, W. Van Winkle, and D.S. Vaughan. 1984. Population biology in the courtroom: the Hudson River controversy. *Bioscience* 34:14-19.

Barnthouse, L. W., D. G. Heimbuch, W. Van Winkle, and J. R. Young. 2008. Entrainment and impingement at IP2 and IP3: A biological assessment. Prepared for Entergy Nuclear Operations, Inc.

Bath, D. W., and J. M. O'Connor. 1985. Food preferences of white perch in the Hudson River estuary. New York Fish and Game Journal 32:63-70.

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Boreman, J., C. P. Goodyear, and S. W. Christensen. 1981. An empirical methodology for estimating entrainment losses at power plants sited on estuaries. Transactions of the American Fisheries Society 110:253-260.

Boreman, J., and C. P. Goodyear. 1988. Estimates of entrainment mortality for striped bass and other fish species in the Hudson River estuary. American Fisheries Society Monograph 4:152-160.

Buckel , J.A., and D. O. Conover. 1997. Movements, feeding period, and daily ration of piscivorous young-of-the-year bluefish *Pomatomus saltatrix* in the Hudson River estuary. Fishery Bulletin 95:665-679.

Central Hudson Gas and Electric Corporation; Consolidated Edison Company of New York, Inc.; New York Power Authority; and Southern Energy New York (DSEIS). 1999. Draft Environmental Impact Statement for State Pollutant Discharge Elimination System Permits for Bowline Point, Indian Point 2 and 3, and Roseton Steam Electric Generating Stations. December 1999.

Gardinier, M. and T.B. Hoff. 1982. Diet of striped bass in the Hudson River estuary. New York Fish and Game Journal. Vol. 29, No. 2. p152-165.

Menzie, C., M. H. Henning, J. Cura, K. Finkelstein, J. Gentile, J. Maughan, D. Mitchell, S. Petron, B. Potocki, S. Svirsky, and P. Tyler. 1996. Special report of the Massachusetts Weight-of-Evidence Workgroup: A weight-of-evidence approach for evaluating ecological risks. Human and Ecological Risk Assessment 2:277-304.

Juanes, F., R. E. Marks, K. A. McKown, and D. O. Conover. 1993. Predation by age-0 bluefish on age-0 anadromous fishes in the Hudson River estuary. Transactions of the American Fisheries Society 122:348-356.

Secor, D.H., and E.D. Houde. 1995. Temperature effects on the timing of striped bass egg production, larval viability, and recruitment potential in the Patuxent River (Chesapeake Bay). *Estuaries* **18**:527-544.

Table D-1. Average (1974-1997) CMR for RIS fish species (From CHGEC 1999)

Species	Source table in CHGE (1999)	CMR		
		Impingement	Entrainment	Combined
Striped bass	V-18	0.002	0.078	0.080
white perch	V-20	0.017	0.049	0.066
Atlantic tomcod	V-22	0.006	0.120	0.126
American shad	V-26	0.000	0.006	0.006
Blueback herring	V-28	0.002	0.012	0.014
alewife	V-30	0.001	0.012	0.013
bay anchovy	V-32	0.001	0.104	0.104
Spottail shiner	V-42	0.001	0.022	0.023

Table D-2. Use and utility scores for RIS trends measures.

Use and Utility Attribute	River segment trends	Riverwide trends	Coastal trends	Attribute scaling factor	Adjusted river segment trends score	Adjusted riverwide trends score	Adjusted coastal trends score
Strength of Association	2	3	1	1	2	3	1
Stressor-specificity	1	2	1	0.7	0.7	1.4	0.7
Site-specificity	1	2	1	0.5	0.5	1	0.5
Sensitivity of measurement	2	2	1	0.5	1	1	0.5
Spatial representativeness	2	3	1	0.4	0.8	1.2	0.4
Temporal representativeness	3	3	3	0.2	0.6	0.6	0.6
Correlation of stressor to response	1	2	1	0.7	0.7	1.4	0.7
Availability of objective measure	3	3	3	0.5	1.5	1.5	1.5
Average adjusted utility score				0.6	1.0	1.4	0.7
rescaling factor				1.78	1.78	1.78	1.78
Overall utility Score					**1.7**	**2.5**	**1.3**

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Table D-3. Use and utility scores for SOC measures.

	RIS Impinged	RIS Entrained	RIS CMR (combined)	RIS Prey impinged	RIS Prey Entrained	Prey CMR (combin[illegible]	[illegible]ing [illegible]itiplier	Adjusted RIS Impinged	Adjusted RIS Entrained	Adjusted RIS CMR	Adjusted RIS Prey impinged	Adjusted RIS Prey Entrained	Adjusted Prey CMR
Strength of Association	1	1	3	1	1		1	1	1	3.0	1.0	1.0	2.0
Stressor-specificity	2	2	3	2	2		0.7	1.4	1.4	2.1	1.4	1.4	1.4
Site-specificity	2	2	3	2	2		0.5	1	1	1.5	1.0	1.0	1.0
Sensitivity of measurement	2	1	3	2	1		0.5	1	0.5	1.5	1.0	0.5	1.0
Spatial representativeness	3	3	3	2	2	2	0.4	1.2	1.2	1.2	0.8	0.8	0.8
Temporal representativeness	2	1	3	2	1	2	0.2	0.4	0.2	0.6	0.4	0.2	0.4
Correlation of stressor to response	1	1	3	1	1	2	0.7	0.7	0.7	2.1	0.7	0.7	1.4
Availability of objective measure	1	1	3	1	1	3	0.5	0.5	0.5	1.5	0.5	0.5	1.5
Average adjusted utility score							0.56	0.90	0.81	1.69	0.85	0.76	1.19
Rescaling factor							1.78	1.78	1.78	1.78	1.78	1.78	1.78
Overall utility score								**1.6**	**1.4**	**3.0**	**1.5**	**1.4**	**2.1**

Table D-4. Weight of Evidence Results for the Population Trend Line of Evidence (LOE-1_

Measurement	River Segment Assessment Score	Riverwide Assesment Score	Coastal Assessment Score	WOE Score	Adjusted WOE Score	Impact Conclusion
Utility score	1.7	2.5	1.3			
Bluefish	3	2.3	2	2.5	1.2	Small
White perch	3	4	1	3.0	3.0	Large
Hogchoker	2.7	1.7	N/A	2.1	2.1	Moderate to Large
Rainbow smelt	3	2.5	N/A	2.7	2.7	Large
Striped bass	1	1	1	1.0	1.0	Small
Atlantic tomcod	1.8	2.5	N/A	2.2	2.2	Moderate to Large
Bay anchovy	2	1.7	N/A	1.8	1.8	Small to moderate
Alewife	4	1.7	2	2.5	2.5	Large
Blueback herring	2	3.3	2	2.6	2.6	Large
American shad	4	3	4	3.5	3.5	Large
Spottail shiner	4	1	N/A	2.2	2.2	Moderate to Large
White catfish	1	4	N/A	2.8	2.8	Large
Weakfish	1	1.5	2	1.5	0.7	Small
Shortnose sturgeon	unknown	1	N/A	1.0	1.0	Small

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Table D-5. Weight of Evidence for the Strength-of-Connection Line of Evidence

	Impingement		Entrainment				WOE	Strength of
Measurement	**RIS**	**Prey**	**RIS**	**Prey**	**CMR**	**Prey CMR**	**Score**	**Connection**
Utility score	1.6	1.5	1.4	1.4	3.0	2.1		
Bluefish	2	2	2	2	1	2	1.7	Low to Medium
White perch	2	1	2	1	2	1	1.8	Low to Medium
Hogchoker	2	1	2	1	1	1	1.7	Low to Medium
Rainbow smelt	2	1	2	1	unknown	1	1.7	Low to Medium
Striped bass	2	2	2	2	2	2	2.0	Medium
Atlantic tomcod	2	1	2	1	4	1	2.4	Medium to High
Bay anchovy	2	1	2	1	4	1	2.4	Medium to High
Alewife	2	1	2	1	1	1	1.5	Low to Medium
Blueback herring	2	1	2	1	1	1	1.5	Low to medium
American shad	2	1	2	1	1	1	1.5	Low to Medium
Spottail shiner	2	1	2	1	1	1	1.5	Low to Medium
White catfish	2	1	2	1	unknown	1	1.7	Low to Medium
Weakfish	2	2	2	2	unknown	2	2.0	Medium
Shortnose sturgeon	unknown	1	unknown	1	unknown	1	1.0	low

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Table D-6. Impingement and Entrainment Impact Summary for Hudson River RIS

Species	**Population Line of Evidence**	**Strength of Connection Line of Evidence**	**Impacts of IP2 and 3 Cooling Systems on Aquatic Resources**
Bluefish	Small	Low to Medium	Small
White perch	Large	Low to Medium	Small to Moderate
Hogchoker	Moderate to Large	Low to Medium	Small to Moderate
Rainbow smelt	Large	Low to Medium	Small to Moderate
Striped bass	Small	Medium	Small
Atlantic tomcod	Moderate to Large	Medium to High	Moderate to Large
Bay anchovy	Small to Moderate	Medium to High	Small to Moderate
Alewife	Large	Low to Medium	Small to Moderate
Blueback herring	Large	Low to Medium	Small to Moderate
American shad	Large	Low to Medium	Small to Moderate
Spottail shiner	Moderate to Large	Low to Medium	Small to Moderate
White catfish	Large	Low to Medium	Small to Moderate
Weakfish	Small	Medium	Small
Shortnose sturgeon	Small	Low	Small

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Attachment 1: Interpretation of food web studies

The strength-of-connection line of evidence (LOE-2) includes measures relating to the entrainment and impingement of prey species. The intent of these measures is to account for the impact of entrainment and impingement of prey species on the abundance of predators. The prey entrainment loss measure is assigned the highest weight of all the measures included in the SOC line of evidence. The rationale for this weighting is provided on page H-30, lines 37-40 and page H-31, lines 1-9. Entrainment losses are said to have higher "stressor-specificity" than other measures of SOC, because "…the loss of a food base for YOY predators has a greater impact on more individuals than the direct loss of single individuals," and "… alterations to lower levels of complex food web relationships result in measurable impacts at higher trophic levels." This claim is supported by citations to Ulanowicz (1996) and Frank et al. (2007).

Neither of the cited papers supports the assertion made concerning indirect effects in the DSEIS. The paper by Ulanowicz (1996) illustrates the use of a mathematical technique called network analysis to characterize the impact of elevated temperatures on carbon flows in a Florida tidal marsh creek. The results of the authors' analysis relate to the effect of elevated temperatures on trophic efficiency and carbon recycling, not to indirect effect of mortality imposed on lower trophic-level organisms. It is important to note that the field study relied on by Ulanowicz (1996) was never documented in a peer-reviewed paper, "…due to disagreements among the primary authors" (p. 359).

The paper by Frank et al. (2007) is a review of studies investigating the trophic structure of North Atlantic marine ecosystems, focusing on the relative importance of "bottom-up" and "top-down" control. In "bottom-up" control, the abundance of higher trophic levels is controlled by the abundance of lower trophic levels such as phytoplankton, zooplankton, and small fish. Higher trophic levels such as predatory fish, on the other hand, have no influence on the abundance of lower trophic levels. The indirect impact of entrainment cited in the DSEIS would be an example of bottom-up control. In "top-down" control, the abundance of predators controls the abundance of lower trophic levels. Changes in abundance of prey species have no influence on the 40-uuuuu-AE

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abundance of predators. If top-down control occurred in the Hudson River, then entrainment of prey species would have no effect on the abundance of predators. Frank et al. (2007) show that both bottom-up and top-down control occur in North Atlantic marine ecosystems, with top-down control being prevalent in arctic regions and regions where predators have been overharvested, and bottom-up control being prevalent in warm regions and regions not affected by overharvesting. No inferences are made concerning the trophic structure of estuarine systems such as the Hudson River.

The volume (Polis and Winemiller 1996) containing the paper by Ulanowicz (1996) also contains 36 other papers on the structure and function of food webs. The synthesis paper by Abrams et al. (1996) is especially relevant to the DSEIS. Abrams et al. (1996) focused on the role of indirect effects in food webs. They discussed methods for determining the magnitude of indirect effects, and summarized published studies concerning the relative magnitudes of direct and indirect effects. Some studies have found indirect effects to be less important than direct effects, but others have found the opposite result. Abrams et al. (1996) described a variety of types of indirect effects that have been observed in various ecosystems, and discussed the strengths and weaknesses of various approaches for studying and quantifying indirect effects. However, these authors were able to provide no general conclusions concerning the importance of indirect effects.

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It is reasonable to conclude from the above-cited papers that uncertainty concerning the potential indirect effects of prey entrainment on predator abundance is very high. Such indirect effects might occur under some circumstances, but might not occur under other circumstances. Whether the abundance of a predator species would be affected by the losses of potential prey organisms would depend on a variety of factors, including the relative abundance of predators and prey and the ability of a predator to switch to other prey species. Prey entrainment might be important in years in which the abundance of YOY predators is high, but unimportant in years in which the abundance of predators is low.

The literature reviewed above supports a conclusion that indirect effects of prey entrainment on predator abundance are possible, but not certain. It is reasonable to include prey entrainment as a line of evidence for the DSEIS, but because of the very

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high uncertainty concerning the importance of prey entrainment this measure should be assigned a lower weight than direct entrainment or impingement losses of RIS.

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References

Abrams, P., B. A. Menge, G. G. Mittelbach, D. Spiller, and P. Yodzis. 1996. The role of indirect effects in food webs. pp. 358-68 in Polis, G. A., and K. O. Winemiller, Polis, G. A., and K. O. Winemiller (eds.) *Food Webs: Integration of Patterns and Dynamics*. Chapman and Hall, New York.

Frank, K. T., B. Petrie, and N. Shackell. 2007. The ups and downs of trophic control in continental shelf ecosystems. Trends in Ecology and Evolution 22:236-242.

Polis, G. A., and K. O. Winemiller. 1996. *Food Webs: Integration of Patterns and Dynamics.* Chapman and Hall, New York.

Ulanowicz. R. E. 1996. Trophic flow networks as indicators of ecosystem stress. Pp. 358-68 in Polis, G. A., and K. O. Winemiller, Polis, G. A., and K. O. Winemiller (eds.) *Food Webs: Integration of Patterns and Dynamics*. Chapman and Hall, New York.

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Attachment 2: Comparison of Impingement Mortality and Entrainment ofHogchoker and Bluefish atIndian Point Nuclear Power Plant toCorresponding Population Abundances

Introduction

The objective of the this report is to compare the magnitude of historical losses of hogchoker and bluefish, due to impingement mortality and entrainment at Indian Point nuclear power plant, to historical levels of population abundance of the hogchoker and bluefish stocks found in the Hudson River. For hogchoker, riverwide abundance estimates, from the Fall Juvenile Survey (FJS) and Beach Seine Survey (BSS) were used as the measures of population abundance. For bluefish, which is believed to be and is managed as a single coastal stock on the Atlantic coast (NEFSC 2006), estimates of abundance of the Atlantic coast stock were used as the measures of population abundance.

Impingement Mortality

Annual estimates of YOY impingement mortality (i.e., the number of fish that die from impingement) were computed for bluefish and hogchoker for 1980 through 1989. Although impingement sampling was also conducted in 1979 and 1990, ages of bluefish and hogchoker were not reported in those two years. The datasets used for this analysis were contained in two data files prepared by Normandeau Associates, Inc. at the request of the NRC: "Imp19751980.csv" and "Imp19811990.csv".

For each species, the annual impingement mortality was estimated as the product of the estimated annual number impinged times the impingement mortality rate:

$$IM_k = I_k R$$

where

IM_k = annual impingement mortality (# fish per year)

I_k = annual number impinged

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R = species-specific impingement mortality rate (the proportion of impinged fish that die from impingement)

For hogchoker, an impingement mortality rate of 2.6% (Fletcher 1990, Table 4, 8 hr tests) was used. Bluefish were not included in the impingement mortality study (Fletcher 1990) at Indian Point. However, bluefish impingement mortality was studied at Calvert Cliffs nuclear power plant (Horwitz 1987), and was estimated to be 50%. In the absence of an estimate from Indian Point, the estimate from Calvert Cliffs is used for this analysis.

Species-specific annual estimates of the number of young-of-year (YOY) fish impinged were computed as the sum of reported seasonal estimates:

$$I_k = \sum_{s=1}^{4} I_{k,s}$$

where

$I_{k,s}$ = reported number impinged during season, s, in year, k.

season 1: January-March

season 2: April-June

season 3: July-September

season 4: October-December

The standard error of the estimated annual impingement mortality was computed as the square root of the estimated variance:

$$se(IM_k) = \sqrt{\hat{\text{var}}(IM_k)}$$

where

$$\hat{\text{var}}(IM_k) = R^2 \sum_{s=1}^{4} \left(se(I_{k,s})\right)^2$$

and

$se(I_{k,s})$= the reported standard error of the estimated number impinged during season, s, in year, k.

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Species-specific estimates of annual impingement mortality were also computed for the total (all ages combined) number of fish impinged. In several years and seasons, impinged yearling (age-1) bluefish and hogchoker were not reported separately. Therefore, separate analyses for yearling bluefish and hogchoker were not conducted. Based on years and seasons in which yearling bluefish and hogchoker were reported, the percentage of total numbers impinged that were YOY or age-1 could be determined. For bluefish, 97.7 % of all fish impinged (1980-1989) were YOY or age-1. For hogchoker, 31.3% of all fish impinged were YOY or age-1.

Entrainment

For each year with entrainment sampling (1981 and 1983 – 1987) species- and lifestage-specific annual estimates of the number of bluefish and hogchoker entrained were computed based on reported weekly entrainment densities and cooling water withdrawal rates. The dataset used for this analysis was contained in one data file prepared by Normandeau Associates, Inc. at the request of the NRC: "EntDensity.csv".

Estimates of mean entrainment densities were reported for weeks 18 through 32 in all years of entrainment sampling. In addition, estimates of mean entrainment densities were reported for weeks 2 through 17 in 1986; however, no bluefish or hogchoker were reported entrained during those weeks. Accordingly, year and lifestage-specific estimates of the number of bluefish and hoghoker entrained, $L_{j,k}$, were computed as the sum of weekly estimates (weeks 18 through 32):

$$L_{j,k} = \sum_{w=18}^{32} L_{j,k,w}$$

where

$$L_{j,k,w} = \overline{D}_{j,k,w}\left(f_{2,k,w} + f_{3,k,w}\right)\left(60 \times 24 \times 7\right)$$

and

$L_{j,k,w}$ = estimated entrainment losses for lifestage, *j*, during week, *w*, of year *k*,

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$\overline{D}_{j,k,w}$ = reported mean entrainment density (#/m^3) for lifestage, j, during week, w, of year k, and

$f_{u,k,w}$ = average cooling water withdrawal rate (m^3/min) for unit, u, during week, w, of year, k.

For each year, k, the number of organisms in each lifestage, j, lost due to entrainment, $L_{j,k}$, was translated into the equivalent number of age-1 fish, $EqAge1_{j,k}$, based on the method described by USEPA (2006):

$$EqAge1_{j,k} = L_{j,k} S_{j,1}$$

where

$S_{j,1}$ = cumulative survival from lifestage j until age 1

$$= S_j^* \prod_{i=j+1}^{j_{max}} S_i$$

and

S_i = survival fraction from lifestage i to lifestage $i+1$,

j_{max} = the lifestage immediately prior to age 1, and

S_j^* = S_j adjusted to account for the expected time period from the beginning of lifestage, j, to the date of entrainment

$$= 2S_j e^{-\ln(1+S_j)}.$$

The total number of age-1 equivalents derived from losses at all stages in year k, $EqAge1_k$, was computed as the sum over all entrained lifestages:

$$EqAge1_k = \sum_{j=j_{min}}^{j_{max}} EqAge1_{j,k}$$

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The standard error of the estimate of number of age-1 equivalents was computed as the square roof of the estimated variance:

$$se(EqAge1_k) = \sqrt{\hat{\text{var}}(EqAge1_k)}$$

where

$$\hat{\text{var}}(EqAge1_k) = \sum_{j=j_{min}}^{j_{max}} \hat{\text{var}}(EqAge1_{j,k})$$

$$\hat{\text{var}}(EqAge1_{j,k}) = (S_{j,1})^2 \sum_{w=18}^{32} \hat{\text{var}}(L_{j,k,w})$$

$$\hat{\text{var}}(L_{j,k,w}) = \{se(\overline{D}_{j,k,w})(F_{2,k,w} + F_{3,k,w})(60 \times 24 \times 7)\}^2$$

and

$se(\overline{D}_{j,k,w})$ = reported standard error of the estimate of mean entrainment density (#/m^3) for lifestage, j, in week, w, of year, k,

Estimates of lifestage-specific survival fractions (S_i) required for the equivalent age-1 analysis were from USEPA (2006) Appendix C1, Tables C1-13 and C1-19.

Hogchoker Riverwide Abundance

Average riverwide abundance of YOY fish was estimated from reported region- and week-specific estimates of standing crop (see, e.g., EA 1991) from the Fall Juvenile Survey (FJS) and the Beach Seine Survey (BSS). Standing crop estimates represent the number of fish, by species and lifestage, based on the average density (# fish/ unit volume for FJS, and # fish/ unit area for BSS) observed in samples and on the total volume or area of each region. Separate estimates were computed for YOY fish and for all ages combined. For bluefish 99.7% of all fish collected (1980-1989) by the FJS and BSS were YOY or age-1. For hogchoker, 99.5% of all fish collected were YOY or age-1.

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Annual estimates of average riverwide abundance were computed as an average of season-specific abundance estimates from seasons 3 and 4 (the seasons consistently sampled by the FJS and BSS):

$$A_k = \frac{1}{2}\sum_{s=3}^{4} A_{k,s}$$

$$A_{k,s} = A_{FJS,k,s} + A_{BSS,k,s}$$

$$A_{FJS,k,s} = \frac{1}{n_{FJS,k,s}} \sum_{w \in w_{FJS,k,s}} A_{FJS,k,w}$$

$$A_{BSS,k,s} = \frac{1}{n_{BSS,k,s}} \sum_{w \in w_{BSS,k,s}} A_{BSS,k,w}$$

where

$w_{FJS,k,s}$ = the set of weeks sampled by the FJS during season, s, in year, k,
$w_{BSS,k,s}$ = the set of weeks sampled by the BSS during season, s, in year, k,
$n_{FJS,k,s}$ = the number of weeks sampled by the FJS during season, s, in year, k,
$n_{BSS,k,s}$ = the number of weeks sampled by the BSS during season, s, in year, k,

and

$$A_{FJS,k,w} = \sum_{r=1}^{12} A_{FJS,k,w,r}$$

$$A_{BSS,k,w} = \sum_{r=1}^{12} A_{BSS,k,w,r}$$

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$A_{FJS,k,w,r}$ = the reported FJS standing crop estimate for river region, r, in week, w, of year, k, in the channel, bottom and shoal strata, and

$A_{BSS,k,w,r}$ = the reported BSS standing crop estimate for river region, r, in week, w, of year, k, in the shorezone stratum.

The standard error of the estimate of annual average abundance was computed as the square root of the estimated variance:

$$se(A_k) = \sqrt{\hat{\mathrm{var}}(A_k)}$$

$$\hat{\mathrm{var}}(A_k) = \frac{1}{2^2}\sum_{s=3}^{4}\left(\hat{\mathrm{var}}(A_{FJS,k,s}) + \hat{\mathrm{var}}(A_{BSS,k,s})\right)$$

(Cochran (1977), equation (10.15)):

$$\hat{\mathrm{var}}(A_{FJS,k,s}) = \frac{1-\left(\dfrac{n_{FJS,k,s}}{13}\right)}{n_{FJS,k,s}} SD^2_{FJS,k,s} + \frac{\left(\dfrac{n_{FJS,k,s}}{13}\right)}{n_{FJS,k,s}}\left(\frac{1}{n_{FJS,k,s}} \sum_{w\in w_{FJS,k,s}} \hat{\mathrm{var}}(A_{FJS,k,w})\right)$$

$$\hat{\mathrm{var}}(A_{FJS,k,w}) = \sum_{r=1}^{12}\left(se(A_{FJS,k,w,r})\right)^2$$

$$\hat{\mathrm{var}}(A_{BSS,k,s}) = \frac{1-\left(\dfrac{n_{BSS,k,s}}{13}\right)}{n_{BSS,k,s}} SD^2_{FJS,k,s} + \frac{\left(\dfrac{n_{BSS,k,s}}{13}\right)}{n_{BSS,k,s}}\left(\frac{1}{n_{BSS,k,s}} \sum_{w\in w_{BSS,k,s}} \hat{\mathrm{var}}(A_{BSS,k,w})\right)$$

$$\hat{\mathrm{var}}(A_{BSS,k,w}) = \sum_{r=1}^{12}\left(se(A_{BSS,k,w,r})\right)^2$$

where

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$SD^2_{FJS,k,s}$ = the standard deviation of the FJS weekly abundance estimates within season, s, in year, k,

$SD^2_{BSS,k,s}$ = the standard deviation of the BSS weekly abundance estimates within season, s, in year, k,

$se(A_{FJS,k,w,r})$ = reported standard error for the FJS standing crop estimate for river region, r, in week, w, of year, k, in the channel, bottom and shoal strata, and

$se(A_{BSS,k,w,r})$ = reported standard error for the BSS standing crop estimate for river region, r, in week, w, of year, k, in the shorezone stratum.

Bluefish Coastwide Abundance

The Atlantic bluefish stock is believed to be a single population and is managed as a single stock (NEFSC 2006, page 53). Accordingly, the coastwide population of bluefish provides the appropriate context for evaluating impingement and entrainment losses.

Annual population abundance estimates for age-0 and age-1 bluefish were listed in the 41st Northeast Regional Stock Assessment Workshop (41st SAW) Assessment Report (NEFSC 2006). Also listed were annual estimates of fishing mortality rates which, together with the annual population abundance estimates, allow annual estimates of fishing mortality of age-0 and age-1 bluefish to be calculated using standard methods from fishery science (Ricker 1975):

$$C_k = N_k \frac{F_k}{M + F_k}\left(1 - e^{-(M+F_k)}\right)$$

where

C_k = fishing mortality (# fish per year) in year, k,

N_k = population abundance at the beginning of year, k,

M = natural mortality rate (assumed to be M=0.2, NEFSC (2006) page 69)

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F_k = fishing mortality rate.

The NEFSC (2006) reported results from applying two stock assessment models: ADAPT and ASAP (which was selected as the preferred model). The estimates of population abundance (1982-1990) are reproduced in Table 1, and the estimates of fishing mortality rates are reproduced in Table 2.

Comparisons of Losses to Population Abundance

To put impingement mortality and entrainment into the context of population abundance, estimates of average annual impingement mortality and entrainment were expressed in terms of percentages of average annual population abundance, $\hat{P}$. The same general formula was used for all estimates:

$$\hat{P} = 100 \times \frac{\overline{Y}}{\overline{X}}$$

where

$\overline{Y}$ = the average annual measure of impingement mortality or entrainment,

$$\overline{Y} = \frac{1}{n}\sum_k Y_k$$

$\overline{X}$ = the average annual measure of population abundance,

$$\overline{X} = \frac{1}{n}\sum_k X_k$$

and

Y_k = year-specific estimate of impingement mortality or entrainment (IM_k or $EqAge1_k$) for year, k,

X_k = year-specific estimate of population abundance (A_k or N_k) in year, k, and

n = the number of years included in the avearges.

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For hogchoker, riverwide abundance estimates were used to represent population abundance, and separate estimates were made for YOY and for all ages collected. For bluefish, coastwide abundance was used to represent population abundance, and separate estimates were made for YOY and for all ages collected. However, because over 97% of all bluefish collected were YOY or age-1, the category of all ages collected can be interpreted as YOY and age-1 bluefish. The following combinations of measures of impingement mortality or entrainment and population abundance were included in the analysis:

Species	Lifestage	$\overline{Y}$	$\overline{X}$	Years
Hogchoker	YOY	IM_k	A_k	1980-1989
	All ages	IM_k	A_k	1980-1989
	YOY	$EqAge1_k$	A_k	1981, 1983-1987
Bluefish	YOY	IM_k	N_k	1982-1989
	YOY and Age-1	IM_k	N_k	1982-1989

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The estimated annual average number of bluefish entrained, expressed in terms of equivalent age-1 fish, was 0.01. Therefore, comparisons of bluefish entrainment to coastwide abundance were not tabulated. In addition to the combinations listed above, bluefish impingement mortality was expressed in terms of percentages of average annual fishing mortality, C_k, (1982-1989).

Approximate lower and upper 95% confidence limits for the estimates of average annual impingement mortality and entrainment, expressed as percentages of average annual population abundance, were computed as:

$$LCL \doteq \hat{P} - \left(1.96 \times se\left(\hat{P}\right)\right)$$

$$UCL \doteq \hat{P} + \left(1.96 \times se\left(\hat{P}\right)\right)$$

where

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LCL and UCL = lower confidence limit and upper confidence limit, respectively, and

$$se(\hat{P}) = \sqrt{\hat{\mathrm{var}}(\hat{P})} \ .$$

The variance of estimated percentage was computed (Kendall and Stuart 1977, equation (10.17)) as:

$$\hat{\mathrm{var}}(\hat{P}) \doteq \left(100\frac{\overline{Y}}{\overline{X}}\right)^2 \left(\frac{\hat{\mathrm{var}}(\overline{Y})}{\overline{Y}^2} + \frac{\hat{\mathrm{var}}(\overline{X})}{\overline{X}^2}\right)$$

where

$$\hat{\mathrm{var}}(\overline{Y}) = \frac{1}{n^2}\sum_k \hat{\mathrm{var}}(Y_k)$$

$$\hat{\mathrm{var}}(\overline{X}) = \frac{1}{n^2}\sum_k \hat{\mathrm{var}}(X_k)$$

Year specific variance estimates for bluefish population abundance estimates were not reported in the 41st SAW Assessment Report (NEFSC 2006); therefore, the annual bluefish abundance estimates were treated as constants and the corresponding variances were set to zero.

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Results and Discussion

Hogchoker

The average annual impingement mortality of YOY hogchoker was estimated to be 0.0069% ($\pm$ 0.0022%) of the average riverwide abundance of YOY hogchoker (Table 3). For all ages collected, the average impingement mortality of hogchoker was estimated to be 0.0048% ($\pm$ 0.0008%) of the riverwide abundance. As noted above, these estimates include the effect of impingement survival, which was estimated to be 97.4% (from Fletcher 1990) for hogchoker. Studies of impingement survival at Salem nuclear power plant (PSEG 2006) and Calvert Cliffs nuclear power plant (Horwitz 1987) found impingement survival for hogchoker to exceed 99%, confirming high impingement survival for hogchoker. Nevertheless, if impingement survival were assumed to be zero,

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the average annual impingement mortality would be less than 0.3% of the riverwide population for YOY, and less than 0.2% of the riverwide population for all ages combined.

The average annual entrainment of hogchoker, expressed in terms of the equivalent number of age-1 fish, was estimated to be 0.1731% (±0.0757%) of the average riverwide abundance of YOY hogchoker (Table 4). It should be noted that the average age of YOY hogchoker collected by the FSJ and BSS is younger than age-1; and therefore, the average YOY abundance is not directly comparable to the number of equivalent age-1 fish (computed using the USEPA method). The estimated number of equivalent age-1 fish can be adjusted to represent the equivalent number of fish in the middle of the juvenile (YOY) lifestage by dividing the estimated number of equivalent age-1 fish by the survival fraction for the period from the middle of the juvenile lifestage to the end of the juvenile lifestage:

$$EqYOY = \frac{EqAge1}{e^{-\left(\frac{M_{Juv}}{2}\right)}}$$

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Using this adjustment and the juvenile mortality rate reported by USEPA (2006) for hogchoker (M_{Juv}=2.31), the average annual entrainment losses expressed in terms of the number of equivalent YOY hogchoker would be 7,271. That is equivalent to 0.55% of the average riverwide abundance of YOY hogchoker.

The riverwide abundance estimates used in the analysis for hogchoker assume 100% gear efficiencies for the FJS and BSS sampling gears. However, it is likely that the gear efficiencies are substantially less than 100% for hogchoker because the gear types used in the FJS and BSS were not selected to collect bottom dwelling flat fish. The assumption of 100% gear efficiency is likely to cause the estimates of impingement mortality and entrainment, expressed as a percentage of riverwide abundance, to be biased high. Also, the entrainment loss estimates do not account for possible entrainment survival, which has been documented with field experiments at Indian Point for several other species, but not for hogchoker. If a portion of entrained hogchokers survived, the

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assumption of zero entrainment survival would introduce additional bias towards overestimating the percentage.

Bluefish

For bluefish, the average annual impingement mortality of YOY fish was estimated to be between 0.0134% and 0.0142% (depending on which stock assessment model was used) of the average population abundance of age-0 bluefish, (Table 5). The average annual impingement mortality of YOY and age-1 bluefish combined was estimated to be between 0.0078% and 0.0080% (depending on which stock assessment model was used) of the corresponding coastwide population abundance.

The coastwide population estimates from NEFSC (2006) represent the abundance on January 1st of each year, which is the end of the period of YOY impingement and the end of the period of yearling (age-1) impingement (based on the convention used by Indian Point for assigning ages to fish). Therefore, these comparisons of impingement mortality to coastwide population abundance likely overestimate the percentages lost due to impingement.

The average annual impingement mortality of YOY bluefish was estimated to be between 0.1053% and 0.1508% (depending on which stock assessment model was used) of the average annual fishing mortality of YOY bluefish (Table 6). For YOY and age-1 bluefish combined, the average annual impingement mortality was estimated to be between 0.0470% and 0.0498% (depending on which stock assessment model was used) of the average annual fishing mortality of YOY and age-1 bluefish.

For bluefish, the estimated annual average number entrained, expressed in terms of equivalent age-1 fish, was 0.01. Because this estimate was almost zero, it was not formally compared to coastwide population abundance estimates.

The impingement mortality of 50% for bluefish used in this analysis was based on results from an impingement survival study conducted at Calvert Cliffs nuclear power plant (Horwitz 1987). That study reported examining 24 bluefish, 12 of which survived impingement on traveling screens with a fish return system. If the impingement survival rate for bluefish were assumed to be zero, the estimates of impingement mortality would double. Specifically, the estimated average annual impingement mortality of YOY fish

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would increase to about 0.028% of the average population abundance of age-0 bluefish; and the estimated average annual impingement mortality of YOY and age-1 bluefish combined would increase to about 0.016% of the corresponding coastwide population abundance. Again assuming zero impingement survival for bluefish, the estimated average annual impingement mortality of YOY bluefish would increase to between 0.2% and 0.3% (depending on which stock assessment model was used) of the average annual fishing mortality of YOY bluefish; and the estimated average annual impingement mortality for YOY and age-1 bluefish combined would increase to about 0.10 % of the average annual fishing mortality of YOY and age-1 bluefish.

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References

Cochran, W.G. 1977. Sampling techniques (3rd Ed.). John Wiley & Sons, NY. 428 p.

EA Engineering, Science, and Technology. 1991. 1989 Year Class Report for the Hudson River estuary monitoring program. Prepared for Consolidated Edison Company of New York, Inc.

Horwitz, R.J. 1987. Impingement studies. In: Heck, K.L. (Ed.), Ecological studies in the middle reach of Chesapeake Bay. Springer-Verlag, Berlin, pp. 254-269.

Kendall, M. and A. Stuart. 1977. The advanced theory of statistics; Volume I distribution theory (4th Ed.). MacMillan Publishing Co., NY. 472 p.

NEFSC. 2006. 41st Northeast Regional Stock Assessment Workshop (41st SAW). 41st SAW assessment report. *U.S. Dep. Commer., Northeast Fish. Sci. Cent. Ref. Doc.* 05-14; 237 p. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026.

PSEG. 2006. Salem NJPDES Permit Renewal Application NJPDES Permit No. NJ0005622 February, 2006.

Ricker, W.E. 1975. Computation and interpretation of biological statistics of fish populations. Bull. Fish. Res. Board Can. 191: 382 p.

USEPA. 2006. Regional Benefits Analysis for the Final Section 316(b) Phase III Existing Facilities Rule. U.S. Environmental Protection Agency Office of Water (4303T) 1200 Pennsylvania Avenue, NW Washington, DC 20460. EPA-821-R-04-007. June 2006.

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Table 1. Bluefish population abundance estimates for January 1 of each year (in 1000's) from NEFSC (2006).

