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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	Docket Nos. 50-247-LR and
	)	50-286-LR
ENTERGY NUCLEAR OPERATIONS, INC.)	
)	
(Indian Point Nuclear Generating Units 2 and 3)	)	March 7, 2011

APPLICANT'S ANSWER TO HUDSON RIVER SLOOP CLEARWATER, INC.'S
AMENDED ENVIRONMENTAL JUSTICE CONTENTION

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Clearwater's argument that minority and low-income populations confined to prison, hospitals, and other nearby institutions may be disproportionately harmed in the event of an accident at Indian Point due to purported challenges evacuating these populations.⁴

Clearwater now proposes three amendments to Contention EC-3. First, Clearwater claims that "the FSEIS suffers from exactly the same deficiencies as the ER" and contains "an erroneous legal argument that emergency planning issues for [environmental justice] populations are outside the scope of this proceeding."⁵ Clearwater thus seeks to amend its original contention to now challenge the FSEIS in addition to Entergy's ER.⁶ Second, Clearwater seeks to expand its original contention to now claim that the FSEIS "assessment of the impact of the no-action alternative on potentially affected environmental justice populations is inadequate."⁷ Third, in another proposed expansion of their original contention, Clearwater argues that the FSEIS "assessment of the impact of adding closed cycle cooling on air quality and on potentially affected local environmental justice populations is inadequate."⁸

As discussed below, Entergy does not oppose Clearwater's first proposed amendment to the extent it merely updates the previously-admitted portion of original Contention EC-3 to reflect a challenge to the FSEIS as well as to Entergy's ER. However, to the extent Clearwater is challenging the *adequacy* of the Indian Point emergency plan, Clearwater's first proposed

⁴ See *Entergy Nuclear Operations, Inc.* (Indian Point Nuclear Generating Units 2 & 3), LBP-08-13, 68 NRC 43, 188, 200-01 (2008).

⁵ Motion at 3, 16.

⁶ *Id.* at 15-16.

⁷ *Id.* at 16.

⁸ *Id.*

amendment to Contention EC-3 should be rejected as inadmissible since the adequacy of emergency plans are outside the scope of license renewal proceedings.⁹

Furthermore, Clearwater's second and third proposed contention amendments—the no-action alternative and closed-cycle cooling amendments, respectively—must be denied because Clearwater has not met the NRC's late-filing requirements set forth in 10 C.F.R. § 2.309(f)(2) or (f)(2)(i)-(iii), and fails to even address the provisions for non-timely contentions set forth in 10 C.F.R. § 2.309(c)(1). Specifically, Clearwater has not demonstrated that its proposed amendments are based on "data or conclusions" in the NRC Staff's FSEIS that "differ significantly" from those contained in Entergy's ER, nor has it demonstrated that the alleged "new" information upon which it relies is materially different from information previously available to it.¹⁰ In fact, Clearwater clearly could have raised these issues when it filed its original Petition in December 2007. Having failed to do so, the newly-proposed contention amendments are untimely and cannot be admitted at this late date.

In addition to being unjustifiably late, the second and third proposed amendments also fail to meet the admissibility requirements set forth in 10 C.F.R. § 2.309(f)(1)(iv)-(vi), as they fail to (1) raise a material issue as required by 10 C.F.R. § 2.309(f)(1)(iv); (2) provide a concise statement of alleged facts or expert opinions required by 10 C.F.R. § 2.309(f)(1)(v); and (3) provide sufficient information to establish a genuine dispute on a material issue of law or fact as required by 10 C.F.R. § 2.309(f)(1)(vi). Accordingly, the second and third contention

⁹ See *Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Units 2 & 3), CLI-05-24, 62 NRC 551, 561 (2005) ("Emergency planning is, by its very nature, neither germane to age-related degradation nor unique to the period covered by the . . . license renewal application."); *Indian Point*, LBP-08-13, 68 NRC at 149 (rejecting New York State Contention 29 challenging the adequacy of Indian Point emergency plans because "consideration of emergency plans [is] outside the scope of this proceeding"); 10 C.F.R. § 50.47(a)(1) ("No finding under this [emergency planning] section is necessary for issuance of a renewed operating license.").

¹⁰ 10 C.F.R. § 2.309(f)(2).

amendments must be dismissed as impermissibly late and inadmissible under NRC regulations, and the Motion must be denied.

II. BACKGROUND

On April 23, 2007, Entergy filed its application to renew the operating licenses for Indian Point Nuclear Generating Units 2 and 3 (“IP2” and “IP3”) for 20 years beyond their current expiration dates of September 9, 2013, and December 12, 2015, respectively. On December 10, 2007, Clearwater filed a Petition to Intervene in this proceeding.

Among other contentions, Clearwater alleged in Contention EC-3 that the ER contains a flawed environmental justice analysis that does not adequately assess the impacts of Indian Point license renewal on minority, low-income, and disabled populations.¹¹ The Board admitted the contention only with respect to Clearwater’s argument that the environmental justice evaluation fails to address purported disparate impacts on minority and low-income populations in nearby institutions.¹² In doing so, however, the Board emphasized that Clearwater EC-3 was admitted as an environmental contention brought under NEPA and not a safety contention claiming that Entergy’s emergency plan is deficient.¹³ Thus, the only issue remaining for Clearwater EC-3 as originally proffered and admitted is whether there is “sufficient information from which the Commission may properly consider, and publicly disclose, environmental factors that may cause harm to minority and low-income populations that would be ‘disproportionate to that suffered by the general population.’”¹⁴

¹¹ Clearwater Petition at 31.

¹² See *Indian Point*, LBP-08-13, 68 NRC at 200-01.

¹³ *Id.* at 201.

¹⁴ *Id.* (quoting *Sys. Energy Res., Inc.* (Early Site Permit for Grand Gulf ESP Site), CLI-05-4, 61 NRC 10, 13 (2005)).

III. LEGAL STANDARDS

A. Legal Standards Governing Admission of New and Amended Contentions

An intervenor may file new or amended environmental contentions “if there are data or conclusions in the NRC draft or final environmental impact statement, environmental assessment, or any supplements relating thereto, that differ significantly from the data or conclusions in the applicant’s documents.”¹⁵ Absent such circumstances, an intervenor may file new contentions only with leave of the presiding officer upon a showing that the new or amended contention is based on information that was not previously available and is materially different than information previously available.¹⁶ The Commission very recently reiterated that the publication of a new document, standing alone, does not meet this standard unless the information in that document is new and materially different from what was previously available.¹⁷ Furthermore, the petitioner must act promptly to bring the new or amended contention.¹⁸ As such, a new contention is not an occasion to raise additional arguments that could have been raised previously.¹⁹

If a petitioner cannot satisfy the criteria of 10 C.F.R. § 2.309(f)(2), then a contention is considered non-timely, and the intervenor must successfully address the late-filing criteria in

¹⁵ 10 C.F.R. § 2.309(f)(2).

¹⁶ *Id.* § 2.309(f)(2)(i)-(iii).

¹⁷ *See, e.g., N. States Power Co.* (Prairie Island Nuclear Generating Plant, Units 1 & 2), CLI-10-27, 72 NRC ___, slip op. at 13-18 (Sept. 30, 2010).

¹⁸ *See Entergy Nuclear Vt. Yankee, LLC* (Vt. Yankee Nuclear Power Station), LBP-06-14, 63 NRC 568, 573, 579-80 (2006) (rejecting petitioner’s attempt to “stretch the timeliness clock” because its new contentions were based on information that was previously available and petitioners failed to identify precisely what information was “new” and “different”).

¹⁹ *Duke Energy Corp.* (McGuire Nuclear Station, Units 1 & 2; Catawba Nuclear Station, Units 1 & 2), CLI-02-28, 56 NRC 373, 385-86 (2002). This Board has emphasized that that it “will not entertain contentions based on environmental issues that could have been raised when the original contentions were filed.” Licensing Board Memorandum and Order (Summarizing Pre-Hearing Conference) at 3 (Feb. 4, 2009) (unpublished).

10 C.F.R. § 2.309(c)(1)(i)-(viii).²⁰ The first factor identified in that regulation, whether “good cause” exists for the failure to file on time, is entitled to the most weight.²¹ Without good cause, a “petitioner’s demonstration on the other factors must be particularly strong.”²²

A proposed contention also “must satisfy, without exception, each of the criteria set out in 10 C.F.R. § 2.309(f)(1)(i) through (vi).”²³ Failure to meet each of the criteria is grounds for dismissal of a proposed new or amended contention.²⁴ Among other things, the petitioner must demonstrate that the issue raised in the contention is within the scope of the proceeding, is *material* to the findings the NRC must make to support the action that is involved in the proceeding, and provide sufficient information to show that a genuine dispute exists with the applicant/licensee on a *material* issue of law or fact.²⁵ A dispute is material if its resolution would make a difference in the outcome of the licensing proceeding.²⁶

Additionally, the Commission has held that a petitioner may not use an adjudicatory proceeding to attack generic rules or regulations.²⁷ Thus, a licensing proceeding is plainly not the proper forum for an attack on applicable statutory requirements or for challenges to the basic

²⁰ See Licensing Board Scheduling Order at 5-6 (July 1, 2010); 10 C.F.R. § 2.309(c)(2) (“The requestor/petitioner shall address the factors in paragraphs (c)(1)(i) through (c)(1)(viii) of this section in its nontimely filing.”).

²¹ See *New Jersey* (Dep’t of Law & Pub. Safety’s Requests Dated Oct. 8, 1993), CLI-93-25, 38 NRC 289, 296 (1993).

²² *Tex. Utils. Elec. Co.* (Comanche Peak Steam Elec. Station, Units 1 & 2), CLI-92-12, 36 NRC 62, 73 (1992) (quoting *Duke Power Co.* (Perkins Nuclear Station, Units 1, 2, & 3), ALAB-431, 6 NRC 460, 462 (1977)).

²³ *S.C. Elec. & Gas Co.* (Virgil C. Summer Nuclear Station, Units 2 & 3), LBP-10-6, 71 NRC ___, slip op. at 3 (Mar. 17, 2010).

²⁴ See Final Rule, Changes to Adjudicatory Process, 69 Fed. Reg. 2182, 2221 (Jan. 14, 2004). See also *Private Fuel Storage, L.L.C.* (Indep. Spent Fuel Storage Installation), CLI-99-10, 49 NRC 318, 325 (1999).

²⁵ See 10 C.F.R. § 2.309(f)(1)(iii)(iv) & (vi).

²⁶ See *Summer*, LBP-10-6, slip op. at 4 (quoting *Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2 & 3), CLI-99-11, 49 NRC 328, 333-34 (1999)).

²⁷ 10 C.F.R. § 2.335(a); *Oconee*, CLI-99-11, 49 NRC at 334.

structure of the Commission's regulatory process.²⁸ A contention that collaterally attacks an NRC rule or regulation is not appropriate for litigation in an adjudicatory proceeding and must be rejected.²⁹

B. Legal Standards Governing Environmental Justice Reviews

Environmental justice refers to a federal policy established by Executive Order 12898 under which each federal agency identifies and addresses, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority or low-income populations.³⁰ The Executive Order states that "whenever practicable and appropriate," federal executive agencies

shall collect, maintain and analyze information on the race, national origin, income level, and other readily accessible and appropriate information for areas surrounding facilities or sites expected to have a substantial environmental, human health, or economic effect on the surrounding populations, when such facilities or sites become the subject of a substantial Federal environmental administrative or judicial action.³¹

Independent agencies, such as the NRC, were requested, rather than directed, to comply with the Executive Order.³² Although NRC is not subject to the Executive Order, the Commission voluntarily committed to undertake environmental justice reviews and, on August

²⁸ See *Phila. Elec. Co.* (Peach Bottom Atomic Power Station, Units 2 & 3), ALAB-216, 8 AEC 13, 20, *aff'd with modifications*, CLI-74-32, 8 AEC 217 (1974). See also *Carolina Power & Light Co.* (Shearon Harris Nuclear Power Plant), LBP-07-11, 66 NRC 41, 57-58 (2007) (*citing Peach Bottom*, ALAB-216, 8 AEC at 20).

²⁹ See, e.g., *Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Unit 2), CLI-03-14, 58 NRC 207, 218 (2003); *Potomac Elec. Power Co.* (Douglas Point Nuclear Generating Station, Units 1 & 2), ALAB-218, 8 AEC 79, 89 (1974).

³⁰ Executive Order 12898 of February 11, 1994, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, 59 Fed. Reg. 7629, 7629 (Feb. 16, 1994) ("Executive Order 12898").

³¹ *Id.* at 7631.

³² *Id.* at 7632.

24, 2004, issued its policy statement on the treatment of environmental justice matters in NRC licensing actions.³³

Executive Order 12898 and the NRC Environmental Justice Policy Statement both make clear that neither document establishes any new substantive or procedural requirements applicable to NRC regulatory or licensing activities.³⁴ In this regard, environmental justice issues are considered only when and to the extent required by the National Environmental Policy Act (“NEPA”), as “NEPA is the only available statute under which the NRC can carry out the general goals of [Executive Order] 12898.”³⁵

NRC’s Environmental Justice Policy Statement also emphasizes that “[t]he focus of any ‘[environmental justice]’ review should be on 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.”³⁶ Additionally, if no significant and adverse impacts to the general population are identified, then a detailed analysis of disparate impacts is not required unless there are unique characteristics associated with specific minority or low-income communities that might contribute to disproportionately significant and adverse impacts to those communities.³⁷ In other words, a contention must do more than just identify the

³³ See Final Policy Statement, Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions, 69 Fed. Reg. 52,040, 52,041-42, 52,046 (Aug. 24, 2004) (“NRC Environmental Justice Policy Statement”).

³⁴ Executive Order 12898, 59 Fed. Reg. at 7632-33; NRC Environmental Justice Policy Statement, 69 Fed. Reg. at 52,046.

³⁵ NRC Environmental Justice Policy Statement, 69 Fed. Reg. at 52,046 n.2.

³⁶ *Id.* at 52,047 (emphasis added) (internal quotations omitted). In fact, in admitting Contention EC-3, the Board made clear that the issue remaining is whether there is “sufficient information from which the Commission may properly consider, and publicly disclose, environmental factors that may cause harm to minority and low-income populations that would be ‘*disproportionate to that suffered by the general population.*’” *Indian Point*, LBP-08-13, 68 NRC at 201 (emphasis added).

³⁷ See NRC Environmental Justice Policy Statement at 52,045.

presence of a minority or low-income population or possible environmental impacts to the general population.³⁸

IV. CLEARWATER'S AMENDMENTS TO CONTENTION EC-3 DO NOT MEET THE NRC'S CONTENTION TIMELINESS AND ADMISSIBILITY CRITERIA

A. First Proposed Amendment (Update to the Original Contention)

In its first proposed amendment, Clearwater asserts that “the FSEIS suffers from exactly the same deficiencies as the ER in that it fails to provide a site-specific analysis of the potential for relicensing to cause disparate impacts on potentially affected [environmental justice] populations.”³⁹ Thus, Clearwater indicates that this “amendment is just a technical change to the already admitted contention” and incorporates by reference all of its previous arguments from its December 2007 Petition.⁴⁰

As an initial matter, Clearwater provides no indication that its first proposed amendment is based on “data or conclusions” in the NRC Staff’s FSEIS that “differ significantly” from those contained in Entergy’s April 2007 ER.⁴¹ Nor has Clearwater pointed to any “new” information that is materially different from information previously available to it.⁴² Nonetheless, Entergy acknowledges that the Board admitted original Contention EC-3 in part and, to the limited extent

³⁸ See *S. Nuclear Operating Co. (Early Site Permit for Vogtle ESP Site)*, LBP-07-3, 65 NRC 237, 262 (2007) (“There are . . . two requirements necessary to implicate this close environmental justice scrutiny. First, support must be presented regarding the alleged existence of adverse impacts or harm on the physical or human environment. Second, a supported case must be made that these purported adverse impacts could disproportionately affect poor or minority communities in the vicinity of the facility at issue.”).

³⁹ Motion at 16.

⁴⁰ *Id.* at 19.

⁴¹ 10 C.F.R. § 2.309(f)(2).

⁴² See *id.* § 2.309(f)(2)(i)-(ii).

Clearwater seeks to merely update its previously-admitted contention to reflect a similar challenge to the FSEIS as well as the ER; Entergy has no objection.⁴³

However, in the Motion, Clearwater further argues that the NRC Staff's FSEIS contains "an erroneous legal argument that emergency planning issues for [environmental justice] populations are outside the scope of this proceeding."⁴⁴ According to Clearwater, "this assertion is not only incorrect, it directly contradicts the findings of this Board in this case."⁴⁵ To the extent Clearwater's contention challenges the adequacy of the Indian Point emergency plan and contends that this issue is within the scope of this proceeding, it is mistaken. NRC regulations, the Commission, and this Board have made it clear that such challenges are beyond the scope of license renewal proceedings.⁴⁶ Accordingly, the Board should reject the first proposed amendment to Contention EC-3 to the extent it addresses the adequacy of the Indian Point emergency plan and find that such issues are outside the scope of this proceeding as required by 10 C.F.R. § 2.309(f)(1)(iii).

⁴³ As explained above in Section II, the Board admitted Contention EC-3 only with respect to Clearwater's argument that the environmental justice evaluation allegedly fails to address purported disparate impacts on minority and low-income populations in nearby institutions. *Indian Point*, LBP-08-13, 68 NRC at 200-01. To the extent that Clearwater is seeking reconsideration of previously-rejected portions of original Contention EC-3, such a request should be summarily dismissed by the Board. See *Private Fuel Storage, L.L.C.* (Indep. Spent Fuel Storage Installation), LBP-00-14, 51 NRC 301, 311 (2000) (rejecting an intervenor's request for reconsideration of a previously-rejected contention as "grossly out of time without good cause shown").

⁴⁴ Motion at 3.

⁴⁵ *Id.*

⁴⁶ See *Millstone*, CLI-05-24, 62 NRC at 561 ("Emergency planning is, by its very nature, neither germane to age-related degradation nor unique to the period covered by the . . . license renewal application."); 10 C.F.R. § 50.47(a)(1) ("No finding under this [emergency planning] section is necessary for issuance of a renewed nuclear operating license."); *Indian Point*, LBP-08-13, 68 NRC at 149 (rejecting New York State Contention 29, which challenged the adequacy of Indian Point emergency plans).

B. Second Proposed Amendment (No-Action Alternative)

The FSEIS (like the DSEIS⁴⁷) found that the air quality and environmental justice impacts of the no-action alternative would be SMALL.⁴⁸ Clearwater claims that these conclusions are contradicted by another statement in the FSEIS indicating that “[s]ome minority and low-income populations located in urban areas could be affected by reduced air quality and increased health risks due to the burning of fossil fuel in existing power plants used to replace the lost power generated by Indian Point.”⁴⁹ Clearwater also disputes the authenticity of comments submitted to the NRC by African-American and other minority groups concerning such impacts.⁵⁰

1. Clearwater’s Complaint Regarding the No-Action Alternative Is Untimely and Contrary to the Requirements in 10 C.F.R. § 2.309(f)(2) and (c)(1)

As an initial matter, Clearwater questions the veracity of comments offered by African-American and other minority groups in an attempt to support its own contention.⁵¹ These comments speak for themselves and reflect concerns, albeit contrary to the viewpoints offered by Clearwater, about adverse impacts that would result from increased reliance on fossil fuels under the no-action alternative.⁵² More importantly, Clearwater fails to demonstrate that those comments (or NRC’s comment responses) support the admission of an amended contention.

⁴⁷ NUREG-1437, Supp. 38, *Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Regarding Indian Point Nuclear Generating Unit Nos. 2 and 3, Draft Report for Comment* (Dec. 2008) (“DSEIS”), available at ADAMS Accession Nos. ML083540594 (Vol. 1), ML083540614 (Vol. 2).

⁴⁸ FSEIS, Vol. 1 at 8-23, 8-26.

⁴⁹ Motion at 7 (*quoting* FSEIS, Vol. 1 at 8-26).

⁵⁰ *See id.* at 5-8 (referencing comments from the National Coalition of 100 Black Men, the National Coalition of 100 Black Women, and the African American Environmentalist Association).

⁵¹ *See id.*

⁵² The comments disparaged by Clearwater were offered not only in writing, but in person at the public meeting to discuss the DSEIS hosted by NRC. *See, e.g.*, Tr. of Pub. Meeting to DSEIS (Feb. 12, 2009) (excerpts appended to FSEIS, Vol. 2, App. A at A-611 to A-613 (indicating that “[a]sthma is now the leading cause of emergency room visits for our children and missed school days with children in New York City’s poorest

Turning to the regulations, Clearwater may amend its contention at this late date only if the FSEIS contains “data or conclusions” that “differ significantly from the data or conclusions” in previous environmental documents.⁵³ Clearwater fails to point to any such information. In fact, the FSEIS reaches the *same* conclusions as the DSEIS on the no-action alternative—all impacts were found to be SMALL (with the exception of socioeconomic impacts, which are SMALL to MODERATE in both documents).⁵⁴ Further, the issues presented in this amended contention concerning impacts under the no-action alternative were originally raised during the environmental scoping process by a number of groups in *September 2007*.⁵⁵ Thus, Clearwater fails to demonstrate that this new claim is based on “data or conclusions” in the NRC Staff’s FSEIS that “differ significantly” from previously-available information. Accordingly, in raising this issue only now, Clearwater fails to meet the requirements of 10 C.F.R. § 2.309(f)(2).

Clearwater candidly states that it did not file this amended contention earlier because it “expected that NRC Staff would remedy the deficiencies of the DSEIS indentified [sic] in the [minority group’s] comments.”⁵⁶ Such an argument not only undercuts its basis for relying on

neighborhoods,” that “[t]he 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,” and that “[i]t’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”), A-918 to A-919 (indicating “there’s an extremely high concentration of fossil fuel burning power plants, which pollute our neighborhoods [in Harlem] with carbon dioxide and other pollutants” and that “environmental policies of the past have already taken a severe toll and Harlem has had one of the highest asthma rates in the country with one in four children suffering from the disease”).

⁵³ 10 C.F.R. § 2.309(f)(2).

⁵⁴ See FSEIS at 8-23, 8-26; DSEIS, Vol. 1 at 8-26.

⁵⁵ See, e.g., 100 Black Men of NY, Statement of Support for Entergy Nuclear Northeast (Entergy CW Contention EC-3 Att. 1) (appended to Environmental Scoping Meeting Written Submittals from Audience (Sept. 19, 2007)), available at ADAMS Accession No. ML072830613; Afr. Am. Env’tlist. Ass’n, AAEA Statement on Indian Point License Renewal Application (Sept. 19, 2007) (Entergy CW Contention EC-3 Att. 2), available at ADAMS Accession No. ML072820272.

⁵⁶ Motion at 19.

these comments, but also is insufficient to satisfy NRC's contention timeliness requirements.⁵⁷

The Commission has held that “[c]ommenting on the scope of the EIS does not substitute for raising a timely contention” because NRC “rules require the filing of contentions as early as possible.”⁵⁸ Similarly, Clearwater is not entitled to wait to amend its contention concerning information that was previously available until after NRC resolves relevant comments submitted by other groups. Rather, Clearwater is required to abide by the same criteria for amended contentions as other intervenors.⁵⁹

Finally, Clearwater also fails to address the criteria in 10 C.F.R. § 2.309(c)(1) and thus, Clearwater's Motion should be dismissed for failure to comply with the Commission's contention amendment regulations.⁶⁰

2. Clearwater's No-Action Alternative Claim Is Immaterial, Inadequately Supported, and Insufficient to Establish a Material Dispute

Even if Clearwater's new no-action alternative argument meets the requirements of 10 C.F.R. § 2.309(f)(2) or (c)(1)—which it does not—it must be rejected because it does not meet each of the mandatory contention admissibility requirements in 10 C.F.R. § 2.309(f)(1)(i)-(vi). As demonstrated below, Clearwater's proposed amendment concerning the no-action alternative must be rejected on the grounds that it fails to (1) raise a material issue as required by 10 C.F.R. § 2.309(f)(1)(iv); (2) provide a concise statement of alleged fact or expert opinion required by 10 C.F.R. § 2.309(f)(1)(v); and (3) provide sufficient information to establish a genuine material dispute, as required by 10 C.F.R. § 2.309(f)(1)(vi).

⁵⁷ See 10 C.F.R. § 2.309(f)(2)(i)-(ii).

⁵⁸ *Private Fuel Storage, L.L.C.* (Indep. Spent Fuel Storage Installation), CLI-04-4, 59 NRC 31, 45 (2004).

⁵⁹ See 10 C.F.R. § 2.309(f)(2)(i)-(ii).

⁶⁰ See, e.g., *Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Unit 3), CLI-09-5, 69 NRC 115, 126 (2009) (“The Board correctly found that failure to address the requirements [of 10 C.F.R. § 2.309(c) and (f)(2)] was reason enough to reject the proposed new contentions.”).

a. ***Clearwater's No-Action Alternative Claim Raises Issues That Are Not Material to the NRC's Findings in This Proceeding***

Pursuant to 10 C.F.R. § 2.309(f)(1)(iv), Clearwater must show “that the issue raised in the contention is *material* to the findings that the NRC must make to support the action that is involved in the proceeding.”⁶¹ As the Commission has observed, “[t]he dispute at issue is ‘material’ if its resolution would ‘make a difference in the outcome of the licensing proceeding.’”⁶²

As noted above, the FSEIS found that the impacts of the no-action alternative would be SMALL with the exception of socioeconomic impacts, which would be SMALL to MODERATE. After comparing the impacts of license renewal to the impacts of reasonable alternatives (including the no-action alternative), the FSEIS concludes “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.”⁶³

Clearwater contends that the FSEIS could have found that the environmental justice impacts under the no-action alternative would be MODERATE or LARGE.⁶⁴ Even if Clearwater is correct, this would only bolster the ultimate conclusion in the FSEIS. In other words, litigating this issue would only provide further support for the conclusion that the adverse environmental impacts of license renewal for IP2 and IP3 are not so great (in comparison, for example, to the no-action alternative) that preserving the option of license renewal for energy planning decision makers would be unreasonable. In this regard, as the Commission has noted,

⁶¹ 10 C.F.R. § 2.309(f)(1)(iv) (emphasis added).

⁶² *Oconee*, CLI-99-11, 49 NRC at 333-34 (citing Final Rule, Rules of Practice for Domestic Licensing Proceedings – Procedural Changes in the Hearing Process, 54 Fed. Reg. 33,168, 33,172 (Aug. 11, 1989)).

⁶³ FSEIS, Vol. 1 at 9-8.

⁶⁴ See Motion at 21 (“Clearwater contends that had the NRC followed its NEPA obligations to conduct a detailed analysis of the EJ impact of the ‘no-action’ alternative to relicensing, the NRC could have arrived at a different determination.”).

“NRC adjudicatory hearings are not EIS editing sessions. Our busy boards do not sit to parse and fine-tune EISs.”⁶⁵ Accordingly, Clearwater’s no-action alternative amendment fails to meet the “materiality” requirement of 10 C.F.R. § 2.309(f)(1)(iv).

b. *Clearwater’s No-Action Alternative Claim Lacks Adequate Factual, Documentary, or Expert Support*

Clearwater’s no-action alternative argument also must be dismissed because it fails to comply with 10 C.F.R. § 2.309(f)(1)(v), which requires a concise statement of “the alleged facts or expert opinions” and “the specific sources and documents” on which the petitioner intends to rely to support its position on the issue. In particular, Clearwater is required to “provide documents or other factual information or expert opinion that set forth *the necessary technical analysis* to show *why* the proffered bases support its contention.”⁶⁶

Clearwater falls far short of meeting these requirements. As explained above, the focus of an environmental justice analysis is on “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.*”⁶⁷ Applying this standard, the Licensing Board in the *Vogtle* ESP proceeding held:

There are . . . two requirements necessary to implicate this close environmental justice scrutiny. First, support must be presented regarding the alleged existence of adverse impacts or harm on the physical or human environment. Second, *a supported case* must

⁶⁵ *Duke Energy Corp.* (McGuire Nuclear Station, Units 1 & 2; Catawba Nuclear Station, Units 1 & 2), CLI-03-17, 58 NRC 419, 431 (2003). *See also Exelon Generating Co., LLC* (Early Site Permit for Clinton ESP Site), CLI-05-29, 62 NRC 801, 811 (2005) (“There may, of course, be mistakes in the [EIS], but in an NRC adjudication, it is Intervenor’s burden to show their significance and materiality. Our boards do not sit to flyspeck environmental documents or to add details or nuances.” (internal quotes omitted)); *Private Fuel Storage, L.L.C.* (Indep. Spent Fuel Storage Installation), CLI-02-25, 56 NRC 340, 349 (2002) (“NEPA does not call for examination of every conceivable aspect of federally licensed projects”) (internal quotes omitted).

⁶⁶ *Private Fuel Storage* (Indep. Spent Fuel Storage Installation), LBP-98-7, 47 NRC 142, 180 (emphasis added) (citing *Ga. Inst. of Tech* (Ga. Tech Research Reactor, Atlanta, Ga.), LBP-95-6, 41 NRC 281, 305), *aff’d*, CLI-98-13, 48 NRC 26 (1998).

⁶⁷ NRC Environmental Justice Policy Statement, 69 Fed. Reg. at 52,047 (emphasis added).

be made that these purported adverse impacts could *disproportionately* affect poor or minority communities in the vicinity of the facility at issue.⁶⁸

Thus, Clearwater has the burden to provide information indicating that the impacts under the no-action alternative somehow fall disproportionately on minority or low-income populations in comparison to the general population.

Clearwater, however, presents no supporting information indicating that the significant adverse impacts stemming from the no-action alternative would disproportionately affect minority or low-income populations. At best, Clearwater's criticisms of the FSEIS are vague and conclusory. For instance, although Clearwater claims that the FSEIS no-action alternative environmental justice discussion is "contradictory and conclusory,"⁶⁹ it fails to set forth *any* relevant facts, references, or expert opinion indicating how or why this evaluation should have been conducted differently. It is well-settled that a contention "will be ruled inadmissible if the petitioner 'has offered no tangible information, no experts, no substantive affidavits,' but instead only 'bare assertions and speculation.'"⁷⁰ Accordingly, these vague and unsupported assertions are insufficient to provide a foundation for an amended contention.

c. *Clearwater's No-Action Alternative Claim Fails to Raise a Genuine Dispute on a Material Issue of Law or Fact*

Clearwater's no-action alternative argument also does not cite to specific portions of the FSEIS that it disputes and provide supporting reasons for each dispute, as required by 10 C.F.R.

⁶⁸ *Vogle*, LBP-07-3, 65 NRC at 262.

⁶⁹ Motion at 16. Clearwater also provides a vague reference to comments it submitted on the no-action alternative. *See id.* at 8. However, Clearwater fails to provide any discussion of the significance of these comments or how they relate to the issues concerning significant and disproportionate impacts to minority or low-income populations under the no-action alternative.

⁷⁰ *Fansteel, Inc.* (Muskogee, Okla. Site), CLI-03-13, 58 NRC 195, 203 (2003) (quoting *GPU Nuclear Inc.* (Oyster Creek Nuclear Generating Station), CLI-00-6, 51 NRC 193, 208 (2000)).

§ 2.309(f)(1)(vi).⁷¹ To satisfy this requirement, Clearwater must do more than allege that NRC has not appropriately responded to comments submitted by other members of the public.

NEPA does not require the Staff to set forth at full length the views with which it disagrees, conduct new studies in response to issues raised in the comments, or resolve conflicts raised by opposing viewpoints.⁷² Rather, NRC's obligation in the FSEIS is to "include consideration of major points of view concerning the environmental impacts of the proposed action."⁷³ This means that the FSEIS must reference opposing viewpoints,⁷⁴ make any differences in opinion readily apparent, and provide a good faith, reasoned response to comments.⁷⁵

Appendix A of the FSEIS in fact fully documents all comments received by the NRC on the DSEIS discussion of energy alternatives (including the no-action alternative) and contains responses to those comments.⁷⁶ The comments addressed in Appendix A include those comments referenced in Clearwater's Motion. Thus, the Staff certainly has met its obligation and provided the required "meaningful reference"⁷⁷ to all responsible opposing viewpoints concerning the agency's proposed decision, made the differences in opinion readily apparent, and provided a "good faith, reasoned analysis in response."⁷⁸

⁷¹ See 10 C.F.R. § 2.309(f)(1)(vi). See also *Fansteel*, CLI-03-13, 58 NRC at 205 (noting that to meet its pleading burden, a petitioner must provide "plausible and adequately supported claims that the data [in the application] are either inaccurate or insufficient, i.e., by specifically identifying each failure and explaining why the data are flawed").

⁷² See *California v. Block*, 690 F.2d 753, 773 (9th Cir. 1982).

⁷³ 10 C.F.R. § 51.71(b).

⁷⁴ See *Comm. for Nuclear Responsibility, Inc. v. Seaborg*, 463 F.2d 783, 787 (D.C.Cir. 1971).

⁷⁵ See *Silva v. Lynn*, 482 F.2d 1282, 1285 (1st Cir. 1973).

⁷⁶ See FSEIS, Vol. 1, App. A at A-150 to A-160 (§ A.2.14, Comments Concerning Alternatives).

⁷⁷ *Seaborg*, 463 F.2d at 787.

⁷⁸ *Silva*, 482 F.2d at 1285.

Furthermore, to the extent that Clearwater is actually concerned that environmental justice populations would be disproportionately impacted by increased reliance on fossil fuels, Clearwater ignores the relevant discussion of these issues in the FSEIS itself. Specifically, Section 8.2 of the FSEIS indicates that the no-action alternative may result in the need for replacement power and states that these impacts are discussed in Section 8.3 of the FSEIS.⁷⁹ Importantly, Section 8.3 of the FSEIS indicates that the environmental justice impacts from fossil fuel-powered generation could be LARGE, depending on the site.⁸⁰ Clearwater ignores this discussion and fails to explain why this conclusion does not address their concerns. Accordingly, Clearwater's failure to controvert relevant portions of the FSEIS renders this contention inadmissible because it does not comply with 10 C.F.R. § 2.309(f)(1)(vi).

C. Third Proposed Amendment (Closed-Cycle Cooling Alternative)

Clearwater's third proposed amendment to Contention EC-3 states that "the [FSEIS] assessment of the impact of adding closed cycle cooling on air quality and on potentially affected local environmental justice populations is inadequate."⁸¹ The FSEIS found that environmental justice impacts under the closed-cycle cooling system alternative would be SMALL.⁸² Clearwater argues that this conclusion is flawed because: (1) it is based purely on Entergy's assertions; (2) it fails to consider the finding that air quality impacts could be significant; and (3) if air quality impacts are in fact significant, then an environmental justice analysis should have analyzed whether there would be disproportionate impacts on local populations.⁸³

⁷⁹ See FSEIS, Vol. 1 at 8-22. See also *id.* (noting power generated by IP2 and IP3 could be replaced by "power supplied by other producers (either existing or new units) using generating technologies that may differ from that employed at IP2 and IP3").

⁸⁰ See *id.* at 8-36 to 8-37, 8-39. See also *id.* at 8-59.

⁸¹ Motion at 16.

⁸² FSEIS, Vol. 1 at 8-18.

⁸³ Motion at 10, 16-17.

1. Clearwater's Closed-Cycle Cooling Alternative Claim Is Untimely

As discussed above, NRC regulations permit Clearwater to amend its contention if the FSEIS contains “data or conclusions” that “differ significantly from the data or conclusions” from previous environmental documents.⁸⁴ Although Clearwater claims that this amended contention is “based upon conclusions reached in the FSEIS that are significantly different from the applicant’s ER,” Clearwater could have raised this issue several years ago in its initial Petition.⁸⁵ For example, the ER noted that “[a]n operating cooling tower could have *significant* air emissions associated with PM_{2.5} and PM₁₀.”⁸⁶ Thus, if it was concerned about whether these impacts would disproportionately affect environmental justice populations, Clearwater could have filed this contention in 2007 based on information contained in the ER. Accordingly, having failed to demonstrate that this claim is based on “data or conclusions” in the FSEIS that “differ significantly” from previously available information, Clearwater’s amended contention must be rejected for failing to comply with 10 C.F.R. § 2.309(f)(2).

As noted above, although Clearwater is permitted, with leave of the Board, to file new contentions based on recent developments other than the Staff’s issuance of the FSEIS, the “new” issue raised in this amendment fails to meet the requirements set forth in 10 C.F.R. § 2.309(f)(2)(i)-(iii). Specifically, Clearwater acknowledges that a similar issue is pending in a state administrative proceeding,⁸⁷ and in fact again concedes that it did not file this contention earlier because it “expected that NRC Staff would remedy the deficiencies of the DSEIS

⁸⁴ 10 C.F.R. § 2.309(f)(2) (emphasis added).

⁸⁵ Motion at 19.

⁸⁶ Indian Point Energy Center, Applicant’s Environmental Report, Operating License Renewal Stage at 8-13 (Apr. 2007), available at ADAMS Accession No. ML071210530 (emphasis added).

⁸⁷ See Motion at 10. This issue has been pending in the state proceeding since 2006. See also *In re Renewal & Modification of [Indian Point SPDES] Permit*, No. 3-5522-00011/00004 (NYDEC Feb. 3, 2006) (Ruling on Proposed Issues for Adjudication and Petitions for Party Status), at 8-9, 44-49 (Entergy CW Contention EC-3 Att. 3), available at http://www.dec.ny.gov/docs/legal_protection_pdf/entergyir.pdf.

identified [sic] in the [minority group's] comments.”⁸⁸ Again, Clearwater is not entitled to wait to amend its contention concerning information that was previously available until after NRC resolves relevant comments submitted by other groups.⁸⁹

2. Clearwater’s Closed-Cycle Cooling Claim Is Unduly Vague, Inadequately Supported, and Insufficient to Establish a Material Dispute

Even if Clearwater’s new closed-cycle cooling alternative argument could hypothetically satisfy the requirements under 10 C.F.R. § 2.309(f)(2) or (c)(1) for purposes of this analysis, it must still be rejected because it does not meet each of the contention admissibility requirements in 10 C.F.R. § 2.309(f)(1)(i)-(vi). As demonstrated below, Clearwater’s proposed amendment concerning the closed-cycle cooling alternative must be rejected on the grounds that it fails to provide either: (1) a concise statement of alleged facts or expert opinions as required by 10 C.F.R. § 2.309(f)(1)(v); or (2) sufficient information to establish a genuine material dispute as required by 10 C.F.R. § 2.309(f)(1)(vi).

a. Clearwater’s Closed-Cycle Cooling Claim Lacks Adequate Factual, Documentary, or Expert Support

Clearwater’s closed-cycle cooling alternative argument must be dismissed because it fails to comply with 10 C.F.R. § 2.309(f)(1)(v). As explained above, the focus of an environmental justice analysis is on identifying *significant and adverse* environmental impacts to minority and low-income populations that are *disproportionate* from the impacts to the *general population*.⁹⁰ Thus, Clearwater must provide *support* that purported adverse impacts could

⁸⁸ Motion at 19.

⁸⁹ See *AmerGen Energy Co., LLC* (Oyster Creek Nuclear Generating Station), CLI-09-7, 69 NRC 235, 272 (2009) (holding that intervenors may not “add new contentions at their convenience during the course of a proceeding based on information that could have formed the basis for a timely contention at the outset of the proceeding.”).

⁹⁰ NRC Environmental Justice Policy Statement, 69 Fed. Reg. at 52,047.

disproportionately affect minority or low-income populations in the vicinity of Indian Point.⁹¹

Clearwater fails to set forth any facts or expert opinion indicating why the air quality impacts from close-cycle cooling would fall disproportionately on minority or low-income populations.

Accordingly, Clearwater's argument is insufficient to support an amended contention.

b. *Clearwater's Closed-Cycle Cooling Claim Fails to Raise a Genuine Dispute on a Material Issue of Law or Fact*

Clearwater's closed-cycle cooling alternative argument does not provide sufficient information to establish a genuine dispute on a material issue of law or fact, as required by 10 C.F.R. § 2.309(f)(1)(vi). This provision requires that Clearwater cite to specific portions of the FSEIS that it disputes and provide supporting reasons for each dispute. Here, Clearwater ignores the relevant discussion of these issues in the FSEIS and thus falls far short of satisfying this requirement.

While Clearwater appears to acknowledge that the air quality impacts from closed-cycle cooling may be significant, it does not dispute the NRC's rationale in the FSEIS for finding that there would be no disproportionate impacts on environmental justice populations. Specifically, the FSEIS states: "Minority and low-income populations are subsets of the general public residing around IP2 and IP3, and all are exposed to the same hazards generated from constructing and operating a closed-cycle cooling system."⁹² Clearwater offers no "supporting reasons" for disputing this conclusion and offers no explanation as to why environmental justice populations would suffer significant impacts under the closed-cycle alternative that are *disproportionate* to those suffered by the general population.⁹³ Therefore, Clearwater's failure to

⁹¹ *Vogle*, LBP-07-3, 65 NRC at 262.

⁹² FSEIS, Vol. 1 at 8-18.

⁹³ 10 C.F.R. § 2.309(f)(1)(vi).

controvert the relevant discussion of environmental justice issues in the FSEIS renders this contention inadmissible because it does not comply with 10 C.F.R. § 2.309(f)(1)(vi).

Clearwater also argues that NRC Staff failed to exercise “independent judgment” in the analysis of air quality impacts under the closed-cycle cooling alternative because the FSEIS relies on information provided by Entergy.⁹⁴ Although Clearwater indicates that the FSEIS cites to reports provided by Entergy concerning the air quality impacts from the closed-cycle cooling alternative, it provides no information to support its claim that NRC Staff failed to independently and objectively evaluate this information.⁹⁵ Nothing in NEPA or the NRC’s regulations, which initially requires that an applicant provide relevant information, later bars NRC from adopting a report furnished by the applicant in whole or in part.⁹⁶ Thus, absent bad faith or misplaced reliance, NRC cannot be expected to ignore useful and relevant information merely because it was provided by an applicant.⁹⁷ Given that Clearwater fails to offer any evidence of bad faith or misplaced reliance on Entergy’s data by the NRC Staff, it has not established a genuine dispute on a material issue of law or fact with the FSEIS, as required by 10 C.F.R. § 2.309(f)(1)(vi).

⁹⁴ Motion at 16, 21.

⁹⁵ See FSEIS, Vol. 1 at 8-11 to 8-12.

⁹⁶ *Lake Erie Alliance for the Prot. of the Coastal Corridor v. U.S. Army Corps of Eng’rs*, 526 F.Supp. 1063, 1073 (W.D. Pa. 1981) (“Nothing in NEPA or the regulations says that the agency cannot adopt a report furnished by the applicant in whole or in part. The Act only requires that the defendants take responsibility for the scope and content and make their own evaluation of the environmental issues.”). See also *Nat’l Wildlife Fed’n v. FERC*, 912 F.2d 1471, 1485-86 (D.C. Cir. 1990) (rejecting argument that agency could not properly rely on information provided by an applicant); *Friends of the Earth v. Hintz*, 800 F.2d 822, 834-35 (9th Cir. 1986) (finding that agency “justifiably and legally relied primarily upon the study prepared by [the applicant], and its review of that study satisfied regulatory requirements”); *Sierra Club v. Van Antwerp*, 719 F.Supp.2d 58, 69 (D.D.C. 2010) (an agency “may rely on information submitted by the applicant but must independently verify such information”) (citing 40 C.F.R. § 1506.5(a))

⁹⁷ *Sierra Club v. Lynn*, 502 F.2d 43, 59 (5th Cir. 1974).

V. CONCLUSION

For the reasons set forth above, Clearwater's proposed amendments to Contention EC-3 are inadmissible and must be dismissed. Accordingly, the Clearwater's Motion must be denied.

CERTIFICATION OF COUNSEL UNDER 10 C.F.R. § 2.323(b)

Counsel for Entergy certifies that he has made a sincere effort to make himself available to listen and respond to the moving parties, and to resolve the factual and legal issues raised in the motion, and that his efforts to resolve the issues have been unsuccessful.

Respectfully submitted,



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COUNSEL FOR ENTERGY NUCLEAR
OPERATIONS, INC.

Dated in Washington, D.C.
this 7th day of March 2011

LIST OF ENTERGY CW CONTENTION EC-3 ATTACHMENTS

Attachment	No.
100 Black Men of NY, Statement of Support for Entergy Nuclear Northeast (Sept. 19, 2007).....	1
Afr. Am. Env'tlist. Ass'n, AAEA Statement on Indian Point License Renewal Application (Sept. 19, 2007)	2
In re Renewal & Modification of Indian Point SPDES Permit, No. 3-5522-00011/00004 (NYDEC Feb. 3, 2006) (Ruling on Proposed Issues for Adjudication and Petitions for Party Status) (excerpts).....	3

Entergy CW Contention EC-3 Attachment 1

**100 Black Men of New York Statement of Support for ENTERGY NUCLEAR
NORTHEAST**

I am Phil Banks, President of One Hundred Black Men, Inc. (OHBM). OHBM is an international organization founded in New York when a group of concerned African American men began to meet to explore ways of improving conditions in their community. The group eventually adopted the name, "One Hundred Black Men, Inc." as a sign of solidarity. These men envisioned an organization that would implement programs designed to improve the quality of life for African Americans and other minorities. Our founders were successful black men from various walks of life

In 1963, the first meeting of the One Hundred Black Men, Inc. was held in New York City. A group of successful businessmen from a variety of social, educational and economic sectors came together for the common purpose of making a difference in African American communities - by making a difference in the lives of African American youth. The idea quickly caught on and soon independent chapters began forming across the nation until 1986 when nine individual chapters joined together to create the alliance known today as the "100 Black Men of America, Inc."

Now some 73 chapters and 10,000 members strong and still growing, OHBM remains committed to it's founding mission: To improve the quality of life in African American communities by improving the educational, economic and social status of African Americans across the entire nation.

The One Hundred Black Men of New York's commitment to improving the lives of African Americans has been demonstrated with the creation of Eagle Academy for Young Men. This school is based upon a strong academic foundation with a focus on the pillars of character that we believe will provide the backdrop for the success of these young men. Each of the students at The Eagle Academy is provided with an adult male mentor for their four-year stint in high school. Founded in 2004, the school consistently demonstrates a level of achievement that is a reflection of the high educational standards encouraged by 100 Black Men of America. Beginning in the fall of 2007, the Eagle Academy will permanently expand its scope to operate as a full 4-year public high school, graduating its first class in the spring of 2008. As we move forward, we are expanding this model with plans to replicate the school throughout New York City.

In-keeping with our mission of improving the quality of life for African Americans we often partner with corporate entities that are supportive of our goals. Entergy Nuclear Northeast has been an ardent supporter of our initiatives. Entergy has

NRC/TPM/12

provided us with support that will enable us to provide opportunities for education, mentoring and small business expansion and development throughout the New York metropolitan area.

We understand that Entergy is committed to improving the health, social and economic conditions of communities of color by providing safe, affordable, reliable and clean energy. Rising energy cost affects all communities across the US and especially New York, which has some of nation's highest energy bills. The costs of residential and transportation energy represent even larger shares of household expenditures for minority citizens.

The poorest and most vulnerable families, are being hit the hardest by energy cost increases. The high energy costs also impact small and minority businesses and provide barriers for those who want to go into business. A recent August 12th New York Times article highlight a recent Census report indicates a disturbing trend of African Americans moving out of the New York. This great exodus of working and middle class African Americans is 'due impart to the growing housing cost coupled with increased energy cost making home ownership unobtainable. These factors negatively contribute to the quality of life for many African Americans in the New York.

The One Hundred supports the creation and distribution of safe, affordable, reliable and clean energy for not only our communities, but the greater community that is New York. We believe that Entergy is a good corporate citizen, and we support any efforts to balance the delivery of safe energy with initiatives that will soften the burden of these costs on our communities and the environment.

Entergy CW Contention EC-3 Attachment 2

**African American Environmentalist Association
New York**

Written Statement of

Dan Durett

Director

New York Office

African American Environmentalist Association

For the

Environmental Scoping Public Meeting

For

License Renewal

For the

Indian Point Nuclear Power Plant

Presented to the

U.S. Nuclear Regulatory Commission

Office of Nuclear Reactor Regulation

September 19, 2007

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 2003.¹

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 32 years experience working on environmental and energy issues.² My comments today address the Environmental Report of the License Renewal Application (LRA) and other environmental issues of concern to AAEA-NY regarding this proposed action.

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

¹ <http://groups.msn.com/aaeanewyork>

² <http://groups.msn.com/aaeanewyork/yourwebpage4.msnw>

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minimal human, animal, air, water, and land impacts. My comments will address specific environmental justice issues and will expand upon the water permit issue included in Entergy's Environment Report (ER).

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

In order to reduce the levels of impingement and entrainment of Hudson River fish, the Department of Environmental Conservation's ("DEC") Draft SPDES Permit could substantially limit the ability of Indian Point 2 and 3 to generate electricity, and may even lead to the closure of the facilities. Any substantial reduction in the amount of electricity generated by Indian Point 2 and 3 will spark demand for replacement electricity from nearby power plants.

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Unfortunately, these nearby plants are, for the most part, pollution-emitting fossil fuel plants located in New York's low-income and minority communities. As production at these fossil-fuel plants increases, the air quality in and around these plants will further deteriorate, causing a spike in the incidences of respiratory and cardiovascular diseases in the communities where these plants are based. The Draft SPDES Permit, therefore, effectively places the interests of Hudson River fish eggs and larva over the health of New York's low-income and minority communities.

The following section specifically addresses the implications of the water permit because the ER, at Section 4.1, Water Use Conflicts, goes into great detail about the issue. Regarding this issue the ER states, "the vast majority of existing nuclear stations, including those stations undergoing license renewal, currently are or in the future will be undergoing comprehensive 316(b) review as EPA develops final 316(b) regulations for existing facilities in response to the recent remand of that rule."³ EPA suspended the Cooling Water Intake Structure Regulations for existing large power plants on July 2, 2007. This suspension is in response to the 2nd Circuit Court of Appeals decision in *Riverkeeper, Inc., v. EPA*. In the meantime, all permits for Phase II facilities should include conditions under section 316(b) of the Clean Water Act developed on a Best Professional Judgment basis. See 40 C.F.R. § 401.14.⁴

AAEA Has Full Party Status in Indian Point Water Permit Process

The ER addresses the National Pollution Discharge Elimination System (NPDES) status of Indian Point. This issue is of vital importance because an unacceptable permit could cause Entergy to close the facility, which would exacerbate environmental injustice in the region. We are submitting this

³ ER Section 4.2.5 Analysis of Environmental Impact, Section 4.2.5.1 Background

⁴<http://www.epa.gov/waterscience/316b> , Federal Register Notice (July 09, 2007) Implementation Memo (PDF) (1 page, 72K, About PDF; March 20, 2007)

AAEA Statement on Indian Point License Renewal Application

information in the hope that NRC will utilize it for the EIS and will also see the important environmental justice implications of this facility.

AAEA sought and received full party status⁵ in order to bring its unique perspective to the Indian Point 2 and 3 permitting process, and to raise the issue of environmental justice in this proceeding. In a report by the Natural Resources Council of America entitled: "*Environmental Stewardship for the 21st Century: Opportunities and Actions for Improving Cultural Diversity in Conservation Organizations and Programs*," it was found that African Americans comprise only 4% of the boards of directors and only 6% of employees at 61 surveyed conservation organizations. From this, it is clear that the African American perspective has heretofore been lacking from the environmental movement.⁶

The need for greater involvement from the African American community in the DEC permitting process has been recognized by the DEC itself. In September 1999, then DEC Commissioner John P. Cahill announced the creation of DEC's Office of Environmental Justice. This Office, which implements the DEC's Environmental Justice Program, seeks to "ensure that local communities are given an opportunity to express their concerns and that those concerns are considered when making decisions which potentially impact the environment and public health."⁷ On March 19, 2003, the DEC issued Policy Statement CP-29: Environmental Justice and Permitting. In issuing this policy,

⁵ <http://www.dec.ny.gov/hearings/11216.html>

⁶ See also AAEA's Environmental Group Diversity Report Card 2003, available at: <http://www.aaenvironment.com/EnviroGroupReportCard.htm>.