Year	ADAPT model (1)		ASAP model (2)	
	Age0	Age1	Age0	Age1
1982	51,171	44,730	61,381	50,364
1983	49,712	31,862	48,325	45,730
1984	60,939	36,388	52,904	35,618
1985	36,564	43,458	31,079	39,437
1986	23,121	25,719	23,235	23,281
1987	23,321	14,279	16,488	16,455
1988	32,968	16,281	22,043	11,561
1989	45,852	25,451	50,783	15,729
1990	34,854	34,412	23,044	36,951

(1) from Table 20, NEFSC (2006)
(2) from Table 24, NEFSC (2006)

Table 2. Bluefish fishing mortality rate estimates from NEFSC (2006).

Year	ADAPT model (1)		ASAP model (2)	
	Age0	Age1	Age0	Age1
1982	0.274	0.274	0.094	0.279
1983	0.112	0.307	0.105	0.311
1984	0.138	0.230	0.094	0.277
1985	0.152	0.179	0.089	0.263
1986	0.282	0.420	0.145	0.429
1987	0.159	0.536	0.155	0.458
1988	0.059	0.150	0.137	0.406
1989	0.087	0.281	0.118	0.349
1990	0.090	0.261	0.108	0.320

(1) from Table 19, NEFSC (2006)
(2) from Table 23, NEFSC (2006)

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Table 3. Hogchoker impingement mortality in comparison to riverwide abundance.

Lifestage	Average Annual Riverwide Abundance (Standard Error in Parentheses)	Average Annual Impingement Mortality (Standard Error in Parentheses)	Average Annual Impingement Mortality as Percentage of Riverwide Abundance	Approximate Lower 95% Confidence Limit for Average Annual Impingement Mortality as Percentage of Riverwide Abundance	Approximate Upper 95% Confidence Limit for Average Annual Impingement Mortality as Percentage of Riverwide Abundance
YOY	1,429,515 (20,363)	99 (16)	0.0069%	0.0047%	0.0091%
YOY and older	32,539,155 (268,634)	1,570 (133)	0.0048%	0.0040%	0.0056%

(Based on data from 1980-1989)

Table 4. Hogchoker entrainment in comparison to riverwide abundance.

Lifestage	Average Annual Riverwide Abundance (Std. Error)	Average Annual Entrainment Expressed in Terms of Equivalent Age-1 Fish (Std. Error)	Average Annual Entrainment (Equivalent Age-1 Fish) as Percentage of Riverwide Abundance	Approximate Lower 95% Confidence Limit for Average Annual Entrainment (Equivalent Age-1 Fish) as Percentage of Riverwide Abundance	Approximate Upper 95% Confidence Limit for Average Annual Entrainment (Equivalent Age-1 Fish) as Percentage of Riverwide Abundance
YOY	1,322,947 (24,155)	2,291 (509)	0.1731%	0.0974%	0.2489%

(Based on data from 1981, 1983-1987)

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Table 5. Bluefish impingement mortality in comparison to coastwide abundance.

Lifestage	Average Annual Coastwide Abundance (NEFSC Stock Assessment Model)	Average Annual Impingement Mortality (Standard Error in Parentheses)	Average Annual Impingement Mortality as Percentage of Coastwide Abundance	Approximate Lower 95% Confidence Limit for Average Annual Impingement Mortality as Percentage of Coastwide Abundance	Approximate Upper 95% Confidence Limit for Average Annual Impingement Mortality as Percentage of Coastwide Abundance
YOY	40,456,000 (ADAPT)	5,426 (345)	0.0134%	0.0117%	0.0151%
YOY	38,279,750 (ASAP)	5,426 (345)	0.0142%	0.0124%	0.0159%
YOY and Age 1	70,227,000 (ADAPT)	5,470 (345)	0.0078%	0.0068%	0.0088%
YOY and Age 1	68,051,625 (ASAP)	5,470 (345)	0.0080%	0.0070%	0.0090%

(Based on data from 1982-1989)

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Table 6. Bluefish impingement mortality in comparison to coastwide fishing mortality.

Lifestage	Average Annual Coastwide Landings (NEFSC Stock Assessment Model)	Average Annual Impingement Mortality (Standard Error in Parentheses)	Average Annual Impingement Mortality as Percentage of Coastwide Landings	Approximate Lower 95% Confidence Limit for Average Annual Impingement Mortality as Percentage of Coastwide Landings	Approximate Upper 95% Confidence Limit for Average Annual Impingement Mortality as Percentage of Coastwide Landings
YOY	5,155,014 (ADAPT)	5,426 (345)	0.1053%	0.0921%	0.1184%
YOY	3,597,566 (ASAP)	5,426 (345)	0.1508%	0.1320%	0.1696%
YOY and Age 1	11,644,528 (ADAPT)	5,470 (345)	0.0470%	0.0412%	0.0528%
YOY and Age 1	10,988,666 (ASAP)	5,470 (345)	0.0498%	0.0436%	0.0559%

(Based on data from 1982-1989)

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Statement by Fred Dacimo
Public Meeting on Nuclear Regulatory Commission's DEIS for Indian Point:
February 12, 2009

BACKGROUND:

Good afternoon, my name is Fred Dacimo, and I am Entergy's Vice President for License Renewal. On behalf of Entergy, I appreciate the opportunity to make this brief statement.

- I would like to acknowledge the dedicated work of the Nuclear Regulatory Commission (or NRC) Staff in preparing the draft Supplemental Environmental Impact Statement (or DEIS) associated with Entergy's license renewal application for Units 2 and 3.

- Furthermore, Entergy agrees with the Staff's ultimate recommendation to the Commission, based on the analysis set forth in the DEIS [AND I QUOTE]: "that the adverse environmental impacts of license renewal for IP2 and IP3 are not so great that preserving the option of license renewal for energy planning decisionmakers would be unreasonable." [END OF QUOTE] In other words, according to the NRC Staff, there is no reason from an environmental perspective to not proceed with the license renewal process.

- In fact, license renewal will not result in significant adverse environmental impacts. As the DEIS recognizes, continued plant operation results in what NRC Staff have characterized as only [QUOTE] "SMALL" [END QUOTE] impacts on many aspects of the environment, including land use,

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terrestrial ecology, water use and quality, air quality, human health, socioeconomics, historical and archeological resources and environmental justice. 40-wwwww-GE/LR contd.

- These conclusions reflect the important fact that Entergy has been, and will continue to be, a proactive and effective environmental steward, as reflected in its substantial contribution to reducing the serious and negative global impacts of Climate Change. For example, Entergy has received the EPA's Climate Protection Award and is one of thirty entities recognized by EPA for outstanding efforts to protect the earth's climate. 40-xxxxx-SE

- Entergy also has demonstrated a longstanding commitment to fully evaluate its potential impacts on the Hudson River. 40-yyyyy-AE

- However, we disagree with some of the underlying analyses in the DEIS. Specifically, we disagree with DEIS statements in three areas relating to: (1) impingement and entrainment, (2) thermal shock, and (3) the mitigation alternative involving closed cycle cooling, including the DEIS impact analysis associated with that mitigation alternative.

- We will be submitting timely written comments to the NRC, but let me summarize why we believe the DEIS warrants revision in these three areas (in the order I mentioned them). 40-zzzzz-AE

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IMPINGEMENT AND ENTRAINMENT:

- As you may know, Entergy and its predecessors have been collecting and assessing information about fish species in the Hudson River, and the Stations' possible impacts on the early life stages – eggs and larvae – of fish species, for over thirty years. These are not minor studies, but major ongoing initiatives to comprehensively monitor aquatic conditions over the operating life of the Stations. These studies have been approved, directed and overseen by New York State Department of Environmental Conservation (or NYSDEC) Staff. Many of these study results have been published in peer- reviewed scientific journals. In addition, Entergy has retained leading fisheries biologists, including two fisheries biologists who represented the United States Environmental Protection Agency in the 1970s, to review and evaluate the monitoring program dataset.

- Along with the owners of two other power plants on the Hudson River (Bowline and Roseton Stations), Entergy has spent more than $50 million on fisheries studies.

- NYSDEC Staff has testified that this dataset – the information compiled by Entergy and the owners of Bowline and Roseton Stations on the Hudson River – is [AND I QUOTE] "probably, the best data set on the planet." [END QUOTE]

- While the NRC Staff's consultants are to be commended for their efforts to review this information in drafting the DEIS, given the scope of the

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information available, it is hardly surprising that some of the conclusions reached are not fully reflective of the available and relevant information—and are therefore in error.

- To that end, Entergy strongly urges the NRC Staff to incorporate the necessary corrections (which will be fully discussed in our written comments) into the final EIS.
- One example of such an error that Entergy's fisheries experts have identified concerns the Bluefish.
    - In Chapter 4, the DEIS concludes that impingement and entrainment during the license renewal period may have a [QUOTE] "LARGE" [END QUOTE] impact on the Bluefish population.
    - The DEIS does not mention that NYSDEC, the regulator charged with overseeing fish issues, has not – please, let me underscore – not identified a concern about Bluefish as a result of IPEC operation. In fact, no regulator has identified a concern with Bluefish as a result of IPEC operation.
    - Chapter 2 of the DEIS recognizes [AND I QUOTE] "Bluefish have not been found in entrainment samples from power plants along the Hudson River, which include Roseton Units 1 and 2, IP2 and IP3, or Bowline Units 1 and 2. Juvenile bluefish may be impinged,

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but the numbers are estimated to be relatively small." [END OF QUOTE] In other words, the DEIS acknowledges that IPEC does not entrain or impinge Bluefish in any meaningful numbers. It offers no other credible scientific basis for a "LARGE" impact finding.

- We conclude, therefore, that the impact should be categorized as "SMALL" in the final EIS.

- I would like to provide a second example as to why the DEIS requires a second look. Namely, in another error, the DEIS ignores that both plants have taken significant steps to address potential fish impacts, by only mildly noting such actions.

- As many in this room know, these Stations have taken significant steps to address potential fish impacts. In the 1980's through the 1990's, the Stations were retrofitted with variable and dual speed pumps that allow us to reduce water use at certain times. More importantly, the Stations were retrofitted with state-of-the-art fish-protective Ristroph screens and fish return systems that take fish that are caught in the fish baskets on the screens and quickly returns them to the River. This technology was designed, redesigned, pilot tested and installed under the oversight of Riverkeeper and NYSDEC staff – full-scale models were built and

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full laboratory testing was conducted. The total cost of these retrofits is more than $100 million in today's dollars.

- Not surprisingly given the extent of review and testing of the Indian Point screening and fish-recovery systems and the success of these added measures, the NYSDEC staff revised our biological monitoring plan to eliminate further impingement monitoring that NYSDEC staff determined was more harmful to fish than the benefit that could be gained by continuing to monitor.

- Yet, despite this history and contrary to that NYSDEC determination, the DEIS suggests Entergy continue impingement monitoring – the very sampling that kills fish. DEIS, p. 4-21. With all due respect to NRC Staff, the evidence is more than sufficient to confirm the significant benefits of the Station retrofits and that impingement should be classified, in the final SEIS, as a "SMALL" impact.

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THERMAL IMPACTS:

- Turning next to thermal impacts, we appreciate the NRC Staff's conclusion that [QUOTE] "thermal impacts could range from SMALL TO MODERATE" [END QUOTE].

- However, the DEIS nonetheless reflects a misimpression about theoretical modeling studies done in the 1990's. Those analyses were performed, as

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those scientists noted at the time, under tidal and temperature conditions which simply cannot exist in nature.

- Thus, we believe this part of the DEIS warrants modification. Thermal impacts should be categorized as "SMALL" in the final EIS.

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MITIGATION ALTERNATIVES:

- Finally, the DEIS' treatment of cooling system mitigation alternatives is flawed.

- Not surprisingly, given the complex NYSDEC-led permitting proceeding to address potential impingement and entrainment impacts that is ongoing (parallel with this proceeding), the DEIS inadvertently misstates the NYSDEC's Staff's position regarding what it calls its [AND I QUOTE] "tentative" [END QUOTE] draft water-discharge (or SPDES) permit—ignoring the NYSDEC Assistant Commissioner's August 2008 decision and subsequent DEC action.

- Simply put, the NYSDEC Staff has not determined – even on a tentative basis – that closed-cycle cooling is feasible or the best alternative for Indian Point.

- Entergy has until December 2009 to submit a report on the technological feasibility of closed cycle cooling for the plants, on a site-specific basis, and what alternative technologies exist. After reviewing that technical report (among others), NYSDEC Staff must then re-issue or revise their

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draft SPDES permit with the appropriate proposed conditions – which are unknown at this time. Therefore, any final determination as to the feasibility of closed cycle cooling at Indian Point is at least a year away.

- For these reasons, the DEIS is not correct in assuming, or suggesting, that closed-cycle cooling has been determined by NYSDEC staff to be feasible at or appropriate for the Stations.

- Our written comments also will explain why the DEIS assessment of the impacts of closed-cycle cooling in the DEIS, particularly with respect to electric-system impacts and Climate Change, reflect incorrect assumptions.

    - Those assumptions are contrary to the findings of the New York Independent System Operator, the authority charged with managing the electric system.

    - They also are contrary to the 2006 independent evaluation of Indian Point done by the National Academy of Science. The National Academy of Science said "Indian Point is the largest generating station close to the major load centers in New York City, Westchester County, and Long Island and south of congestion points in the NYCA transmission system that prevent more power from being sent south during periods of peak demand. Indian Point also produces the lowest cost power in the area. Thus,

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Indian Point is a critical component of both the reliability and economics of power for the New York City area."

- We would like to reiterate our thanks for the dedicated efforts of the NRC Staff and to all those participating here.
- We look forward to submitting written comments and working cooperatively with participants in the NEPA process as NRC prepares the final EIS. Thank you.

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RULES AND DIRECTIVES BRANCH USNRC

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Washington, DC 20555-0001

12/31/08
73 FR 80440
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March 15, 2009

Dear Chief of Rulemaking:

I am submitting comments on the re-licensing request by Entergy Company for the Indian Point plant. I ask that you also hear my voice as an individual, as a private citizen and as a member of the Ardsley community which is relatively near Indian Point.

I am very concerned and very opposed to the relicensing of the nuclear plant at Indian Point and am supportive of the **RIVERKEEPER's** position on the relicensing. 41-a-OR

Firstly, the Indian Point plants are located in a densely populated area of our state, only 24 miles from New York City. <u>Safety issues</u> are of prime concern because of the possibility of corrosion with such aging plants. Approximately 20 million people live within a 50 mile radius of the plant. Additionally, the long term storage of thousands of tons of highly toxic nuclear waste in poorly maintained spent fuel pools and "dry casks," are accidents waiting to happen. 41-b-AM/SF

Secondly, I have grave <u>environmental concerns</u> related to Indian Point plants. The continued leaking of radioactive water from the Indian Point 2 spent fuel pool into groundwater and into the Hudson River is frightening. Residual contamination is caused by the plumes of contaminated water that slowly leach toxic strontium 90 and cesium-137 into the River. Additionally, shortnose sturgeon, an endangered species, are killed when trapped against cooling water intake screens at the plant. 41-c-AE/LE

I hope that the NRC will refuse the relicensing of the Indian Point power plant. I sympathize with the need for energy and for jobs, but as Section 8 of the DEIS document points out - alternate energy sources are available which will provide both energy and jobs.

Thanks you for taking these thoughts into your considerations! 41-d-AL

Mary Ann E Daly

E-RIDS= ADM-03
Add= A. Stuyvenberg (AXS3)

SUNSI Review Complete
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MR. DAVIS: Thank you for the opportunity to address you this afternoon. My name is Darwin Davis. I'm proud to represent the Greater Harlem Chamber of Commerce and our president Lloyd Williams. We’ve been in operation for the last 110 years. While the Indian Point Energy Center and Entergy may not directly be in my backyard, the effects of Indian Point have a dramatic impact on it. For that and a host of other reasons, I am here in support of Entergy's request an application for Indian Point’s re-licensing. First you should know that Indian Point provides up to 30% of the energy in New York City, where I and 2000 of our Chamber members reside. This is electricity that directly powers our subways, our schools, our hospitals, our homes and our businesses.

42-a-EC/SR

Secondly, while the business climate in Harlem has certainly improved over the last decade, the fact of matter is that businesses within our region and the working families who operate them would be severely impacted by the loss of Indian Point’s reliable low-cost electricity. Higher utility rates and interrupted service will only move my community further into economic tsunami engulfing much of the nation.

42-b-EC/SO

Thirdly, Indian Point’s environmental benefits are crucial to my community’s quality of life. The asthma point has already been raised, I won't add it to the debate.

42-c-HH

Fourth, energy has proven itself to be a good corporate citizen. It

42-d-SE/SR

seeks collaboration with nonprofit organizations in the service areas of its facilities and the relationship it has with the Chamber and has had with the New York Urban League when I was its CEO. Communities like Harlem need affordable, reliable and clean sources of energy, which enhance our quality of life. Indian Point does just that. I urge you to support the licensing renewal. Thank you.

42-d-SE/SR contd.

Darwin M. Davis

Executive Board Member

Greater Harlem Chamber of Commerce

Comments on the U.S. Nuclear Regulatory Commission's Report
for Indian Point License Renewal

Feb 12, 2009

Thank you for the opportunity to address you this afternoon. My name is Darwin M. Davis and I am proud to represent the Greater Harlem Chamber of Commerce and its President Lloyd Williams as one of the Chamber's Executive Board Members.

While the Indian Point Energy Center and Entergy may not directly be in my backyard, the effects of Indian Point have a dramatic impact on it. For that reason and a host of others, I am here in support of Entergy's request and application for Indian Point's relicensing. 42-e-SR

First, you should know that Indian Point provides up to 30% of the power used in New York City – where I and nearly 2,000 of the Chamber's Members reside. This is electricity that directly powers our subways, our schools, our hospitals, our homes and our businesses.

Secondly, while the business climate of Harlem has certainly improved over the past decade, the fact of the matter is that businesses within our region – and the working families who operate them would be severely impacted by the loss of Indian Point's reliable, low-cost electricity. Higher utility rates and interrupted service will only move my community further into the economic tsunami engulfing much of the nation. 42-f-EC/SO

Thirdly, Indian Point's environmental benefits are crucial to my community's quality of life. Indian Point produces emissions-free electricity, and closure of Indian Point would only lead to more fossil-fuel burning plants in our region. This would increase sulfur dioxide and nitrogen oxides emissions, whose negative health effects are quite serious and would further impact the already inordinately high incidence of Asthma and lung related illnesses in my community. 42-g-AL/AQ

Fourth, Entergy has proven itself to be a good corporate citizen. It seeks collaborations with non-profit organizations in the service area of its facilities like the relationships is has with the Chamber and had with the New York Urban League when I was its CEO.

Communities like Harlem need affordable, reliable and clean sources of energy which enhance our quality of life. Indian Point does just that. 42-h-SE/SL

I urge you to support Indian Point's license renewal.

Thank you.

130 pm   page 1

My name is Jill Davis, and I am the Director of the Hendrick Hudson Free Library, which for over 70 years, has supported – and continues to support – the needs of residents in the Hendrick Hudson School District.

Henry Ward Beecher once said, "A library is not a luxury, but one of the necessities of life." Beecher understood the lifeblood a library provides to a community – especially smaller communities – where the library stands as the repository of local history and knowledge, a cultural center, a meeting place, and a symbol of the local community's vitality as a suitable location for raising a family. The Hendrick Hudson Free Library is all of these things and more.

Without the annual voting support of the residents, the library would suffer greatly; however, also of significant importance is the generous support we receive from businesses throughout the area. One such major supporter is Entergy.

Entergy and its employees are an integral part of this community, many are area homeowners; their children attend the schools in the Hendrick Hudson School District and use the library for their academic enrichment, as well as for their reading pleasure. 43-a-SE/SO

Being the main contributor to our Cultural Enrichment Fund, has allowed our library to provide the community

130 pm page 2

with additional programs, events and concerts that our budget alone could not support. They are one funder of "Step Up For Literacy" our pre-school literacy program that supports parents and children in our community who are English Language Learner's to better prepare them for a lifetime of learning. We are also in the beginning stages of a joint venture which will provide the latest technology, "Go Library" a book vending machine, to be placed in a high traffic area in the community, allowing library services to reach the portion of our community that is on the go and finds it hard to visit the physical library building.

As you can see Entergy is a valuable supporter of the library, as well as the community we serve, and without it, there would be a significant loss of support.

43-a-SE/SO contd.

Thank you.

535 Ashford Avenue
Ardsley, New York 10502

Chief of Rulemaking, Directives and Editing Branch
Division of Administrative Services
Office of Administration, Mailstop T-6D59
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

March 15, 2009

Dear Chief of Rulemaking:

I am submitting comments on the re-licensing request by Entergy Company for the Indian Point plant. I ask that you also hear my voice as an individual, as a private citizen and as a member of the Ardsley community which is relatively near Indian Point.

I am very concerned and very opposed to the relicensing of the nuclear plant at Indian Point and am supportive of the **RIVERKEEPER's** position on the relicensing. 44-a-OR

Firstly, the Indian Point plants are located in a densely populated area of our state, only 24 miles from New York City. Safety issues are of prime concern because of the possibility of corrosion with such aging plants. Approximately 20 million people live within a 50 mile radius of the plant. Additionally, the long term storage of thousands of tons of highly toxic nuclear waste in poorly maintained spent fuel pools and "dry casks," are accidents waiting to happen. 44-b-AM/DE/SF

Secondly, I have grave environmental concerns related to Indian Point plants. The continued leaking of radioactive water from the Indian Point 2 spent fuel pool into groundwater and into the Hudson River is frightening. Residual contamination is caused by the plumes of contaminated water that slowly leach toxic strontium 90 and cesium-137 into the River. Additionally, shortnose sturgeon, an endangered species, are killed when trapped against cooling water intake screens at the plant. 44-c-AE/LE

I hope that the NRC will refuse the relicensing of the Indian Point power plant. I sympathize with the need for energy and for jobs, but as Section 8 of the DEIS document points out - alternate energy sources are available which will provide both energy and jobs. 44-d-OR

Thanks you for taking these thoughts into your considerations!

Carol DeAngelo

REV. DEGRAFF: Good afternoon. My name is Rev. Jacques Degraff. I'm second vice-president of the 100 Black Men. We're an organization that was founded in 1963 to fight for issues of justice on behalf of our community. The symbol on my pin indicates an open door, open to opportunities for our community. We operate under several principles, the principles of education, economic opportunities and health-care. It is because of these three pillars that our organization has been driven here today, because the values are being threatened by this discussion and it's implicit, leaving us out of to many of these discussions.

The debate over the Indian Point Energy Center has waged on without participation from New York's diverse communities of color. For to long, our communities have been relegated to the sidelines as energy policy was made in our name, but without our input. A small vocal minority has received the disproportionate level of attention, while the benefits to a larger yet silent majority have not been properly considered. Today, New York's communities of color, from Harlem to Bushwick, from the Bronx to South Jamaica, are here to end this disturbing trend and to say in one unified voice that no decision on the continued operation of Indian Point can be made without substantial contributions from all the communities the power-plant serves. As an organization devoted to increasing 45-a-AQ/EJ public awareness of health issues which affect our community, we are all too familiar with the impact asthma has on our children. The asthma rate in Harlem is four times the national average with one in four children suffering from serious life altering disease. Nearly one third of New York City children with asthma reside in the Bronx, with neighborhoods like Hunts Point and Mount Haven having among the highest rates of asthma in the country.

45-a-AQ/EJ contd.

Asthma is now the leading cause of emergency room visits for our children and missed school days with children in New York City's poorest neighborhoods. The air quality of New York City's poor neighborhoods already stands in violation of federal law and to often it is in our communities that the alternatives to nuclear power, dirty fossil fuel polluting power plants are constructed. Some of these plants are constructed without environmental impact statements and leave our neighborhoods literally suffocating while wealthier, more affluent communities breathe freely. It's as if those who cried not in my backyard when it comes to Indian Point, failed to realize that there are nearby communities with no backyards left. Our community recognizes that the Indian Point Energy Center avoids millions of tons of pollution every year, while providing us with over 2000 Mw of electricity for our schools, mass transit, hospitals and government institutions. We

45-b-AL/EC/EJ

recognize that without Indian Point, we can expect a drastic spike in the cost of electricity. Coupling the increased electric bills with the diminished economic opportunity our community already faces is the real disaster waiting to happen.

45-b-AL/ EC/EJ contd.

We owe it to our children and to our grandchildren to conduct this debate on Indian Point in a responsible manner. We must move past the scare tactics and the old attacks of the past and strive towards a debate that will set the proper course for New York's clean energy future. We must travel this course together as a single group of concerned and conscientious citizens for it is only together that we can strike the balance necessary to ensure the health and safety of all God’s creatures. I thank you for allowing me the time to add our concerns to this community debate. We are hopeful that any decision reached will ensure a continued supply of reliable, clean and affordable electricity for all New Yorkers.

45-c-LR

MR. DIGBY: Good evening. My name is Derry Digby, vice president of the African-American Environmental Association. The African-American Environmental Association is a nonprofit group. We are here today because we are very, very concerned about the issues dealing with the environmental community as it relates to environmental injustices. We are very pro-Indian Point. We are pro-Indian Point because we are believers, we were the first environmental organization in the United States to support nuclear energy. We support Indian Point because we believe that it deals with issues that we are all concerned about. They're clean energy is not a black thing or a white thing. It's a health thing. This is why we support the 20-year renewal of the Indian Point Nuclear Power Plant. AAEA specifically supports the Indian Point 2 and 3 nuclear power facilities because these facilities provide significant electrical capacity to the State of New York with minimal human, animal, air, water and land impacts. I'm not here to demonize fossil fuel power plants because they have made our country what we are today for better or for worse. But I believe that the future of our country is in good clean nuclear power. That's why we're here today because we all believe in that. I hope we believe in the future of our country. AAEA agrees with the preliminary recommendation of the NRC staff. 46-a-EC/SR

Environmental justice is defined by AAEA as the unfair treatment of all people 46-b-AQ/EJ regardless of race or income with respect to environmental issues. AAEA is deeply concerned with any policy or measure that impacts the air quality of the communities where it is based or that affects the health of its members.

46-b-AQ/EJ contd.

We agree with the NRC conclusion in the GEIS on the environmental justice impacts if IP-2 and IP-3 are re-licensed for another 20 years, which states we totally disagree with the environmental justice conclusion that the overall environmental justice impact of construction and operating a closed-in cycle cooling system at the IP-2 and IP-3 sites are likely to be small. The environmental impacts would be devastating because we believe that Entergy would shut down the plant rather than build a cooling tower. That's why we believe that we need to renew this license. I thank you for the opportunity to present my views. Thank you very much.

46-c-AL/EJ/SR

ML090771334

IPRenewalCEmails

From: stevetimberline@optonline.net
Sent: Tuesday, March 17, 2009 11:16 PM
To: IndianPointEIS Resource
Cc: stevetimberline@optonline.net
Subject: Indian Point comment
Attachments: Steve NRC letter 3-17-09.doc

Importance: High

March 17th, 2009

To: the NRC voting members
Re: Indian Point request for re-licensing

From: Steve DiRocco / SteveTimberline@optonline.net

To the Voting Members of the NRC,

By sitting in on the February 12th NRC hearing on the Indian Point request for relicensing, it became apparent to me that Indian Point, and all nuclear plants put forth an incomplete plan

When I say incomplete plan I refer to the fact that we have absolutely no idea what to do with the nuclear waste, which in my way of thinking is an incomplete plan. In any aspect of business, in any other business proposal, no one would even consider this application. 47-a-SF

It was also very obvious that most all the people who spoke in favor of relicensing had a personal monetary interest in the ongoing of operations.

The people who spoke against re-licensing came from all walks of life and were not paid to give their time and knowledge to try and make the NRC aware of the fact that there are a lot of dire concerns and problems.

The likelihood of potential threat to public health and safety has been overwhelmingly proven.

The rusting underground pipes that are apparently impossible to monitor, the impossible evacuation plans, the faulty dry casks, and the existence of the horribly toxic waste being generated every day without the slightest notion of how to properly dispose of it, should be enough reason for the voting members of the NRC to come to the logical conclusion that the Indian Point application for renewal should be denied 47-b-LE/EP/SF

Toxic nuclear waste is building up around the world every day and no body knows what to do with it. This is a legacy that we give to our children and our grandchildren who are going to have enough to deal with. I hope that each of you, who have been entrusted with the responsibility of looking out for all of humanity understand the importance of the task that has been put before you. 47-c-RW

Respectfully,

Steve DiRocco, W. Nyack , NY

MAYOR DONAHUE: Okay, thank you. As Mayor of Buchanan, I have had the distinct honor of representing the more than 2000 residents of the village of Buchanan before the Nuclear Regulatory Commission. I take this role very seriously as Buchanan is the home to the twin nuclear reactors now known as Indian Point Energy Center under its current owner and operator Entergy. Buchanan has thrived as a community in the shadow of these plants, but never shirked away from its responsibility in ensuring the operator of Indian Point ran these plants in a manner that preserved the health and welfare of area residents.

48-a-OP

The Village of Buchanan grew side-by-side with the construction of the site as has our appreciation for Entergy's dedication to running these plants well and remaining an involved community partner. Indian Point is responsible for providing approximately 37% of Buchanan's total operating budget as well as provide substantial financial support to the nearby Hendrick Hudson High School District attended by many of Buchanan’s children. In addition, Entergy has invested in local infrastructure, provided critical funding to the library system and even paid for the lighting system at the high school so residents could enjoy football games at night. Entergy has been an outstanding corporate citizen at a time when other corporations are either fleeing the region or significantly cutting back on their corporate philanthropy.

48-b-EC/SO

Most important, Entergy employees are involved in the community, donating hundreds of hours in volunteering their time. Everything from sitting on a local committee to supporting our great St. Patrick's Day parade. They are here. They are involved. They are part of our community. Since the Indian Point opened in the early 1970s, Buchanan residents have seen Indian Point host its share of dignitaries and detractors, politicians and pundits, friends and foes especially after 9/11. 48-b-SE/SO contd.

The people in opposition to the Indian Point will always be in opposition to nuclear power. I cannot change their opinion and neither can you. These critics will never see what so many others see, that Indian Point provides 2000 Mw of clean, affordable and reliable electricity. These plants are absolutely vital to regional community. Our local economy is struggling under the weight of the latest recession. Yet, you're hearing from some individuals today, who, without thought of even a short-term consequences of their actions want to shut down this site plant. I have seen opponents take some outrageous actions, yet your arguments are always the same. In good economic times or bad, before 9/11 or after 9/11, certainly 48-c-SE/SO

the NRC knows them all by heart. They will say the plants are unsafe. The plants are unsecured and would add easily replaced nonsense. And other times study and study, the opposite has been shown to be true and these opponents proven wrong. 48-d-AQ/SO

MR. RAKOVAN: Sir, if you could please finish.

MAYOR DONOVAN: Yeah, one more second. Entergy has proven itself as reliable operator. They have invested hundreds of millions of dollars in Indian Point. When problems have arisen, they have responded appropriately. And when their responsibility was insufficient like with the replacement of the existing siren system, the company paid the appropriate price and the NRC and FEMA acted accordingly. Their security force is top notch. And as a former state police officer, I can say that with great confidence and conviction. 48-e-OP/SR

To the final piece, now more then ever, the economy interests of the entire Hudson Valley region are tied to the outcome of the regulatory process to determine if Indian Point remains on the job for the next 20 years. The economic facts are clear. Indian Point provides anywhere from 18 to 38% of our regional electricity and there's currently no viable alternative for replacing its 2000 Mw of power. The environmental case is equally compelling. Replacing Indian Point with fossil fuel plants would trigger a 20% increase in carbon monoxide emission according to a recent study by the National Academy of Sciences. The citizens of Buchanan are already suffering from polluted Hudson Valley area air, which is not caused by the nuclear plant, but will -- 48-f-SE

MR. RAKOVAN: Sir, I'm going to have to ask you to close. We've got to many speakers.

MAYOR DONOVAN: I understand that, but it's in my village and I timed people that talked for six or seven minutes. I've only got one more page.

-- definitely get exponentially worse if these plants were replaced by more coal or gas plants. Let me be critically clear at this point, the many economics and environmental benefits of Indian Point can never outweigh safety. Personally, I was impressed with the thoroughness of the recent independent safety evaluation conducted by a panel of distinguished experts who announced it concluded that Indian Point is a safe plant of course. Many of the Indian Point critics here today dismiss this report, even before it was released. That is why I take comfort from the fact that the NRC and the local officials working together will continue to judiciously review the ability of India Point’s owners, Entergy, to continue to run these plants as safely and efficiently as they have taken over the operation. I strongly support the continual operation of the Indian Point Energy plant for another 20 years and beyond its current license and strongly recommend you listen to the voices of recent and scientific fact, rather than those individuals who use fear. Thank you. 48-g-AQ/SO

MR. DURETT: Good afternoon. I would first like to thank the commission for holding this hearing, one on the birth date of Abraham Lincoln and equally and more importantly, during this month of Black history. For those who do not know the significance of that, then please reach out to a person of color and they will explain it. I only have three minutes. My name is Dan Durett. I am the Director of the African American Environmentalists Association, heading up the office in New York.

We are an organization dedicated to protecting the environment and enhancing human, animal and plant ecologies and promoting the efficient use of natural resources. We include an African American point of view in environmental policy decision-making, and in resolving environmental racism and injustice issues through the application of practical environmental solutions. So you see, this is not only a significant hearing, but indeed, a continuation of the voicing of environmental perspectives from people of color. We support, let it be known clearly, that we support the 20-year license renewal for Indian Point. We expressed public support for nuclear power for the first time in 2001 after a two-year internal process of studying and debating the issue. AAEA was the first environmental organization to support nuclear power. 49-a-SR

I am a veteran environmentalist with 34-years experience working on environmental and energy issues. My comments today address this Draft Generic Impact Statement. But again, we are here to look at the continued operation of Indian Point. Our members in New York breathe the air in a clean-air non-attainment area. Of particular import to our members is the promotion of clean air in African-American communities. Because nuclear power is emission free and has a demonstrated safety record, whereas fossil fuel power contributes to numerous health issues, AAEA New York seeks to promote the safe use of nuclear power and we support Indian Point 2 and 3 facilities. These facilities provide significant electrical capacity to the State of New York with minimal human and other impacts. 49-b-AQ/EJ

MR. RAKOVAN: If you could please close.

MR. DURETT: I'll close with this then. You have copies of my statement. 40-years ago or during the `60's, there was a particular phrase that rang across this country and it started with a sign like this and it said power to the people. As you think about Indian Point and the continued operation, it is the power of that point, of Indian Point, that gives power to the people. It is looking at the alternatives and what would happen if the plant was closed and the adverse impact on communities of color. We support the license renewal for Indian Point because this facility will continue to provide alternative solutions and advance the participation of people of 49-c-LR/SR color in the decision-making process. We started in 2001 looking at this issue and here we are in 2008 still saying let's keep this plant operating so that our communities can have the benefit of clean-air. I hope I'm under my three minutes. 49-c-LR/SR contd.

1

African American Environmentalist Association
New York

Written Statement of

Dan Durett
Director
New York Office
African American Environmentalist Association

For the

Nuclear Regulatory Commission Meeting To Discuss The Draft Supplemental Environmental Impact Statement

For

License Renewal

For the

Indian Point Nuclear Power Plant

Presented to the

U.S. Nuclear Regulatory Commission

Office of Nuclear Reactor Regulation

February 12, 2009

347 Fifth Avenue, Suite 508, New York, NY 10016
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AAEA Statement on Indian Point License Renewal Application

Introduction

My name is Dan Durett and I am the Director of the African American Environmentalist Association New York Office (AAEA-NY). AAEA, founded in 1985, is an organization dedicated to protecting the environment, enhancing human, animal and plant ecologies and promoting the efficient use of natural resources. AAEA includes an African American point of view in environmental policy decision-making and resolves environmental racism and injustice issues through the application of practical environmental solutions. The New York Office was established in 2003.

AAEA New York supports the 20-year License Renewal for the Indian Point nuclear power plant located in Buchanan, New York. AAEA expressed public support for nuclear power for the first time in 2001 after a two-year internal process of studying and debating the issue. AAEA was the first environmental organization to support nuclear power. I am a veteran environmentalist with 34 years experience working on environmental and energy issues. My comments today address the Generic Environmental Impact Statement for the License Renewal of Nuclear Plants, Supplement 38, Regarding Indian Point Nuclear Generating Unit Nos. 2 and 3.

AAEA-NY has members in the New York area. Members of AAEA live and work – and breathe the air in a Clean Air Act Nonattainment Area. Of particular import to AAEA-NY is the promotion of clean air in African American communities. Because nuclear power is emission-free and has a demonstrated safety record, whereas fossil-fuel power contributes to numerous health issues, AAEA-NY seeks to promote the safe use of nuclear power. AAEA-NY specifically supports the Indian Point 2 and 3 nuclear power facilities because these facilities provide significant electrical capacity to the State of New York with minimal human, animal, air, water, and land impacts. My comments will address specific environmental justice, air pollution, and global warming issues. 49-d-AQ/EJ/SR

AAEA-NY Comments on GEIS 2

1

AAEA-NY agrees with the preliminary recommendation of the NRC staff:

> "...that the Commission determine that the adverse environmental impacts of license renewals for IP2 and IP3 are not so great that not preserving the option of license renewals for energy planning decision makers would be unreasonable. This recommendation is based on (1) the analysis and findings in the GEIS, (2) the ER submitted by Entergy, (3) consultation with other Federal, State, and local agencies, (4) the staff's own independent review, and (5) the staff's consideration of public comments received during the scoping process."[1]

49-d-AQ/EJ/SR contd.

Environmental Justice

Environmental justice is defined by AAEA-NY as the fair treatment of all people regardless of race or income with respect to environmental issues. AAEA-NY is deeply concerned with any policy or measure that impacts the air quality of the communities where it is based, or that affects the health of its members. Although AAEA-NY is concerned about air quality in all areas, we are particularly concerned with promoting clean air in African American communities because, in many instances, those communities suffer a disproportionate amount of total pollution.

The license renewal of Indian Point is vitally needed because if units two and three are not producing emission free electricity then the air pollution will increase throughout the region. Closure of Indian Point would result in compliance issues for the State with respect to the federal Clean Air Act State Implementation Plan ("SIP"). Additionally, Indian Point provides reliable energy without contributing pollutants that exacerbate asthma.

The New York State Department of Environmental Conservation's (DEC) Environmental Justice policy states that it is the general policy of DEC to promote environmental justice and incorporate measures for achieving environmental justice into its programs, policies, regulations, legislative proposals and activities. This policy is specifically intended to ensure that DEC's environmental permit

49-e-AL/EJ

[1] U.S. NRC GEIS for License Renewal of Nuclear Plants, Supplement 38, Regarding IP2 & 3, Draft Report For Comment, Main Report, Executive Summary, p. xvii.

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process promotes environmental justice. (Environmental Justice Policy, Policy Statement CP-29, March 19, 2003).

We would like additional information as to why environmental justice is not evaluated on a generic basis. The environmental justice assessment in GEIS is woefully inadequate and does not consider the great benefits of IP2 and IP3 to nearby environmental justice communities. AAEA submits information regarding these benefits but it has yet to be incorporated into site-specific assessments. We would appreciate an explanation as to why these environmental justice benefits are not included in the assessments.[2]

We agree with the NRC conclusion in the GEIS on the environmental justice impacts if IP 2 and IP 3 are relicensed for another twenty years, which states:

> "Based on the analysis on environmental health and safety impacts presented in this draft SEIS for other resource areas (contained in Chapters 2 and 4 of this SEIS), there would be no disproportionately high and adverse impacts to minority and low income populations form continued operation of IP2 and IP3 during the license renewal period."[3]

We totally disagree with the environmental justice conclusion that, "the overall environmental justice impacts of constructing and operating a closed-cycle cooling system at the IP2 and IP3 site are likely to be SMALL."[4] The impacts would be devastating because we believe Entergy would shut the facility down before building cooling towers and that would lead to significantly more air pollution in minority communities that are already inundated with a disproportionate amount of pollution sites. We support the alternative proposal that would combine the existing once-through cooling system with modified intake retrofits that would be equivalent to a new closed-cycle cooling system.

49-e-AL/EJ contd.

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[2] In the GEIS, the staff assessed 92 environmental issues and determined that 69 qualified as Category 1 issues, 21 qualified as Category 2 issues, and 2 issues were not categorized. The two issues not categorized are environmental justice and chronic effects of electromagnetic fields. Environmental justice was not evaluated on a generic basis and must be addressed in a plant specific supplement to the GEIS., p 1-4.

[3] GEIS, 4.4.6 Environmental Justice, p 4/45-4-46.

[4] GEIS, Section 8.1.1.2 Environmental Impacts of the Closed-Cycle Cooling Alternative, Environmental Justice, p. 8-16.

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Requiring a closed-cycle cooling system is essentially the No-Action Alternative (shut down).

The license renewal of Indian Point is vitally needed because if units two and three are not producing emission free electricity then the air pollution will increase throughout the region. Closure of Indian Point would result in compliance issues for the State with respect to the federal Clean Air Act State Implementation Plan ("SIP"). Additionally, Indian Point provides reliable energy without contributing pollutants that exacerbate asthma.

The New York State Department of Environmental Conservation's (DEC) Environmental Justice policy states that it is the general policy of DEC to promote environmental justice and incorporate measures for achieving environmental justice into its programs, policies, regulations, legislative proposals and activities. This policy is specifically intended to ensure that DEC's environmental permit process promotes environmental justice. (Environmental Justice Policy, Policy Statement CP-29, March 19, 2003).

49-e-AL/EJ contd.

New York's Minorities Pay the Price for Fossil-Fuel Air Pollution

New York is no exception to this national crisis. In New York City, it is estimated that there are 2,290 deaths, 1,580 hospitalizations, 546 asthma-related emergency room visits, 1,490 cases of chronic bronchitis, and 46,200 asthma attacks yearly attributable to power plant pollution.[5] The New York City area has also been ranked as one of the top five U.S. metropolitan areas for particulate air pollution.[6] And again, these adverse effects disproportionately affect minority communities. In one study, nonwhites in New York City were found to be hospitalized twice as many times as whites on days when ozone levels were

49-f-AQ/EJ

[5] Death, Disease & Dirty Power: Mortality and Health Damage Due to Air Pollution from Power Plants, at 24, Clean Air Task Force (October 2000) ("Death, Disease & Dirty Power") (Exhibit C) (http://cta.policy.net/fact/mortality/mortalitylowres.pdf).

[6] New York's Dirty Power Plants, Clear the Air – the National Campaign Against Dirty Power (available at http://cta.policy.net/relatives/17841.pdf). The Air Quality in Queens County Report states that "New York City … [is] burdened with significant air quality problems" and "[t]he US EPA has determined that the NY metropolitan area … is in 'severe nonattainment' for ozone."

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high.[7] Another study found that, of the 23 counties in New York State that fail to meet Federal air pollution standards, 37.7% of them are populated by people of color.[8]

That African Americans and other minorities are disproportionately affected by air pollution in New York is not surprising when considering the fact that the majority of air-polluting power plants in the New York metropolitan area are located in African American and other minority communities. Based on figures from the 2000 U.S. Census, only 12.3% of New York State is identified as being African American, and only 29.4% of the total population is classified as a minority. However, in communities that are predominantly minority, such as Queens, the Bronx, and Brooklyn, there are a disproportionate number of fossil-fuel power plants emitting criteria air pollutants. For example, there are approximately 1,563,400 people of color, 217,247 children living in poverty, and 40,248 children who suffer from pediatric asthma within 30 miles of the Lovett facility, a coal-fired power plant bordering the New York City metropolitan area.[9] In the Bronx, which is 35.6% African American and 88% minority, there are two power plants, Harlem River Yards and Hell's Gate. In Brooklyn, which is 36.4% African American and 64.2% minority, there are seven power plants, the 23rd and 3rd Plant, Brooklyn Navy Yard, Gowanus, Hudson Ave., Narrows, the North First St. Plant, and Warbasse Cogen. In Queens, which is 20% African American and

49-f-AQ/EJ contd.

[7] Martha H. Keating, AIR INJUSTICE, at 4 (October 2002).
[8] Clear the Air: People of Color in Non-Attainment Counties (http://cta.policy.net/fact/injustice/injustice_non_attainment.pdf).
[9] *See* Clear the Air: People of Color Living Within 30 Miles of a Specific Coal-Fired Power Plant (available at http://cta.policy.net/relatives/20121.pdf); Clear the Air, Power Plant Pollution Threatens the Health of New York's Children (June 11, 2002) (available at http://cta.policy.net/relatives/20121.pdf).

63.2% minority, there are six power plants, Astoria, Poletti, Far Rockaway, JFK Cogeneration, Ravenswood, and the Vernon Blvd. Plant. Queens is also ranked among the worst 10% of U.S. Counties in terms of its exposure to criteria air pollutants, and is one of two city boroughs that violate federal standards.[10] In the Air Quality in Queens County Report, it is stated that:

> The concentration of generating capacity in Northwest Queens is exceptionally high for such a densely populated area. In addition, this community includes a high percentage of low-income people and persons of color. These demographics suggest that "environmental justice" concepts and policies should be taken into account when considering options for addressing air quality in Queens and in considering the siting of further sources of air pollution. The steam generating units in Queens are responsible for a large percent of the NO_x, SO_2, and CO_2 emitted in Queens.

In total, there are 24 power plants in the New York metropolitan area, only a handful of which are in areas where minorities do not comprise the majority of the population. One of these is the Indian Point power generating facility.[11]

49-f-AQ/EJ contd.

<u>Lost Production From IP Will Be Replaced By In-City and Other Nearby Facilities</u>

If generation at Indian Point 2 and 3 were to be significantly limited or were to cease altogether, the lost electricity would most likely be replaced by nearby facilities, including the above-referenced in-city facilities and the Lovett coal-burning facility. For instance, in a study by Synapse Energy Economics, Inc., dated November 3, 2003 and entitled, *The Impact of converting the Cooling systems at Indian Point Units 2 and 3 on Electrical System Reliability* (attached hereto as Exhibit D), Synapse finds that New York electricity generators,

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[10] Air Quality in Queens County, at S-5.
[11] All population data compiled from the 2000 U.S. Census.

particularly in-city generators, have excess capacity which would supplant capacity losses at Indian Point if Indian Point were brought offline. Similarly, in an August 2002 study by the TRC Environmental Group entitled, *Entergy Nuclear Indian Point 2, LLC and Entergy Nuclear Indian Point 3, LLC Emissions Avoidance Study* (the "TRC Report"), TRC concluded that "it is reasonable to assume that the majority of lost output [(if Indian Point were brought offline)] would be made up by increased generation of units nearest to the New York City/Westchester load pocket."

Increasing Generation at Facilities Near Indian Point Will Increase Air Pollution in the Communities Where These Facilities Are Based

The TRC Report further found that, if Indian Point is brought offline, the air quality in New York would decrease dramatically. For instance, if the gap created by Indian Point's closure were to be filled by the power plants located in New York City, almost all of which are in predominantly minority communities, CO_2 plant emissions would increase by 101% (or 12,494,172 tons), SO_2 plant emissions would increase by 106% (or 8,020 tons), and NO_x plant emissions would increase by 105% (or 16,107 tons). Even if replacement electricity were spread out more broadly, to include all of the Hudson Valley and New York City plants, CO_2 plant emissions would still increase by 57% (to 13,686,648 tons), SO_2 plant emissions would increase by 62% (to 35,961 tons), and NO_x emissions would increase by 57% (to 20,258 tons).

And as the level of air pollution increases, so do the incidences of death and respiratory and cardiovascular ailments. For instance, in the National Morbidity and Mortality Air Pollution Study ("NMMAPS"), a team of investigators

49-g-AL/AQ/EJ contd.

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from Johns Hopkins University and the Harvard School of Public Health found, among other things, strong evidence linking daily increases in particle pollution to increases in death in the largest U.S. cities.[12] Links have also been found between fine particle levels and increased hospital admissions for asthma, cardiovascular disease, pneumonia, and chronic obstructive pulmonary disease.[13] Stated bluntly in the Air Quality in Queens County Report, "Epidemiological studies tell us that on days when air pollution levels are high, more people get sick or die

Based on the above data and studies, it is clear that if Indian Point 2 and 3 were to be brought offline, forced to close, or if their production were limited, the void in electricity production would be filled by power plants located in minority communities, with a corresponding increase in the rates of asthma and other respiratory diseases, cardiovascular diseases, and even infant mortality in these communities.

49-g-AL/AQ/EJ contd.

The Benefits of Indian Point 2 and 3

The Indian Point facilities, located in the affluent and predominantly white Westchester County, have a combined generating capacity of approximately 2000 megawatts (MW). The facilities provide approximately 20-30% of the electricity for New York City and its northern suburbs. And, unlike New York's fossil-fuel burning facilities, Indian Point 2 and 3 do not pollute the air.

AAEA has a strong environmental interest in this proceeding because AAEA is an environmental action group, with a chapter in Manhattan, New York,

49-h-AQ/EC

[12] Cited in Death Disease & Dirty Power.
[13] Cited in Death Disease & Dirty Powers

with a stated goal of promoting clean air in low-income and minority communities by, among other things, supporting the safe use of nuclear energy. AAEA also has members in the New York area whose air quality may be impacted by the DEC's Permit for Indian Point 2 and 3. Further, AAEA has publicly supported Indian Point 2 and 3, due to its positive impact on New York's air quality, for several years. For instance, in May 2002, AAEA President Norris McDonald presented testimony before the Committee on Environmental Protection in opposition to Chairman James F. Gennaro's Resolution 64, which called for the immediate shutdown of Indian Point. AAEA also presented testimony on February 28, 2003, before the New York City Council's Committee on Environmental Protection, again opposing efforts to shut down Indian Point. And most recently, AAEA participated in the DEC's legislative hearing relating to Indian Point's Draft SPDES Permit.

49-h-AQ/EC contd.

Conclusion

AAEA New York supports the 20-year License Renewal (ESP) for the Indian Point nuclear power plant located in Buchanan, New York. We support this renewal because the facility is a positive structure for mitigating ground level air pollution, global warming and environmental injustice.

49-i-SR

MR. EDELSTEIN: Thank you very much. I'm Michael Edelstein. I'm a professor at Ramapo College and I'm pleased to be here with many of my students from my course on environmental assessment. I'd like to thank the NRC for helping to increase the educative value of this moment. But I'm speaking not as a Ramapo College professor nor for Ramapo College. I'm a president of Orange Environment Inc., which is a non-profit organization in Orange County, New York and I did file extensive scoping comments on behalf of Orange Environment and my comments today should be taken in that context, please. Now, first of all, I will resubmit many of my comments because I don't think they were adequately addressed. But tonight I want to focus on a number of issues and I want to put this in a context, which is the purpose of environmental assessment, the exercise that is being gone through here is to create evidence for decision-makers who will make the decision about whether to issue the license or not. The better that record is, the more complete it is, the better they can do their job. It is with that intent that I continue. Now, I generally favor the use of generic environmental impact statements. But they do open up the possibility that I think exists here, which is that issues can be lost and in effect a shell game can be played where certain issues get placed in one pile and therefore not looked at it another.

50-a-LR

And as was already pointed out tonight, the generic impact statement is old enough, enough new things have happened that I would suggest that my first comment that there be a review of that generic environmental impact statement to see whether or not there are new issues that would be pertinent to the Indian Point review that should be brought forward into Supplement 38 and its further development is the final impact statement. Now, the issues with the generic impact statement can be understood in the number of context, let me give one. And that is the issue of accidents. The issue of accidents get obscured when we talk about Indian Point and its review in the impact statement for Indian Point, because there's a generic set of decisions that suggest that there's no risk that therefore obviate the need to look further at Indian Point. That need to look further, however, exists at Indian Point for a number of reasons that don't apply to the generic pool. First of all, if you take a look at the demographics and it goes all the way back to the earliest studies on risk. Indian Point has a much larger population that would be affected were an accident to occur. That population has a different demographic set of characteristics, much more involved in what we now call environmental justice issues. So it's not really a comparable situation. What's happened is that we don't really look at the consequences of potential accidents because in fact we're caught

50-b-DE/PA

up in making conclusions that there cannot be no risk, so there's no need to look at it. But those consequences are a genuine and legitimate responsibility that impact statement to examine and I think that examination needs to be there. 50-b-DE/PA contd.

To go back to the earliest risk studies, CRAC-2 is one of them, we begin to see that you go down a list of the impacts of accidents at nuclear power plants, and when you come to got Indian Point those impacts are dramatically larger than at any other facility that exists on the list. That's true of more modern and current impact assessments, or risk assessments, as well. There are a number of issues that have been raised today that suggest significant new issues for reopening this examination. 50-c-PA Those include the discussion today, in the afternoon, about reference doses. The fact that the risk studies are based on a population of young males, which is not indicative of the broad population. Second of all, some evidence has been introduced about cancers. Also about exposures that have been detected in milk, in women's milk. There's also some new evidence of seismology or earthquake activity that goes beyond what we knew in the past. So, there's a whole set of issues here.

One last point, is that there's also an issue of segmentation, which I think needs to be addressed with regard to the issue of the evacuation. We have a very checkered record in 50-d-EP/HH terms of the compliance of this facility for requirements for evacuation and the ability to sign-off on evacuation and safety has been a real problem for county executives who are required to do so. Given that, I believe that that should be addressed, but it's been segmented by the regulatory thinking that's involved in the Agency. 50-d-EP/HH contd.

NEPA is inherently, the National Environmental Policy Act, is inherently an integrative statute. It has components like cumulative effects, secondary impacts, long-term impacts that breakdown the barriers that are used to segment those issues. I don't think there's any justification for that. So, in the revision for the final impact statement, I believe those issues should also be addressed. Thank you very much. 50-e-NE

TESTIMONY OF MICHAEL R. EDELSTEIN, PH.D.
President, Orange Environment, Inc.

At the
HEARING FOR INDIAN POINT NUCLEAR GENERATING
UNIT NOS. 2 AND 3, LICENSE RENEWAL APPLICATION
COMMENTS ON THE DRAFT GENERIC ENVIRONMENTAL IMPACT
STATEMENT
SUPPLEMENT 38

February 12, 2009
Cortland Manor, Putnam, County
Submitted as Written Testimony March 10, 2009

I am President of a 501C3 organization, Orange Environment, Inc. that for the past 26 years has been deeply involved in the crucial environmental, community and sustainability issues affecting Orange County, New York and its region. OEI has intervened in numerous permit hearings for hazardous facilities. OEI has had a long term interest in issues of safety relating to Indian Point. I am speaking tonight on behalf of OEI.

I am also Professor of Psychology at Ramapo College of New Jersey, whose campus and nearly 6,000 students and staff are also potentially within an impact region for the Indian Point Complex. At Ramapo, I head the Environmental Studies program and co-direct the Institute for Environmental Studies. Tonight, students from my Environmental Assessment course are with me and some will offer testimony.

Recently I was listed by Clearwater, an intervener into the Permit Hearings on this matter, as a potential Expert Witness. I do not address in any detail issues relating to my potential testimony in these comments.

In this written version I expand upon my February 12 oral comments. I further reviewed my expertise with regard to issues pertinent to this application in my scoping comments submitted at a hearing in the same location in September of 2007 (see Edelstein 2004). I will not repeat details discussed then.

I began my oral testimony on February 12 by recalling the purpose of NEPA as a tool for rationally informing decision makers of potentially significant impacts that must be weighed in the decision making process. The aim of these comments is accordingly to assure that this hard look record is created.

I have reviewed the Draft Impact Statement that is subject of this hearing and hereby offer these comments pertinent to further research and revision required prior to issuance of a Final impact study.

My initial comment is my disappointment that many of the issues that I raised in my scoping submission have not been addressed or were minimally addressed in the Draft document.
I wish to ask that these comments be revisited point by point in constructing the Scope for the Final. 50-f-NE

In addition, I have these comments.

1. Comment One: Revisiting the Generic Impact Study

NRC rationally conducted a GEIS covering 69 issues that it found to be similar to all nuclear reactors that might seek twenty year extended operating permits. However, this generic study is now 13 years old, creating a potential that conditions have changed in the intervening time that might have led to different conclusions for all reactors or specifically for Indian Point. I offer but one example. Thirteen years ago, there was a greater certitude that Yucca Mountain would open in the near term as a national nuclear repository. In the intervening time, cask storage in situ has been implemented as a recognition that imminent disposal in Nevada was no longer a reality that could be counted upon. The use of monitored retrievable storage as potentially a long-term rather than interim solution to nuclear waste management has potential implications for the entire reactor system, but certainly for Indian Point's review. 50-g-GE/RW/SF

Rather than reviewing all 69 issues in this submission, it seems more appropriate to ask the generic question. Therefore, I ask that NRC review the entire generic impact assessment looking for new information that might result in different findings of impact or mitigation or the different weighing of alternatives with regard to generic considerations or specifically with implications for the Indian Point review. The goal will be to bring that review up to date with current conditions, knowledge and assumptions regarding impacts, mitigation and alternatives.

2. Shifting Generic Issues to Site Specific Issues

In the above process, there must also be a reconsideration of issues that were considered to be generic but would better be viewed as site unique and therefore must be considered in Supplement 38.

I offer the specific instance of the risk assessment and the conclusion that because there was a generic finding of safety that this finding applies to Indian Point. In fact, both the generic and supplemental studies offer evidence that contradicts this logic. Specifically, with regard to risk assessment, it is clear that there are sensitive receptor issues at Indian Point that differ from those encountered in the larger reactor "population." 50-h-DE/PA

As found in the early CRAC II studies, for example, it was recognized that an accident at Indian Point would cause a different and greater magnitude of deaths, injuries and financial loss than would an accident at any other reactor location. These findings are

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mirrored of necessity in subsequent studies. The underlying facts are that Indian Point contains a disproportionately large sized population within both the inner and outer proximate zones of impact resulting in the likelihood if not certitude of substantial losses---human and economic---were an accident to occur. Because the magnitude of this impact does not parallel the situation at other reactors, the Supplemental review clearly must address questions of risk that are ruled out in the Generic study and consequently the Draft.

50-h-DE/PA contd.

3. EJ and Other Issues Improperly Dismissed Due to the Misapplication of Generic and Questionable Findings of No Risk

The Draft study recognizes that Indian Point has nearly a 50% EJ population at risk, a situation that again has no parallels for other reactors among the Generic Pool and, therefore, requires a unique analysis in the Supplemental Study. Over the twenty year extension, the proportion of EJ members of the surrounding is likely to increase. As a secondary impact of the failure of the Draft to consider risk as a unique issue, it dismisses the EJ differential as moot because if there is no risk at all, there is no risk to minorities and poor. In revisiting the issue of risk at IP, it thus becomes necessary to analyze in detail all issues that pertain to Environmental Justice. The mootness is removed. I make parenthetical note, here, of the findings of the Advisory Committee on Reactor Safeguard, rendered only a few days ago, that cite concerns with the age and performance of Indian Point, making special note of chronic leaks.

50-i-EJ/LE

It should be mentioned here that the area of reactor risk has always been looked at as the classic case of "low probability/high consequence" accident. The GEIS does not claim zero risk; rather, while the consequences of a "severe" accident are acknowledged to be significant, the probability is defined as "small" (DSEJS at 5.3). There is a logical fallacy engaged here. The probability of an accident, no matter how remote, does not diminish the severity of an accident should it occur. Therefore, weighting the severity as a function of probability is meaningless. Severity and probability are really independent factors to be properly considered in isolation. Unless it can be shown that low probability is really zero chance, then the consequences pertain. And, they need to be fully described and analyzed and, if possible, mitigated. And, consequently, in the case of Indian Point, issues of Environmental Justice are therefore directly relevant.

50-j-EJ/PA

4. Consequence Not Just Mitigation of Accidents is Required to be Analyzed

As a further implication of the above, the fact that Supplement 38 examines mitigations for accidents but not the consequences of accidents is inappropriate and makes no sense. Bogard (1989) wrote presciently that a mitigation is merely a restatement and backdoor recognition of a hazard. If one requires a discussion of mitigations, therefore, one acknowledges that there is not zero chance of failure. Instead, an accident of some form may occur. The FSEIS must discuss the potential consequences of different accident scenarios. One might argue that the occurrence of a given disaster might be minimized by a range of mitigations, but were the accident to occur, what would the impact be?

50-k-PA

The brief treatment of different scenarios in Tables 5.3-5.4 falls far short of meeting the need for analysis of accidents. For example, in the instance of an accident caused release due to a failure of the "SGTR" contaminant failure mode (the gas distribution system), it is indicated that a population dose of 7.7 person-rems/year would occur at IP2 and 16.6 at IP3 (Table 5.4 at DGEIS 5.6). If this accident scenario were then linked to the sensitive receptor information, what then would the consequences be? Likewise, for other failures listed here. This section must be expanded to present a thorough analysis of what it would mean for the affected populations should any of the potential event scenarios unfold. 50-l-HH/PA

There are likely many scenarios not reflected in these tables. In fact, after the Three Mile Island accident, Environmental Sociologist Chip Perrow (1984) coined the term "normal accident" to refer to events that are catastrophic in consequence even though simple and mundane in cause. Rather than major systems failure, they occur due to operational error, simple mistakes, poor control design or errors in institutional thinking. The worst disasters have been of a normal rather than systems failure nature. The potential for normal accidents may expand the list of failures that requires analysis here. To normal accidents we now must add the potential for terrorism, or deliberate accidents, as well as such non deliberate accidents as an airplane crash (not that an airplane would ever come down on the Hudson River). 50-m-PA/ST

Finally, it should be noted that the protracted use of spent-fuel pools and the addition of interim on-site waste storage represents a new condition for inclusion in these analyses. 50-n-RW/SF

5. Significant new information

Beyond the above considerations, several new areas of exploration have emerged that require analysis in themselves and that are associated with the likelihood of release and exposure events.

a. Testimony on February 12 called attention to the problem of reference dose. This is only one of the methodological assumption issues discussed in the literature and the FSEIS should review all areas of controversy over methodological assumptions that might alter impact conclusions. In this instance, without repeating testimony put on the record, it should be clear that analysis would include outcomes if different reference dose assumptions were made. That is, if we looked at vulnerable populations rather than least vulnerable populations, would conclusions change? 50-o-HH/LE/PA
b. Furthermore, evidence was introduced showing excess cancers in populations proximate to Indian Point. A full and detailed analysis of this data should be presented, drawing conclusions that are appropriate.
c. While the above point shows consequence without a causal linkage, another study introduced at the hearings indicates an exposure pathway at Indian Point

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through mother's milk. Testing of this pathway should be included in the FSEIS.

d. These pieces of new data need to be considered in light of known release from leaking storage pools at Indian Point, as well as other known and potential forms of release.

e. Finally, new indications of seismic activity are known to have occurred in the Indian Point region that bear thorough analysis.

50-o-HH/LE/PA contd.

6. Inappropriate Segmentation of Impacts: the Case of Warning and Evacuation

NEPA is an integrative tool that clearly seeks analysis that is not compartmentalized artificially. Through such tools as cumulative impact assessment, analysis of secondary impacts, analysis of long range as well as short term impacts, NEPA seeks to present a comprehensive portrait of the impacts for consideration by the decision makers.

In this regard, there is an inappropriate segmentation made in the DSEIS that results in ignoring issues covered by other regulatory frameworks outside of licensing and re-licensing. Of major concern here is the exclusion from analysis of the adequacy of contingency plans relating to warning, protection and evacuation of populations in the face of an accident. This segmentation has no legitimacy under NEPA. It confuses the regulatory need for contingency planning with NEPA's demand for a hard look. They are independent demands for different actions.

The issue of protection and evacuation is of particular salience in New York, where a constructed reactor at Shoreham was never operated because it failed to meet requirements for evacuation. At Indian Point, where County Executives have refused to certify evacuation plans, there is a danger that NRC would allow Entergy to upgrade the Indian Point reactors only to face a subsequent and expensive decision to mothball or remove the reactors. NEPA seeks to avoid such occurrences and New York State would have been well served had NRC been able to conclude after NEPA/SEQRA review that the Shorham plant was not operable under existing evacuation considerations. The failure to take a hard look in the Shorham case illustrates the risk of the same kinds of segmentation employed here. It is neither prudent nor consistent with the law.

50-p-DE/EP/NE

There is no analysis here of the myriad problems Entergy has encountered with its warning systems (the fact that systems worked days before the hearing merely calls attention to the fact that, given their history, one would is forced to conclude that they might not work at a point when needed). There is no review of the problems to be encountered were evacuation of populations surrounding the plant and outward were necessitated. Again, the fact that County Executives of surrounding counties have not certified safety precautions on numerous occasions is a fact for consideration, as are the reasons for these decisions.

Likewise, the issue of where fleeing residents would go, the ability of road networks to get them out of harm's way, the realistic availability of busses and drivers,

50-q-DE/EP

complications surrounding school children and pets and the safety and suitability of emergency destinations all need to be considered. As seen in the Katrina disaster, some do not evacuate even when told to for reasons not previously considered as serious impediments to the efficacy of contingencies. Others lack the ability to evacuate. And, impacts of evacuation also can be serious (potential for automobile accidents, for example).

And, there also needs to be a consideration of populations that would not or can not evacuate and how well protected they can be in situ. These sheltered-in-place populations would face what added risks? Are there contingencies to protect them?

The demographics of the region further suggest that an EJ analysis and vulnerable population analysis is required for each of these outcomes---evacuation, failure to evacuate, unable to evacuate, sheltered in place.

50-q-DE/EP contd.

The psycho-social analysis that I had requested during scoping would include in its consideration the issue of perceived risk and resulting fear and changed behaviors in the community. For example, within the evacuation zones, how many people trust that they can be protected should an event occur? What is the basis of their perceptions? How are their lives affected by the potential for exposure, evacuation etc,? What prevalent beliefs about safety occur, how are they manifested and upon what are they grounded?

50-r-EP/PS

During the hearing, testimony was heard from those fearing the loss of jobs, tax losses and economic consequences to the community should re-licensing fail. These issues need to be explored as impacts and in light of possible mitigation. The DSEIS discusses the potential for a new gas-fired plant on the IP site. Other mitigations may be existent or possible. For example, if not re-licensed, would not Indian Point continue as owner of the property and as a tax payer? Would not decommissioning activities employ workers for an extended period of time? Could not some socio-economic impacts be mitigated through new uses of the land? Would not decommissioning provide a sufficient delay in order to develop mitigations for job loss and economic impacts? Since the plants would presumably be decommissioned twenty years hence even if re-licensed, would not adverse socio-economic consequences occur at a later point? Are there other economic values diminished by Indian Point that might flourish in its absence and make up for losses (for example eco-tourism)?

50-s-SO

Additional testimony was heard from leaders of the African American and Hispanic communities of the region. This testimony consistently espoused the additional belief that Indian Point's closure would force combustion based power plants to be built in New York City, further exacerbating current unacceptable levels of asthma for largely EJ populations there. What credibility is there to this belief that closing Indian Point would spike asthma rates? And were these speakers aware of consequences projected from various accident scenarios and the implications for their communities?

50-t-EJ

Some basis for informed choice is needed for the communities designated as potentially affected should an accident occur. The FSEIS should meet this need if a hard look is taken.

By extension, other areas of segmentation must also be revisited in detail, including on-site waste storage. A full catalog of excluded considerations from the DSEIS should be made and addressed in the FSEIS under cumulative, secondary and long-term impacts. 50-t-EJ contd.

7. Greenhouse Gas

The belief that re-licensing Indian Point would help to control greenhouse gas emissions was a prevalent belief espoused at the hearing. The veracity of this belief should be fully considered. The Greenhouse gas section of the DSEIS (Section 6) indeed implies that nuclear plants do not have an adverse impact on climate. However, a close reading of the section reveals that the primary scientist cited for this conclusion (Mortimer 1990) stated a clear assumption for his findings, namely their calculation upon conditions in uranium mining and refinement that no longer pertain. As available concentrations of uranium ore decrease and its resulting level of refinement increases, the climate-friendly finding would be reversed (DSEIS at 6-10). Twenty years after key studies were conducted, and with uranium long past peak supply, this assumption is no longer valid and new analysis is required. 50-u-GL/UF

References:
Bogard, William. 1989. *The Bhopal Tragedy: Language, Logic and Politics in the Production of a Hazard.* Boulder, Co.: Westview Press.
Edelstein, Michael R. 2004. *Contaminated Communities: Coping with Residential Toxic Exposure.* Boulder, Co.: Westview Press.
Perrow, Charles. 1984. *Normal Accidents: Living with High Risk Technologies*. N.Y.: Basic.

MS. EVANS: Hello, my name is Laurie Evans. I'm the Director of Westchester SAFE. A mother. A local resident. I want to go on record that Westchester SAFE opposes the re-licensing of Indian point.

51-a-HH/PA/UF

I want to say that one of my dear friends, her son died of asthma. We lived in Brooklyn at the time. I also know a young teenager right now who has been operated on for thyroid cancer. So I see both sides of those issues. One of the things they talk about is the clean energy from Indian Point. They are not discussing the environmental injustice of where the uranium is mined. The impact of the toxicity of the water in those regions and how the contamination of that water is creating illness and death in those residents. So just because we can't see or smell the Strontium-90 which is leaking into the Hudson, doesn't make it clean or healthy. With elevated thyroid cancers, with toxic Strontium-90 makes us realize this aging plant should not continue. In addition, it's siting on a fault puts local residents at further risk.

51-b-AL

Tonight, I've heard speakers talk about the need for local energy, but I've heard very little about conservation. Employees could be trained to do environmental energy audits and work on efficiency and health sustaining viable alternatives. I have relatives who live in Sweden and due to students initiatives, they decided to have a night without electricity and measure their savings. As well as discuss in school the

51-c-AL

next day, what they did instead of using computers, TV's, dishwashers and other electrical appliances. This is a time for us to ask what each of us can do to create sustainable solutions for our health is the most important for our children. What can we do instead? What energy will ensure the health of our children, our water, soil and air? And what jobs can we create for the people currently employed by Indian Point so they can maintain jobs? Let us all rise to the task. Thank you.

51-c-AL contd.

MR. FALCIANO: Good evening. My name is Pat Falciano. I am a retired employee of Indian Point and currently a consultant to the nuclear power industry. I'd like tonight to give you my perspective concerning the safe, secure, vital philosophy of Indian Point. I worked at Indian Point for more than 38. During that time, first of all, I've got to tell you that I've never seen anything that would lead me to believe that Indian Point's not safe. But probably a bigger testimony to that is the fact that a lot of us that have worked there for a long time have their children working there now. You can say all you want about motives and how some people would do just about anything for money and I'd probably be the first to agree with you. But I draw the line at my family. I can guarantee you that if there was any inkling to me that Indian Point wasn't safe, my son wouldn't be working there. 52-a-SA

The other thing you have to understand, a few people mentioned concern tonight about security of Indian Point. I spent a little over 22 years as a senior training instructor at Indian Point. Just about everybody that worked there was a student of mine at one time or another, including the security officers. First off, I have to say that whenever I had any of those officers in my classroom, they always exhibited nothing but the highest level of integrity. Knowing these people as I do, as previous co-workers and thinking about this stellar 52-b-ST performance during the force on force drills, I have no doubt in my mind at all that the security officers would be able to successfully protect Indian Point in the event of some kind of an incident. 52-b-ST contd.

If you want to talk about the importance of Indian Point, about the fact that it's vital to the local area, this was mentioned a couple of times already this evening, but where would you get 2000 Mw of electricity if Indian Point was shut down? People talk about green energy sources, renewable sources, conservation, and we really do need to use as much of that as we can possibly get. But the problem is, after you put all of that together, it will only give you a very tiny percentage of the electricity that would be lost. The bulk of that power would have to be made up by burning air polluting fossil fuels. You can talk to the families of asthma victims here in New York State to see how they feel about that. 52-c-AL/AQ/EC

Some of you might recognize the name James Lovelock. But for those of you that don't, Dr. Lovelock is a British scientists and a world-renowned environmentalist. He's written many books on the environment. Not too long ago he gave a statement to a British newspaper and I'd like to just read to you just a couple of lines from one of his statements. It says, I quote, we have no time to experiment with visionary energy sources. Civilization is in imminent danger and has to use 52-d-AL nuclear, the one safe, available energy source now or suffer the pain soon be inflicted by an outraged planet. 52-d-AL contd.