⁷ <http://www.dec.state.ny.us/website/ej/ejprogram.html>. (Last visited Feb. 10, 2004.)

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the DEC stated that the policy was meant to "promote the fair involvement of all people in the DEC environmental permit process," and further stated 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.

Allowing AAEA to participate in the Indian Point 2 and 3 permitting process will achieve the DEC's goal of ensuring that the concerns of local communities, particularly low-income and minority communities be considered when making decisions that impact the environment and public health of these communities.

Fossil-Fuel Power Causes Serious Adverse Health Effects

In 1999, coal-fired power plants in the United States emitted into the environment 11.3 million tons of sulfur dioxide ("SO₂"), a criteria air pollutant that is correlated to asthma and impaired lung functions, 6.5 million tons of nitrogen oxides ("NO_x") which, when combined with other pollutants and sunlight, forms ozone, another lung irritant linked to asthma, and 1.9 billion tons of carbon dioxide ("CO₂"), yet another contributor to increased ozone levels and global climate change.⁸ This equates to approximately 60% of all SO₂ emissions, 25% of all NO_x emissions, and 32% of all CO₂ emissions nationwide.⁹

These and other airborne pollutants emitted by fossil-fuel power stations may have a direct and significant effect on human health. In a study by Abt

⁸ See Rachel H. Cease, ADVERSE HEALTH IMPACTS OF GRANDFATHERED POWER PLANTS AND THE CLEAN AIR ACT: TIME TO TEACH OLD POWER PLANTS NEW TECHNOLOGY, 17 J. Nat. Resources & Env'tl. L. 157, 158 (2002-2003); Martha H. Keating, AIR INJUSTICE, at 4 (October 2002) (attached hereto as Exhibit B).

⁹ 17 J. Nat. Resources & Env'tl. L. at 158.

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Associates, one of the largest for-profit government and business research consulting firms in the world, it was found that over 30,000 deaths each year are attributable to air pollution from U.S. power plants.¹⁰ Another study found that air pollution from power plants was a contributing factor to higher infant mortality rates and higher incidences of Sudden Infant Death Syndrome ("SIDS").¹¹ Research has further shown that pollutants from fossil-fuel power plants form tiny particles (called fine particulate matter) that are linked to diseases of both the respiratory and cardiovascular systems.¹²

Not surprisingly, air pollution has been characterized as one of the largest threats to public health.¹³

The Negative Health Effects of Fossil-Fuel Power Are Borne Disproportionately by African Americans

Sadly, these serious health effects disproportionately fall on the shoulders of low-income and minority communities, including African American communities. For instance, the percentage of African Americans and Hispanics living in areas that do not meet national standards for air quality is considerably higher than that of whites.¹⁴ Correspondingly, respiratory ailments affect African Americans at rates significantly higher than whites. Asthma attacks, for example,

¹⁰ *Id.* at 159.

¹¹ See Martha H. Keating, AIR INJUSTICE, at 3 (October 2002).

¹² See *id.* at 4. See also Air Quality in Queens County: Opportunities for Cleaning Up the Air in Queens County and Neighboring Regions, at S-6, Synapse Energy Economics, Inc. (May 2003) ("Air Quality in Queens County") ("Epidemiological studies tell us that on days when air pollution levels are high, more people get sick or die.") (available at <http://www.synapse-energy.com/Downloads/Synapse-report-queens-air-quality-exec-summary-05-29-2003.pdf>); Children at Risk: How Pollution from Power Plants Threatens the Health of America's Children, at 2, Clean Air Task Force (May 2002) ("Power plant emissions and their byproducts form particulate matter, ozone smog and air toxics. These pollutants are associated with respiratory hospitalizations, lost school days due to asthma attacks, low birth weight, stunted lung growth and tragically, even infant death.") (available at <http://cta.policy.net/fact/children/>).

¹³ Allison L. Russell, URBAN POLLUTANTS: A REVIEW AND ANNOTATED BIBLIOGRAPHY, at 3, New York City Environmental Justice Alliance 2000 (available at <http://www.nyceja.org/pdf/Urban.pdf>).

¹⁴ See *id.*

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send African Americans to the emergency room at three times the rate of whites (174.3 visits per 10,000 people for African Americans versus 59.4 visits per 10,000 people for whites), and African Americans are hospitalized for asthma at more than three times the rate of whites (35.6 admissions per 10,000 people for African Americans versus 10.6 admissions for every 10,000 people for whites).¹⁵ Similarly, the death rate from asthma for African Americans is almost three times that of whites (38.7 deaths per million versus 14.2 deaths per million).¹⁶

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.¹⁷ The New York City area has also been ranked as one of the top five U.S. metropolitan areas for particulate air pollution.¹⁸ 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 high.¹⁹ Another study found that, of the 23 counties in New York State that fail to

¹⁵ *Id.*

¹⁶ *Id.*

¹⁷ See *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) (available at <http://cta.policy.net/fact/mortality/mortalitylowres.pdf>).

¹⁸ See *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." *Id.* at S-5.

¹⁹ See Martha H. Keating, *AIR INJUSTICE*, at 4 (October 2002).

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meet Federal air pollution standards, 37.7% of them are populated by people of color.²⁰

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.²¹ 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 63.2% minority, there are six power plants, Astoria, Poletti, Far Rockaway, JFK Cogeneration, Ravenswood, and the Vernon Blvd. Plant. Queens is also ranked

²⁰ See Clear the Air: People of Color in Non-Attainment Counties (available at http://cta.policy.net/faci/injustice/injustice_non_attainment.pdf).

²¹ 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>).

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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.²² 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, SO₂, and CO₂ 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.²³

Lost Production From Indian Point Will Be Replaced By In-City and Other Nearby Facilities

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, 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*

²² See Air Quality in Queens County, at S-5.

²³ All population data compiled from the 2000 U.S. Census.

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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, CO₂ plant emissions would increase by 101% (or 12,494,172 tons), SO₂ 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, CO₂ plant emissions would still increase by 57% (to 13,686,648 tons), SO₂ 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 from Johns Hopkins University and the Harvard School of Public Health found, among other things, strong evidence linking daily increases in particle pollution to

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increases in death in the largest U.S. cities.²⁴ Links have also been found between fine particle levels and increased hospital admissions for asthma, cardiovascular disease, pneumonia, and chronic obstructive pulmonary disease.²⁵ 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.

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.

Draft SPDES Permit Hinders Indian Point's Ability to Produce Non-Air-Polluting Electricity

Several conditions of the DEC's Draft SPDES Permit for Indian Point 2 and 3 significantly limit Indian Point's ability to generate electricity for the State of New York. For example, Special Condition 28 of the Draft Permit requires the

²⁴ Cited in Death Disease & Dirty Power, at 14.

²⁵ *Id.*

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construction of cooling towers. NYSDEC issued a draft SPDES permit for IP1, IP2, and IP3 in 2003 that, among other conditions, requires the design and, if appropriate, the installation of closed-cycle cooling systems for IP2 and IP3 if the site seeks and receives from NRC license renewals for IP2 and IP3.

AAEA understands that, under conservative estimates, it would take approximately 10 months of Indian Point being offline for a closed-cycle cooling system to be installed. AAEA further understands that the costs of installing cooling towers are sufficiently prohibitive so that Indian Point's owners may elect to shut down the plants rather than invest in the retrofit. Either way, the results will be devastating in terms of the pollution-related health effects when New York's non-clean burning plants scramble to replace the power lost by Indian Point 2 and 3. And since most of these plants are in African American and minority communities, the bulk of the adverse health effects – including asthma and other respiratory diseases, cardiovascular disorders, and even infant mortality – will be borne by these communities. For this reason, AAEA objects to any provision of the Draft SPDES Permit for Indian Point 2 and 3 that imposes any significant limit on the facilities' ability to generate clean-burning electricity, including Special Condition 28.

DEC Did Not Consider Environmental Justice in the Draft Permit

The NRC is required to consider environmental justice in the preparation of an environmental impact statement. Unfortunately, the State of New York did not consider environmental justice in the current permit. Moreover, DEC is imposing a structure that could lead Entergy to close the facility. In the Draft SPDES Permit, the DEC concludes that cooling towers are the "Best Technology Available" ("BTA") to maximize fish protection at Indian Point. However, in making a BTA determination, DEC was required not only to attempt to maximize fish protection, but also to minimize or avoid "other impacts ... to the 'maximum extent practicable' to satisfy SEQR as well as CWA § 316(b)." See Final

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Environmental Impact Statement ("FEIS"). See also 6 NYCRR § 704.5 ("The location, design, construction and capacity of cooling water intake structures, in connection with point source thermal discharges, shall reflect the best technology available for *minimizing adverse environmental impact*") (emphasis added); ("closed-cycle systems do not come without impacts, and those potential impacts must also be weighed for each site"); ("there are certain expenses associated with installing closed-cycle cooling"). Despite these acknowledgments, the DEC issued the Draft SPDES Permit without addressing the environmental justice impacts, which its decision would entail, particularly the significant adverse impacts that will result from a shift in power production from Indian Point 2 and 3 to existing fossil-fuel facilities. The DEC's failure to consider these "other impacts" violates the SEQRA, 6 NYCRR § 704.5, and rendered the FEIS and the Draft SPDES Permit null and void.

AAEA MET THE LEGAL STANDARD FOR PARTY STATUS

6 NYCRR § 624.5(b) allows a person to obtain party status by timely filing a petition, (i) identifying the proposed party together with the name(s) of the person or persons who will act as representative of the party; (ii) identifying the petitioner's environmental interest in the proceeding²⁶; (iii) identifying any interest relating to statutes administered by the department relevant to the project; (iv) identifying whether the petition is for full party or amicus status; and (v) identifying the precise grounds for opposition or support. Additionally, a petitioner must (i) identify an issue for adjudication which meets the criteria of 6

²⁶ Although the DEC's regulations do not define the term "environmental interest," the DEC has held that this term should be applied broadly. See *In the Matter of the Application of Stissing Valley Farms, Inc.*, 1996 WL 33142551, at *3 (N.Y. Dept. Env. Conserv. Nov. 4, 1996).

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NYCRR § 624.4(c) and (ii) present an offer of proof specifying the witness(es), the nature of the evidence the person expects to present and the grounds upon which the assertion is made with respect to that issue. AAEA's Petition for Full Party Status met these criteria. As discussed above, this Petition was brought by AAEA, and the President of AAEA, Norris McDonald, will act as its representative.

Second, AAEA has a strong environmental interest in this proceeding because AAEA is an environmental action group, with a chapter in Long Island, New York, 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 approximately 1,000 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.

Third, AAEA has an interest relating to the statutes administered by DEC, namely, AAEA seeks to ensure that those statutes are interpreted consistent with

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the DEC's policy goal of promoting environmental justice. AAEA also has an interest in ensuring that, when DEC is required by statute or regulation to weigh adverse environmental impacts, it factor environmental justice into the calculation. In addition, AAEA believes that the reference to adverse environmental impacts in the regulation at issue, 6 NYCRR § 704.5, the best technology assessment, implicates the environmental considerations that AAEA has raised herein.

Fourth, AAEA's Petition made clear that it was seeking full party status.

Finally, AAEA's Petition made clear that it opposes the DEC's Draft SPDES Permit for Indian Point 2 and 3 to the extent the Permit imposes substantial limits on the facilities' ability to generate electricity, as these limitations will translate into increased levels of generation – *and* increased levels of air emissions – at nearby facilities, most of which are fossil-fuel facilities located in or near minority and low-income communities.

AAEA'S ISSUES FOR ADJUDICATION

In order to qualify for party status, AAEA identified substantive and significant issues for adjudication, and presented an offer of proof specifying the witnesses and testimony it expects to present, and the grounds upon which the assertion is made with respect to the issue. Under 6 NYCRR § 624.4(c)(2), an issue is substantive "if there is sufficient doubt about the applicant's ability to meet statutory or regulatory criteria applicable to the project, such that a reasonable person would require further inquiry." An issue is significant "if it has the potential to result in the denial of a permit, a major modification to the

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proposed project or the imposition of significant permit conditions in addition to those proposed in the draft permit." 6 NYCRR § 624.4(c)(3).

AAEA submitted the following issues for adjudication:

- (1) Whether the DEC fully considered – as required – all adverse environmental impacts in formulating the Draft SPDES Permit for Indian Point 2 and 3, including air impacts on minority communities?
- (2) Whether the DEC would have issued a different permit had it adequately considered the negative impacts on air quality in low-income and minority communities that will result from any substantial reduction in generation at Indian Point 2 and 3?
- (3) Whether the failure to consider all adverse environmental impacts in formulating the Draft SPDES Permit for Indian Point 2 and 3, including air impacts in minority communities, renders the Permit unsupportable?

AAEA's issues for adjudication are substantive, given that they call into question the legality of the DEC's FEIS and Draft SPDES Permit for Indian Point 2 and 3, raise important public health and environmental justice concerns, and challenge the Draft Permit's compliance with the SEQRA and 6 NYCRR § 704.5 requirement that in issuing a permit, DEC consider *all adverse environmental impacts*. AAEA's issues for adjudication are also significant because they ultimately call for a major modification to the DEC's SPDES Permit for Indian Point 2 and 3, namely, eliminating those provisions of the Permit which would result in significant reductions in generation at Indian Point 2 and 3, including Special Condition 28 (the cooling tower requirement).

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Recommendation

AAEA-NY wants the DEC to eliminate the cooling tower provision in a water permit for Indian Point. Such a permit would eliminate the issue of possible closure of the plant and provide a more clear-cut status for NRC in considering the license renewal. Resolution of this situation will also provide a simpler situation for describing the position environmental justice impacts provided by Indian Point in the EIS.

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.

African American Environmentalist Association

Written Statement of

Norris McDonald

Founder and President
African American Environmentalist Association

For the

Environmental Scoping Public Meeting

For

License Renewal

For the

Indian Point Nuclear Power Plant

Presented to the

U.S. Nuclear Regulatory Commission

Office of Nuclear Reactor Regulation

September 19, 2007

Introduction

My name is Norris McDonald and I am the founder and president of the African American Environmentalist Association (AAEA). 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.

AAEA 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 and I was the first environmentalist to publicly support this technology. I am a veteran environmentalist with 28 years experience working on environmental and energy issues.¹

The AAEA headquarters office is located in the metropolitan Washington, D.C., area and we also maintain a New York City chapter located in Long Island, New York.² AAEA also has chapters in other states and in other countries.³

Entergy Nuclear Indian Point 2, LLC and Entergy Nuclear Indian Point 3, LLC (hereafter referred to as "Entergy") has submitted an Environmental Report (ER) in conjunction with the License Renewal Application (LRA) to the U.S. Nuclear Regulatory Commission (NRC) to renew the operating licenses for Indian Point Units 2 and 3 (IP2 and IP3) for twenty years beyond the end of the current license terms. AAEA will comment on the contents of the ER and provide its own environmental perspective about the LRA.

¹ Mr. McDonald has published numerous articles on environmental issues including: Global Warming and the African American Community (<http://www.blackelectorate.com/articles.asp?ID=629> & <http://www.blackelectorate.com/articles.asp?ID=630>); What A Good Energy Policy Means for Blacks (<http://www.blackelectorate.com/articles.asp?ID=508>); and South Africa Takes the Lead in Nuclear Energy (<http://www.blackelectorate.com/articles.asp?ID=524>).

² <http://groups.msn.com/aaeanewyork>

³ Active: Nigeria, China, Hong Kong, Midwest, Southeast, Missouri. Inactive: Texas and Los Angeles

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Of particular import to AAEA 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 seeks to promote the safe use of nuclear power. 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. This public support started in 2001 and continues to this day. The fundamental reasons that AAEA supports nuclear power are:

- Nuclear power provides electricity safely and reliably,
- Nuclear power produces no smog forming emissions,
- Nuclear power produces no greenhouse gases,
- Spent fuel can be reprocessed for reuse,
- Yucca Mountain is acceptable as a repository for non-recyclable products,
- Nuclear power has an excellent quarter century safety record, and
- Nuclear power plants can use nuclear bomb warhead material as a fuel.

Indian Point is one of 103 other commercial nuclear power plants that provide 20 percent of our nation's electricity.

Environmental Justice

Environmental justice is defined by AAEA as the fair treatment of all people regardless of race or income with respect to environmental issues. AAEA was among the participants at the U.S. Environmental Protection Agency in 1991 when environmental justice policies were first being considered by the agency. AAEA is currently promoting environmental justice locally, regionally and nationally.

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, which will exacerbate conditions in minority

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communities already overburdened by pollution sites. Indian Point provides reliable emission free energy without contributing pollutants that exacerbate asthma. Closure of Indian Point would also result in compliance issues for the State with respect to the federal Clean Air Act State Implementation Plan ("SIP") and to meeting the requirements of the Regional Greenhouse Gas Initiative (RGGI).

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. Comments being submitted by our New York Office address the specific environmental justice issues that are negatively affecting minority communities. Those comments will specifically list how the operation of Indian Point continually mitigates those negative effects.

Environmental Justice Review

This section of the ER could be a little confusing to the casual observer. In one section it states, "The need for and the content of an analysis of environmental justice will be addressed in plant specific reviews." (4.22.2) The next section states, "Other than the above referenced finding, there is no requirement concerning environmental justice in 10 CFR Part 51." (4.22.3). The Background section then goes on to state, "The environmental justice review involves identifying off-site environmental impacts, their geographic locations, minority and low income populations that may be affected, the significance of such effects, and whether they are disproportionately high and adverse compared to the population at large within the geographic area, and if so, what mitigative measures are available, and which will be implemented. The NRC staff will perform the environmental justice review to determine whether there will be disproportionately high human health and environmental effects on minority and low-income populations and report the review in its SEIS." The section then comes full circle to state, "The staff's review will be based on information provided in the ER and developed during the staff's site-specific scoping process." (4.22.4). So Entergy is not required to develop the environmental justice analysis, but the NRC will conduct an environmental justice review based

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on information provided by Entergy in the ER. Regardless, we agree with Entergy's assessment that, "there can be no disproportionately high and adverse impacts or effects on members of the public, including minority and low-income populations, resulting from the renewal of the IP2 and IP3 Operating Licenses."

(4.22.6) We have one caveat. This section did not include the great environmental benefits that Indian Point provides to minority communities. Entergy is enhancing environmental justice and is fighting environmental injustice. It should be allowed to continue doing so for another 20 years:

Fossil-Fuel Power Causes Serious Adverse Health Effects

In 1999, coal-fired power plants in the United States emitted into the environment 11.3 million tons of sulfur dioxide ("SO₂"), a criteria air pollutant that is correlated to asthma and impaired lung functions, 6.5 million tons of nitrogen oxides ("NO_x") which, when combined with other pollutants and sunlight, forms ozone, another lung irritant linked to asthma, and 1.9 billion tons of carbon dioxide ("CO₂"), yet another contributor to increased ozone levels.⁴ This equates to approximately 60% of all SO₂ emissions, 25% of all NO_x emissions, and 32% of all CO₂ emissions nationwide.⁵

These and other airborne pollutants emitted by fossil-fuel power stations may have a direct and significant effect on human health. In a study by Abt Associates, one of the largest for-profit government and business research consulting firms in the world, it was found that over 30,000 deaths each year are attributable to air pollution from U.S. power plants.⁶ Another study found that air pollution from power plants was a contributing factor to higher infant mortality

⁴ See Rachel H. Cease, ADVERSE HEALTH IMPACTS OF GRANDFATHERED POWER PLANTS AND THE CLEAN AIR ACT: TIME TO TEACH OLD POWER PLANTS NEW TECHNOLOGY, 17 J. Nat. Resources & Envtl. L. 157, 158 (2002-2003); Martha H. Keating, AIR INJUSTICE, at 4 (October 2002) (attached hereto as Exhibit B).

⁵ 17 J. Nat. Resources & Envtl. L. at 158.

⁶ *Id.* at 159.

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rates and higher incidences of Sudden Infant Death Syndrome ("SIDS").⁷

Research has further shown that pollutants from fossil-fuel power plants form tiny acidic particles (called fine particulate matter) that are linked to diseases of both the respiratory and cardiovascular systems.⁸ Not surprisingly, air pollution has been characterized as one of the largest threats to public health.⁹

The Negative Health Effects of Fossil-Fuel Power Are Borne Disproportionately by African Americans

Sadly, these serious health effects disproportionately fall on the shoulders of low-income and minority communities, including African American communities. For instance, the percentage of African Americans and Hispanics living in areas that do not meet national standards for air quality is considerably higher than that of whites.¹⁰ Correspondingly, respiratory ailments affect African Americans at rates significantly higher than whites. Asthma attacks, for example, send African Americans to the emergency room at three times the rate of whites (174.3 visits per 10,000 people for African Americans versus 59.4 visits per 10,000 people for whites), and African Americans are hospitalized for asthma at more than three times the rate of whites (35.6 admissions per 10,000 people for African Americans versus 10.6 admissions for every 10,000 people for whites).¹¹ Similarly, the death rate from asthma for African Americans is almost three times that of whites (38.7 deaths per million versus 14.2 deaths per million).¹²

⁷ See Martha H. Keating, AIR INJUSTICE, at 3 (October 2002).

⁸ See *id.* at 4. See also Air Quality in Queens County: Opportunities for Cleaning Up the Air in Queens County and Neighboring Regions, at S-6, Synapse Energy Economics, Inc. (May 2003) ("Air Quality in Queens County") ("Epidemiological studies tell us that on days when air pollution levels are high, more people get sick or die.") (available at <http://www.synapse-energy.com/Downloads/Synapse-report-queens-air-quality-exec-summary-05-29-2003.pdf>); Children at Risk: How Pollution from Power Plants Threatens the Health of America's Children, at 2, Clean Air Task Force (May 2002) ("Power plant emissions and their byproducts form particulate matter, ozone smog and air toxics. These pollutants are associated with respiratory hospitalizations, lost school days due to asthma attacks, low birth weight, stunted lung growth and tragically, even infant death.") (available at <http://cta.policy.net/fact/children/>).

⁹ Allison L. Russell, URBAN POLLUTANTS: A REVIEW AND ANNOTATED BIBLIOGRAPHY, at 3, New York City Environmental Justice Alliance 2000 (available at <http://www.nyceja.org/pdf/Urban.pdf>).

¹⁰ See *id.*

¹¹ *Id.*

¹² *Id.*

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 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.

Applicant's Environmental Report

The proposed action of renewing the operating license for Indian Point would lead to continued environmental benefits for the region. The alternatives to the proposed action: no action, decommissioning or utilizing alternative energy sources, will either have very negative environmental impacts or are not feasible. The proposed action is to renew the operating licenses for IP2 and IP3 for a period of twenty (20) years beyond the current operating licenses' expiration dates. For IP2 the requested renewal would extend the existing license expiration date from September 28, 2013 until September 28, 2033. For IP3 the requested renewal would extend the existing license expiration date from December 12, 2015 to December 12, 2035.

Physical and Chemical Environment

The lower Hudson River is a 152-mile tidal estuary and Indian Point is located 43 miles from the mouth. Two of the most serious issues around the plant are 1) it is located in a Clean Air Act nonattainment area and 2) serious PCB contamination occurred upriver and there are currently plans for mitigation. Regarding air issues, Indian Point is probably the most positive industrial structure in the region that provides valuable electricity service while adding no EPA criteria pollutants. In terms of the river, poison runoff from urban, suburban and rural sources is the principle threat to the river. The ER comprehensively covers the environmental issues related to the physical and chemical environments in the area. The ER also includes helpful information generated from years of environmental impact statements generated by the New York

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Department of Environmental Conservation. The report provides extensive coverage of the endangered species in the area. The NRC Generic Environmental Impact Statement is utilized to establish characterization methods for fish populations and other environmental characteristics.

Minority and Low Income Populations

The NRC performs environmental justice analyses utilizing a 50-mile radius around the plant as the environmental "impact site" and the four states (New York, New Jersey, Pennsylvania & Connecticut) individually when all or part of a block group is in those states as the "geographic area" for comparative analysis. The NRC Procedural Guidance for Performing Environmental Assessments and Considering Environmental Issues indicates that a minority population is considered to be present if either of the two following conditions exists: (1) The minority population in the census block group exceeds 50 percent. (2) The minority population is more than 20 percentage points greater in the census block group than it is in the minority percentage of the geographic area chosen for the comparative analysis. The NRC defines "minority" population as American Indian or Alaskan Native, Asian, Native Hawaiian or Pacific Islander, Black, other, multi-racial, the aggregate of all minority races, or Hispanic ethnicity. The ER includes significant demographic information related to minority and low-income populations.

Indian Point is, and has been, a positive environmental structure for minority and low-income people. This positive influence should be allowed to continue.

Taxes, Local Land Use and Housing

The ER contains an exhaustive description of benefits it provides to local entities in terms of income. All of the counties around the facility are growing rapidly and will be challenged to meet electrical capacity needs and the aforementioned atmospheric regulations. Indian Point is a positive factor for growth in the region.

AAEA Statement on Indian Point LRA

History

The description of the history of the Indian Point site is illuminating. The construction and operation of the facility has added to the fine history of this site. The NRC should provide the license renewal requested so that the excellent emission free electricity can continue to flow throughout the region.

Radioactive Waste Treatment Processes

We are satisfied that Entergy is taking the appropriate steps to manage its waste products. They are following the procedures for managing and storing liquid, gaseous and solid radioactive wastes. Entergy also initiated site preparation work in 2006 for dry cask storage. This Independent Spent Fuel Storage Installation (ISFSI) Facility will provide acceptable temporary storage until Yucca Mountain is ready to accept spent fuel. According to the ER, the ISFSI Facility will contain a 96' x 208' concrete storage pad, which will provide storage locations for 78 Holtec International HI-STORM 100S(B) Casks. The HI STORM Casks will be arranged in a 6 x 13 array with 75 storage locations allocated for the casks.

IP2 and IP3 Gaseous Effluent Releases

The quantities of gaseous effluents released from the site are controlled by the administrative limits defined in the Offsite Dose Calculation Manual (ODCM). Entergy has operated the plant within ODCM parameters and we are satisfied that releases have never caused environmental harm.

Employment

The work force at Indian Point consists of approximately 1,255 persons. The ER gives a comprehensive description of this workforce: where they live and how many employees live in a particular jurisdiction. AAEA wants these employees and future employees to have the opportunity to work at this electric power facility for an additional 20 years beyond 2013 and 2015. They probably do not consider themselves to be environmental justice activists, but by their functions, they are fighting environmental injustice.

GEIS Categories For Environmental Issues

The NRC identified and analyzed 92 environmental issues in its Generic Environmental Impact Statement (GEIS) that it considers being associated with nuclear power plant license renewal and has designated the issues as Category 1, Category 2, or NA (not applicable). Entergy lists 43 Category 1 issues that are applicable to the site. The NRC identified 21 issues as Category 2. Entergy lists 11 Category 2 issues that are applicable to the site. Regarding Not Applicable License Renewal Issues, NRC determined that its categorization and impact-finding definitions did not apply to electromagnetic fields (chronic effect) and environmental justice. However, the ER goes on to state that, "for environmental justice, NRC does not require information from applicants, but noted that it would be addressed in individual license renewal reviews (10 CFR Part 51, Appendix B, Table B-1, Footnote 6). Entergy has included environmental justice demographic information in Section 2.6.2.

Impingement and Entrainment

AAEA concurs with Entergy's conclusion on impingement and entrainment that withdrawal of water from the Hudson River for the purposes of once-through cooling at the site does not have any demonstrable negative effect on representative Hudson River fish populations, nor does it warrant further mitigation measures. (Section 4.3.6)

Heat Shock and Thermal Discharge Analysis

The ER states that Indian Point, "is complying with this permit, including limits and conditions established by the NYSDEC for thermal discharges...and the associated agreement to continue implementation of the fourth Consent Decree ensures that thermal impacts will satisfy the requirements of CWA 316(a) and will thus remain SMALL during the license renewal term. Therefore, no further mitigation measures are warranted. ." (Section 4.4.6) AAEA has no information to challenge this conclusion.

AAEA Statement on Indian Point LRA

Endangered Species

AAEA concurs with Entergy's conclusion regarding endangered species: "The continued operation of the site will not adversely impact any federally listed species which may exist on or pass through the site."

Groundwater contamination

AAEA believes that any leakage of radiation into the groundwater is unacceptable. The site does not use groundwater in its operations or as a source of drinking water. Groundwater is not the source of drinking water for Peekskill or Buchanan. Current conditions of the radiological contamination appear to be largely limited to the general area beneath the facility. The ER provides extensive coverage of this issue. The information is satisfactory to AAEA and should be comforting to the public. The ER also states, "The investigation of the radionuclide contamination of the groundwater began in 2005, and although the investigation is on-going, Entergy and the NRC have concluded that although there appears to be some level of contaminated groundwater that discharges to the Hudson River, these levels do not exceed the effluent or radiological dose criteria established by the NRC. Entergy plans to continue to investigate groundwater contamination mitigation methods to determine their feasibility, as deemed appropriate by the NRC." (4.23.5) Thus, the current condition of this contamination should not be an impediment to license renewal.

Alternatives Considered

AAEA supports the proposed action, opposes the no-action alternative, and believes that alternative energy technologies are not feasible for replacing the electricity output at the facility. The ER gives thorough coverage to these alternatives.

Closed Cycle Cooling Alternatives

The ER examines four alternative technologies for heat dissipation: 1) evaporative ponds, spray ponds or cooling canals, 2) dry cooling towers, 3) natural draft cooling towers, and 4) mechanical draft wet cooling towers. A closed cycle cooling retrofit has never been performed on a nuclear power plant before and the consequences of trying are wildly unpredictable. The

AAEA Statement on Indian Point LRA

consideration of these technologies is comprehensive in the ER. We oppose all of these technologies and fear that if any of them are imposed, it is our belief the company will choose to close.

Natural Gas or Coal Replacement

AAEA believes these fossil fuel plants are not feasible at the Indian Point location. AAEA believes natural gas should be used to produce base-load electricity as little as possible. The site is not large enough to accommodate a coal plant.

Water Permit (Water Quality 401 Certification)

The ER states, "NYSDEC has taken the position that it will require submission of an application for a new state water quality (401) certification in conjunction with the license renewal application, rather than relying on the SPDES permit as evidence of continued certification. To initiate the approval process, Entergy will file the Joint Application for Permit with the NYSDEC for the water quality certification at a date determined by the NYSDEC. The SPDES permit for discharges at the site expired on October 1, 1992. However in accordance with the New York State Administrative Procedures Act, Entergy filed a timely SPDES permit renewal application 180 days prior to the current permit's expiration date on April 3, 1992. Therefore, the SPDES permit has been administratively continued." This summary of the current status of Entergy's Indian Point water permit illustrates that the company is in compliance with the Clean Water Act. AAEA intends to participate in the future adjudication of this issue. There is also the matter of EPA finalizing regulations for determination of best available technologies for power plants.

Recommendation and Conclusion

The license should be renewed. There are not environmental considerations that would merit refusal of the renewal. AAEA supports the License Renewal. The facility is an environmental asset for the local area, the state and the planet. The license renewal would promote environmental justice and mitigate global warming. The license would enhance New York's ability to meet its clean air requirements and global warming agreement.

Entergy CW Contention EC-3 Attachment 3

In the Matter of a Renewal
and Modification of a
State Pollutant Discharge
Elimination System (SPDES)
permit pursuant to
Environmental Conservation Law
ECL) Article 17 and
Title 6 of the Official
Compilation of Codes,
Rules and Regulations of
the State of New York
(6 NYCRR) Parts 704 and
750 et seq. by

**Ruling on Proposed Issues
For Adjudication and Petitions
For Party Status**

DEC No.: 3-5522-00011/00004
SPDES No.: NY-0004472

Entergy Nuclear Indian Point 2, LLC
and Entergy Nuclear Indian Point 3, LLC,

Permittees.

February 3, 2006

Background

Entergy Nuclear Indian Point 2, LLC and Entergy Nuclear Indian Point 3, LLC (collectively referred to herein as "Entergy," or "Permittees") seek to renew a State Pollutant Discharge Elimination System ("SPDES") permit for the Indian Point nuclear powered steam electric generating stations (the "Stations"). The Stations are located on the east side of the Hudson River, at river mile 43, in the Village of Buchanan, Westchester County, New York. Indian Point 2, which commenced operations subject to a license issued by the Nuclear Regulatory Commission in 1972, has a capacity of 970 megawatts. Indian Point 3 was licensed by the Nuclear Regulatory Commission in 1976, and has a capacity of 980 megawatts.¹

Indian Point 2 and Indian Point 3 are equipped with separate cooling water systems that withdraw water from the Hudson River and discharge that water back to the River through a shared discharge canal (a "once-through" cooling system). The water is taken into the cooling system, circulates past the condenser coils to absorb waste heat from operation of the generation

¹ Indian Point 1 is also owned and managed by Entergy, but no longer generates electricity and will be decommissioned. Nevertheless, cooling and service water is still drawn through the Unit 1 intake.

equipment, and is discharged back to the River at a higher temperature than at the intake. The Stations withdraw up to 2.5 billion gallons of water per day from the Hudson River, through three intake structures on the shoreline. The heated non-contact cooling water is discharged to the River through sub-surface diffuser ports located along the seaward wall of the discharge canal, south of the intake structures.

Staff of the New York State Department of Environmental Conservation ("DEC" or "Department") issued a SPDES permit for the Stations in 1987. The permit was originally jointly issued to Consolidated Edison (the then-owner and operator of Unit 2) and the New York Power Authority (the then-owner and operator of Unit 3). In April 1992, Consolidated Edison and the New York Power Authority filed, pursuant to Environmental Conservation Law ("ECL") Section 17-0823, a timely renewal application with the Department. As a result, the Stations have continued to operate pursuant to the "safe harbor" provision of the State Administrative Procedure Act ("SAPA") Section 401(2).² In November 2000, the Indian Point 3 permit was transferred to Entergy Nuclear Indian Point 3. In September 2001, the Indian Point 2 permit was transferred to Entergy Nuclear Indian Point 2.

In 1975, the United States Environmental Protection Agency ("EPA") issued National Pollutant Discharge Elimination System ("NPDES") permits for the Indian Point facilities, as well as the Roseton and Bowline Point fossil fuel powered facilities. At that time, Central Hudson Gas & Electric ("CHG&E") operated the Roseton facility, and Orange and Rockland Utilities, Inc. ("O&R") was the owner of the Bowline power plant. The Roseton plant was jointly owned by CHG&E, Consolidated Edison, and Niagara Mohawk.

On December 19, 1980, the New York State Attorney General, the Department, EPA, Consolidated Edison, CHG&E, NYPA, and O&R, as well as other interested parties, entered into the Hudson River Settlement Agreement ("HRSA"). Since 1975, when EPA issued the NPDES permits, the signatories to the agreement had been

² Section 401(2) provides that

[w]hen a licensee has made timely and sufficient application for the renewal of a license or a new license with reference to any activity of a continuing nature, the existing license does not expire until the application has been finally determined by the agency, and, in case the application is denied or the terms of the new license limited, until the last day for seeking review of the agency order or a later date fixed by order of the reviewing court, provided that this subdivision shall not affect any valid agency action then in effect summarily suspending such license.

involved in adjudicatory hearings and subsequent negotiations with respect to, among other things, retrofitting cooling towers at the facilities. The HRSA was "a 10-year agreement designed to obtain necessary data, impose needed analytical assessments, and develop an impact assessment to determine how best to mitigate impacts to the Hudson River," and was intended to take into account the social, energy, economic and environmental issues in connection with the HRSA facilities' operations. June 25, 2003. Final Environmental Impact Statement, Issues Conference Exhibit (hereinafter "IC Exh.") 7, at 8. Through a series of judicial orders on consent,³ the HRSA process continued through the 1990s.

In May 1992, the Department, as lead agency, issued a positive declaration pursuant to the State Environmental Quality Review Act ("SEQRA"), ECL Article 8, with respect to the SPDES permit renewal application. Department Staff determined that the proposal is a Type I action, pursuant to Part 617 of Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York ("6 NYCRR"). A coordinated review was conducted and the Department determined that the project may have a significant adverse impact on the environment. Department Staff issued the positive declaration due to concerns about the impacts the HRSA facilities may have on Hudson River fish populations. The purpose of the positive declaration was to undertake a comprehensive environmental review of the potential adverse impacts and to assess reasonable mitigation measures.

The Department issued a Notice of Complete Application dated February 28, 2000, which was published in the Department's *Environmental Notice Bulletin* ("ENB") on March 8, 2000, and in newspapers in the vicinity of the Stations during the following week.

In 2002, certain petitioners, including the Hon. Richard L. Brodsky, an assemblyman in the New York State Legislature, commenced a proceeding in Albany County Supreme Court, pursuant to Article 78 of the New York Civil Practice Law and Rules ("CPLR"), to mandate action by the Department on the Indian Point SPDES permit renewal applications (Matter of Brodsky v. Crotty, Sup. Ct., Albany County, Keegan, J., Index No. 7136-02). On April 8, 2003, upon review of the renewal application, Department Staff proposed to modify the SPDES permit to require reduction of impacts to aquatic organisms and completion of a water quality

³ The First Amended Consent Order expired on September 1, 1994. The Second Amended Consent Order expired on September 1, 1995. The Third Amended Consent Order expired on September 1, 1997, and the Fourth Amended Consent Order expired on February 1, 1998.

review that would result in adjustments to certain limits in the existing SPDES permit. On May 14, 2003, the court issued an order that set a schedule requiring, among other things, that Department Staff complete the Final Environmental Impact Statement ("FEIS") for the Stations by July 1, 2003, and issue a draft SPDES permit for the Stations by November 14, 2003. The court's order also granted a motion by Riverkeeper, Inc. to intervene.

The Department accepted the FEIS on June 25, 2003. The FEIS described the project's "Potential Environmental Impacts" as follows:

The majority of impacts to aquatic organisms and habitat associated with intake structures from these facilities is closely linked to water withdrawals from the various waters in which the intakes are located. . . . The withdrawal of such quantities of cooling water affects large numbers of aquatic organisms annually Aquatic organisms drawn into CWIS [cooling water intake structures]⁴ are either impinged on components of the CWIS or entrained in the cooling water system itself.

Impingement takes place when organisms are trapped against intake screens by the force of the water passing through the cooling water intake structure. This can result in starvation and exhaustion (organisms are trapped against an intake screen or other barrier at the entrance to the cooling water intake structure), asphyxiation (organisms are pressed against an intake screen or other barrier at the entrance to the cooling water intake structure by velocity forces which prevent proper gill movement, or organisms are removed from the water for prolonged

⁴ EPA has defined a "cooling water intake structure" as the total physical structure and any associated constructed waterways used to withdraw water from the waters of the United States, from the point at which water is withdrawn, up to and including the intake pumps. 66 Federal Register ("Fed. Reg.") 65259 (Dec. 18, 2001). The Agency has defined "cooling water" as water used for contact or non-contact cooling, including water used for equipment cooling, evaporative cooling tower makeup, and dilution of effluent heat content. See generally 65 Fed. Reg. 49071-4 (Aug. 10, 2000) and 66 Fed. Reg. 65262 (Dec. 18, 2001). Cooling water's intended use is to absorb waste heat from production processes or auxiliary operations. 66 Fed. Reg. 65262 (Dec. 18, 2001).

periods of time), descaling (fish lose scales when removed from an intake screen by a wash system), and other physical harms.

Entrainment usually occurs when relatively small benthic, planktonic, and nektonic organisms, including early life stages of fish and shellfish, are drawn through the cooling water intake structure into the cooling system. In the normal water body ecosystem, many of these small organisms serve as prey for larger organisms that are found higher on the food chain. As entrained organisms pass through a plant's cooling system they are subject to mechanical, thermal, or toxic stress. Sources of such stress include physical impacts in the pumps and condenser tubing, pressure changes caused by diversion of the cooling water into the plant or by the hydraulic effects of the condensers, sheer stress, thermal shock, and chemical toxemia induced by antifouling agents such as chlorine.

In addition to impingement and entrainment losses associated with the operation of CWIS, another concern is the cumulative degradation of the aquatic environment as a result of (1) multiple intake structures operating in the same watershed or in the same or nearby reaches, (2) intakes located within or adjacent to an impaired waterbody.

Issues Conference Exhibit (hereinafter "IC Exh.") 7, at 15-16 (citations omitted).

The FEIS goes on to note that historically, impacts related to CWIS have been evaluated pursuant to Clean Water Act ("CWA") Section 316(b) (33 United States Code Section 1326(b)) on a facility-by-facility basis. Section 316(b) of the statute requires that any standard established pursuant to Sections 301 or 306 of the Act and applicable to a point source discharge must require that the location, design, construction and capacity of the cooling water intake structures ("CWIS") reflect the "best technology available" for minimizing adverse environmental impact.

On November 12, 2003, Department Staff provided a draft permit for the Stations (IC Exh. 3A).⁵ The draft permit contains conditions which address three aspects of operations at Indian Point: conventional industrial-wastewater pollutant discharges, thermal discharge, and cooling water intake. Limits on the conventional industrial discharges are not proposed to be changed significantly from the previous permit. The draft permit does, however, contain new conditions addressing the thermal discharge and additional new conditions to implement the measures the Department has determined to be the best technology available ("BTA") for minimizing impacts to aquatic resources from the cooling water intake, including the installation of a closed cycle cooling system at the Stations.

In order to reduce mortality of fish and aquatic invertebrates, the Stations currently operate Ristroph modified traveling screens, a fish handling and return system, two-speed pumps in Unit 2, and variable speed pumps in Unit 3. With respect to thermal discharges, the draft SPDES permit would require Entergy to conduct a tri-axial (three-dimensional) thermal study to document whether the thermal discharges from Units 2 and 3 comply with State water quality criteria. If the Stations do not meet State standards, Entergy may apply for a modification of those criteria in an effort to demonstrate to the Department that such criteria are unnecessarily restrictive and that the requested modification would not inhibit the existence and propagation of a balanced indigenous population of shellfish, fish and wildlife in the River.

The Department has also determined that a closed-cycle cooling system is the site-specific BTA to minimize the adverse environmental impacts of the Units 1, 2 and 3 cooling water intake structures. Nevertheless, Entergy may propose, within a year of the permit's becoming effective, an alternative technology or technologies that can minimize adverse environmental impacts to a level equivalent to that achieved by a closed-cycle cooling system at the Stations.

In order to implement closed-cycle cooling, the draft permit would require Entergy to submit a pre-design engineering report within one year of the permit's effective date. Within one year after the submission of the report, Entergy must submit complete design plans that address all construction issues for conversion

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At the issues conference, Department Staff provided a revised draft permit dated March 1, 2004 (IC Exhs. 11A, 11B, 11C, and 11D). The revisions addressed stenographic errors and other inaccuracies which were resolved between Entergy and Department Staff.

to closed-cycle cooling. In addition, the draft permit requires Entergy to obtain approvals for the system's construction from other government agencies, including modification of the Stations' operating licenses from the Nuclear Regulatory Commission. According to the fact sheet that accompanied the draft SPDES permit, the Department cannot require Entergy to seek extensions of its Nuclear Regulatory Commission licenses. If Entergy elects not to extend those licenses, or if the Commission denies a requested extension, the Department will not require closed cycle cooling at the Stations. The fact sheet stated that Entergy estimated that once construction begins, the conversion to closed cycle cooling will take nearly five years to complete.

While steps are being taken to implement BTA, Entergy would be required to schedule and take annual generation outages of no fewer than 42 unit-days during the peak entrainment season, between February 23 and August 23 of each calendar year. Under the terms of the draft SPDES permit, these fish protection outages must continue until closed cycle cooling is operational at the Stations. In addition, Entergy must continue to operate the existing fish impingement mitigation measures, including the Ristroph screens and the fish return system, and, to reduce entrainment, Entergy must reduce flows throughout the year according to a schedule specified in the permit. The draft SPDES permit would also require Entergy to continue to conduct long-term fish monitoring programs, and to pay \$24 million annually into an escrow account (the Hudson River Estuary Restoration Fund), from which the Department will draw funds for programs or projects intended to restore, protect or enhance Hudson River Estuary resources.

Proceedings

A notice dated November 12, 2003 (the "Notice"), announcing the public comment period and the availability of the draft permit, as well as providing notice of the legislative public hearing and issues conference, appeared in the Department's *Environmental Notice Bulletin* on November 12, 2003 and in the *Journal News*, the *Poughkeepsie Journal*, the *New York Times*, the *Middletown Times Herald Record*, and the *Kingston Daily Freeman* on November 14, 2003.

Legislative Public Hearings

As provided for in the Notice, administrative law judge ("ALJ") Maria E. Villa convened legislative hearing sessions on January 28, 2004 at 2:00 p.m. and 7:00 p.m., and on January 29, 2004 at 2:00 p.m. and 7:00 p.m. at the Esplanade Hotel in White

Plains, New York to receive unsworn statements from members of the public about the application materials and the draft SPDES permit. ALJ Daniel P. O'Connell also presided.

At each of the four sessions, representatives of Permittees and Department Staff made presentations. Eight persons spoke at the 2:00 p.m. session on January 28, including the Honorable Richard Brodsky, of the New York State Assembly. Mr. Brodsky discussed Matter of Brodsky v. Crotty, and stated that the Stations' withdrawal, use and discharge of water from the Hudson River damaged the resource. The Assemblyman went on to criticize the decision to defer implementation of closed cycle cooling for fifteen years, as provided for in the draft SPDES permit. In his remarks, Mr. Brodsky raised objections to the factual basis for Department Staff's determinations, and the legal sufficiency of the draft permit.

The next speaker, an Entergy employee and local resident named Vincent Coulehan, stated that over the years he had seen the water quality and fish population in the River improve, and maintained that attempting to retrofit cooling towers at the Stations would reduce the electrical output and ultimately result in a permanent shutdown. Mr. Coulehan said that electric reliability is of great concern, and that installing cooling towers would harm the environment by increasing air pollution. According to Mr. Coulehan, cooling towers would be unsightly, and would not provide measurable ecological benefits to the River.

Norris McDonald, the president of the African American Environmentalist Association ("AAEA"), was the next speaker. Mr. McDonald raised concerns with respect to the adverse environmental and health effects to be anticipated if the Stations were obliged to shut down. According to Mr. McDonald, the Stations are already using best available technology to prevent fish kills. He stated that the AAEA took the position that the recommendation that cooling towers be installed is expensive, unnecessary and would only lead to the Stations' closure.

Mr. McDonald went on to say that closure of the Stations would only shift air pollution to other areas of the State, specifically, minority communities, and thus would raise a significant environmental justice issue. This speaker questioned whether environmental justice considerations had been taken into account as part of Department Staff's review of the permit, and observed that if the appropriate review had not occurred, the AAEA would consider filing an environmental justice complaint with EPA. Mr. McDonald also maintained that closure of Indian

Point would result in compliance issues for the State with respect to the federal Clean Air Act State Implementation Plan ("SIP"), and emphasized that the Stations provided reliable energy without contributing pollutants that exacerbate asthma. According to Mr. McDonald, a balanced approach should be taken that would consider the environment, the health of minority communities, and the need to provide electricity for the metropolitan area. Mr. McDonald stated that the AAEA strongly opposes the recommendations in the draft permit, and asserted that closed-cycle cooling would not minimize environmental impacts because the owner of the Stations would probably close Indian Point rather than install the system recommended by Department Staff.

A third speaker and Entergy employee, Robert Licata, spoke in opposition to the installation of cooling towers, contending that polychlorinated biphenyls ("PCBs") are the primary pollutant of concern in the Hudson River, and are not attributable to the Stations. Mr. Licata asserted that the heated water that is returned to the River by once-through cooling has a beneficial impact on the fish population. This speaker expressed concern that changes at Indian Point could have far-reaching consequences for nuclear plants throughout the nation, and urged consideration of the effects of any decision on all segments of society.

Antonio Zoulis, who spoke next, referred to a letter he had written to the Wildlife Conservation Magazine, pointing out that the Stations' thermal discharge was strictly regulated and that there was no conclusive evidence that the Stations actually harmed fish populations. Mr. Zoulis argued that the most effective emission control strategy for utilities would be to increase nuclear generation, pointing out that nuclear energy accounted for about 72 percent of U.S. emission-free generation in 2000.

The final speaker, Elise N. Zoli, Esq., counsel for Entergy, responded to the remarks made earlier by Assemblyman Brodsky. Ms. Zoli took issue with the Assemblyman's characterization of the Court's order in Matter of Brodsky, pointing out that the Department voluntarily agreed to issue the SPDES permit by November 14, 2003. Ms. Zoli stated that Judge Keegan did not reach any conclusion as to the Stations' impact on the Hudson River or its fisheries.

Other than representatives of Permittees and Department Staff, no one appeared for the 7:00 p.m. session on January 28, 2005. Consequently, no comments from the public were received at that time. At the 2:00 p.m. session on January 29, ten persons

advised the ALJ that as a result of recent discussions with Department Staff, proposed issue 4 was withdrawn. Accordingly, this issue will not be considered at the adjudicatory hearing.

AAEA's Issues for Adjudication

As noted above, the African American Environmentalist Association ("AAEA") filed a timely petition for party status. According to the petition, the AAEA was founded in 1985 and is a national, nonprofit organization "dedicated to protecting the environment, promoting the efficient use of natural resources, enhancing human, animal and plant ecologies, and increasing African American participation in the environmental movement." IC Exh. 4, at 2. The petition stated that the AAEA has approximately 10,000 members, including approximately 1,000 members in the New York area. Id. The AAEA is "deeply concerned with any policy or measure which impacts the air quality of the communities in which it is based, or which affects the health of its members," and "seeks to include an African American point of view in environmental policy and decision-making." IC Exh. 4, at 2-3. The AAEA is particularly concerned with promoting clean air in African American communities. IC Exh. 4, at 3.

The petition stated that the AAEA sought party status to bring its unique perspective to the Indian Point permitting process, and to raise the issue of environmental justice. Id. The petition cited to the Department's Environmental Justice policy which states that

[i]t 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, at 2 (March 19, 2003).

In its petition, the AAEA asserted that in order to reduce impingement and entrainment of Hudson River fish, the draft permit "substantially limits" the Stations' ability to generate electricity, and might even lead to the Stations' closure. IC Exh. 4, at 1. According to AAEA, other nearby fossil fuel burning electric generation plants would then be called upon to supply electric power to the region, with a corresponding

increase in air pollution and decrease in air quality in low-income and minority communities, where most such plants are sited. The AAEA argued that, as a result, the draft permit "effectively places the interests of Hudson River fish eggs and larva over the health of New York's low-income and minority communities." IC Exh. 4, at 2.

The petition went on to assert that fossil-fuel generated power plants cause adverse health effects, and contended that those adverse effects are borne disproportionately by African Americans. IC Exh. 4, at 6. The AAEA argued that any lost production from Indian Point would be replaced by in-city and other facilities concentrated in the New York metropolitan area, where a significant proportion African Americans reside. IC Exh. 4, at 8. The AAEA pointed out that the Stations are located in an affluent, primarily white area of the State, and took the position that closure of the Stations, or restrictions on Indian Point's operations, would shift the burden of air pollution to minority communities. IC Exh. 4, at 10. The AAEA noted that there are 24 power plants in the New York metropolitan area, and only a small number of those plants are located in areas not predominantly populated by minorities. IC Exh. 4, at 8.

With respect to the organization's environmental interest, AAEA stated that it is a non-profit environmental action group, with an interest relating to the statutes administered by the Department. IC Exh. 4, at 13. The AAEA indicated that it has an interest in ensuring that environmental justice is factored into the Department's decision-making, and that environmental statutes are interpreted with the Department's policy goal of promoting environmental justice. Id.