Some people here tonight try to express what they believe is the opinion of the major population of the people around Indian Point and they say that they shouldn't allow Indian Point to continue to operate. My last six years at Indian Point was spent as the outreach education coordinator. During that time, we brought in thousands of people to visit Indian Point to see the day-to-day operation. We've gone out and spoke to high school students, college students, civic organizations, places of business. I personally, in the last six years, have spoken to more than 9000 people. None of those people, with the exception of maybe three individuals that I can think of, none of those people ever expressed the opinion that they wanted to see Indian Point shut down. In fact, quite the contrary. There's an enormous interest right now for people to want to see Indian Point and how it works. I've got an envelope here full of letters that were written to me by people that came to visit the plant, in appreciation and for their support of Indian Point. This is just a sample. I would like to put this into the record, give this to the NRC before we leave. But I want to strongly urge tonight that the NRC considers this information when they rule on the impact of license renewal for Indian Point. Thank you. 52-e-SR

MR. FEDERSPIEL: Okay, thank you. My name is John Federspiel and I am the president at the Hudson Valley Hospital Center. Hudson Valley Hospital Center is a major health care provider in the region, as well as an emergency planning partner working closely with Entergy employees and many first responders throughout the area as part of Indian Point’s emergency planning program. Since Entergy purchased Indian Point, this partnership between the hospital and the site has grown exponentially to the benefit of the residents we both serve.

For example, when we were seeking a substantial investment for upgrading the hospital's existing emergency room into a full-service state-of-the-art 24-hour No Wait emergency department, Entergy was there for us. And today I'm proud to say, we have one of the finest emergency rooms in the entire New York metropolitan region.

Over the years, this partnership as grown beyond a donor and charity relationship to Entergy providing insightful training and true community leadership to our boards, physicians, nurses and the entire staff of the Hudson Valley Hospital Center. We are a stronger health-care provider because of their presence in the community and would rather not think of how we would survive without the low-cost power the site provides, as well as the substantial investments Entergy makes into the local health-care system. The short-term outlook for

53-a-SE/SR

health-care in New York State is dire. And the long-term prognosis is becoming even worse. We cannot afford to lose one of the area's few remaining economic lifelines. That is why on behalf of the employees and the entire Hudson Valley Hospital Center family, I strongly recommend extending the license of Indian Point for another 20 years. Thank you.

53-a-SE/SR contd.

ML090720670

IPRenewalCEmails

From:	Janie Feinberg [jfeinberg@jponline.com]
Sent:	Wednesday, March 11, 2009 1:53 PM
To:	IndianPointEIS Resource
Subject:	re: Indian Point
Attachments:	image002.jpg

To Whom It May Concern,

I believe <u>strongly</u> that the Indian Point nuclear power plant should be closed. Indian Point's #2 spent fuel pool is reaching highly toxic levels. 54-a-LE/OR/RW/SF In addition, since there is no off-site place to put all nuclear waste that the plant produces, it is simply stored in above-ground storage tanks. We are talking about 1,500 tons of nuclear waste that is subject to terrorist attacks. Mind you, the Indian Point nuclear plant is 24 miles north of NYC. Some 20 million people live within a 50 mile radius of the plant. 54-b-DE/ST Even if there were no safety concerns, Indian Point uses billions of gallons of water from the Hudson annually in order to cool the reactors. In the process, millions of dish and fish eggs get sucked into the plant and die. 54-c-AE

I implore you **<u>not to renew the Indian Plant's license.</u>** 54-d-OR

JP ASSOCIATES

Janie Feinberg
President
Office: 516-825-6991
Fax: 516-872-2009
Cell: 516-659-1302
www.jponline.com

1
2

RULES AND DIRECTIVES BRANCH

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
290 BROADWAY
NEW YORK, NY 10007-1866

2009 MAR 20 AM 9: 23

ML 090860878

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73FR 80440
12

Chief, Rules Review and Directives Branch
Division of Administrative Services
U.S. Nuclear Regulatory Commission
Mail Stop TWB-05-B01
Washington, DC 20555-0001

Dear Sir or Madam:

Rating: EC-2

In accordance with Section 309 of the Clean Air Act and Section 102(2)(C) of the National Environmental Policy Act (NEPA), the U.S. Environmental Protection Agency (EPA) has reviewed the Draft Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 38 (draft SEIS) regarding Indian Point Nuclear Generating Unit Nos. 2 and 3 (Indian Point) (CEQ # 20080543). The proposed Federal action would renew for an additional 20 years the current operating licenses for Indian Point Generating Units Nos. 2 and 3, (IP2, IP3) which expire in September 2013 and December 2015 respectively.

Background

The draft SEIS was prepared as a plant specific supplement to the Nuclear Regulatory Commission's (NRC) 1996 Final Generic Environmental Impact Statement for the License Renewal of Nuclear Plants (GEIS). The GEIS was prepared to streamline the license renewal process on the premise that in general, the environmental impacts from relicensing nuclear power plants are similar. That GEIS proposed that NRC develop facility-specific SEIS documents for individual plants as the facilities apply for license renewal. EPA provided comments on the GEIS during the development process in 1992 and 1996.

Indian Point is located on approximately 239 acres of land in the Village of Buchanan in upper Westchester County, New York. Both IP2 and IP3 use Westinghouse pressurized-water reactors and nuclear steam supply systems. Primary and secondary plant cooling is provided by a once-through cooling water intake system that supplies cooling water from the Hudson River. IP2 and IP3 are each currently licensed to operate at a core power of 3216 megawatts thermal, combining to produce approximately 2158 megawatts electric. Both are refueled on a 24 month schedule. Indian Point Unit 1, which is not subject to this licensing action, is located between IP2 and IP3, but was shutdown on October 31, 1974 and has been placed in a safe storage condition awaiting final decommissioning. 55-a-OS

E-RIDS = ADM-03

SUNSI Review Complete

Add = A. Stuyvenberg

Internet Address (URL) • http://www.epa.gov
Recycled/Recyclable • Printed with Vegetable Oil Based Inks on Recycled Paper (Minimum 50% Postconsumer content)

(a/53)

Template = ADM-013

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EPA's comments are as follows:

Aquatic Resources

EPA understands NRC's weight of evidence assessment which indicates that potential impacts from impingement and entrainment can be SMALL to LARGE, depending on the species. We also agree with NRC staff conclusions that thermal impacts from IP2 and IP3 could range from SMALL to MODERATE. However, EPA believes that collection of new impingement/entrainment and thermal data would have provided NRC and others with the information necessary to determine the level of significance of impacts with more certainty, and to differentiate impacts between alternatives. Notwithstanding the wide range of potential impacts, it appears that the New York State Department of Environmental Conservation's State Pollutant Discharge Elimination System (SPDES) draft permit contains reasonable measures to quantify and minimize these impacts to the Hudson River. 55-b-AE/RG

Storage of Low Level Waste

With the closure of the Barnwell facility on July 1, 2008, to all but generators from the Atlantic Compact States (South Carolina, New Jersey and Connecticut), there is no disposal access for any Class B and C low-level radioactive waste from New York State generators, including nuclear power plants, other industrial, governmental, medical, and academic generators. On page 2-21 of the draft SEIS, Entergy asserts that it can safely store these low-level radioactive wastes in existing onsite buildings and that it is currently developing a comprehensive plan to address the potential need for long-term storage for Class B and C wastes. The final SEIS should indicate the date that the plan is expected to be completed and identify specifics such as location, shielding, duration, and security as deemed appropriate for disclosure. 55-c-RW

Severe Accident Mitigation Alternatives (SAMAs)

Pages 5-9 and 5-10 of the draft SEIS note that some SAMAs were potentially cost beneficial, but need not be implemented as part of license renewal pursuant to 10 CFR 54. We urge Entergy to continue to refine and implement these alternatives as they appear to be cost beneficial and would mitigate the impact of a severe accident, should one occur. 55-d-SM

Seismic Data

In our scoping comments of October 10, 2007, EPA requested that NRC include and analyze any new geologic or seismic information in the project area. It appears this information was not included in the draft SEIS. We recommend that new geologic and seismic data be included in the final SEIS particularly concerning seismic activity occurring in the northern New Jersey-New York metropolitan region in recent months. 55-e-PA

Based on the review of the Indian Point draft SEIS, the EPA has rated the project and document "Environmental Concerns - insufficient information" (EC-2). We have concerns regarding the impacts associated with entrainment and impingement of fish and shellfish, and a lack of new seismic data. Also, we recommend that the final SEIS address opportunities for pollution prevention and waste recycling. 1 55-f-AE/PA/RW

We appreciate the opportunity to comment on the draft SEIS. Please call Lingard Knutson of my staff, at (212) 637-3747 if you have any questions.

Sincerely yours,

John Filippelli, Chief
Strategic Planning and Multi-Media Programs Branch

8 John Walsh Boulevard
Peekskill, New York 10566

March 9, 2009

Nuclear Regulatory Commission
Washington, DC

Dear Sirs:

If Indian Point (IP) is closed, the difference would be made up by taking power off the grid. 51% of grid capacity comes from burning coal. This would result in a major increase in air pollution: particles, sulfur dioxide ("acid rain") and mercury are some of the pollutants that would increase. Coal-fired plants even emit more radioactivity than nuclear plants. Overall, I believe that the cancer risk with coal is worse than with nuclear power. In August 2003, there was an electrical blackout in the Northeast. Besides demonstrating the inadequacy of the grid, aircraft measurements showed a 90% reduction in sulfur dioxide. The Environmental Impact Statement notes the 5754 tons of sulfur oxides would be emitted by a coal-fired plant of equal capacity, using limestone to trap 99% of the sulfur oxides. The question arises: what would be done with the huge amount of limestone-sulfur oxide waste? Even bringing in the limestone would create, in all likelihood, a great dust problem. Natural gas is cleaner, but, since it is so easily ignited, it is a very easy target for terrorists; many people have been killed in pipeline fires. 56-a-AL/AQ/EC

On the surface, it would seem that there is a great deal of political opposition to IP. However, the Village of Buchanan has an image of a man splitting an atom on its logo, and Buchanan government officials never seem to be opposed to IP. For the past 18 years, I have had a business on Charles Point, very close to IP. In all that time, only once have I heard any safety concern mentioned about IP; an office worker thought that you would be exposed to radiation if you worked at the plant. However, workers that retire from the plant often stay in the area. My contact with the community is extensive: I talk to factory workers, business owners and many other types of people. I also run through the area around the plant, and have observed only pro-IP signs. Thus, it seems that the opposition to IP comes from people outside the immediate vicinity of the plant. It is often mentioned, by IP opponents, that the plant should be closed because there are now many more people that live in the area. However, probably many of those people moved there in order to have lower taxes; real estate agents often used to advertise that a home was in "District 3". A county legislator (from another district) proposed that the NRC meetings be moved to the County Center, about 20 miles away. He said "It (the County Center) is not on Entergy's home turf." That is precisely the point: in the area of the plant (the 'home turf'), the people have little opposition to it. Thus, it seems to me that we have a very good example of "inverse democracy": people from the outside trying to dictate to the local people. 56-b-SO

This assertion was tested in a recent election. In 2002, the State Assemblywoman was redistricted. She had always won with 60-70% of the vote in her previous district, but the new district was very different. Her opponent called for the "immediate" shutdown of IP, making it the key point of his campaign; she had advocated a gradual shutdown. She sent a letter to supporters, asking them to come to a fund raiser because she was seriously challenged. She won by her usual large margin; in this off-year election, if IP opponents were numerous, the outcome of the election should have been different. In addition, the issue has never been submitted to a vote by the public; even an advisory referendum would be worth doing. 56-b-SO contd.

Westchester County distributes a booklet: "Community Emergency Planning for Indian Point: A Guide for You and Your Family". It devotes two whole pages (the centerfold) to the use of potassium iodide pills for reducing the risk of thyroid cancer. These pills are distributed in Ossining; I was the third person to ask for them. Since my business is in Peekskill and we received a booklet there as well, it seemed that we should have some pills from them; however, the telephone has no answer. If "the public" was really concerned, they would get these pills in numbers; it seems that there should even be some demand from IP opponents. 56-c-HH

It is often stated by IP opponents that evacuation is unfeasible due to heavy traffic on the roads. This may be true for much of the New York area, where I have lived for most of my life. However, in the IP area, if one drives at the speed limit during the rush hour, one will be passed by many vehicles. 56-d-EP

The general public does not seem to criticize Entergy; Con Edison is always criticized, in comparison with other utilities (they once called New York a "city of deadbeats"). IP opponents, a group in my belief distinct from the general public, are often contradictory: "Entergy's nuclear empire building has prompted watchdogs to question whether Entergy has the financial strength to safely operate its fleet and to provide proper security at each plant."(Indian Point Safe Energy Coalition brochure) vs. "at least $2 million/day, sheer profit"(Ms.Lee, transcript of 7/31/08 Independent Safety Evaluation Panel meeting). At $2 million/day, $730 million of financial strength will be generated annually. 56-e-SE

To conclude, it is my opinion that the other realistic near-term energy alternatives (coal, gas) are less safe than nuclear energy; even in the Con Edison days, nothing of real consequence happened. "The Public" should not be confused with the small number of IP opponents, and should be heard. 56-f-AL/SA

Very truly yours,

Brian J. Fitzpatrick

Brian J. Fitzpatrick

MR. FOREHAND: Good evening. My name is Ron Forehand and I am the president and CEO of Hudson Valley Gateway Chamber of Commerce. We're are a regional Chamber of Commerce that's located in the area. An area that encompasses were Indian Point is located. We are Westchester, Northern Westchester and Putnam Counties leading business Association and proud to be that. We're about jobs. We're about safety. And because of that, our proximity to Indian Point makes us acutely aware of how important safety is and the running of those plants safely. The employees that run the plant and the people like Linda Puglisi and our mayor in Peekskill that help with the overseeing, we appreciate because we can see what a job they've done in making sure that these plants are safe for the residents. 57-a-SA On the economic side, which we're obviously very concerned with, the continued operation of Indian Point is vital to our region. Westchester residents already pay more than twice the national average per kilowatt hour for their electricity. Should Indian Point be shut down, these prices would rise dramatically, as we all know.

In the current economic climate, the lower Hudson Valley cannot afford to do anything that would push away residents or businesses. We're having enough trouble as it is getting businesses to come in here to New York State. We have a lot of regulations that are difficult. We don't need additional

57-b-AQ/EC/SO

things to run our businesses off. The environmental impact of losing Indian Point are equally compelling. Replacing Indian Point's power would require 4 to 5 fossil fuel burning plants and would, according to a study by the National Academy of Sciences, cause a 20% increase in regional carbon dioxide emissions. In this era of global warming and environmental concerns, this is not even an option for our state. 57-b-AQ/EC/SO contd.

Entergy, the owners and operators of Indian Point, have invested and have continued to invest large sums of money in the operation of these plants. They also do that investment in the community that they serve. Not to buy off the community, not to buy their good will, but because they think it's important to be a good servant of that community. So when you look around at things that we've all become accustomed to, our better schools, our emergency response agencies, you can thank them partially for those things because they contribute heavily to those things. As the NRC reviews the environmental impact to the continued operation of the plant, our Chamber would ask that you factor some very important major benefits that Indian Point provides to our region. Safe energy. Jobs. Very good jobs. High-paying jobs when they are needed most right now in this economy. Thank you. 57-c-SA/SE/SO

Hudson Valley Gateway Chamber of Commerce

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RULES AND DIRECTIVES BRANCH USNRC

03/10/2009

Mr. Samuel J. Collins
Regional Administrator
U.S. Nuclear Regulatory Commission, Region I
475 Allendale Road
King of Prussia, PA 19406-1415

Dear Mr. Collins:

The Hudson Valley Gateway Chamber of Commerce is northern Westchester and Putnam County's leading business association and encompasses Indian Point. We own a building in downtown Peekskill. As such we understand how important clean, affordable and reliable sources of energy are to a strong and vibrant economy. This is why we support the relicensing of Indian Point and encourage an expedited process for final review of Indian Point's application. 57-d-SL

Our proximity to Indian Point also makes us acutely aware of how important the safety of the plant is. The employees who run the plant safely and efficiently should be commended, as should the local officials and federal regulators who oversee its operations.

On the economic side, the continued operation of Indian Point is vital to this region. Westchester residents already pay more than twice the national average per kilowatt hour on their electric bill. If Indian Point were to be shut down, these prices would rise dramatically more. In the current economic climate, the lower Hudson Valley cannot afford to do anything that would push away residents or businesses. I can assure you that as the cost of energy and conducting business increase, the more this region will lose vital economic output. 57-e-EC/OP/SO

The environmental implications of losing Indian Point are equally compelling. Replacing Indian Point's power would require four to five fossil fuel burning plants and would, according to a study by the National Academy of Sciences, cause a 20 percent increase in regional carbon dioxide emissions. In this era of global warming and environmental concerns this is not an option for downstate New York -- either environmentally or economically. 57-f-AL/AQ

Entergy, the owners and operators of Indian Point have invested and continue to invest hundreds of millions of dollars into the plant and also set an excellent standard as a good neighbor to the local community as well as all of Westchester. Their tax dollars and contributions pay for many of the public services northern Westchester residents have become accustomed to like our superb schools and emergency response agencies. 57-g-SR

As the NRC reviews the environmental impact of the continued operation of the plant, I implore you to factor the very important, major benefits, Indian Point provides our region. Safe energy, Jobs at a time when they are really needed – good jobs! 57-h-SE/SR

Sincerely yours,

Ron Forehand

Ron C Forehand, Sr
President and CEO
Hudson Valley Gateway Chamber of Commerce

Mr. Andrew Stuyvenberg Environmental
Project Manager
Division of License Renewal, Office of Nuclear Reactor Regulation U.S. Nuclear
Regulatory Commission
Mail Stop 0-l1Fl
Washington, DC 2055-0001

RE: February 12, 2009 Public Hearing on the Relicensing of the Indian Point Energy Center

I write here in support of renewing the license for Indian Point Energy Center. 58-a-SR

The debate over relicensing has taken place without input from communities of color which are under siege by dirty air not to mention the health effects that come along with poor air quality. The debate over relicensing has raged on without input from New York City working families who can ill-afford higher electricity bills. The {debate over relicensing has taken place without reassurance that the dirty-air power plants, built to replace Indian Point, will not once again end up in low-income minority neighborhoods. 58-b-AL/AQ/EJ

Indian Point is clean, emissions-free energy that will help improve air quality. In this age of global warming, now is not the time to embrace dirty energy that is harmful to the public and planet's health. Indian Point is affordable energy that helps keep electricity bills stable. In this age of economic uncertainty and rising unemployment, now is certainly not the time to increase electric bills. Indian Point is reliable energy that can keep pace with the ever-growing demands of our region. In this age of green technology, we must continue making investments in renewable energy, however, now is not the time to shutter Indian Point without having clean energy options already in place 58-c-AQ/EC/SO

Thank you for allowing me to add my concerns into this debate. We are hopeful that any decision reached will be one that ensures a continued supply of reliable, clean and affordable electricity for all New Yorkers. 58-d-SR

Sincerely,

____

Name

____

City, State & Zip Code

MS. FOSTER: Hi, I’m Mary Foster. I'm the Mayor in the city of Peekskill. For those who of you who don't know, Peekskill is a city. It is surrounded by the town of Cortlandt, but it is about 2 1/2 miles from Indian Point. The city itself is 4 1/2 square miles and so the Village of Buchanan in the city of Peekskill are the two soul little municipalities closest to Indian Point.

The reason I'm here is not to really talk about whether or not we have a future in front of us that can generate the energy needs our nation needs without nuclear power. I think there are greater minds than mine who will ponder that issue and come up with the solutions. A rather, what I want to stress is a point that Supervisor Puglisi made. That is, it’s important to acknowledge who needs to have a seat at the table when Indian Point, Entergy and the NRC work through the issues that are in the EIS. The city of Peekskill also hosts the waste to energy burn plant for Westchester County and having recently gone through a renegotiation of that contract, it's really important that local governments, who typically host these facilities but are typically relegated to sitting on the sidelines and worrying about the issues, it's more important that those officials actually have a seat at the table so then when the EIS issues are ironed out, we actually can weigh in on the things that make the most importance to our local 59-a-LR communities. So, when we are dealing with environmental issues to air, water and species, it's important for us to understand how those mitigations will happen and what the other impacts will be to the surrounding communities that really host this facility.

I've heard a lot about cooling towers. On the one hand, I am horrified at the thought of some huge tower being right on the waterfront, but I also can empathize with what we need to do with the quality of the Hudson River and the decades it has taken to clean up the Hudson River. Having the city and the supervisor from Cortlandt at the table as those issues are dealt with is important because we're the ones that are ultimately responsible for the total economic development of our municipalities, the jobs that can get created in our municipalities, the economic growth that we can enjoy it or the economic devastation that can happen to us. Being relegated to the sidelines is a very difficult place to sit because when we are left with just writing letters to our county, federal and state officials to ask for more security to be provided, as opposed to being able to speak directly to the issue, have the information directly and share it with our constituents who are most impacted by this is important. So, my three points are really about the importance of the local municipalities having a seat at the table when the issues in the EIS are ironed out

59-a-LR contd.

because we are the ones most directly affected, us and those in our cities, most directly affected, by what the net results will be. We get terrified when you hear about leaking groundwater. How that's dealt with will be important. How it's dealt with and the economic impacts of that will be important to us as well. So, I don't think there's any elected official in the local communities that want Indian Point closed. What we do want is to be able to have a role in how these ultimate issues get resolved. Thank you.

59-a-LR contd.

MR. FRAISER: Great, good afternoon everyone. My name is Andrew Fraiser and I'm a member of the NextGen Network. I've served in various leadership positions over the years. The NextGen Network has partnered with Entergy for several years. The Entergy Corporation has upheld a high standard of corporate citizenship and has remained an influential supporter of the communities it serves.

Entergy Nuclear's support of the NextGen Network is one example of its commitment to communities of color. It's partnership has enabled our organization to continue to provide world-class career and professional development and community service opportunities, while continuing to be a point of connectivity within the African-American community. Through Entergy, the nuclear partnership with NextGen Network, we were able to fill a much-needed void by providing mentoring and scholarships to deserving individuals.

Entergy Nuclear has a role ensuring that African-American high school students can take full advantage of higher education opportunities and receive coaching and mentoring in doing so. This shows how much they care about the culture in the diverse community and an inclusive global marketplace. With the help of Entergy Nuclear, we have been able to offer 15 scholarships to individuals at nationally accredited universities each year for the past five years.

60-a-SE

The NextGen Network has reach thousands of students as well as over 700 students have submitted essays and participated in our business case competitions. Both competitions encourage seniors in high school around the country to think critically and to address important issues regarding the environmental justice, climate change and nuclear power and taking a look at how that can impact and lessen the disparate impact on the minority communities around the country. The NextGen Network has also been able to attract highly respected senior business leaders seeking our knowledge and expertise in developing African-American professionals, who possess business acumen, as well as community consciousness.

60-a-SE contd.

Our membership has been recognized in part because of Entergy's continued support, which enables members to reach back in service to generations of leaders who follow us. Because of our mission to develop African-American leaders, the NextGen Network believes our communities are best served by leaders who are thoroughly knowledgeable about the gamut of zero emissions energy standards and sources. If we are to ensure the health of our communities as an important part of this ongoing conversation about strategies to improve air quality and the health of our communities throughout New York, the Indian Point facility is a critical source for the region. We appreciate the opportunity to provide feedback about Entergy Nuclear’s record

60-b-AQ/SE

of corporate citizenship and good environmental stewardship. 60-b-AQ/SE contd.

Thank you.

IPRenewalCEmails ML 090640398

From:	Chiroangel@aol.com
Sent:	Tuesday, March 03, 2009 1:11 PM
To:	IndianPointEIS Resource
Subject:	I Oppose the License Renewal of Indian Point

Chief, Rulemaking, Directives and Editing Branch
Division of Administrative Services
Office of Administration, Mailstop T-6D59,
U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001

To whom it may concern:

I am a resident of Nyack, New York. I oppose the license renewal of Indian Point, and am particularly concerned about the following environmental impacts:

•**The slaughter of billions of fish, eggs and larvae** every year that results from Indian Point's outdated cooling water intake system, which uses billions of gallons of Hudson River water every day to keep the plant operating.

•**The killing of shortnose and Atlantic sturgeon** when they are trapped against the cooling water intake screens. Shortnose sturgeon are listed as an endangered species under the federal Endangered Species Act.

61-a-AE/AL/OR

MY STRONGEST CONCERNS ARE:

•**The continuing leak of radioactive water** from the Indian Point 2 spent fuel pool into the groundwater and Hudson River, and the residual contamination caused by the plumes of contaminated groundwater that slowly leach toxic strontium-90 and cesium-137 into the Hudson River.

•**The long term storage of thousands of tons of highly toxic nuclear waste** on the banks of the Hudson River, currently housed in poorly maintained spent fuel pools and "dry casks" that are vulnerable to terrorist attack.

61-b-LE/RW/ST

Thank you for considering my point of view.
Carolyn Friedman

The story I tell myself determines my joy or misery.

Dr. Carolyn Honey Friedman
Student of Byron Katie www.thework.com
Option Dialogue Mentor www.option.org
Young Living Essential Oils www.youngliving.com
Former Network Chiropractor

Home/Office: 845-348-0002
Cell Phone: 845-300-4477
Web Site: www.chiroangel.com

Snail Mail:
68 Jefferson Street
Nyack, NY, 10960

MR. FRYE: Good evening. My name is Glen Frye and I'm a board member of the Brooklyn Anti-Violence Coalition. On behalf of the grassroots and community organizations throughout Brooklyn, I have come here this evening to give my support for the recertification of Indian Point Energy Center. Re-licensing Indian Point is the right move for households in Brooklyn because the alternative is unacceptable. Currently, of the 22 fossil fuel plants operating in New York City, over half our located in the neighborhoods of low to moderate income households. 62-a-EJ/SR

Despite a lifetime of poor environmental decisions made for us but not by us, the residents in Brooklyn had to suffer through bad health and there's no reassurance that if Indian Point is closed, that dirty power plants constructed to replace Indian Point will not be located in our neighborhoods. Our communities should not be forced to endure more dirty energy and the health issues that arise as byproducts. So, after years of neglect for our health, our communities should not be forced to bear the burden of just the bad health that comes as a result of having dirty power plants in our communities. Grassroots and community organizations like the one I represent in Brooklyn understand that Indian Point produces clean, safe and affordable energy that powers New York City households, schools, hospitals, mass transit and government operations. As this debate 62-b-EJ/SR proceeds, our community hopes to work together with those serviced by Indian Point in order to strike a proper balance to ensure the health and safety of all. So I'd like to thank the NRC for allowing me to comment and express my support for the Indian Point. Thank you.

62-b-EJ/SR contd

IPRenewalCEmails ML 090640355

From:	John Funck [johnfunck@optonline.net]
Sent:	Friday, February 27, 2009 9:24 AM
To:	IndianPointEIS Resource
Cc:	John Funck
Subject:	Indian Point Renewal Request

Chief, Rule - making, Directives and Editing Branch
Division of Administrative Services
Office of Administration, Mail - stop T-6D59,
U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001

Please, do not renew the operating license of the aged and poorly maintained Indian Point Nuclear Power Plant. I am particularly concerned about the following environmental and safety issues and impacts: 63-a-OR

The high danger of the the long term storage of thousands of tons of highly toxic nuclear waste on the banks of the Hudson River, currently housed in poorly maintained spent fuel pools and "dry casks" that are vulnerable to terrorist attack. All right in the middle of many millions of fine 63-b-RW

The slaughter of billions of fish, eggs and larvae every year that results from Indian Point's outdated cooling water intake system, which uses billions of gallons of Hudson River water every day to keep the plant operating. 63-c-AE

The killing of short nose and Atlantic sturgeon when they are trapped against the cooling water intake screens. short nose sturgeon are listed as an endangered species under the federal Endangered Species Act.

The continuing leak of radioactive water from the Indian Point 2 spent fuel pool into the groundwater and Hudson River, and the residual contamination caused by the plumes of contaminated groundwater that slowly leach toxic strontium-90 and cesium-137 into the Hudson River.

New Leak Containing Tritium Found at Indian Point On Sunday February 15, 2009, a worker at Indian Point, who inadvertently found himself standing in a puddle of water, discovered a pipe leaking several feet underground. The pipe had been leaking water contaminated with dangerous levels of tritium at a rate of approximately 18 gallons per minute for more than five days. As a result, more than 100,000 gallons of highly contaminated water were discharged from the plant into the Hudson River. 63-d-LE

Indian Point's ability to prevent, or even detect, such apparent and destructive plant deterioration, is a key concern that needs resolution in the license renewal proceeding relating to the plant's aging infrastructure. 63-e-AM

If you are going to place the many millions of local residences lives into danger by renewing the Indian Point License, please upgrade its current design-basis threat level to require nuclear power plants to be able to defend against a 9/11-type terrorist attack. According to U.S. intelligence sources, U.S. nuclear power plants were originally chosen as targets during the planning of the 9/11 attacks, and they remain terrorist targets today. The 9/11 Commission found that as recently as June 16, 2004 nuclear power plants remained top al Qaeda targets. During an interview on Meet the Press with Tim Russert (December 4, 2005), Thomas Kean, Chair of the 9-11 Commission, noted that the Department of Homeland Security (DHS) has done "something that's totally inadequate" in making a risk assessment for U.S. nuclear power plants and chemical plants, concluding that DHS "doesn't set the priorities out, it just sets basically vague guidelines what the priorities should be." 63-f-RW/ST

Riverkeeper's concerns have been compounded by two government reports that suggest that high-level radioactive fuel waste is not properly safeguarded. The first, released in April 2005 by the National Academy of Sciences (NAS), calls for a plant-by-plant examination of the fuel storage pools at nuclear power reactors because the material stored is a vulnerable terrorist target and that a successful strike could result in lethal radioactive emissions. The second
disturbing revelation comes from a report by the General Accountability Office (GAO), also released in April 2005. It charges that the federal government, the NRC, and nuclear power plant owners have failed to implement and enforce accountability measures for high-level radioactive waste currently stored onsite in spent fuel pools. Since 2000, three nuclear power plant operators, including Entergy, have "lost" high-level radioactive fuel rods.

63-f-RW/ST contd.

In January 2006, Riverkeeper filed public comments with the Nuclear Regulatory Commission in response to the Committee to Bridge the Gap's petition for Rule - making which calls for enhanced security regulations at our nation's nuclear power plants. Riverkeeper requested enhanced protections to guard against air attacks and urged the construction of "Beamhenge" shields to guard sensitive reactor structures from air attacks. Moreover, Riverkeeper urged enhanced protection against waterborne attacks. For example, the present "exclusion zone" around Indian Point, as well as other regional reactors located on waterbodies, are marked by buoys or floating "no-trespassing" signs and are not impenetrable.

You must handle this risk with care and respect for human well being.
Please... help us by closing this plant down or by truly making it safe from the high risk we are now in.

63-g-OR

Thank you for taking intelligent action.

John Funck

Health Advantage Institute
43 Cutler Lane
Garrison New York, 10524
johnfunck@optonline.net
845 424 6017

IPRenewalCEmails ML 090640376

From:	Lisa Furgatch [lfurgatch@mac.com]
Sent:	Friday, February 27, 2009 1:18 PM
To:	IndianPointEIS Resource
Subject:	Please close Indian Point

I live in Westchester County with my husband and have 2 young children. This power plant is constantly under disrepair and is a disaster waiting to happen. It is leaking radioactive material into the river and the water table---as far as I'm concerned any level of radioactive material is unsafe. Every day tons of nuclear waste is created by these power plants.

Please, do not renew Indian Point's license! Thank you, Lisa Furgatch

64-a-LE/OM/OR/RW

MR. GARCIA: Good afternoon, my name is Frank Garcia. I am chairman of the Bronx Hispanic Chamber of Commerce. I'm also a small Hispanic business. I'm the CEO of Millennium Recycle Toner in the South Bronx. The reason I'm here today is to speak on what's going on with the small businesses in the Bronx. If this Indian Point energy plant closes down, this is going to hurt a lot of our small businesses. Right now, the record of small businesses in the Bronx is closing to 15 to 20 businesses per week because of the climate. We strongly recommend that this plant remain open to be able to help the small businesses to continue being able to be open. 65-a-SO/SR

Everybody knows that New York pays almost the highest electric bills than any other area. I myself as a small business, this has hurt me very dramatically how the energy has gone up. As a manufacture, it's very hard for me to be able to continue manufacturing in New York, in the Bronx with the increase of electricity. Without electricity, I can't manufacture. I'm asking that the doors cannot shut down to Indian Point. Why? Because shutting it down, you're shutting businesses down. 65-b-EC/SR

We are, in this moment, in a crisis in New York City and New York State and we’re asking to keep this open to be able to keep businesses still open in New York. A lot of other areas have increased electricity in other states and that’s hurt small business. We need to encourage to keep the 65-c-EC/SO/SR plant open. A lot of the revenue that the businesses depend on, like the small bodegas or restaurants that I myself represent -- my grandfather was the head of the Latin Grocery Association in the 1960s and if he was a bodega owner right now, he would not have been able to survive his business. Why? Because it increased, not just in electricity, rent and everything else. I encourage today, as a small-business owner, to keep the energy plant open, to keep businesses and small businesses open and to continue with clean energy and to help the community continue growing in the small-business community. Thank you. 65-c-EC/SO/SR contd.

IPRenewalCEmails ML090720675

From: Garisto, Mary Ann [MGaristo@scny.org]
Sent: Thursday, March 12, 2009 2:17 PM
To: IndianPointEIS Resource
Subject: Comments on DEIS

Dear Members of the NRC,

I am opposed to the license renewal of Indian Point on many counts but especially as one deeply concerned about the environment and the impacts that Indian Point is having on our ecosystem, I am opposed on environmental grounds. 66-a-GI/OR

I join and support the position of RIverkeeper on many of the issues in the DEIS- their contentions seem valid and are supported by strong scientific evidence. 66-b-OE

I have always supported the NRC , and I hope the agency will review its assessment of these issues ,taking into consideration the studies done bv the new York DEC and on the data collected by the power plant operators themselves. 66-c-RG

Thank you.

Sincerely.
Mary Ann Garisto

ML090700176
ML091680298

RULES AND DIRECTIVES BRANCH

Dr. Marsha Gordon
President & CEO

2009 JUN -3 PM 2:45

108 Corporate Park Drive
Suite 101
White Plains, NY 10604
P: 914.948.2110
F: 914.948.0122
westchesterny.org

THE BUSINESS COUNCIL OF WESTCHESTER

Market Learn Advocate Grow

RECEIVED

March 9, 2009

12/31/08

73FR 80440

25

2009 MAR 11 PM 1:51

RECEIVED REGION 1

Mr. Samuel J. Collins
Regional Administrator
U.S. Nuclear Regulatory Commission, Region I
475 Allendale Road
King of Prussia, PA 19406-1415

Dear Mr. Collins:

On behalf of the 1,200 member businesses comprising The Business Council of Westchester, I am writing in support of the relicensing of the Indian Point Energy Center (IPEC). 67-a-SR

Indian Point provides more than 75 percent of the electricity consumed within the Lower Hudson Valley, and contributes over $50 million paid in local taxes including sales taxes, payroll taxes, property taxes and state/local income taxes. Losing Indian Point's 2,000 megawatts of clean baseload power would potentially cause major power disruptions, the loss of up to 11,000 jobs, and $2.1 billion in cumulative lost wages. 67-b-EC/SO

The closure of Indian Point could result in the doubling of electricity rates of the second-highest rates that New York homeowners and businesses currently pay. Many businesses in Westchester County are already having trouble managing their increasing costs, including the cost of reliable electricity. In these tough economic times, the prospect of closing Indian Point truly defies common sense. 67-c-EC

The alternatives laid out to replace Indian Point do not make sense economically or environmentally for this region. For example, replacing Indian Point with any fossil fuel equivalent would greatly increase the carbon emissions of our region – and create a detrimental impact on the quality of life we enjoy in Westchester County. 67-d-AL

Finally, Indian Point's parent company Entergy has proven itself as a model corporate citizen within our community. It has consistently donated millions of dollars to worthy programs and initiatives, while their hard-working employees routinely give back to their community through volunteer efforts and other selfless actions. 67-e-SE/SO

I strongly urge you to support the relicensing of Indian Point. 67-f-SR

Sincerely yours,

Marsha Gordon

Marsha Gordon

Public Comment of Ross Gould
E-mail: rgouldesq@gmail.com
February 12, 2009
Afternoon Session

Good afternoon. My name is Ross Gould. I live and work in Manhattan and I am an attorney that is working with Hudson River Sloop Clearwater in the parallel proceedings before the Atomic Safety and Licensing Board (ASLB) involving Entergy's license renewal application. Although I actively work with Clearwater I do not represent them in my comments here today.

The Draft Supplemental Environmental Impact Statement (DSEIS) is insufficient and a more thorough assessment is required. Under NEPA, the NRC Staff must take a "hard look" at the environmental impacts caused by renewing Indian Point's license, as well as determine the range of alternatives and impacts to be considered. Significantly, the impacts from the various alternatives must be presented in a form that allows for the comparison of alternatives as to their scientific bases and environmental consequences. The NRC Staff has not met its burden and the impacts are not presented in a form that allows for an adequate comparison nor were the assessments ~~made~~ a thorough review ~~assessment~~ of all current scientific data. In fact, the NRC Staff only ~~either~~ relies upon ~~either~~ either Entergy's Environmental Review or government statistics, not once does the NRC Staff look to an independent non-governmental scientist, scientific organization or energy expert for the data upon which it relies. No assessment that relies on such a limited amount of information can be said to be taking a "hard look" at the issue. The NRC Staff must address these issues in the Final Supplemental Environmental Impact Statement. 68-a-AL/NE

The DSEIS is inadequate in many areas, however the issues I will focus on the inadequate assessment of the impacts on environmental justice communities and 68-b-DE/EF/NE

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Public Comment of Ross Gould
E-mail: rgouldesq@gmail.com
February 12, 2009
Afternoon Session

inadequate assessment of conservation, and energy efficiency and the generation of electricity from renewable sources as replacements for Indian Point. Other areas will be raised in written comments either presented by myself or by one of the organizations that I work with. 68-b-DE/EF/NE contd.

The DSEIS is inadequate in its assessment of environmental justice and here are a few examples of the shortcomings. The DSEIS fails to consider the many immobile people with disabilities and other institutionalized individuals in special facilities in the region who would be adversely affected by the renewal of the Indian Point licenses. Clearwater has asserted this as a contention in the parallel license renewal proceedings before the ASLB. These hospitalized and imprisoned individuals will be significantly impacted by the renewal of Indian Point's license. At the very least, the Supplemental EIS must consider the impacts upon these disabled and institutionalized populations.

The DSEIS also does not discuss the significant environmental justice community in Peekskill, which is 2.5 miles from Indian Point nor does the DSEIS assess the impact that the license renewal will have on this community. Additionally, the DSEIS does not provide a complete life cycle analysis of nuclear power generation and does not assess the impact of both the mining of the uranium on Native Americans and the disposal of the radioactive waste on environmental justice communities. NEPA requires the NRC Staff to make these assessments in the DSEIS. 68-c-DE/EJ/NE

Also, in the DSEIS the NRC Staff relies on incomplete demographic analyses and/or inconsistent data in making their assessments. For example, the DSEIS discusses the population within 20 miles of Indian Point based on the 2000 census

2

2

Public Comment of Ross Gould
E-mail: rgouldesq@gmail.com
February 12, 2009
Afternoon Session

data; however there is no mention of the minority composition within 20 miles of Indian Point. Another inconsistency found in the DSEIS is the use of projected population growth rates for the total population during the license renewal period while not including projected growth rates for environmental justice communities over that same time period. Without complete and consistent data the DSEIS does not meet the minimum requirements of NEPA. 68-c-DE/EJ/ NE contd.

The DSEIS also inadequately discusses the no action alternative and conservation, energy efficiency and safe renewable sources of energy as a replacement for Indian Point. The DSEIS ignores current science on the feasibility and potential for conservation, energy efficiency and safe renewable sources of energy as replacements for Indian Point. There is substantial evidence that with today's currently available technologies we can replace Indian Point's electricity. However, the DSEIS does not adequately evaluate these alternatives and fails to consider their proven ability to generate electricity throughout the world, in other parts of the U.S. and here in New York.

It is also important to note that the DSEIS provides an assessment of the impact on employment that may occur if the plant shuts down, however the DSEIS does not assess the jobs that would be created if Indian Point was replaced with renewable sources of energy such as wind and solar. Anyone who stays current on the discussions relating to the stimulus package has heard news reports relating to the jobs that are expected to be created with investments in clean green renewable energy. In addition, the DSEIS fails to assess the associated revenues created as a result of the growth of the renewable energy industry. 68-d-AL

3

Public Comment of Ross Gould
E-mail: rgouldesq@gmail.com
February 12, 2009
Afternoon Session

A sustainable energy portfolio of energy efficiency and an array of renewables (solar, wind, geothermal, tidal) is the alternative to the nuclear power produced by this increasingly failing facility. Investment of infrastructure into more sustainable, fossil-fuel free sources of electrical generation by 2013 and for the 20 years thereafter will be substantial. These must be reliably estimated and evaluated in the Supplement Environmental Impact Statement.

I respectfully request that the NRC Staff perform a more thorough assessment of the environmental justice communities and the impact of the license renewal on those communities. In addition, I request a more thorough assessment of conservation, energy efficiency, and renewable energy as viable options to safely replace the electricity produced by Indian Point.

68-d-AL contd.

Thank you.

NRC
CASE NO.
OFF. EXH. NO
ID: D/RFC'D
1:30P
2/12/09

4

ML090700185

IPRenewalCEmails

From: Pjamesg7@aol.com
Sent: Saturday, March 07, 2009 3:23 PM
To: IndianPointEIS Resource
Subject: Indian Point relicensing

Please do not relicense Indian Point as it has been a constant threat to our safety and health here in Rockland County. I don't know how there is any question that they should *not* be allowed to opperate as they continue to expose us to their poisonous leaks and potential catastrophy. 69-a-HH/LE/OR/PA

The NRC should be protecting "we, the people".

Please act responsibly.

Sincerely, Peter Grady
Rockland County, NY

MS. CYPSER & MS. KARAMATY [singing]: Would you like a world safe and clean, where the air is fresh good to breathe, and the water's so sweet to drink or would you rather have a nuke? A nuke is an industry that piles up its waste, which leaks from containers to the ground. The terrorists know, where it's to be found and blowing it up kills for miles around. Eons pass before poison leaves the ground. There is no place to store the waste. Would you like to have your home warm, with your power from earth and sun, that costs almost nothing to run compared to what you pay for nukes? A nuke is a monstrosity that we all finance. It sucks all us taxpayers dry. It costs less to build and more to fix, to keep it going takes a lot of tricks. And by the way if you count external costs, it's quite a monetary loss. Would you like to breathe good fresh air, grow your kids up Strontium free? Don't live in our neighborhood then, or did you know we have a nuke? Our nukes have emissions that have poisoned our air, we've more thyroid woes than our fair share. We're told it's safe and we know it's not. Evacuation plan don't work, it's rot. And by the way, if the sirens ever blow, there will be millions dead and gone. Would you like your groundwater pure? Want to drink be healthy still for sure? Eat fish without needing a cure or would you rather

70-a-ON

have a nuke? Our nuke makes the riverwater too hot for fish, endangered ones we are sure to miss. The cooling pipes leak. You don't hear much about. Fish eggs and fish in, radiation out. The antiquated coolers poison us and the fish. It's all because we have a nuke. Do you want your world safe and sane. Government for the people are game? By the will of the people we are bound, people want that nuke shut down. Or don't you wish we had no nuke?

70-a-ON contd.

RAGING GRANNIES SPOKESPERSON: Good evening. We are the Raging Grannies of Westchester. We have even an additional granny from, came all the way from Brooklyn because she knows that Manhattan and Brooklyn are within the kill-zone. Don't sink, they’re not. I would like to congratulate Entergy, though, the test, for the first time ever, all the sirens worked. Good work Entergy. Good work Entergy. How do I know that? It made the headlines that the sirens worked. At any rate, I have looked at your report, such as it is, I congratulate the Ramapo student 70-b-UF for pointing out just a handful of the many defects in this report. I would like, if I had time, to talk about the nuclear fuel cycle, which is ignored when they talk about greenhouse gases. Things don't start and end with a flip of the switch at Indian Point, there's uranium mining to think about. But, we need to be brief, so we have our testimony in the form of a couple of songs, in addition to the one that was done by two of our grannies this afternoon. Take it.

RAGING GRANNIES [singing song #1]: Call us anti-nuke environmentalists. We are anti-nuke environmentalists. We protect our air and water. You can't lead us to the slaughter. `Cause we’re anti-nuke environmentalists. 70-c-OR

We know tons of facts regarding nuclear waste. When it leaks into our water there’s no taste. But it's poison all the same. Entergy is who we blame. So we’re anti-nuke environmentalists.

If you get yourself re-licensed and still run, there'll be lots more dead fish lying in the sun. More Strontium in our babies’ teeth. More leaks that millions hate to breathe. With no evacuation they can't run.

There are twenty tons of new waste every year. All created by the Indian Point plant here. You can swear on our own Bibles, that it's safe, secure and vital, but we’re sure not gonna swallow what we hear.

When we think about Chernobyl, we have qualms. You're a target for those terrorists with bombs. There's no anti-nuke insurance. Which means there’s no assurance. That we will not all be blown to kingdom come.

Bring us solar, bring us hydro, bring us wind. Bring us energy from sources that won't end. Before we could trust uranium, we'd need holes in our cranium, call us anti-nuke environmentalists.

70-c-OR contd.

RAGING GRANNIES SPOKESPERSON: I thought that booing and holding up the signs was not permitted. Apparently the rules have changed. Thank you NRC and Entergy. The second song is a little bit more somber. Then we will be off the stage. Take up a collection to save the river? OK, we will. If anyone wants copies of the lyrics so they can sing along next time, we brought copies. The lyrics are also entered as testimony.

Ready?

RAGING GRANNIES [singing song #2]: We ask for a clean world. A world that is kind. We look for a good world but what do we find? Too many people who don't seem to care. Who dies from so much tainted air?

So much nuclear waste is piled up, up, up, up. Underground in containers that leak. Those leaky containers were built by no-brainers. And what else becomes of that waste?

We send it in weapons to an impoverished place. To help in destroying a powerless race. Palestinians in Gaza, Iraqis in Iraq. Let's stop making nuclear waste! 70-d-OR

Oh, isn't it awful, oh, isn't it funny. Political power still follows the money. We hope those who don't care will learn to share. The goods of the earth with the world.

From the seats of great power many tumble. For the whole world belongs to the humble. Although critics mutter and grumble. We must have a clean source of power!

We ask for a kind world where everyone cares. About clean, clear water and pure, sweet fresh air. And wind, sun, and water create energy. And nuclear power’s history.

Make nuclear power history.

Would You like a World Safe and Clean?
Tune: "Would You Like to Swing on a Star?"

Would you like a world safe and clean?
Where the air is fresh – good to breathe?
And the water's so sweet to drink!
< * > Or would you rather have a nuke?

A nuke is an industry that piles up its waste.
Which leaks from containers to the ground.
The terrorists know where it's to be found
And blowing it up kills for miles around!
E-ons must pass before poison leaves the ground
< * >There is no place to store the waste!

Would you like to have your home warm?
With your power from earth and sun?
That costs almost nothing to run
< * >Compared to what you pay for nukes!

A nuke's a monstrosity that we all finance.
It sucks all us taxpayers dry.
It costs lots to build, and more to fix.
To keep it going, takes a lot of tricks!
And by the way if you count external costs
< * >It's quite a monetary loss!

Would you like to breathe good fresh air?
Grow your kids up strontium free?
Don't live in our neighborhood then!
< * >Oh, 'cause you know we have a nuke!

Our nuke's had emissions that have poisoned our air.
We've more thyroid woes than our fair share.
We're told it's safe, and we do know it's not.
The 'vacuation plan don't work; it's rot.
And by the way, if the sirens ever blow
There will be millions dead and gone.

Would you like your ground water pure?
Want to drink, be healthy still, for sure?
Eat fish without needing a cure?
< * >Or would you rather have a nuke?

Our nuke makes the river water too hot for fish.
Endangered ones we are sure to miss!
The cooling pipes leak. You don't hear much 'bout
Fish eggs and fish in. Radiation's out.
The antiquated coolers poison us and fish.
< * >It's all because we have a nuke!

Do you want our world safe and sane?
'Government for the people' our game?
By the will 'of the people' we are bound,
< * >People want that nuke shut down!

< * >Oh don't you wish we had no nuke!

70-a-ON

Anti-Nuke Environmentalists

lyrics by Sunny Armer with the Raging Grannies… And Their Friends of Westchester, NY
(adapted from a song written by the Raging Grannies of Seattle)
Tune: "She'll Be Coming Round the Mountain"

Call us anti-nuke environmentalists.
We are anti-nuke environmentalists.
We protect our air and water,
You can't lead us to the slaughter,
'Cause we're anti-nuke environmentalists.

We know tons of facts regarding nuclear waste.
When it leaks into our water there's no taste,
But it's poison all the same,
Entergy is who we blame,
So we're anti-nuke environmentalists.

If you get yourself relicensed and still run,
There'll be lots more dead fish lying in the sun,
More strontium in our babies' teeth,
More leaks that millions hate to breathe
With no evacuation they can't run.

There are twenty tons of new waste every year,
All created by the Indian Point plant here
You can swear on our own Bibles
That it's "safe, secure and vital,"
But we're sure not gonna swallow what we hear.

When we think about Chernobyl, we have qualms.
You're a target for those terrorists with bombs.
There's no anti-nuke insurance,
Which means there's no assurance
That we will not all be blown to Kingdom Come.

Bring us solar, bring us hydro, bring us wind.
Bring us energy from sources that won't end.
Before we could trust uranium,
We'd need holes in our cranium.
Call us anti-nuke environmentalists.

70-c-OR

We Ask for a Clean World

lyrics by Sunny Armer with the Raging Grannies… And Their Friends of Westchester, NY
Tune: "The Man on the Flying Trapeze"

We ask for a clean world, a world that is kind.
We look for a good world but what do we find?
Too many people who don't seem to care
Who dies from so much tainted air.

So much nuclear waste is piled up,
Underground in containers that leak.
Those leaky containers were built by no-brainers.
And what else becomes of that waste?

We send it in weapons to an impoverished place
To help in destroying powerless race:
Palestinians in Gaza, Iraqis in Iraq—
Let's stop making nuclear waste!

Oh, isn't it awful, oh, isn't it funny:
Political power still follows the money.
We hope those who don't care will learn to share
The goods of the earth with the world

From the seats of great power many tumble,
For the whole world belongs to the humble.
Although critics mutter and grumble,
We must have a clean source of power!

We ask for a kind world where everyone cares
About clean, clear water and pure, sweet fresh air.
And wind, sun, and water create energy
And nuclear power's history.

Raging Grannies..and Their Friends of Westchester sing and work for peace, justice, the environment, and social and economic equality. We welcome new members. Our group is a blend of members of various talents and levels of ability.

Contact information: RaggingGrannies63@aol.com
General information is at http://westchester.raginggrannies.org

70-d-OR

NRC
CASE NO.
OFF. EXH. NO.: 7PM
ID'D/REC'D
DATE 2/12/09

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Drew Stuyvenberg

Project Manager

U.S. Nuclear Regulatory Commission

My name is Jennifer Gray and I am a senior at Ramapo College of NJ. I am in the Environmental Program and wish to submit the following comments. In regards to the draft DSEIS Supplement 38 for the license renewal that is written for Indian Point, I feel it does not have all of the information needed to be able to make a confident decision to relicense Indian Point's operating permits for another 20 years. 71-a-OE

First, the Nuclear Regulatory Commission only considers the threat of earthquakes during initial licensing hearings and does not revisit the issue during relicensing. Scientists can use the data to issue reports, but the federal Nuclear Regulatory Commission cannot use it to determine whether the plant should have its license renewed. This issue should be reconsidered for revision because a great deal more of information on earthquakes and seismic activity has become available since the hazard analysis, which was performed decades ago, regarding the risk of damage to Indian Point posed by seismic activity. Furthermore, studies by officials at Lamont-Doherty Earth Observatory show that the nuclear power plant closest to America's largest city is more likely to be hit by an earthquake than previously thought because it sits atop a newly identified intersection of two active seismic zones. New research suggests that damaging earthquakes could nucleate at a shallower depth than previously thought. While the probability of a damaging earthquake may be low, damage to the nuclear plants at Indian Point may have dire secondary consequences for the region. An updated seismic hazard analysis is urgently needed! 71-b-PA

Furthermore, if relicensing is granted what would happen to the leaks from Indian Point 1 that has been shut down but has not been fully addressed? For instance, when IP1 was permanently shut down it was stated that all spent fuel was removed. However, it seems this hazardous waste is just being left in 'long-term storage'. Entergy's plan to entirely decommission this waste is not expected until Indian Point 2 is decommissioned; therefore the issues and concerns at Indian point 1 will be left untaken care of for another 20 years. 71-c-LE/RW

Lastly, nuclear fuel reprocessing/recycling is a believed to be a safe activity that should be part of America's nuclear energy program. It can be affordable and is technologically feasible. The material being stored at Indian Point as waste right now is more than 99% recyclable into usable material. Because Indian Point does not recycle any of the used material as of now, this nuclear plants costs hundreds of times more than operation costs in Europe or Japan where they do recycle theirs. The issue about recycling nuclear waste is not adequately addressed in the 71-d-RW

DSEIS and studies need to be done by a third party to bring the United States one step closer to fulfilling our responsibility to future generations; to deal with spent fuel and high-level radioactive waste on a permanent, not temporary basis before a license renewal takes place. 71-d-RW contd.

Thank you for your time.

Sincerely, Jennifer Gray

IPRenewalCEmails ML090440378

From: george green [georgeegreen@hotmail.com]
Sent: Friday, February 27, 2009 11:44 AM
To: IndianPointEIS Resource
Subject: Indian Point Nuclear Reactor

Please! do not reliscense this reactor=
Killing of fish and fiah eggs, leakage of poisonous Ce137 and Sr90 into the Hudson River, hazardous storage of thousands of tons of radioactive nuclear waste in an area so densely populated that no effective evacuation plan can be proposed- 72-a-EP/LE/OR/RW
Please do not reliscense the Indian Point nuclear reactor.
Sincerely,
George E Green,MD

MS. GREENE: My name is Manna Greene and I am the environmental director for Hudson River Sloop Clearwater. We are very concerned about the potential health effects. The Draft Supplemental Environmental Impact Statement issued by the Nuclear Regulatory staff on the relicensing of Indian Point Units 2 and 3 concludes that Indian Point poses no significant public health risk. But data, and this was in Joe's report, Joe Mangano's report, data just released by the New York State Department of Health shows that thyroid cancer rates in the four counties closest to Indian Point are nearly double the U.S. average and that childhood cancer is also above the national rate. Rockland, Orange, Putnam and Westchester Counties in particular. Rockland, Orange and Putnam, are all surrounding Indian Point, have the first, second and third highest thyroid cancer rates from 2001 to 2004. That is higher than all of the 62 counties in New York State. Westchester was eighth. 73-a-HH

In addition, a recent study by the Mother's Milk Project shows that 30 milk samples from breast-feeding mothers and goats that happened to be within 50 miles of Indian Point all reveal levels of Strontium-90 and the closer you are to the plant the higher the levels. Together these suggest that the emissions from Indian Point may be compromising the health of local residents. We also think that there are environmental justice impacts that the SDEIS dismisses. Specifically, 73-b-EJ/LE disproportionate impacts upon minority or low income communities including impacts on families of subsistence fishermen who catch fish and crabs that contain traces of Strontium-90 and other isotopes. They call this insignificant. 73-b-EJ/LE contd.

In the GEIS, the generic, done in 1996 for all nuclear power plants, these impacts were considered to be small. The SDEIS focuses on the additional impacts from the planned releases in discharges at Indian Point under normal operations and also from the leaks of radioactive isotopes that were discovered and are specific to Indian Point. While NRC sees these as small and of no significance, we are not convinced. We believe that this additional burden of radioactivity places at risk the people who are eating and catching fish. Impacts on the proposed Rockland County desalination plant. It is only proposed, but it will take seven and a half million gallons of water out of the Hudson River for drinking water for Rockland County. 73-c-EJ/HH/LE

Also, we think that it underestimates the sustainable energy alternatives that are coming on board very quickly. Are much cleaner and do not require replacement by fossil fuel. We agree with Riverkeeper about the impact on fish and we are very, very concerned about the narrowing of the relicensing process in which things like whether or not the plant could actually be evacuated in the event of an accident or an incident at Indian 73-d-EP

Point. We don't think there's a viable evacuation plan but that is not allowed to be considered in the relicensing. So we have grave concerns about that. We will submit full comments by March 15th. Thank you.

73-d-EP contd.

HUDSON RIVER SLOOP
CLEARWATER, INC.

Public Comment
Manna Jo Greene, Environmental Director, Hudson River Sloop Clearwater, Inc.
February 12, 2009

INDIAN POINT ENVIRONMENTAL IMPACT STUDY IGNORES HEALTH RISKS, ENVIRONMENTAL JUSTICE IMPACTS AND BENEFITS OF RENEWABLE ENERGY

My name is Manna Jo Greene; I am the environmental director for Hudson River Sloop Clearwater, Inc.

Potential Health Impacts: The Draft Supplemental Environmental Impact Statement (DSEIS) issued by Nuclear Regulatory Commission (NRC) staff on the relicensing of Indian Point nuclear reactors Units 2 & 3 in Westchester County, NY, and concludes that Indian Point poses no significant public health risk. Data just released by the New York State Health Department, however, show that thyroid cancer rates in the four counties closest to Indian Point are nearly double the U.S. average, and that childhood cancer is also above the national rate. Rockland, Orange, and Putnam Counties, three of the four counties flanking Indian Point, had the 1st, 2nd, and 3rd highest thyroid cancer rates in 2001-2004 of all 62 New York State counties. The other county, Westchester, had the 8th highest rate. A total of 992 persons in the four counties were diagnosed with thyroid cancer in these four years.

In addition, a study by the Mother's Milk Project shows that of 30 milk samples from breastfeeding mothers and goats within 50 miles of Indian Point, nearly all reveal levels of strontium-90 with the highest results occurring closest to the nuclear plant located on the Hudson River in Buchanan, New York. Together with the NYS Health Department data, this suggests that emissions from Indian Point may be compromising the health of local residents. 73-e-EJ/HH

Environmental Justice Impacts: The SDEIS also dismisses any disproportionate impacts on minority or low-income communities, including impacts on families of subsistence fishermen who catch fish and crabs that contain traces of strontium-90 and other isotopes, as insignificant. In a previous generic environment impact study (GEIS) done in 1996 for all nuclear power plants, the health and environmental impacts were considered to be "small." The SDEIS focuses on any additional impacts from planned releases and discharges at Indian Point during normal operations and the leaks of radioactive isotopes that were discovered in and are specific to Indian Point.

While the regulatory standards the NRC staff used to evaluate the radioactive isotopes leaking from the plant into the Hudson may allow them to label the potential impacts "small" and "of no significant impact to plant workers, the public and the environment," we are not convinced. We believe that this additional burden of radioactivity to people who may be catching and eating fish, sharing their catch with friends and families, without even realizing that the plant is leaking radioactivity is an example of environmental injustice.

112 LITTLE MARKET STREET, POUGHKEEPSIE, NY 12601 • 845-454-7673 • FAX 845-454-7953 • E-MAIL: OFFICE@MAIL.CLEARWATER.ORG • WWW.CLEARWATER.ORG

Specifically, the DSEIS does not evaluate the impacts of relicensing on the Environmental Justice Communities in Peekskill, Haverstraw and West Haverstraw. 73-e-EJ/HH contd.

Impacts on the proposed Rockland Desalination Plant: The SDEIS also fails to consider the impacts on United Water of New York's proposed desalination plant directly across the river in Haverstraw, which, if approved, would provide 7.5 million gallons a day of drinking water to Rockland County.

Sustainable Energy Alternatives: Although the SDEIS does provide comparisons renewable energy resources to nuclear power generated Indian Point, it underestimates the ability of energy efficiency and renewables to serve as more sustainable alternatives to nuclear or fossil fuel. It ignores for example, Westchester County Executive Andy Spano's aggressive plan to reduce the county's carbon footprint by 20 percent within the next seven years and 80 percent by 2050. Stanford University's Mark Z. Jacobson recently conducted the first quantitative, scientific evaluation of major, energy-related solutions currently extant, assessing not only their energy potential but also their impacts on global warming, human health, energy security, water supply, space requirements, wildlife, water pollution, reliability and sustainability. Jacobson—who received no funding from any interest group, company or government agency—ranked nuclear and coal with capture and carbon sequestration tied for last place as the two worst sources of energy. Best was wind, followed by concentrated solar, geothermal, tidal, solar photovoltaics, wave and hydroelectric. 73-f-AL/AQ/WA

Impact on Fish: In addition we share concerns expressed by Riverkeeper and others about the massive fish kill from once through cooling that results from the more than 2 billion gallons of Hudson River water the plant uses its cooling system. This is of even greater significance in the context of decreasing fish populations, with 10 of 13 signature Hudson River fish in serious decline. 73-g-AE

Narrowing of Relicensing Process: In addition to minimizing concern in the issues that are addressed in the SDEIS, most of the public health, safety and environmental issues, which the public would assume are being considered, are deemed to be "out of the scope" of the relicensing proceedings. For example, although the huge increase in the surrounding population in the past 40 years is noted, the corresponding impossibility of a viable evacuation plan is considered to be out of scope, as are the plant's vulnerability to terrorism in a post-911 world, and its past history of serious, repeated problems related to aging, such as a steam boiler rupture, transformer explosion and clogged cooling system intake valves. 73-h-AM/LR/ST

Thank you for this opportunity to raise our concerns. Clearwater will submit more detailed and annotated comments by March 11.

Respectfully submitted,

Manna Jo Greene

Manna Jo Greene
Environmental Director
Hudson River Sloop Clearwater
845-807-1270

NRC CASE NO.
OFF. EXH. NO. 1:30P
ID: D/RECD
DATE. 2/12/09

IPRenewalCEmails ML 090640394

From: Howard [samgrand1999@yahoo.com]
Sent: Thursday, March 05, 2009 4:26 AM
To: IndianPointEIS Resource
Subject: re-licensing of Indian Point

Hello,

I was told by Riverkeeper that one can send comments to this e-mail address. I am only one person living in Brooklyn, NY, so perhaps I don't know that much. But from what Riverkeeper has reported, there are many problems with Indian Point concerning strontium in the water affecting fish and possibly drinking water, various leaks into the Hudson, not enough safety measures in place, possible radiation leaks, and security concerns. I cannot imagine what your job is like and what reports and documents and hearings you must follow. It just seems that if we have an opportunity here to correct problems or prevent problems, it might be wise to do so, instead of just re-licensing Indian Point quickly. 74-a-LE

I don't know how much New York relies on Indian Point for power. It just seems that after Three Mile Island in Pennsylvaina and Chernobyl all those years ago, we should make sure all safety precautions are in place, all parts are modernized and up to specifications, or we should just not re-license Indian Point. I don't understand all aspects of or the benefit of nuclear power, but I am sure Riverkeeper has more extensive and thorough information. If you do not consider my comments, I hope that you will listen to more knowledgeable people such as the people who are trying to protect us and keep us safe, at Riverkeeper and other organizations. Thank you for reading this and considering my comments. 74-b-SA

Howard Hassman

IPRenewalCEmails ML 090440393

From: Gerry Hawkins [g.hawkins@dakotagrp.com]
Sent: Friday, February 27, 2009 10:17 AM
To: IndianPointEIS Resource
Subject: CLOSE INDIAN POINT

As a homeowner who lives within 5 miles of Indian Point, I urge you to recommend the closing of this plant. 75-a-OR
The reasons are obvious and numerous:

1. Repeated leaks of radioactive water, and the frightening mystery of what further leaks have yet to be discovered
2. Numerous safety mechanical failures which will only become more dangerous in an aging plant 75-b-EP/LE/OP/ST
3. The absolute impossibility of an evacuation in the event of a serious accident
4. The always-present possibility of a terrorist attack.

The list could go beyond this, but the above is enough of a good reason to shut the plant. The energy can and will be replaced.
You don't risk thousands of lives to save a buck. 75-c-EC/SA

Gerard Hawkins
90 Hastings Ave
Croton on Hudson, NY

IPRenewalCEmails ML090640363

From: lucillesel@optonline.net
Sent: Thursday, February 26, 2009 9:50 PM
To: IndianPointEIS Resource
Subject: ndian Point plant

I am against Entergy's proposal to extend for 20 years the plant's operating licenses.Since the plant is so old and is leaking radioactive water into the Hudson, it should be closed down. The pollution of the Hudson River should not be allowed to continue, as well as the poisoning of fish in the river should be stopped. 76-a-AE/LE/OR

It is also built on an earthquake fault line, close to New York City. What genius decided on that placement? A new facility should be built to replace it by 2013, when the operating licenses expire, so power can be continued in a safe and effective manner. As the Nuclear Regulatory Commission voting on this matter, please vote against keeping Indian Point open. Thank you. Lucille Helman 76-b-OR/PA

IPRenewalCEmails ML ~~00~~ 090640395

From: Seth Hirsh [sethlh@yahoo.com]
Sent: Tuesday, March 03, 2009 10:33 PM
To: IndianPointEIS Resource
Subject: Re: Indian Point License Renewal

Indian Point in NO WAY should be allowed a License Renewal because of their FOWLING of the Hudson!!!!!!!!!!!!!!! 77-a-AW/OR

Seth Hirsh
901 Kilmer Lane
North Woodmere, N.Y. 11581-3103

[redacted]

☺*SETH*

MR. HOHLFELD: Thank you for this opportunity to address you this afternoon. My name is Bill Hohlfeld and I'm from the Local-46 Labor-Management Cooperative Trust. On behalf of the working men and women of Local-46, I rise today to speak in support of the Indian Point re-licensing. 78-a-SR

There's no question that these are tough times for New York's working families. However, New York cannot meet its current and future energy needs without the continued operation of the Indian Point Energy Center. Indian Point produces 2000 Mw of clean emission free electricity and is a critical economic engine for the lower Hudson Valley, responsible for more than $700 million in annual regional economic activity. The New York Independent system operator noted that the closure of Indian Point’s reactors would result in, and I quote, an immediate violation of reliability standards. Given that on a typical day, Indian Point provides up to 30% of the power used in New York City and the surrounding region is even more critical to keep Indian Point online. 78-b-EC/GI/ST

Additionally, Indian Point is also a friend of working families throughout the Hudson Valley. Not only does Indian Point provide reliable low-cost electricity, but organized labor has been central to the continued operation and support of this facility. Working families deserve a comprehensive commonsense 78-c-SO/SR energy plan that will support our state's economic recovery. Indian Point’s 2000 Mw of clean, reliable, low-cost electricity are completely crucial to this effort. As I speak to you today as a member and a representative of Local-46, as a resident of the Hudson Valley and a member of the area and I ask you, please keep Indian Point open. Thank you very much. 78-c-SO/SR contd.

HUDSON RIVER SLOOP
CLEARWATER, INC

INDIAN POINT ENVIRONMENTAL IMPACT STUDY IGNORES HEALTH RISKS, ENVIRONMENTAL JUSTICE IMPACTS AND BENEFITS OF RENEWABLE ENERGY

For Immediate Release
February 12, 2008

POUGHKEEPSIE, NY – Manna Jo Greene, environmental director at Hudson River Sloop Clearwater, joined Joseph Mangano of the Radiation and Public Health Project today at the U.S. Nuclear Regulatory Commission (NRC) hearing in Cortlandt Manor, NY, in presenting newly released data that shows that thyroid cancer rates in the four counties closest to Indian Point are nearly double the U.S. average, and that childhood cancer is also above the national rate.

The NRC recently issued a Draft Supplemental Environmental Impact Statement (DSEIS) on the relicensing of Indian Point nuclear reactors in Westchester County, NY, and concluded that Indian Point poses no significant public health risk. The statement is part of the federal review for the application to extend the licenses for Indian Point Units 2 and 3 for 20 years.

Data just released by the New York State Health Department, however, show that thyroid cancer rates in the four counties closest to Indian Point are nearly double the U.S. average, and that childhood cancer is also above the national rate. Rockland, Orange, and Putnam Counties, three of the four counties flanking Indian Point, had the 1st, 2nd, and 3rd highest thyroid cancer rates in 2001-2004 of all 62 New York State counties. The other county, Westchester, had the 8th highest rate.

A total of 992 persons in the four counties were diagnosed with thyroid cancer in these four years. In addition, a study by the Mother's Milk Project shows that of 30 milk samples from breastfeeding mothers and goats within 50 miles of Indian Point, nearly all reveal levels of strontium-90 with the highest results occurring closest to the nuclear plant located on the Hudson River in Buchanan, New York. Together with the NYS

79-a-HH

Health Department data, this suggests that emissions from Indian Point may be compromising the health of local residents.

The SDEIS also dismisses any disproportionate impacts on minority or low income communities, including impacts on families of subsistence fishermen who catch fish and crabs that contain traces of strontium-90 and other isotopes, as insignificant. In a previous generic environment impact study (GEIS) done in 1996 for all nuclear power plants, the health and environmental impacts were considered to be "small." The newly released SDEIS focused on any additional impacts from planned releases and discharges at Indian Point during normal operations and the leaks of radioactive isotopes that were discovered in and are specific to Indian Point.

Clearwater's Environmental Director, Manna Jo Greene, notes, "While the regulatory standards the NRC staff used to evaluate the radioactive isotopes leaking from the plant into the Hudson may allow them to label the potential impacts 'small' and 'of no significant impact to plant workers, the public and the environment,' we are not convinced. This additional burden of radioactivity to people who may be catching and eating fish, sharing their catch with friends and families, without even realizing that the plant is leaking radioactivity is an example of environmental injustice." 79-b-EJ/HH

Although the SDEIS does provide comparisons renewable energy resources to nuclear power generated Indian Point, it underestimates the ability of energy efficiency and renewables to serve as more sustainable alternatives to nuclear or fossil fuel. It ignores for example, Westchester County Executive Andy Spano's aggressive plan to reduce the county's carbon footprint by 20 percent within the next seven years and 80 percent by 2050. Stanford University's Mark Z. Jacobson recently conducted the first quantitative, scientific evaluation of major, energy-related solutions currently extant, assessing not only their energy potential but also their impacts on global warming, human health, energy security, water supply, space requirements, wildlife, water pollution, reliability and sustainability. Jacobson—who received no funding from any interest group, company or government agency—ranked nuclear and coal with capture and carbon sequestration tied for last place as the two worst sources of energy. Best was wind, followed by concentrated solar, geothermal, tidal, solar photovoltaics, wave and hydroelectric. 79-c-AL

In addition to minimizing concern in issues addressed in the SDEIS, most of the public health safety and environmental issues, which the public would assume are being considered, are deemed to be "out of the scope" of the relicensing proceedings. For example, although the huge increase in the surrounding population in the past 40 years is noted, the corresponding impossibility of a viable evacuation plan is considered to be out of scope, as are the plant's vulnerability to terrorism in a post-911 world, and its past history of serious, repeated problems related to aging, such as a steam boiler rupture, transformer explosion and clogged cooling system intake valves. 79-d-LR/NE

Contact:
Manna Jo Greene
Environmental Director
Hudson River Sloop Clearwater
845-807-1270

Tom Staudter
Communications Director
Hudson River Sloop Clearwater
845-454-7673 x112

HUDSON RIVER SLOOP CLEARWATER, INC.'S WRITTEN COMMENTS ON THE SUPPLEMENT 38 TO THE GENERIC ENVIRONMENTAL IMPACT STATEMENT FOR LICENSE RENEWAL FOR NUCLEAR PLANTS, REGARDING INDIAN POINT GENERATING UNITS 2 AND 3, ISSUED BY THE NUCLEAR REGULATORY COMMISSION ON DECEMBER 22, 2008 (DRAFT NUREG-1437, SUPPLEMENT 38 VIII DECEMBER 2008)

Hudson River Sloop Clearwater, Inc. ("Clearwater") submits these written comments on the Supplement 38 to Generic Environmental Impact Statement for License Renewal for Nuclear Plants, Regarding Indian Point Generating Units 2 and 3 (hereinafter referred to as "DSEIS") issued by the Nuclear Regulatory Commission ("NRC") Staff on December 22, 2008 to supplement the oral testimony of its Environmental Director, Manna Jo Greene given at the public comments hearing on February 13, 2009.

Entergy Nuclear Operations, Inc. ("Entergy") submitted a license renewal application on April 30, 2007, to the United States Nuclear Regulatory Commission ("NRC") requesting a 20-year extension of the existing licenses for Units 2 and 3 at the Indian Point Nuclear Generating Facility ("Indian Point"). The license renewal application was submitted pursuant to the federal Atomic Energy Act and NRC regulations. Among other requirements of these provisions, the NRC must conduct an environmental review and consider the adverse environmental impacts of the renewal, with public review and comment.