The AAEA proposed the following issues for adjudication:

1. Whether Department Staff considered all adverse environmental impacts in formulating the draft permit, including air impacts on minority communities?
2. Whether Department Staff would have issued a different permit had it adequately considered the negative impacts on air quality in low-income and minority communities which will result from any substantial reduction in generation at Indian Point 2 and 3?
3. Whether the failure to consider all adverse environmental impacts in formulating the draft permit for Indian Point 2 and 3, including air impacts in

minority communities, renders the draft permit unsupportable?

In its petition, the AAEA argued that if generation at Indian Point were reduced, the shortfall would of necessity be replaced by facilities in the New York metropolitan area, and the Lovett coal-burning facility. IC Exh. 4, at 9. The AAEA cited to a November 3, 2003 report prepared by Synapse Energy Economics, Inc. for counsel to Riverkeeper, which detailed the in-city capacity available if the Stations were taken off-line. IC Exh. 4E, at 2, 5. The AAEA's petition also included an August 2002 report prepared for Entergy Nuclear Northeast by TRC Environmental Corporation. IC Exh. 4F. TRC stated in that report that it was reasonable to assume that the majority of any lost output from Indian Point would be replaced by increased generation from units in the New York City/Westchester load pocket. Id., at ES-1.

According to the TRC report, if Indian Point's lost output were to be filled by in-city power plants, carbon dioxide emissions would increase by 101%, or over 12 million tons, sulfur dioxide would increase by 106%, or over 8 thousand tons, and oxides of nitrogen would increase by 105%, or over 16 thousand tons. IC Exh. 4F, at 5-3, 5-4. Even if plants in the Hudson Valley were included, the TRC report stated that emissions of these pollutants would increase by over 50%. Id., at 5-5, 5-6. Consequently, AAEA argued, the incidences of death and respiratory and cardiovascular diseases would show a corresponding increase. IC Exh. 4, at 10.

The AAEA contended in its petition that under conservative estimates, installation of closed cycle cooling will require a ten-month shutdown of the Stations. IC Exh. 4, at 11. The AAEA argued further that in making its BTA determination, Department Staff was required to minimize or avoid other impacts to the maximum extent practicable, as set forth in the FEIS. Id., at 12. The AAEA went on to assert that despite the acknowledgments set forth in the FEIS with respect to weighing impacts, Department Staff issued the draft SPDES permit "without addressing the environmental justice impacts which its decision would entail, particularly the significant adverse impacts that will result from a shift in power production from Indian Point 2 and 3 to existing fossil-fuel facilities." Id. According to the AAEA, the Department's failure to consider other impacts violates SEQRA and renders the FEIS and the draft permit null and void. Id.

The AAEA argued that the proposed issues are substantive because those issues "call into question the legality of the DEC's FEIS and Draft SPDES Permit for Indian Point 2 and 3, raise important public health and environmental justice concerns, and challenge the Draft Permit's compliance with the SEQRA and 6 NYCRR § 704.5 requirement that in issuing a permit, DEC consider *all adverse environmental impacts*." IC Exh. 4, at 15 (emphasis in original).

The AAEA contended that the issues proposed are significant because they would ultimately call for a major modification of the draft SPDES permit to eliminate all provisions that would reduce generation at the Stations, including the requirement that cooling towers be installed. Id.

For its offer of proof, AAEA indicated that its President, Norris MacDonald, and its expert, John McCormick, an energy policy analyst with thirty years of experience, would present testimony to establish the negative effects of fossil fuel plants, the disproportionate effect such plant emissions have on minority and low-income communities, and the negative impact to be anticipated if the Stations are brought off-line. IC Exh. 4, at 15-16. The AAEA further stated that it intended to offer evidence that the Department failed to consider environmental justice issues when it conducted its impact assessment for the SPDES permit. Id.

At the issues conference, Entergy stated that it had no objection to the environmental interest advanced by this petitioner, nor did it object to any of the issues AAEA proposed for adjudication. IC Tr. at 201. Department Staff objected to the petition, arguing that AAEA's contentions were based upon an unrealistic scenario where the Stations would be shut down, and that nothing in the draft permit would or could cause a closure of Indian Point. IC Tr. at 199. Department Staff went on to note that the draft permit would require Entergy to provide a design for closed cycle cooling, and any understanding as to the air quality impacts to be anticipated must be informed by knowing what the particular design for the system will ultimately be. IC Tr. at 200. According to Department Staff, submission of the design would enable the Department to assess and analyze the air quality impacts for the second permit term. Id.

Riverkeeper argued that the issues identified by the AAEA failed to particularize the criteria in question in the draft permit. IC Tr. at 201. Riverkeeper asserted that the AAEA's issues were appropriate for consideration under SEQRA, noting that SEQRA contemplates that questions such as those advanced by

the AAEA be raised earlier in that process. IC Tr. at 202. According to Riverkeeper, the AAEA's offers of proof with respect to the issues proposed did not identify permit conditions and indicate why those conditions were not in conformance with applicable law and permitting standards. IC Tr. at 203. Riverkeeper argued further that the AAEA's arguments with respect to outages at the Stations were merely general concerns about impacts on an unspecified population, and Riverkeeper went on to assert that the impacts were not specified. IC Tr. at 205. Finally, Riverkeeper contended that environmental justice concerns fall more within the purview of SEQRA, and should be addressed in that process, rather than in the context of non-compliance with a SPDES permit requirement. IC Tr. at 206.

In response, the AAEA argued that the Department's Environmental Justice policy specifically states that it is applicable to the permitting process, noting that allowing AAEA to participate would further the Department's goal of ensuring that the concerns of low income and minority communities are considered in permitting decisions. IC Tr. at 207. The AAEA maintained that even one outage day could result in health impacts. IC Tr. at 208. Department Staff responded that the draft permit does consider air impacts on the New York metropolitan area, and that the Department might be able to submit additional testimony in that regard. IC Tr. at 212.

Department Staff went on to point out that outages at Indian Point would not authorize replacement generators to violate the terms of their air emissions permits. Id. Department Staff contended further that the issues, as proposed, overlapped and amounted to one issue. IC Tr. at 213. Riverkeeper offered additional remarks in support of its contention that forced outages were not good policy, and that if Riverkeeper's plan for closed cycle cooling at the Stations were adopted, the risks of outages of concern to the AAEA would be substantially eliminated. IC Tr. at 225-27. Counsel for DPS reiterated that the MAPS model would provide guidance as to the potential air quality impacts of the proposals for closed cycle cooling at the Stations. IC Tr. at 227-28.

John McCormick, the AAEA's expert, stated that while he was not fully prepared to give a technical evaluation, when construction begins at Indian Point there is a likelihood that coal fired capacity will be called into service. IC Tr. at 217. Shutdowns of 42 days could increase emissions from such plants by over 1.2 million tons during ozone season, according to Mr. McCormick, including an increase in oxides of nitrogen. IC Tr. at 218-19. Mr. McCormick went on to assert that he could

identify fifteen units in the New York City load pocket that could make up the lost power if Indian Point's generation were reduced. IC Tr. at 219. Moreover, the AAEA indicated that it is prepared to offer testimony to establish that the Department in fact failed to take environmental justice considerations into account in the process of arriving at the terms of the draft permit. IC Exh. 4, at 15-16; IC Tr. at 223.

In light of the uncertainty with respect to the ultimate design of a closed cycle cooling system and the air emissions impacts that could be associated with such a system, it would be inappropriate to foreclose participation by the AAEA in this process at this juncture. At the issues conference, Department Staff acknowledged that the air impacts of closed cycle cooling at the Stations cannot be fully understood until Entergy submits a design for such a system. In addition, Department Staff stated that further SEQRA review is contemplated. IC Tr. at 99. Moreover, the issues proposed by the AAEA have already been joined in connection with Entergy's disputes with Department Staff over the conditions in the draft SPDES permit, particularly with respect to Section III, issues 2 and 3 in Entergy's comments. See IC Exh. 6, at 16-17. Accordingly, the AAEA is granted full party status in this proceeding.

Pursuant to Section 624.4(b)(5)(ii), the ALJ is tasked with determining which issues satisfy the standards for adjudication, and defining those issues as precisely as possible. The issues in the AAEA's petition, while substantive and significant, essentially restate the same issue. Moreover, the petition discusses only the potential effect on air quality as the adverse environmental impact to be addressed. Therefore, the AAEA's issues will be considered as one, and the issue for adjudication at the hearing will be whether the draft SPDES permit has considered adequately the impacts on air quality if a closed cycle cooling system is installed at the Stations. This issue is substantive because, based on the AAEA's offer of proof, and upon this record, capacity may be limited by such installation. The issue is significant because, after hearing, the proposed draft permit may be modified to address air emission concerns.

Assemblyman Brodsky's Petition for Party Status

Assemblyman Brodsky's late-filed petition proposed the same issues for adjudication set forth in Riverkeeper's petition. Entergy objected to Mr. Brodsky's petition, as did Department Staff. The AAEA supported the petition, and Riverkeeper took no

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	Docket Nos. 50-247-LR and
	)	50-286-LR
ENTERGY NUCLEAR OPERATIONS, INC.)	
)	
(Indian Point Nuclear Generating Units 2 and 3))	
	)	March 7, 2011

APPLICANT'S ANSWER TO RIVERKEEPER, INC.'S MOTION FOR LEAVE
AND NEW CONTENTION CONCERNING THE CONSIDERATION
OF ENDANGERED AND THREATENED AQUATIC SPECIES

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APPLICANT'S ANSWER TO RIVERKEEPER, INC.'S MOTION FOR LEAVE
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OF ENDANGERED AND THREATENED AQUATIC SPECIES

I. INTRODUCTION

Pursuant to 10 C.F.R. § 2.309(h)(1), Entergy Nuclear Operations, Inc. ("Entergy") submits this Answer opposing the "Consolidated Motion for Leave to File a New Contention and New Contention Concerning NRC Staff's Final Supplemental Environmental Impact Statement" ("Motion"), filed by Riverkeeper, Inc. ("Riverkeeper") on February 3, 2011. In response to the U.S. Nuclear Regulatory Commission ("NRC") Staff's issuance of its Final Supplemental Environmental Impact Statement ("FSEIS"),¹ Riverkeeper proposes new Contention EC-8 alleging that the FSEIS is deficient because it fails to consider the yet-to-be-issued Biological Opinion ("BiOp") of the National Marine Fisheries Service ("NMFS") following the conclusion of the ongoing consultation between NMFS and NRC pursuant to Section 7 of the Endangered

¹ NUREG-1437, Supp. 38, *Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supp. 38, Regarding Indian Point Nuclear Generating Units Nos. 2 and 3, Final Report* (Dec. 2010) ("FSEIS"), available at ADAMS Accession Nos. ML103350405 (Vol. 1), ML103350438 (Vol. 2), ML103360209 (Vol. 2), ML103360212 (Vol. 2), ML103350442 (Vol. 3).

Species Act (“ESA”).² Riverkeeper further argues that NRC must supplement the FSEIS to reflect the results of the Section 7 consultation before NRC can make a final decision regarding whether to issue the renewed licenses.³

As shown below, Riverkeeper’s Motion does not meet the NRC’s late-filed contention requirements set forth in 10 C.F.R. § 2.309(f)(2), or the contention admissibility requirements codified in 10 C.F.R. § 2.309(f)(1). Specifically, to the extent Riverkeeper complains about the timing of NRC’s issuance of its Biological Assessment (“BA”), Riverkeeper has not demonstrated that this argument is based on any “data or conclusions” in the NRC Staff’s FSEIS that “differ significantly” from previously available information.⁴ In fact, Riverkeeper clearly could have raised this issue much earlier in this proceeding, and therefore, this aspect of the contention is impermissibly late.

Even if the Atomic Safety and Licensing Board (“Board”) were to put aside issues of timeliness, Riverkeeper Contention EC-8 fails to meet the admissibility requirements set forth in 10 C.F.R. § 2.309(f)(1). In this regard, Riverkeeper fails to identify any legal basis for its argument that NRC was required to conclude its consultation with NMFS pursuant to the ESA *before* issuing its FSEIS under the National Environmental Policy Act (“NEPA”). Consistent with the requirements of the ESA, the consultation process must only be completed before any final decision by the NRC in this proceeding. Also, if any information generated during the consultation process is both new and significant, NRC regulations require the Staff to supplement the FSEIS. Riverkeeper presents no basis for challenging or assuming irregularities

² Riverkeeper Inc. Consolidated Motion for Leave to File a New Contention and New Contention Concerning NRC Staff’s Final Supplemental Environmental Impact Statement at 1 (Feb. 3, 2011) (“Motion”), *available at* ADAMS Accession No. ML110410361.

³ *Id.*

⁴ 10 C.F.R. § 2.309(f)(2).

in either of these processes. Accordingly, Contention EC-8 fails to provide sufficient information to establish a genuine dispute on a material issue of law or fact, as required by 10 C.F.R. § 2.309(f)(1)(vi), and should be dismissed.

II. BACKGROUND

A. Evaluation of Endangered Species in the License Renewal Proceeding

On April 23, 2007, Entergy filed its application to renew the operating licenses for Indian Point Nuclear Generating Units 2 and 3 (“IP2” and “IP3,” collectively “Indian Point”), for 20 years beyond their current expiration dates of September 9, 2013, and December 12, 2015, respectively. After accepting the Indian Point license renewal application (“LRA”) for detailed review, the NRC Staff began the environmental review process described in 10 C.F.R. Part 51 by publishing a notice of intent to prepare an environmental impact statement (“EIS”) and begin the environmental scoping process.⁵ As part of that process, the Staff requested that NMFS provide a list of federally-listed endangered or threatened species as well as information on protected, proposed, and candidate species and any designated critical habitat that may be in the vicinity of Indian Point.⁶

NMFS responded to the NRC request in a letter dated October 4, 2007, indicating that the federally-listed endangered shortnose sturgeon and the candidate species Atlantic sturgeon are present in the Hudson River.⁷ Thus, NMFS stated that these species should be considered in any

⁵ Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Process, 72 Fed. Reg. 45,075 (Aug. 10, 2007).

⁶ FSEIS, Vol. 3, App. E at E-14 to -15 (Letter from R. Franovich, NRC, to P. Colosi, NMFS (Aug. 16, 2007)). NMFS is part of the U.S. Department of Commerce’s National Oceanic and Atmospheric Administration. NMFS and the U.S. Fish and Wildlife Service (“FWS”) share responsibilities for administering the ESA. *See* 50 C.F.R. § 402.01(b). Generally speaking, FWS is responsible for land and freshwater species, while NMFS is responsible for marine and anadromous species.

⁷ FSEIS, Vol. 3, App. E at E-77 to -79 (Letter from M. Colligan, NMFS, to NRC (Oct. 4, 2007)). A “candidate species” is a “species being considered by [NMFS] for listing as endangered or threatened species but not yet the subject of a proposed rule.” 50 C.F.R. § 402.12(d).

NRC NEPA documents and that it expected NRC to initiate consultation pursuant to Section 7 of the ESA concerning any potential effects of the proposed action on listed species.⁸

On December 22, 2008, the Staff issued its DSEIS, in which it evaluated the site-specific environmental impacts of license renewal for IP2 and IP3.⁹ Sections 2.2.5.5 and 4.6.1 of the DSEIS presented information on the shortnose sturgeon and the Atlantic sturgeon. Based on information available to the NRC Staff at that time, the DSEIS indicated that there was uncertainty on the potential impacts to both species of sturgeon during the license renewal term, and found that the impacts could be SMALL to LARGE. Appendix E of the DSEIS contained the Staff's December 2008 initial BA, which the NRC Staff provided to NMFS by letter dated December 22, 2008.¹⁰ That letter indicated that although the renewal of the Indian Point operating licenses could adversely affect the population of shortnose sturgeon, NRC Staff could not, at that time, quantify the extent to which the species could be affected.

On February 24, 2009, NMFS responded to NRC and indicated that additional information would be necessary before initiating consultation concerning the shortnose sturgeon.¹¹ Subsequently, the NRC Staff corresponded with NMFS to determine how best to coordinate the consultation going forward.¹² The NRC Staff proceeded to discuss the need for

⁸ FSEIS, Vol. 3, App. E at E-78 (Letter from M. Colligan, NMFS, to NRC (Oct. 4, 2007)).

⁹ NUREG-1437, Supp. 38, *Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Regarding Indian Point Nuclear Generating Unit Nos. 2 and 3, Draft Report for Comment* (Dec. 2008) ("DSEIS"), available at ADAMS Accession Nos. ML083540594 (Vol. 1), ML083540614 (Vol. 2).

¹⁰ FSEIS, Vol. 3, App. E at E-89 to -90 (Letter from D. Wrona, NRC, to M. Colligan, NMFS (Dec. 22, 2008)).

¹¹ *Id.* at E-93 to -95 (Letter from M. Colligan, NMFS, to D. Wrona, NRC (Feb. 24, 2009)). Specifically, NMFS requested four types of information: (1) corrections to the life history section of the 2008 BA; (2) additional information on impingement mortality; (3) estimates of thermal impacts; and (4) clarification regarding the status of the State of New York adjudicatory process relating to the closed-cycle cooling system alternative. *See id.* at E-93 to -94.

¹² *See* E-mail from A. Stuyvenberg, NRC, to J. Crocker, NMFS (Mar. 26, 2009), available at ADAMS Accession No. ML090850187.

additional data with Entergy¹³ and Entergy subsequently provided NRC with the requested shortnose sturgeon impingement data.¹⁴

The NRC Staff issued its FSEIS on December 3, 2010. Significantly, the Staff modified and augmented the FSEIS in response to comments submitted by NMFS and the additional data provided by Entergy. Based on this information, the FSEIS found that the impacts of continued operation on the shortnose sturgeon and the Atlantic sturgeon would be SMALL.¹⁵ In addition, the NRC Staff sent NMFS a revised BA by letter dated December 10, 2010.¹⁶

In January 2011, NRC and NMFS corresponded informally via e-mail about the revised BA and Section 7 consultation process. NMFS indicated that it was working on a response to NRC's December 10 letter, but that NMFS had all the information it needed to initiate formal consultation.¹⁷ In addition, NMFS stated that the due date for the final BiOp would be April 30, 2011 (135 days after NMFS received NRC's revised BA) unless during the course of the consultation NMFS and NRC mutually agreed to extend this date.¹⁸

Subsequently, NMFS sent NRC a letter dated February 16, 2011, indicating that formal consultation began on December 16, 2010, that the consultation would conclude within 90 days

¹³ See Summary of Telephone Conference Call Held on May 11, 2009, Between the U.S. Nuclear Regulatory Commission and Entergy Nuclear Operations, Inc., Concerning Endangered Species Act Consultation Data (June 11, 2009), *available at* ADAMS Accession No. ML091420036.

¹⁴ See Letter from F. Dacimo, Entergy, to NRC, Request for Additional Information Related to License Renewal Indian Point Nuclear Application Environmental Report – Impingement Data (Nov. 24, 2009), *available at* ADAMS Accession No. ML093420528; Letter from F. Dacimo, Entergy, to NRC, Transmission of Additional Requested Information Regarding Sturgeon Impingement Data (July 1, 2009), *available at* ADAMS Accession No. ML091950345.

¹⁵ See FSEIS, Vol. 1 at 4-59 to -60.

¹⁶ See Letter from D. Wrona, NRC, to M. Colligan, NMFS, Revised Biological Assessment for License Renewal of the Indian Point Nuclear Generating Plan, Unit Nos. 2 and 3 (Dec. 10, 2010) (Entergy RK Contention EC-8 Att. 1) (“Revised BA”), *available at* ADAMS Accession No. ML102990043.

¹⁷ See E-mail from D. Stuyvenberg, NRC, to J. Crocker, NMFS, Inquiry Regarding Proposed Indian Point License Renewal and ESA Consultation (Jan. 20, 2011) (Entergy RK Contention EC-8 Att. 2), *available at* ADAMS Accession No. ML110200539.

¹⁸ *Id.* at 1.

of initiation, and confirming that NMFS would deliver its BiOp by April 30, 2011, unless the consultation is extended.¹⁹ NMFS also stated that “[i]n the meantime, pursuant to Section 7(d) of the ESA, the NRC must not make any irreversible or irretrievable commitment of resources that would foreclose the formulation or implementation of any reasonable and prudent alternatives to avoid jeopardizing endangered or threatened species.”²⁰

On March 1, 2011, Entergy submitted a letter to the NRC referencing the above communications from NMFS and stating that Entergy intended to participate in the consultation process.²¹ Entergy requested a 45-day extension of the consultation period, so that it would be allowed the opportunity to exercise its right to submit information during the consultation process.²² Assuming the extension is granted, NMFS must issue its final BiOp in June 2011.²³

B. Summary of Riverkeeper Contention EC-8

On February 3, 2011, pursuant to the Board’s Order dated December 27, 2010, Riverkeeper submitted Contention EC-8.²⁴ As stated therein, Riverkeeper asserts the following:

NRC Staff’s FSEIS is deficient for failure to include or consider the assessment of [NMFS] regarding impacts to endangered species due to incomplete ESA § 7 consultation procedures. A supplemental EIS must be prepared by NRC Staff that fully considers the outcome of the consultation process, including NMFS’ forthcoming biological opinion, prior to any decision by the NRC regarding whether to relicense Indian Point.²⁵

¹⁹ See Letter from R. Kurkul, NMFS, to D. Wrona, NRC, Biological Assessment for License Renewal of the Indian Point Nuclear Generating Unit Nos. 2 and 3, at 1 (Feb. 16, 2011) (Entergy RK Contention EC-8 Att. 3), available at ADAMS Accession No. ML110550751.

²⁰ *Id.* at 1-2.

²¹ See Letter from F. Dacimo, Entergy, to D. Stuyvenberg, NRC, Endangered Species Act Consultation at 1-2 (Mar. 1, 2011) (*citing* 50 C.F.R. § 402.14(d) (Entergy RK Contention EC-8 Att. 4).

²² *See id.* at 1-2.

²³ *See id.* at 2 (*citing* 50 C.F.R. § 402.14(g)(5)).

²⁴ See Licensing Board Order (Granting Intervenor’s Unopposed Joint Motion for an Extension of Time) (unpublished) (Dec. 27, 2010).

²⁵ Motion at 1.

Accordingly, Riverkeeper alleges a procedural violation, arguing that issuance of the FSEIS prior to the completion of the Section 7 consultation violates the ESA, applicable regulations and guidance, and settled practice, which “require” completion of consultation before the end of the NEPA review process.²⁶ Riverkeeper further claims that the forthcoming NMFS BiOp is directly relevant to the NRC’s assessment of endangered species and speculates that NMFS may find significant impacts that are likely to jeopardize the continued existence of any such species.²⁷ Therefore, Riverkeeper maintains that the NRC Staff will be required to supplement the FSEIS following the issuance of the NMFS BiOp.²⁸

III. LEGAL STANDARDS

A. Legal Standards Governing Admission of New and Amended Contentions

An intervenor may file new environmental contentions “if there are data or conclusions in the NRC draft or final environmental impact statement, environmental assessment, or any supplements relating thereto, that differ significantly from the data or conclusions in the applicant’s documents.”²⁹ Absent such circumstances, an intervenor may file new contentions only with leave of the presiding officer upon a showing that the new or amended contention is based on information that was not previously available and is materially different than information previously available.³⁰ The Commission very recently reiterated that the publication of a new document, standing alone, does not meet this standard unless the information in that document is new and materially different from what was previously available.³¹ Furthermore, an

²⁶ *Id.* at 11.

²⁷ *Id.* at 14, 17.

²⁸ *See id.* at 1.

²⁹ 10 C.F.R. § 2.309(f)(2).

³⁰ *Id.* § 2.309(f)(2)(i)-(iii).

³¹ *See, e.g., N. States Power Co. (Prairie Island Nuclear Generating Plant, Units 1 & 2), CLI-10-27, 72 NRC ___, slip op. at 13-18 (Sept. 30, 2010).*

intervenor must act promptly to bring the new or amended contention.³² As such, a new contention is not an occasion to raise additional arguments that could have been raised previously.³³

If an intervenor cannot satisfy the criteria of 10 C.F.R. § 2.309(f)(2), then a contention is considered non-timely, and the intervenor must successfully address the late-filing criteria in 10 C.F.R. § 2.309(c)(1)(i)-(viii).³⁴ The first factor identified in that regulation, whether “good cause” exists for the failure to file on time, is entitled to the most weight.³⁵ Without good cause, a “petitioner’s demonstration on the other factors must be particularly strong.”³⁶

A proposed contention also “must satisfy, without exception, each of the criteria set out in 10 C.F.R. § 2.309(f)(1)(i) through (vi).”³⁷ Failure to meet each of the criteria is grounds for dismissal of a proposed new or amended contention.³⁸ Among other things, the petitioner must demonstrate that the issue raised in the contention is within the scope of the proceeding, is *material* to the findings the NRC must make to support the action that is involved in the proceeding, and provide sufficient information to show that a genuine dispute exists with the

³² See *Entergy Nuclear Vt. Yankee, LLC* (Vt. Yankee Nuclear Power Station), LBP-06-14, 63 NRC 568, 573, 579-80 (2006) (rejecting petitioner’s attempt to “stretch the timeliness clock” because its new contentions were based on information that was previously available and petitioners failed to identify precisely what information was “new” and “different”).

³³ *Duke Energy Corp.* (McGuire Nuclear Station, Units 1 & 2; Catawba Nuclear Station, Units 1 & 2), CLI-02-28, 56 NRC 373, 385-86 (2002). This Board has emphasized that that it “will not entertain contentions based on environmental issues that could have been raised when the original contentions were filed.” Licensing Board Memorandum and Order (Summarizing Pre-Hearing Conference) at 3 (Feb. 4, 2009) (unpublished) (“Pre-Hearing Conference Order”).

³⁴ See Licensing Board Scheduling Order at 5-6 (July 1, 2010); 10 C.F.R. § 2.309(c)(2) (“The requestor/petitioner shall address the factors in paragraphs (c)(1)(i) through (c)(1)(viii) of this section in its nontimely filing.”).

³⁵ See *New Jersey* (Dep’t of Law & Pub. Safety’s Requests Dated Oct. 8, 1993), CLI-93-25, 38 NRC 289, 296 (1993).

³⁶ *Tex. Utils. Elec. Co.* (Comanche Peak Steam Elec. Station, Units 1 & 2), CLI-92-12, 36 NRC 62, 73 (1992) (quoting *Duke Power Co.* (Perkins Nuclear Station, Units 1, 2, & 3), ALAB-431, 6 NRC 460, 462 (1977)).

³⁷ *S.C. Elec. & Gas Co.* (Virgil C. Summer Nuclear Station, Units 2 & 3), LBP-10-6, slip op. at 3 (Mar. 17, 2010).

³⁸ See Final Rule, Changes to Adjudicatory Process, 69 Fed. Reg. 2182, 2221 (Jan. 14, 2004). See also *Private Fuel Storage, L.L.C.* (Indep. Spent Fuel Storage Installation), CLI-99-10, 49 NRC 318, 325 (1999).

applicant/licensee on a *material* issue of law or fact.³⁹ A dispute is material if its resolution would make a difference in the outcome of the licensing proceeding.⁴⁰

Additionally, the Commission has held that a petitioner may not use an adjudicatory proceeding to attack generic rules or regulations.⁴¹ Thus, a licensing proceeding is plainly not the proper forum for an attack on applicable statutory requirements or for challenges to the basic structure of the Commission's regulatory process.⁴² A contention that collaterally attacks a rule or regulation is not appropriate for litigation and must be rejected.⁴³

B. Legal Standards Governing Endangered Species Reviews

1. Endangered Species Act Requirements

Section 7(a)(2) of the ESA requires that the NRC, in consultation with NMFS or FWS (depending on the species involved), "insure that any action authorized, funded, or carried out by such agency . . . is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of habitat of such species."⁴⁴ Pursuant to Joint NMFS and FWS implementing regulations, an action will jeopardize continued existence of a species only if it appreciably diminishes or reduces the

³⁹ See 10 C.F.R. § 2.309(f)(1)(iii), (iv), (vi).

⁴⁰ See *Summer*, LBP-10-6, slip op. at 4 (quoting *Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2 & 3), CLI-99-11, 49 NRC 328, 333-34 (1999)).

⁴¹ 10 C.F.R. § 2.335(a); *Oconee*, CLI-99-11, 49 NRC at 334.

⁴² *Phila. Elec. Co.* (Peach Bottom Atomic Power Station, Units 2 & 3), ALAB-216, 8 AEC 13, 20, *aff'd with modification*, CLI-74-32, 8 AEC 217 (1974). See also *Carolina Power & Light Co.* (Shearon Harris Nuclear Power Plant), LBP-07-11, 66 NRC 41, 57-58 (2007) (citing *Peach Bottom*, ALAB-216, 8 AEC at 20).

⁴³ See, e.g., *Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Unit 2), CLI-03-14, 58 NRC 207, 218 (2003); *Potomac Elec. Power Co.* (Douglas Point Nuclear Generating Station, Units 1 & 2), ALAB-218, 8 AEC 79, 89 (1974).

⁴⁴ 16 U.S.C. § 1536(a)(2) (emphasis added). Section 7(a)(4) of the ESA requires that NRC confer (not consult) with NMFS on any action that is likely to jeopardize the continued existence of a species *proposed* for listing. *Id.* § 1536(a)(4); 50 C.F.R. § 402.10(a). Conferences are conducted on an informal basis between NRC and NMFS. See 50 C.F.R. § 402.10(c). NMFS will make recommendations, if any, to minimize or avoid adverse effects of the action on proposed species, but these recommendations are advisory in nature because the "jeopardy" prohibition of Section 7(a)(2) does not apply unless and until the species is listed. See 50 C.F.R. § 402.10(c).

likelihood of “both the survival and recovery” of the species.⁴⁵ This is a high standard. As was discussed by the Appeal Board in *Hartsville*, Section 7(a)(2) of the ESA does not prohibit the NRC from issuing a license for a nuclear power plant because the plant may have a small adverse impact on an endangered or threatened species.⁴⁶

While a Section 7(a)(2) consultation is ongoing, Section 7(d) of the ESA prohibits NRC and an applicant from making any irreversible or irretrievable commitment of resources that would foreclose the development of reasonable and prudent alternatives.⁴⁷ This prohibition remains in force until the requirements of Section 7(a)(2) are satisfied.⁴⁸

To ensure compliance with these requirements, NRC must request information from NMFS regarding whether any listed or proposed species are present in the area of the proposed action.⁴⁹ If NMFS determines that listed species may be present in the affected area, NRC typically will prepare a BA. The results of the BA help determine the level of consultation necessary between NRC and NMFS.⁵⁰ If the BA concludes that the proposed action “may affect” listed species or critical habitat, then “formal consultation” is necessary unless an exception from the formal consultation requirement is applicable.⁵¹

⁴⁵ 50 C.F.R. § 402.02.

⁴⁶ See *Tenn. Valley Auth.* (Hartsville Nuclear Plant, Units 1A, 2A, 1B, & 2B), ALAB-463, 7 NRC 341, 360 (1978).

⁴⁷ 16 U.S.C. § 1536(d); 50 C.F.R. § 402.09.

⁴⁸ 50 C.F.R. § 402.09.

⁴⁹ 16 U.S.C. § 1536(c)(1); 50 C.F.R. § 402.12(c).

⁵⁰ See 50 C.F.R. § 402.12(k)(1).

⁵¹ *Id.* § 402.14(a). One such exception applies if NRC determines, with the written concurrence of NMFS, “that the proposed action is not likely to *adversely* affect any listed species or critical habitat.” *Id.* § 402.14(b)(1) (emphasis added).

Once initiated, formal consultation must conclude within 90 days unless extended pursuant to the provisions of NMFS/FWS regulations.⁵² NRC is required to provide the applicant an opportunity to submit information during the consultation period.⁵³ Additionally, if requested, NMFS must provide a draft BiOp to the NRC and the applicant for purposes of analyzing reasonable and prudent alternatives.⁵⁴ NRC and the applicant are then permitted to comment on the draft BiOp.⁵⁵

Within 45 days after concluding formal consultation NMFS must deliver its final BiOp,⁵⁶ which evaluates the nature and extent of the proposed action's effect on the listed species and presents NMFS' opinion on whether the action is likely to jeopardize the continued existence of such listed species.⁵⁷ An incidental take statement may also be provided with the BiOp if NMFS determines that the proposed action results in the incidental "take" of a listed species, but does not jeopardize the continued existence of that species.⁵⁸

Following the issuance of the BiOp, NRC must determine whether and in what manner to move forward with the proposed action in light of its Section 7 obligations.⁵⁹ If NMFS issues a "no jeopardy" BiOp, or if NRC chooses a reasonable and prudent alternative recommended by NMFS, then the requirements of Section 7(a)(2) are met, the Section 7(d) prohibition expires,

⁵² See 16 U.S.C. § 1536(b)(1)(B); 50 C.F.R. § 402.14(e) ("Formal consultation concludes within 90 days after its initiation unless extended as provided below.").

⁵³ 50 C.F.R. § 402.14(d).

⁵⁴ See *id.* § 402.14(g)(5).

⁵⁵ See *id.*

⁵⁶ *Id.* § 402.14(e)(3).

⁵⁷ See *id.* § 402.14(h)(3). If necessary, the BiOp also provides reasonable and prudent alternatives. See *id.* § 402.14(g)(5).

⁵⁸ See *id.* § 402.14(i)(1).

⁵⁹ *Id.* § 402.15(a).

and NRC may proceed with the proposed action.⁶⁰ Alternatively, if NMFS issues a “jeopardy” BiOp, but NRC disagrees with this opinion or chooses an alternative not recommended by NMFS, then NRC may move forward based on its own analysis.⁶¹

2. National Environmental Policy Act Requirements

Separate from the requirements of the ESA, NEPA requires that NRC consider the environmental consequences of its licensing actions more generally. NEPA, however, does not prohibit adverse environmental effects, but instead, imposes procedural requirements on agencies, requiring them to take a “hard look” at the environmental impact of the proposed action.⁶² This hard look is subject to a “rule of reason.”⁶³

NRC environmental regulations also address the potential need to supplement an FSEIS before the agency takes the proposed action. Specifically, pursuant to 10 C.F.R. § 51.92(a), NRC must supplement an FSEIS if there are (1) substantial changes in the proposed action that are relevant to environmental concerns, or (2) significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts. In order to be significant, new information must present a “seriously different picture” of the environmental impact of the proposed project from what was previously considered.⁶⁴

⁶⁰ See Final Rule, Interagency Cooperation – Endangered Species Act of 1973, as Amended, 51 Fed. Reg. 19,926, 19,940 (June 3, 1986).

⁶¹ See *id.*

⁶² See *La. Energy Servs., L.P.* (Claiborne Enrichment Ctr.), CLI-98-3, 47 NRC 77, 87-88 (1998). See also *Natural Res. Def. Council v. Morton*, 458 F.2d 827, 838 (D.C. Cir. 1972); *La. Energy Servs., L.P.* (Nat'l Enrichment Facility), CLI-05-28, 62 NRC 721, 726 (2005).

⁶³ *La. Energy Servs., L.P.* (Nat'l Enrichment Facility), LBP-06-8, 63 NRC 241, 258 (2006) (citing *Long Island Lighting Co.* (Shoreham Nuclear Power Station), ALAB-156, 6 AEC 831, 836 (1973)).

⁶⁴ *Hydro Res., Inc.* (2929 Coors Road, Suite 101, Albuquerque, N.M. 87120), CLI-99-22, 50 NRC 3, 14 (1999) (citing *Sierra Club v. Froehlke*, 816 F.2d 205, 210 (5th Cir. 1987)); accord *Wisconsin v. Weinberger*, 745 F.2d 412, 420 (7th Cir. 1984)).

IV. **RIVERKEEPER CONTENTION EC-8 DOES NOT MEET THE NRC'S
CONTENTION TIMELINESS AND ADMISSIBILITY CRITERIA**

A. **Riverkeeper Contention EC-8 Is Untimely to the Extent it Challenges
the Timing of NRC's Biological Assessment**

Riverkeeper argues that the NRC Staff should have completed its initial BA within 180 days of receiving a species list from NMFS in October 2007, and should have completed its revised BA within 180 days of receiving comments on the initial BA from NMFS in February 2009.⁶⁵ Putting aside that the regulations cited by Riverkeeper as support for this argument are inapplicable in this case, this claim is untimely.

NRC regulations permit Riverkeeper to file new contentions only if the FSEIS contains data or conclusions that differ significantly from the data or conclusions in previous environmental documents.⁶⁶ Although FSEIS reaches different conclusions than the DSEIS on endangered species—impacts were found to be SMALL in the FSEIS, but SMALL to LARGE in the DSEIS⁶⁷—Riverkeeper's procedural argument about the timing of the BA is not based on this new information. Because this procedural argument is not based on this new information, such new information cannot satisfy the requirements of 10 C.F.R. § 2.309(f)(2).

Indeed, to the extent that Riverkeeper complains that the initial BA should have been issued in April 2008, instead of December 2008, this claim could have been filed before the DSEIS was even issued. Similarly, to the extent that Riverkeeper complains that the revised BA should have been issued in August 2009, instead of December 2010, this claim could have been filed in late-2009. Therefore, Riverkeeper's complaint regarding the timeliness of NRC's initial

⁶⁵ See Motion at 8-10.

⁶⁶ 10 C.F.R. § 2.309(f)(2) (emphasis added).

⁶⁷ See FSEIS, Vol. 1 at 4-60; DSEIS, Vol. 1 at 4-52.

and revised BA are unjustifiably late, and therefore fail to meet the requirements of 10 C.F.R.

§ 2.309(f)(2).⁶⁸

B. Riverkeeper Contention EC-8 Fails to Establish a Genuine Dispute on a Material Issue of Law or Fact

Even if the Board were to put aside issues of timeliness, Riverkeeper Contention EC-8 fails to meet the admissibility requirements set forth in 10 C.F.R. § 2.309(f)(1). As demonstrated below, Riverkeeper fails to provide sufficient information to establish a genuine dispute on a material issue of law or fact concerning compliance with the mandates of the ESA or NEPA, as required by 10 C.F.R. § 2.309(f)(1)(vi). Specifically, Riverkeeper fails to provide any legal or factual basis for (1) arguing that NRC was required to conclude its consultation with NMFS pursuant to the ESA before issuing its FSEIS; (2) demanding that NRC supplement the FSEIS following the conclusion of the ESA consultation process; or (3) challenging the timing of NRC's BA.

1. Riverkeeper Fails to Provide a Legal Basis Requiring Consolidation of the ESA and NEPA Reviews

Contrary to Riverkeeper's position, issuance of the FSEIS prior to the completion of the Section 7 consultation process does not violate the ESA or applicable regulations. Riverkeeper provides no legal basis for its claim that the ESA "explicitly *require[s]* completion of consultation procedures prior to the end of the NEPA review process."⁶⁹

The relevant statutory requirements are found in Section 7(d) of the ESA. At most, however, Section 7(d) only precludes NRC from reaching a final decision on Entergy's LRA

⁶⁸ Riverkeeper fails to address the criteria in 10 C.F.R. § 2.309(c)(1). The Commission has held that it is appropriate to summarily dismiss late-filed contentions that fail to address these factors. *See, e.g., Dominion Nuclear Conn., Inc.* (Millstone Nuclear Power Station, Unit 3), CLI-09-5, 69 NRC 115, 126 (2009) ("The Board correctly found that failure to address the requirements [of 10 C.F.R. § 2.309(c) and (f)(2)] was reason enough to reject the proposed new contentions."). Thus, the Board should not further entertain this argument given Riverkeeper's failure to comply with the Commission's late-filed contention regulations.

⁶⁹ Motion at 11 (emphasis added).

while the consultation process is ongoing.⁷⁰ It does not require consultation to be complete upon issuance of the FSEIS.⁷¹ In fact, NMFS explicitly acknowledged this requirement in its February 16, 2011 letter to NRC.⁷² Moreover, even with Entergy's modest request for a 45-day extension of the consultation period, NMFS will issue its final BiOp in or around June 2011—*well before* the NRC reaches a final decision on Entergy's LRA.⁷³ Riverkeeper has provided no basis for its allegation that the NRC has or will violate the requirements of the ESA.

Further, as Riverkeeper recognizes, the ESA and associated implementing regulations and guidance state that the ESA consultation process and the NEPA review process *may* or *should* be consolidated.⁷⁴ Specifically, the ESA indicates that a BA “*may* be undertaken as part of a Federal agency's compliance with the requirements of section 102 of [NEPA].”⁷⁵ Similarly, ESA implementing regulations indicate that “[c]onsultation, conference, and biological assessment procedures under section 7 *may* be consolidated with interagency cooperation procedures required by other statutes, such as the [NEPA].”⁷⁶ That regulation further indicates that “[w]here the consultation or conference has been consolidated with the interagency cooperation procedures required by other statutes such as NEPA . . . , the results *should* be included in the documents required by those statutes.”⁷⁷

⁷⁰ See 16 U.S.C. § 1536(d); 50 C.F.R. § 402.09 (prohibiting only an “irreversible or ir retrievable commitment of resources with respect to the agency action which has the effect of foreclosing the formulation or implementation of any reasonable and prudent alternatives”).

⁷¹ See *id.*

⁷² See Entergy RK Contention EC-8 Att. 3, at 1-2 (“In the meantime, pursuant to Section 7(d) of the ESA, the NRC must not make any irreversible or ir retrievable commitment of resources that would foreclose the formulation or implementation of any reasonable and prudent alternatives to avoid jeopardizing endangered or threatened species.”).

⁷³ See Entergy RK Contention EC-8 Att. 4, at 1-2.

⁷⁴ See Motion at 5-7.

⁷⁵ 16 U.S.C. § 1536(c)(1) (emphasis added).

⁷⁶ 50 C.F.R. § 402.06(a) (emphasis added).

⁷⁷ *Id.* § 402.06(b) (emphasis added).

It is a fundamental rule of statutory and regulatory construction that “may” and “should,” when contrasted with “shall” and “must,” describe permissive, not mandatory actions.⁷⁸ In light of the numerous “shalls” and “musts” contained in the ESA and associated implementing regulations, it is clear that Congress and NMFS intended to allow agencies discretion to combine their ESA and NEPA reviews, but did not mandate that agencies do so. Thus, the plain language of these provisions does not “require” that NRC complete the ESA consultation process before issuance of the FSEIS.

The absence of any legal requirement that one of these separate statutory reviews conclude before the other is further supported by the preamble to 50 C.F.R. § 402.06, which states that NMFS “encourages Federal agencies to coordinate these responsibilities, but believes it is preferable to allow Federal agencies to do so in a manner that best conforms to their particular actions and which they believe is most efficient.”⁷⁹

Riverkeeper does not cite any statutory or regulatory provision (and we are aware of none) that requires that these separate statutory reviews be consolidated or that one conclude before the other. Likewise, the cases Riverkeeper cites only stand for the proposition that the BA and BiOp are *sometimes* final when an FEIS is completed—not that this must always be the case.⁸⁰ In fact, other cases illustrate that the ESA consultation process may continue or even

⁷⁸ See *Crockett Tel. Co. v. FCC*, 963 F.2d 1564, 1570 (D.C. Cir. 1992) (use of words “may” and “shall” in same provision shows them to have their usual, different meanings); *Int’l Union, UAW v. Dole*, 919 F.2d 753, 756 (D.C. Cir. 1990) (“the usual presumption that ‘may’ confers discretion, while ‘shall’ imposes an obligation to act”); *Rastelli v. Warden, Metro. Corr. Ctr.*, 782 F.2d 17, 23 (2d Cir. 1986) (“The use of a permissive verb—‘may review’ instead of ‘shall review’—suggests a discretionary rather than mandatory review process.”).

⁷⁹ Final Rule, Interagency Cooperation – Endangered Species Act of 1973, as Amended, 51 Fed. Reg. at 19,938. That preamble further indicates that a BiOp need only be included as part of the NEPA document if completion time permits. See *id.* at 19,939.

⁸⁰ See Motion at 7 n.5.

follow the issuance of an FEIS.⁸¹ Accordingly, Riverkeeper fails to demonstrate that NRC violated any legal requirement by continuing the ESA consultation process after issuance of the FSEIS.

Riverkeeper also claims that the FSEIS is deficient because it does not include or reflect comments from NMFS.⁸² Riverkeeper, however, conflates the requirements of NEPA and the ESA. As far as NEPA is concerned, NRC regulations required that the DSEIS be accompanied with a request for comments and that NRC provide a minimum 45-day comment period.⁸³ NRC fully complied with this requirement and provided NMFS with a copy of the DSEIS.⁸⁴ Furthermore, after NRC received the February 2009 NMFS letter, NRC obtained and analyzed additional information based on the recommendations by NMFS. In fact, the NRC made several changes to the text of the FSEIS based on comments from NMFS.⁸⁵ Accordingly, this claim is also unsupported.

2. Riverkeeper Speculates That NRC Must Supplement the FSEIS

Riverkeeper further argues that NRC must supplement the FSEIS because the NMFS BiOp will be directly “relevant” to the NRC’s assessment of endangered species and NMFS “may find” significant impacts that are likely to jeopardize the continued existence of any such

⁸¹ See, e.g., *Enos v. Marsh*, 769 F.2d 1363, 1374 (9th Cir. 1985) (finding agency decision not to supplement an EIS was reasonable because the agency complied with ESA consultation requirements after the FEIS was issued); *Roosevelt Campobello Int'l Park Comm'n v. EPA*, 684 F.2d 1041, 1044-45 (1st Cir. 1982) (noting that Section 7 ESA consultation was initiated several months after issuance of FEIS); *Vill. of False Pass v. Watt*, 565 F. Supp. 1123, 1141, 1157-63 (D. Alaska 1983) (indicating that a BiOp was prepared after issuance of the FEIS).

⁸² See Motion at 12.

⁸³ See 10 C.F.R. § 51.73.

⁸⁴ See FSEIS, Vol. 1, App. E at E-89 (Letter from D. Wrona, NRC, to M. Colligan, NMFS (Dec. 22, 2008)); Notice of Availability of the Draft Supplement 38 to the Generic Environmental Impact Statement for License Renewal of Nuclear Plants and Public Meeting for the License Renewal of Indian Point Nuclear Generating Unit Nos. 2 and 3, 73 Fed. Reg. 80,440, 80,440 (Dec. 31, 2008) (providing opportunity for any interested party to submit comments on DSEIS and establishing March 18, 2009 as deadline for comments).

⁸⁵ See FSEIS, Vol. 1 at 2-80, 4-59.

species.⁸⁶ Although Entergy agrees that the NMFS BiOp will likely contain relevant information, Riverkeeper engages in inappropriate speculation in assuming that NRC must necessarily supplement the FSEIS.

Importantly, if genuinely new and significant environmental information emerges during the ESA consultation process, NRC regulations provide for the possibility of supplementing the FSEIS.⁸⁷ As discussed above, NRC regulations require that the FSEIS be supplemented only if there are (1) substantial changes in the proposed action that are relevant to environmental concerns, or (2) significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.⁸⁸ Riverkeeper never explains why this existing NRC regulatory process is insufficient in these circumstances or why a contention needs to be litigated in this proceeding. Absent any such showing, Riverkeeper is prohibited from lodging an “open-ended, placeholder” contention based on the presumption that the Staff will fail to follow its own regulations.⁸⁹

Moreover, in accordance with NRC regulations, the FSEIS need not be supplemented merely because the NMFS BiOp contains “relevant” information. Instead, the FSEIS need only be supplemented if the BiOp contains new and significant information. This standard is much higher than the “relevance” standard mentioned in Riverkeeper’s Motion. In fact, courts have upheld agency decisions not to supplement an EIS when new documents are subsequently

⁸⁶ Motion at 14, 17.

⁸⁷ See 10 C.F.R. § 51.92(a).

⁸⁸ *Id.*

⁸⁹ *S. Nuclear Operating Co.* (Vogle Electric Generating Plant, Units 3 & 4), LBP-09-3, 69 NRC 139, 158 (2009). See also *Private Fuel Storage, L.L.C.* (Indep. Spent Fuel Storage Installation), CLI-01-9, 53 NRC 232, 235 (2001) (“[I]n the absence of evidence to the contrary, the NRC does not presume that a licensee will violate agency regulations wherever the opportunity arises.”).

generated pursuant to an ESA consultation.⁹⁰ Accordingly, Riverkeeper is simply incorrect that NRC is required to supplement the FSEIS merely because the NMFS BiOp will contain “relevant” information.

3. Riverkeeper’s Challenge to the Timing of NRC’s Biological Assessment Lacks a Valid Factual or Legal Basis

Riverkeeper incorrectly claims that NRC did not complete its BA within the timeframe contemplated in the regulations.⁹¹ As an initial matter, this argument is now moot. As NMFS indicated in its February 16, 2011 letter to the NRC, all of the information needed to initiate formal consultation was included in NRC’s revised BA.⁹² The Commission has made clear that where a contention alleges the omission of particular information and that information is later supplied by the NRC Staff, the contention is moot.⁹³

Even putting aside the mootness issue, Riverkeeper fails to establish that NRC violated any applicable and enforceable deadline for issuance of the BA. Although Riverkeeper cites to 50 C.F.R. § 402.12 as support for its argument, that regulation is irrelevant because it indicates that “[t]he procedures of this section are required for Federal actions that are *major construction activities*.”⁹⁴ There is no dispute that the Indian Point license renewal is not a major construction activity.⁹⁵ Therefore, the 180-day BA completion time cited by Riverkeeper is simply not applicable.

⁹⁰ See *Natural Res. Def. Council v. FAA*, 564 F.3d 549, 561-62 (2d Cir. 2009) (upholding agency decision not to supplement EIS to address newly-identified endangered species because agency subsequently issued BA finding that proposed action is not likely to adversely affect species); *Enos*, 769 F.2d at 1374 (finding agency decision not to supplement an EIS reasonable because the agency complied with ESA consultation requirements after the EIS was issued).

⁹¹ See Motion at 8-10.

⁹² See Entergy RK Contention EC-8 Att. 3, at 1.

⁹³ *McGuire*, CLI-02-28, 56 NRC at 383.

⁹⁴ 50 C.F.R. § 402.12(b) (emphasis added).

⁹⁵ See, e.g., Revised BA at 1.

Furthermore, even if this timeframe were applicable—which it is not—it is not legally enforceable. The applicable ESA regulations are found at 50 C.F.R. § 402.12 and the preamble for these regulations states that there is “no remedy to expedite the preparation” of a BA and thus, the 180-day period can theoretically be extended indefinitely.⁹⁶ Similarly, that preamble also explains that while a federal agency has an obligation under the ESA to determine whether a proposed action may affect listed species and whether formal consultation is required, NMFS does not intend to dictate the timing of this review, which is solely at the discretion of the federal agency.⁹⁷ Accordingly, Riverkeeper fails to establish a genuine dispute on a material issue of law or fact, as required by 10 C.F.R. § 2.309(f)(1)(vi).

V. CONCLUSION

For the reasons set forth above, Riverkeeper Contention EC-3 is inadmissible and should be dismissed in its entirety. Accordingly, Riverkeeper’s Motion should be denied.

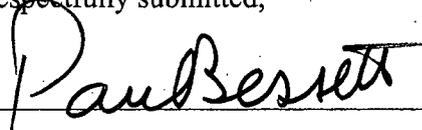
⁹⁶ Final Rule, Interagency Cooperation – Endangered Species Act of 1973, as Amended, 51 Fed. Reg. at 19,948. Of course, the Section 7(d) prohibition would preclude the agency from acting if it indefinitely delayed initiating formal consultation.

⁹⁷ See *id.* at 19,949.

CERTIFICATION OF COUNSEL UNDER 10 C.F.R. § 2.323(b)

Counsel for Entergy certifies that he has made a sincere effort to make himself available to listen and respond to the moving parties, and to resolve the factual and legal issues raised in the motion, and that his efforts to resolve the issues have been unsuccessful.

Respectfully submitted,



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COUNSEL FOR ENTERGY NUCLEAR
OPERATIONS, INC.