On December 22, 2008 the NRC Staff issued Supplement 38 to Generic Environmental Impact Statement for License Renewal for Nuclear Plants, Regarding Indian Point Generating Units 2 and 3 (hereinafter referred to as "DSEIS") issued by the NRC Staff as required by the National Environmental Policy Act ("NEPA") and NRC rules. The DSEIS is deficient under the requirements of NEPA, the facts of this proceeding, and the unique location of Indian Point, which requires that the site-specific environmental statement include accurate and complete assessments of the impacts of renewal of the Indian Point licenses including the following: impacts: the impacts to of radiological releases on drinking water sources and on mother's milk; the socioeconomic factors in Rockland County related to cooling systems, other cooling system issues; impacts upon the environmental justice, disabled and institutionalized populations in the region; impacts on drinking water quality and the aquatic ecology of the Hudson River; impacts of the complete uranium fuel cycle; and the feasibility and impacts of the no action alternatives including the use of renewable sources of energy generation, and the implementation of conservation and energy efficiency measures.

I. NEPA Standards for NRC's Review of License Renewal Applications

The National Environmental Policy Act of 1969 ("NEPA") places upon an agency the obligation to consider every significant aspect of the environmental impact of a proposed action and "ensures that the agency will inform the public that it has indeed considered environmental concerns in its decision-making process." *Baltimore Gas & Elec. Co. v. Natural Res Def. Counsel, Inc.*, 462 U.S. 87, 97 (1983). NEPA mandates that federal agencies involved in

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activities that may have a significant impact on the environment must complete a detailed statement of the environmental impacts and project alternatives. NEPA requires that federal agencies take a "hard look" at the environmental impacts of proposed actions, specifically:

> (i) the environmental impact of the proposed action,
> (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,
> (iii) alternatives to the proposed action,
> (iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and
> (v) any irreversible and irretrievable commitments of resources which would be involved if the proposed action should be implemented.

42 *U.S.C. §* 4332. Federal agencies must prepare an Environmental Impact Statement ("EIS") for "all major Federal actions significantly affecting the ... environment." 42 U.S.C. § 4332(2)(C).

"NEPA was created to ensure that agencies will base decisions on detailed information regarding significant environmental impacts and that information will be available to a wide variety of concerned public and private actors." *Morongo Band of Mission Indians v. Federal Aviation Administration,* 161 F.3d 569, 575 (9th Cir. 1998) *(quoted* in *Mississippi River Basin Alliance v. Westphal,* 230 F.3d 170, 175 (5th Cir. 2000)). Thus, the fundamental goal of a NEPA evaluation is to require the responsible government agency to undertake a careful and thorough analysis of the need for the project and its impacts before proceeding. Agencies must consider environmentally significant aspects of a proposed action, let the public know that the agency's decision-making process includes environmental concerns, and decide whether the public benefits of the project outweigh the environmental costs. *Baltimore Gas & Elec. Co. v. Natural Resources Defense Council,* 462 U.S. 87, 971,76 L. Ed. 2d 437, 103 S. Ct. 2246 (1983); *Utahns For Better Transportation v. United States Dept. of Transp.,* 305 F.3d 1152, 1162 (10th Cir. 2002); *Illinois Commerce Com. v. Interstate Commerce Com.,* 84.8 F.2d 1246, 1259 (D.C. Cir. 1988).

The requirements of NEPA are mandatory and apply to the NRC. *Calvert Cliffs Coordinating Comm., Inc. v. U.S. Atomic Energy Comm.'s,* 449 F.2d 1109 (D.C. Cir. 1971)(holding that NEPA applies to NRC's predecessor). Both Entergy and the NRC must comply with NEPA by evaluating the environmental impacts of license renewal and by weighing the costs and benefits of mitigating or avoiding such impacts. 10 C.F.R. § 51.95(c). The NRC must prepare an environmental impact statement before making its decision on Entergy's renewal application. *See* 10 C.F.R. § 51.95(d).

The NRC has created a generic environmental impact statement for license renewal. NUREG 1437, *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* ("GEIS"). Environmental impacts are categorized as either "Category 1" or "Category 2." See 10 C.F.R. 50, Appendix B to Subpart A, Table B-1. As a general matter, Category 1 impacts may not be challenged in license renewal proceedings. *See Florida Power & Light. Co,* (Turkey Point Nuclear Generating Plant, Units 3 and 4), CLI-01-17, 54 NRC 3, 12 (2001). Category 2 issues include offsite land use (significant changes associated with population and tax revenue changes resulting from license renewal), and the consideration of severe accident mitigation alternatives ("SAMA") for all plants that have not considered such alternatives. 10 C.F.R. 50, Appendix B to Subpart A, Table B-1. 10 C.F.R. §1.53(c)(3)(ii)(I) and. (L). Entergy must address SAMA in its environmental report. *Entergy Nuclear Generation Co. and Entergy Nuclear Operations, Inc.* (Pilgrim Nuclear Power Station), LBP-06-23, 64 NRC 257, 279, citing 10 C F.R. § 51.53(c)(3)(ii)(L).

II. <u>Specific Deficiencies in the DSEIS</u>

Clearwater notes the following deficiencies in the DSEIS:

A. The DSEIS fails to adequately address the Radioactive Releases to Drinking Water Sources: Radioactive Waste Management Systems and Effluent Control Systems (2.1.4) and Radiological Impacts (2.2.7). NRC staff's discussion of planned and unplanned radioactive releases of tritium, strontium-90, cesium-37 and nickel-23 from IP-1 spent fuel pools and IP-2 and IP-3 relies on the fact that: i) such releases are within radiation standards"; and ii) that there are no residential or municipal drinking water wells or surface reservoirs near the plant and thus there are no known impacts to any drinking water source.

In a discussion of the potential for groundwater contamination, NRC staff quotes Entergy as "asserting that no NRC dose limits have been exceed[ed], and drinking water limits, [which the groundwater contamination under Indian Point does exceed], are not applicable since no drinking water exposure pathway exists (Entergy 2007a,)." On p. 2-108, "[c]urrently, there is no drinking water exposure pathway to humans that is affected by the contaminated ground water conditions at the IP2 and IP3 site. Potable water sources in the area of concern are not presently derived from ground water sources or the Hudson River, a fact confirmed by the New York State Department of Health." 79-e-HH/SO

However, "contaminated ground water is leaking into the Hudson River" (p.2-109) and the Hudson River is a municipal water source. On p. 2-36 the DSEIS mentions the Poughkeepsie Water Works (PWW), which processes drinking water from the Hudson River 30 miles upstream from the plant, as a source of water temperature information. Moreover, Table 2.9 lists all Major Public Water Supply Systems in the vicinity of IP2 and IP2 in 2005. All the facilities listed either use groundwater or surface water from reservoirs; except, as noted in the text, Poughkeepsie uses surface water from the Hudson River. Further, the DSEIS does not include the water intake in New Hamburg--a back up water supply for New York City located south of Poughkeepsie, or facilities in Rhinebeck, Highland/Town of Lloyd or Port Ewen/Town of Esopus, which take their drinking water directly from the Hudson. Also, while Table 2.9 may have been representative in 2005, the proposed Rockland County Desalination Plant, which, if approved, will be located directly across the Hudson River from Indian Point, would provide a third major source of water to Rockland County beyond existing ground and surfaces sources. When fully constructed the facility would take up to 10 -15 million gallons per day (gpd) from the Hudson River via an intake on the border of Stony Point and Haverstraw only 3.5 miles from the plant to produce up to 7.5 million gpd for Rockland's water supply.

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Given the potential impact upon the planned Rockland County water treatment plant (and upon other communities in the lower Hudson that take drinking water from the Hudson River), the deficiencies are substantial and the impacts may have direct adverse consequences upon human health. Because of the seriousness of this issue, Clearwater is filing a contention in the relicensing proceeding to require both Entergy and NRC staff to consider these impacts.

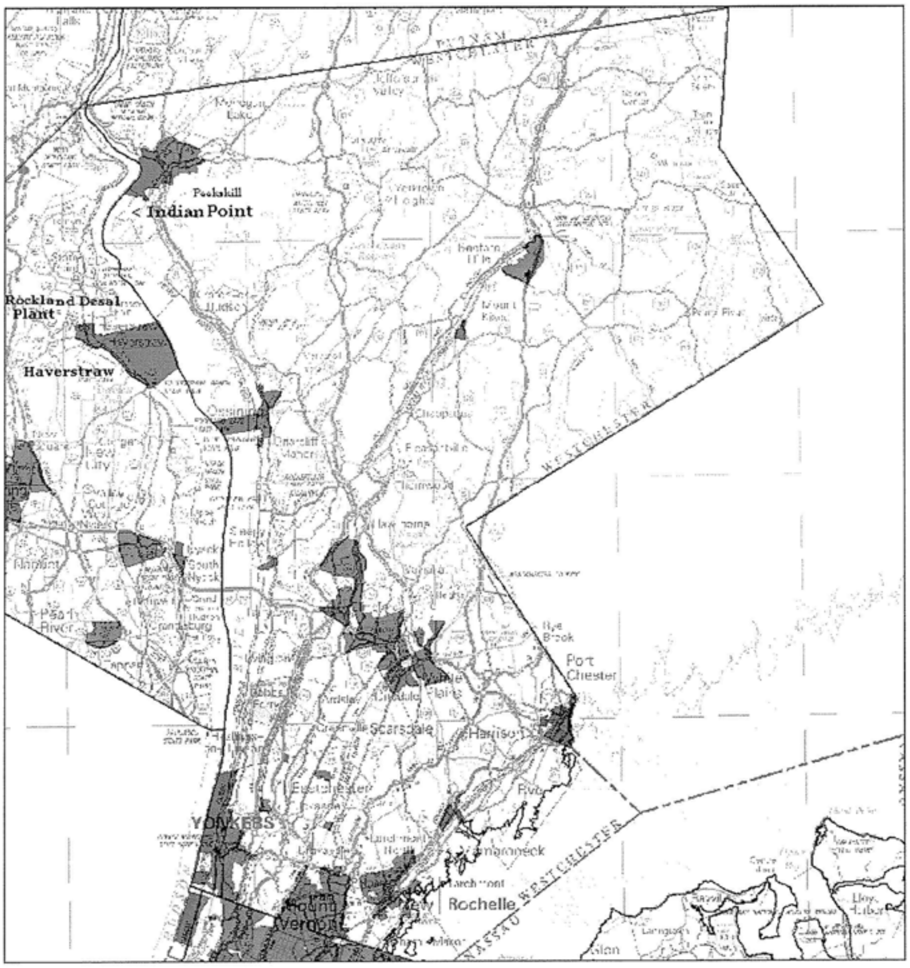

Figure 1. Map of Westchester County showing proximity of Indian Point to Potential Environmental Justice Areas (PEJA) in purple, with approximate location of United Water of NY's proposed desalination plant in Rockland County. *Courtesy of NYS DEC Office of Environmental Justice.*

79-e-HH/SO contd.

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Additionally on p. 2-105, the DSEIS states that "the results of the gamma spectroscopy analyses of the monthly drinking water samples and results of tritium analysis of quarterly composites showed that, other than naturally occurring radionuclides, no radionuclides from plant operation were detected in drinking water samples. The data indicate that operation of IP2 and IP3 had no detectable radiological effect on drinking water." The DSEIS is deficient because it does not specify where the drinking water samples were collected. The leaks, which were discovered in 2005, were likely present through the sampling in 2006, but no newer data has been included making it difficult to assess current and future trends now that the leaks are known.

79-e-HH/SO contd.

B. The DSEIS fails to address the possible effects on Mother's Milk: Radiological Impacts (2.2.7): Because nearby dairies were closed by 1992, reports by NYS Department of Health in 1993 and 1994 indicated that no cow's milk was collected or sampled nearby, although it is not clear what criteria were used to define "nearby", and what methodology was used to determine the efficacy of this parameter. Furthermore, these studies and the evidence presented in the DSEIS failed to assess the impact of radiological releases on human breast milk; clearly human mothers milk is a potential route of exposure and should be evaluated.

79-f-HH

C. The DSEIS fails to include Rockland County in Socioeconomic Factors (2.2.8): It is unclear why the NRC staff ignored all of Rockland County in this section. The reason stated is that the majority of the IP2 and IP3 workforce lives in the four counties of Dutchess, Orange, Putnam and Westchester (and not Rockland). However the topic is "Plant Interaction with the Environment/Socioeconomic Factors," which is by no means limited to where the workforce resides. In fact, much of Rockland County is within the 17.5-mile peak fatality zone and all of Rockland is within the 50-mile peak injury zone around Indian Point. While it is clear on Table 2.7 that a relatively small percentage of Indian Point employees live in Rockland, there were still 28 employees from Rockland and the proportion could easily increase over the twenty years of the license renewal. This defect applies to the housing section 2.2.8.1 and Table 2-8, as well.

79-g-SO

D. The DSEIS fails to Project Demographics (2.2.8.5) of Environmental Justice Populations: Table 2-11 looks at demographics and projects future growth, which has further implications regarding evacuation; Tables 2-12 and 2-13 look at 2000 and 2006 data, but do not project the growth of non-white and low-income populations over the 20 years of the LRA. See also discussion below on environmental justice.

79-h-EJ

E. The DSEIS fails to evaluate the impact of global warming on the relicensing of Indian Point: The projected warming of the Hudson River and the projected increase and severity of storms and flooding could exacerbate the impact of the thermal plume discharged by Indian Point cooling systems into the river. Increased storms and flooding could exacerbate the effects of aging, such as corrosion of underground piping and other systems, thereby increasing the possibility of additional accidental radiation, releases such as the one that occurred in February 2009.

79-i-HH/SO

F. The DSEIS fails to analyze seismic hazard: This is a serious omission, especially in light of recent seismic activity in the region, and recent studies conducted by Columbia University's Lamont-Doherty Earth Observatory, which specifically note the potential threat to Indian Point.

79-j-HH

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G. The DSEIS fails to adequately address the impact upon the environment and human health of storing spent fuel rods and other nuclear waste on site indefinitely. Recent announcements by the Secretary of Energy indicate that the use of Yucca Mountain as a long-term storage site for high-level nuclear waste is likely to be abandoned, leaving little alternative but to store Indian Points high-level nuclear waste on site in dry cask storage. 79-k-SF

H. Issues Related to Cooling Systems (4.1): In Section 2.2.5, Aquatic Resources, Regulatory Framework for Monitoring, on p. 2 -49, in referring to the Hudson River Settlement Agreement, the NRC staff refers to lack of agreement on fifth consent order in the ongoing SPDES renewal process, and again in 4.1:

> "The SPDES permit for the Indian Point site, which addressed discharge from the currently operating IP2 and IP3, as well as the shutdown IP1 unit, expired in 1992 but has been administratively extended by NYSDEC. The NYSDEC proposed new SPDES permit for the site, currently in draft form, is in adjudication. The SPDES permit for the Indian Point site, which addressed discharge from the current operating IP2 and IP3, as well as the shutdown IP1 unit, expired in 1992 but has been administratively extended by NYSDEC. The NYSDEC proposed new SPDES permit for the site, currently in draft form, is in adjudication.
>
> "Section 316(b) of the Clean Water Act of 1997 (CWA) (Title 33, Section 1326, of the United States Code (33 USC 1326)) requires that the location, design, construction, and capacity of Environmental Impacts of Operation December 2008 4-7 Draft NUREG-1437, Supplement 38 cooling water intake structures reflect the best technology available for minimizing adverse environmental impacts. In the fact sheet for the site's draft SPDES permit, NYSDEC states that it has determined that **the site-specific best technology available** ("BTA') to minimize the adverse environmental impacts of the IP Units 1, 2, and 3 cooling water intake structures is **closed-cycle cooling** (NYSDEC 2003b). Under the terms of the proposed SPDES permit, NYSDEC (2003b) states that it will evaluate proposals from Entergy to institute alternative methods to avoid adverse environmental impacts. Given NYSDEC's statements in the proposed SPDES permit, the NRC staff decided to consider the environmental impacts that may occur if Entergy institutes closed-cycle cooling at IP2 and IP3—as well as the environmental impacts of a possible alternative method of reducing impacts to aquatic life—in Chapter 8 of this SEIS." p. 4 -6, 4-7. 79-l-AE

There was no mention of possible new cooling towers from BTA closed-cycle cooling on p. 2-119, which addressed future Visual Aesthetics and Noise of the plant; however these are thoroughly discussed in Section 8.1.1. The main discussion of closed-cycle cooling in Section 4.1 centered around potentially reduced fish impacts on fish from significantly reduced cooling water consumption and subsequent reduction of impingement, entrainment and thermal pollution (heat shock).

The NRC staff has done a very detailed assessment of the impacts of the impingement, entrainment and heat shock from the plant's 2.8 billion gallon per day cooling systems on a variety of aquatic species. The May 2008 Pisces Report indicates that ten of the thirteen signature Hudson River fish populations are in decline. The effects of the cooling systems at Indian Point and the several fossil fuel plants along the Hudson is not the only cause of the decline (fishing pressures, loss of habitat, invasive species are among other causes) but they do contribute significantly and are a controllable cause of fish decline.

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"NYSDEC, in Section 1, "Biological Effects," of Attachment B to the 2003 SPDES fact sheet (NYSDEC 2003b), states that operation of IP2 and IP3 results in the mortality of more than a billion fish of various lifestages per year and that losses are distributed primarily among seven species, including bay anchovy, striped bass, white perch, blueback herring, Atlantic tomcod, alewife, and American shad. Of these, NYSDEC indicates that the populations of Atlantic tomcod, American shad, and white perch are known to be declining in the Hudson River and considers current losses to be substantial." (p.4-9)

In addition to Atlantic tomcod, American shad, and white perch, the Pisces Report indicates that **alewife, bay anchovy, and blueback herring** are declining as well, as are **rainbow smelt, and weakfish**, which are found in the IP section of the river, as well as white catfish, which were not found, according to table 2-5, p. 2-57. Striped bass, which are strong predators, are recovering, but themselves contribute to the decline of other species.

Clearwater's main concern in this regard is the lack of data on which to base a careful assessment. Impingement losses associated with IP2 and IP3 were studied annually from 1975 to 1990. However, no further studies were conducted after the modified Ristroph traveling screens were installed in 1992 in all intake bays of IP2 and IP3, and no assessment was ever performed to determine their effectiveness by documenting any change in mortality of key species. NRC staff site many other examples of insufficient data.

79-l-AE contd.

I. The DSEIS Fails to adequately address potential visual and EJ impacts of the Closed-Cycle Cooling Alternative (8.1.1): This section discusses a variety of impacts from closed-cycle cooling, which "NYSDEC identified closed-cycle cooling as a BTA in its 2003 draft SPDES permit (NYSDEC 2003a, 2003c). Entergy's preferred close-cycle alternative consists of two hybrid mechanical-draft cooling towers (Enercon 2003, Entergy 2007). IP2 and IP3 would each utilize one cooling tower. Entergy rejected single-stage mechanical draft cooling towers, indicating that the dense water vapor plumes from the towers may compromise station operations (including visual signaling) and equipment over time, and single-stage towers may result in increased noise (Enercon 2003). These include land disturbance and the need to prevent erosion and siltation, visual/aesthetic impacts of either type of cooling towers, additional noise, health, socioeconomic and other impacts."

A concern here is that the DSEIS ignores potential environmental justice impacts on the residents of the City of Peekskill, just 2.5 miles from the site. It focuses exclusively on Buchanan and Verplanck, while also ignoring potential impacts on Haverstraw and West Haverstraw, whose communities are designated by New York State as having potential Environmental Justice areas (PEJA). This is true also in the map on Figure 2.9 on p. 2-25, which shows topographic features surrounding IP 2 and IP 3, just south of Peekskill, but does not include Peekskill.

Again, in discussing EJ impacts of closed-cycle cooling at p. 8-15:

"The NRC staff addresses environmental justice impacts of continued operations in Section 4.4.6 of this draft SEIS. Construction and operation of cooling towers at IP2 and IP3 would have an impact on potential environmental justice if environmental impacts of cooling system construction and operation affected minority and low-income populations in a disproportionately high and adverse manner.

79-m-AL

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"Within the 50-mi (80-km) radius of the IP2 and IP3 site, a number of potential environmental impacts (onsite land use, aesthetics, air quality, waste management and socioeconomic impacts) could affect populations in the immediate vicinity of the site. However, the potentially affected populations for the construction and operation of the closed-cycle cooling alternative, including residents of the **Villages of Buchanan and Verplanck, contain low percentages of minority and low-income populations.**

"Overall, low-income populations within the 50-mi (80-km) radius represent a small percentage of the total population. The low-income population was approximately 11.7 percent of the total population in the combined four-State reference area, or 10.4 percent when the individual States were used as the geographic area. According to 2004 census data, the percentages of people below the low-income criteria in Dutchess and Westchester Counties were 7.7 percent."

This narrowed focus should be corrected in the final EIS for this project.

79-m-AL contd.

III. Deficiencies in the DSEIS Relating to Environmental Justice (EJ)

A. General EJ Standards

Environmental justice (EJ) issues are not considered as part of the generic EIS, and therefore, an environmental justice assessment must be performed in the Supplemental Environmental Impact Statement ("Supplemental EIS"). *See NRC Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions, 69* Fed. Reg. 52040 (Aug. 24, 2004). In fact in 1994, President Clinton issued executive order decreeing the EJ must be a part of the NEPA process. Specifically, President Clinton wrote:

> "[E]ach Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations."

Exec. Order No. 12,898, 1994 WL 43891 ("Pres.Exec.Order"), 59 FR 7629. The NRC has adopted this executive order and incorporated it into its regulations 69 Fed. Reg. 52040. In a March 31, 1994 letter to President Clinton, then Commissioner of the NRC, Ivan Selvin stated that the NRC would carry out the measures in the Executive Order. See LBP-97-8, 45 NRC at 375. An EIS must conduct a "full and thorough" investigation. *Id.* The NRC is required to address environmental justice impacts in an environmental impact statement for a license renewal. *Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions,* 69 Fed. Reg. 52040 (Aug. 24, *2004)("EJ Policy Statement")*

In the *EJ Policy Statement,* the NRC stated that "EJ is a tool, within the normal NEPA context, to identify communities that might otherwise be overlooked and identify impacts due to their uniqueness as part of the NRC's NEPA review process." *EJ Policy Statement,* at 52047. An EJ-related socioeconomic impact analysis is pertinent "when there is a nexus to the human or physical environment or if an evaluation 'is necessary for an accurate cost-benefit analysis.'" *Id.* at 52047. According the EJ Policy Statement, the focus of any EJ review "should be on

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identifying and weighing disproportionately significant and adverse, environmental impacts on minority and low-income populations that may be different from the impacts on the general population." *Id.* at 52047. The NRC recognizes that the impacts of its licensing decisions on some populations "may be different from impacts on the general population due to a community's distinct "cultural characteristics or practices.'" *Id*. The NRC has acknowledged that "EJ, as well as other socio-economic issues are normally considered in site-specific EISs," are not usually considered during the preparation of generic EISs, and are performed "in the licensing action for each particular facility." *Id.*

The NRC has indicated that normally a 50-mile radius should be examined for licensing and regulatory actions involving power reactors, however this is only a guideline and the "geographic scale should be commensurate with the potential impact area and should include a sample of the surrounding population because the goal is to evaluate the communities, neighborhoods, and areas that may be disproportionately impacted." *Id.* at 52047-8. The NRC instructs that once the impacted area is identified, potentially affected low-income or minority communities should be identified. The NRC compares the percentage of the minority or low-income population in the impacted area to the percentage in the County and State. If the percentage in the impacted area significantly exceeds that of the State or County percentage for either minority or low-income population, then EJ will be considered in greater detail. *Id.* at 52048. "Significantly" is defined by staff guidance to be 20 percentage points. Alternatively, if either the minority or low-income population percentage exceeds 50 percent, EJ matters are considered in greater detail. *Id.* However, this is only guidance and these numbers are flexible: The goal is to identify and assure that communities or transient populations that will bear significant adverse effects will not be overlooked. *Id.* Therefore, this issue is material to findings that must be made in this proceeding. 10 C.F.R. §2.309(f)(1)(iv).

79-n-EJ contd.

In addition, although the EJ Policy Statement does not expressly require the NRC to consider potential impacts on communities other than minority and low-income populations, NEPA clearly requires an analysis of impacts of license renewal on other discrete communities that may be impacted, including people with disabilities, and people who are hospitalized, in nursing homes, in psychiatric facilities, and in other similar institutions and long- and short-term care facilities. Such an analysis is mandated by NEPA and supported by the broad range of federal law and policy that protects these groups of people including the Americans with Disabilities Act, 42 U.S.C. §§ 12101 et seq., Civil Rights of Institutionalized Persons Act, 42 U.S.C §§ 1997 et seq., Architectural Barriers Act, 42 U.S.C §§ 4151 et seq., Sections 501, 503, 504 and 508 of the Rehabilitation Act of 1973, 29 U.S.C §§ 791, 793, and 794, and the Equal Protection and Due Process Clauses in the Fifth and Fourteenth Amendments to the United States Constitution.

Given NEPA and the NRC's regulations, 10 CFR Part 51, a Supplemental EIS is required as part of this license renewal proceeding and that Supplemental EIS must address the environmental justice impacts of renewing the Indian Point licenses, together with the impacts upon people with disabilities and people in institutions, and in long- and short-term care facilities in the surrounding area.

B. The DSEIS Fails to Perform an Adequate Analysis of Environmental Justice, Disabled and Institutionalized Populations

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As stated above, the NRC Staff is required to review the impacts upon the environmental justice, disabled and institutionalized populations that will occur because of Indian Point's license renewal. The DSEIS completely ignores the impacts on disabled and institutionalized populations.

The DSEIS contains a seriously flawed environmental justice and related analyses that do not adequately assess the impacts of Indian Point on the minority, low-income, disabled and institutionalized populations in the area surrounding Indian Point. The NRC Staff's DSEIS does not satisfy NEPA because its methodology is flawed, and its analysis is incomplete and limited to questionable interpretations and presentation of data. It fails to acknowledge or describe potential impacts upon the high minority, low-income, disabled and institutionalized populations that surround the plant. The DSEIS also fails to provide a sufficient analysis of the many potential and disparate environmental impacts of Indian Point on the minority and low-income communities residing in close proximity to Indian Point.

First, there appears to be a disparate impact upon minority communities for cancer that may be related to radiation releases from Indian Point. Second, there is a group of subsistence fisherman in the Hudson who will suffer disparate impacts from radiation released from Indian Point that may wind up in the Hudson River fish. Third, there is a large minority, low-income and disabled population in special facilities (including hospitals and prisons) within 50 miles who will be severely impacted if there is an evacuation from the area surrounding Indian Point. It does not appear that these issues have been considered in prior environmental impact statements prepared in connection with Indian Point nor were the considered in the DSEIS. 79-o-EJ

The NRC Staff's analysis is based upon at least three flawed premises: first, an improper methodology; second it fails to adequately acknowledge the significant EJ, disabled and institutionalized communities within 50 miles of Indian Point; and third, it fails to assess the impact of license renewal on these communities. As discussed above, NRC's policy statement makes clear those impacts on some populations "may be different from impacts on the general population," and that "EJ, as well as other socio-economic issues are normally considered in site-specific EISs," are not in the preparation of generic EIS. *EJ Policy Statement*. Therefore, potential effects impacts the relicensing will have on these communities cannot be ignored.

i. The N.R.C's EJ and Demographic Methodology is Flawed and Incomplete.

The N.R.C. Staff has performed a partial and questionable descriptive portrait of minority and low-income populations within the NRC-defined impact area. The data set that the NRC Staff present is incomplete. They do not, for example, present their raw data for total minority and low-income populations for each Census Block Group (CBG), which would permit the public to independently assess and analyze the information. Moreover, the NRC Staff's data is limited to highly aggregated summaries based upon relative percentages of population groups targeted by the NRC review process. We are not presented with relevant numerators or denominators for target populations in each, Census Block Group, which would be necessary for serious data analysis. Whether this is intended obfuscation or not, the strategy is very convenient 79-p-EJ for the NRC Staff and they do not have to deal with the evident fact that millions of non-whites live within the 50-mile zone.

Also, in the DSEIS the NRC Staff relies on incomplete statistical analyses and/or inconsistent data in making their assessments. For example, the DSEIS discusses the population within 20 miles of Indian Point based on the 2000 census data however there is no mention of the minority composition within 20 miles of Indian Point. Another inconsistency found in the DSEIS is the use of projected population growth rates for the total population during the license renewal period while not including projected growth rates for environmental justice communities over that same time period. See Table 2-11 DSEIS (shows general population growth from 1970-2000 and provides projected growth from 2010 through 2050). The DSEIS does not contain an equivalent analysis for minority populations.

The DSEIS also does not discuss the significant environmental justice community in the city of Peekskill, which is 2.5 miles from Indian Point nor does the DSEIS assess the impact that the license renewal will have on this community. Indeed, the DSEIS does discuss two communities in the vicinity of IP Buchanan and Verplanck to explain how the areas surrounding IP do not have a significant EJ community, 7% and 11% respectively (p. 8-16). However, it fails to discuss the significant EJ community merely 2.5 miles from the plant in Peekskill to the north, or the communities of Haverstraw and West Haverstraw 3.5 miles across the Hudson to the southwest (See Figure 1). NYS DEC lists these three communities on its map of EJ communities at: http://www.dec.ny.gov/docs/permits_ej_operations_pdf/westchesterco.pdf and http://www.dec.ny.gov/docs/permits_ej_operations_pdf/rocklandco.pdf. Without complete and consistent data the DSEIS does not meet the minimum requirements of NEPA.

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The NRC Staff's use of Census Block Groups is, also, crude. CBGs are too gross in how they capture data, since they obscure small neighborhood concentrations of minority populations that likely would emerge had Entergy's analysis focused on the smallest geographic unit utilized by the Bureau of the Census, the Census Block, rather than aggregations of Census Blocks Groups. Census Blocks provide the finest level of detail in the Census Bureau figures. Since minority groups are often highly concentrated in specific neighborhoods, a CBG aggregation can obscure the presence of those racial and ethnic communities, especially in the small towns and cities that characterize the mid-Hudson Valley. Census Block-level analysis should result in a more accurate identification of minority and low-income population concentrations within the specified impact region. Moreover, even with the limited data the DSEIS includes, it is notable that there is no analysis of the data. The obvious implications of its findings, including the potential for disproportionate effects of Indian Point on minority populations, are disregarded by the NRC Staff. Probable real-life impacts on Environmental Justice Communities are neither presented nor analyzed.

Because the NRC Staff has used a flawed methodology it has left unanswered questions that are essential in a rigorous environmental justice analysis, such as: i) What would a proper analysis of the data show?; ii) How are the large minority populations living very near the plant *(see, e.g,* ER, Figure 2-22) likely to be impacted?; and iii) How would the huge number of low income and minority people living within 50 miles of the plant - a number in the millions, larger than the total population of many states and most metropolitan regions in the United States - be impacted

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by a renewal of Entergy's license? The NRC's Final Supplemental EIS must address these questions. 79-p-EJ contd.

ii. The NRC Staff Does Not Adequately Acknowledge the Significant EJ Communities within 50 Miles of Indian Point, or Assess Indian Point's Impact on this Community.

As discussed above, NRC guidance instructs that in evaluating minority communities within the impacted area, it is appropriate to determine whether the percentage of EJ population in the impacted area significantly exceeds the population in the local county or state as a whole. *Id.* at 52048. NRC staff guidance defines "Significantly" as a disparity of 20 percentage points, and, alternatively, states that EJ matters should be considered in greater detail, in any event, if either the minority or low-income population percentage exceeds 50 percent. *Id.*

In the DSEIS, the NRC Staff cites to the United States Census from 2000 to inform us that 48.7% of the population residing within 50 miles of Indian Point identify themselves as minorities. Relying on data that will be ten years old at the time the license renewal period is inadequate. However, even with this flawed and outdated information one can determine that this is "significant" because it shows a minority population that is 15 percentage points higher than the national average.[1] In addition, when you compute the projected growth rate for minority populations over the 10-year period from 2000 to 2010 the percentage of minority population exceeds 50% and therefore becomes "significant."

In fact, Table 2-7A in the ER indicates that 45.5 percent of Census Blocks within a 50-mile radius in the four states surrounding Indian Point have "significant" minority populations as defined by NRC guidance (ER, Table 2-7A, p. 2-42). This high number of Census Block groups means that very large numbers of minority community members reside in a 50-mile radius of Indian Point. 79-q-EJ

It should be noted that neither the *EJ Policy Statement* nor the staff guidance is a regulation, and as such, these numbers are not binding. As the *EJ Policy Statement* makes clear, the numbers are flexible and are written with the goal of identifying communities or transient populations and assuring that significant adverse effects will not be overlooked. *Id.* In any event, a very large number of Census Blocks meet the NRC criteria of having high proportions of minorities: either a ratio of 50 percent or more of its population belonging to a minority as defined by the NRC, or a minority to total population ratio that is 20 percent or greater than the average for the reference region.

Indeed, compared to any other area of the nation, more minority group members are at greater risk from releases or serious incident at Indian Point than at any nuclear plant in the country.[2]

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[1] Overall, the nation's minority population reached 102.5 million in 2007 — 34 percent of the total.
http://www.census.gov/Press-Release/www/releases/archives/population/011910.html

[2] In addition, on March 6, 2009 ACRS panel made it clear that Indian Point will continue to leak into the future.

Figures 2-20 and 2-21 from the ER clearly indicate: 1) a geographic concentration of racial minority Census Block in the most densely populated sub-regions within the region defined by a 50-mile radius; and 2) a significant presence of racial minority Census Blocks located within closer proximity to Indian Point (Applicant's Environmental Report, p. 2-115, 116). Moreover, when Hispanic ethnicity is added to minority racial status in Figures 2-22 and 2-23 (Applicant's Environmental Report), the exceptionally strong presence of minority groups in the NRC defined impact region is even more striking. (Applicant's Environmental Report, p. 2- 117,11.8.)

It is also notable that the New York Metropolitan Region contained 10.6 percent of the total minority population of the United States (www.census.gov).[3] In fact, a significant fraction of the total minority populations of the United States as a whole is, located within a 50-mile radius of Indian Point. Westchester County, the home of Indian Point, has a proportion of both African-Americans and Hispanics, which exceeds that for the United States as a whole. African-Americans composed 14.9 percent of Westchester's total population in 2005, compared to 12.8 percent of the national. This means that the Westchester African American population is 16.4% higher than in the U.S. as whole. The enormity of the African American population in absolute numbers and the high percentage both demand that an impact assessment be made.

The 2000 Census indicates that 9,246,133 out of 21,199,865 people residing in the New York Metropolitan Region, 43.6 percent are either classified in non-white racial categories or are Hispanics or Latinos reporting their race as white. This compares with 30.9 percent for the United States as whole, which had a total minority population of 86,869,132 in the year 2000 population (U.S. Bureau of the Census at www.census.gov), Hispanics composed 18.0 percent of Westchester County's population, as opposed to 14.4 percent of the national population. This means that the Hispanic population in Westchester is 25% higher than the national average, a number well above the 20% NRC, guidance number. (U.S. Bureau of the Census at www.census.gov.)

Westchester County also is home to an unusually high proportion of people who were born abroad, and who speak a language other than English at home. Since Asia composes the second most-important source of immigration after Latin America, all high proportion of Westchester's non-Hispanic immigrants belong to environmental justice groups as well. Proportionally, twice as many of Westchester's 949,355 residents were born abroad as compared to the national average: 22.2 percent compared to 11.1 percent in the year 2000. With respect to the language spoken at home 28.4 percent of Westchester residents speak a language other than English, compared to 17.9 percent nationally. (U.S. Bureau of the Census at www.census.gov)

Parallel observations apply to Census Blocks with high proportions of low-income residents. Figures 2-24 and 2-25 in Entergy's submission indicate a substantial presence of low-income Census Blocks as defined by NRC criteria. Using an individual state criterion for classifying Census Blocks, Entergy's data indicates that 10.4 percent of these geographical units have relatively high concentrations of low-income residents. Entergy's alternative methodology of aggregating average poverty levels across four states yields a measurement of 11.8 percent of

79-q-EJ contd.

[3] Given the considerable overlap between the region defined by a 50-mile radius of Indian Point and the New York Metropolitan Region as defined by the Census, we use the relative weight of minorities in the latter as a proxy for racial proportion of minorities in the NRC-defined impact region.

Census Blocks within the 50-mile radius. One obvious conclusion from this measurement is not stated: counties within the 50-mile impact region defined by NRC had a total population of 19.9 million people. (Applicant's Environmental Report, p. 2-37). The fact that one out of ten Census Blocks is classified as low-income, most of them in the most densely populated part of the impact region means that at least several million low-income people are impacted.