Dated in Washington, D.C.
this 7th day of March 2011

TABLE OF ENTERGY RK CONTENTION EC-8 ATTACHMENTS

Attachment	No.
Letter from D. Wrona, NRC, to M. Colligan, NMFS, Revised Biological Assessment for License Renewal of the Indian Point Nuclear Generating Plan, Unit Nos. 2 and 3 (Dec. 10, 2010).....	1
Email from D. Stuyvenberg, NRC, to J. Crocker, NMFS, Inquiry Regarding Proposed Indian Point License Renewal and ESA Consultation (Jan. 20, 2011)	2
Letter from R. Kurkul, NMFS, to D. Wrona, NRC, Biological Assessment for License Renewal of the Indian Point Nuclear Generating Unit Nos. 2 and 3 (Feb. 16, 2011).....	3
Letter from F. Dacimo, Entergy, to D. Stuyvenberg, NRC, Endangered Species Act Consultation (Mar. 1, 2011).....	4

Entergy RK Contention EC-8 Attachment 1



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

December 10, 2010

Ms. Mary A. Colligan
Assistant Regional Administrator for Protected
Resources
U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
Northeast Region
One Blackburn Drive
Gloucester, MA 01930-2298

SUBJECT: REVISED BIOLOGICAL ASSESSMENT FOR LICENSE RENEWAL OF THE
INDIAN POINT NUCLEAR GENERATING PLANT, UNIT NOS. 2 AND 3

Dear Ms. Colligan:

The U.S. Nuclear Regulatory Commission (NRC) staff has prepared a revised biological assessment (BA) for the proposed license renewal of Indian Point Nuclear Generating Unit Nos. 2 and 3 (IP2 and IP3). The BA is included as the enclosure to this letter. The NRC staff is conveying this revised BA in response to your letter dated February 24, 2009, which indicated that formal consultation under Section 7 of the Endangered Species Act could not begin until NRC submitted additional information or explained why certain information is not available. The enclosed BA contains, wherever possible, the requested information. As noted in our initial consultation letter dated December 22, 2008, the proposed action (license renewal) involves continued operation of IP2 and IP3 for 20 years beyond their current license expiration dates of 2013 and 2015, respectively. The proposed action (license renewal) is not a major construction activity.

On August 16, 2007, the NRC requested that the National Marine Fisheries Service (NMFS) provide lists of Federally listed endangered or threatened species and information on protected, proposed, and candidate species, as well as any designated critical habitat, that may be in the vicinity of IP2 and IP3 and their associated transmission line right-of-ways. The NMFS responded to the NRC request on October 4, 2007, and indicated that the Federally listed endangered shortnose sturgeon (*Acipenser brevirostrum*) and the candidate species Atlantic sturgeon (*Acipenser oxyrinchus*) should be considered for potential impacts of license renewal and operation.

In its letter of December 22, 2008, the NRC staff found that renewal of the operating licenses of IP2 and IP3 to include another 20 years of operation could adversely affect the population of shortnose sturgeon in the Hudson River through impingement and thermal impacts. NRC staff indicated, in the 2008 BA, that it was unable to determine the specific impacts to shortnose sturgeon of continued IP2 and IP3 operation.

On February 24, 2009, NMFS responded to NRC and indicated that additional information would be necessary before NMFS could begin its consultation regarding the shortnose sturgeon. NMFS requested four types of information from NRC:

1. Corrections to the life history section of the BA;
2. Additional information on impingement and impingement mortality;
3. Estimates of thermal impacts; and
4. Closed-cycle cooling and the National Pollutant Discharge Elimination System (NPDES) permit process.

Item 1: Corrections to life history

The NRC staff has updated the life history of the shortnose sturgeon as suggested in the February 24, 2009, NMFS letter.

Item 2: Additional information on impingement and impingement mortality

The NRC staff requested additional data from Entergy Nuclear Operations, Inc. (Entergy) (owner and operator of IP2 and IP3), and has included the additional data provided by Entergy in the attached BA. These data include the level of monitoring effort, dates of impingements, and size and condition of impinged fish. As reported in the NRC staff's 2008 BA and reiterated by NMFS, no impingement monitoring has occurred since traveling Ristroph-type screens were installed at the facility in 1991.

The NRC staff has not identified any relevant data regarding impingement rates for shortnose sturgeon at similar facilities with Ristroph screens. The NRC staff assumes, however, that impingement has increased proportionately with the Hudson River shortnose sturgeon population. Additionally, the NRC staff did not identify any information resources that could assist the staff in developing mortality rates for shortnose sturgeon after impingement at a facility similar to IP2 and IP3. As noted by the NRC staff and NMFS, however, Ristroph screens may have reduced impingement mortality. In view of the lack of any more recent data, the NRC staff suggests that pre-1991 impingement numbers with a 100 percent mortality rate could be used to estimate current impingement mortality.

Item 3: Estimates of thermal impacts

As NMFS is likely aware, the New York State Department of Environmental Conservation (NYSDEC) has requested that Entergy perform a three-dimensional thermal study of the Hudson River near Indian Point to determine plume extent and characteristics. The NRC staff understands that Entergy will be providing model and verification data to NYSDEC in the coming year. At this point, the NRC staff has no basis for estimating the temporal and spatial extent of thermal plume that exceeds 28 degrees Celsius.

Item 4: Closed-cycle cooling and the NPDES permit process

As NMFS is aware, SPDES proceedings involving Entergy and NYSDEC are in progress at this time. For water quality matters, the NRC staff defers to NYSDEC, to which the U.S. Environmental Protection Agency has delegated Clean Water Act authority. If NYSDEC determines that cooling towers must be installed at IP2 and IP3, the NRC would review the proposed implementation to the extent that installation could affect safe operations at IP2 and IP3. If the proposed installation of that requirement has no effect on safety-related plant systems, structures, or components, then the NRC would have no role in

approving a proposed cooling tower retrofit. The current SPDES permit does not require closed-cycle cooling or cooling towers and has been administratively extended since 1992.

NMFS requested information about the potential outcome of the ongoing NYSDEC adjudicatory process. On this matter, the NRC staff will continue to defer to NYSDEC, its internal schedules, and its delegated authority under the Clean Water Act. Given the permit's long history of administrative extension and contentious adjudication, the NRC staff cannot predict when a final permit will be issued and what requirements will exist in the final permit. The NRC staff notes that Entergy and NYSDEC are parties to an additional adjudicatory proceeding relating to the SPDES permit in the New York State civil court system. That proceeding also is in progress at this time.

The NRC staff concludes, in the Final Supplemental Environmental Impact Statement Regarding Indian Point Nuclear Generating Unit Nos. 2 and 3, (NUREG-1437, Supplement 38) that the impacts of another 20 years of IP2 and IP3 operation to the endangered shortnose sturgeon, due to entrainment and impingement, would be small (FSEIS, 4-20). Regarding the impact of heated plant discharges, the NRC staff analysis of young-of-year shortnose sturgeon in the Hudson River could not resolve a population trend, although other investigators using other methods found a trend of increasing abundance in the overall, mixed-age population. These observations are consistent with NRC's definition of a small level of impact in that any possible adverse effect is not detectable and is not destabilizing the population. This conclusion is based on NRC's specific definitions of small, moderate, and large impact levels as published in the NRC's Generic Environmental Impact Statement for License Renewal of Nuclear Plants and codified in NRC's 10 CFR Part 51 regulations that implement the National Environmental Policy Act.

For the purpose of the enclosed revised BA – prepared pursuant to the Endangered Species Act – the staff determines that renewal of the operating licenses for an additional 20 years could possibly have an adverse effect on the shortnose sturgeon population in the Hudson River, depending on the effects of thermal discharges. Further, NYSDEC has indicated that thermal discharges from the power plant may have an adverse affect on aquatic life. Sufficient information is not available at this time for the NRC staff to quantify the extent to which the population could be affected by thermal discharges, though proceedings between the NYSDEC and Entergy are currently underway that may provide additional information.

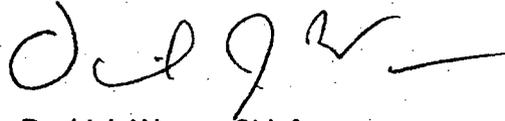
We are requesting your concurrence with our determination. In reaching its conclusion, the NRC staff relied on information provided by the applicant, on research performed by NRC staff and on information from NMFS (including a current listing of species provided by the NMFS). If

M. Colligan

- 4 -

you have any questions regarding this BA or the NRC staff's request, please contact Mr. Andrew Stuyvenberg, Environmental Project Manager, at 301-415-4006 or by e-mail at Andrew.Stuyvenberg@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read 'D. J. Wrona', with a horizontal line extending to the right.

David J. Wrona, Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-247 and 50-286

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M. Colligan

- 4 -

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Sincerely,

/RA/

David J. Wrona, Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-247 and 50-286

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Letter to Mary A. Colligan from David J. Wrona dated December 10, 2010

**SUBJECT: REVISED BIOLOGICAL ASSESSMENT FOR LICENSE RENEWAL OF THE
INDIAN POINT NUCLEAR GENERATING PLANT, UNIT NOS. 2 AND 3**

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Biological Assessment

**Indian Point Nuclear Generating Plant, Unit Nos. 2 and 3
License Renewal**

December 2010

Docket Nos. 50-247 and 50-286

**U.S. Nuclear Regulatory Commission
Rockville, Maryland**

Revised Biological Assessment of the Potential Effects on Federally Listed Endangered or Threatened Species from the Proposed Renewal of Indian Point Nuclear Generating Plant, Unit Nos. 2 and 3

Introduction and Purpose

The U.S. Nuclear Regulatory Commission (NRC) staff prepared this biological assessment (BA) to support the supplemental environmental impact statement (SEIS) for the renewal of the operating licenses for Indian Point Nuclear Generating Unit Nos. 2 and 3 (IP2 and IP3), located on the shore of the Hudson River in the village of Buchanan, in upper Westchester County, New York. The current 40-year licenses expire in 2013 (IP2) and 2015 (IP3). The proposed license renewal for which this BA has been prepared would extend the operating licenses to 2033 and 2035 for IP2 and IP3, respectively.

The NRC is required to prepare the SEIS as part of its review of a license renewal application. The SEIS supplements NUREG-1437, Volumes 1 and 2, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants (GEIS)," (NRC 1996, 1999)¹ for the license renewal of commercial nuclear power plants. The SEIS covers specific issues, such as the potential impact on endangered and threatened species, that are of concern at IP2 and IP3 and that could not be addressed on a generic basis in the GEIS. The NRC staff published the draft SEIS in December 2008 (NRC 2008) and published the final SEIS on December 3, 2010 (NRC 2010).

Pursuant to Section 7 of the Endangered Species Act of 1973 (ESA), as amended, the NRC staff requested, in a letter dated August 16, 2007 (NRC 2007), that the National Marine Fisheries Service (NMFS) provide information on Federally listed endangered or threatened species, as well as on proposed or candidate species, and on any designated critical habitats that may occur in the vicinity of IP2 and IP3. In its response, dated October 4, 2007 (NMFS 2007), NMFS expressed concern that the continued operation of IP2 and IP3 could have an impact on the shortnose sturgeon (*Acipenser brevirostrum*), an endangered species that occurs in the Hudson River. NMFS also noted that a related species that also occurs in the Hudson River, the Atlantic sturgeon (*Acipenser oxyrinchus*), is a candidate species for which NMFS has proposed listing as endangered. The NRC staff has corresponded with NMFS regarding the Atlantic sturgeon, and requests that NMFS address Atlantic sturgeon to the extent appropriate (NMFS 2010).

Under Section 7, the NRC is responsible for providing information on the potential impact that the continued operation of IP2 and IP3 could have on the Federally listed species, the shortnose sturgeon. In addition, the NRC has prepared information regarding the potential impact on important species, including the Atlantic sturgeon; this information can be found in Chapters 2 and 4 of the SEIS (NRC 2010).

The NRC staff relied on data originally supplied by the applicant, Entergy Nuclear Operations, Inc. (Entergy) in preparing the BA for IP2 and IP3 in the draft SEIS (Entergy 2007b) but

^a The GEIS was originally issued in 1996. Addendum 1 to the GEIS was issued in 1999. Hereafter, all references to the "GEIS" include the GEIS and its Addendum 1.

subsequently questioned the impingement data supplied by Entergy. The NRC staff sought, and Entergy later submitted revised impingement data (Entergy 2009). Mathematical errors in the original data submitted to the NRC (Entergy 2007b) apparently resulted in overestimates of the take of shortnose sturgeon that the NRC staff presented in the previous BA. The NRC staff found that the differences in the original (Entergy 2007b) and revised (Entergy 2009) data were of sufficient magnitude to possibly affect the staff's conclusions and has issued this revised biological assessment based on the revised data.

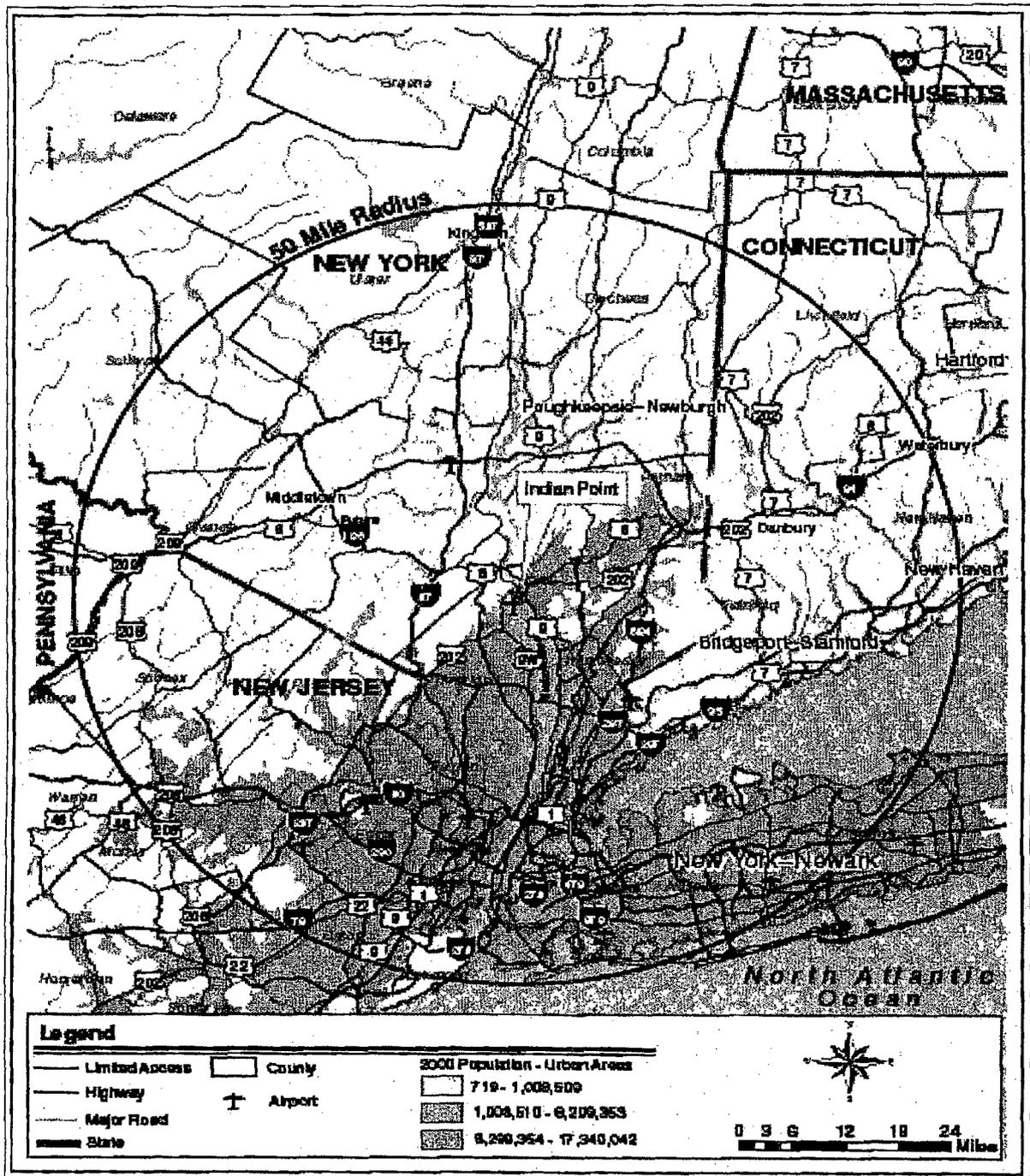
Proposed Action

The current proposed action considered in the SEIS is the renewal of the operating licenses for IP2 and IP3 for an additional 20-year term beyond the period of the existing licenses. The applicant has indicated that it may replace reactor vessel heads and control rod drive mechanisms during the period of extended operation. (For a description of these activities and potential environmental effects, see Chapter 3 of the SEIS.) If the NRC grants the operating license renewals, the applicant can operate and maintain the nuclear units, the cooling systems, and the transmission lines and corridors as they are now until 2033 and 2035.

Site Description

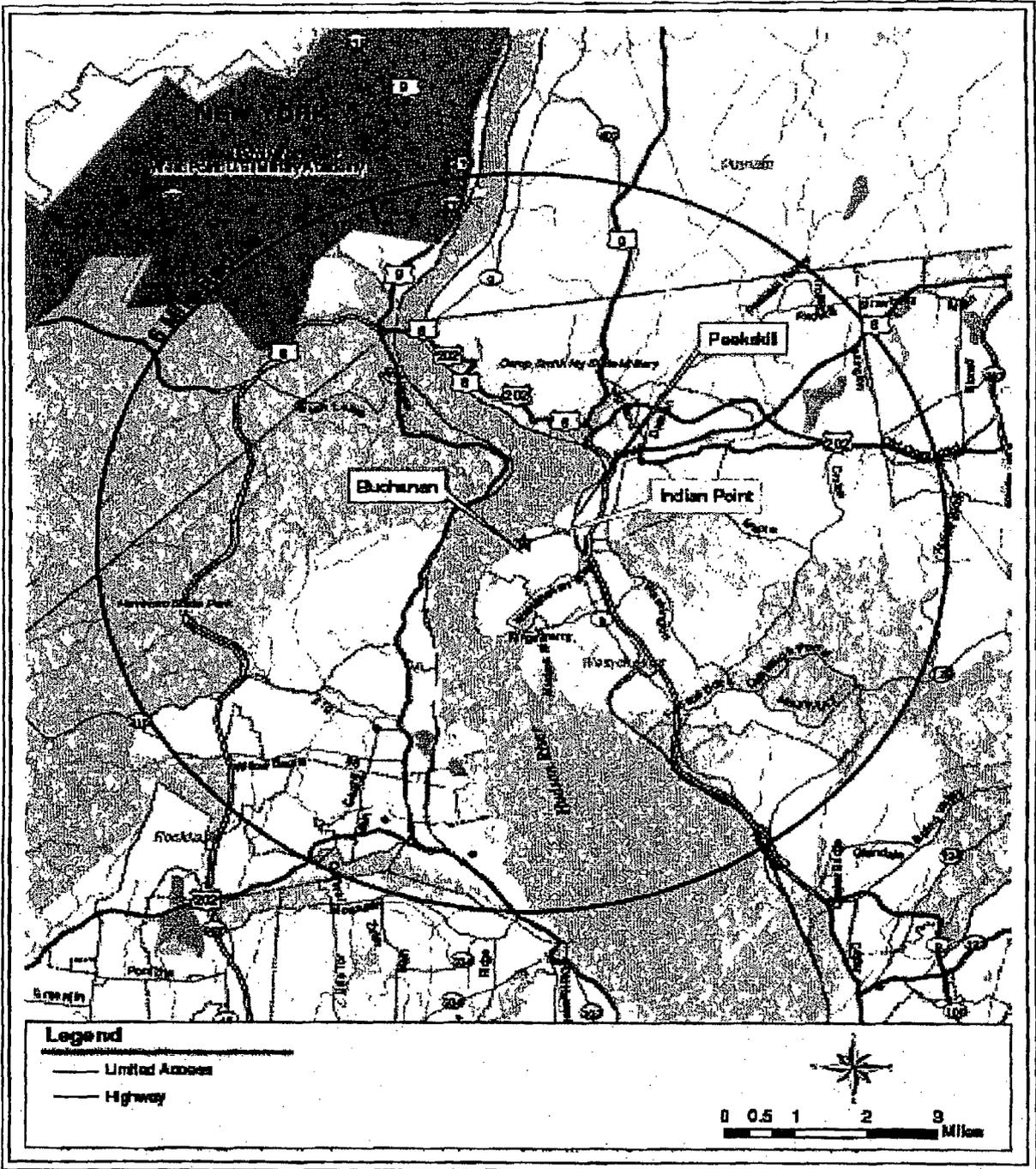
IP2 and IP3 are located on a 239-acre (97-hectare) site on the eastern bank of the Hudson River in the village of Buchanan, Westchester County, New York, about 24 miles (mi) (39 kilometers [km]) north of New York City, New York (Figures 1 and 2). Privately owned land bounds the north, south, and east sides of the property (Figure 3). The area is generally described as an eastern deciduous forest, dominated by oak (*Quercus*), maple (*Acer*), and beech (*Fagus*) species. The lower Hudson River is a tidal estuary, flowing 152 miles (244 km) from the Federal Dam at Troy, New York, to the Battery in New York City. IP2 and IP3 are located at River Mile (RM) 43 (RKM 69), where the average water depth is 40 feet (ft) (12 meters [m]), and the average width of the river is 4500 ft (1370 m). The Hudson River is tidal all the way to the Federal Dam, and the salinity zone in the vicinity of the facility is oligohaline (low salinity, ranging from 0.5 to 5 parts per thousand (ppt)), with the salinity changing with the level of freshwater flow. Water temperature ranges from a winter minimum of 34 degrees Fahrenheit (F) (1 degree Celsius (C)) to a summer maximum of 77 degrees F (25 degrees C) (Entergy 2007a).

The mid-Hudson River provided the cooling water for four other power plants: Roseton Generating Station, Danskammer Point Generating Station, Bowline Point Generating Station, and Lovett Generating Station; all four stations are fossil-fueled steam electric stations, located on the western shore of the river, and all use once-through cooling. Roseton consists of two units and is located at RM 66 (RKM 106), 23 mi (37 km) north of IP2 and IP3. Just 0.5 mi (0.9 km) north of Roseton is Danskammer, with four units. Bowline lies about five mi (eight km) south of IP2 and IP3 and consists of two units (Entergy 2007a; CHGEC 1999). Lovett, almost directly across the river from IP2 and IP3, is no longer operating.



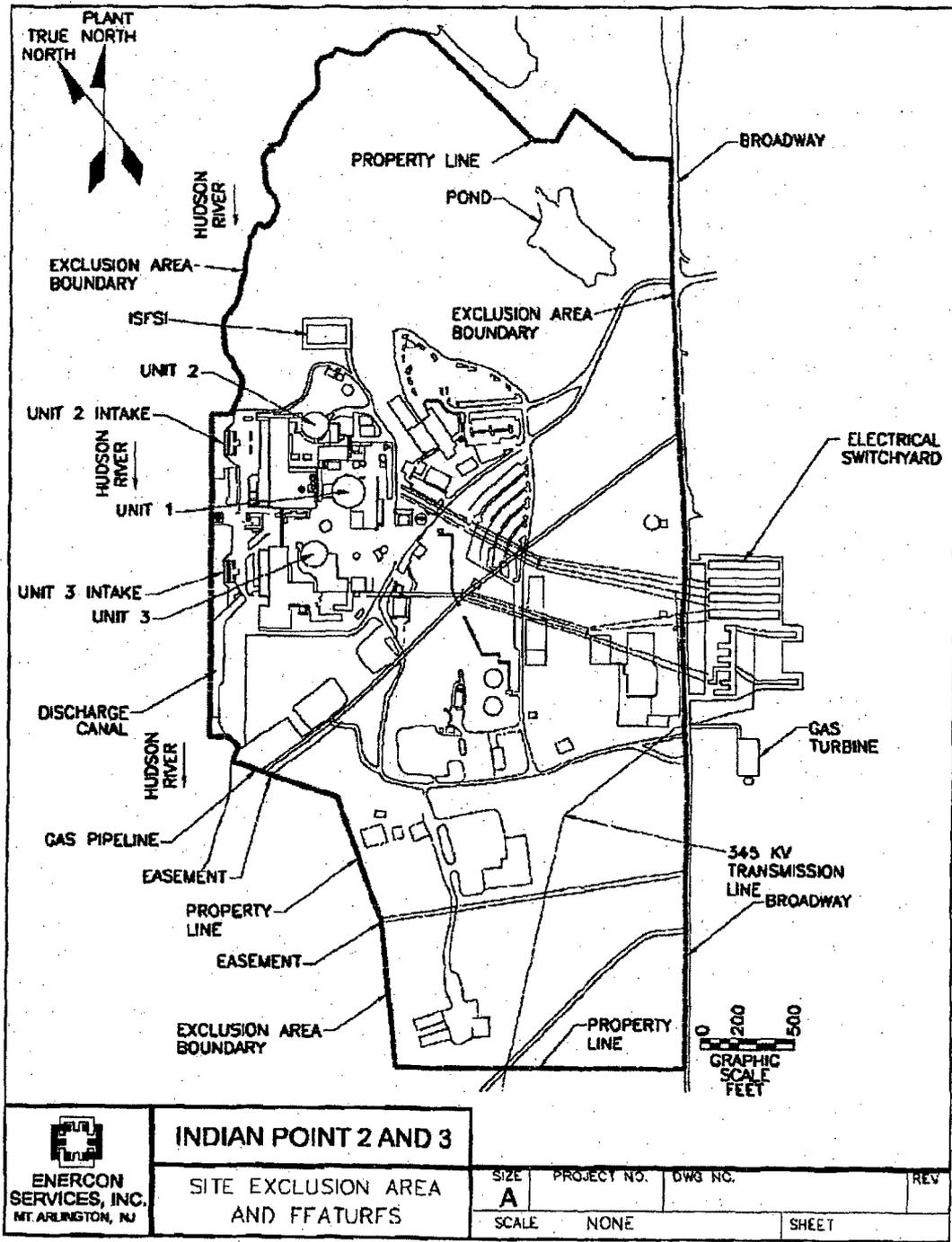
Source: Entergy 2007a

Figure 1: Location of IP2 and IP3, 50-mile (80-km) radius



Source: Entergy 2007a

Figure 2: Location of IP2 and IP3, 6-mile (10-km) radius

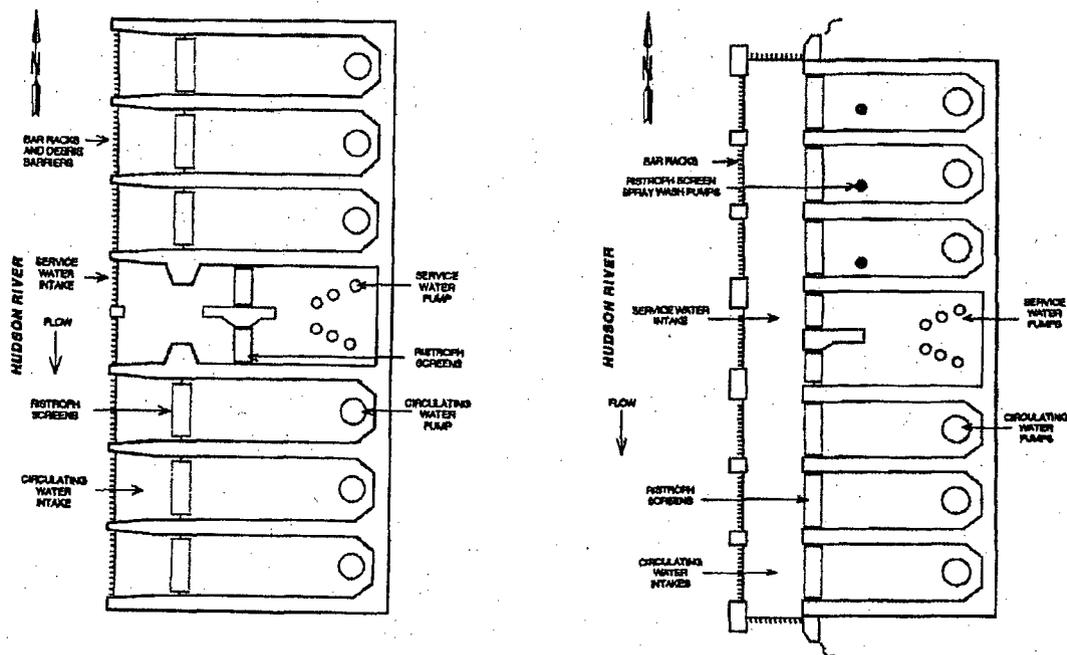


Source: Entergy 2007a

Figure 3: IP2 and IP3 property boundaries and environs

Description of Plants and Cooling Systems

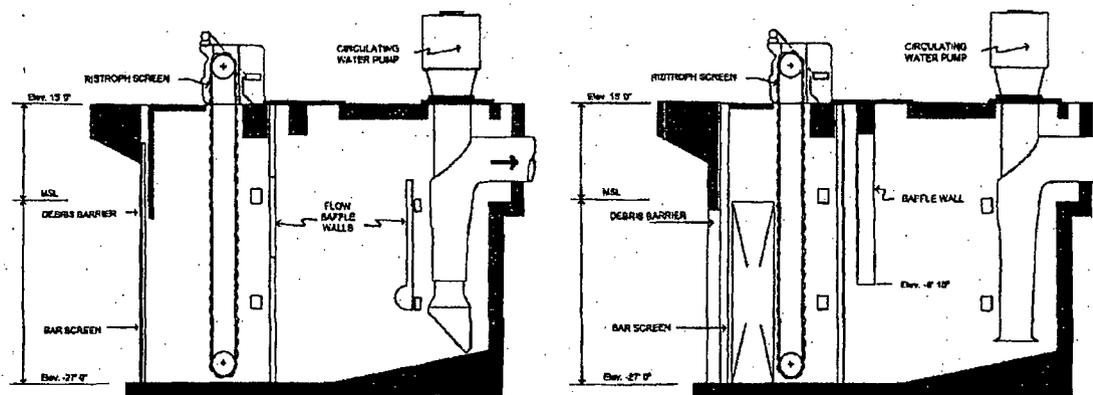
IP2 and IP3 are pressurized-water reactors with turbine generators that produce a net output of 6432 megawatts-thermal and approximately 2158 megawatts-electrical. Both IP2 and IP3 use water from the Hudson River for their once-through condensers and auxiliary cooling systems. Each unit has seven intake bays (Figure 4), into which the river water flows, passing under the floating debris skimmer wall and through Ristroph traveling screens (Figure 5). IP2 has six dual-speed circulating water pumps that can each pump 140,000 gallons per minute (gpm) (8.83 cubic meters per second [m^3/s]) at full speed and 84,000 gpm (5.30 m^3/s) at reduced speed; at full speed, the approach velocity is approximately 1 foot per second (fps) (0.30 meters per second [m/s]) and at reduced speed, the approach velocity is 0.6 fps (0.2 m/s). IP3 also has six dual-speed circulating water pumps. The full speed flow rate of each of these pumps is 140,000 gpm (8.83 m^3/s), with a 1 fps (0.30 m/s) approach velocity; the reduced speed is 64,000 gpm (4.04 m^3/s), with a 0.6 fps (0.2 m/s) approach velocity (Entergy 2007a).



Source: Entergy 2007a

Figure 4: IP2 intake structure (left) and IP3 intake structure (right)

The traveling screens employed by IP2 and IP3 are modified vertical Ristroph-type traveling screens installed in 1990 and 1991 at IP3 and IP2, respectively. The screens were designed in concert with the Hudson River Fishermen's Association, with screen basket lip troughs to retain water and minimize vortex stress (CHGEC 1999). Studies indicated that, assuming the screens continued to operate as they had during laboratory and field testing, the screens were "the screening device most likely to impose the least mortalities in the rescue of entrapped fish by mechanical means" (Fletcher 1990). The same study concluded that refinements to the screens would be unlikely to greatly reduce fish kills.



Source: Entergy 2007a

Figure 5: IP2 intake system (left) and IP3 intake system (right)

There are two spray-wash systems—the high-pressure spray wash removes debris from the front of the traveling screen mechanism; the low-pressure spray washes fish from the rear of the mechanism into a fish sluice system to return them to the river. A 0.25 x 0.5-inch (in.) (0.635 x 1.27-centimeter (cm)) clear opening slot mesh on the screen basket panels was included to minimize abrasion as the fish were washed into the collection sluice. The sluice system is a 12-in.-diameter (30.5-cm-diameter) pipe that discharges fish into the river at a depth of 35 ft (10.7 m), 200 ft (61 m) from shore (CHGEC 1999).

Status Review of Shortnose Sturgeon

Life History

The shortnose sturgeon (*Acipenser brevirostrum*, family Acipenseridae) is amphidromous, with a range extending from the St. Johns River, FL, to the St. John River, Canada. Unlike anadromous species, shortnose sturgeon spend the majority of their lives in freshwater and move into salt water periodically without relation to spawning (Collette and Klein-MacPhee, 2002). From colonial times, shortnose sturgeon have rarely been the target of commercial fisheries but have frequently been taken as incidental bycatch in Atlantic sturgeon and shad gillnet fisheries (NEFSC 2006; Dadswell et al. 1984). The shortnose sturgeon was listed on March 11, 1967, as endangered under the ESA. In 1998, NMFS completed a recovery plan for the shortnose sturgeon (NMFS 1998).

Shortnose sturgeon can grow up to 143 cm (56 in.) in total length and can weigh up to 23 kilograms (kg) (51 pounds [lb]). Females are known to live up to 67 years, while males typically do not live beyond 30 years. As young adults, the sex ratio is 1:1; however, among fish larger than 90 cm (35 in.), measured from nose to the fork of the tail, the ratio of females to males increases to 4:1. Throughout the range of the shortnose sturgeon, males and females mature at 45 to 55 cm (18 to 22 in.) fork length, but the age at which this length is achieved varies by geography. At the southern extent of the sturgeon's range, in Florida, males reach maturity at age two, and females reach maturity at six years or younger; in Canada, males can reach maturity as late as 11 years, and females, 13 years. In one to two years after reaching

maturity, males begin to spawn at two-year intervals, while females may not spawn for the first time until five years after maturing and, thereafter, spawn at three- to five-year intervals (Dadswell et al. 1984).

In the Hudson River, shortnose sturgeon migrate into freshwater to spawn during late winter or early summer when water temperatures are between 8 and 15 degrees C (NMFS 2009). Eggs sink and adhere to the hard surfaces on the river bottom, hatching after 4 to 6 days. Larvae consume their yolk sac and begin feeding in 8 to 12 days, as they migrate downstream away from the spawning site, remaining close to the river bottom (Kynard 1997; Collette and Klein-MacPhee 2002). The juveniles, which feed on benthic insects and crustaceans, do not migrate to the estuaries until the following winter, where they remain for three to five years. As adults, they migrate to the near-shore marine environment, where their diet consists of mollusks and large crustaceans (Dadswell 1984).

Status of Shortnose Sturgeon in Hudson River

Shortnose sturgeon inhabit the lower Hudson River; the Federal Dam creates a physical barrier preventing the species from swimming farther north. They are found dispersed throughout the river-estuary from late spring to early fall and then congregate to winter near Sturgeon Point (RM 86). Spawning occurs in the spring, just downstream of the Federal Dam at Troy, between RM 118 and 148 (between Coxsackie and Troy) (Bain et al. 2007; NMFS 2000). According to the NMFS environmental assessment (2000) for a permit for the incidental take of shortnose sturgeon at the nearby power plants, Roseton and Danskammer, larvae are typically found upstream of the intakes of all five power plants along the mid-Hudson River.

The Hudson River population of the shortnose sturgeon was estimated to be approximately 13,000 adults in 1979–1980. Based on population studies done in the mid-1990s, the population has apparently increased as much as 400 percent since then, up to almost 57,000 adult fish. Bain et al. (2007) suggested that the total population of the shortnose sturgeon in the Hudson River is approximately 61,000, including juveniles and nonspawning adults, although NMFS (2009) indicates that the adult population may be less than half that size (approximately 30,000 individuals). Woodland and Secor (2007) ascribed the population growth to several strong year-classes and two decades of sustained annual recruitment. Bain et al. (2007) maintained that the annual trawl surveys conducted by the electric utilities (CHGEC 1999) show an increase in abundance between the mid-1980s and mid-1990s, supporting the finding that the Hudson River population has increased. The NRC staff assessed the population trend for yearling and older shortnose sturgeon in the fall juvenile survey data provided by the applicant and found a small but statistically significant increase in the catch-per-unit-effort from 1975 to 2005.

Impact Assessment of Indian Point on the Shortnose Sturgeon Population Entrainment

The southern extent of the shortnose sturgeon spawning area in the Hudson River is approximately RM 118 (RKM 190), about 75 RM (121 RKM) upstream of the intake of IP2 and IP3 (NMFS 2000). The eggs of shortnose sturgeon are demersal, sinking and adhering to the bottom of the river, and, upon hatching, the larvae in both yolk-sac and post-yolk-sac stages remain on the bottom of the river, primarily upstream of RM 110 (RKM 177) (NMFS 2000). Shortnose sturgeon larvae grow rapidly, and, after a few weeks, they are too large to be

entrained by the cooling intake (Dadswell 1979). Because the egg and larval life stages of the shortnose sturgeon (the life stages susceptible to entrainment) are not found near the intake for IP2 and IP3, the probability of their entrainment at IP2 and IP3 is low.

IP2 and IP3 monitored entrainment from 1972 through 1987. Entrainment monitoring became more intensive at Indian Point from 1981 through 1987, and sampling was conducted for nearly 24 hours per day, four to seven days per week, during the spawning season in the spring (NMFS 2000). Entrainment monitoring reports list no shortnose sturgeon eggs or larvae at IP2 and IP3. NMFS (2000) lists only eight sturgeon larvae collected at any of the mid-Hudson River power plants (all eight were collected at Danskammer, and four of the eight may have been Atlantic sturgeon). Entrainment sampling data supplied by the applicant (Entergy 2007b) include large numbers of larvae for which the species could not be determined, although sturgeon larvae are distinctive and most likely were identified when they occurred. Entergy currently conducts no monitoring program to record entrainment at IP2 and IP3, and any entrainable life stages of the shortnose sturgeon taken in recent years would go unrecorded.

Based on the life history of the shortnose sturgeon, the location of spawning grounds within the Hudson River, and the patterns of movement for eggs and larvae, the number of shortnose sturgeon in early life stages entrained at IP2 and IP3 is probably low or zero. The available data from past entrainment monitoring do not indicate that entrainment was occurring. Therefore, the NRC staff concludes that the continued operation of Indian Point for an additional 20 years is not likely to adversely affect the population of shortnose sturgeon in the Hudson River through entrainment.

Impingement

IP2 and IP3 monitored impingement of most fish species daily until 1981, reduced collections to a randomly selected schedule of 110 days per year until 1991, and then ceased monitoring in 1991 with the installation of the modified Ristroph traveling screens. IP2 and IP3 monitored the impingement of sturgeon species daily from 1974 through 1990 (Entergy 2009). As described in Section 2.2.5.3 of the 2008 draft SEIS (NRC 2008) and the final SEIS (NRC 2010), the Ristroph screens, installed in 1990 and 1991, were designed in a collaborative effort with the Hudson River Fishermen's Association to minimize the mortality of impinged fish.

In 2000, NMFS prepared an environmental assessment (EA) for the incidental take of shortnose sturgeon at Roseton and Danskammer (NMFS 2000). The EA included the estimated total number (Table 1) of shortnose sturgeon impinged at Roseton, Danskammer, Bowline Point, Lovett, and IP2 and IP3, with adjustments to include the periods when sampling was not conducted.

Table 1: Estimated Total and Average Shortnose Sturgeon Impinged by Mid-Hudson River Power Plants, Adjusted for Periods Without Sampling

Power Plant	1972-1998		1989-1998	
	Total	Average No. Impinged/Year	Total	Average No. Impinged/Year
Bowline Point	23	0.9	0	0
Lovett	0	0	0	0
IP2	37	1.4	8	0.8
IP3	26	1.0	8	0.8
Roseton	49	1.8	15	1.5
Danskammer Point	140	5.2	44	4.4
Total	275	10.2	75	7.5

Source: Adapted from NMFS 2000.

Entergy (2009) provided revised shortnose sturgeon impingement data (Table 2), which are available through the NRC's online Agencywide Documents Access and Management System (ADAMS). The average impingement rate of shortnose sturgeon at IP2 and IP3 combined from 1975 through 1990 is about four fish per year. Appendix 1 to this BA reproduces detailed information from Entergy (2009) on the impinged fish. These data are the most recent and complete available.

An increase in the population of shortnose sturgeon in the Hudson River would most likely result in an increase in impinged shortnose sturgeon at IP2 and IP3. If the population data presented by Bain et al. (2007) and Woodland and Secor (2007) are accurate, then a four-fold increase in population between the mid-1980s and mid-1990s could result in a similar increase in impingement rates. Impingement data (Table 2), however, do not increase concomitantly with population through 1990. A population increase would mean that the population-level effect of taking an individual shortnose sturgeon would decrease.

When considering the effects of impingement, it is important to consider the affected species' impingement mortality rate. For IP2 and IP3, however, there are few data regarding the survival of the shortnose sturgeon after impingement. In 1979, NMFS issued a biological opinion (BO) relating to the take of shortnose sturgeon at Indian Point (Dadswell 1979). At the time, there was only one year in which records describing the status of impinged shortnose sturgeon were kept. In that year, 60 percent of collected impinged shortnose sturgeon were dead when collected. The BO assumed both that all dead sturgeon died as a result of the impingement and that no impingement-related mortality occurred after the impinged sturgeon were released.

Table 2: Estimated* Numbers of Impinged Shortnose Sturgeon from Impingement Monitoring at Indian Point Units 2 and 3

Year	Unit 2	Unit 3
1975	3	NA
1976	2	0
1977	11	2
1978	5	5
1979	4	3
1980	0	2
1981	0	0
1982	0	0
1983	0	0
1984	3	2
1985	0	0
1986	0	0
1987	0	2
1988	7	2
1989	0	2
1990	3	0
Yearly Mean	2.8	1.2
Sum of Unit Yearly Means	4.0	

*Numbers are corrected for collection efficiency and then rounded to whole numbers.

NA means data not available.

Source: Entergy 2009, ML091950345

The BO estimated that, in a worst-case scenario, 35 shortnose sturgeon would be impinged at IP2 and IP3 per year, and that 60 percent (21 individuals) would die on the intake screens. At the time, the population of adult shortnose sturgeon in the Hudson River was estimated to be 6,000, and this level of mortality would result in a 0.3 to 0.4 percent death rate caused by impingement at IP2 and IP3 (Dadswell 1979). The average yearly impingement rate from 1975 through 1990 based on revised data (Entergy 2009) is about four shortnose sturgeon, a rate almost an order of magnitude lower than Dadswell's (1979) worst-case assumption of 35 fish per year in the BO. Also, as stated above, the population of shortnose sturgeon in the Hudson River has increased and the population-level effect of IP2/IP3 impingement is thus lower than was previously estimated by NMFS in its BO.

Because all monitoring of impingement ceased after the Ristroph screens were installed in 1991, no updated mortality rate estimates for impinged shortnose sturgeon exist at IP2 and IP3. The NRC staff does not know the current level of impingement or the level of mortality. Although the laboratory and field tests (Fletcher 1990) performed on the modified Ristroph screens were not conducted using the shortnose sturgeon, the tests did show that injury and death were reduced for most species when compared to the first version of screens that were proposed (and rejected, based on their "unexceptional performance") (Fletcher 1990). If the NRC staff assumes that the modified Ristroph screens performed as well as the Fletcher's 1990 results indicated, then mortality and injury from impingement would be lower than reported by the NMFS in its BO (Dadswell 1979), and the impact to the species would be less. Without current monitoring, however, the NRC staff cannot confirm this.

In its BO, NMFS (Dadswell 1979) found that that operation of IP2 and IP3 is "not likely to jeopardize the continued existence of the shortnose sturgeon because, even assuming 100% mortality of the impinged fish, its contribution to the natural annual mortality is negligible." The NRC staff finds that the best estimate of takes of shortnose sturgeon by IP2 and IP3 based on revised data (Entergy 2009) is much less than that assumed by Dadswell (1979) in the NMFS BO, that installation of Ristroph screens since the original BO was prepared may have decreased the mortality rate of shortnose sturgeon that are impinged, and that the population of shortnose sturgeon in the Hudson River is increasing although impingement rates appear not to have increased concomitantly through 1990. The NRC staff recognizes the difficulties in drawing conclusions from two-decade old impingement data and incomplete impingement mortality data, but concludes that, based on the best available information, impingement and entrainment resulting from operation of IP2 and IP3 for an additional 20 years beyond the original license term are not likely to jeopardize the continued existence of the endangered shortnose sturgeon in the Hudson River.

Thermal Impacts

The discharge of heated water into the Hudson River can cause lethal or sublethal effects on resident fish, influence food web characteristics and structure, and create barriers to migratory fish moving from marine to freshwater environments.

State Pollution Discharge Elimination System (SPDES) permit NY-0004472 regulates thermal discharges associated with the operation of IP2 and IP3. This permit imposes effluent limitations, monitoring requirements, and other conditions to ensure that all discharges are in compliance with Article 17 of the Environmental Conservation Law of New York State, Part 704 of the Official Compilation of the Rules and Regulations of the State of New York, and the Clean Water Act. Specific conditions of the SPDES permit related to thermal discharges from IP2 and IP3 are specified by NYSDEC (2003) and include the following:

The maximum discharge temperature is not to exceed 110 degrees F (43 degrees C).

The daily average discharge temperature between April 15 and June 30 is not to exceed 93.2 degrees F (34 degrees C) for an average of more than 10 days per year during the term of the permit, beginning in 1981, provided that it not exceed 93.2 degrees F (34 degrees C) on more than 15 days during that period in any year.

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; the 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. IP2 and IP3 have not yet completed triaxial thermal studies, to completely assess the size and nature of the thermal plume created by the discharge from IP2 and IP3 and the possible impact on the sturgeon. The NRC staff understands, however, that Entergy has collected triaxial thermal data, and will submit a final, verified thermal model to NYSDEC in the next year.

According to the NMFS Final Recovery Plan for the Shortnose Sturgeon (NMFS 1998), "During summer months, especially in southern rivers, shortnose sturgeon must cope with the physiological stress of water temperatures that often exceed 82 degrees F (28 degrees C)." Although the area closest to the discharge from IP2 and IP3 can exceed these temperatures, the summer maximum temperature of the Hudson River in the area of IP2 and IP3 is 77 degrees F (25 degrees C) (Entergy 2007a). The combined discharge from both Indian Point units is about 1.75 million gpm (110 m³/s), including the service water (Entergy 2007a). Table 3 presents the net downstream flow (controlling for the influence of tides) of the Hudson River at Indian Point. These data suggest that discharges from IP2 and IP3 equal, at most, 15% of the river flow 20% of the time, while up to 2% of the time, IP2 and IP3 discharges equal 97% or more of the downstream river flow. This variation – due to differences in seasonal precipitation, tidal influence, and other factors – suggests that discharges may mix in very different ways under different conditions.

Table 3: Cumulative Frequency Distribution of Net Downstream Flows of Hudson River

Million gallons per minute (gpm)	Cumulative percentile
11.7	20
6.8	40
4.71	60
3.1	80
1.8	98

Adapted from Entergy 2007a

The NRC staff cannot determine, based on available information, whether a shortnose sturgeon in the Hudson River would experience any prolonged physiological stress from the thermal plume caused by the discharge from IP2 and IP3. Shortnose sturgeon could be forced to seek refuge from elevated water temperatures as they are forced to do in southern rivers, and this could limit their available habitat. If studies reveal that the plume is buoyant, shortnose sturgeon could pass underneath the plume on their passage past the facility, but there are no data to indicate that this is the case.

As noted earlier, the NYSDEC thermal modeling of the Hudson River suggests that the discharge from IP2 and IP3 could exceed the limits specified in the SPDES permit, but without a triaxial thermal study, the exact size and nature of the thermal plume is unknown. Information about the species, based on the NMFS recovery plan, suggests that increased temperatures can have a significant effect on the shortnose sturgeon. Therefore, the NRC staff concludes that the continued thermal effects from operation of IP2 and IP3 for an additional 20 years could potentially adversely affect the population of shortnose sturgeon in the Hudson River through thermal discharge, but the staff is unable to determine the extent to which the population would be affected.

Conclusion

Renewal of the operating licenses of IP2 and IP3 to include another 20 years of operation could potentially adversely affect the population of shortnose sturgeon in the Hudson River due to the

thermal effects of once-through cooling. An analysis of the revised impingement data recently submitted by Entergy indicates that impingement and entrainment would not adversely affect the population of shortnose sturgeon. Sufficient information is not available at this time for the NRC staff to quantify the extent to which the shortnose sturgeon population could be affected by thermal effects, though forthcoming data is likely to provide additional information.

References

Bain, M.B., Haley, N., Peterson, D.L., Arend, K.K., Mills, K.E., and Sullivan, P.J. 2007. "Recovery of a US Endangered Fish," *PLoS ONE* 2(1): e168. Accessed at: <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0000168#s3> on December 11, 2007.

Central Hudson Gas and Electric Corporation (CHGEC), Consolidated Edison Company of 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." ADAMS Accession No. ML083400128.

Collette, B.B. and Klein-MacPhee, G., eds. 2002. "Short-nosed sturgeon," *Bigelow and Schroeder's Fishes of the Gulf of Maine*, Third Edition, Smithsonian Institution Press: Washington, DC.

Dadswell, M.J. 1979. Testimony on behalf of the National Marine Fisheries Service, presented before the U.S. Environmental Protection Agency, Region II, May 14, 1979. ADAMS Accession No. ML083430546.

Dadswell, M.J., Taubert, B.D., Squiers, T.S., Marchette, D., and Buckley, J. 1984. "Synopsis of Biological Data on Shortnose Sturgeon, *Acipenser brevirostrum* LeSueur 1818," NOAA Technical Report NMFS-14, FAO Fisheries Synopsis No. 140. Accessed at: http://www.nmfs.noaa.gov/pr/pdfs/species/shortnosesturgeon_biological_data.pdf on December 11, 2007.

Entergy Nuclear Operations, Inc. (Entergy). 2007a. "Applicant's Environmental Report, Operating License Renewal Stage (Appendix E to Indian Point, Units 2 & 3, License Renewal Application)," April 23, 2007. ADAMS Accession No. ML071210530.

Entergy Nuclear Northeast (Entergy). 2007b. Letter from F. Dacimo, Vice President, Entergy Nuclear Northeast, to U.S. Nuclear Regulatory Commission Document Control Desk. Reference NL-07-156. Subject: Entergy Nuclear Operations, Inc., Indian Point Nuclear Generating Unit Nos. 2 & 3, Docket Nos. 50-247 and 50-286, Supplement to License Renewal Application (LRA)—Environmental Report References. December 20, 2007. ADAMS Accession Nos. ML080080205, ML080080209, ML080080213, ML080080214, ML080080216, ML080080291, ML080080298, ML080080306.

Entergy Nuclear Northeast (Entergy). 2009. Letter from F. Dacimo, Vice President, Entergy Nuclear Northeast, to U.S. Nuclear Regulatory Commission Document Control Desk. Reference NL-09-091. Subject: Transmission of Additional Requested Information Regarding Sturgeon Impingement Data Indian Point Nuclear Generating Unit Nos. 2 & 3 Docket Nos. 50-247 and 50-286 License Nos. DPR-26 and DPR-64. July 1, 2009. ADAMS Accession No. ML091950345.

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

Kynard, B. 1997. "Life history, latitudinal patterns, and status of the shortnose sturgeon *Acipenser brevirostrum*," *Environmental Biology of Fishes* 48: 319-334.

National Marine Fisheries Service (NMFS). No date. "Shortnose Sturgeon (*Acipenser brevirostrum*)," Office of Protected Resources (OPR). Accessed at: <http://www.nmfs.noaa.gov/pr/species/fish/shortnosesturgeon.htm> on December 11, 2007. ADAMS Accession No. ML083430566.

National Marine Fisheries Service (NMFS). 1998. "Recovery Plan for the Shortnose Sturgeon (*Acipenser brevirostrum*)," prepared by the Shortnose Sturgeon Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland. Accessed at: http://www.nmfs.noaa.gov/pr/pdfs/recovery/sturgeon_shortnose.pdf on December 11, 2007.

National Marine Fisheries Service (NMFS). 2000. "Environmental Assessment of a Permit for the Incidental Take of Shortnose Sturgeon at the Roseton and Danskammer Point Generating Stations." ADAMS Accession No. ML083430553.

National Marine Fisheries Service (NMFS). 2007. Letter from M. Colligan, Assistant Regional Administrator for Protected Resources, National Marine Fisheries Service to Chief, Rules and Directives Branch, U. S. Nuclear Regulatory Commission. Subject: Response to request for information regarding threatened and endangered species in the vicinity of Indian Point. October 4, 2007. ADAMS Accession No. ML073340068.

National Marine Fisheries Service (NMFS). 2009. Letter from M. Colligan, Assistant Regional Administrator for Protected Resources, National Marine Fisheries Service to Chief, Rules and Directives Branch, U. S. Nuclear Regulatory Commission. Subject: Biological Assessment for License Renewal of the Indian Point Nuclear Generating Unit Nos. 2 and 3. February 24, 2009. ADAMS Accession No. ML090820316.

National Marine Fisheries Service (NMFS). 2010. E-mail correspondence from J. Crocker to D. Logan, NRC. November 10, 2010. ADAMS Accession No. ML103400027.

New York State Department of Environmental Conservation (NYSDEC). 2003. "Final Environmental Impact Statement Concerning the Applications to Renew New York State Pollutant Discharge Elimination System (SPDES) Permits for the Roseton 1 and 2 Bowline 1 and 2 and IP2 and IP3 2 and 3 Steam Electric Generating Stations, Orange, Rockland and Westchester Counties," Hudson River Power Plants FEIS, June 25, 2003. ADAMS Accession No. ML083360752.

Nuclear Regulatory Commission (NRC). 1996. "Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants," NUREG-1437, Volumes 1 and 2, Washington, DC.

Nuclear Regulatory Commission (NRC). 1999. "Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Main Report," Section 6.3, "Transportation," Table 9.1; "Summary of Findings on NEPA Issues for License Renewal of Nuclear Power Plants," NUREG-1437, Volume 1, Addendum 1, Washington, DC.

Nuclear Regulatory Commission (NRC). 2007. Letter from R. Franovich to Mr. Peter Colosi, National Marine Fisheries Service, Gloucester, Massachusetts, "Re: Request for List of Protected Species and Essential Fish Habitat Within the Area under Evaluation for the Indian Point Nuclear Generating Unit Nos. 2 and 3 License Renewal Application Review," August 16, 2007. ADAMS Accession No. ML072130388.

Nuclear Regulatory Commission (NRC). 2008. "Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants: Supplement 38, Regarding Indian Point Nuclear Generating Unit Nos. 2 and 3, Draft Report for Comment." NUREG-1437, Supplement 38, Volumes 1 & 2. December 22, 2008. Washington, DC. ADAMS Accession No. ML083540594.

Nuclear Regulatory Commission (NRC). 2010. "Generic Environmental Impact Statement for License Renewal of Nuclear Plants: Supplement 38, Regarding Indian Point Nuclear Generating Unit Nos. 2 and 3, Final Report." Final NUREG-1437, Supplement 38, Volumes 1, 2, and 3. December 3, 2010. Washington, DC. ADAMS Accession Nos. ML103350405, ML103350438, ML103360209, ML103360212, and ML103350442.

Shepherd, G. 2006. "Shortnose Sturgeon (*Acipenser brevirostrum*)," National Marine Fisheries Service (NOAA), Office of Protected Resources (OPR). Last updated in December 2006. Accessed at: http://www.nefsc.noaa.gov/sos/spsyn/af/sturgeon/archives/42_Atlantic_ShortnoseSturgeon_2006.pdf on December 11, 2007. ADAMS Accession No. ML083430573.

Woodland, R.J. and Secor, D.H. 2007. "Year-class strength and recovery of endangered shortnose sturgeon in the Hudson River, New York," *Transactions of the American Fisheries Society* 136:72-81.

Appendix 1 to Biological Opinion

This appendix presents a reproduction of Tables 2a, 2b and 4 from Entergy (2009) showing detailed information on shortnose sturgeon impinged at IP2 and IP3 for the years 1974 through 1990. The Entergy submittal is available at ADAMS Accession No. ML091950345.

Table 2a. Individual Data File Records of Shortnose Sturgeon Collected by Impingement at Indian Point Unit No. 2 in Each Year, 1974 through 1990.

Unit	Year	Taxon	Date	Sample Number	Total Weight (g)	Length (mm)	Condition (alive or dead)	H2O Temp (deg C)	Total Count	Table V-36 DEIS 1999	DSEIS 2008 Table 4-11	Coll. Eff. Adj. Cnt	Comments
2	1974	Shortnose Sturgeon	5-May-74	212508	532			7.0	1			2.19	
2	1974	Shortnose Sturgeon	20-Jun-74	217109	1702			21.5	1			3.02	
2	1974	Shortnose Sturgeon	8-Aug-74	222005	1588			25.7	1			3.39	
2	Total 1974	Shortnose Sturgeon							3	3	NR	8.60	1974 not reported in DESIS Table 4-11
2	1975	Shortnose Sturgeon	20-Jun-75	217109	84			23.0	1			3.14	
2	Total 1975	Shortnose Sturgeon							1	1	3	3.14	
2	1976	Shortnose Sturgeon	16-Feb-76	204708	253			2.5	1			2.01	
2	Total 1976	Shortnose Sturgeon							1	2	2	2.01	
2	1977	Shortnose Sturgeon	23-Jan-77	202309	516			0.5	1			1.94	
2	1977	Shortnose Sturgeon	23-Feb-77	205409	1800			3.0	1			2.03	
2	1977	Shortnose Sturgeon	2-Apr-77	209209	67			5.3	2			4.23	two fish combined; no individual records
2	1977	Shortnose Sturgeon	25-May-77	214509	73			19.2	1			2.85	
2	Total 1977	Shortnose Sturgeon							5	6	11	11.06	
2	1978	Shortnose Sturgeon	9-Jan-78	200904	27			1.7	1			1.98	
2	1978	Shortnose Sturgeon	14-Nov-78	231808	940			14.5	1			2.55	
2	Total 1978	Shortnose Sturgeon							2	2	5	4.53	
2	1979	Shortnose Sturgeon	28-Feb-79	205909	567			0.7	1			1.95	
2	1979	Shortnose Sturgeon	29-Apr-79	211908	625			10.9	1			2.36	
2	Total 1979	Shortnose Sturgeon							2	2	4	4.31	
2	Total 1980	Shortnose Sturgeon							0	0	NR	0.00	
2	Total 1981	Shortnose Sturgeon							0	0	NR	0.00	
2	Total 1982	Shortnose Sturgeon							0	0	NR	0.00	
2	Total 1983	Shortnose Sturgeon							0	0	NR	0.00	
2	1984	Shortnose Sturgeon	30-May-84	215108	673			17.8	1			2.75	
2	Total 1984	Shortnose Sturgeon							1	1	176	2.75	
2	Total 1985	Shortnose Sturgeon							0	0	NR	0.00	
2	Total 1986	Shortnose Sturgeon							0	0	NR	0.00	
2	1987	Shortnose Sturgeon	8-Mar-87	206707	127	320	D	3.0	1			2.03	
2	1987	Shortnose Sturgeon	27-Feb-87	NS	1845	710	A	4.3	1			2.08	
2	Total 1987	Shortnose Sturgeon							2	1(1)	116	4.11	
2	1988	Shortnose Sturgeon	1-Feb-88	NS	637	580	D	1.6	1			1.98	
2	1988	Shortnose Sturgeon	27-Apr-88	NS	1160	605	D	14.1	1			2.52	
2	1988	Shortnose Sturgeon	4-Nov-88	NS	1785	672	D	13.9	1			2.52	
2	Total 1988	Shortnose Sturgeon							3	0(3)	NR	7.02	
2	Total 1989	Shortnose Sturgeon							0	0	NR	0.00	
2	1989	Shortnose Sturgeon	18-Sep-90	NS	687	443	D	25.5	1			3.37	
2	Total 1990	Shortnose Sturgeon							1	0(1)	NR	3.37	

NS : Collected on a non-scheduled sampling date

NR Not reported

na Not available

1.7 Water temperature estimated from weekly average

Blank space = no data in the SAS Impingement Data Files

(1) Numbers in parentheses indicate number of shortnose sturgeon taken on non-sample days.

Table 2b. Individual Data File Records of Shortnose Sturgeon Collected by Impingement at Indian Point Unit No. 3 in Each Year, 1974 through 1990.

Unit	Year	Taxon	Date	Sample Number	Total Weight (g)	Length (mmtl)	Condition (alive or dead)	H2O Temp (deg C)	Total Count	V-36 DEIS 1999	DSEIS 2008 Table 4-11	Coll. Eff. Adj. Cnt	Comments
3	Total 1974	Shortnose Sturgeon							0	NR	NR	0.00	
3	Total 1975	Shortnose Sturgeon							NR	NR	NR	NR	
3	Total 1976	Shortnose Sturgeon							0	0	NR	0.00	
3	1977	Shortnose Sturgeon	23-Sep-77	326609	99			23.0	1			1.87	
3	Total 1977	Shortnose Sturgeon							1	1	2	1.87	
3	1978	Shortnose Sturgeon	27-Jan-78	302709	65			3.8	1			1.46	
3	1978	Shortnose Sturgeon	2-Mar-78	306109	54			2.9	1			1.44	
3	1978	Shortnose Sturgeon	27-May-78	314709	62			16.9	1			1.72	
3	Total 1978	Shortnose Sturgeon							3	3	5	4.62	
3	1979	Shortnose Sturgeon	3-Apr-79	309309	450			8.0	1			1.53	
3	1979	Shortnose Sturgeon	4-May-79	312407	595			12.2	1			1.61	
3	Total 1979	Shortnose Sturgeon							2	2	3	3.14	
3	1980	Shortnose Sturgeon	29-Apr-80	312004	525			13.3	1			1.64	
3	Total 1980	Shortnose Sturgeon							1	1	2	1.64	
3	Total 1981	Shortnose Sturgeon							0	0	NR	0.00	
3	Total 1982	Shortnose Sturgeon							0	0	NR	0.00	
3	Total 1983	Shortnose Sturgeon							0	0	NR	0.00	
3	1984	Shortnose Sturgeon	19-May-84	314010	598			15.8	1			1.69	
3	Total 1984	Shortnose Sturgeon							1	1	154	1.69	
3	Total 1985	Shortnose Sturgeon							0	0	NR	0.00	
3	Total 1986	Shortnose Sturgeon							0	0	NR	0.00	
3	1987	Shortnose Sturgeon	29-Apr-87	311908	325	433	D	13.0	1			1.63	
3	Total 1987	Shortnose Sturgeon							1	1	55	1.63	
3	1988	Shortnose Sturgeon	19-Aug-88	323210	479	434	D	28.0	1			2.02	
3	Total 1988	Shortnose Sturgeon							1	1	186	2.02	
3	1989	Shortnose Sturgeon	6-Oct-89	NS	600	530	A	21.0	1			1.82	
3	Total 1989	Shortnose Sturgeon							1	0(1)	NR	1.82	
3	Total 1990	Shortnose Sturgeon							0	0	NR	0.00	

NS- Collected on a non-scheduled sampling date

NR Not reported

na Not available

1.7 Water temperature estimated from weekly average

Blank space = no data in the SAS Impingement Data Files

(1) Numbers in parentheses indicate number of shortnose sturgeon taken on non-sample days.

Table 4. Impingement Data File Level 5 Actual Counts and Level 5 Counts Adjusted for Collection Efficiency for Shortnose and Atlantic Sturgeon Collected in Impingement Samples, Indian Point, 1975 through 1991

Study Year	IP2						IP3						IP2 & IP3	
	Shortnose Sturgeon		Atlantic Sturgeon		Total IP2		Shortnose Sturgeon		Atlantic Sturgeon		Total IP3		Grand Total Level 5 Collection Efficiency	Grand Total Adjusted Count
	Level 5 Count	Efficiency ^a	Level 5 Count	Efficiency	Level 5 Count	Efficiency	Level 5 Count	Efficiency	Level 5 Count	Efficiency	Level 5 Count	Efficiency		
1975	1	3.14	118	301.81	119	304.95	NR	NR	NR	NR	NR	NR	119	304.95
1976	1	2.01	8	16.64	9	18.65	0	0.00	8	14.09	8	14.09	17	32.74
1977	5	11.06	44	104.85	49	115.91	1	1.87	153	252.20	154	254.07	203	369.98
1978	2	4.53	16	38.28	18	42.81	3	4.62	21	31.43	24	36.05	42	78.86
1979	2	4.31	32	74.75	34	79.06	2	3.14	38	60.97	40	64.11	74	143.17
1980	0	0.00	9	23.72	9	23.72	1	1.64	10	16.58	11	18.22	20	41.94
1981	0	0.00	3	8.01	3	8.01	0	0.00	5	7.46	5	7.46	8	15.47
1982	0	0.00	1	2.39	1	2.39	0	0.00	1	1.41	1	1.41	2	3.80
1983	0	0.00	3	6.11	3	6.11	0	0.00	0	0.00	0	0.00	3	6.11
1984	1	2.75	3	6.43	4	9.18	1	1.69	5	9.75	6	11.44	10	20.62
1985	0	0.00	9	19.23	9	19.23	0	0.00	17	25.00	17	25.00	26	44.23
1986	0	0.00	2	5.54	2	5.54	0	0.00	5	5.79	5	5.79	7	13.33
1987	2	4.11	2	6.01	4	10.12	1	1.63	1	1.79	2	3.42	6	13.54
1988	3	7.02	1	2.11	4	9.13	1	2.02	0	0.00	1	2.02	5	11.15
1989	0	0.00	0	0	0	0.00	1	1.82	0	0.00	1	1.82	1	1.82
1990	1	3.37	0	0	1	3.37	0	0.00	2	3.07	2	3.07	3	6.44
Grand Total	18	42.30	251	615.88	269	658.18	11	18.43	266	429.54	277	447.97	546	1,106.15

NR - Not reported

^a Unit specific collection efficiency coefficients calculated according to the equations presented in the 1990 Indian Point Annual Report and applied to the Level 5 raw count.

Entergy RK Contention EC-8 Attachment 2

IPRenewal NPEmails

From: Stuyvenberg, Andrew
Sent: Thursday, January 20, 2011 2:47 PM
To: 'Julie Crocker'
Cc: IPRenewal NPEmails; Logan, Dennis
Subject: RE: Inquiry regarding proposed Indian Point license renewal and ESA consultation

Thank you, Julie. I appreciate the follow-up and look forward to being in touch.

Best,
Drew

From: Julie Crocker [<mailto:Julie.Crocker@Noaa.Gov>]
Sent: Thursday, January 20, 2011 2:34 PM
To: Stuyvenberg, Andrew
Cc: IPRenewal NPEmails; Logan, Dennis
Subject: Re: Inquiry regarding proposed Indian Point license renewal and ESA consultation

Hi Drew -

Yes, we are working on a response to the December 10 letter that indicates we have all the information we need to initiate formal consultation and that it is our understanding that you'd like us to include a "conference" for Atlantic sturgeon as a proposed species. The due date for the final Biological Opinion will be April 30, 2011 (135 days after we received the letter) unless during the course of the consultation we mutually agree to extend this date.

I'll send you a PDF of our letter as soon as it is signed.

Julie

Stuyvenberg, Andrew wrote:
Ms. Crocker -

I'm writing to follow-up on the revised biological assessment that the NRC issued on December 10 regarding the proposed license renewal of Indian Point Units 2 and 3. I know you've been in touch with Dennis Logan of NRC regarding the consultation, but I'm writing today because I want to confirm that you've received the revised BA and also inquire as when/whether we may receive a notification letter from NMFS regarding the consultation process (as indicated in Mary Colligan's February 24, 2009, letter to David Wrona of NRC).

As you may recall, I'm the project manager for the Indian Point license renewal environmental review. I've been on several phone calls with you and Dennis since I began managing the project in early 2008.

Please contact me if you have any questions or need anything additional from me. I look forward to hearing from you, and I appreciate your time.

Best regards,
Drew

Drew Stuyvenberg
U.S. Nuclear Regulatory Commission
301-415-4006
Andrew.Stuyvenberg@nrc.gov

Hearing Identifier: IndianPointUnits2and3NonPublic_EX
Email Number: 2152

Mail Envelope Properties (AF843158D8D87443918BD3AA953ABF781C89D40FFE)

Subject: RE: Inquiry regarding proposed Indian Point license renewal and ESA
consultation
Sent Date: 1/20/2011 2:46:42 PM
Received Date: 1/20/2011 2:46:43 PM
From: Stuyvenberg, Andrew

Created By: Andrew.Stuyvenberg@nrc.gov

Recipients:
"IPRenewal NPEmails" <IPRenewal.NPEmails@nrc.gov>
Tracking Status: None
"Logan, Dennis" <Dennis.Logan@nrc.gov>
Tracking Status: None
"Julie Crocker" <Julie.Crocker@Noaa.Gov>
Tracking Status: None

Post Office: HQCLSTR02.nrc.gov

Files	Size	Date & Time
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Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received:

**Entergy RK Contention EC-8
Attachment 3**

Received
2/16



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
55 Great Republic Drive
Gloucester, MA 01930-2276

FEB 16 2011

David J. Wrona, Branch Chief
Projects Branch 2
Division of License Renewal
Office of Nuclear Reactor Program
US Nuclear Regulatory Commission
Washington, DC 20555-0001

RE: Biological Assessment for License Renewal of the Indian Point Nuclear Generating Unit
Nos. 2 and 3

Dear Mr. Wrona:

This correspondence responds to a letter dated December 10, 2010, (received December 16, 2010) regarding the initiation of formal consultation for the proposed renewal by the US Nuclear Regulatory Commission (NRC) of the Indian Point Nuclear Generating Unit Nos. 2 and 3 (IP2 and IP3) operating licenses for a period of an additional 20 years pursuant to Section 7 of the Endangered Species Act (ESA) of 1973, as amended. The current operating licenses for these units expire on September 28, 2013 (IP2) and December 12, 2015 (IP3). Consultation with NOAA's National Marine Fisheries Service (NMFS) regarding the proposed license renewal is appropriate as the action may adversely affect the federally endangered shortnose sturgeon (*Acipenser brevirostrum*). Accompanying your letter was a revised Biological Assessment (BA) evaluating the impact of the proposed renewal on federally endangered shortnose sturgeon (*Acipenser brevirostrum*). The original BA was sent to NMFS with a letter dated December 22, 2008, and included a copy of the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 39 Regarding Indian Point Nuclear Generating Unit Nos. 2 and 3 Draft Report*. In a letter dated February 24, 2009, NMFS requested additional information from NRC before the consultation could be initiated.

The information requested by NMFS is included in the December 10, 2010, letter and accompanying revised BA. All of the information required to initiate a formal consultation has been received. The date that your letter was received (December 16, 2010) will serve as the commencement of the formal consultation process. The ESA and the Section 7 regulations (50 CFR 402.14) require that formal consultation be concluded within 90 calendar days of initiation, and the biological opinion (Opinion) be delivered to the action agency within 45 days after the conclusion of formal consultation (i.e., April 30, 2011), unless extended. In the meantime, pursuant to Section 7(d) of the ESA, the NRC must not make any irreversible or irretrievable



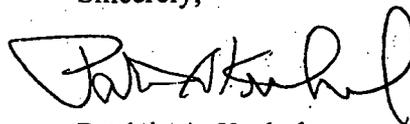
commitment of resources that would foreclose the formulation or implementation of any reasonable and prudent alternatives to avoid jeopardizing endangered or threatened species.

On October 6, 2010, NMFS published two rules proposing to list four distinct population segments (DPS) of Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) as endangered (New York Bight (NYB), Chesapeake Bay, Carolina and Southeast Atlantic) and one DPS as threatened (Gulf of Maine DPS) under the ESA (75 FR 1872). The NYB DPS includes all Atlantic sturgeon whose range occurs in watersheds that drain into coastal waters, including Long Island Sound, the New York Bight, and Delaware Bay, from Chatham, MA to the Delaware-Maryland border on Fenwick Island, as well as wherever these fish occur in coastal bays, estuaries, and the marine environment from the Bay of Fundy, Canada, to the Saint Johns River, FL. Within this range, Atlantic sturgeon have been documented from the Hudson and Delaware rivers as well as at the mouth of the Connecticut and Taunton rivers, and throughout Long Island Sound.

The proposed action by the applicant falls within the geographic range of the NYB DPS of Atlantic sturgeon and this species is known to occur in the action area. Monitoring reports indicate that Atlantic sturgeon have been impinged and/or entrained at the facility in the past. Under the provisions of 50 CFR §402.10, federal agencies shall confer with NMFS on any action which is likely to jeopardize the continued existence of any proposed species or result in the destruction or adverse modification of proposed critical habitat. Federal action agencies may request a conference on any proposed action that may affect proposed species or proposed critical habitat. As such, as confirmed in correspondence between Andrew Stuyvenberg of your staff and Julie Crocker of NMFS' Protected Resources Division on January 20, 2011, the NRC is requesting a conference regarding the effects of the proposed relicensing of IP2 and IP3 on Atlantic sturgeon. NMFS agrees that a formal conference is appropriate.

I look forward to continuing to work with you and your staff during the consultation process. If you have any questions or concerns about this letter or about the consultation process in general, please contact Julie Crocker at (978) 282-8480 or by e-mail (Julie.Crocker@noaa.gov).

Sincerely,



Patricia A. Kurkul
Regional Administrator

cc: Crocker, F/NER3
Rusanowsky- F/NER4
Stuyvenberg - NRC

File Code: Sec 7 NRC Indian Point Nuclear Plant Relicensing
PCTS: F/NER/2009/00619

Entergy RK Contention EC-8 Attachment 4



Entergy Nuclear Northeast
Indian Point Energy Center
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P.O. Box 249
Buchanan, NY 10511-0249
Tel (914) 788-2055

Fred Dacimo
Vice President
License Renewal

NL-11-024

March 1, 2011

Mr. Andrew Stuyvenberg
NRC Environmental Project Manager
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: Endangered Species Act Consultation
Indian Point Nuclear Generating Unit Nos. 2 & 3
Docket Nos. 50-247 and 50-286
License Nos. DPR-26 and DPR-64

REFERENCE:

1. NRC Letter dated December 10, 2010, "Revised Biological Assessment for License Renewal of the Indian Point Nuclear Generating Plant, Unit No. 2 and 3" (ADAMS No. ML102990043)
2. NRC E-mail dated January 20, 2011, "Inquiry Regarding Proposed Indian Point License Renewal and ESA Consultation" (ADAMS No. ML110200539) (Added to ADAMS on February 18, 2011)
3. NMFS Letter dated December 16, 2010, "Biological Assessment for License Renewal of the Indian Point Nuclear Generating Unit Nos. 2 and 3" (ADAMS no. ML110550751) (Added to ADAMS on February 24, 2011)

Dear Sir:

The purpose of this letter is to formally notify the Nuclear Regulatory Commission ("NRC") that Entergy Nuclear Operations, Inc., Entergy Nuclear Indian Point Unit 2, LLC, and Entergy Nuclear Indian Point Unit 3, LLC (together, "Entergy") intend to participate in the formal consultation and conference process between NRC and the National Marine Fisheries Service ("NMFS") conducted pursuant to Section 7 of the Endangered Species Act as it relates to license renewal of Indian Point Units 2 and 3 ("IP2" and "IP3," collectively "IPEC"). Entergy also requests expedited consideration of a 45-day extension of the consultation process.

By letter dated December 10, 2010, the NRC sent NMFS a revised biological assessment associated with IPEC license renewal, but the NRC did not, in that letter, request initiation of formal consultation (Ref. 1). NRC also did not notify Entergy that the formal consultation process had begun or offer Entergy the opportunity to submit information for consideration during the consultation process pursuant to 50 CFR 402.14(d). On February 18, 2011,

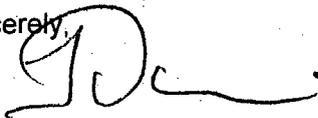
however, NRC made public an e-mail dated January 20, 2011, between NRC and NMFS indicating that NMFS had sufficient information to initiate formal consultation, and that NMFS planned to issue the final biological opinion by April 30, 2011 (Ref. 2). Subsequently, on February 24, 2011, the NRC made public a letter dated February 16, 2011, from NMFS to the NRC indicating that formal consultation began on December 16, 2010, when NMFS received the NRC's biological assessment, that the consultation will conclude within 90 days of initiation, and confirming that NMFS will deliver its biological opinion by April 30, 2011, unless the consultation is extended (Reference 3).

As noted above, pursuant to 50 CFR 402.14(d), NRC must provide Entergy with the opportunity to submit information for consideration during the formal consultation period. However, because Entergy only very recently learned that formal consultation likely began approximately 60 days ago, Entergy requests a 45-day extension of the consultation period in accordance with 50 CFR 402.14(e), in order to provide Entergy with sufficient notice and time to exercise its rights with regard to the consultation process. Commensurate with this request, and to assist NRC in providing NMFS with the best scientific and commercial data available, Entergy proposes to submit relevant information to NMFS through the NRC on or before April 30, 2011. The due date for the final biological opinion would then be June 14, 2011, unless the NRC and NMFS agree to a further extension. Entergy requests that the NRC and NMFS seek its approval in accordance with 50 CFR 402.14(e) for any extension beyond June 29, 2011.

In accordance with 50 CFR 402.14(g)(5), Entergy also asks that NRC request that NMFS make the draft biological opinion available to the NRC, and that NRC provide Entergy with a copy of the draft biological opinion upon issuance, as well as the opportunity to review and comment on the draft opinion. As specified in the regulations, Entergy would then submit its comments on the draft biological opinion to NMFS through the NRC. Entergy also requests disclosure of all past and future non-privileged communications between NRC and NMFS concerning the consultation. Finally, Entergy requests that NRC facilitate a meeting or teleconference with Entergy and NMFS at least two weeks prior to April 30, 2011 to allow discussion of the information and comments Entergy plans to submit as part of the consultation process.

Entergy looks forward to participating in the consultation process and again requests prompt consideration of Entergy's extension request. Should the NRC or NMFS require additional information or have any questions, please contact Dara Gray at (914) 736-8414.

Sincerely,



FRD/cbr

cc: U.S. Nuclear Regulatory Commission Document Control Desk
Mr. William Dean, Regional Administrator, NRC Region I
Mr. John Boska, NRR Senior Project Manager
Mr. Paul Eddy, New York State Department of Public Service
NRC Resident Inspector's Office
National Marine Fisheries Service
OGC

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	Docket Nos. -50-247-LR and
	)	50-286-LR
ENTERGY NUCLEAR OPERATIONS, INC.)	
)	
(Indian Point Nuclear Generating Units 2 and 3)	)	March 7, 2011

APPLICANT'S ANSWER TO NEW YORK STATE'S CONTENTION 37
CONCERNING THE NRC STAFF'S EVALUATION OF ENERGY ALTERNATIVES

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meaningful consideration to non-fossil fuel alternatives to IPEC license renewal.³ NYS-37 further challenges the NRC Staff's analysis and recommendations with respect to new alternatives included in Chapter 8 of its December 2010 Final Supplemental Environmental Impact Statement ("FSEIS"),⁴ and asserts that the FSEIS does not provide a rational basis for the NRC's record of decision.

As set forth below, Entergy does not oppose NYS's characterization of NYS-37 as an "update" to NYS-9/NYS-33, or NYS's incorporation by reference of supporting evidence previously identified by NYS in support of NYS-9/NYS-33. Nor does Entergy oppose the submittal of NYS-37 on timeliness grounds. However, insofar as NYS-37 constitutes a "new" contention challenging the FSEIS, Entergy opposes its admission under the criteria of 10 C.F.R. § 2.309(f)(1)(iii), (v), and (vi).

In summary, NYS and its experts directly challenge the need for power from IPEC, urging the NRC to undertake detailed (and speculative) analyses of NYS's energy markets. Such an inquiry is beyond the scope of this proceeding and not required by 10 C.F.R. § 51.95(c)(2). By doing so, NYS fails to address the relevant inquiry, which is *not* whether there is a need for the power produced by IPEC, but whether preserving the option of license renewal for future decision makers would be unreasonable in view of the environmental impacts of continued operation of IPEC. Indeed, Section 51.95(c)(2) expressly precludes discussion of power needs or the economic costs and economic benefits of the proposed action or of alternatives to the proposed action in the FSEIS, "except insofar as such benefits and costs are either essential for a

³ NUREG-1437, Supp. 38, *Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Regarding Indian Point Nuclear Generating Unit Nos. 2 and 3, Draft Report for Comment* (Dec. 2008) ("DSEIS"), available at ADAMS Accession Nos. ML083540594, ML083540614.

⁴ NUREG-1437, Supp. 38, *Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Regarding Indian Point Nuclear Generating Unit Nos. 2 and 3, Final Report* (Dec. 2010) ("FSEIS"), available at ADAMS Accession Nos. ML103350405, ML103350438, ML103360209, ML103360212, ML103350442.

determination regarding the inclusion of an alternative in the range of alternatives considered or relevant to mitigation.”⁵ As detailed below, the FSEIS already includes a reasonable evaluation of all of the energy alternatives cited by NYS, including energy conservation/energy efficiency and renewable energy sources.

Indeed, despite NYS’s numerous supporting references and attached expert declarations, NYS-37 also lacks adequate factual and legal bases. Contrary to NYS’s argument, the review of energy alternatives in the FSEIS is not arbitrary, biased, or based on stale information. The FSEIS responds to NYS’s comments and also made significant substantive modifications to its alternatives analysis. For example, the FSEIS considered energy conservation as a stand-alone alternative, removed coal-fired power generation as a reasonable alternative, and included a significant energy conservation/renewable energy component in its Combination of Alternatives. In addition, the FSEIS evaluated the relative environmental impacts of the proposed action and a spectrum of reasonable alternatives to that action. It also bears emphasis that the proposed action is renewal of the IP2 and IP3 operating licenses so that those units may commence extended operations within a few years, in September 2013 and December 2015, respectively. Therefore, the scope of the reasonable alternatives includes only those alternatives that are essentially available now—not one or two decades from now.

Finally, NYS does not accurately portray the totality of the FSEIS, and cites State agency documents that actually undercut its factual claims. Accordingly, there is no basis for NYS’s claim that the FSEIS does not meaningfully consider non-fossil fuel alternatives or in any way runs afoul of the requirements in the National Environmental Policy Act (“NEPA”) or the

⁵ 10 C.F.R. § 51.95(c)(2).

Administrative Procedure Act (“APA”). No further evaluation is required. For these reasons, NYS-37 does not warrant admission as a new contention challenging the FSEIS.

II. BACKGROUND

A. Procedural History

1. Admission of NYS-9

On November 30, 2007, NYS filed a petition for leave to intervene in this proceeding.⁶ One of its contentions, NYS-9, alleged that Entergy’s ER is deficient because it failed to include consideration of energy conservation in its analysis of alternatives that are able to replace IPEC’s full base-load generation capacity of approximately 2,158 gross MW(e) and that, at a minimum, the ER should analyze energy conservation as part of the “no-action” alternative (*i.e.*, non-renewal of the IP2 and IP3 operating licenses).⁷

In July 2008, the Board admitted NYS-9 as a “narrow” contention of omission, finding that it raised a material dispute regarding the need for Entergy’s ER to analyze the potential environmental impact of energy conservation that may result from the no-action alternative.⁸ However, the Board denied admission of NYS-9, insofar as it alleged that Entergy’s overall energy alternatives analysis—for the defined goal of producing 2,158 MWe of base-load power generation—is deficient because it ignores energy conservation.⁹ In rejecting that portion of NYS-9 relating to Entergy’s overall energy alternatives analysis (in addition to rejecting NYS-10

⁶ See New York State Notice of Intention to Participate and Petition to Intervene (Nov. 30, 2007) (“NYS Petition”), available at ADAMS Accession Nos. ML073400187, ML073400205.

⁷ See *id.* at 106-08

⁸ *Entergy Nuclear Operations, Inc.* (Indian Point Nuclear Generating Units 2 & 3), LBP-08-13, 68 NRC 43, 93 (2008).

⁹ See *id.*

and NYS-11), the Board found the reasonable alternatives for license renewal to be limited to discrete electric generation sources that are feasible technically and available commercially.¹⁰

2. Issuance of the Staff's December 2008 DSEIS

On December 22, 2008, the Staff issued its DSEIS, in which it evaluated the site-specific environmental impacts of license renewal for IP2 and IP3. In particular, Chapter 8 of the DSEIS compared the environmental effects of IPEC license renewal to those of the no-action alternative and alternative energy sources, including two possible combinations of alternatives that included contributions from energy conservation.¹¹ Section 8.2 recognized that the power not generated by IPEC during the license renewal term as a result of the no-action alternative could be replaced by certain generation or energy conservation (*i.e.*, demand-side management, or “DSM”) options or some combination thereof.¹² The DSEIS concluded that the environmental impacts of the alternatives considered therein were similar in magnitude to those of continued operation of IP2 and IP3 under renewed licenses.¹³

3. Admission of NYS-33

In February 2009, NYS filed NYS-33 in response to the DSEIS.¹⁴ NYS-33 alleged that the DSEIS violated NEPA because it ignored significant new information and failed to provide a rigorous analysis of the costs, benefits, and feasibility of energy conservation and efficiency, the

¹⁰ See *id.* at 93, 95-96, 99.

¹¹ See generally, DSEIS, Vol. 1, Ch. 8 (Environmental Impacts of Alternatives to License Renewal).

¹² See *id.* at 8-27.

¹³ See *id.* at 8-78 (stating that the environmental impact levels of the alternatives considered by the NRC Staff in the DSEIS are similar to the impact levels of continued IP2 and IP3 operation under a renewed license with or without modifications to the existing once-through cooling system).

¹⁴ State of New York Contentions Concerning NRC Staff's Draft Supplemental Environmental Impact Statement (Feb. 27, 2009) (“NYS DSEIS Contentions”), available at ADAMS ML090690303.

viability of renewable energy resources, energy transmission capacity, and possible combinations of different energy sources under the “no-action” alternative.¹⁵

Thereafter, on March 18, 2009, NYS also filed comments on the DSEIS. NYS’s DSEIS comments presented essentially the same criticisms of the DSEIS contained in NYS-33.¹⁶ In short, NYS again asserted that the DSEIS failed to adequately consider conservation and efficiency, the viability of renewable energy resources, expanded energy transmission capacity, and appropriate combinations of different alternative energy sources.¹⁷

In June 2009, the Board admitted NYS-33 and consolidated it with NYS-9.¹⁸ The Board ruled that NYS-33 directly challenged the NRC Staff’s findings in the DSEIS that energy conservation would only result in a savings of 800 MW, and that wind power or other renewable energy sources could only provide 200 to 400 MW of energy to replace either or both IPEC units.¹⁹ The Board further noted that NYS-33 alleged that the two combination alternatives analyzed in the DSEIS were “artificially narrow and arbitrary.”²⁰

4. Issuance of the FSEIS and Submittal of NYS-33

The Staff issued its FSEIS on December 3, 2010, having substantially modified and augmented Chapter 8 of the FSEIS in response to comments submitted by NYS and others. On February 3, 2011, NYS submitted NYS-37. NYS-37 seeks to “update” consolidated contentions

¹⁵ NYS DSEIS Contentions at 20-34.

¹⁶ See Comments Submitted by the New York State Office of the Attorney General on the Draft Supplemental Environmental Impact Statement Prepared by the Staff of the Nuclear Regulatory Commission for the Renewal of the Operating Licenses for Indian Point Units 2 and 3, Buchanan, New York, at 21-37 (Mar. 18, 2009) (Entergy Contention NYS-37 Att. 1), available at ADAMS Accession No. ML090771328.

¹⁷ See *id.*

¹⁸ See Licensing Board Order (Ruling on New York State’s New and Amended Contentions) at 9-13 (June 16, 2009) (“June 16, 2009 Board Order”) (unpublished).

¹⁹ See *id.* at 13.

²⁰ *Id.* at 12 (citations omitted).

NYS-9 and NYS-33 in response to the Staff's issuance of the FSEIS.²¹ It also purports to present new challenges to the FSEIS's analysis and recommendations with respect to new alternatives based on the revised discussion contained in Chapter 8 of the FSEIS.²²

In challenging the FSEIS, NYS-37 makes four principal arguments, which Entergy addresses in the order set forth below. First, NYS alleges that the FSEIS did not adequately discuss non-fossil fuel alternatives.²³ Second, NYS claims that the FSEIS did not consider new information material to non-fossil fuel alternatives and, instead, relied on obsolete and inaccurate information.²⁴ Third, NYS contends that the FSEIS failed to respond to the State's detailed comments on the DSEIS.²⁵ Finally, NYS asserts that the Staff's energy alternatives analysis is so deficient and biased that it renders the FSEIS a "nullity" with respect to the recommendation that the adverse environmental impacts of IPEC license renewal are not so great that preserving the option of license renewal for energy planning decision makers would be unreasonable.²⁶

III. APPLICABLE LEGAL STANDARDS

A. Legal Standards Governing Admission of New and Amended Contentions

Entergy does not oppose NYS-37 on timeliness grounds. However, to be admitted, NYS-37 must satisfy each of the criteria set out in 10 C.F.R. § 2.309(f)(1)(i)-(vi).²⁷ Among other things, the petitioner must demonstrate that the issue raised in the contention is within the scope of the proceeding, is material to the findings the NRC must make to support the action that is

²¹ Contention NYS-37 at 1.

²² *See id.*

²³ *See id.* at 17-31.

²⁴ *See id.* at 8-15.

²⁵ *See id.* at 15-17.

²⁶ *Id.* at 2. *See also id.* at 31-43.

²⁷ *S.C. Elec. & Gas Co. (Virgil C. Summer Nuclear Station, Units 2 & 3)*, LBP-10-6, slip op. at 3 (Mar. 17, 2010).

involved in the proceeding, and provide sufficient information to show that a genuine dispute exists with respect to a *material* issue of law or fact.²⁸ A dispute is material only if its resolution would make a difference in the outcome of the licensing proceeding.²⁹

In view of NYS's specific allegations in NYS-37, several key points warrant emphasis here. First, environmental contentions in license renewal proceedings cannot, absent a waiver, challenge the generic conclusions contained in the NRC's Generic Environmental Impact Statement for License Renewal of Nuclear Plants ("GEIS")³⁰ and codified in 10 C.F.R. Part 51.³¹ Second, the Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention.³² Any supporting material provided by a petitioner or its expert is subject to scrutiny "both for what it does and does not show."³³ Third, an allegation that some aspect of the Staff's analysis is inadequate does not establish a genuine dispute unless it is supported by facts and a reasoned statement of why the analysis is unacceptable in some material respect.³⁴ In this regard, a petitioner must demonstrate that the challenged "analysis fails to meet a statutory or regulatory requirement."³⁵

²⁸ See 10 C.F.R. § 2.309(f)(1)(iii), (iv), (vi).

²⁹ See *Summer*, LBP-10-6, slip op. at 4 (quoting *Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2 & 3), CLI-99-11, 49 NRC 328, 333-34 (1999)).

³⁰ NUREG-1437, Generic Environmental Impact Statement for License Renewal of Nuclear Plants (May 1996) ("GEIS") (Energy Contention NYS-37 Att. 2), available at ADAMS Accession Nos. ML040690705, ML040690720, ML040690738.

³¹ See 10 C.F.R. §§ 51.71(d), 51.95(c); *Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 & 4), CLI-01-17, 54 NRC 3, 12 (2001).

³² *Private Fuel Storage, L.L.C.* (Indep. Spent Fuel Storage Installation), LBP-98-7, 47 NRC 142, 181, *aff'd*, CLI-98-13, 48 NRC 26 (1998).

³³ See *Yankee Atomic Elec. Co.* (Yankee Nuclear Power Station), LBP-96-2, 43 NRC 61, 90, *rev'd in part on other grounds*, CLI-96-7, 43 NRC 235 (1996).

³⁴ See *Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 & 4), LBP-90-16, 31 NRC 509, 521 & n.12 (1990).

³⁵ *Indian Point*, LBP-08-13, 68 NRC at 187.

B. Legal Standards Governing Consideration of Energy Alternatives Under NEPA and 10 C.F.R. Part 51 in an NRC License Renewal Proceeding

Before explaining why NYS-37 is not admissible under 10 C.F.R. § 2.309(f)(1) as a new contention, it is necessary to place NYS's claims in their appropriate legal contexts.

1. The Range of Alternatives To Be Considered Under NEPA

Under NEPA and federal regulations implementing that statute, federal agencies are required only to consider alternatives that are reasonable; *i.e.*, those that are feasible and nonspeculative.³⁶ Specifically, an agency must follow a “rule of reason” in preparing an EIS, and this rule of reason governs both *which* alternatives the agency must discuss, and the *extent* to which it must discuss them.³⁷ That is, an agency's discussion of alternatives must be bounded by “some notion of feasibility.”³⁸ Also, an agency need not consider every available alternative.³⁹ An agency is required to examine only those alternatives that are necessary to permit a reasoned choice.⁴⁰ NEPA does not require a separate analysis of alternatives which are not significantly distinguishable from alternatives actually considered, or which have substantially similar consequences.⁴¹ With respect to alternatives that were eliminated from detailed study, NEPA requires only a brief discussion of the reasons for their elimination.⁴²

³⁶ See *City of Carmel-by-the-Sea v. U.S. Dep't of Transp.*, 123 F.3d 1142, 1155 (9th Cir. 1997); *City of Angoon v. Hodel*, 803 F.2d 1016, 1021 (9th Cir. 1986), *cert. denied*, 484 U.S. 870 (1987); *Nuclear Mgmt. Co., LLC* (Monticello Nuclear Generating Plant), LBP-05-31, 62 NRC 735, 753 (2005) (*citing Natural Res. Def. Council, Inc. v. Morton*, 458 F.2d 827, 834, 837 (D.C. Cir. 1972); *Long Island Lighting Co.* (Shoreham Nuclear Power Station, Unit 1), CLI-91-2, 33 NRC 61, 65 (1991)).

³⁷ *Citizens Against Burlington v. Busey*, 938 F.2d 190, 195 (D.C. Cir. 1991) (*citing Morton*, 458 F.2d at 834, 837; *quoting Alaska v. Andrus*, 580 F.2d 465, 475 (D.C. Cir. 1978), *vacated in part as moot sub. nom. W. Oil & Gas Ass'n v. Alaska*, 439 U.S. 922 (1978)), *cert. denied*, 502 U.S. 1994 (1991).

³⁸ *Muckleshoot Indian Tribe v. U.S. Forest Serv.*, 177 F.3d 800, 814 (9th Cir. 1999).

³⁹ *Headwaters, Inc. v. Bureau of Land Mgmt.*, 914 F.2d 1174, 1180 (9th Cir. 1990).

⁴⁰ *Id.*

⁴¹ *Id.* at 1181.

⁴² 40 C.F.R. § 1502.14(a).

These principles derive largely from a case that, importantly, involved the NRC's consideration of energy alternatives. Specifically, in *Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, Inc.*, the U.S. Supreme Court, reversing the D.C. Circuit, upheld a rule of reason test for the range of alternatives that need to be considered by an agency.⁴³ The Court further stated that, given the constraints on an agency's time and resources, it need not "ferret out every possible alternative, regardless of how uncommon or unknown that alternative may have been at the time the project was approved."⁴⁴ In other words, "the agency has discretion to choose a manageable number of alternatives [that can] present a reasonable spectrum of policy choices that meet the goals of the action."⁴⁵

2. Relationship Between the Purpose and Need for the Proposed Action and the Alternatives to Be Considered by the NRC in its FSEIS

a. *The Purpose and Need for License Renewal As Defined in the GEIS and Adopted by the Commission in 10 C.F.R. Part 51*

The terms "reasonable" and "alternatives" are not self-defining.⁴⁶ As a result, the courts have held that project alternatives derive from an EIS's statement of purpose and need. The Commission has followed the approach established by the court in *Citizens Against Burlington*,

⁴³ See *Vt. Yankee Nuclear Power Corp. v. Natural Res. Def. Council*, 435 U.S. 519, 551-52 (1978).

⁴⁴ *Id.* at 551. See also *id.* at 553 (requiring a licensing board's consideration of energy alternatives to be "judged by the information then available to it"); *Roosevelt Campobello Int'l Park Comm'n v. EPA*, 684 F.2d 1041, 1047 (1st Cir. 1982) (holding that, for siting alternatives, the "duty under NEPA is to study all alternatives that appear reasonable and appropriate for study at the time of drafting the EIS"); *Carolina Envtl. Study Group v. United States*, 510 F.2d 796, 800-01 (D.C. Cir. 1975) (stating that NEPA requires consideration of alternatives "as they exist and are likely to exist" and rejecting energy alternatives such as oil shale, geothermal energy, and solar energy).

⁴⁵ *Oceana, Inc. v. Evans*, 384 F.Supp. 2d 203, 241 (D.D.C. 2005) (citing *Vt. Yankee*, 435 U.S. at 551).

⁴⁶ *Citizens Against Burlington*, 938 F.2d at 194-95.

holding that reasonable alternatives are those that will bring about the ends of the proposed action, taking into consideration the economic goals of a private applicant.⁴⁷

For purposes of nuclear power plant license renewal, the purpose and need for the proposed action (renewal of an operating license) is to provide an option that allows for power generation capability beyond the term of a current nuclear power plant operating license to meet future system generating needs, as such needs may be determined by applicable State and Federal decision makers.⁴⁸ Based on this statement of purpose and need, the Commission concluded that “the NRC staff, adjudicatory officers, and Commission shall determine whether or not the adverse environmental impacts of license renewal are so great that preserving the option of license renewal for energy planning decisionmakers would be unreasonable.”⁴⁹ The Commission also emphasized that consideration of the need for generating capacity and of utility economics is neither within the NRC’s jurisdiction nor necessary for the NRC’s understanding of the environmental consequences of a license renewal decision.⁵⁰

b. Reasonable Alternatives Discussed in the GEIS

Chapter 8 of the GEIS states that “a reasonable set of alternatives should be limited to analysis of single, discrete electric generation sources and only electric generation sources that are *technically feasible and commercially viable*.”⁵¹ The GEIS does not expressly define the term “discrete electric generation source.” However, it is implicit in the GEIS’s discussion of

⁴⁷ See *Hydro Res. Inc.* (P.O. Box 15910, Rio Ranch, N.M. 87174), CLI-01-4, 53 NRC 31, 55-56 (2001) (citing *Citizens Against Burlington*, 938 F.2d at 195-96; *City of Grapevine v. Dep’t of Transp.*, 17 F.3d 1502, 1506 (D.C. Cir. 1994)).

⁴⁸ See Final Rule, Environmental Review for Renewal of Nuclear Power Plant Operating Licenses, 61 Fed. Reg. 28,467, 28,472 (June 5, 1996), amended by 61 Fed. Reg. 66,537 (Dec. 18, 1996). See also GEIS, Vol. 1 at 1-2.

⁴⁹ 10 C.F.R. § 51.95(c)(4) (emphasis added).

⁵⁰ See Final Rule, Environmental Review for Renewal of Nuclear Power Plant Operating Licenses, 61 Fed. Reg. at 28,473.

⁵¹ GEIS, Vol. 1 at 8-1 (emphasis added).

various energy alternatives that the GEIS is referring to baseload generation sources.⁵²

“Baseload” power refers to a power source that is “intended to continuously produce electricity at or near full capacity, with high availability.”⁵³ Nonetheless, the NRC included in the GEIS a brief discussion of energy conservation and power import alternatives.⁵⁴ It explained that, while these alternatives do not fulfill the purpose and need of the proposed action, they are tools available to state and utility energy planners.⁵⁵

c. *The No-Action Alternative*

As indicated above, NEPA also requires discussion of the agency alternative of taking “no action.”⁵⁶ In the present context, the no-action alternative is denial of the renewed licenses for IP2 and IP3. The Commission has held that the no-action alternative is most easily viewed as simply maintaining the status quo.⁵⁷ It is intended to foster comparison of the expected environmental impacts of renewing the IPEC licenses with the potential environmental impacts of not renewing those licenses.

⁵² See *id.* at 8-17 (“The inability to increase the capacity factors of wind power makes the technology an inappropriate choice for baseload power.”); *id.* at 8-19 (“Use of PV cells for baseload capacity requires very large energy storage devices, such as pumped hydro facilities, batteries, or compressed air chambers. Currently available energy storage devices are too expensive to store sufficient electricity to meet the baseload generating requirements.”); *id.* at 8-22 (“Solar thermal systems have constraints similar to those of PV systems in that capital costs are higher than for nonrenewable resources, and solar thermal systems lack baseload capability unless combined with natural gas backup.”); *id.* at 8-25 to 8-27 (“Although geothermal plants offer alternative baseload capacity to conventional fossil fuel and nuclear plants, widespread application of geothermal energy is constrained by the geographic availability of the resource and the maturity of the technology.”); *id.* at 8-33 (“Combined-cycle plants . . . are particularly efficient and are used as intermediate and baseload facilities . . .”).

⁵³ *Env'tl. Law & Policy Ctr. v. NRC*, 470 F.3d 676, 679 (7th Cir. 2006). See also *Consumers Power Co. (Midland Plant, Units 1 & 2)*, ALAB-452, 6 NRC 892, 951 n.272 (1977) (“‘Baseload’ units are designed to run continuously (except for maintenance) to meet that constant portion of the utility’s load.” (citations omitted)).

⁵⁴ GEIS, Vol. 1 at 8-2, 8-38 to 8-42.

⁵⁵ *Id.* at 8-2.

⁵⁶ See 40 CFR § 1502.14(d); Council on Environmental Quality, Memorandum to Agencies: Answers to 40 Most Asked Questions on NEPA Regulations, 46 Fed. Reg. 18,026 (Mar. 23, 1981) (Question No. 7).

⁵⁷ *La. Energy Servs., L.P. (Claiborne Enrichment Ctr.)*, CLI-98-3, 47 NRC 77, 97 (1998) (citing *Ass’n of Pub. Agency Customers v. Bonneville Power Admin.*, 126 F.3d 1158, 1188 (9th Cir. 1997)). See also *Private Fuel Storage, L.L.C. (Indep. Spent Fuel Storage Installation)*, CLI-04-4, 59 NRC 31, 41 (2004); *Hydro Res., Inc.*, CLI-01-4, 53 NRC at 54.

IV. ARGUMENT

A. Entergy Does Not Oppose the Admission of NYS-37 Insofar As It Simply Reasserts Previously-Admitted Challenges to the ER and DSEIS

NYS states that its new contention “updates” previously-admitted contentions NYS-9 and NYS-33.⁵⁸ Entergy does not oppose NYS’s characterization of NYS-37 as an “update” to NYS-9/NYS-33, or NYS’s incorporation by reference of supporting evidence *previously* identified by NYS in support of NYS-9/NYS-33.⁵⁹ However, Entergy does not waive its prior arguments opposing the admissibility NYS-9/NYS-33 and, for the reasons stated below, opposes the admission of NYS-37 insofar as it raises new challenges to the FSEIS.