Given the enormity of the EJ population in this region, both in percentage and absolute terms, further investigation by independent experts is mandated. There is a particular need to consider the full range of health, accident risk and terrorist risk impacts on minority populations residing immediately adjacent to Indian Point: in Peekskill, Haverstraw and West Haverstraw. Entergy's ER Figures 2-22 and 2-23 show that these are the closest EJ communities to the plant, and therefore the most likely to be impacted. Because the NRC Staff concludes that there are no offsite impacts, it makes no effort to analyze the impact that continued operation of the plant may have on these populations and is seriously incomplete. 79-q-EJ contd.

The NRC has failed to adequately address the effects that a license renewal will have on these communities in its DSEIS and must adequately and accurately address the effects on the communities in its Final Supplemental Environmental Impact Statement.

C. The Environmental Justice Impacts that must be addressed in the Final Supplemental EIS for Indian Point.

As set forth above, the NRC is required to address the environmental justice impacts of the renewal of Indian Point's licenses. The DSEIS failed to or inadequately addressed the:

- impact of cancer on minority and low-income populations that are more susceptible to cancer from Indian Point radionuclide emissions than other populations;
- impact to subsistence fishing in the Hudson River; 79-r-EJ
- fact that low-income populations will be more severely and negatively impacted by an evacuation resulting from a radiological event at Indian Point;
- the fact that disabled and institutionalized residents of special facilities will be more severely and negatively impacted by an evacuation or radiological event at Indian Point, including disabled patients in the dozens of hospitals and long term care facilities, and inmates in the many prisons in the area; and
- environmental justice concerns relating to production and long term storage of Indian Point's Fuel, especially upon Native American populations.

i. The Final Supplemental Impact Statement Must Address the Impact of Cancer Because Minority and Low-Income Populations May be More Susceptible to Cancer from Indian Point Radionuclide Emissions than Other Populations.

Research has shown that cancer rates in the four counties surrounding Indian Point are higher than for the general population. The NRC fails to adequately address this fact in its **DSEIS**. In its DSEIS it states that because it does not see effects to the population as a whole there must not 79-s-EJ/HH

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be effects to minority groups. This is a logical fallacy and cannot be the basis for a "hard look." Indeed, minority groups in the four county region are more vulnerable to the adverse impacts of radiological and nuclear plant induced chemical pollution in the environment that is the case for the general minority or Entergy's submission comments that "most" of the low-income Census Blocks are located within a 29-40 mile radius. (Applicant's Environmental Report, p. 2-45.) One possible reading of this comment is an implication that these Census Blocks somehow count less because they are in an intermediate zone of the NRC-defined impact region. That interpretation is far from obvious, and far from NRC application review criteria. It also demands a look into the specific impacts on the many low-income Census Blocks that are in closer proximity to Indian Point.

79-s-EJ/HH contd.

As evidenced by Joseph Mangano's preliminary findings of an increase in thyroid cancer and other health impacts in those communities closest to the plant, the current magnitude of the impact on the affected population may be significant and the projected impact on the health of the population during the new license period must be carefully evaluated in the Final Supplemental EIS. *Public Health Risks,* by Joseph Mangano, p. 17-34. Low-income and minority populations living near the plant are at a considerably increased risk of getting cancer. Four of the nine zip code regions closest to Indian Point have either high or intermediate concentrations of minorities and low-income populations, and these adjacent residents are exposed to higher risks of cancer than minority and low-income populations, residing in sub-regions of Westchester and Rockland Counties that are further from Indian Point.

ii. The Final Supplemental Environmental Impact Statement Must Fully and Accurately Address the Impact to Subsistence Fishing in the Hudson River.

In its DSEIS, although the NRC Staff acknowledges that subsistence fishing occurs in the region its assessment is merely cursory and fails to take into account the high percentage of minority and low-income populations in the lower Hudson Valley region who engage in subsistence fishing. Because of planned and unplanned emissions from Indian Point, through leaks, air and otherwise, it is likely that this population's intake of radionuclides and other toxic substances generated by the reactors will be both significant, and significantly greater, than the population at large. The cumulative effects have been increasing, and will continue to increase if a license renewal is granted. Because subsistence fishing is an exposure pathway that disproportionately impacts low-income and minority populations, subsistence fishing must be considered in greater depth in the NRC's Final EIS.

79-t-EJ

There is a long history of subsistence fishing in the Hudson in the areas surrounding Indian Point. In 1998, the New York State Department of Health and the Agency for Toxic Substances and Disease Registry (ATSDR) of the United States' Department of Health and Human Services released a study concerning subsistence fishing in connection with polychlorinated biphenyls (PCBs). *Survey of Hudson River Anglers and an Estimate of Their Exposure to PCBs,* September 30, 1998, prepared by State of New York Department of Health Under a Cooperative Agreement with the Agency for Toxic Substances and Disease Registry ("Angler Survey").[4] (www.atsdr.cdc.gov/hac/pha/hudsonri/hudtoc.html). The report was based on Clearwater's

[4] ATSDR. 1989. *Health Assessment for Hudson River PCB (Polychlorinated Biphenyl)* NPL Site, State of New York, CERCLIS No. NYD980763841.

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Hudson River Angler Survey, which included results from 336 shore-based anglers interviewed at 20 different locations along the Hudson, including three sites in the upper Hudson, during 1991 and 1992 (Barclay, 1993)[5]. The anglers were asked how often they fished and ate fish from the Hudson in the previous week and month, and the extent to which they shared their catch with other relatives and friends. The Angler Survey described the very serious community health concerns for children and women of childbearing age who were non-white or low-income.

The ATSDR report also included the results of a second Hudson River Angler Survey was performed by Edward Horn of the NYS Department of Health in 1996 and found similar results.[6] The 1996 survey used essentially the same questionnaire used in the original 1993 Clearwater study, which found that many Hudson River anglers were not aware of the consumption advisories and others who were aware did not heed the advice. The report highlighted concerns for women of childbearing age and children under the age of 15 who appear to be at particular risk, for non-whites and for low-income anglers. The author concluded that the prohibition of fishing in the Upper Hudson River and the health advisories were "having only limited success in preventing unsafe levels of exposure to PCBs through consumption of Hudson River fish." Angler Survey (http://www.atsdr.cdc.gov/hac/pha/hudsonri/hud_toc.html)

The results of the study were compelling and have important implications for Indian Point because, like PCBs, strontium-90, cesium-137 and other radioactive isotopes bioaccumulate in higher trophic levels in the food chain. In both the 1991 and 1996 surveys, more than half the anglers had annual incomes less than $30,000. Moreover both studies found that compared to licensed anglers across the state, the Mid-Hudson River anglers in the studies consisted of: a much greater proportion of African-American and Hispanic anglers, a much greater proportion of family incomes less than $30,000 and a larger proportion of women. *Id.*

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Additionally, low-income respondents were less aware of the health advisories than the others (21-34%-compared to 49-68%), two-thirds of angler fishing between Catskill and the Tappan Zee Bridge (the area closest to Indian Point) reported eating at least some of their fish, and almost half of anglers gave fish away sometimes or frequently; and the fish that anglers kept were the most contaminated species in each part of the river; half of the anglers who said they ate fish from the Hudson River reported eating two meals in the previous month; and some anglers and others who eat fish from the Hudson River were being exposed to levels of PCBs that are a health concern and are at risk of adverse health effects.

There are many reasons to believe that radionuclides from Indian Point are ending up in the local fish population and being eaten by subsistence anglers, a largely minority and low-income population, in the region. The most likely affected populations are the non-English speaking residents and the residents of Buchanan, Peekskill, Verplanck, Haverstraw, Stony Point and others living within 10 miles of Indian Point. They are unjustly endangered for the following reasons:

[5] Barclay, B., 1993. *Hudson River Angler Survey: A Report on the Adherence to Fish Consumption Health Advisories Among Hudson River Anglers*, Hudson River Sloop Clearwater, Inc. 1993.
[6] Horn, E.G., L.J. Hetling and T.J. Tofflemire. 1979. *The Problem of PCBs in the Hudson River System*. Annals NY Acad. Sci. 320: 591-609.

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- Radioactive isotopes are known to bioaccumulate in the aquatic food web in a manner similar to that of PCBs, except that radionuclides are harbored in bones more than in fatty tissue. Since Indian Point is leaking strontium-90, the impact on the environment and human health is site-specific.

- The exposure caused by the presence of radionuclides in fish is clearly an environmental injustice, because people who rely on the river for a large portion of their protein are disproportionately impacted by pollution from the plant. The LRA does not set -forth mitigation measures which locate, contain, and remediate any and all leaks of strontium, cesium and tritium from Indian Point into the ground, air, groundwater and river.

- The DSEIS fails to fully assess the unique burdens faced by minority and low-income populations who depend on the Hudson River for food. These populations are already disproportionately affected, via bioaccumulation, by increases in hazardous and radioactive material from the nuclear reactors at Indian Point. Further, the DSEIS is inadequate because it fails to consider impacts to important fish species targeted by subsistence fishermen. Low-income and minority communities will bear-the burden if target species are contaminated with radioactive isotopes, or are smaller, less abundant, or less healthy because of the proposed relicensing.

NRC Staff's Final Supplemental EIS must consider the lack of fish consumption advisories, or awareness of associated risks among the minority and low-income populations. Subsidence anglers who fish in the Hudson River are unaware that the food they are catching for their families may contain strontium-90 and other radioactive isotopes. A high proportion of subsistence anglers are members of minority groups or have-low-incomes.

79-t-EJ contd.

Unlike the case for Hudson River PCBs where signage has been posted and bilingual educational materials have been widely distributed, there are no health advisories to inform recreational or subsistence anglers that the fish or crabs in the area may contain radioactive isotopes, nor does the LRA acknowledge the need for such a program during the 20 year new superseding license period. These fishermen and women are unaware that radioactive strontium has been detected in the flesh and bones of some area fish. This is especially dangerous for young children, because strontium acts like calcium in bone formation and has a half-life of 33 years. As Barclay and other have observed, even with posted fish advisories, compliance is low for a variety of reasons, including lack of understanding and denial.

During the proposed 20-year license renewal period, there is a reasonable probability that subsidence anglers may be adversely affected by Entergy's failure to properly prevent the release of radioactive waste into the environment: the air, the water and the ground. The DSEIS also failed to look at synergistic effects of radiation with other known toxins, such as PCBs, dioxins, polyaromatic hydrocarbons (PAHs), mercury and other heavy metals which are known to be present in the regional environment, especially as they bioaccumulate in the food chain.

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The Final Supplemental EIS must address the impact that renewing the licenses will have on subsidence anglers. 79-t-EJ contd.

iii. The Final Supplemental EIS Must Address the Fact that Low-Income Populations Will be More Severely and Negatively Impacted by an Evacuation Resulting from a Radiological Event at Indian Point.

The DSEIS is deficient because it fails to discuss or analyze the disparate impact a significant accident would have on minority and low-income populations, nor does it address these communities' ability to respond or evacuate in the event of a nuclear accident or terrorist incident. Low-income and minority families are more likely to use public transportation and may not have a personal vehicle, making evacuation more difficult. The recent Hurricane Katrina disaster revealed that low-income and minority populations are particularly vulnerable in emergency situations. Prior to Hurricane Katrina, the City of New Orleans developed and implemented an emergency plan that was well, engineered and publicized. One evaluation of the Katrina emergency response states that "People who had resources were served relatively well because planners are familiar with their abilities and needs. People who were poor, disabled or ill were not well served," apparently because decision-makers were unfamiliar with and insensitive to their needs. Litman, *Lessons from Katrina and Rita: What Major Disasters Can Teach Transportation Planners,* Journal of Transportation Engineering, Vol. 132, January 2006. pp. 11-18. (Exhibit 2.9). 79-u-EJ/SM

iv. The Final Supplemental EIS Must Address the Fact that Residents of Special Facilities will be More Severely and Negatively Impacted by an Evacuation or Radiological Event at Indian Point, including disabled patients in the dozens of hospitals and long term care facilities, and inmates in the many prisons in the area.

There are many thousands of prisoners housed in prisons and jails within the 50-mile emergency planning zone, including at least twenty-six federal, state, county and New York City facilities -- not including police holding areas, juvenile detention centers, psychiatric facilities, and not including any facilities in Connecticut and New Jersey. New York City alone averaged 13,497 prisoners per day in 2006, most of whom were housed within 50 miles of Indian Point. See http://www.nyc.gov/html/doc/html/stats/doc stats.shtml (visited November 25, 2007). Sing Sing Correctional Facility is located within the 10-mile zone, approximately 8 miles from Indian Point, and as of November 3, 2007, housed 1760 prisoners.

Although Sing Sing is a maximum-security prison for convicted felons, it bears noting that many prisoners held in New York City and local jail facilities have not been convicted of a crime, but are merely being held pending trial. The vast majority of prisoners are minority and indigent, and therefore any harm to the prison population would have a hugely disproportionate burden on minority and low-income communities. For example, according to New York's Monthly Minority Inmate Population Report, on November 3, 2007 at Sing Sing, only 212 of 1760 inmates were white (12%) -- 994 were African American (56.4%) and 520 were Hispanic (29%). The statewide numbers are only slightly less disparate: 20.8% white, 51.2% African American, 26% Hispanic. Additionally, according to a recent study by the Sentencing Project, the prison 79-v-EJ/EP/SM

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population nationwide has grown more than 500% since the 1970's when Indian Point was first licensed, to a current prison population of more than 2.2 million people. *"Uneven Justice: State Rates of Incarceration By Race and Ethnicity,"* p. 1 Marc Mauer and Ryan S. King, The Sentencing Project July 2007 (http://www.sentencingproject.org/ Admin%5CDocuments%5Cpublications%5Crd_stateratesofincbyraceandethnicity.pdf).

This growth has been accompanied by an increasingly disproportional radical composition; African Americans; for example, now constitute 900,000 of the total 2.2 million incarcerated population. *Id.* The Hispanic prison population also had increased dramatically-- by 43% since 1990. *Id.* at p. 2, *citing* Louis W. Jankowsky, *Correctional Populations in the United States,* 1990, Bureau of Justice Statistics, 1992, p. 86; Paige M. Harrison and Allen J. Beck, Prisoners in 2005, Bureau of Justice Statistics, 2006, p. 8. Nationwide, according to the study, the per capita incarceration rate of African Americans is 5.6 times the rate of whites, and the per capital incarceration rate for Hispanics is nearly double (1.8) times the rate of whites. *Id.*, p. 3.

According to this study, New York is well above the national average. The incarceration rates for African Americans in New York is 9.4 times that of whites (9th highest in the country) and for Hispanics 4.5 times that of Whites (4th in country) *Id.* p. 11, 14. Other states within Indian Point's peak injury zone are also highly disproportionate: New Jersey and Connecticut have the 3rd and 4 the highest rates in the country, respectively, of black-to-white white incarceration (12 or more times higher than whites); and the 6th and 11th highest rates in the country, respectively, of Hispanic-to-white incarceration (6.6 times higher than whites in Connecticut; and 3.3 higher than whites in NJ). *Id. See, also,* The National Center for State Courts (http ://www.ncsConline.org/wc/CourTopics/FAQs.asp?topic=IndDef)(visited November 25, 2007) (80-90% of people charged with crimes nationwide are entitled to indigent representation). There are also many dozens, perhaps hundreds of other special facilities including hospitals, nursing homes, elder care facilities and psychiatric facilities in the 50 miles zone. These facilities may have higher percentages of minority and low-income populations, and they certainly have a disproportionate number of people with disabilities.

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In 2002, New York Governor George Pataki commissioned former FEMA chairman, James Lee Witt, to prepare a report on emergency preparedness in relation to Indian Point. *"Review of Emergency Preparedness of Areas Adjacent to Indian Point and Millstone,"'* James Lee Witt Associates, 2003 ("Witt Report"). The Witt Report analyzed evacuation plans for two correctional facilities, Sing Sing, and Westchester Department of Corrections. The Witt Report suggests that the initial evacuation plan at these facilities is to shelter-in-place, and then to evacuate if deemed appropriate.

The Witt Report found that Sing Sing is a maximum and medium security prison located in Westchester County within the 10 mile EPZ. It suggested that, initially at least, the plan for Sing Sing in the event of a radiological event was to shelter-in-place. The report indicates that the first step in a radiological event would be for a lock-down - - meaning that prisoners would be retained in their cells. Sing Sing had no radiation monitors. They had no hazard specific training for its staff, nor was there training about family protection plans. The report indicated that any decision to evacuate would be made by the State Emergency Management Office ("SEMO") and

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would be based upon whether it is riskier to move inmates rather than to stay in place. Witt Report, ¶ 4.5.2.1, p. 71.

The Witt Report also reported upon the Westchester Department of Corrections facility, in Valhalla, NY, located 17 miles from Buchanan. The report indicated that the facility would learn of an event from Westchester County, and then decide upon appropriate protective actions. They can shelter-in-place for one week, after which they would need both food and fuel. There was no hazard-specific training for the staff, or for family protection plans. In the event of an incident and a resultant lock down, the staff would not be able to leave. The interviews did not elicit confidence that off-duty personnel would report for duty in the event of a significant event. Witt Report, ¶ 4.5.2.2, p. 71.

The Witt Report also found that are hundreds, and possibly thousands, of "Special Facilities [that] Need to Plan for Emergencies at Indian Point" within the 10 and 50-mile emergency planning zones. Special facilities are any facilities that house populations that are either harder to warn, harder to-protect, or more vulnerable to the health effects from exposure. They include day care centers, schools, universities, correctional facilities, nursing homes, hospitals, and assisted care living facilities. Witt Report, ¶11.2.2.2, p. 234. Given the health and mobility issues at these special facilities, evacuation for the disabled population is extremely problematic.

In addition to the evidence from the Witt Report, there is every reason to believe that prison evacuation would be extremely problematic in the event of a radiological emergency and low priority. Historically, and today, convicted criminals are treated as poorly as any class of people in our society, and there is little reason to think our society would make prisoners a priority in the event of radiological event, or evacuation. 79-v-EJ/EP/SM contd.

The experience following the Katrina Hurricane in New Orleans 2005 provides stark evidence of what might happen in the event of a radiological event, an evacuation, or even a perceived scare, from Indian Point. In *Abandoned & Abused: Orleans Parish Prisoners in the Wake of Hurricane Katrina,* the American Civil Liberties Union's National Prison Project, reported on what happened to prisoners during Katrina. According to the report's Executive Summary:

> During the storm, and for several days thereafter, thousands of men, women, and children were abandoned at [Orleans Parish Prison (OPP)]. As 'floodwaters rose in the OPP buildings, power was lost, arid entire buildings were plunged into darkness. Deputies left their posts wholesale, leaving behind prisoners in locked cells, some standing in sewage-tainted water up to their chests. Over the next few days, without food, water, or ventilation, prisoners broke windows in order to get air, and carved holes in the jail's walls in an effort to get to safety. Some prisoners leapt into the water, while others made signs or set fire to bed sheets and pieces of clothing to signal to rescuers. Once freed from the buildings, prisoners were bused to receiving facilities around the state, where, for some, conditions only got worse. At the Elayn Hunt Correctional Center, thousands of OPP evacuees spent several days on a large outdoor field, where prisoner-on-prisoner violence was rampant and went unchecked by correctional officers. From there, 'prisoners went to other facilities, where some were subjected to systematic abuse and racially motivated assaults by prison guards.

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Id. (http://www.aclu.org/prison/conditions/26414pub20060809.html: visited November 23, 2007).

Unfortunately, there is no reason to expect that consequences would be any better for the tens of thousands of minority and low-income people in the dozens of prisons within 50 miles of Indian Point. Many of the immobile people with disabilities in the many special facilities in the region might not fare much better. At the very least, the Final Supplemental EIS should consider the impacts upon these communities.

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v. Environmental justice concerns relating to production and long-term storage of Indian Point's Fuel, especially upon Native American populations.

This is discussed in greater detail below in Clearwater's comments relating to the uranium fuel cycle.

vi. The Final Supplemental Environmental Impact Statement Must Address the Impacts on the Disabled and Institutionalized Populations in the Region.

The GEIS and the NRC Staff's DSEIS completely ignore the potential impacts upon the significant population of disabled and institutionalized individuals affected by the Indian Point relicensing proceeding. The relicensing of Indian Point places institutionalized individuals including children, seniors and veterans at risk.

Within 50 miles of Indian Point there are numerous hospitals, residential rehabilitation centers, assisted living or nursing homes, and New York State Office of Mental Health facilities. According to the New York State Department of Health ("DOH"), there are 16 hospitals in Westchester and a total of 80 in the counties in New York State within 50 miles of Indian Point. The DOH lists 45 nursing homes in Westchester County alone and a total of 197 nursing homes in the counties in New York State within 50 miles Indian Point as defined by Entergy in the ER Fig. 2-4. In addition, the DOH lists 25 adult care facilities in Westchester County and a total of 116 in the counties within 50 miles of Indian Point. There are 15 state mental health treatment facilities listed bye the New York State Office of Mental Health within 50 miles of Indian Point.

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The Office of Real Property Services data for 2006 reflect the presence of one hospital (Hudson Valley Hospital in the Town of Cortlandt Manor with 635 beds) and at least nine retirement residences or nursing homes within 10 miles of the IP facility. In addition, Helen Hayes Hospital is a rehabilitation facility with 155 beds that treats special needs patients including those who have suffered traumatic brain and spinal cord injuries. Finally, the New York State Veterans' Home at Montrose with 252 beds is located approximately 3 miles from Indian Point.

Other institutional facilities affected by the relicensing of Indian Point include Blythedale Children's Hospital and Burke Rehabilitation Center. Blythedale Children's Hospital, a hospital specializing in treatment for coma recovery, traumatic brain injury and other forms of rehabilitation treatment has 92 beds located within 20 miles from Indian Point. Burke Rehabilitation Center with 150 beds is 24 miles from Indian Point and treats patients with brain

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or spinal cord injury, neurological conditions, knee or hip replacements and amputations. These are but a few examples of the facilities that are affected by the renewal of Indian Point's licenses.

The DSEIS failed to consider the many immobile people with disabilities and other institutionalized individuals in special facilities in the region who would be adversely affected by the renewal of the Indian Point licenses. At the very least, the Final Supplemental EIS should consider the impacts upon these disabled and institutionalized populations.

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vii. The Final Supplemental Impact Statement Must Address the Impact on Employment for the Economic Justice Communities and the Low-Income Populations.

Although the DSEIS provides information relating to the number of employees employed at Indian Point, the DSEIS fails to adequately and accurately address the impact of renewing IP's licenses on EJ communities and low-income populations. In fact, the DSEIS fails to provide a breakdown of its employees' racial and economic composition so that the full impact of IP's license renewals can be assessed. In addition, the DSEIS fails to provide data relating to a comparison of the number of jobs that would be gained or lost by members of the EJ community and low-income populations in its discussion of No-Action Alternatives. Moreover, as discussed in Section D below, the DSEIS fails to consider wind, solar and other renewable forms of energy as viable, which leads to an insufficient and incomplete assessment of the employment opportunities for the EJ communities and low-income populations if the No Action Alternative is chosen.

In the DSEIS, NRC states that the facility employs 1,255 employees. Unfortunately, although the NRC Staff does provide a breakdown of the communities that employees reside in they do not provide us with a breakdown the percentage of employees that are a part of EJ communities or low-income populations. As such, the DSEIS does not adequately assess the impact on the EJ communities or low-income population. Regardless, it is clear that over the course of decommissioning of Indian Point many of these 1,255 jobs would be lost; that however is not the end of the story. As claimed in the ER the electricity generated by IP would need to be replaced, and we agree that closing Indian Point would require energy conservation and efficiency measures, and at least some replacement power. The generation of electricity from other sources, as well as conservation and efficiency measures, would have an impact on the environment and on the EJ communities and low-income population. Clearly, many jobs would be created through increasing alternative generation, and from conservation and efficiency measures –likely many more than would be lost be closing Indian Point. Any environmental impact review should address these impacts on the local minority and low-income populations.

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As discussed in section D below, the electricity generated by IP can be offset with energy efficiency and conservation, and with alternative sources of energy such as wind, solar and other forms of renewable energy, which the DSEIS fails to adequately assess. There is ample proof that switching to renewable sources of energy creates jobs and strengthens a local economy. Therefore, the No-Action Alternative is likely to create more jobs for the EJ community and the low-income population than are currently found at IP.

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An increase in wind generation has been proven to create new jobs. The European Wind Energy Association estimates that for every Megawatt of installed wind capacity 60 person-years of employment are created.[7] American Wind Energy Association ("AWEA"), http://www.awea.org/pubs/factsheets/EconDev.PDF. Replacing IP's 2,158 MWe with wind would therefore create 129,480 person-years of employment. In addition, Germany has created 250,000 jobs by shifting to wind energy.[8] Wind of Change, Mirror, by Jake Morris and Mike Swain, June 27, 2008. Great Britain is aiming at installing 7,000 turbines over the next 12 years and expects to create 160,000 green collar jobs as a result of these installations. *Id.* The Renewable Energy Policy Project estimated that if the U.S. increases wind capacity by 8 times the current level, 150,000 manufacturing jobs would be created. AWEA, http://www.awea.org/faq/wwt economy.html.

By pursuing an energy policy calling for increased use of renewable energy, Pennsylvania has benefited by creating 1,000 manufacturing jobs and $100,000,000.00 in investments into the state's economy. *Statement of Kathleen McGinty, Secretary of Pennsylvania, Department of Environmental Protection,* "Review of the Financial Structure of Renewable Energy Sources," Hearing Before the Subcommittee on Conservation, Credit, Energy and Research of the Committee on Agriculture, House of Representatives 110th Congress, First Session, March 7, 2007, Serial No. 110-03. The $100,000,000 in investments into the economy of the state is far greater than that invested by Entergy into the state of New York.

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An increase in energy generated by solar has also been shown to increase employment. According to the Renewable Energy Policy Project, each Megawatt hour of solar capacity creates 69,650 labor hours or 36 person years of labor. http://www.repp.org/articles/static/1/binaries/LABOR_FINAL_REV.pdf . The jobs created include positions for clerical, processing, machine trades, bench work and structural work, jobs usually performed by members of an EJ community or low-income population. Some of the jobs would be available at already established businesses that can supply the components for renewable energy. Indeed, there already exist 73 firms in Westchester and 298 total firms in a 50 mile radius that are currently active in the industrial sectors that would supply the components for increased production of solar energy.

Germany provides a great example of the potential of use of solar energy. In Germany there are currently 45,000 jobs in the solar industry and this number is expected to double in the next 5 years and reach 200,000 by 2020. Cloudy Germany Unlikely Hotspot for Solar Power, Reuters, July 30, 2007. http://uk.reuters.com/article/email/idUKL2389939520070730.

There is every reason to believe that by replacing Indian Point with energy efficiency and safe,

[7] A person-year of employment means one person is employed full-time for one year.

[8] Germany's population is 82,431,390 https://www.cia.gov/library/publications/the-world-factbook/. According to the ER, 16,791,654 people reside within 50 miles of IP. As such, the population of Germany is 20% larger than found in the 50 miles surrounding IP and it would be expected that the number of jobs created in Germany would be about 20% more than the number of jobs that would be created 50 miles surrounding Indian Point i.e., 50,000 jobs. Even if the number of jobs created in Germany were 10 times greater than would be created here the number of jobs created would still be approximately 5,000 jobs.

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renewable sources of energy such as wind and solar in the 50 miles surrounding Indian Point would result in increases in employment similar to those outlined above. It would also be expected that the EJ communities and low-income population would benefit from these new jobs. In fact several organizations are already working with EJ and low-income communities to provide them with access to jobs in the renewable energy industry. In Dutchess County, Clearwater is currently working with EJ communities and low-income populations to help these groups transition to green jobs in the renewable energy and clean tech industries. In addition, several other organizations in the Bronx (such as Sustainable South Bronx and Green Worker Cooperatives) are working with EJ communities and low-income populations to provide these groups with the training and competitive advantage to allow them to benefit from the increased job openings for the growing renewable energy and clean tech industries.

Clearly, the above data shows that the NRC Staff did not fully and adequately assess of the impact of the No Action Alternative. The Final Supplemental EIS must address the employment impact of the EJ communities and low-income populations and provide amore thorough and accurate assessment than found in the DSEIS.

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viii. The Final Supplemental Environmental Impact Statement Must Address the Environmental Justice Concerns Relating to Production and Long Term Storage of Indian Point's Fuel, especially upon Native American Populations.

The GEIS and the NRC Staff's DSEIS (The Uranium Fuel Cycle - 6.1) completely ignore the potential impacts upon EJ communities from lifecycle impacts on the production, use and storage of radioactive fuel, especially Native American people, who are disproportionately impacted by mining and manufacture of nuclear fuel and targeted to store massive, amounts of radioactivity. Because the GEIS did not assess this topic, the NRC Staff must provide an accurate and adequate assessment.

Demand for nuclear fuel from the Indian Point plants contributes towards the heavy impact of mining, manufacture and storage of radioactive materials on Native American communities. Clearwater's concerns about the impact, of the nuclear fuel cycle on Native American communities are cogently expressed in a talk by Professor Karl Grossman, presented to the Institute of American Indian Arts, Santa Fe, New Mexico (November 29, 2006)(Republished as *Native Nations and the Nuclear Cycle,* http://www.shundahai.org/NativeNationsandtheNuclearCycle.htm) Professor Grossman pointed out the significant impacts of the nuclear fuel cycle on Native American populations:

> Native Americans and indigenous people from around the world have been especially hard-hit by uranium mining and other aspects of the so-called nuclear fuel cycle.... I noted that with U.S. Nuclear Regulatory Commission: approval, Sequoyah Fuel Corporation deliberately channels out 8 million gallons annually of its radioactive waste as a liquid fertilizer it calls 'raffinate.' The company sells the fertilizer, and also uses it on 10,000 surrounding acres where cattle graze and where hay and corn are grown for feed." ... I wrote about interviewing Lance Hughes, director of Native Americans for a Clean Environment in Talequah, Oklahoma, and in speaking of "unusual cancers" and birth defects from "genetic mutation" in the area, Hughes said: "It's pretty sad babies born without eyes, with brain' cancers." Wildlife is also born deformed. Said Hughes, "We

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found a nine legged frog, a two-headed fish and a four-legged chicken." ... As for the last stage of the nuclear fuel cycle somehow safeguarding nuclear waste endlessly as Winona LaDuke, an Ojibwe (who ran for vice president of the U.S. in 1996 and 2000 on the Green Party ticket), who lives and works on the White Earth Nation in Minnesota, has said: "The greatest minds in the nuclear establishment have been searching for an answer to the radioactive waste problem for 50 years and they've finally got one: haul it down a dirt road and damp it on an Indian reservation." Some 60 Indian communities have been "directly targeted by the nuclear power establishment" to be waste dumps, notes the Washington-based Nuclear Information and Resource Service. *Id.*

With regard to the Environmental Justice impact of manufacturing nuclear fuel, Dr. Robert Bullard, professor of sociology at Clark Atlanta University and one of the leading authorities in the nation regarding environmental justice, notes:

> Grassroots groups are making sure that government agencies do the right thing. On May 1, 1997, after eight years of litigation, Citizens Against Nuclear Trash or CANT won a favorable court decision from the Nuclear. Regulatory Commission Atomic Safety and Licensing Board. The three-judge panel concluded that "racial bias played a role in the selection process" and denied a permit from Louisiana Energy Services to build a uranium enrichment plant in the middle of Forest Grove and Center Springs, Louisiana---two black communities that date back to the 1860's and 1910, respectively. The decision was upheld on appeal on April 4, 1998. *(Environmental Justice: Strategies for Creating Healthy and Sustainable Communities* http-//www.law.mercer.edu/elaw/rbullard.htm)

Environmental Justice concerns require that the Final Supplemental EIS address the impact of how Indian Point will obtain nuclear fuel and dispose of nuclear waster in a manner that is consistent with the health of Native American communities.

79-y-EJ/UF contd.

IV. The Final Supplemental Environmental Impact Statement Must Thoroughly Address Energy Conservation and Efficiency, the Use of Alternative Sources of Energy, Especially the Use of Renewable Sources of Energy, and Combinations of Alternatives.

The NRC Staff's DSEIS fails to fully and accurately assess New York State's ability to generate its energy from renewable sources of energy such as wind, solar, geothermal and biomass, the impact on the environment of generating electricity from renewable sources, the impact of energy efficiency and conservation, or the impact of a Combination of Alternatives. In fact, although it provides a detailed description of coal, natural gas and nuclear as alternatives, DSEIS completely dismisses the viability of renewable energy, or of energy efficiency and conservation or a Combination of Alternatives, and fails to discuss how these options are integral parts of New York State's energy future but are also currently used throughout the world.

A sustainable energy portfolio of energy efficiency and an array of renewables (solar, wind, geothermal) is the alternative to the nuclear power produced by this increasingly failing facility. Currently, there is 33 GWs of installed capacity to generate electricity from renewable sources and in 2007 renewable energy accounted for over 35% of all new capacity installations in the

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U.S. http://www1.eere.energy.gov/maps_data/pdfs/eere_databook_091208.pdf. Investment of infrastructure into more sustainable, fossil-fuel free sources of electrical generation by 2013 and for the 20 years thereafter will be substantial. These must be reliably estimated and evaluated in the Final Supplemental EIS.

Significantly, the power generated by IP can be replaced by renewable sources such as solar and wind on their own. The energy generated from IP can be replaced by electricity generated by wind. Generation of electricity from wind is the fastest growing source of energy generation and energy experts believe that wind energy will play a major role in world energy portfolios as we move into the future. Berry, Lauren "Duke Energy Invest in Wind Power," The Charlotte Observer, June 27, 2008, Final Ed. In addition, energy experts predict a ten-fold increase in world installed wind capacity by 2020. Orchison, Keith "Wind Doing Well, but not Without Hurdles" from the Sustainable Investments- Special Report Business and Environment Series, The Australian, June 28, 2008. The industry is growing quickly as countries around the world push to increase their installed wind capacity. *Id.* and Global Wind Energy Council Press Release "Global Wind Energy Markets Continue to Boom- 2006 Another Record Year."

If IP's licenses are not renewed, the energy it generates can be offset by renewable energy sources by 2015. Indeed, Denmark already generates 20% of its electricity from wind.

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The U.S. is also increasing its installed wind capacity. Since 2004, U.S. installed wind capacity has grown 29% a year. In 2007, 35% of all new electricity generation developed in the U.S. was from wind farms. In 2007, installed wind power capacity increased 46% and $9 billion was invested in new plants. Dibenedetto, Bill "Energy Department Seeks to Boost Wind Energy," The Shipping News, June 30, 2008. The U.S. Department of Energy (DOE) predicts that the industry will grow through the year 2025. *Report by United States Government Accountability (GAO) to the Ranking Democratic Member, Committee on Agriculture, Nutrition, and Forestry, U.S. Senate* "Renewable Energy: Wind Power's Contribution to Electric Power Generation and Impact on Farms and Rural Communities" GAO-04-756, Sept. 2004 Office, p. 5.

The DSEIS also fails to fully and accurately assess the current potential for the use of solar energy to meet consumer demands for energy and the environmental impact of the use of solar. First, Entergy states that solar power is not a viable option for the generation of energy. Solar radiation is the most abundant resource for the generation of electricity. In fact, each year the Earth receives 350,000,000 Terawatt hours of solar radiation. On the other hand, Uranium supplies are much more limited with only 1,500,000 Terawatt hours of Uranium 235 remaining on the planet. Professor Richard Perez, SUNY Albany, http://www.asrc.cestm.albany.edu/perez/planet3.jpg. Currently, solar power generation is viable and is used throughout the U.S. and the world, most notably in Germany, a country that has more cloudy days than are typical for New York in a year.[9]

[9] It is estimated that Germany has clouds covering its sky during two-thirds of its daylight hours. A comparison of Berlin and New York City showed that New York City is capable of producing 1.5 kWh per square meter more than Berlin is capable of generating. Prof. Richard Perez, *Is There Really Enough Sun in the Empire State,* Solar New York, May 14, 2007, http://www.asrc.cestm.albany.edu/perez/2007/richard-perez-solar-new-york-2007.pdf

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The City of New York has the potential to generate three to four times more electricity with solar alone than is currently generated by Indian Point. According to the City of New York, PlaNYC website, New York City is capable of generating from 6,000 MW to over 15,000 MW. http://www.nyc.gov/html/planyc2030/html/plan/energy_renewable.shtml. This assertion is supported by a study by the CUNY Center for Sustainable Energy. It estimates that New York City's potential for solar energy is somewhere between 6,000 and 8,000mW. Solar and the City by Wilson Rickerson, Lara Ettenson, Tom Marrott, and Tria Case, Renewable Energy Focus, Sept./Oct 2007.