B. Insofar as NYS-37 Raises New Challenges to the FSEIS, It Fails to Meet Each of the Admissibility Criteria in 10 C.F.R. § 2.309(f)(1)

1. **NYS-37 Raises Issues That Are Outside the Scope of This Proceeding Because It Directly Challenges the Need for Power from IPEC**

As threshold matter, NYS and its experts directly challenge the statement of purpose and need for license renewal adopted by the Commission, as it applies to IPEC. For example, NYS asserts that the FSEIS “assumes a need for too much power” and “distorts the analysis of the amount, location, and timing, of new and/or alternative sources of necessary to replace the power supplied by Indian Point.”⁶⁰ These arguments are outside the scope of this proceeding and directly contrary to 10 C.F.R. § 51.95(c)(2). In promulgating that regulation, the Commission stated unequivocally that “the NRC will neither perform analyses of the need for power nor draw

⁵⁸ Contention NYS-37 at 1.

⁵⁹ See, e.g., June 16, 2009 Board Order at 4 (“We see no issue with an intervenor proactively asking the Board to recognize that an admitted contention relative to the ER challenges the same issue when included in the Draft SEIS.”).

⁶⁰ Contention NYS-37 at 9, 15.

any conclusions about the need for generating capacity in a license renewal review.”⁶¹

2. NYS’s Claim That the FSEIS Does Not Contain an Adequate Discussion of Non-Fossil Fuel Alternatives Lacks a Valid Factual or Legal Basis

NYS alleges that the Staff failed to take a “hard look” at non-fossil energy alternatives in the FSEIS.⁶² This claim simply ignores the contents of the FSEIS. The FSEIS discussion of non-fossil alternatives, which the Staff substantially modified and augmented in response to public comments—including comments from NYS—is robust and plainly adequate on its face when evaluated under the NEPA standards discussed in Section III.B above. Specifically, the FSEIS considered a reasonable range of alternatives in order to reach a reasoned conclusion regarding the relative environmental impacts of the proposed action and feasible alternatives.⁶³

In particular, due in large part to public comments, Section 8.3 (Alternative Energy Sources) of the FSEIS now includes detailed consideration of the following:

- Purchased electrical power (FSEIS § 8.3.2) – The FSEIS conservatively assumed that adequate transmission will exist through planned, new projects (*e.g.*, the proposed New York Regional Interconnect (“NYRI”), or the Champlain-Hudson Power Express, Inc. (“CHPEI”) Project, among others), or by locating the alternatives near downstate loads.⁶⁴
- Energy conservation and efficiency (FSEIS § 8.3.3) – The FSEIS considered energy conservation as a viable, stand-alone alternative to license renewal.⁶⁵ The FSEIS explicitly acknowledges New York State’s Energy Efficiency Portfolio Standard program, calling for a 15 percent reduction in energy usage by 2015 compared to forecast levels.⁶⁶

⁶¹ Final Rule, Environmental Review for Renewal of Nuclear Power Plant Operating Licenses, 61 Fed. Reg. at 28,472. *See id.* at 28,484 (“The Commission has concluded that, for license renewal, the issues of need for power and utility economics should be reserved for State and utility officials to decide.”).

⁶² *See* Contention NYS-37 at 17-18.

⁶³ *Id.*

⁶⁴ FSEIS, Vol. 1 at 8-39.

⁶⁵ *See id.* at 8-41 to 8-43.

⁶⁶ *See id.*

- Two combinations of alternatives (FSEIS § 8.3.5) – The Staff revised this section to discuss two combinations of alternatives that include *larger* contributions from renewable energy and energy conservation.⁶⁷ Specifically, Combination 1 now includes obtaining 600 MW(e) from renewable energy sources (primarily wind with smaller amounts of hydropower, biomass, and possibly landfill gas) and implementing 600 MW(e) of conservation programs based on the State’s “15x15” energy conservation program and other efforts to improve energy efficiency or increase conservation. Combination 2 now includes obtaining 600 MW(e) from renewable energy sources and implementing 1000 to 1200 MW(e) of conservation programs.⁶⁸

Although the FSEIS concluded that wind power and combined heat and power (“CHP”) did not warrant consideration as stand-alone alternatives to IPEC’s baseload generation, it adequately explained the bases for those determinations.⁶⁹ The FSEIS concluded that, by itself, wind power currently is not suitable for baseload capacity, given the resource’s high degree of intermittency, the relatively low average annual capacity factors of wind facilities, and the expensive nature of current energy storage technologies.⁷⁰ It also noted that there is no assurance that proposed wind generation projects will go into service, and that even if all 7,000 MW(e) of potential wind power projects identified by the New York Independent System Operator (“NYISO”) are completed, less than 700 MW(e) would be credited by NYISO as firm capacity.⁷¹

The FSEIS explained that the Staff did not consider CHP to be a direct alternative to IPEC license renewal because CHP sources generally are found on large industrial buildings or

⁶⁷ See *id.* at 8-59 to 8-60.

⁶⁸ See *id.*

⁶⁹ *Id.* at 8-44, 8-49, 8-61. See, e.g., *All Indian Pueblo Council v. United States*, 975 F.2d 1437, 1445 (10th Cir. 1992) (“We hold that the agency’s discussion of demand side planning, although abbreviated, was adequate under the requirements of NEPA, because it explained why the alternative was rejected.”).

⁷⁰ FSEIS, Vol. 1 at 8-44. See *Exelon Generation Co., LLC* (Early Site Permit for Clinton ESP Site), CLI-05-29, 62 NRC 801, 810-11 (2005) (“Intervenors’ various claims fail to come to grips with fundamental points that can’t be disputed: solar and wind power, by definition, are not always available . . .”).

⁷¹ FSEIS, Vol. 1 at 8-44, 8-61. As noted above, however, the Staff did not exclude wind power from its consideration of reasonable energy alternatives. The Staff included 600 MW(e) from renewable energy sources in Combination Alternatives 1 and 2; *i.e.*, primarily wind with smaller amounts of other renewable energy sources. See *id.* at 8-60.

in urban centers where many buildings are near one another.⁷² CHP facilities provide electrical power as well as heat (e.g., as steam) for use by nearby industries or buildings—a need not met by IPEC.

The FSEIS contains a detailed comparative analysis of the environmental impacts of the proposed action and the following alternatives: the no-action alternative (denial of the application), an alternative involving altering plant operations to comply with the New York State Department of Environmental Conservation draft State Pollutant Discharge Elimination System permit, construction of gas-fired generating capacity at alternate sites, gas-fired generation of power at IP2 and IP3, energy conservation/efficiency, and two combinations of alternatives. FSEIS Table 9-1 summarizes the significance of the environmental effects of the proposed action and reasonable alternatives.⁷³ Based on this analysis, the FSEIS concluded that the adverse environmental impacts of IPEC license renewal are not so great that preserving the option of license renewal for energy planning decision makers would be unreasonable.⁷⁴

In view of the foregoing, there is no factual basis for NYS's claim that the FSEIS gives only "putative recognition" to non-fossil fuel alternatives, including energy conservation.⁷⁵ NEPA requires consideration only of feasible and nonspeculative alternatives that appear appropriate for study at the time of the agency's NEPA evaluation and that will accomplish the purpose of the proposed project within the timeframe of the proposed project.⁷⁶ As explained above, the FSEIS has met this requirement by presenting "in sufficient detail, the viable

⁷² See *id.* at 8-49.

⁷³ See *id.* at 9-9 to 9-10.

⁷⁴ *Id.* at 9-8.

⁷⁵ Contention NYS-37 at 2.

⁷⁶ *Monticello*, LBP-05-31, 62 NRC at 752-53.

alternatives to the Project.”⁷⁷ Furthermore, under Part 51, license renewal denial is appropriate “only if the expected environmental effects of license renewal significantly exceed all or almost all alternatives.”⁷⁸ That is not the case here. For these reasons, NYS-37 does not meet the requirements of 10 C.F.R. § 2.309(f)(1)(vi).

3. The Documents Cited by NYS and its Experts Call for Speculation and Do Not Support NYS’s Claim that the FSEIS Is Inadequate

In arguing that the FSEIS is deficient, NYS overlooks key portions of certain documents on which it relies (and relevant discussion in other, closely-associated documents) that both undercut its argument and reinforce the reasonableness of the conclusions in the FSEIS.

For instance, NYS cites sections of the 2009 State Energy Plan⁷⁹ and numerous documents issued by the NYISO. In doing so, NYS merely speculates that technical/practical potential of renewable energy sources and its energy conservation goals can and will be fully achieved by 2018—several years after IP2 and IP3 would begin extended operations in 2013 and 2015, respectively.⁸⁰ But the 2009 State Energy Plan itself states that “even with the considerable achievements made to date in the State’s end-user efficiency programs, achieving the ‘15 by 15’ goal will require nearly a five-fold increase in annual energy savings by 2015.”⁸¹ Moreover, the 2009 State Energy Plan indicates that, even if the “15 x 15” goal were to be achieved, there still would be a need for replacement generation infrastructure in the vicinity of

⁷⁷ *Sierra Club v. Morton*, 431 F.Supp. 11, 17 (S.D. Tex. 1975).

⁷⁸ Final Rule, Environmental Review for Renewal of Nuclear Power Plant Operating Licenses, 61 Fed. Reg. at 28,472.

⁷⁹ New York State, *2009 State Energy Plan*, Vol. I. (Dec. 2009) (Energy Contention NYS-37 Att. 3), available at http://www.nysenergyplan.com/final/New_York_State_Energy_Plan_Volumel.pdf. The next State Energy Plan is scheduled for issuance in 2013.

⁸⁰ *Cf. Friends of the River v. FERC*, 720 F.2d 93, 101 (D.C. Cir. 1983) (“Regional power planning is difficult and uncertain; it becomes increasingly difficult and uncertain as its scope is extended in time and space.”).

⁸¹ *2009 State Energy Plan*, Vol. I at 23.

Indian Point (*e.g.*, 700 MW combined cycle, gas-fired generating plant)—a finding that is consistent with the FSEIS.⁸²

In addition, the 2009 State Energy Plan recognizes that wind generation facilities can present challenges for the electrical system and impacts on the infrastructure.⁸³ This is consistent with conclusions reached in the FSEIS.⁸⁴

Finally, one of the most recent documents issued by the NYISO—the September 2010 Reliability Needs Assessment—undermines NYS’s claim that baseload generation provided by IPEC can be readily replaced by renewables, energy conservation, purchased electrical power, and CHP in the near-term; *i.e.*, when IP2 and IP3 enter the period of extended operation in 2013 and 2015.⁸⁵ In that report, the NYISO concluded that the IPEC retirement scenario showed reliability violations in 2016 if both units retired when their current licenses expire, and that those impacts would include loss of power supply and transmission voltage support affecting the metropolitan New York region.⁸⁶

As made clear by recent documents issued by the NYISO and other State entities and cited above, NYS does not provide a complete a presentation of the relevant facts. Furthermore, NEPA requires only consideration of alternatives that are feasible and nonspeculative,⁸⁷ and does

⁸² *See id.*

⁸³ *See id.*, Vol. III, *Energy Infrastructure Issue Brief* at 24 (Entergy Contention NYS-37 Att. 4), available at http://www.nysenergyplan.com/final/Energy_Infrastructure_IB.pdf. Notably, the Energy Infrastructure Issue Brief states that, using the base case, NYISO modeled a scenario that decreased generation in the lower Hudson Valley and New York City by 1,500 MW and increased upstate generation by the same amount to simulate increased wind and/or hydro resources. Without any transmission upgrades, this change would result in a 2018 base case loss of load expectation (“LOLE”) of 0.25 (loss of load for two and a half days in a 10-year period on average), thereby exceeding the minimum reliability criterion (LOLE = 0.10). *Id.* at 25.

⁸⁴ *See* FSEIS, Vol. 1 at 8-44.

⁸⁵ *See* New York Independent System Operator, *2010 Reliability Needs Assessment, Final Report* (Sept. 2010) (Entergy Contention NYS-37 Att. 5), available at http://www.nyiso.com/public/webdocs/newsroom/press_releases/2010/2010_Reliability_Needs_Assessment_Final_09212010.pdf.

⁸⁶ *See id.* at ii, 34-38, 57.

⁸⁷ *See* *Vt. Yankee*, 435 U.S. at 551; *Monticello*, LBP-05-31, 62 NRC at 753.

not require consideration of alternatives that are “emerging and under development.”⁸⁸ Again, in this case, the Staff has completed an environmental review for the renewal of two operating licenses that, if approved, would take effect in 2013 and 2015—not ten or twenty years from now.⁸⁹ The Staff acted well within its discretion, and consistent with NEPA’s rule of reason,⁹⁰ in appropriately focusing its review on those energy alternatives that exist or are likely to exist now or in the immediate future; *i.e.* when the IPEC operating licenses expire.⁹¹

In conclusion, insofar as NYS-37 purports to challenge the Staff’s revised and augmented discussion of non-fossil fuel alternatives in the FSEIS, it lacks an adequate factual and legal basis, as required by 10 C.F.R. § 2.309(f)(1)(v) and (vi).

4. The FSEIS Did Not Ignore New and Significant Information Regarding Non-Fossil Fuel Alternatives or Rely on Obsolete and/or Inaccurate Information in its FSEIS

NYS also alleges that the FSEIS relies primarily on “obsolete or stale” economic data.⁹² For the reasons set forth below, NYS’s argument lacks a valid factual basis and fails to establish a genuine material dispute, as required by 10 C.F.R. § 2.309(f)(1)(v) and (vi).

First, the FSEIS relied on a wide array of information provided by federal and state entities, including, for example, information obtained from the U.S. Department of Energy,⁹³ the

⁸⁸ *Entergy Nuclear Generation Co. (Pilgrim Nuclear Power Station), CLI-10-11, 71 NRC ___, slip op. at 37 (Mar. 26, 2010).*

⁸⁹ *See FSEIS, Vol. 1 at 1-1, 9-1.*

⁹⁰ *See Friends of the River, 720 F.2d at 102 (citing Kleppe v. Sierra Club, 427 U.S. 390, 412 (1976))* (“FERC’s decision as to the space dimensions of its demand and supply exploration in this case was properly bounded by reasonable considerations of what could be forecast with a fair degree of reliability and with the energy, research, and time resources available to the agency.”).

⁹¹ *See, e.g., FSEIS, Vol. 1 at 8-61* (“By 2015, then, new renewable resource additions could readily supply the 600 MW of renewable capacity considered here with sufficient biomass, hydropower, and landfill gas additions to back up wind power generation.”); *App. A at A-153 to A-154* (“After reviewing the comments as well as available reference documents, the NRC staff determined that solar power alone, or a combination of wind and solar, would be insufficient to replace the power generated by IP2 and IP3 upon expiration of the licenses without license renewal. Similarly, sufficient tidal power capacity is not likely to be available by 2013 or 2015 to replace IP2 and IP3.”) (emphasis added).

⁹² *Contention NYS-37 at 9.*

New York State Public Service Commission, and the NYISO.⁹⁴ And, as discussed further below, the Staff considered comments on the DSEIS. As the Commission recently noted, while there “will always be more data that could be gathered, agencies must have some discretion to draw the line and move forward with decisionmaking.”⁹⁵ Thus, under NEPA’s rule of reason, the Staff is not required to incorporate or discuss in the FSEIS every reference or source of information cited by NYS in its multiple energy alternatives contentions.

Second, while the 2006 National Research Council study and other sources relied upon by the Staff in the FSEIS may pre-date certain developments cited by NYS, the State provides no reason to conclude that the FSEIS’s use of those documents has resulted in any material deficiencies in its analysis of energy alternatives and the *environmental impacts* of those alternatives. In short, a NEPA review “must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail.”⁹⁶

Finally, as discussed above, recent documents, both cited and not cited by NYS, support the reasonableness of the Staff’s conclusions in the FSEIS. For example, while the 2010 Reliability Needs Assessment stated that full and effective implementation of New York State’s “45x15” Clean Energy Strategy would improve the adequacy of system resources, it also identified significant risks, including reliability violations, associated with the potential

⁹³ See FSEIS, Vol. 1 at 8-28, 8-29, 8-45 (citing DOE/EIA-0383, *Annual Energy Outlook 2010 with Projections to 2035* (Apr. 2010), available at [http://www.eia.doe.gov/oiaf/aeo/pdf/0383\(2010\).pdf](http://www.eia.doe.gov/oiaf/aeo/pdf/0383(2010).pdf)).

⁹⁴ See generally 1 FSEIS at 8-73 to 8-81 (list of references).

⁹⁵ *Pilgrim*, CLI-10-11, slip op. at 37 (quoting *Town of Winthrop v. FAA*, 535 F.3d 1, 11-13 (1st Cir. 2008)) (internal quotation marks omitted). See also *Westlands Water Dist. v. U.S. Dep’t of the Interior*, 376 F.3d 853, 871-72 (9th Cir. 2004) (holding that an agency need not consider “every conceivable permutation” of a given alternative for the EIS evaluation to be adequate); *Nat’l Helium Corp. v. Morton*, 486 F.2d 995, 1004 (10th Cir. 1973) (holding that NEPA should not be viewed as necessitating that the completion of an EIS be unreasonably or interminably delayed in order to include all potential comments or the results of works in progress which might shed some additional light on the subject of the impact statement, because “[s]uch a result would often inordinately delay or prevent any decision in environmental cases”).

⁹⁶ 40 C.F.R. § 1500.1(b).

retirement of IP2 and IP3 upon license expiration. Specifically, this September 2010 document states that there are no reliability needs assuming that *all* modeled transmission and generation facilities—including *Indian Point*—remain in service in New York from 2011 through 2020.⁹⁷ That is, the 2010 Reliability Needs Assessment makes clear that an energy portfolio that excludes IP2 and IP3 would result in “significantly higher” reliability violations and a degradation of system voltage performance under stress conditions.⁹⁸

5. The Staff’s Reponses to NYS’s Comments on Chapter 8 of the DSEIS Are Adequate Under NEPA and 10 C.F.R. Part 51

NYS also alleges in NYS-37 that the Staff violated NEPA and 10 C.F.R. § 51.91 by failing to respond to NYS’s comments on the DSEIS.⁹⁹ This argument lacks adequate factual and legal support and, therefore, does not satisfy the requirements in 10 C.F.R. § 2.309(f)(1)(v).

NYS’s claim that the Staff did not carefully consider its comments is not supported by the record. Appendix A of the FSEIS fully documents the comments received by the NRC on the DSEIS discussion of energy alternatives (including the no-action alternative) and contains responses to those comments.¹⁰⁰ The comments addressed in Appendix A include those comments on the DSEIS submitted by NYS in March 2009.

The NRC significantly modified Chapter 8 of the DSEIS in response to public comments—including comments from NYS. For example, Section 8.3 of the FSEIS removed the coal-fired alternative from the range of alternatives considered in depth based in part on

⁹⁷ 2010 Reliability Needs Assessment at i (emphasis added).

⁹⁸ *Id.* at ii-iii.

⁹⁹ See Contention NYS-37 at 2, 6, 15-17.

¹⁰⁰ See FSEIS, Vol. 1, App. A at A-150 to A-160 (§ A.2.14, Comments Concerning Alternatives). In addressing public comments, the Staff utilized all options available to it under 10 C.F.R. § 51.91, including modification of alternatives or the consideration of new alternatives, updating and augmenting analyses, making factual corrections, and explaining why certain comments do not require a more detailed response.

comments indicating that coal-fired power would be infeasible or highly unlikely in New York State.¹⁰¹

In addition, the NRC expressly recognized the efforts on the part of New York State regulatory, policy-setting, and policy-implementing agencies to promote and further renewable energy and energy efficiency in New York.¹⁰² This fact is particularly evident in the two combination alternatives considered in the FSEIS, which attribute between 1,200 and 1,800 MW(e) total to renewable energy and energy conservation/efficiency.¹⁰³ There is no credible basis for NYS's statement that the FSEIS gives only "passing lip service" to the State of New York's energy efficiency and energy conservation programs, or ignores the issues presented in the declarations of NYS's proffered experts, including David Schlissel and Peter Bradford.¹⁰⁴

In arguing otherwise, NYS misconstrues the extent of the NRC's obligations under NEPA with respect to responding to public comments and opposing viewpoints. Like other agency responsibilities under NEPA, the duty to respond to comments is governed by the rule of reason. One court summed up the obligation as follows:

Admittedly, an agency's obligation to respond to public comment is limited. Not every comment need be published in the final EIS. Nor must an agency set forth at full length the views with which it disagrees. Moreover, an agency is under no obligation to conduct new studies in response to issues raised in the comments, nor is it duty-bound to resolve conflicts raised by opposing viewpoints.

Agencies are nonetheless obliged to provide a meaningful reference to all responsible opposing viewpoints concerning the agency's proposed decision. This standard requires the agency to

¹⁰¹ See *id.* at 8-28 ("Given a smaller future role for coal-fired power, in line with New York State's declining reliance on coal . . . and GHG restrictions imposed by the Regional Greenhouse Gas Initiative (RGGI), the NRC staff has relocated the supercritical coal-fired alternative to Section 8.3.4., Alternatives Dismissed from Individual Consideration.").

¹⁰² *Id.* at A-151.

¹⁰³ See *id.* at 8-60.

¹⁰⁴ Contention NYS-37 at 16, 26.

identify opposing views found in the comments such that differences in opinion are readily apparent. Moreover, there must be good faith, reasoned analysis in response.¹⁰⁵

Here, the FSEIS has provided the required “meaningful reference” to all responsible opposing viewpoints concerning the agency’s proposed decision, clearly identified differences in opinion, and provided a good faith, reasoned analysis in response.¹⁰⁶ Thus, the Staff has fully met its obligations under NEPA and Part 51.

6. NYS’s Argument that the FSEIS is Deficient, Arbitrary, and Biased Lacks a Factual or Legal Basis and Contravenes Settled NEPA Principles

NYS’s overarching claim in NYS-37 is that the FSEIS is so deficient and biased that it renders the FSEIS a nullity with respect to the Staff’s recommendation that the preservation of the license renewal option for energy planning decision makers is not unreasonable.¹⁰⁷ In view of the above, this argument lacks an adequate factual or legal basis.

First, the record indicates that the Staff’s review is both thorough and even-handed. The Staff made a substantial effort to respond to public comments and also made significant substantive modifications to Chapter 8 of the FSEIS in response to NYS’s comments in particular. Thus, there is no basis for NYS’s claims that the FSEIS “marginalize[s] meaningful consideration of non-fossil fuel alternatives and reduce[s] the impacts analysis to a comparison of nuclear and fossil fuels.”¹⁰⁸

Second, NYS’s argument also is flawed as a matter of law. NYS nominally recognizes the applicable decision standard in 10 C.F.R. § 51.95(c)(4), which focuses on the magnitude of

¹⁰⁵ *California v. Block*, 690 F.2d 753, 773 (9th Cir. 1982) (internal quotation marks, brackets, and citations omitted).

¹⁰⁶ *See id.* (quoting *Comm. for Nuclear Responsibility, Inc. v. Seaborg*, 463 F.2d 783, 787 (D.C.Cir. 1971); *Silva v. Lynn*, 482 F.2d 1282, 1285 (1st Cir. 1973)).

¹⁰⁷ Contention NYS-37 at 2.

¹⁰⁸ *Id.* at 35.

the *adverse environmental impacts of license renewal*. Nonetheless, it asks the Staff and this Board to engage in inquiries that are not required under NEPA, Part 51, or controlling case law and, therefore, are outside the scope of this proceeding.¹⁰⁹

Again, the relevant inquiry is whether the impacts of license renewal sufficiently exceed the impacts of all or almost all of the reasonable alternatives that preserving the option of license renewal in 2013 and 2015 for applicable State and Federal energy planners would be unreasonable. It does *not* entail re-examining the need for power based on detailed econometric analyses or market forecasts; comparing the economics of IPEC operation with non-nuclear options; or including in the FSEIS unnecessary details about alternatives that are not directly relevant to the proposed action and/or that are speculative in nature. If, as here, the FSEIS has adequately evaluated a reasonable range of alternatives and the environmental impacts of those alternatives relative to the proposed action, nothing more needs to be done.¹¹⁰

V. CONCLUSION

For the reasons set forth above, the Amended Contention should be rejected as inadmissible under the requirements of 10 C.F.R. § 2.309.

¹⁰⁹ See Final Rule, Environmental Review for Renewal of Nuclear Power Plant Operating Licenses, 61 Fed. Reg. at 28,472-73.

¹¹⁰ *Sys. Energy Res., Inc.* (Early Site Permit for Grand Gulf ESP Site), CLI-05-4, 61 NRC 10, 13 (2005) (citation omitted) (quoting *Hydro Res.*, CLI-01-4, 53 NRC at 71). See also *Nat'l Helium Corp.*, 486 F.2d at 1004 (“The courts should look for adequacy and completeness in an impact statement, not perfection.”).

CERTIFICATION OF COUNSEL UNDER 10 C.F.R. § 2.323(b)

Counsel for Entergy certifies that he has made a sincere effort to make himself available to listen and respond to the moving parties, and to resolve the factual and legal issues raised in the motion, and that his efforts to resolve the issues have been unsuccessful.

Respectfully submitted,



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OPERATIONS, INC.

Dated in Washington, D.C.
this 7th day of March 2011

LIST OF ENTERGY CONTENTION NYS-37 ATTACHMENTS

Attachment	No.
Comments Submitted by the New York State Office of the Attorney General on the Draft Supplemental Environmental Impact Statement Prepared by the Staff of the Nuclear Regulatory Commission for the Renewal of the Operating Licenses for Indian Point Units 2 and 3, Buchanan, New York (Mar. 18, 2009)	1
NUREG-1437, Generic Environmental Impact Statement for License Renewal of Nuclear Plants (May 1996) (excerpts).....	2
New York State, 2009 State Energy Plan, Vol. I. (Dec. 2009) (excerpts).....	3
New York State, 2009 State Energy Plan, Vol. III, Energy Infrastructure Issue Brief (Dec. 2009) (excerpts)	4
New York Independent System Operator, 2010 Reliability Needs Assessment, Final Report (Sept. 2010) (excerpts).....	5

**Entergy Contention NYS-37
Attachment 1**

COMMENTS SUBMITTED BY THE NEW YORK STATE OFFICE OF THE ATTORNEY GENERAL ON
THE DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT PREPARED BY THE STAFF
OF THE NUCLEAR REGULATORY COMMISSION FOR THE RENEWAL OF THE OPERATING
LICENSES FOR INDIAN POINTS UNITS 2 AND 3, BUCHANAN, NEW YORK

submitted to the United States Nuclear Regulatory Commission
March 18, 2009

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York Seismic Zone posits a peak ground acceleration of 0.19g, which exceeds the design criteria that was confirmed in the 1977 ALAB decision.

V. The DSEIS Does Not Adequately Analyze Energy Alternatives, Including Conservation, Efficiency, Transmission, and Connection Enhancements

Pursuant to 10 C.F.R. § 51.71(b), a draft environmental impact statement must include “consideration of major points of view concerning the environmental impacts of the proposed action and the alternatives, and contain an analysis of significant problems and objections raised by other Federal, State, and local agencies, by any affected Indian tribes, and by other interested persons.” 10 C.F.R. § 51.71(b). 10 C.F.R. § 51.71(a) explains that the scope of the Staff’s environmental review encompasses the requirements to which the Applicant is held in its Environmental Report, which under 10 C.F.R. § 51.53(c)(3)(iv) requires the Applicant (and by reference, Staff) to examine significant new information. *See* 10 C.F.R. § 51.71(a); 10 C.F.R. 51.53(c)(3)(iv); 10 C.F.R. Part 51, Subpart A, Appendix B; *see also* 10 C.F.R. § 51.95.

Appendix A to Subpart A to Part 51 requires analysis of the no-action alternative. Part 51, Subpart A, Appendix A, Section 4. Pursuant to 10 C.F.R. § 51.71 the DSEIS must analyze the evidence offered regarding the availability and environmental impacts of alternatives which would likely be implemented if no action were taken to relicense either IP2 or IP3. Appendix A to 10 C.F.R. Part 51 emphasizes the importance of the examination of alternatives: “This section is the heart of the environmental impact statement. It will present the environmental impacts of the proposal and the

alternatives in comparative form.” Appendix A to 10 C.F.R. Part 51 at Section 5. CEQ regulations also require the agency to “include the alternative of no action.” 40 C.F.R. § 1502.14(d)

In addition, CEQ’s regulations require the agency to “[r]igorously explore and objectively evaluate all reasonable alternatives.” 40 C.F.R. § 1502.14(a). Likewise, CEQ requires a supplement to a draft environmental impact statement if “[t]here are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.” 40 C.F.R. § 1502.9(c)(1)(I).

Contrary to these regulatory obligations, the December 22, 2008 DSEIS ignores or fails to include consideration and analysis of substantial comments and information provided by the State of New York relating to the “no-action” alternative and the benefits of certain measures that would be taken if the no-action alternative were chosen compared to the detriments that would be caused by relicensing of IP2 and IP3.

Among the items which were identified by the State of New York in its previous filings in this proceeding and in scoping comments that have been ignored or not considered and analyzed in the DSEIS are the following:

- Information on the potential for energy efficiency and renewable energy resources, combined heat and power, and power plant repowering that was provided in the November 27, 2007 Report prepared by Synapse Energy Economics, Inc., and David Schlissel in support of the State of New York’s Petition to Intervene (Supporting Declarations and Exhibits, Volume I, November 30, 2007 (“Synapse Report”));
- New York’s 15x15 plan that has the goal of reducing the state’s electricity usage by 15 percent by 2015, and the steps that are being taken by state agencies, such

as the Public Service Commission, to implement that plan. Evidence of the efforts already underway to achieve these goals can be found at http://www.dps.state.ny.us/Phase2_Case_07-M-0548.htm, which is ignored in the DSEIS. For example, on January 16 2009, the New York State Public Service Commission issued combined Orders Approving "Fast Track" Utility-Administered Electric Energy Efficiency Programs with Modifications. See PSC Case 08-E-1003 - *Petition of Orange and Rockland Utilities, Inc. for Approval of an Energy Efficiency Portfolio Standard (EEPS) "Fast Track" Utility-Administered Electric Energy Efficiency Program*. In addition, in his January 2009 State of the State speech to the Legislature, Governor Paterson pledged to expand the 15x15 Program and the Renewable Portfolio Standards Program;

- The potential capacity and energy from combined heat and power;
- The potential capacity and energy that could be provided by repowering existing power plants in New York State (Synapse Report at 12-14);
- The potential for importing additional power from the PJM area¹² and/or New England (Synapse Report at 14-15);
- The potential for additional transmission system upgrades that would increase the capability to import power into downstate New York from PJM and NE, including increases in the capability to import power from PJM (*id.*);
- The reduced energy sales and peak loads being experienced by utilities in downstate New York as a result of the current economic recession (Schlissel Declaration).

Energy Conservation and Efficiency and Reduced Energy Consumption

In its November 30, 2007 petition for intervention, the State of New York presented evidence to the NRC concerning the State's program to increase energy efficiency and reduce energy use. Since then, the State has devoted significant time and resources to implement this program. On June 23, 2008, the Public Service Commission

¹²The "PJM Area" is a interconnected regional electric system in 13 states and the District of Columbia. Pennsylvania and New Jersey are two states within PJM.

adopted a goal of reducing electricity usage (as forecast in 2007) by 15% statewide by 2015. An Energy Efficiency Portfolio Standard ("EEPS") program was created for New York State to develop and encourage cost-effective energy efficiency over the long term, and immediately to commence or augment near-term efficiency measures. See PSC Case 07-M-0548, *Energy Efficiency Portfolio Standard (EEPS)*, Order Establishing Energy Efficiency Portfolio Standard and Approving Programs (issued June 23, 2008). Eight weeks ago, on January 16, 2009, the Public Service Commission Approved "Fast Track" Utility-Administered Electric Energy Efficiency Programs with Modifications. See PSC Case 08-E-1003, Orders Approving "Fast Track" Utility-Administered Electric Energy Efficiency Programs with Modifications. These orders will increase energy efficiency, including in the southern areas of New York near the Indian Point power reactors (including Zones H, I, J, and K).

The DSEIS artificially limits its analysis of energy conservation to a single study, the National Research Council of the National Academy of Sciences' report entitled *The Alternatives to the Indian Point Energy Center for Meeting New York Electric Power Needs* ("NAS 2006"), which while a useful document, is only one of many sources addressing the energy conservation potential in New York State. Information, including recent data that has become available since the 2006 NAS Report and that has been cited - today and previously in this proceeding - by the State of New York, demonstrates that: (1) with the volatile energy costs of the last few years, additional energy conservation is even more financially viable; (2) with strong directives from the Governor of New York

State, institutional and other non-technical barriers to energy conservation are less of a problem; (3) with the recent shift in emphasis by the federal government and private business, energy conservation and efficiency will increase; and (4) with the current economic climate, the demand for energy will remain flat for several years, or, perhaps decline, thus prolonging the date by which energy conservation and renewable energy will have to be available to fully displace some or all of the demand now being met by IP2 or IP3. The DSEIS does not address this information. Contrary to the clear regulatory obligation imposed by 10 C.F.R. § 51.71(d), the DSEIS incorrectly assumes that energy conservation would only result in a savings of 800 MW and, based on that arbitrary conclusion that is contrary to recent evidence, fails to consider energy conservation as a full replacement for one or both of the units under the no-action alternative.

Moreover, the likelihood of the availability of energy efficiency and conservation measures (as well as alternative and renewable energy sources and transmission enhancements) has recently been greatly increased as a result of the recently-enacted American Recovery and Reinvestment Act of 2009, Public Law 111-5 (signed February 17, 2009). Although no final allocation has yet been made, the State of New York could receive approximately \$120 million for the State Energy Program, approximately \$18 million for Energy Efficiency and Conservation Block Grants to small cities and additional hundreds of millions for Energy Efficiency and Conservation Block Grants to large cities and counties - which would include Westchester County and the New York

metropolitan area - and approximately \$390 million for weatherization assistance, which has the potential to greatly reduce energy consumption through energy efficiency and conservation. See American Recovery and Reinvestment Act of 2009, Public Law 111-5. In addition, New York would be eligible to compete for an approximate \$5 billion available nationwide for improvements in transmission and smart grid technology. *Id.* Furthermore, the State of New York's Regional Greenhouse Gas Initiative (RGGI) auction is anticipated to generate additional money to promote energy efficiency and increase renewable energy use. The New York State Energy and Research Development Authority (NYSERDA) recently released an *Operating Plan for Investments in New York under the CO2 Budget Trading Program and the CO2 Allowance Auction Program* (draft, Feb. 25, 2009). In the draft plan, NYSEDA estimates that \$525 million in projected funds received from the RGGI carbon dioxide auctions could be allocated to further energy efficiency and renewable energy use within the State. The DSEIS should be substantially revised to include this new and significant information.

One the most significant pieces of significant new information which was not available when the GEIS was written and is ignored in the DSEIS is the central role of energy conservation in energy planning and its growing importance in providing for energy needs. For example, the State of New York has taken the lead in pressing the federal government to implement stronger efficiency standards for home appliances. See NYS Petition at 116-118; see also *NRDC v. Abraham, Secretary, U.S. Department of Energy*, 355 F.3d 179 (2d Cir. 2004); *State of New York v. Bodman, Secretary of U.S.*

Department of Energy, No. 05 Civ 7807, Consent Decree (S.D.N.Y. Nov. 3, 2006). The DSEIS paid no attention to New York's efforts to improve energy efficiency and its actions to encourage the federal government to improve appliance efficiency standards. The fruits of these efforts by the State of New York can be found in actions taken by the New York State Public Service Commission (http://www.dps.state.ny.us/Phase2_Case_07-M-0548.htm) and the recent actions by the White House urging the U.S. Department of Energy to consider accelerating the dates on which these new standards for all appliances will be implemented. See February 5, 2009 White House Memorandum For The Secretary Of Energy Subject: Appliance Efficiency Standards. Like the State's own programs, these accelerated federal efficiency standards will further conserve energy within New York State and in Zones H, I, J, and K.

The enacted regulations and actual programs for energy efficiency undoubtedly will reduce energy consumption. Although the December 2008 DSEIS looks to 2006 and early 2007 data prepared by the U.S. Energy Information Administration (EIA), DSEIS 8-32 to 8-33, it does not take into account recent EIA projections which contain reduced demand projections. See *EIA Annual Energy Outlook 2008 with Projections to 2030 (AEO 2008)*, Report # DOE/EIA-0383 (2008) (released June 2008); *EIA Annual Energy Outlook 2009 Early Release Overview (AEO-2009)* Report # DOE/EIA-0383(2009) (released Dec. 17, 2008); EIA Press Release: *New EIA Energy Outlook Projects Flat Oil Consumption to 2030, Slower Growth in Energy Use and Carbon Dioxide Emissions, and Reduced Import Dependence* (Dec. 17, 2008), available at <http://www.eia.doe.gov/neic/press/press312>.

html. Also, the DSEIS fails to take into account the current economic situation and the likelihood that energy consumption will decrease as a result. Nor does it account for the impact of the Federal Energy Independence and Security Act of 2007. *See* Public Law 110-140; *see also* 42 U.S.C. § 6295.

Energy conservation produces no carbon, no pollution, and requires the use of no fuel. Once an energy conservation measure is in place, its benefit continues without further capital or maintenance costs for a substantial period of time into the future. The DSEIS acknowledges that there is virtually no adverse environmental impact associated with energy conservation measures. DSEIS at 8-66 (“Impacts from conservation measures are likely to be negligible, as the NRC staff indicated in the GEIS (1996).” The DSEIS, however, ignores other information from credible sources, including those identified in the State of New York's previous submissions, that the energy conservation potential between now and 2012 equals at least 1,000 MW -- equivalent in size to the capacity of at least one of the IP units. By wholly failing to address this new information, which greatly enhances the potential benefits and substantially reduces the perceived adverse impacts of the no action alternative, the DSEIS violates NEPA.

Renewables

The DSEIS erroneously concludes, without any critical analysis and with only bare assertions regarding Staff beliefs, that there are too many obstacles to implementing sufficient renewable energy resources such that these sources could not provide anything more than 200 to 400 MW toward replacing the IP units. *See* DSEIS 8-

65 to 8-66 (Combination Alternatives 1 and 2). By making this assumption, the DSEIS's analysis incorrectly constrains and limits the potential benefits of the no-action alternative by undervaluing the ability of wind and other renewables to provide power in New York in general and southeastern New York area in particular. The DSEIS ignores recent projections by the federal Energy Information Administration that the coming years will see the increased use of renewable energy, including strong growth in the use of renewables for electricity generation. See *EIA Annual Energy Outlook 2009 Early Release Overview* (AEO-2009) Report # DOE/EIA-0383(2009) (released Dec. 17, 2008); EIA Press Release: *New EIA Energy Outlook Projects Flat Oil Consumption to 2030, Slower Growth in Energy Use and Carbon Dioxide Emissions, and Reduced Import Dependence* (Dec. 17, 2008).

The DSEIS's assertions ignore substantial evidence, offered by the State of New York and generally available, that the potential for renewable resources is much more viable. See Synapse Report at 7-12. By way of example, on February 26, 2009, the New York Independent System Operator announced that the combined wind energy generation output within New York State has reached 1,000 MW and that such output is expected to increase. See NYISO's February 26, 2009 statement concerning wind generation capacity in New York State, available at http://www.nyiso.com/public/webdocs/newsroom/press_releases/2009/NYISO_Marks_Wind_Power_Milestone_02262009.pdf. The DSEIS also ignores the fact that New York has considerable wind resources as demonstrated by the wind resource maps prepared by AWS Truewind for

the New York State Energy Research and Development Authority.¹³ At present, there is 8,081 MW of additional wind power proposed for connection to the grid in New York State. See *Interconnection Requests and Transmission Projects/New York Control Area by the New York Independent System Operator* (Updated 3/2/09), NYISO Interconnection Queue, available at http://www.nyiso.com/public/services/planning/interconnection_studies_process.jsp (last visited Mar. 16, 2009).

The DSEIS also incorrectly discounts and then eliminates any contribution from hydro power or distributed geothermal energy. DSEIS at 8-61, 8-62, 8-65 to 8-66. The DSEIS minimizes the opportunity provided by solar energy resources. DSEIS at 8-62. The State of New York is also moving forward to increase the utilization of its solar energy resources. On February 27, 2009, the Long Island Power Authority announced plans to purchase 50 MW of solar energy generated on Long Island and for deliveries to begin between June 1, 2009 and May 1, 2011. See *Governor Paterson Announces Plans for the Largest Solar Energy Project in State History*, available at http://www.lipower.org/newscenter/pr/2009/022709_gov.html. By eliminating consideration of these energy sources in the portfolio of alternatives to IP2 and/or IP3, the DSEIS no action alternative analysis is skewed and arbitrary.

¹³The New York Wind Resource Explorer (WRE) was developed by AWS Truwind LLC for NYSERDA. AWS Truwind has produced maps of mean annual wind speed at 30, 50, 70 and 100 meters above ground level. The New York Wind Resource Explorer and related maps prepared for NYSERDA may be accessed at <http://windexplorer.awstruwind.com/NewYork/NewYork.htm>.

Indeed, as discussed in the November 28, 2007 Declaration of former Commissioner Peter Bradford, it would be reasonable to assume that a determination that one or both of the IP units will not be available after 2013 or 2015 would further stimulate the development and use of renewable energy sources in New York. *See* November 2007 Bradford Declaration at ¶¶ 10, 11, 12. Such a decision would increase the development of wind, solar, geothermal, hydro, biomass and wood energy sources.

The DSEIS also does not take into account Governor Paterson's recently-announced initiative to expand the 15x15 Program and the Renewable Portfolio Standards Program to further improve energy efficiency and the generation of renewable energy. In his January 7, 2009 State of the State Speech, the Governor unveiled the "45x15" Program:

Today, I announce one of the most ambitious clean energy goals in America. By 2015, New York will meet 45 percent of its electricity needs through improved energy efficiency and clean renewable energy. We call this our "45 by 15" program.

Working in concert with this program, the New York Power Authority ("NYPA") will increase funding to school districts, local governments, and hospitals to increase energy efficiency. As part of the State's energy efficiency program, NYPA will provide capital for school districts, as well as eligible local governments and hospitals to retrofit and install clean distributed energy resources. NYPA's trustees have approved increasing financing for these projects to \$185 million per year - up from \$100 million - in support

of the State's clean energy agenda. *See generally* Energy Efficiency Fact Sheet, *available at* [http://www.ny.gov/governor/press/fact sheet0107092.html](http://www.ny.gov/governor/press/fact%20sheet0107092.html).

Energy Transmission

Based on a 2006 U.S. Department of Energy determination, the DSEIS assumes that the Zones H, I, J, K are a so-called "critical congestion area" and that this situation will continue indefinitely. *See* DSEIS at 8-32. The DSEIS however, fails to acknowledge that this DOE decision is the subject of a judicial challenge,¹⁴ and more importantly that additional transmission capacity either has been installed, is in the process of being installed, or has been approved to be installed in Zones H, I, J, and K. For example,

- the Neptune Cable links the LIPA service area with New Jersey and energy sources in the PJM area. It provides up to 660 megawatts of electricity to Long Island. *See* LIPower.com.
- LIPA and Connecticut Light & Power Company are replacing the 300 megawatt electric transmission cable system that connects Long Island with southwest Connecticut. *See* LIPower.com.
- the Cross-Sound cable from Connecticut to Shoreham (Long Island) has been operating for several years.
- In addition, trans-Hudson and trans-Arthur Kill connections and interconnection upgrades are in the ISO interconnection queue. These projects currently include the Brookfield Power U.S. Harbor Cable Project II (200 MW), the East Coast Power LLC interconnection upgrade (300 MW; Linden, Staten Island), and the Hudson Transmission Partners interconnection upgrade (660 MW) (linked to Sayreville, NJ). *See* NYISO Interconnection Queue *available at* http://www.nyiso.com/public/services/planning/interconnection_studies_process.jsp (last visited Feb. 27, 2009).

The DSEIS does not address these transmission avenues.

¹⁴*Wilderness Society et al. v. U.S. Department of Energy* (9th Cir. No. 08-71074).

Combinations

In discussing the no action alternative, the DSEIS acknowledges that “[t]he power not generated by IP2 and IP3 during license renewal term would likely be replaced by (1) power supplied by other producers (either existing or new units) using generating technologies that may differ from that employed at IP2 and IP3, (2) demand side management and energy conservation, or (3) some combination of these options. DSEIS at 8-27. The DSEIS also primarily relies on the assumption, initially adopted more than 12 years ago, that the only way to replace a large generating unit like a nuclear power plant is with another similarly large generating unit. DSEIS at 8-33 to 8-55. Regardless of the validity of that assumption 12 years ago, it is definitely not valid today in the New York metropolitan area. *See, e.g., EPRI, Assessment of Achievable Potential from Energy Efficiency and Demand Response Programs in the U.S. (2010 - 2030)* (published Jan. 14, 2009).

Rather than preparing a comprehensive and detailed analysis of the development of a portfolio of means to provide power in lieu of IP2 and IP3, the DSEIS devotes considerable effort to proving that a 2,200 MW coal plant is not a good option in this service area. DSEIS at 8-33 to 8-45. The analysis of the impacts flowing from the construction of a new coal plant in Zones H, I, J, or K is besides the point and appears to be a “strawman” analysis. This analysis of the coal alternative (1) fails to acknowledge that no New York-based utility has a pending application for the construction of new

coal generation in Zones H, I, J, and K and (2) ignores objective evidence demonstrating the existence of other (*i.e.*, non-coal) sources of power generation and conservation.

To the extent that the DSEIS discusses natural gas production, DSEIS at 8-46 to 8-56, the NRC Staff tacitly acknowledges that IP2 and IP3 power reactors could be replaced by natural gas-fired combined-cycle generation either at the Indian Point site or elsewhere. Indeed, the record reflects that utilities have developed natural gas capacity in New York. For example, the Long Island Power Authority is completing the construction of its Caithness facility which is expected to come on line in the summer of 2009 (350 MW) and other new sources are coming on line or have been permitted. *See* Synapse Report, at 15-16 (identifying additional new generation facilities); *see also* LIpower.com; Independent System Operator 2008 Load and Capacity Data (Goldbook) (Apr. 2008). NRC Staff's analysis of natural gas is a tacit recognition that the continued operation of the IP2 and IP3 power reactors are not necessary. Thus, the DSEIS is flawed because it relies on outdated information about how utilities meet their energy needs. As a result of this flaw, the DSEIS is deficient in how it addresses new and significant information and how it addresses the consequences of the no-action alternative.

Moreover, Staff's comparative weighing of natural gas and two operable IP power reactors notes that a gas fired power plant would operate at higher thermal efficiencies, require less water, and need smaller cooling towers than the existing reactors. DSEIS at 8-46. Because of these differences, the DSEIS is flawed when its no

action alternatives analysis concludes (DSEIS at 8-78) that a gas fired power plant would have "similar" impacts to the continued operation of IP2 and IP3.

Staff is required to consider and incorporate in the DSEIS significant new information with regard to any findings in the GEIS, which applies to the GEIS conclusion that only gas or coal are viable alternatives and that the only option must be stand-alone, single solution alternatives. While the DSEIS does suggest a couple of options in which combinations of energy sources are used, the options include one Indian Point reactor as part of the mix and/or a single 300 or 400 MW combined-cycle gas-fired plant at the Indian Point site. See DSEIS at 8-65 to 8-66. The two "combination alternatives" proffered by the DSEIS are artificially narrow and arbitrary and fail to take into account additional combinations of alternatives in violation of NEPA. A proper no-action alternative would consider a broader range of combinations.

For example, the following combinations, which are derived from the November 2007 Synapse Report, of energy options are achievable and environmentally-preferable to operating IP2 and IP3 and demonstrate that the no-action alternative is the preferable alternative to the two already selected by the DSEIS:

Combination 3:

- 1000-1200 MW from renewable resources like biomass and wind
- 1200-1400 MW from energy efficiency programs being implemented as part of New York State's 15x15 plan
- 100-200 MW from combined heat and power.

Combination 4:

- 400-600 MW from repowering an existing fossil-fired power plant in downstate New York as an efficient new gas-fired combined cycle unit
- 1200-1500 MW from energy efficiency
- 600-800 MW from renewable resources such as biomass and wind

See Synapse Report at 3 to 15. Already existing and identified New York State programs are in place to achieve these results. See February 27, 2009 Declaration of David Schlissel, at ¶ 8. In addition, many other achievable combinations are environmentally preferable to the relicensing of Indian Point, including the construction of new, efficient natural-gas fired generation and transmission line alternatives and interconnection upgrades. See generally State of New York, Proposed Contention No. 33 (submitted Feb. 27, 2008); November 2007 Synapse Report.

The DSEIS's no-action alternatives analysis fails under NEPA because it fails to consider:

- The no-action alternative as to the relicensing of only one unit;
- The option of repowering existing power plants in the combination of alternatives that can be used if the no-action alternative is chosen and the environmental benefits of repowering existing power plants (see Declaration and Report of David A. Schlissel (Nov. 28, 2007), attached to the New York State Notice of Intention to Participate and Petition to Intervene);
- Combined heat and power as one of the combinations of alternatives that can be used if the no-action alternative is chosen and the environmental benefits of this choice (see Synapse Report);
- Purchase power as a viable stand alone alternative rather than the DSEIS analysis which is based upon a pessimistic and speculative group of assumptions about inter-state and intra-state transmission options. DSEIS at 8-56-8-57. In reaching

this conclusion the DSEIS ignores the considerable contrary evidence contained in the Synapse Report and recent transmission enhancements;

- The demonstrated feasibility of providing upgraded transmission capability and interconnection upgrades that, in turn, would facilitate the use of alternatives to IP2 and IP3. On this point, the DSEIS accepts, without any evaluation, the assumption that various institutional restraints will impede the implementation of improved transmission capability and solely on that basis dismisses improved transmission capabilities. *See* DSEIS at 8-57. Thus, the DSEIS's dismissal of purchase power alternatives or the use of wind power generated outside of the IP2 and IP3 service area, based on the alleged constraints on transmission capabilities, is not rational because it does not address substantial evidence which contradicts the evidence upon which it relies. *See* Synapse Report.

For all of the above reasons, the alternatives analysis contained in Chapter 8 of the DSEIS is deficient and therefore does not comply with NEPA, CEQ regulations, and NRC's own Part 51 regulations.

VI. The DSEIS Incorporates Defects in the SAMA Analysis and the Use of an Inappropriate Air Dispersion Model With Inaccurate Input of Population Figures

The DSEIS improperly adopted Entergy's SAMA analysis and ignored deficiencies in its air dispersion modeling which were raised by New York's Contention 16 and accepted as a subject of litigation by the Licensing Board. *See* Memorandum and Order, *In the Matter of Entergy Nuclear Operations, Inc.* (Indian Point Nuclear Generating Units 2 and 3)(July 31, 2008). Pursuant to the FGEIS, an analysis of alternative methods of reducing the risk of severe accidents is a Category 2 issue, which must be specifically conducted for all plants, such as IP 2 and 3, that have not engaged in this analysis before. However, a risk mitigation method must only be considered for

Entergy Contention NYS-37
Attachment 2

NUREG-1437
Vol. 1

Generic Environmental Impact Statement for License Renewal of Nuclear Plants

Main Report

Final Report

Manuscript Completed: April 1996
Date Published: May 1996

**Division of Regulatory Applications
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001**



INTRODUCTION

are necessary at the time of license renewal and throughout the renewal term to ensure continued safe operation of the plant. Most utilities are expected to begin preparation for license renewal about 10 to 20 years before expiration of their original operating licenses. The inspection, surveillance, test, and maintenance programs for license renewal would be integrated gradually into plant operations over a period of years. For the purpose of the analysis in this GEIS, NRC anticipates that plant refurbishment undertaken specifically for license renewal would probably be completed within normal plant outage cycles beginning 8 years before the original license expires and one longer outage, if a major refurbishment item is involved. Activities associated with license renewal and operation of a plant for an additional 20 years are discussed in Chapter 2.

1.3 PURPOSE AND NEED FOR THE ACTION

The Commission will act on an applications for license renewal submitted by a licensee of an operating nuclear power plant. Although a licensee must have a renewed license to operate a plant beyond the term of the existing operating license, the possession of that license is just one of a number of conditions that must be met for the licensee to continue plant operation during the term of the renewed license. State regulatory agencies and the owners of the plant would ultimately decide whether the plant will continue to operate based on factors such as need for power or other matters within the State's jurisdiction or the purview of the owners. Economic considerations will play a primary role in the decision made by State regulatory agencies and the owners of the plant.

Thus, for license renewal reviews, the Commission has adopted the following definition of purpose and need:

The purpose and need for the proposed action (renewal of an operating license) is to provide an option that allows for power generation capability beyond the term of a current nuclear power plant operating license to meet future system generating needs, as such needs may be determined by State, utility, and, where authorized, Federal (other than NRC) decision makers.

This definition of purpose and need reflects the Commission's recognition that, absent findings in the safety review required by the Atomic Energy Act of 1954, as amended, or findings in the NEPA environmental analysis that would lead the NRC to reject a license renewal application, the NRC has no role in the energy planning decisions of State regulators and utility officials as to whether a particular nuclear power plant should continue to operate. From the perspective of the licensee and the State regulatory authority, the purpose of renewing an operating license is to maintain the availability of the nuclear plant to meet system energy requirements beyond the term of the plant's current license. The underlying need that will be met by the continued availability of the nuclear plant is defined by various operational and investment objectives of the licensee. Each of these objectives may be dictated by State regulatory requirements or strongly influenced by State energy policy and programs. In cases of interstate generation or other special circumstances, Federal agencies such as the Federal Energy Regulatory Commission (FERC) or the

8. ALTERNATIVES TO LICENSE RENEWAL

8.1 INTRODUCTION

The Nuclear Regulatory Commission's (NRC's) environmental review regulations implementing the National Environmental Policy Act (NEPA) (10 CFR Part 51) require that the NRC consider all reasonable alternatives to a proposed action before acting on a proposal, including consideration of the no-action alternative. The intent of such a consideration is to enable the agency to consider the relative environmental consequences of an action given the environmental consequences of other activities that also meet the purpose of the action, as well as the environmental consequences of taking no action at all. The information in this chapter does not constitute NRC's final consideration of alternatives to license renewal. Therefore, the rule accompanying this Generic Environmental Impact Statement (GEIS) does not contain any conclusions regarding the environmental impact or acceptability of alternatives to license renewal. Accordingly, the NRC will conduct a full analysis of alternatives at individual license renewal reviews. NRC expects that information contained in this chapter will be used in the analysis of alternatives for the supplemental environmental impact statements prepared for individual license renewals. As defined in Chapter 1, the proposed action is the granting of a renewed license. Additionally, the purpose of such a proposal is to provide an option that allows for power generation capability beyond the term of a current nuclear power plant operating license in order to meet future system generating needs as such needs may be determined by state, utility, and, where authorized, federal

(other than NRC) decision makers. This chapter examines the potential environmental impacts associated with denying a renewed license (i.e., the no action alternative); the potential environmental impacts from electric generating sources other than nuclear license renewal; the potential impacts from instituting additional conservation resources to reduce the total demand for power; and the potential impacts from power imports.

The no-action alternative is the denial of a renewed license. In general, if a renewed license were denied, a plant would be decommissioned and other electric generating sources would be pursued if power were still needed. It is important to note that NRC's consideration of the no-action alternative does not involve the determination of whether any power is needed or should be generated. The decision to generate power and the determination of how much power is needed are at the discretion of state and utility officials.

While many methods are available for generating electricity, and a huge number of combinations or mixes can be assimilated to meet a defined generating requirement, such expansive consideration would be too unwieldy to perform given the purposes of this analysis. Therefore, NRC has determined that a reasonable set of alternatives should be limited to analysis of single, discrete electric generation sources and only electric generation sources that are technically feasible and commercially viable.

To generate this reasonable set of alternatives, NRC included commonly known generation technologies and consulted various state energy plans to identify the alternative generation sources typically being considered by state authorities across the country. From this review, NRC has established a reasonable set of alternatives to be examined in this chapter. These alternatives include wind energy, photovoltaic (PV) cells, solar thermal energy, hydroelectricity, geothermal energy, incineration of wood waste and municipal solid waste (MSW), energy crops, coal, natural gas, oil, advanced light water reactors (LWRs), and delayed retirement of existing non-nuclear plants. NRC has considered these alternatives pursuant to its statutory responsibility under NEPA. NRC's analysis of these issues in no way preempts or displaces state authority to consider and make decisions regarding energy planning issues.

This chapter also includes a discussion of conservation and power import alternatives. Although these alternatives do not represent discrete power generation sources, they represent options that states and utilities may use to reduce their need for power generation capability. In addition, energy conservation and power imports are possible consequences of the no-action alternative. While these two alternatives are not options that fulfill the stated purpose and need of the proposed action *per se* (i.e., options that provide power generation capability), they nevertheless are considered in this chapter because they are important tools available to energy planners in managing need for power and generating capacity.

The potential environmental impacts evaluated include land use, ecology,

aesthetics, water quality, air quality, solid waste, human health, socioeconomics, and culture. These impacts are addressed in terms of construction impacts and operational impacts (Tables 8.1 and 8.2, respectively). This chapter occasionally mentions economic costs of particular alternatives for descriptive purposes; they do not provide a basis for an NRC decision on license renewal. In addition such economic costs may change prior to specific license renewal decisions as improvements occur to particular technologies. Additionally, this chapter discusses the relative construction and operating costs of various technologies where available.

8.2 ENVIRONMENTAL IMPACTS OF THE NO-ACTION ALTERNATIVE

As discussed in the introduction, the no-action alternative is denial of a renewed license. Denial of a renewed license as a power generating capability may lead to a variety of potential outcomes. In some cases, denial may lead to the selection of other electric generating sources to meet energy demands as determined by appropriate state and utility officials. In other cases, denial may lead to conservation measures and/or decisions to import power. In addition, denial may result in a combination of these different outcomes. Therefore, the environmental impacts of such resulting alternatives would be included as the environmental impacts of the no-action alternative. Additionally, a denial of a renewed license would lead to facility decommissioning and its associated impacts; these impacts would also represent impacts of the no-action alternative.

The environmental impacts expected from decommissioning are analyzed in NUREG-0586, *Final Generic Environmental Impact Statement of Decommissioning of Nuclear Facilities* (1988). Consequently, NUREG-0586 represents some of the environmental impacts associated with denial of a renewed license. The analysis in Section 8.3 is equally applicable to the no-action alternative in that the alternatives analyzed in this section are all possible actions resulting from denial of a renewed license. Therefore, Section 8.3 represents additional impacts of the no-action alternative.

8.3 ENVIRONMENTAL IMPACTS OF ALTERNATIVE ENERGY SOURCES

This section describes the technologies and evaluates the environmental impacts of 13 energy supply or demand alternatives identified by NRC as capable of satisfying the purpose and need of the proposed action [i.e., to provide an option that allows for power generation capability beyond the term of a current nuclear power plant operating license to meet future system generating needs as such needs may be determined by state, utility, and, where authorized, federal (other than NRC) decision makers]. The technologies were selected because they correspond with those generally considered in state energy plans as potential generating technologies, or they were proposed as alternatives to nuclear license renewal in comments to the Draft GEIS. Many of these technologies differ dramatically from nuclear, and it is important to evaluate them using a consistent standard. A reference generating capacity of 1000 MW(e) is used in evaluating environmental impacts, because this is the

approximate generating capacity of many nuclear plants.

The section evaluates impacts that could occur during construction (Table 8.1) or operation (Table 8.2) of each alternative technology. Environmental resources considered include land use, ecology, aesthetics, water quality, air quality, human health, socioeconomics, and cultural resources. The tables provide more detailed information, and the text highlights the more important impacts. References are omitted in the text when they are included in the impact tables.

License renewal decisions may vary considerably among states and utilities based on numerous factors, of which environmental factors are but one set. These decisions may be reached by utilities and states prior to NRC involvement. NRC staff evaluated the process used by 10 states with nuclear power plants to decide which electricity supply and demand options to implement. (NRC examined state energy plans of California, Florida, Illinois, Massachusetts, Michigan, Minnesota, New York, Texas, Vermont, and Wisconsin.) NRC determined that integrated resource planning in some form is used in almost all of these states. Nuclear technology and license renewal are not emphasized in most of these plans, which are developed by either state energy offices or state public service commissions. It is apparent in the plans that nuclear generating plants submitted for license renewal would be required to demonstrate the overall benefits of license renewal over alternative technologies before states would approve renewal. The options would include large, central generating stations powered by nonrenewable sources of energy, probably coal or natural gas, or advanced technologies powered by those

same fuels. Some states not enamored of conventional nuclear power may be amenable to considering advanced nuclear technologies. Renewable energy sources have the potential to replace at least some of the generating capacity lost through decommissioning nuclear plants. Solar thermal energy, PV cells, wind energy, hydroelectricity, energy crops, and incineration of MSW and wood waste have some potential in most states surveyed. Geothermal energy has potential in states like California where the resource is prevalent.

Besides sources of power generation, other alternatives are mentioned in state energy plans. Demand-side management (DSM) is viewed in every state as a means to help meet electricity forecasts. Other alternatives include end-use conservation and purchases of power from other utility systems in the United States, Canada, or Mexico. While these two alternatives are not options that fulfill the stated purpose and need of the proposed action *per se* (i.e., options that provide power generation capability), they nevertheless are considered in this section because they are important tools available to energy planners in managing needs for power and generating capacity.

Every technology discussed in this section could generate power in much smaller facilities than 1000 MW(e) in dispersed locations throughout a utility's service area. Typically, conservation or demand-side alternatives and renewable technologies lend themselves best to relatively small facilities, whereas conventional, nonrenewable technologies are suited more for large central generating stations. Numerous exceptions to these generalizations exist or are feasible. Thus, multiple alternatives could be selected to

replace a single nuclear plant. For example, a utility and state public utility commission could agree that a combination of 500 MW(e) of conventional or advanced-technology coal, 100 MW(e) of conservation, 100 MW(e) of purchased power, 50 MW(e) of wind power, 50 MW(e) of MSW combustion, and 200 MW(e) of combined-cycle-generation would be the preferred set of alternatives to replace a single nuclear plant. This siting scenario would be expected to diffuse over a wider area the construction and operational impacts otherwise expected from a single 1000-MW(e) facility. It also could be feasible to replace a nuclear plant with an equal amount of capacity from a single technology sited in a dispersed fashion. The types and general magnitude of environmental impacts would be about the same as for a central generating facility using that technology, but impacts would be dispersed in smaller concentrations over a wider area.

The following discussion is intended to suggest generic impacts that could occur from each technology as well as approximations of the magnitude of those impacts. In addition, this discussion is intended to address the reasonably foreseeable impacts of the various alternatives and does not attempt to address impacts that are remote or speculative. In the cases of conservation and renewable technologies, where there are no current equivalents to 1000-MW(e) plants, the impact data are less reliable than for nonrenewable technologies. The GEIS depends on data gathered from many studies, and the data may not always be comparable among technologies.

8.3.1 Wind

Of the approximately 33,000 quads of wind resources available annually in the coterminous United States, only about 170 quads per year can be accessed with current technology, and only about 1/6 quad per year can currently be used cost-effectively to generate electricity (DOE/EIA-0561). Wind speeds of at least 21 km/h (13 miles/h) are considered necessary for generating electricity. As shown in Figure 8.1, regions with such speeds include the Great Plains, the West, coastal areas, and parts of the Appalachians (DOE/EIA-0561).

The average annual capacity factor (i.e., the proportion of actual generation to potential generation at 100 percent capacity utilization) is estimated at 21 percent in 1995 and 29 percent in 2010. This relatively low capacity, compared with current baseload technologies, results from the high degree of intermittency of wind energy in many locations (DOE/EIA-0561). Current energy storage technologies are too expensive to permit wind power plants to serve as large baseload plants. The inability to increase the capacity factors of wind power makes the technology an inappropriate choice for baseload power (Johansson et al. 1993)

In 1992, wind provided 1676 MW(e) of electric generating capacity, produced mostly in California by nonutility generators (Hamrin and Rader 1993). Windfarms in areas around the Altamont Pass, the Tehachapi Mountains, and the San Gorgino Pass have more than 15,000 wind turbines (Pace 1991). The U.S. Department of Energy's (DOE's) Energy Information Administration (EIA) projects that the contribution of wind power will rise to 3600 MW(e) in 2000 and

6300 MW(e) in 2010, all of which would be generated by nonutilities (DOE/EIA-0561).

A recent survey of utilities conducted by UDI/McGraw-Hill indicated that no utilities have announced plans to construct 25 MW(e) or larger wind power plants in the foreseeable future, although some utilities may have unpublished plans (Bergesen 1994). Wind technology can be advanced with many small improvements, as well as larger ones such as development of lighter, stronger blade materials; improved gearing to capture a greater portion of useful wind velocities; improved understanding of wind patterns and siting configurations for wind turbines at a site; and improved electrical storage capabilities (SERI/TP-260-3674).

Wind energy is expected to require the use of approximately 61,000 ha (150,000 acres) or 610 square km (about 235 square miles) of land to generate 1000 MW(e) of power (see Table 8.1 for construction impacts and references). This large land requirement, even in dispersed sites, would eliminate any possibility of co-locating a wind energy facility with a retired nuclear plant, thereby pointing to the need for greenfield siting (siting on undeveloped land). The relatively low capacity factor of wind power means that it would operate less frequently at full power than nuclear, but the impacts associated with land use would still occur. The earth-moving that might be required to clear such a large amount of land would destroy much of the natural environment in affected areas (e.g., coastal, mountainous, or plains), where wind velocities are highest. Erosion and sedimentation, while controllable, would still occur and would adversely affect land and water resources. The visual impact of such extended land clearing would be quite

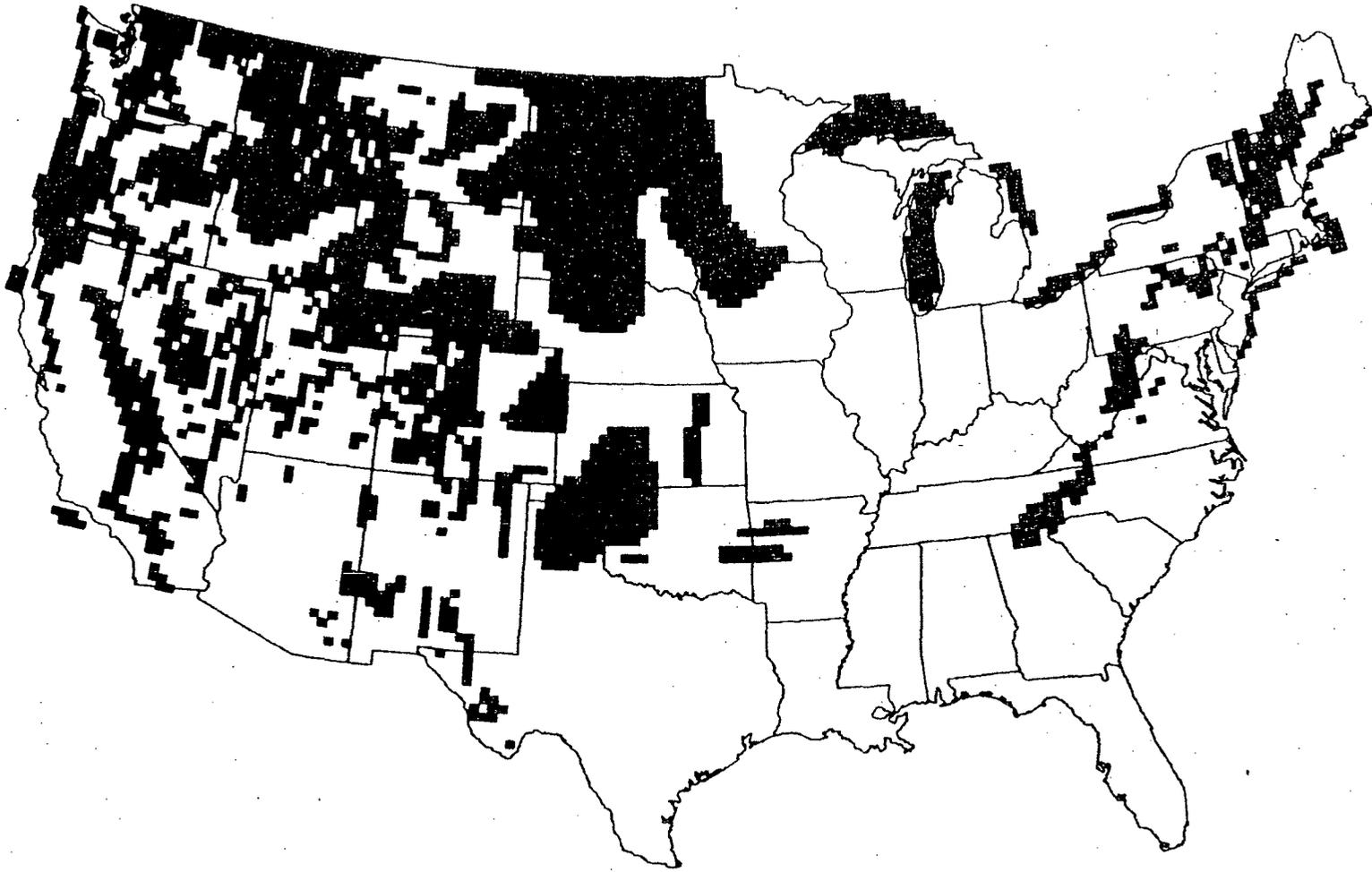


Figure 8.1 U.S. wind energy resources (contiguous states, winds 13 miles per hour or greater).
Source: Adapted from DOE/EIA-0561.

noticeable and would be a negative aesthetic consequence. Short-term air quality impacts from fugitive dust and equipment exhaust would occur with such extensive activities, and considerable vegetation debris could require disposal. Disturbance of such a large amount of land likely would reveal cultural resources that would require protection. Each of these site impacts would be magnified because of the new transmission lines that are almost always required for greenfield sites. Agricultural land could also be committed to the siting of wind energy facilities in some areas. Adverse impacts could still occur where land is taken out of production, but the acreage lost would likely be less than with natural environments.

The projected impacts of operating wind energy facilities are less than those expected from construction (see Table 8.2 for operational impacts and references). The same amount of land would still be committed to wind generation, but the machines would occupy less than 10 percent of it, freeing up most of the remainder for agricultural or some other compatible use. The aesthetic impact of several thousand wind turbines over a large area likely would strike many observers as obtrusive. The noise from such equipment likely would reinforce these negative opinions. Birds are likely to collide with the turbines, and wind energy developers should consider migration areas and nesting locations when sites for wind energy facilities are selected. In terms of positive environmental impacts, wind power plants would have little effect on water and air quality and would generate very little waste. Human health, except for a potential small number of occupational injuries, would not be affected by operations.

8.3.2 Photovoltaic Cells

PV cells, solid-state devices composed of a thin layer of semi-conductor material (usually single-crystal silicon), convert sunlight directly into electricity. Groups of cells that are mounted on a rigid plate and interconnected to form PV modules have a peak generating capacity of 50 W each (DOE/EH-0077). Usually, groups of modules are permanently attached to a frame and interconnected to form PV arrays or power systems. Power production is proportional to the amount of solar radiation received in a specific geographic area.

The most promising geographic area for the expansion of PV systems is the West; the Midwest and South have some potential (Figure 8.2).

PV power is produced intermittently because solar cells generate electricity only when sunlight is available. The National Association of Regulatory Utility Commissioners indicates an estimated capacity factor of 25 percent (Hamrin and Rader 1993). The largest utility PV system in the United States was built in 1984 on Carrisa Plain in central California by ARCO Solar at a site owned by Pacific Gas and Electric Company (Firor et al. 1993). Until it was dismantled in 1990, it generated 6.5 MW(e) of peak power. Thirty utilities were experimenting with small, grid-connected PV systems as of 1991 (Firor et al. 1993). Use of PV cells for baseload capacity requires very large energy storage devices, such as pumped hydro facilities, batteries, or compressed air chambers. Currently available energy storage devices are too expensive to store sufficient electricity to meet the baseload generating requirements. Thus, while the resource is plentiful, the reserves that

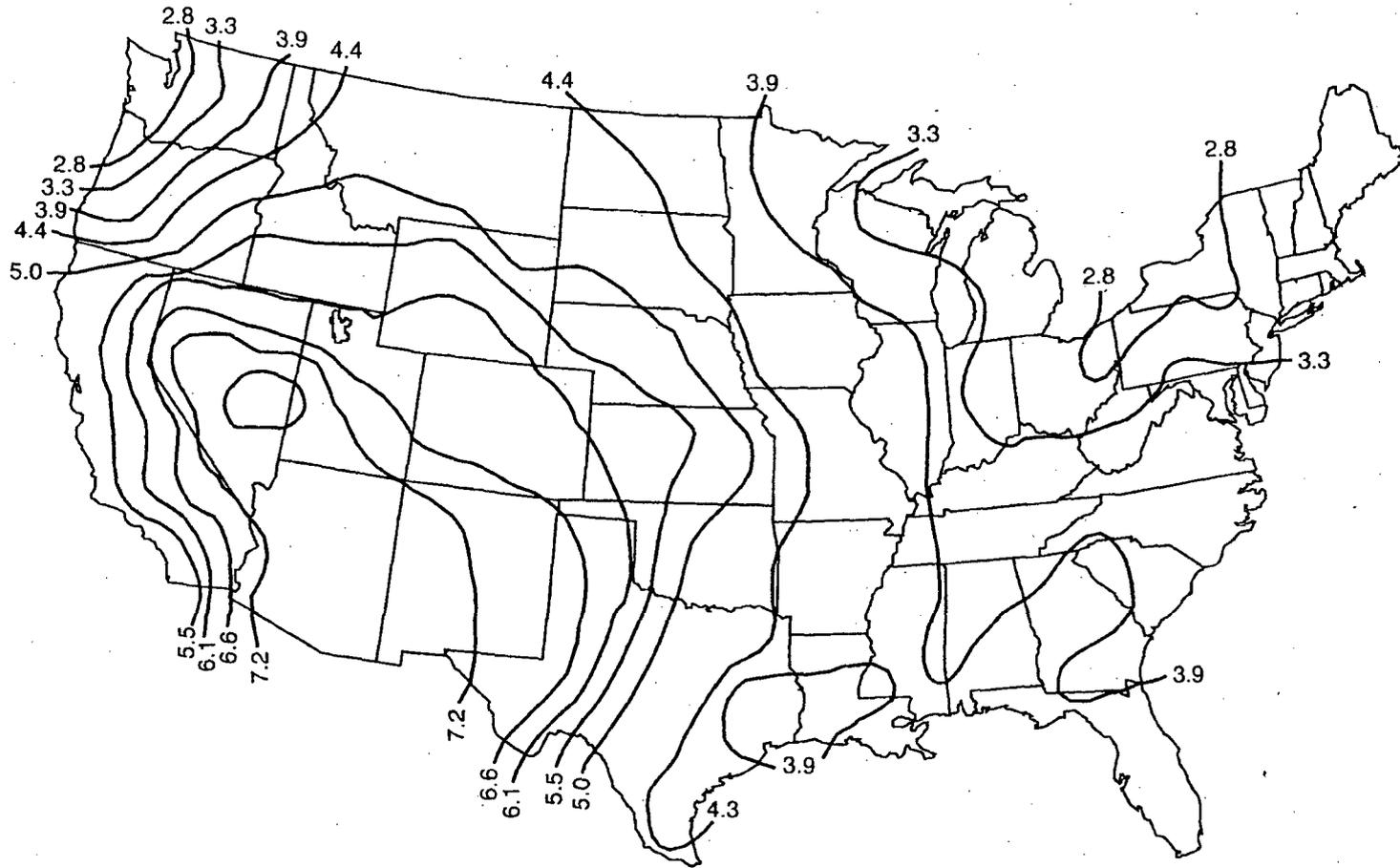


Figure 8.2 Solar resource availability: annual average daily direct normal solar radiation.
Source: Adapted from DOE/EIA-0561.

currently can be tapped economically for generating electricity in plants of appreciable size are limited.

The high cost of PV systems has been the primary impediment to their more extensive use. These high costs reflect the technical barriers that PV technology must overcome to be competitive. Improvements such as more effective concentrators, use of more easily produced thin-film PV cells rather than silicon cells, and lower module costs could play some part in reducing PV costs. Energy storage technology must become considerably less expensive to enable intermittent technologies like PV to provide reliable electricity. EIA projects that almost no additional PV generating capacity will be added to the electricity grid by 2010, its longest-term forecast (DOE/EIA-0561).

Construction impacts to several resources would be substantial from building a 1000-MW(e) PV facility either at a single site or at numerous smaller dispersed sites. The large land requirement would rule out co-locating a PV facility with an existing nuclear plant, which requires far less land. In addition to these new land requirements, additional land would be required for new transmission lines. No PV plant of this size currently exists, and impacts must be inferred from smaller PV facilities. It is estimated that at least 14,000 ha (35,000 acres) or about 130 km² (50 square miles), either at a single site or at multiple sites, would be needed in areas optimal for PV technology to be able to generate as much as 1000 MW(e) of power. Clearing and grading 14,000 ha (35,000 acres) would largely destroy the previous natural or agricultural environment for the life of the facility, with resulting potential impacts to any threatened and endangered species and to

aesthetic qualities of the area. Such construction likely would create erosion and resulting stream sedimentation problems. Considerable vegetation debris probably would need to be disposed of as well, which could create short-term air quality problems if it were disposed of through open-air burning. In an area this large, construction impacts to cultural resources would be likely to occur. No work force projections are available for constructing a large PV facility. If prefabricated components and a modular construction approach were used, the work force would probably be smaller than for nonrenewable central generating stations. Such a work force would result in fewer socioeconomic impacts in the form of jobs and local purchases, but the severe impacts of large work forces affecting small communities probably could be avoided.

Adverse operating impacts of PV facilities are associated with the large land requirements. All of the 14,000 ha (35,000 acres) would be lost to other uses for the life of the plant because the land would be covered with PV arrays. Impacts associated with loss of wildlife habitat or agricultural lands would occur, and erosion could develop without proper controls. Water quality could be adversely affected from runoff from PV arrays and drainage unless site engineering included mitigative measures. Substantial visual impacts created from land clearing would be continued in a different form by the extensive PV arrays covering the landscape. The socioeconomic benefits flowing to host communities would be considerably less with PVs than from baseload nonrenewable generating technologies because work forces and plant expenditures would be much less. Tax revenues could be fairly substantial, however, if PV capital costs were

comparable to nuclear and fossil plant costs and resulted in correspondingly high assessed values. Other impacts, including those to air quality, solid wastes, and human health, either would not occur or would be small.

8.3.3 Solar Thermal Power

Solar thermal conversion systems use reflective materials to concentrate sunlight to heat a fluid that runs a turbine. Both central-receiver and distributed-receiver systems have been used. The parabolic trough, an example of a distributed receiver system, is used in the only large-scale [354-MW(e)] commercial solar thermal power program in the United States, the Luz International facilities located at several sites in the Mojave Desert in California. The Luz facilities, which consist of nine thermal plants [one 13.8-MW(e) unit, six 30-MW(e) units, and two 80-MW(e) units], use natural gas as a backup fuel for generating steam on cloudy days and at night. The company filed for bankruptcy in 1991 because of lower fossil fuel prices and reduced incentives for renewable technologies (DeLaguil et al. 1993). DOE and a consortium of 12 other organizations are retrofitting Solar One, a 10-MW(e) central receiver pilot plant near Barstow, California. It is to come on-line in 1995, renamed Solar Two, and will use a molten-salt heat transfer medium instead of the original oil system to collect and store heat energy. Developers hope that commercial versions of this new Solar Two technology can operate at capacity factors of 60 percent and thus provide dispatchable rather than intermittent power. Based upon solar energy resources (Figure 8.2), the most promising region of the country for this technology is the West.

Solar thermal systems have constraints similar to those of PV systems in that capital costs are higher than for nonrenewable resources, and solar thermal systems lack baseload capability unless combined with natural gas backup. The use of purely solar thermal systems for baseload capacity requires very large amounts of energy storage, such as pumped hydro facilities, compressed air chambers, or batteries. Capacity factors are estimated to be between 25 and 40 percent for future solar thermal plants (Hamrin and Rader 1993). Except for a few older units, most nuclear and baseload coal units generate between 200 and 1000 MW(e) of baseload power and have reached average capacity factors of 65 percent or better in recent years (OTA 1993a).

The construction impacts of building a solar thermal central generating station would stem from the amount of land required to generate 1000 MW(e) of electricity. About 6000 ha (14,000 acres) or 57 km² (22 square miles) of land would be cleared either at one site or at multiple locations, with the resulting destruction of whatever wildlife habitat or agricultural values the land provided. A greenfield site or sites, along with new transmission lines, probably would be required because few existing facilities would have sufficient land for such an endeavor. The visual impact of such clearing, even in desert landscapes where solar thermal technology is most competitive, would be regarded by many observers as an obvious negative aesthetic impact. Potential impacts to cultural resources could be considerable because of the large amount of land affected, and care would need to be taken to identify such resources before construction. Some erosion and sedimentation would likely occur during land clearance. Considerable short-term impacts to air quality would

the sites likely would be new. Wildlife habitat would be lost for terrestrial and free-flowing aquatic biota, and additional habitat would be created for some aquatic species. Associated with the loss of land would be some erosion, sedimentation, dust, equipment exhaust, debris from land clearing, probable loss of cultural artifacts, and aesthetic impacts from land clearing and excavating. The construction work force would be fairly large, and socioeconomic impacts likely would be substantial, especially if the dam were constructed in a remote area where immigrating workers would burden local public services.

Operating impacts from hydroelectric dams are associated predominantly with land and water resources. Land that once was lived on, farmed, ranched, forested, hunted, or mined would be submerged under water indefinitely. The original land uses would be replaced by electricity generation and recreation and, perhaps, residential and business developments that take advantage of the lake environment. Changes in water temperature, currents, and amount of sedimentation would produce a different aquatic environment above and below the dam. Alterations to terrestrial and aquatic habitats could change the risks to threatened and endangered species.

Although the hydroelectric dam would create no air quality or solid waste impacts during operation and could serve as a protector of property and lives in preventing floods, lake recreation would likely bring with it a number of drownings and cause water pollution during the facility's operation.

8.3.5 Geothermal

Potentially recoverable geothermal resources are located in the upper 10 miles

(16 km) of the earth's crust. These resources exist in the form of hot vapor (steam) or liquid (hydrothermal), geopressurized brines, or hot dry rock. Hydrothermal is the only resource used by current commercial technology. EIA estimates that about 1.5 million quads per year of geothermal resources exist in the United States; however, only about 22,800 quads are accessible and, of these, only approximately 250 quads per year can be economically developed today (DOE/EIA-0561). In 1990, geothermal resources contributed 0.32 quad of primary energy in the western United States. The net geothermal generating capacity in the United States is projected to grow from 15 billion kWh in 1990 to about 60 billion kWh in 2010. In comparison, one 1000-MW(e) nuclear plant operating at 60 percent capacity generates 5.26 billion kWh annually (DOE/EIA-0561). Geothermal has a high capacity factor of approximately 90 percent and can be used to provide reliable, baseload power. A geothermal electricity generating facility consists of a conversion well that brings the geothermal resources to the surface, the conversion system that produces useful energy from the resource, and the injection well that recycles cooled brine back to the underground reservoir (SERI/TP-260-3674).

As shown in Figure 8.4, geothermal plants may be located in the western United States, Alaska, and Hawaii where hydrothermal reservoirs are prevalent. The discrepancy between the vast amount of resource projected to be available (1.5 million quads per year) and projected usage is due primarily to technological problems. Although geothermal plants offer alternative baseload capacity to conventional fossil fuel and nuclear plants, widespread application of geothermal

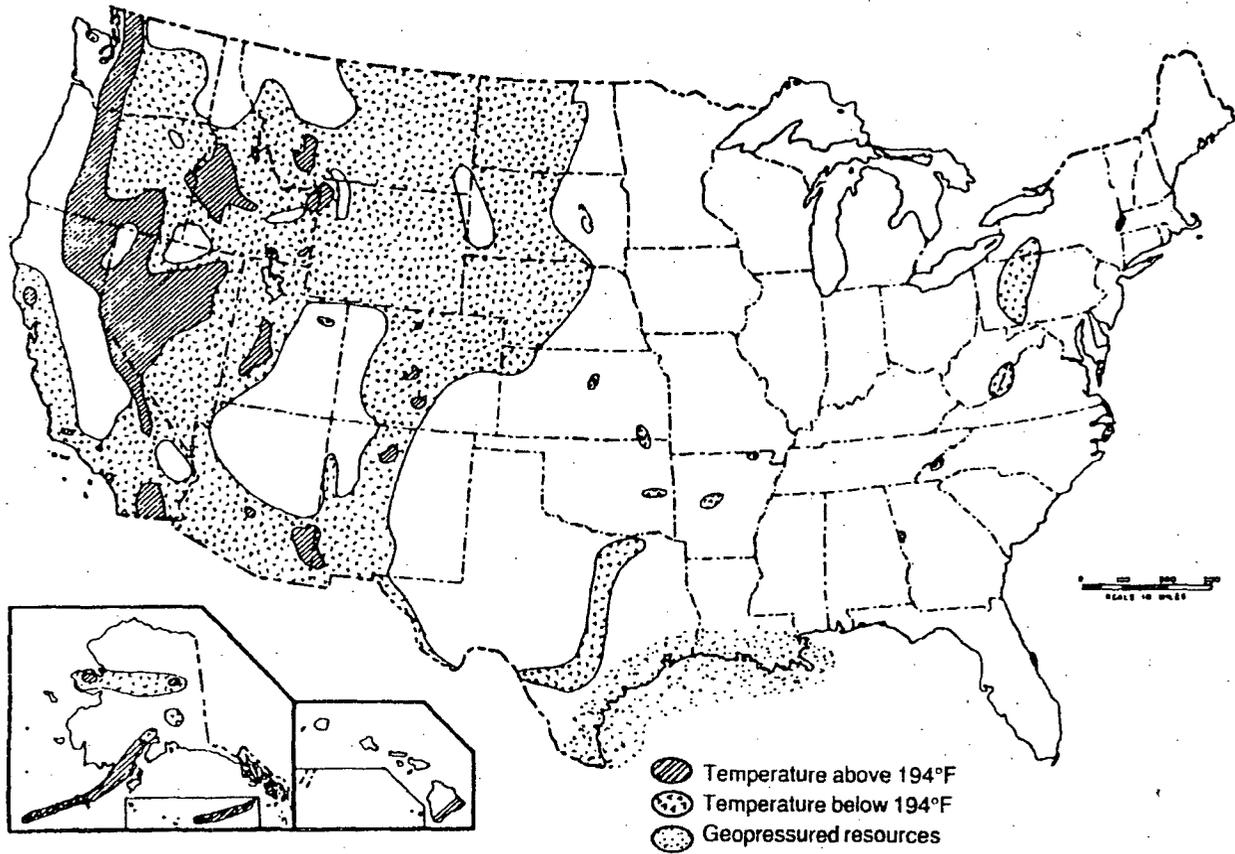


Figure 8.4 U.S. known and potential geothermal energy resources. Source: Adapted from DOE/EIA-0562.

energy is constrained by the geographic availability of the resource and the maturity of the technology. The maximum size of geothermal power plants, in their present state of development, is about 110 MW(e) per unit. Geothermal plants, however, could be sited as modular units that would allow for larger generating capacities.

Construction impacts of a geothermal facility would result primarily from disturbance of land to support the large number of geothermal wells and the power plant needed to produce electricity equivalent to that from a 1000-MW(e) plant. Excluding new transmission corridors, which would add to most impacts, an estimated 2800 ha (7000 acres) would be needed even though the generating facility or facilities would only occupy around 25 ha (60 acres). This amount of acreage having appropriate geothermal resources would require a greenfield site or sites, which would imply altering current land uses of farming, ranching, forest, or natural habitat. Clearing this land would damage or destroy much of the existing habitat for wildlife, as well as pose potential adverse consequences for cultural resources. Aesthetic impacts would include extensive vegetation removal and earth moving. Soil erosion and stream sedimentation likely would result in some degree from the early clearing operations. Fugitive dust and exhaust fumes from heavy equipment would reduce air quality temporarily. The moderate-sized work force would create some community impacts, particularly if affected communities were small and had little service infrastructure to accommodate workers who might move into a rural environment to build the plant. Operating impacts would involve those resources most closely associated with the land disturbed

in constructing the geothermal facility. Some of the land originally cleared for construction of the geothermal facilities could probably be returned to previous uses, since it would not all have geothermal facilities located on it. Much acreage would still be lost for the life of the plant, however, and this loss could be complicated by subsidence caused by withdrawal of the geothermal fluid. Loss of habitat, impacts to threatened and endangered species, and visual impacts could be mitigated partially by returning much of the land to, or even leaving it in, its original condition. Surface water and groundwater quality could be impacted adversely if waste fluids from wells escaped into the ground water or surface streams or ponds. In addition various toxic gases such as ammonia, methane, and hydrogen sulfide and trace amounts of arsenic, borax, mercury, radon, and benzene would be released to the atmosphere. Noise impacts could be a problem for residents living on the edge of a geothermal site. Socioeconomic impacts should be positive with substantial tax revenues and a considerable number of jobs accruing to local taxing jurisdictions from a geothermal plant.

8.3.6 Wood Waste

The 2.4 quads per year of waste wood energy consumed in the United States generally is apportioned among the following sectors: industrial heat and power—1.6 quads (66 percent), residential space heating—0.8 quads (33 percent), and electric utilities—0.01 quads (1 percent). Industrial wood energy is used in a variety of process heat and cogeneration applications. Nearly half of that wood energy is used in boilers, a little over 40 percent in cogeneration (steam and electricity), and the remainder as process

Operating impacts of new coal plants would be substantial for several resources. Concerns over adverse human health effects from coal combustion have led to important federal legislation in recent years, such as the CAAA. Although the situation appears to be improving, health concerns remain. Air quality would be impacted by the release of CO₂, regulated pollutants, and radionuclides. Public health risks such as cancer and emphysema are considered likely results. CO₂ has been identified as a leading cause of global warming. SO₂ and oxides of nitrogen have been identified with acid rain. Substantial solid waste, especially fly ash and scrubber sludge, would be produced and would require constant management. Losses to aquatic biota would occur through impingement and entrainment and discharge of cooling water to natural water bodies. Socioeconomic benefits can be considerable for surrounding communities in the form of several hundred jobs, substantial tax revenues, and plant spending.

An estimated 8,900 ha (22,000 acres) for mining the coal and disposing of the waste could be committed to supporting a coal plant during its operational life. Air quality impacts from fugitive dust, water quality impacts from acidic runoff, and aesthetic and cultural resources impacts are all potential adverse consequences of coal mining. Socioeconomic benefits from several hundred mining jobs and tax revenues would also accompany the coal mining.

8.3.10 Natural Gas

Natural gas supplied 9.4 percent of this country's net electric utility generation in 1992 and is projected to supply 11.4 percent of electricity in 2010

[DOE/EIA-0383(94)]. Domestic natural gas resources are estimated at 1,700 quads, of which approximately 900 quads are accessible resources and about 230 quads are reserves that currently can be recovered cost-effectively (DOE/EIA-0561). Most of the supply in the continental United States is located in Texas, Louisiana, Oklahoma, New Mexico, and Kansas, locations favored for gas-fired plants because of relatively low gas prices. Although natural gas reserves are fairly large, much of the resource is located in remote areas that are not served by a pipeline infrastructure connected to high-demand centers.

The natural gas fuel cycle consists of exploration/extraction (drilling and production), processing, transportation by pipelines, end use, and waste management. Utilities receive gas at power plants through pipelines on a continuous basis.

Natural gas is used in three technologies: conventional steam, gas-turbine, and combined-cycle. In conventional steam plants, the traditional gas-fired technology, natural gas is burned to produce steam. The process is very similar to that used for coal and oil technologies. Because natural gas can be used more efficiently in gas-turbine and combined-cycle facilities than in a conventional steam plant, the latter technology is no longer being used for new generating stations. In gas-turbine plants, gas (or distillate oil) is burned to produce an exhaust gas that drives the turbine. Combined-cycle plants, which are particularly efficient and are used as intermediate and baseload facilities, combine the gas-turbine technology with a heat recovery system that powers a steam cycle [DOE/EIA-0383(94)]. These combined-cycle systems represent the large majority of the total number of plants

negligible during repowering, as would impacts to air and water. Socioeconomic impacts would occur but would be smaller than during the original construction of the coal or gas-fired plants.

Major reductions in a plant's airborne emissions should be realized as the most important impact. DOE/EIS-0146 states, "Repowering opens the door to a future of sustained deep reductions in nationwide emissions of SO₂, one of the chief pollutants thought to contribute to acid rainfall" (p. 2-10). SO₂ reductions by conventional coal-fired plants would vary from 90 to 99 percent depending upon the specific technology. Similarly, oxides of nitrogen, one of the emissions associated with global warming, would be reduced between 60 and 92 percent from current emissions from conventional coal-fired plants. On the other hand, solid waste would be increased as the new technologies reduced air pollution by converting what would normally be an air pollutant into solid wastes (DOE/EIS-0146). Recent experience with repowered plants starting to come on line confirms SO₂ and oxides of nitrogen reductions of at least 90 percent in these technologies (Bretz 1994). Gas turbine/generators without heat recovery steam generators are expected to reduce oxides of nitrogen emissions by more than 90 percent. Land use, cultural resources, and socioeconomic resources should not be affected by repowering.

8.3.14 Conservation

A wide variety of conservation technologies could be considered as alternatives to generating electricity at current nuclear plants. These technologies could include hardware, such as more efficient motors in consumer appliances, commercial

establishments, or manufacturing processes; more energy-efficient light bulbs; and improved heating, ventilation, and air conditioning systems. Also, structures could be weatherized with better insulation, weather stripping, and storm windows. These measures generally come under the heading of DSM, which is a collection of diverse measures to reduce customers' electricity consumption without adversely affecting service. Other conservation measures a utility could take would be to install more efficient equipment as it retrofits its power plants and improves distribution and transmission technologies. An average of 6.2 percent of an American utility's power is lost before reaching customers (Kelly and Weinberg 1993).

Conservation technologies and measures have proved to be popular with some utilities, public utility commissions and members of the public, who see them as a way of providing economical service while avoiding construction of more electric generating facilities. Increased competition within the utility industry and pressure from public utility commissions and public interest groups have forced utilities to consider conservation technologies as essentially new resources in the utility's portfolio of capabilities and invest in them as they would new generating sources. On a national scale (based on EIA electricity growth projections in DOE's National Energy Strategy and Electric Power Research Institute estimates of DSM savings in 1990), Hirst (1991) calculates that almost half of electricity demand growth from 1990 to 2010 could be eliminated with an "ambitious" DSM program. This growth would eliminate the need for an estimated 430 500-MW(e) power plants or an equivalent 215 1000-MW(e) nuclear plants (Hirst 1991). A study of three New York utilities found

that DSM programs could produce energy savings equalling 10-20 percent of each utility's projected demand in the years 2000 and 2008 (Nagel 1993).

Treating energy conservation measures as resource options received a major stimulus in the form of the EPACT, which amended the Public Utility Regulatory Policies Act of 1978 to require each utility to employ up-to-date integrated resource planning as a forecasting tool in cooperation with state regulators and the public. Under Sec. 111 (d)(19), integrated resource planning is defined as "a planning and selection process for new energy resources that evaluates the full ranges of alternatives, including new generating capacity, power purchases, energy conservation and efficiency, cogeneration and district heating and cooling applications, and renewable energy resources, in order to provide adequate and reliable service to its electric customers at the lowest system cost." A major barrier to implementing conservation technologies was the degree to which utilities could recover their costs and earn a profit while reducing growth in electric sales as opposed to selling more power. This barrier was removed under EPACT by ensuring that conservation investments were at least as profitable to utilities as investments in energy generation facilities [Sec. 111(a)(8)].

Environmental impacts of electrical energy conservation programs are not well understood. The Pace report (1991) that surveyed literature assessing indoor air quality impacts of conservation programs, and a 1991 national conference with multiple government, utility, and environmental sponsors that investigated the environmental impacts of utility DSM programs (DSM and the Global

Environment) are two noteworthy efforts to address such impacts. Environmental impacts of electrical energy conservation programs should fall into three categories: those resulting from energy demand reduction measures, those resulting from energy supply reduction measures, and those caused by fuel cycle activities.

Energy demand reduction measures are specific procedures or technologies that are undertaken to reduce energy demand. Indoor air quality is considered to be the potential impact of greatest concern from demand reduction technologies. Radon, formaldehyde, and combustion products from cigarette smoking and furnaces are the substances that appear to be the sources of most problems. Another area of concern is mercury used in fluorescent lights and polychlorinated biphenyls (PCBs) used in fluorescent light ballasts.

Pace's (1991) examination of the indoor air quality issue reached the general conclusion that, "there are no significant environmental impacts of DSM." Pace went on to argue that "weatherization programs by themselves are not a primary cause of indoor air pollution problems. Where problems do exist, mitigation measures are available." Pace also notes, however, that the U.S. Environmental Protection Agency warns that indoor air quality can be impaired if energy conservation measures override health considerations. The report also pointed out that a Bonneville Power Administration radon study found that radon was a serious concern in new home construction if mitigation measures were not built in. Cancer cases from radon were estimated to be 335 per 100,000 for baseline homes but as high as 767 cases per 100,000 for new homes with advanced infiltration control but no exhaust or mechanical ventilation.

Current research, according to Pace (1991), indicates that indoor air quality is highly site specific, and the levels of contamination existing before weatherization appear to be a major factor in determining post-weatherization pollution levels. In addition, research indicates that mitigation measures are available to correct problems. It should be noted that no studies have been completed to quantify pollutants associated with weatherization, and more research is called for.

As conservation technologies are implemented and growth in electricity demand is reduced, utilities should expect to build fewer power plants. Cost savings to electric utilities nationwide could be substantial. Hirst (1991) estimates that an ambitious 20 percent conservation-inspired reduction in total demand by 2010 could produce savings in fuel and capital of \$370 billion and could reduce utility bills by \$61 billion at a total cost to the utilities of \$165 billion. Studies for specific utilities have identified savings either in terms of money saved or emissions eliminated. Although a utility might prefer to close a fossil-fired plant that is particularly costly or dirty to operate rather than close a nuclear power plant, 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 those discussed in Section 8.3.

The third category of environmental impact of electrical energy conservation programs is the resource recovery, processing, and manufacturing stages associated with producing conservation equipment or material, as well as impacts of disposing of the equipment or material. At this time

little assessment has been undertaken of these stages. Resources used in producing conservation technologies are common to many manufacturing processes, and large amounts of resources would not be required. Disposal should involve normal procedures, and some benefits are likely over the long term as troublesome components of current technologies, such as PCBs and chlorofluorocarbons (CFCs) that require special handling, ultimately are eliminated from the waste stream and replaced by more benign components. The amounts of mercury and PCBs in lighting are considered to be small enough and disposal methods sufficiently effective that no adverse health effects should be experienced. Acceleration of CFC releases could occur as some appliances are disposed of earlier than anticipated, but this increase should abate as CFC replacements come on the market.

8.3.15 Imported Electrical Power

Although it is not a technology as such, imported electrical power from Canada or Mexico could constitute an alternative to renewing a nuclear plant's license. Electricity trading has existed between the United States and both countries for many years, and numerous transmission ties exist, particularly with Canada, to facilitate easy exchanges of power. The North American Electric Reliability Council (NERC) was established in 1968 to enhance electricity reliability between the United States and Canada and a small portion of northern Baja California in Mexico. Today this system operates essentially as a single power grid, albeit with limited power exchanges and varying prices (NERC 1993b).

Electricity trading between the United States and Mexico has been quite small,

amounting in 1990 to about 2 billion kWh of power imported by the United States (Texas) and about 600 million kWh of power exported to Mexico [DOE/EIA-0531(90)]. [The annual electric generation of a 1000-MW(e) power plant operating at 60 percent capacity is 5.26 billion kWh; thus, 1990 imports from Mexico amounted to the equivalent of about 40 percent of a 1000-MW(e) plant.]

Electricity trading between the United States and Canada is considerably larger and involves exchanges along almost the entire boundary separating the countries. In 1990 American utilities purchased approximately 22.5 billion kWh of electricity [the equivalent of four 1000-MW(e) plants] and sold about 20.5 billion kWh to Canada. These figures exclude power that is exchanged at no cost between utilities in which power moves freely across the border in one direction and is replaced with an equal amount of power moving free of charge in the other direction [DOE/EIA-0531(90)]. In 1990 the largest provincial exporter of power to the United States was British Columbia, which accounted for about 30 percent of the total. The largest provincial importer of power was Ontario, which accounted for almost two-thirds of the total Canadian imports from the United States.

Environmental impacts of importing electrical power to the United States in place of relicensing American nuclear plants should be similar to impacts of operating a mix of coal, hydropower, and nuclear power plants and the associated transmission lines in the United States. Projected capacity margins—essentially the amount of existing and planned generating capacity available for planned maintenance, unplanned electrical outages, and unforeseen growth in demand—are similar

in both the United States and Canada, from which most imported power originates. U.S. capacity margins are projected at 20.6 percent of capacity in 1994 and 17.6 percent of capacity in 2002. Canada's capacity margins are projected to be 20.7 percent in 1994 and 16.3 percent in 2002 (NERC 1993a).

Canada's mix of generating technologies is considerably different from that of the United States, with hydroelectric power constituting over half of its capacity and coal constituting a distant second at about 20 percent. Nuclear power accounts for about 16 percent of Canadian capacity, or about the same as in the United States. Oil and gas combined make up only 10 percent of Canadian capacity, or slightly more than one-third the amount they account for in the United States. This mix of generating technologies is not expected to change appreciably through 2002 (NERC 1993a). Electrical power that is exported to the United States could originate almost anywhere in Canada, because the U.S.-Canadian system is essentially a grid in which power can be transmitted to any location from any location. Since transmission is not free and line losses do occur, however, distance is a factor in determining transmission costs and thus feasibility.

Given the generating mix of Canadian power plants, one would expect that hydroelectric dams would be a principal source of exported power to the United States. This point is particularly true when new dam development on the James Bay in northern Quebec is factored into Canadian capacity. Coal and nuclear plants would provide approximately equal amounts of power that would not total the hydropower contribution to exported power. Thus, if environmental impacts of power imported

by the United States are distributed among Canadian power plants according to their percentage of the total, environmental impacts of hydroelectric dams (Section 8.2.5) would be the most prevalent types expected. Hydroelectric development in James Bay has been an important environmental dispute in Canada for quite some time, particularly in its impacts on native groups concerned with hunting, fishing, and gathering activities. Impacts of coal and nuclear plants would be expected to follow similar courses as in the United States, which are described in Sections 8.2.9 and 8.2.12, respectively.

Because Canada is engaged in substantial conservation efforts and has adequate generating capacity, it appears unlikely that a major power plant construction effort would have to be undertaken to meet expected American needs in the next 20 years. Similarly, transmission lines are in place within and between the two countries, and any construction of new lines should be a modest effort at best.

8.4 TERMINATION OF NUCLEAR POWER PLANT OPERATIONS AND DECOMMISSIONING

A nuclear power plant that ceases operations and closes permanently must go through a lengthy decommissioning process. In the process certain activities will occur that will have environmental consequences. This section summarizes the impacts of cessation of operations and beginning of decommissioning. The effect of the shutdown of operations is expected to be the same as that of a major scheduled outage, although the effect would be permanent and the loss of employment, local purchases, and most tax revenues would be permanent. All

nonradioactive emissions (both airborne and liquid) would cease, as would cooling system impacts, transportation of radioactive materials, and major economic activities. Decommissioning would involve the removal of nuclear components from service and the reduction of residual radioactivity to a level that would allow the eventual release of the property for unrestricted use. Decommissioning does not mean that the plant would be demolished and the site returned to an essentially greenfield status. Rather, decommissioning requires that a nuclear facility be secured in nonoperational storage for a specified period before the next step: dismantlement. The decommissioning methods and their environmental impacts are summarized in Chapter 7. A more detailed evaluation of decommissioning requirements is provided in NUREG-0586.