Second, only 0.75% of New York State's land is needed to generate all of the energy needed for New York State from solar energy. http://www.asrc.cestm.albany.edu/perez/2007/richard-perez-solar-new-york-2007.pdf There are also studies that show that solar can be generated from on top of already existing structures such as buildings and parking areas. In fact according to Professor Perez, the 9823 acres of parking lots (all within the 50 miles that surround Indian Point) could immediately be used to place 2947 MW into the system -- over 700 more MWs than produced by IP. http://www.asrc.cestm.albany.edu/perez/2006/parkings.pdf. It should be noted that this amount could be immediately placed into the current grid system, without any upgrades to the system. *Id.* Finally, studies have found that there is enough roof space in New York City to provide power to all of New York State.

Additionally, New York State is increasing its capacity to produce component parts for solar power generation. Earlier this year the Empire State Development Corp announced a deal to provide hydropower in Western New York to a new facility to produce approximately 30,000 tons of metallurgical grade silicon annually and the ability to convert that metallurgical grade silicon into 4000 tons of Solar Grade silicon -- enough to produce 500 MW of solar power. http://www.empire.state.ny.us/press/press_display.asp?id=936 . Thus, providing the source materials for the production of solar panels needed to generate power to replace Indian Point.

Next, the DSEIS fails to adequately and accurately assess energy efficiency and conservation as alternatives to the electricity generated by IP. Significantly, the DSEIS concludes that conservation could only replace IP in conjunction with other alternatives. This is not accurate. Several studies have found that through conservation and energy efficiency the need for the electricity generated by IP can be eliminated.

The conclusion that conservation and energy efficiency must be in combination with other alternatives is also contrary to the analysis the Staff provided in its GEIS. In the GEIS, the NRC finds that "[a] wide variety of conservation technologies could be could be considered as alternatives to generating electricity at current nuclear plants." Moreover, "the GEIS assumes that conservation technologies produce enough energy savings to permit the closing of a nuclear plant. Should a nuclear plant be closed, the environmental gain, in terms of avoided environmental impacts, would be discussed in Section 8.3)." The NRC Staff fails to adequately and accurately assess these "conservation technologies" i.e., energy efficiency and conservation as required by the GEIS.

The use of conservation as a means of replacing the electricity generated by the Indian Point has been thoroughly assessed by Charles Komanoff in Securing Power Through Conservation and

79-z-AL contd.

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Efficiency in New York. May, 2002, www.riverkeeper.org/document.php/39/2002 May_Koman.pdf ("Securing Power"). (Clearwater adopts Securing Power as stated fully herein.) Significantly, the Report concludes that "the central estimate of the conservation saving is just over 2,000 megawatts..." almost exactly the amount of electricity generated by IP. It is important to note that as Securing Power is now over 6 years old and conservation technologies are advancing rapidly, the finding in Securing Power may be outdated and current levels of savings may be greater than found by Mr. Komanoff. In addition, the DSEIS completely ignores the National Academy of Sciences study "Alternatives to the Indian Point Energy Center for Meeting New York Electric Power Needs" which was release in 2006 and concluded that IP is replaceable and New York has a ready supply of alternative energy sources at its disposal. It is therefore extremely important to perform an up to date analysis of conservation and energy efficiency technologies in the site specific EIS.

Finally, the DSEIS fails to adequately and accurately assess a "Combination of Alternatives" as a replacement for IP. The DSEIS completely fails to consider a "combination of alternatives" that is one hundred percent based on generation from renewable sources. Instead both alternatives include the use of at least a 330 MW gas fired plant. This is not adequate. A "Combination of Alternatives" that must be assessed is one that contains an array of renewable sources along with a program for conservation and energy efficiency. This assessment must be made in the Final Supplemental EIS.

79-z-AL contd.

Under NRC guidelines, a site-specific Environmental Impact Statement alternative must include "electric generation sources that are technically feasible and commercially viable." As outlined above and is abundantly clear from surveying worldwide electrical generation, wind, solar and geothermal are all "technically feasible and commercially viable." Clearly, the above data shows that the NRC Staff's DSEIS did not fully and adequately assess renewable energy as alternative to IP or provide an accurate assessment of the environmental impact of renewable energy. The NRC must perform a more thorough and accurate analysis of not only the capability to currently generate power from renewable sources in New York, the U.S, and worldwide, but also the remarkable growth that those industries are expected to achieve over the course of the 20 year license for each IP 2 and IP3.

The Final Supplemental EIS must address these and other renewable energy alternatives in the No Action Alternative.

V. Clearwater's Assessment of the DSEIS' Conclusions and Recommendations (9.3):

79-aa-LR

> "Based on (1) the analysis and findings in the GEIS, (2) the ER submitted by Entergy, (3) consultation with Federal, State, and local agencies, (4) the NRC staff's consideration of public scoping comments received, and (5) the NRC staff's independent review, the **preliminary recommendation of the NRC staff is that the Commission determine that the adverse environmental impacts of license renewal for IP2 and IP3 are not so great that preserving the option of license renewal for energy planning decision-makers would be unreasonable.**" p. 9-8.

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While Clearwater understands the value of exploring this option, however to finalize the SEIS, NRC staff must obtain or require more recent and in some cases more comprehensive studies to adequately assess the impacts of the proposed twenty year relicensing. These include:

- Human health studies, including follow up of preliminary assessments that indicate increased levels of thyroid cancer and childhood leukemia in people living closer to the plant; also a study of breast milk of human mothers living within a 50-mile radius of the plant;
- New York State's plans to do additional sampling to assess the source and uptake of strontium-90 and other radioactive isotopes in fish, crabs and other aquatic and terrestrial wildlife (p.2-109), promised over a year ago by NYS DEC officials.
- Updated assessments of declining fish populations, including current impingement/entrainment data and the required triaxial thermal study, especially with regard to shortnose and Atlantic sturgeon, which will require defining the extant and magnitude of the thermal plume created by Indian Point's once-through systems.
- Potential Environmental Justice impacts, especially on communities of Peekskill, Haverstraw and West Haverstraw

79-aa-LR contd.

In addition, both the NRC staff and the applicant will need to:

- consider the transport of radioactive isotopes and other contaminants in water and sediment in this estuarine setting, and
- study the potential impacts of planned and unplanned discharges of radioactivity into the Hudson River on the proposed Rockland County desalination plant and the five other drinking water intakes in the tidal Hudson.

It is unclear how these studies will actually get done. Recommendations and promises are distinct from actual investigations. NRC staff should take leadership, provide follow up and clarify to the public how this will occur.

Finally, we believe it was unreasonable to release the quantity of information contained in both the DSEIS and the SER and require comments on both to filed at the same time. This places an undo burden on individuals or groups with limited resources. An extra two weeks to review the SER would have provided the NRC staff with more information and constructive criticism, which would have ultimately benefited then entire relicensing process.

Respectfully submitted by:

Manna Jo Greene, Environmental Director, Hudson River Sloop Clearwater, Inc.

Ross Gould, Esq., Member, Hudson River Sloop Clearwater, Inc.

March 18, 2009

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IPRenewalCEmails ML 090640366

From: Olivia Imoberdorf [olivia.i@verizon.net]
Sent: Monday, February 16, 2009 10:01 PM
To: IndianPointEIS Resource
Subject: Deny relicensing of Indian Point

To whom this may concern,

I am opposed to the relicensing of Indian Point Nuclear power plant due to a multitude of safety concerns. I am raising my young family in Rockland county and fear for their safety. Included in some of concerns are:

The plant's vulnerability to terrorism,

The storage of 1500 tons of radioactive waste onsite,

The lack of a workable evacuation plan,

80-a-EP/OR/RW/ST

The continuing leak of radioactive water into the Hudson River and into the groundwater from the Indian Point 2 spent fuel pool, and the residual contamination caused by the plumes of contaminated groundwater that slowly leach toxic strontium-90 and cesium-137 into the Hudson River.

and the long term storage of thousands of tons of highly toxic nuclear waste on the banks of the Hudson River, currently housed in poorly maintained spent fuel pools and "dry casks" that are vulnerable to terrorist attack.

80-b-LE/RW/SF/ST

The troubled history (including emergency shutdowns of the reactors, fires damaging transformers, malfunctioning of electrical connections) of the nuclear reactors at Indian Point speaks for itself indicating that the plants need to be SHUT DOWN for the safety of our communities.
Please act in the best interest of our families by denying the relicensing of Indian Point.

80-c-OR

Sincerely
Olivia Imoberdorf
Suffern, NY 10901

MS. INDUSI: Good evening. I missed the introductions, so can I, I don't know where the NRC is sitting. Gentlemen, and you're on the commission? Your commissioners?

MR. WRONA: We're staff.

MS. INDUSI: Your staff members. So you'll be taking these back to the commissioners? These remarks.

MR. WRONA: Your remarks will be [unintelligible]

MS. INDUSI: Okay. I'm calling for four things tonight. All of which involve honesty. I'm calling for first of all for honesty about the greenhouse gases that are produced by Indian Point. Out there, there's a booth called, Right for New York Indian Point Energy Center. They claim that operating Indian Point produces practically no greenhouse gases. This is fraudulent and misleading. In fact, the mining, the refining, the transporting of uranium produces tons of greenhouse gases. It is a dirty industry. End the lie that it's clean. 81-a-UF

Secondly, nuclear power is not cheap. Much of its cost is paid for in federal tax dollars in the form of subsidies, research, regulations and more. State the true cost of a kilowatt hour including all the costs of this energy. 81-b-EC

Thirdly, the members of the NRC come from the nuclear industry. They have a vested interest in keeping this industry alive. It is important to them. Their tunnel vision sees only nuclear power. Alternative energy sources can produce energy that is 81-c-AL honestly cheap, honestly safe and honestly reliable. End the lie that Indian Point is necessary. End the lie that there are only two options. Nuclear and fossil fuel. 81-c-AL contd.

And forth, end the lie that this hearing and keeping Indian Point here, has any concern for the well-being of the people here. Keeping Indian Point running past its scheduled life is the NRC's attempt keep a dying, dirty, expensive and unsafe industry alive. 81-d-OR

MR. JACOBS: Thank you. My name is Mark Jacobs. Most of you know me. I live within 5 miles of Indian Point. I work within 5 miles of Indian Point. There is no financial interest that I receive from trying to close down the Indian Point Nuclear Power Plant, which should indeed be closed down. Now, I listened to a lot of speakers here today. I was late because I had to work. I listened to others to hear what had been spoken about today. You know, the most amazing thing is very little of what this meeting is supposed to be about was spoken about here today. Now, there are two points about that. 82-a-OR

One point is that Entergy did a really good job of bringing all of the groups that they have paid off to come, without any research, without any knowledge, particularly about the dangers or threats of Indian Point, without any knowledge about the potential environmental hazards of Indian Point. They've gotten the these groups to come here and say, Entergy's Indian Point is a good neighbor. And why are they good? They're good because they have given us money and helped our programs. Well, it's great that Entergy is giving back the tiniest fraction of the million dollars per day per reactor profit that they are receiving from these plants. But I hope that nobody lets themselves be deluded that this has any significance whatsoever on whether Indian Point is safe or not safe. 82-b-GI/LR

Now the second reason that nobody's talking about, what this meeting is supposed to be about, is because the Nuclear Regulatory Commission under the guidance of the nuclear industry has done a very good job of limiting what is to be discussed at this meeting, so that almost nothing of significance can be discussed here. In the broader sense, we’re here to talk about the environment, but when you look at the specific environmental impacts we can talk about, we can only talk about a very small fraction of the ones that are going to cause the grave impact on my community and many of your community who live here. And to me, that is awful. 82-c-LR

To me that is a the large number of people working for our government and the Nuclear Regulatory Commission who are taking their paycheck in the same way that the organizations are taking the contributions from Entergy and they’re not standing up and saying, what I'm seeing is not acceptable and it is not worth the money they pay me to work for an agency that is not going to do its job to regulate. And that's what the NRC doesn't do. It doesn't regulate. So I urge any of you who are left sitting here to stand up and walk away from your agency and find a way to help the environment, to help your society in a way that is not with a captured agency and that's what the Nuclear Regulatory Commission is. Thank you.

MR. JOHNSON: Thank you. Thank you for giving me this opportunity to come up here and share a story with you. A good friend of mine named Paul couldn't be with me here tonight but he wanted me to share this story. I'm a volunteer firefighter and Paul is a volunteer firefighter in Buchanan, I'm sorry in the Verplanck fire department, where he's actually Chief for the second time around. After a structure fire, several years ago, he shared with me a story about his first real job he had, right out of high school. Paul's a real outdoorsy kind of guy. Loves the outside. Loves to fish. Ate out of the Hudson his entire life. He's in his late 50s now. He's raised kids. He's fed them out of the Hudson his entire life. His first job was a job under a grant through the State of New York studying the fish and the fish life around the area known as Indian Point and the power plant and the impacts that it would have on the wildlife. He loved this job. He was the only non-scientist there. They were all from Texas Instruments and a lot of them not even from the area. His job was to bring the fish in. Put them in the tanks. They have hundreds of tanks to gauge the health and the quality of the schools of fish.

In addition to doing that, he's actually a pretty down-to-earth guy, he actually gave a good tip to some of the scientists because one of his jobs was to pull the one-month fish and put them in the two-month tank and the two-month fish

83-a-OS

and put them in the three-month think and so on and so forth. One day he went to them and he said, hey guys instead of pulling these fish out and changing tanks, why don't we just change the signs. Wouldn't that be easier? They said, you know, you're a smart man Paul. We're going to give your raise and that's exactly what we’re going to do. Well one day he showed up to work five years into his job and he was all done. They said, Paul, sorry, we’re not going to need you anymore. He said, well what did I do wrong? Why don't I have my job anymore? He said, well, it's not just you, none of us have our job. You see, the grant is up and we handed in our findings and they said they won't be needing us anymore. And he was perplexed. He had no idea this was happening. He said I can't believe this. He said, you said the fish were doing great. They were thriving. That the power plant or nothing in the Hudson was hurting them. The schools were up. The health of the fish were up. It was no radiological impact. He says, I don't understand it. Why would they just cancel that? He goes, well you're right. You can eat out of the Hudson River all you want. There's nothing wrong with the fish. They're doing fine. Then why didn't they continue the grant? Why are we all fired?

Well the people who hired us to do this grant, they didn't like the findings that the fish were doing as well as they were, so now we’re all done. Well, I'm not going to name

83-a-OS contd.

any names on who through the State of New York got that grant but what I want to do now is I really want to thank very much and take my hat off to the good people of the NRC and just having this ability to come forward and tell our stories because as you see what goes on with politicians in high places and people with money and power and buying and selling Senate seats and doing whatever they want, some of us little people kind of get left in the dark. Now, more than ever, maybe in our history, after what we've been through, we need safe, affordable, reliable domestic energy more than ever. For us to be pawns on someone's political chess board and moved around when the facts don't jive with the fiction, they just get disguarded. We want to take our hats off and we’re very fortunate to have this forum to come up and tell our stories. I want to thank the people from the NRC. I know it's their job to be here, but if we didn't have them to talk to we might be stuck in front of some Senate panel trying to convince somebody who really didn't care what we thought anyways. Thank you very much for this opportunity. 83-a-OS contd.

MS. KARAMATY: I am against nuclear toxicity. My complaint is about the destructive power of nuclear waste. First, there is no guarantee of its safety when nuclear waste is in transit. There are no realistic plans for cleanup of a spill or accident of a truckload or trainload of nuclear waste.

Secondly, there is no place to store the waste. The Native Americans don't want it on their lands. No place on earth wants it. And we cannot send it to outer space as it might return. What goes up, must come down. 84-a-RW

Thirdly, what I find to be the worst thing about nuclear waste is that it has been used for hardening the tips of bunker bombs and reliable replacement warheads. These weapons have been used against the civilians in Iraq because they penetrate deeper and kill and maim with more intensity. Can the Iraqi people ever forgive us? Do people who make or use electricity from a nuclear power plant ever think about where the waste product goes and about the people who have been destroyed or may be destroyed in the future? Seeing we’re Raging Grannies, we have a song that we’re going to sing. 84-b-OS

MS. CYPSER: Try.

MS. KARAMATY: That we’re going to try and sing and we have one mic, and we don't sing that well. So --

MS. CYPSER & MS. KARAMATY [singing]: Would you like a world safe and clean, where the air is fresh good to breathe, 84-c-ON and the water's so sweet to drink or would you rather have a nuke? A nuke is an industry that piles up its waste, which leaks from containers to the ground. The terrorists know, where it's to be found and blowing it up kills for miles around. Eons pass before poison leaves the ground. There is no place to store the waste. Would you like to have your home warm, with your power from earth and sun, that costs almost nothing to run compared to what you pay for nukes? A nuke is a monstrosity that we all finance. It sucks all us taxpayers dry. It costs less to build and more to fix, to keep it going takes a lot of tricks. And by the way if you count external costs, it's quite a monetary loss. Would you like to breathe good fresh air, grow your kids up Strontium free? Don't live in our neighborhood then, or did you know we have a nuke? Our nukes have emissions that have poisoned our air, we've more thyroid woes than our fair share. We're told it's safe and we know it's not. Evacuation plan don't work, it's rot. And by the way, if the sirens ever blow, there will be millions dead and gone. Would you like your groundwater pure? Want to drink be healthy still for sure? Eat fish without needing a cure or would you rather have a nuke? Our nuke makes the riverwater too hot for fish, endangered ones we are sure to miss. The cooling pipes leak. You don't hear much about. Fish eggs and fish in, radiation out. The antiquated coolers poison us and the fish. It's all

84-c-ON contd.

because we have a nuke. Do you want your world safe and sane. Government for the people are game? By the will of the people we are bound, people want that nuke shut down. Or don't you wish we had no nuke?

MS. KARAMATY: In case you didn't see our sign, it says, Nuclear Waste Is Unhealthy for Human Beings As Well As for Fish. But down at the bottom in small print it says, Save Jobs: Transform Nuclear Plants To Solar and Wind.

84-c-ON contd.

MR. KARAS: Good evening. My name is Joseph Karas. I am a representative of Carpenters Union Local-11 of the Empire State Regional Council Carpenters. I'm also a 17-year resident in the village of Buchanan, where I live with my wife and three children. I have come here today to urge you to support the re-licensing of Indian Point. These are tough economic times right now and working families are particularly feeling the pinch. High costs of home heating oil and natural gas are damaging our economy and hitting the middle-class right in the pockets where it hurts. Our state's energy transmission infrastructure is outdated and in need of serious repair. The lack of a comprehensive power plant siting law has also impacted energy investment here in New York and curtailed efforts to grow our energy capacities. This is why Indian Point is so critical now. The facility produces 2000 Mw of affordable reliable base-load power and is directly responsible for millions of dollars in direct economic impact for our region. It is also responsible for hundreds of well-paid union jobs with benefits. This is a matter which is very close my heart. Especially to the members I represent. 85-a-EC/SO/SR

From an environmental impact standpoint, Indian Point produces its electricity in an emission-free manner. This is good for our air and water and lowers the rates of child asthma and their ailments and other impacts in our community. 85-b-AQ/HH

Indian Point has been a good neighbor with a strong reputation 85-c-EC/SO/SR for community support. It provides jobs, low-cost energy and fosters a positive impact on our environment. For these reasons, I ask you to support the re-licensing of Indian Point. Thank you.

85-c-EC/SO/SR contd.

MS. KARDOS: Good afternoon my name is Terry Kardos. I'm a 20-year resident of Cortlandt Manor. For the past 15 years, I have worked as an environmental and outdoor educator, mainly teaching about nature to children at Teatown Lake Reservation for the town of Cortlandt recreation department and 86-a-OR in other capacities, but I'd like to emphasize I'm here speaking on my own behalf. I am here to oppose the re-licensing of Indian Point. I agree with the comments of the New York State representative, Riverkeeper, Clearwater, the Sierra Club and the Grannies. I'm sort of sorry that it looks like our visitors, or most of the visitors, for New York City have left because I would like to say, I share their concerns about air quality. I 86-b-AQ would not like to see any kind of fossil fuel power plant in replacement, but I just hope that these people are as pro-active in their opposition to increased vehicle traffic in the City and increased development in the City as they are supportive of Nuclear Plant re-licensing.

I'd also like to say that these concerns about air quality and keeping the price of electricity low are going to be completely irrelevant if there is a major accident with radioactive release as the area will become uninhabitable. I am 86-c-AL puzzled that in considering alternative energy sources, tidal power was not considered, since the Hudson River is tidal all the way up to the Troy dam. It seems to me that this avenue should be explored. 86-c-contd.

While I do question the data analysis of the NRC as to the impacts on aquatic life, even they admit that there are some impacts that range to large, especially on endangered species. However, in light of the fact that we are already starting to experience the negative effects of climate change, it is quite likely that what are estimated to be small effects today, will become large ones with the increased stresses of climate change on ecosystems. Estimated large effects could become catastrophic. I think we also have to pay a lot more attention to conservation, perhaps in the short term, there shouldn't be a limit on how late into the night Christmas lights should go. 86-d-AE/AL/GL

Maybe even the lights in Times Square, but I think there are viable alternatives besides relicensing Indian Point. Thank you. 86-e-OR

ML09071342

IPRenewalCEmails

From: terrykardos@aol.com
Sent: Tuesday, March 17, 2009 3:31 PM
To: IndianPointEIS Resource
Subject: Comments on relicensing Indian Point Nuclear Power Units 2 and 3

To the Nuclear Regulatory Commission:

As a concerned citizen, a parent, a local resident, and an environmental educator I strongly oppose the relicensing of Indian Point Units 2 and 3. I did attend the public comment session held at the Colonial Terrace on February 12, 2009. I hold my opinion for several reasons.

I do not understand how the NRC does not take into account the evacuation plan in the environmental review, especially since the population in the surrounding area has increased tremendously in the past 40 years. Such a nuclear power plant could not be licensed in its present location if it were newly proposed. I live within the 10 mile radius of Indian Point, and although I have studied every Westchester County evacuation plan that has come out, I find them very confusing. N.Y. State has concluded that the evacuation plan is unworkable, and any thinking person agrees. The traffic jams would result in gridlock. Moreover, parents worried about their children in school may ignore the plan and try to go directly to the schools to pick up their children. The evacuation plan also does not consider wind direction and strength that could push radiation in a particular direction. It would seem to make more sense that any evacuation should be away from the direction any radiation is heading. However, any plan is likely to result in chaos and massive traffic jams that will prevent timely, organized evacuation.

87-a-DE/EP

I believe that the Indian Point nuclear facility poses a health risk to humans. The above ground storage of spent nuclear fuel is not as safe as underground storage. The NRC has not considered Indian Point's location on the Ramapo Fault, which was recently active. While the NRC review concludes that there is no significant public health risk, data recently released by the N.Y. State Health Department show that thyroid cancer rates in the four counties closest to Indian Point are nearly double the U.S. average, and that childhood cancer is also above the national rate. A study by the Mother's Milk Project shows that of 30 samples from breastfeeding human mothers and goats within 50 miles of Indian Point, almost all of them show levels of strontium-90. Moreover, the closer to Indian Point the samples were taken, the higher the strontium-90 levels were. Furthermore, Indian Point is still vulnerable to terrorist attack, the consequences of which could be devastating.

87-b-HH/PA/RW/ST

I worry about the aging infrastructure and the leaks that have been occurring for a number of years. I am appalled that the NRC has exempted the facility from passing a one-hour fire rating, but instead has granted it a 24 minute fire rating. I believe that the NRC's assessment and guidelines are flawed: they are based on the impact on 20-30 year old white males. However, women are 52% more likely to get cancer than men from the same dose, and children and fetuses are even more vulnerable.

87-c-AM/HH/OM

Indian Point is also detrimental to wildlife. The current method of cooling the water results in entrainment and impingement of fish and other creatures of the Hudson River. In the NRC's own review of environmental issues, the impacts of entrainment, heat shock, and negative effects on threatened and endangered species range from small to large. If admitted environmental impacts can be large, I do not see how the NRC can just ignore these. No relicensing should be permitted unless closed cycle cooling is implemented.

87-d-AE

I am particularly concerned about the negative environmental impacts on the Hudson River ecosystem in light of the climate crisis. Negative effects from global warming are already manifest, and much faster than scientists had predicted. Adverse impacts from Indian Point on various species, especially threatened and endangered ones, are likely to be magnified by the climate crisis. We should be doing everything possible to minimize all environmental impacts we can, as a precaution against climatic impacts that we may not be able to ameliorate. 87-e-GL

At the public hearing, many spoke about what a good neighbor Entergy has been. Representatives from groups in New York City spoke passionately about the problems from the burning of fossil fuels in or near their neighborhoods. Others spoke about the need for keeping the cost of energy as low as possible. I do not believe that the solution to our energy problems should be solved by putting minority and poor neighborhoods at greater risk from additional fossil fuel-burning plants. However, being a good neighbor, and the cost of electricity are not relevant issues in an environmental review. For all of the reasons above, I feel that the scope and conclusions of the NRC's environmental review are inadequate and flawed; the negative impacts to the environment and to human health, along with various other risks, should lead the NRC to conclude against relicensing Indian Point. Yes, the region needs electricity, but adequate power supply should depend on conservation and truly sustainable production of power, such as solar, wind, and tidal. 87-f-AL

Thank you for your consideration.

Sincerely,
Theresa Kardos
26 Montrose Station Rd.
Cortlandt Manor, NY 10567

MS. KEARNEY: Of the many problems facing the Brooklyn community today, one of our top concerns is the health of our children and the quality of the air we breathe. New York's air quality is so low that it fails federal standards and presents a daily danger to our children. Today, Brooklyn's youth suffer from asthma at four times the national average. The high a rate of disease is caused in great part by the dirty power plants that spew toxic fumes into the air. Indian Point is one of the only plants in the New York City area that does not harm the air. Yet some would replace the facility with even more of the dirty power plants that threaten the health of our children. 88-a-AQ

Re-licensing Indian Point is important to the community of Brooklyn because we know that without it, our children would be in even more danger. In addition to the fact that Indian Point is a cleaner and healthier alternative to dirty power plants, it is also a more stable source of energy. Unpredictable energy costs have continually threatened by community, making it difficult for low-income families to predict how much more money they will have to spend on energy every month. 88-b-EC/SR

The nuclear energy of Indian Point has a much more stable price than oil or coal plants and will give Brooklyn families a chance to stay in their homes. In addition, independent studies show that closing Indian Point would raise 88-c-EC/SR the cost of energy for Brooklyn families by thousands of dollars per year. That is additional money that we simply cannot afford to spend. Re-licensing Indian Point is critical for both the health of our children and the financial stability of our community. Please consider Brooklyn families as you evaluate re-licensing the facility. Thank you.

88-c-EC/SR contd.

Drew Stuyvenberg
Project Manager
U.S. Nuclear Regulatory Commission

Dear Drew Stuyvenberg

I am a student in the Environmental Assessment class at Ramapo College of New Jersey. I have read the DSEIS and have found it to lack certain aspects relating to health and safety. I am writing to discuss what should be added to the Impact Statement.

The DSEIS fails to comment on the effects of a fire disaster on the spent fuel pools at Indian Point. In particular, the release of cesium-137 from the spent fuel pools as a result of a fire disaster is not discussed. If Indian Point were subject to a fire disaster, there could be contamination greater than that seen at Chernobyl.

According to Dr. Gordon Thompson in his study, Robust Storage of Spent Nuclear Fuel: A Neglected Issue of Homeland Security, "This situation poses a very high risk to people and the environment, because the loss of water from a high density pool will cause spent fuel in the pool to heat up, self-ignite, burn and release a huge amount of long-lived radioactive material –including tens of millions of Curries of the isotope cesium-137--to the atmosphere." The spent fuel pools can also have a fire disaster after an attack such as by aircraft for which there is no defense.

89-a-HH/PA/SF

Cesium is a radioisotope that decays into barium-137m, emitting beta particles and gamma rays. If people are exposed, it is stored in the soft tissues of the body, especially the muscles. People can also be affected by the gamma radiation emitted from cesium-137. In the event of a nuclear accident, cesium-137 will be dispersed as dust that cannot be seen. Exposure to this radioisotope can lead to cancer and radiation sickness. Higher exposure can lead to burns or death.

I would like to see the Impact Statement discuss the environmental effects and safety impacts that would ensue in the event of a fire disaster on the spent fuel pools. It should also discuss who would be affected and what the health effects would be. Also, what actions are being taken to prevent a fire disaster?

Sincerely,

Jennifer Keenan

Reference:
Gordon, Thompson. "Robust Storage of Spent Nuclear Fuel: A Neglected Issue of Homeland Security." Institute for Resource and Security Studies.
<http://www.nirs.org/reactorwatch/security/sechorsses012003.pdf>

MR. KELLY: Good afternoon, my name is John Kelly. I am the retired director of licensing for Entergy's Northeast operations and had directly worked with the Indian Point plants during my career starting in 1970. I moved to this region, living less than 4 miles from the plant in 1971. I have raised my children there. I still live there. I know the plants are

90-a-SA

safe. I'm addressing a few points in the EIS however. The deterioration of air quality in the lower Hudson Valley, which has been by others, that would be caused by the shutdown of the Indian Point plants is not adequately addressed by the EIS. I'm page 2-29 of the EIS, you note that 22 counties with a total population of more than 16 million people within 50 miles of IPEC are in the non-attainment status for compliance with Clean Air Act requirements for ozone. 19 of those counties are also in non-compliance with PM-2.5 particulates and one of those counties, New York County or Manhattan Island, is also in non-compliance with the PM-10 particulates. On page 8-40 of the EIS, you conclude that the impact on air quality of IPEC shutdown and replacement with a state-of-the-art fossil plant would be moderate.

90-b-AQ

On page 8-42, you conclude that the impact on human health would be moderate from this additional air pollution. How many people would be sickened and die because of this

90-c-AL/AQ/HH

moderate impact on human health by closing Indian Point. In an analysis performed in 2002 and provided to you on the docket, I’ve provided an additional copy with these comments to you today, showed the generation replacement power for a shutdown of IPEC coming from existing plants running at higher capacities would result in substantially more air pollution than you analyzed in you or EIS. This is much more likely to happen in construction of new plants in this area. How much more of a human health impact would this have? It's not addressed at this point in time in the EIS. Your EIS does not adequately address the air quality deterioration and negative human health effects of shutdown of IPEC.

90-c-AL/AQ/HH contd.

On page 8-42 of the EIS, you conclude that the long-term socioeconomic impact of shutdown of IPEC would be small to moderate. NEI published a report titled "Economic Benefits of IPEC" using information from 2002. A copy is provided with this statement for your information. This report noted that IPEC employed more than 1500 people and was directly responsible for 1200 more additional jobs in the region, resulting in more than $200 million in salaries in 2002. Plant purchases in that year exceeded $280 million and $50 million was paid in direct local and state taxes by the IPEC facilities in 2002. As a result of IPEC operations, the total taxes paid as a result of economic activity induced by IPEC was $215 million in 2002, with a total

90-d-AL/EC/SO

economic benefit of $1.5 billion for that year. I think this is more than small to moderate. This NEI report also notes that shut down of IPEC would increase electric costs in the region by 13-25%. This would result in additional cost of $800 million to $1 billion per year for electricity in the region. Your EIS does not adequately address the enormous economic benefits of IPEC, which would be lost upon plant shutdown. Thank you.

90-d-AL/
EC/SO
contd.

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COMMENT ON ENVIRONMENTAL IMPACT STATEMENT CONCERNING
LICENSE RENEWAL FOR IP-2 AND IP-3
PUBLIC MEETING ON FEBRUARY 12, 2009

THE US SUPREME COURT IS REVIEWING THE APPLICABILITY OF COST BENEFIT ANALYSIS WHEN EVALUATING THE BEST AVAILABLE TECHNOLOGY FOR APPLICATION OF THE CLEAN WATER ACT TO INDUSTRIAL FACILITIES. THE DECISION OF THE COURT WHICH SHOULD BE MADE BY THE END OF THE CURRENT TERM WILL DETERMINE WHAT COOLING SYSTEM WILL BE REQUIRED FOR RELICENSING, I WILL NOT COMMENT ON THE PORTIONS OF THE EIS THAT ADDREDD FISH POPULATIONS.

THE DETERIORATION OF AIR QUALITY IN THE LOWER HUDSON VALLEY THAT WOULD BE CAUSED BY SHUTDOWN OF THE INDIAN POINT PLANTS IS NOT ADEQUATELY ADDRESSED BY THE EIS. ON PAGE 2-29 OF THE EIS YOU NOTE THAT 22 COUNTIES WITH A TOTAL POPULATION OF MORE THAN 16 MILLION PEOPLE WITHIN 50 MILES OF IPEC ARE IN THE NON ATTAINMENT STATUS FOR COMPLIANCE WITH CLEAN AIR ACT REQUIREMENTS FOR OZONE, 19 OF THESE COUNTIES ARE ALSO IN NON COMPLIANCE FOR PM-2.5 PARTICULATES AND ONE OF THESE COUNTIES ALSO FOR PM-10 PARTICULATES.

ON PAGE 8-40 OF THE EIS YOU CONCLUDE THAT THE IMPACT ON AIR QUALITY OF IPEC SHUTDOWN AND REPLACEMENT WITH A STATE OF THE ART FOSSIL PLANT WOULD BE MODERATE. ON PAGE 8-42 YOU CONCLUDE THAT THE IMPACT ON HUMAN HEALTH WOULD BE MODERATE FROM THIS ADDITIONAL AIR POLLUTION. HOW MANY PEOPLE WOULD BE SICKENED AND DIE BECAUSE OF THIS “MODERATE” IMPACT ON HUMAN HEALTH OF CLOSING IPEC? 90-e-AL/AQ

IN AN ANALYSIS PERFORMED IN 2002 AND PROVIDED TO YOU ON THE DOCKET,(I PROVIDE ANOTHER COPY OF IT TO YOU TODAY) , SHOWED THAT GENERATION OF REPLACEMENT POWER FOR A SHUTDOWN IPEC, COMING FROM EXISTING PLANTS RUNNING AT HIGHER CAPACITIES, PLANTS LIKE BOWLINE AND DANSKAMMER WOULD RESULT IN SUBSTANTIALLY MORE AIR POLLUTION. THIS IS MORE LIKELY TO HAPPEN THAN CONSTRUCTION OF NEW PLANTS. HOW MUCH MORE OF A HUMAN HEALTH IMPACT WOULD THIS HAVE?

YOUR EIS DOES NOT ADEQUATELY ADDRESS THE AIR QUALITY DETERIORATION AND NEGATIVE HUMAN HEALTH EFFECTS OF SHUTDOWN OF IPEC.

ON PAGE 8-42 THE EIS CONCLUDES THAT THE LONG TERM SOCIOECONOMIC IMPACT OF SHUTDOWN OF IPEC WOULD BE SMALL TO MODERATE.

NEI PUBLISHED A REPORT TITLED "ECONOMIC BENEFITS OF IPEC "USING INFORMATION FROM 2002. A COPY IS PROVIDED WITH THIS STATEMENT FOR YOUR INFORMATION. THIS REPORT NOTED THAT IPEC EMPLOYED MORE THAN 1500 PEOPLE AND WAS DIRECTLY RESPONSIBLE FOR 1200 MORE JOBS IN THE REGION RESULTING IN MORE THAN 200 MILLION DOLLARS IN SALARIES IN 2002. PLANT PURCHASES IN THAT YEAR EXCEEDED 280 MILLION DOLLARS AND 50 MILLION DOLLARS IN LOCAL AND STATE TAXES WERE DIRECTLY PAID IN 2002 AS A RESULT OF IPEC OPERATIONS AND THE TOTALTAXES PAID AS THE RESULT OF ECONOMIC ACTIVITY INDUCED BY IPEC WAS 215 MILLION DOLLARS IN 2002. WITH A TOTAL ECONOMIC BENEFIT OF 1.5 BILLION DOLLARS FOR THAT YEAR. I THINK THIS IS MORE THAN SMALL TO MODERATE.

THIS NEI REPORT ALSO NOTES THAT SHUTDOWN OF IPEC WOULD INCREASE ELECTRIC COSTS IN THE REGION BY 13 TO 25 PERCENT. THIS WOULD RESULT IN AN ADDITIONAL COST OF $800 MILLION TO $1 BILLION PERYEAR FOR ELECTRICITY IN THE REGION.

YOUR EIS DOES NOT ADEQUATELY ADDRESS THE ENORMOUS ECONOMIC BENEFITS OF IPEC WHICH WOULD BE LOST UPON PLANT SHUTDOWN.

90-e-AL/AQ contd.

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