8.4.1 Land Use

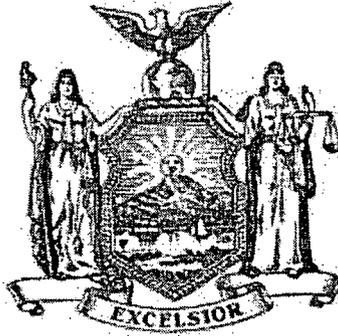
Neither terminating operations nor decommissioning is expected to have any immediate impacts on land use at a plant site, which would generally encompass 80-200 ha (200-500 acres). Because the ultimate objective of decommissioning is to release a site for unrestricted use, the activities that would occur at a site after the eventual completion of decommissioning and dismantlement of the plant would determine the subsequent land-use impacts. For example, it might be feasible to co-locate another power plant on a retired nuclear plant site provided safety requirements could be met and the site were large enough.

8.4.2 Air Quality

Only temporary, localized ambient air quality impacts result from nuclear plant

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Attachment 3**

STATE ENERGY PLANNING BOARD



2009 State Energy Plan
Volume I

GOVERNOR DAVID A. PATERSON

STATE OF NEW YORK

DECEMBER 2009

Initiatives by Energy Source

Electricity. The need for infrastructure to produce and deliver electricity is driven by end-use demand. From 1997 to 2007, New York's electricity sales increased 1.2 percent annually. Results of the Starting Point case, which assumed only reaching 27 percent of the '15 by 15' goal, show that from 2009 to 2018, electricity demand increases at an average rate of 0.8 percent per year, or a total increase of 7.3 percent. In dramatic contrast, results of the SEP Policy Reference case, based on full achievement of the '15 by 15' goal, show a reduction in demand over the planning period, as well as a reduction in output from New York's gas-fired combined cycle generating plants and a reduction in electricity imports.

In light of these benefits, the State has taken steps to fully fund electricity targeted efficiency programs in an effort to meet Governor Paterson's '15 by 15' goal. Achieving this goal will require the cooperative efforts of many different entities, including all State agencies and authorities.

Figure 3 projects energy use reductions by major program categories that will be needed to meet the '15 by 15' goal, assuming continuation of existing programs, implementation of new programs, and the contribution of enhanced codes and standards. The area marked as "Ratepayer Funded Programs" is the portion of the '15 by 15' goal to be met by new PSC-authorized programs to be administered primarily by utilities and NYSERDA. The other large wedge on the chart, "Codes and Standards," underscores the importance of enhancing efficiency standards for electrical equipment and appliances and for assuring compliance with the Energy Code – as discussed above. The ongoing programs of NYSERDA, as well as expanded programs by NYPA and LIPA, are projected to make up most of the balance. It is significant to note that even with the considerable achievements made to date in the State's end-user efficiency programs, achieving the '15 by 15' goal will require nearly a five-fold increase in annual energy savings by 2015.

Achieving the '15 by 15' policy goal is expected to reduce the net retail cost of electricity paid by all ratepayers by 2015.³⁸ Figure 4 and Figure 5 show the results of an analysis of the net impacts of the '15 by 15' policy on statewide average retail electricity prices in selected years. As shown in Figure 4, in 2015, the statewide average retail price of electricity is projected to be 0.4 to 0.9 cents per kilowatt hour (kWh) lower, on a net basis, than if the '15 by 15' policy were not implemented. Figure 5 indicates that this estimated reduction in net price per kWh is equivalent to aggregate annual bill savings to ratepayers

³⁸ Pursuing the '15 by 15' policy goal impacts average retail electricity prices in two opposing ways. First, the average retail price is expected to increase because the annual cost of implementing and administering energy efficiency programs is added to customer bills, while utility fixed costs will be spread across a smaller amount of energy sales. Second, the commodity portion of the electricity price is expected to decrease as a result of the price reduction effect of lower overall demand for electricity. Both types of price impacts affect all ratepayers, assuming that energy efficiency program costs are averaged across all customer classes and locations. This analysis does not include the additional bill savings that accrue to program participants who install energy-saving equipment and thereby benefit as a result of reduced volume of electricity purchased over time. The price reduction (or "market price effect") impact of achieving the '15 by 15' policy goal is extracted directly from Integrated Planning Model modeling results by comparing the Statewide average electricity prices in the SEP Policy Reference Case, which assumes full achievement of the '15 by 15' policy goal, to the Higher Demand Case, based on NYISO's econometric forecast, which includes no downward adjustments for implementation of the '15 by 15' policy goal. The lower average electricity prices in the SEP Policy Reference Case are directly attributable to achievement of the '15 by 15' policy goal, due to the reduction in the need for electricity generated by the most inefficient and expensive fossil fuel-fired units, as well as by reducing imports of electricity from outside New York. Because the annual costs to ratepayers of all the programs needed to achieve the '15 by 15' policy goal are not yet known with a high degree of certainty, "low" and "high" estimates are used to bound the analysis. The low estimate is based on a three-year historical average (2006 through 2008) of NYSERDA's energy efficiency programs funded through the System Benefits Charge. The high estimate assumes that the future cost of energy efficiency programs on a cents per kWh basis is double the cost of programs implemented to date. The expected system load reduction due to improved Codes and Standards is assumed to be achievable with no incremental cost to ratepayers.

RGGI program as well as financial incentives for the accelerated development of renewable energy technologies.⁶⁴

Government mandates, e.g., emissions cap and trade programs, renewable fuels standards and financial incentives, that are designed to reduce this disparity are sometimes criticized for having short-term impacts of raising the price of energy. These arguments, however, fail to consider the broader and longer-lasting economic benefits, in addition to environmental and energy security benefits, associated with the development of renewable resources. The direct economic benefits of renewable energy include the creation of short-term (engineering, design and construction) and long-term (administration, operation and maintenance) jobs, increased local capital investment, increased tax revenues for local governments, and increased revenue for landowners. Direct economic benefits lead to additional indirect economic benefits through the macroeconomic “ripple” effects of injecting incremental income into the State economy over the life of various projects, which may be 20 years or more.

As discussed in the next section, the potential exists for renewable energy to meet a large percentage of society’s energy needs, but achieving the full potential in the near-term given current economic and technical realities, would come at an extraordinary cost. As renewable energy programs are designed, targets that are designed to take advantage of the energy, environmental and economic development opportunities must also consider the cost of other resources that are available to meet short-term goals. Over time, the cost of deploying renewable technologies continues to decrease as demand for renewables grows and technologies become more advanced.

3.1.1 In-State Potential and Development Progress

New York’s renewable potential exists in all of the primary energy-consuming sectors of the economy: the electric generation sector, the transportation sector, the residential, commercial, and industrial sectors, and the agriculture sector. New York currently meets approximately 11 percent of its primary energy needs with renewable energy resources. However, the available technical/practical potential, which takes into consideration technical and some social constraints on the “pure” technical potential, but not economic constraints, indicates that approximately 40 percent of all New York’s energy needs over all sectors could be met with renewables by 2018.⁶⁵ This accounts for only hydropower, wind, biomass, and solar-PV resources. It does not include the potential of solar thermal, geothermal, and hydrokinetic energy sources. This “outer-bound” forecast leaves New York with substantial room to expand its use of renewable energy resources. This expansion could technically occur, but there would be a significant cost associated with the implementation of these resources. The solar and wind resources represent approximately 60 percent of the technical/practical potential and an even larger percentage of the overall cost. If the full technical/practical potential for solar and wind resources were installed at current prices, the cost to New York would be approximately \$300 billion dollars.⁶⁶

⁶⁴ RGGI requires electricity generators to purchase CO₂ allowances for every ton of CO₂ they emit. The price of these allowances is built into the marginal operating costs of the plant, and then passed on in their offering price. In this way, the harmful effects of carbon dioxide emissions are being partially accounted for in the price of electricity.

⁶⁵ Technical/practical potential includes consideration of manufacturing and materials limitations and land use constraints, e.g., the prohibition of the development of renewable energy projects in State parks, but does not consider economic costs, certain social constraints, or system operation, transmission, or distribution limitations.

⁶⁶ The \$300 billion dollar estimate is based on the following approximate installation cost assumptions: solar-PV costs \$8,000 per kW; onshore wind costs \$2,000 kW, and offshore costs \$3,300 per kW. The State incentive level required to drive the adoption of this technology would not need to equal the entire \$300 billion, but would be a significant percentage (as much as 1/3 depending on federal incentives). DOE has aggressive goals for solar-PV cost reductions. If solar-PV costs were to see rapid reductions to \$3,000 per kW, during the planning period, the total cost would amount to approximately \$150 billion dollars.

hold their own spent fuel on site. Care must be taken to help ensure that this spent fuel is securely held and any potential for harm to public health or the environment is minimized.¹⁰⁴ Going forward, nuclear power generation should be encouraged within New York where safety, security, and environmental conditions favor its deployment and operation, and retained where it can be demonstrated that the safety and security of its operation can be maintained and its adverse environmental impacts minimized.

At the same time, the State recognizes that there are safety, security and environmental impact concerns related to the two active reactors at Indian Point, located along the Hudson River in northern Westchester County. New York is opposing the license renewals of Indian Point Units 2 and 3, whose current 40-year license terms are set to expire in 2013 and 2015, respectively, due to significant safety and environmental impacts associated with their operation.¹⁰⁵ These concerns include the adequacy of the evacuation plan in the event of a sudden, fast moving radiological event in an area of high population density; the risk of a terrorist attack on the spent fuel pools, which are located in buildings adjacent to the containment structures; the impact of earthquakes on the integrity of the facility, the possibility of which are better analyzed with more modern geological methods than existed when the plants were first licensed; and the impact on aquatic life from the use of 2.5 billion gallons of Hudson River water each day which is used to cool the facility and then discharged back into the Hudson River at higher temperatures. These issues must be fully evaluated and addressed in order to protect the health and safety of the communities surrounding the plant.

From a reliability perspective, Indian Point currently provides voltage support and system capacity to help ensure there is sufficient energy to supply demand in the downstate load pocket. With the issuance of this Plan, the State has begun to identify the potential impacts associated with the possible closure of Indian Point and the infrastructure needs that would be necessary to maintain system reliability standards in that event. As discussed in more detail in the Energy Infrastructure Issue Brief, modeling indicates that the retirement of the Indian Point units may present tradeoffs, including higher electricity prices and CO₂ emissions, and that achieving the State's '15 by 15' energy efficiency target reduces, but does not eliminate, the need for replacement infrastructure in the vicinity of Indian Point. As assumed in the modeling, if '15 by 15' is achieved, one possible replacement option under these circumstances would be a 700 MW combined cycle, gas-fired generating plant connected directly to the Buchanan 345 kilovolt substation. Under the Starting Point case (which assumes only 27 percent of the '15 by 15' energy efficiency target is achieved) modeling shows a need for 1,800 MW of replacement power in the vicinity of Indian Point to maintain reliability. It is unclear, however, whether new natural gas pipeline capacity would be needed for such a facility. In addition, further study may be necessary to quantify the potential impacts of closing Indian Point on: (1) the ability to transfer power to downstate load areas; (2) the transfer capability of the transmission system into the area; (3) reactive power resources in the lower Hudson Valley; and (4) overall system reliability.

Under the relicensing schedule for the Indian Point units, it is anticipated that the earliest a decision could be made is the Spring of 2010, although this time frame could be significantly extended. If Indian Point is not relicensed, then the NYISO, the PSC, and involved utilities will need to engage in a process to develop various scenarios for replacement generation as well as associated transmission and pipeline infrastructure needs.

¹⁰⁴ The DOE Secretary of Energy, Dr. Chu, has noted that there may be alternatives to this national repository. However, at this time, DOS has not withdrawn its application from Nuclear Regulatory Commission.

¹⁰⁵ On December 3, 2007, the New York State Department of Environmental Conservation and Attorney General Andrew Cuomo filed a petition with the Nuclear Regulatory Commission that opposed relicensing. The petition is available at http://www.oag.state.ny.us/media_center/2007/dec/brief.pdf.

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Attachment 4**

Energy Infrastructure Issue Brief
New York State Energy Plan 2009

December 2009

infrastructure and equipment. The net costs and/or benefits to ratepayers of actual projects could be highly dependent on negotiated long-term contractual agreements among specific parties, other generation, transmission, and natural gas infrastructure that is built or retired (both in New York and in neighboring regions), and significant additions to energy supply (such as potential large-scale hydro projects in Canada). Additions to the State's transmission system, while perhaps not called for to meet reliability needs, may be prompted by the clean energy policy objectives outlined in the State Energy Plan.

Needs of New York City

As load grows in New York City, either new generation needs to be built in the City, or new transmission needs to be constructed. The New York City Economic Development Corporation commissioned a Master Transmission Plan for New York City to determine whether new transmission facilities into the area would: decrease the cost of electric service to New York City ratepayers and reduce the costs of electricity production statewide; improve the reliability of bulk power supply to New York City; reduce the City's electricity carbon footprint; and, ensure a fair, competitive market for electricity generation and transmission in the City. The study identified and evaluated the costs and benefits of various proposed and conceptual generation and transmission options that have the potential to meet New York City's energy needs. Overall, the projects evaluated did not show significant net benefits either by production cost or consumer benefit standards. The analysis found that new capacity will be required in New York City in 2019 to meet reliability requirements, and that a gas turbine combined-cycle would be the economically optimal solution to meet the need. In addition, in-city generation would serve other public policy objectives, such as providing economic development benefits in the form of construction jobs and tax revenues, and reducing emissions, particularly if combined with repowering of an older higher pollution emitting generator. The addition of transmission facilities upstate, e.g. from Leeds to Pleasant Valley, would provide consumer benefits in New York City, but would potentially raise prices upstate. Other in-city options, which include a controllable cable between New Jersey and New York City and offshore wind generation, also showed projected New York City consumer benefits and additional analysis will be conducted. A key finding of the study was that the fact that there is not an immediate reliability need for additional capacity. Therefore, decision makers have adequate time to decide which projects to move forward with. The study recommended, however, that New York City seek ways to encourage clean, efficient in-city generation, pursue policies that reduce energy consumption, and pursue joint planning studies within New York and neighboring regions.

2.7.5 Increasing Renewable Development, Deliverability Issues and System Impacts

New York is committed to increasing renewable generation resources. Although there are multiple renewable technologies being supported by State programs, wind resources are the fastest growing of those under development. Wind generation facilities can present certain issues for the electrical system and impacts on the infrastructure that must be addressed. Due to the limited predictability of wind power when compared with conventional power plants, adequate reserve and balancing power must be available, and the transmission system must be adequate to deliver all necessary resources to load.

In an effort to examine concerns regarding the integration of wind resources, a March 2005 study conducted on behalf of NYSERDA found that 3,300 MW of new wind resources could be incorporated into the existing grid with some adjustments to operations but without requiring upgrades to the bulk electric transmission system. The NYISO is in the process of performing a follow-up study on wind integration that will revisit the issues of the 2005 study, but it uses as a starting point the actual location and performance characteristics of the wind turbines that have been built to-date. The new NYISO study will estimate the potential impacts of levels of wind resources that significantly exceed the 3,300 MW

evaluated in the original study. The study will identify the level and location of constraints on the bulk system that could result from various levels of wind development based on projects currently in the NYISO's interconnection queue.

STARS, a statewide long-term (2018-2028) utility-sponsored study, will determine specific transmission upgrades that would support distribution of additional renewable energy throughout the State. NYSEG, RG&E and National Grid are analyzing their local transmission systems for the possibility of future congestion from the development of additional renewable generation. In addition, the PSC now requires an energy deliverability study for each individual renewable project designed to identify the amount of energy that can actually be delivered from the plant without impacting the output of other renewable resources. The results of these studies will provide information and inputs to developers and policymakers on the most beneficial sites to develop additional renewable resources and where transmission system upgrades would be effective.

In another analysis, the NYISO, using the base case developed for its 2009 RNA, modeled a scenario that decreased generation in the lower Hudson Valley and New York City by 1,500 MW and increased upstate generation by the same amount to simulate increased wind and/or hydro resources. Without any transmission upgrades, this change would result in a 2018 base case LOLE of 0.25 (loss of load for two and a half days in a 10-year period on average). If transmission capacity is increased into the lower Hudson Valley by about 800 MW, the expectation is reduced to the criteria of 0.10, i.e., improved to one day in 10 years, which is the minimum criterion for achieving a reliable system. This analysis provides further insight into the understanding that transmission additions may be needed to achieve the full benefits of renewable generation, depending on where the generation is located.

The potential benefits of expanding the PSC is RPS from a goal of 25 percent of New York's energy use by 2013 to a goal of 30 percent by 2015 were evaluated by modeling for this Plan. The modeling projects no discernable changes in the State's generation mix, net imports, CO₂ emissions, CO₂ allowance prices, and wholesale electricity prices when it is also assumed that the 15 by 15 program is implemented fully to yield a significant reduction in the 2015 expected load to which the 30 percent would apply. Again, as noted above, transmission additions may be required, depending on where renewable generation is located.

2.7.6 Plug-In Hybrid Electric Vehicles

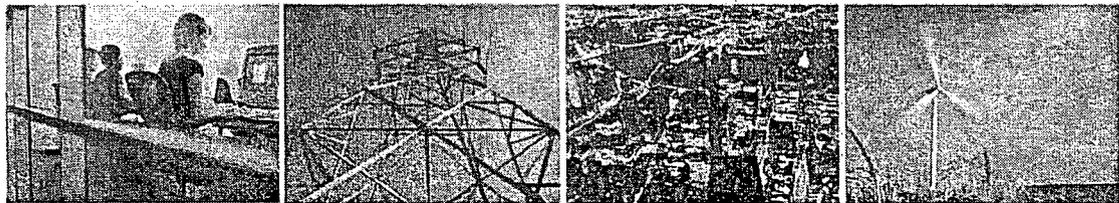
To address some of the pollution impacts of automobiles, hybrid (electricity and petroleum fuel) engine technologies have been introduced to the market, and their use is expanding. Although the hybrid vehicle engines in commercial use today primarily charge their batteries when the engine is running on petroleum fuels, other charging technologies are in development. One that could impact the electricity system and its infrastructure involves charging the vehicle batteries through a plug-in arrangement with the local electricity system. While use of grid electricity would impose an additional burden on the system, such use (charging) during off-peak periods would increase the capacity factors of some generators and improve the overall load factor (efficiency) of the system.

Modeling of plug-in hybrid electric vehicle penetration for the year 2018 (assuming one million units in operation by that date distributed throughout the State, with charging during off-peak periods) was performed for this Plan. The results indicate that the output and fuel use for all generation resources, other than nuclear and hydro facilities, increase slightly as would be expected. CO₂ emissions, emissions allowances, and wholesale electricity prices would also increase slightly. Overall, the impacts on the studied variables from penetration of plug-in hybrid vehicles appears relatively small, given the expected off-setting load reductions projected from achievement of the State's '15 by 15' energy efficiency program.

**Entergy Contention NYS-37
Attachment 5**



2010 Reliability Needs Assessment



New York Independent System Operator

FINAL REPORT

September 2010

Executive Summary

The 2010 Reliability Needs Assessment (RNA) commences the fifth cycle of the NYISO's reliability planning processes provided for in its Comprehensive System Planning Process (CSPP). The NYISO's CSPP encompasses the existing reliability planning processes with the new economic planning process called the Congestion Analysis and Resource Integration Study (CARIS). The RNA provides a long-range reliability assessment of both resource adequacy and transmission security of the New York bulk power system conducted over a 10-year planning horizon. This 2010 RNA builds upon the results and analyses contained in the NYISO's prior Comprehensive Reliability Plans (CRP) in 2005, 2007, 2008 and 2009 respectively. The first three CRPs responded to the Reliability Needs identified by their respective RNAs. The 2009 RNA, with the reduced forecast associated with energy efficiency peak load reductions, increased generation and increased demand response, identified no Reliability Needs. The fourth CRP indicated that the system was reliable and no solutions were necessary in response to the 2009 RNA.

The 2010 RNA identified no Reliability Need, assuming that all modeled transmission and generation facilities, including Indian Point, remain in service during the next 10 years from 2011 through 2020. The study of the Base Case indicates that the baseline system meets all applicable Reliability Criteria. However pending regulatory initiatives may affect Base Case facilities and could result in unanticipated retirement of capacity in New York. The NYISO will continue to monitor these developments and will conduct appropriate reliability studies as necessary.

There are three primary reasons this year's RNA continues to find no Reliability Needs for the next 10 years:

1. Generation additions – Two new proposed generating plants totaling 1060 MW located in Zone J are included in the 2010 RNA Base Case, but were not included in the previous RNAs.

2. Lower Energy Forecast – two factors contributed to this outcome:

The 2009 Recession – The effect of the 2009 recession was to reduce the peak demand forecast for 2011 by 1400 MW, before any energy efficiency adjustments. This also reduced the projections of peak load in subsequent years.

Statewide Energy Efficiency Programs (15 x 15) – This refers to the Governor's initiative to lower energy consumption on the electric system by 15% of the 2007 forecasted levels in 2015. Based on seven factors set forth in the 2010 RNA, the projected impact of these energy efficiency programs has increased from the 2009 RNA. The 2009 RNA included cumulative energy savings of 10,235 GWh by 2018. In the 2010 RNA, this value increased to 13,040 GWh by the year 2018 and to 13,684 GWh by the year 2020.

The 2010 RNA Base Case forecast reflects larger energy efficiency usage reductions than the preceding 2009 RNA Base Case forecast. Each of those base case forecasts was created by subtracting a projected energy efficiency impact from the respective current econometric forecast. For example, in the case of the 2009 RNA Base Case energy forecast for 2015, a projected 8086 GWh in energy savings were subtracted from the econometric forecast to reach the base case forecast. In the 2010 RNA, for the year 2015, a projected 9914 GWh were subtracted from the current econometric forecast.

3. Increased registration in Special Case Resource (SCR) – The NYISO continues to experience increases in the registration of the SCR programs that supply capacity resources to the system through the NYISO market. The NYISO has projected registrations of 2251 MW of SCRs, an increase of 167 MW of resources over the SCR levels included in the 2009 RNA Report.

The NYISO has conducted scenario analyses in order to test the robustness of the needs assessment studies and to bind the conditions under which resource adequacy or transmission security needs may arise. In some scenarios, violations of Reliability Criteria were identified; however, a scenario will not identify or propose additional Reliability Needs. Scenarios are variations on key assumptions in the RNA Base Case to assess the impact of possible changes in circumstances that could impact the RNA. The findings under the scenario conditions are:

1. The Econometric Forecast Scenario reveals that reliability violations would occur in 2019 and 2020 at the higher peak load levels which do not account for the projected energy efficiency reductions included in the Base Case.
2. The 45 x 15 Scenario (full 15 x 15 energy efficiency coupled with 30% renewables) demonstrates that LOLE levels, already low and well below 0.1 in the Base Case, would drop to essentially zero. This scenario used the same energy forecast used for the 2009 RNA 15 x 15 scenario for the year 2015 and beyond. This forecast did not reflect the impact of the current recession. The inclusion of the recession impact would have further reduced the LOLE.
3. Reliability violations would occur if the Indian Point Plant were to be retired at the latter of the two units' current license expiration dates using the Base Case load forecast assumptions. In addition to the LOLE violations, transmission analysis demonstrated thermal violations per applicable Reliability Criteria. Under stress conditions, the voltage performance on the system without Indian Point would be degraded. To relieve the transmission security violations, load relief measures will be required for Zones G through K. Further, utilizing the econometric forecast scenario, but if the Indian Point Energy Center units were to be retired, significantly higher LOLEs would result.

Table 4-9: Additional Proposed Renewable Projects

Queue	Developer	Project Name	POI	CTO	Zone	Rating (MW)	CRIS (MW)(1)	UNIT TYPE	Completed Class	Proposed In-Service
<u>Completed Class Year Facilities Study</u>										
119	ECOGEN, LLC	Prattsburgh Wind Farm	Eelpot Rd-Flat St. 115kV	NYSEG	C	78.2	78.2	Wind Turbines	2003-05	2010/Q3
147	NY Windpower, LLC	West Hill Windfarm	Oneida-Fenner 115kV	NM-NG	C	31.5	31.5	Wind Turbines	2006	N/A
156	PPM Energy/Atlantic Renewable	Fairfield Wind Project	Valley-Inghams 115kV	NM-NG	E	74.0	74.0	Wind Turbines	2006	2011/01
161	Marble River, LLC	Marble River Wind Farm	Willis-Plattsburgh WP-1 230kV	NYPA	D	84.0	84.0	Wind Turbines	2006	2011/10
166	AES-Acciona Energy NY, LLC	St. Lawrence Wind Farm	Lyme Substation 115kV	NM-NG	E	79.5	79.5	Wind Turbines	2007	2012/09
171	Marble River, LLC	Marble River II Wind Farm	Willis-Plattsburgh WP-2 230kV	NYPA	D	132.3	132.3	Wind Turbines	2006	2011/10
182	Howard Wind, LLC	Howard Wind	Bennett-Bath 115kV	NYSEG	C	62.5	62.5	Wind Turbines	2007	2010/12
186	Jordanville Wind, LLC	Jordanville Wind	Porter-Rotterdam 230kV	NM-NG	E	80.0	80.0	Wind Turbines	2006	2011/12
197	PPM Roaring Brook, LLC/PPM	Tug Hill	Boonville-Lowville 115kV	NM-NG	E	78.0	0.0	Wind Turbines	2008	2011/09
207	BP Alternative Energy NA, Inc.	Cape Vincent	Rockledge Substation 115kV	NM-NG	E	210.0	0.0	Wind Turbines	2008	2012/12
213	Noble Environmental Power, LLC	Ellenburg II Windfield	Willis-Plattsburgh WP-2 230kV	NYPA	D	21.0	21.0	Wind Turbines	2007	2011/10
<u>Class 2009 Projects</u>										
222	Noble Environmental Power, LLC	Ball Hill	Dunkirk-Gardenville 230kV	NM-NG	A	90.0	TBD	Wind Turbines	CY09 in progress	2011/12
<u>Class 2010 Projects</u>										
237	Allegany Wind, LLC	Allegany Wind	Homer Hill - Dugan Rd. 115kV	NM-NG	A	72.5	TBD	Wind Turbines	CY10 in progress	2011/10
254	Ripley-Westfield Wind, LLC	Ripley-Westfield Wind	Ripley - Dunkirk 230kV	NM-NG	A	124.8	TBD	Wind Turbines	CY10 in progress	2011/12
263	Stony Creek Wind Farm, LLC	Stony Creek Wind Farm	Stolle Rd - Meyer 230kV	NYSEG	C	88.5	TBD	Wind Turbines	CY10 in progress	2010/12
330	BP Solar	Upton Solar Farms	Brookhaven 8ER 69kV Substation	LIPA	K	32.0	TBD	Solar	CY10 in progress	2010/09-2011/09
<u>Other Non-Class Generators</u>										
180A	Green Power	Cody Road	Fenner - Cortland 115kV	NM-NG	C	10.0	10.0	Wind Turbines	N/A	2010/10
204A	Duer's Patent Project, LLC	Beekmantown Windfarm	Kent Falls-Sciota 115kV	NYSEG	D	19.5	19.5	Wind Turbines	N/A	N/A
Overall Total						1368.3				

4.3.2. Indian Point Plant Retirement Scenario

Reliability violations of the NYS Reliability Council and NPCC resource adequacy criteria would occur if the Indian Point Plant were to be retired at the latter of the current license expiration dates using the Base Case load forecast assumptions. In this 2016 scenario, LOLE was 0.14 days/year, a violation of the 0.1 days/year criterion, which is an unacceptable probability of a load shedding occurrence. Beyond 2016, due to annual load growth, the LOLE continues to escalate for the remainder of the Study Period reaching an LOLE of 0.38 days/year in 2020. In addition to the LOLE violations, a transmission analysis was

performed and demonstrated thermal violations per applicable Reliability Criteria. Furthermore, under stress conditions, the voltage performance on the system without the Indian Point Plant would be degraded. In all cases, power flows replacing the Indian Point generation cause increased reactive power losses in addition to the loss of the reactive output from the plant. It would be necessary to take emergency operations measures, including load relief,¹⁰ to eliminate the transmission security violations in Southeastern New York.

The Indian Point Plant has two base-load units (2060 MW) located in Zone H in Southeastern New York, an area of the State that is subject to transmission constraints that limit transfers in that area. As indicated in the Base Case analysis, there are no reliability violations if the two units remain in operation. Southeastern New York, however, with the Indian Point Plant in service, currently relies on transfers to augment existing capacity, and loads in this area, and across the state, are forecasted to continue to grow.

Transfer limit analysis was performed with both Indian Point units out-of-service (i.e. beginning 2016), and it was assumed all other generation capacity in Zones G through I would be fully dispatched, supporting Southeastern New York load. The analysis shows that, under typical load conditions, the ability to transfer power to Zone J and Zone K would be limited by the upstream UPNY-SENY interface, before reaching the UPNY-ConEd interface limits. Even with all of the remaining generating capacity in Zones G, H, and I fully dispatched, the UPNY-ConEd and I to J and K interface facilities would not be loaded to either their voltage or thermal limits. The difference in interface loading would be approximately 2000 MW if the Indian Point Plant were to be retired.

As shown in Table 4-10 below with both units out of service in 2016, the reliability criterion for resource adequacy is violated with an LOLE of 0.14 days/year. Thereafter, the LOLE continues to escalate for the remainder of the Study Period reaching an LOLE of 0.38 days/year in 2020 which substantially exceeds the reliability criterion of 0.1 days/year.

¹⁰ According to the NYISO Emergency Operations Manual, Load Relief Capability is described as including measures such as: voltage reduction, load shedding, and other curtailment measures such as interruptible customers and public appeals.

Table 4-10: Indian Point Plant Nuclear Retirement Scenario

Area/Year	2016	2017	2018	2019	2020
AREA_A					
AREA_B					
AREA_C					
AREA_D					
AREA_E					
AREA_F					
AREA_G	0.05	0.06	0.08	0.13	0.17
AREA_H	0.12	0.15	0.20	0.29	0.38
AREA_I	0.12	0.17	0.23	0.33	0.41
AREA_J	0.10	0.14	0.19	0.28	0.38
AREA_K	0.01	0.00	0.00	0.00	0.01
NYCA	0.14	0.19	0.26	0.36	0.38

The 2009 RNA reported an LOLE of 2.41 for the year 2016 as noted in Table 4-12 compared to 0.14 noted above in Table 4-10. This significant difference is primarily due to the combination of the lower load and the generation additions included in the 2010 RNA as compared to the 2009 RNA as shown in Table 4-11.

Table 4-11: Comparison of Year 2016 Peak Load and Capacity

Year	2009 RNA Year 2016	2010 RNA Year 2016	Delta
Peak Load			
NYCA	35,258	34,193	-1065
Zone J	12,787	12,120	-667
Zone K	5374	5554	180
Resources			
NYCA			
Capacity	40,452	41,239	787
SCR	2084	2180	96
Total	42,536	43,419	883
Res./Load Ratio	120.6%	127.0%	6.3%
Zone J			
Capacity	9206	10,332	1126
SCR	622	586	-36
Total	9828	10918	1091
Res./Load Ratio	76.9%	90.1%	13.2%
Zone K			
Capacity	6368	6311	-57
SCR	216	193	-23
Total	6584	6504	-80
Res./Load Ratio	122.5%	117.1%	-5.4%

To further illustrate the impact that the peak load and capacity differences have on this scenario results, additional sensitivity analyses on year 2016 were performed as described below and shown in Table 4-12 below:

1. Utilizing the 2009 RNA database with the peak load data and capacity data from the 2010 RNA database results in the NYCA LOLE being reduced from 2.41 (as reported in the 2009 RNA) to 0.11 for 2016.
2. Utilizing the 2010 RNA database with the peak load data from the 2009 RNA results in the NYCA LOLE increasing from 0.14 to 0.60 for 2016.
3. Utilizing the 2010 RNA database with the capacity additions of Astoria Energy II (550MW) and Bayonne Energy (513MW) units removed, results in the NYCA LOLE increasing from 0.14 to 0.94 for 2016.

4. Utilizing the 2010 RNA database with both the peak load data from the 2009 RNA and with the Astoria Energy II (550MW) and Bayonne Energy (513MW) units removed results in the NYCA LOLE increasing from 0.14 to 3.11 for 2016.

Table 4-12: Effects on LOLE for 2016 without Indian Point Units 2 and 3

RNA Year	RNA Base Case Results	with 2010 Load and Capacity	with 2009 Load and Capacity	without Astoria II and Bayonne	without Astoria II and Bayonne and with 2009 Load projections
2009	2.41	0.11	2.41	2.41	2.41
2010	0.14	0.14	0.6	0.94	3.11

This illustrates that when the peak load and capacity values are aligned, the results between the two RNA models are more consistent. This also illustrates that it is the combination of both the lower energy forecast and the capacity additions in Zone J in the 2010 RNA that leads to changes in results from the 2009 RNA.

Utilizing the econometric forecast with the Indian Point units retired results in a NYCA LOLE of 0.98 in 2016 and 3.34 in 2020.

4.3.3. Zonal Capacity at Risk

Given that the LOLE of the Base Case conditions did not exceed 0.10 for the 10-year study period, additional analysis was performed to determine the reduction in capacity which would cause the LOLE to exceed 0.10. The eleven zones, A through K comprising the NYCA were aggregated A-F, G-I, J, and K. The overall capacity in these zonal aggregates was derated in increments of 250 MW until the NYCA LOLE exceeded 0.10. The NYISO did not model the potential impacts within zones or superzones. Therefore no internal transmission problems were evaluated. The results do not indicate whether or not the transmission system could support some or all of the capacity derates nor does it indicate whether even a single generating unit can be removed without violating transmission system security. Transmission security analyses would need to be performed for any contemplated unit shutdown to avoid transmission security violations.

In separate studies, the levels of capacity removed in those zones for 2020 without violating NYCA LOLE are: Zone J at 1000 MW, or Zone K at 1000 MW, or Zones G-I at 1000 MW total. These capacities cannot be removed simultaneously. For Zones A-F, the individual zone reductions ranged from 250 – 2500 MW, indicating that the amount of

6.2. Scenarios

The NYISO conducted analyses of scenarios to determine whether, and under what conditions, shifts in resources, peak load levels or public policy programs would give rise to Reliability Needs. Under certain scenarios there were Reliability Criteria violations identified which would need to be addressed if those scenarios materialized.

6.2.1. Econometric Forecast.

The NYISO evaluated resource adequacy needs against the 2010 econometric load forecast in the Gold Book, which does not include the projected effect of the statewide energy efficiency programs. Because the peak load would be approximately 2,510 MW higher in 2020 than in the RNA Base Case forecast, there would be a need for additional resources in 2019 and 2020 in the absence of the statewide energy efficiency programs.

6.2.2. 45 x 15 Scenario

The 45 x 15 Scenario models the State's clean energy policy goal to serve 30% of the state's energy needs with new renewable resources and to reduce energy usage in 2015 by 15%. While the full 15 x 15 energy reduction goal was modeled, the total of renewable generation built since 2003 plus renewable generation that is completed or is currently part of the NYISO Class Year Facilities Study, only added up to 59% of the renewable resource goal. Nevertheless, in combination with the energy efficiency programs, this was sufficient to demonstrate an LOLE of 0.0 for this scenario.

6.2.3. Indian Point Plant Retirement Scenario

Reliability violations would occur if the Indian Point Plant were to be retired at the latter of the current license expiration dates using the Base Case load forecast assumptions. In addition to the LOLE violations, transmission analysis demonstrated thermal violations per applicable Reliability Criteria. Under stress conditions, the voltage performance on the system without Indian Point would be degraded. To relieve the transmission security violations, load relief measures will be required for Zones G through K. Because these results appear to be different from the higher LOLE results from the 2009 RNA for this scenario, this report showed the effect of the lower peak loads and additional generating capacity as applied to the 2009 RNA Base Case. The results showed that the 2009 and 2010 results are very similar once adjustments are made to more closely align for the assumptions for the peak load forecast and generation.

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**UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION**

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of)	Docket Nos. 50-247-LR and
ENTERGY NUCLEAR OPERATIONS, INC.)	50-286-LR
(Indian Point Nuclear Generating Units 2 and 3))	
	March 7, 2011

**APPLICANT’S ANSWER TO NEW YORK STATE’S AMENDED CONTENTION 12C
CONCERNING SEVERE ACCIDENT MITIGATION ALTERNATIVES ANALYSIS**

I. INTRODUCTION

Pursuant to 10 C.F.R. § 2.309(h)(1) and the Atomic Safety and Licensing Board’s (“Board’s”) July 1, 2010, Scheduling Order, Entergy Nuclear Operations, Inc. (“Entergy”) submits this Answer to New York State (“NYS”) Contention 12C (“NYS-12C”), filed on February 3, 2011.¹ This proceeding concerns Entergy’s license renewal application (“LRA”) for Indian Point Units 2 and 3 (“IP2” and “IP3”), also known as the Indian Point Energy Center (“IPEC”).

NYS-12C seeks to update previously-admitted and consolidated contentions, NYS-12, 12A and 12B, which relate to Entergy’s severe accident mitigation alternatives (“SAMA”) analysis for IP2 and IP3. Collectively, these contentions allege that Entergy’s Environmental Report (“ER”), the U.S. Nuclear Regulatory Commission (“NRC”) Staff’s Draft Supplemental

¹ See State of New York Contention 12-C Concerning NRC Staff’s December 2010 Final Environmental Impact Statement and the Underestimation of Decontamination and Clean Up Costs Associated with a Severe Reactor Accident in the New York Metropolitan Area (Feb. 3, 2011) (“Amended Contention NYS-12C”). See also State of New York’s Motion for Leave to File [Amended Contention NYS-12C] (Feb. 3, 2011).

Environmental Impact Statement (“DSEIS”),² and Entergy’s December 2009 Revised SAMA Analysis failed to address purported deficiencies in assumptions and inputs to modeling related to clean-up and decontamination costs in the event of a severe accident at IPEC.³ NYS-12C also challenges, for the first time, related analysis contained in the NRC Staff’s December 2010 Final SEIS (“FSEIS”),⁴ specifically the discussion contained in Appendix G, Section G.2.3 (Review of Issues Related to NYS Contentions 12 and 16) of the FSEIS. NYS, as supported by its proffered expert, Mr. David Chanin, contends that the FSEIS does not meaningfully address previously-alleged deficiencies in the ER, DSEIS, and SAMA Reanalysis⁵ or provide a rational basis for the NRC’s record of decision relative to severe accident decontamination costs and mitigation alternatives.⁶

As set forth below, Entergy does not oppose NYS’s characterization of NYS-12C as an “update” to NYS-12/12A/12B, or NYS’s incorporation by reference of supporting evidence previously identified by NYS in support of those contentions. However, Entergy opposes the

² NUREG-1437, Supp. 38, *Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Regarding Indian Point Nuclear Generating Unit Nos. 2 and 3, Draft Report for Comment* (Dec. 2008) (“DSEIS”), available at ADAMS Accession Nos. ML083540594, ML083540614.

³ See *Entergy Nuclear Operations, Inc.* (Indian Point, Units 2 and 3), LBP-08-13, 68 NRC 43, 102 (2008) (admitting NYS-12); Licensing Board Order (Ruling on New York State’s New and Amended Contentions) at 3-4 (June 16, 2009) (unpublished) (“June 16, 2009 Board Order”) (admitting and consolidating NYS-12A with NYS-12); LBP-10-13, 71 NRC ___, slip op. at 9-10 (June 30, 2010) (admitting and consolidating NYS-12B with NYS-12/12A).

⁴ NUREG-1437, Supp. 38, *Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Regarding Indian Point Nuclear Generating Units Nos. 2 and 3, Final Report, Vol. 1, Main Report and Comments Responses* (Dec. 2010) (“FSEIS”), available at ADAMS Accession Nos. ML103350405, ML103350438, ML103360209, ML103360212, ML103350442.

⁵ See Letter from Fred Dacimo, Entergy, to NRC, “License Renewal Application - SAMA Reanalysis Using Alternate Meteorological Data” (Dec. 11, 2009) (“NL-09-165” or “Revised SAMA Analysis”), available at ADAMS Accession No. ML093580089

⁶ Amended Contention NYS-12C at 1. See also David I. Chanin, *Errors and Omissions in NRC Staff’s Economic Cost Estimates of Severe Accident Mitigation Alternatives Contained in December 2010 Indian Point Final Supplemental Environmental Impact Statement (FSEIS)*, NUREG-1437, Supplement 38 (Feb. 3, 2011) (“Chanin Report”) (report accompanying Amended Contention NYS-12C).

admission of NYS-12C insofar as it presents new challenges to the FSEIS and does not meet the admissibility criteria of 10 C.F.R. § 2.309(f)(1)(v) and (vi).

In summary, while NYS has presented an expert report in support of the contention, that report suffers from major technical and factual flaws that fatally undermine its adequacy as an alleged source of support for the contention. Specifically, NYS's expert relies heavily on technical papers concerning the economic costs of "rad/nuc" attacks using nuclear weapons or "dirty" bombs, but fails to adequately demonstrate that those papers have any direct nexus to SAMA analysis, particularly the manner in which decontamination or cleanup costs of a *nuclear power plant* severe accident are estimated. Furthermore, by seeking to artificially inflate Entergy's decontamination cost estimates by as much as a factor of 20, NYS and its expert fundamentally misconstrue the nature and purpose of NRC-required SAMA analysis, which is intended to provide mean estimated values for predicted total population dose and predicted off-site economic costs, to allow a *reasonable* assessment of mitigation measures for beyond-design-basis severe accidents.

II. PROCEDURAL HISTORY

On November 30, 2007, NYS filed a petition for leave to intervene in this proceeding.⁷ One of its proposed contentions, NYS-12, alleged that Entergy's SAMA's analysis was deficient because the cost formula contained in version 2 of the MELCOR Accident Consequence Code System ("MACCS2") computer program used by Entergy calculates decontamination and clean-up costs based on large-sized particles and, therefore, underestimates severe accident costs.⁸ Specifically, NYS-12 alleged that a severe accident resulting in the dispersion of radionuclides

⁷ See New York State Notice of Intention to Participate and Petition to Intervene (Nov. 30, 2007) ("NYS Petition"), available at ADAMS Accession No. ML073400187.

⁸ NYS Petition at 140-45.

from a nuclear power plant likely will result in the dispersion of small-sized radionuclide particles that are significantly more expensive to remove and clean up than the large-sized radionuclide particles allegedly assumed in the MACCS2 model.⁹ NYS-12 further asserted that the SAMA analysis should incorporate the analytical framework contained in a 1996 Sandia National Laboratories (“Sandia”) study concerning site restoration costs associated with a plutonium-dispersal accident as well as two other studies examining the purported economic consequences of a terrorist attack and spent fuel pool fire at Indian Point.¹⁰

In July 2008, the Board admitted NYS-12 to the extent that it challenged the cost data for decontamination and clean-up used by MACCS2; *i.e.*, whether specific inputs and assumptions made in MACCS2 SAMA analyses are correct for the area surrounding Indian Point.¹¹

On December 22, 2008, the Staff issued its DSEIS, in which it evaluated the site-specific environmental impacts of license renewal for IP2 and IP3. Thereafter, in February 2009, NYS filed amended contentions in response to the DSEIS, including NYS-12A as an “update” to NYS-12.¹² The Board admitted NYS-12A and consolidated it with NYS-12 on June 16, 2009.¹³

In December 2009, Entergy submitted a Revised SAMA Analysis that corrected wind direction inputs in MACCS2 and re-analyzed the SAMAs for IP2 and IP3. Thereafter, NYS filed NYS-12B, in which it sought to “reassert” admitted contention NYS-12/12A as applicable

⁹ See *id.* at 141.

¹⁰ *Id.* at 141-42 (citing D. Chanin and W. Murfin, *Site Restoration: Estimation of Attributable Costs from Plutonium-Dispersal Accidents*, SAND96-0957, *Unlimited Release*, UC-502 (May 1996) (“Site Restoration Study”), Entergy Contention NYS-12C Att. 1; Jan Beyea, Edwin Lyman, and Frank von Hippel, *Damages from a Major Release of Cs into the Atmosphere of the United States*, 12 *Science and Global Security* 125-36 (2004); Edwin Lyman, Union of Concerned Scientists *Chernobyl on the Hudson? The Health and Economic Impacts of a Terrorist Attack at the Indian Point Nuclear Power Plant* (Sept. 2004)).

¹¹ *Indian Point*, LBP-08-13, 68 NRC at 102.

¹² State of New York Contentions Concerning NRC Staff’s Draft Supplemental Environmental Impact Statement (Feb. 27, 2009) (“NYS DSEIS Contentions”), available at ADAMS Accession No. ML090690303.

¹³ See June 16, 2009 Board Order at 9-13.

to the Revised SAMA Analysis.¹⁴ On June 30, 2010, the Board admitted NYS-12B as an adjunct to NYS-12/12A consolidated it with NYS-12/12A.¹⁵

On December 3, 2010, the Staff issued its FSEIS. As discussed further below, the Staff revised Appendix G to the FSEIS to include new section G.2.3 (Review of Issues Related to NYS Contentions 12 and 16). Therein, the Staff, with technical assistance from its contractor Sandia National Laboratories (“Sandia”), responded to the issues raised in NYS-12/12A/12B and NYS-16/16A/16B.¹⁶ The Staff concluded that Entergy’s decontamination cost estimates are reasonable and acceptable, and consistent with the estimates used in SAMA analyses performed for other nuclear power plants and previously accepted by the NRC.¹⁷

On February 3, 2011, pursuant to the Board’s Order dated December 27, 2010, NYS submitted NYS-12C. As stated therein, NYS-12C seeks to “update” consolidated contentions NYS-12/12A/12B in response to the Staff’s issuance of the FSEIS.¹⁸ NYS-12C also seeks to challenge the discussion contained in Section G.2.3 of the FSEIS as it applies to those contentions.¹⁹ In particular, NYS argues that the FSEIS is inadequate because it (1) accepts and applies cost data for moderate decontamination efforts in lieu of cost data for heavy contamination events, and (2) fails to “scale up” the 1996 *Site Restoration Study*

¹⁴ See State of New York’s New and Amended Contentions Concerning the December 2009 Reanalysis of Severe Accident Mitigation Alternatives Reanalysis (Mar. 11, 2010), *available at* ADAMS Accession No. ML100780366; State of New York’s Motion for Leave to File New and Amended Contentions Concerning the December 2009 Reanalysis of Severe Accident Mitigation Alternatives (Mar. 11, 2010), *available at* ADAMS Accession No. ML100780366.

¹⁵ See *Indian Point*, LBP-10-13, slip op. at 10.

¹⁶ See FSEIS, Vol. 3, App. G at G-22 to G-29.

¹⁷ See *id.* at G-24.

¹⁸ Amended Contention NYS-12C at 1.

¹⁹ See *id.* at 1-2.

decontamination cost data, which allegedly are based on the population density of Albuquerque, New Mexico to a “hyper-density” urban area such as New York City.²⁰

III. BACKGROUND

A. Regulatory Background

The NRC’s GEIS²¹ provides an evaluation of severe accident impacts that applies to all U.S. nuclear power plants.²² A severe accident is defined as a beyond-design-basis accident that could result in substantial damage to the reactor core, whether or not there are serious off-site consequences.²³ Severe accidents are thus events whose probability of occurrence is so low that they are excluded from the spectrum of design-basis accidents postulated for a plant by the Commission’s regulations.²⁴ Based on the GEIS evaluation, 10 C.F.R. Part 51 concludes that “[t]he probability weighted consequences of atmospheric releases, fallout onto open bodies of water, releases to ground water, and societal and economic impacts from severe accidents are *small for all plants*.”²⁵ The NRC has noted that the GEIS analyses represent plant-specific estimates of the impacts from severe accidents that would generally over-predict, rather than under-predict, environmental consequences.²⁶ Thus, “NRC SAMA analyses are not a substitute for, and do not represent, the NRC NEPA analysis of potential impacts of severe accidents.”²⁷

²⁰ See *id.* at 7.

²¹ NUREG-1437, Generic Environmental Impact Statement for License Renewal of Nuclear Plants (May 1996) (“GEIS”) (Entergy Contention NYS-12C Att. 2), available at ADAMS Accession Nos. ML040690705, ML040690720, ML040690738.

²² See *Entergy Nuclear Generation Co. (Pilgrim Nuclear Power Station)*, CLI-10-11, 71 NRC ___, slip op. at 37-38 (Mar. 25, 2010); GEIS at 5-114 to 5-116.

²³ FSEIS, Vol. 1 at 5-3.

²⁴ See *id.* at 5-2 to 5-3, 5-11.

²⁵ 10 C.F.R. Part 51, Subpart A, App. B, Table B-1 (Postulated Accidents; Severe Accidents) (emphasis added).

²⁶ Final Rule, Environmental Review for Renewal of Nuclear Power Plant Operating Licenses, 61 Fed. Reg. 28,467, 28,480 (June 5, 1996).

²⁷ *Pilgrim*, CLI-10-11, slip op. at 37.

Nonetheless, Part 51 states that if the Staff has not previously considered SAMAs for a license renewal applicant's plant in an EIS or in an environmental assessment, then the applicant must complete an evaluation of alternatives that may mitigate severe accidents.²⁸ The purpose of a SAMA analysis is to identify potential changes to a nuclear power plant, or its operations, that (1) could further reduce the already very low risk of severe reactor accident scenarios postulated in the GEIS, and (2) may be cost-beneficial to implement.²⁹

The Nuclear Energy Institute ("NEI") has issued a guidance document, NEI 05-01, Revision A, to assist NRC license renewal applicants in preparing SAMA analyses.³⁰ The Staff has approved and recommended the use of NEI 05-01 by license renewal applicants.³¹ NEI 05-01 states that the MACCS2 code, which the Commission recently described as "the most current, established code for NRC SAMA analysis,"³² may be used to calculate the off-site consequences of a severe accident, and provides guidance on the input data.³³

²⁸ 10 C.F.R. § 51.53(e)(3)(ii)(L). *See also id.* Part 51, Subpart A, App. B, Table B-1.

²⁹ *See Pilgrim*, CLI-10-11, slip op. at 3.

³⁰ *See* NEI 05-01, Severe Accident Mitigation Alternatives (SAMA) Analysis, Guidance Document, at i (Rev. A, Nov. 2005) ("NEI 05-01") (Entergy Contention NYS-12C Att. 3), *available at* ADAMS Accession No. ML060530203.

³¹ *See* Final License Renewal Interim Staff Guidance LR-ISG-2006-03: Staff Guidance for Preparing Severe Accident Mitigation Alternatives Analyses (Aug. 2007) ("LR-ISG-2006-03") (Entergy Contention NYS-12C Att. 4), *available at* ADAMS Accession No. ML071640133. *See also* Notice of Availability of the Final License Renewal Interim Staff Guidance LR-ISG-2006-03, Staff Guidance for Preparing Severe Accident Mitigation Alternatives Analyses, 72 Fed. Reg. 45,466 (Aug. 14, 2007).

³² *Entergy Nuclear Generation Co.* (Pilgrim Nuclear Power Station), CLI-10-22, 72 NRC ___, slip op. at 9 (Aug. 27, 2010). *See also* *Entergy Nuclear Generation Co.* (Pilgrim Nuclear Power Station), LBP-07-13, 66 NRC 131, 142 (2007) (stating that the MACCS2 code "has been widely used and accepted as an appropriate tool in a large number" of SAMA analyses).

³³ *See* NEI-05-01, at 13. *See also Pilgrim*, CLI-10-11, slip op. at 4 ("NRC guidance documents conclude that the MACCS2 code (a version of the MELCOR Accident Consequence Code System code) is acceptable for performing SAMA analyses, and NRC licensees commonly use the MACCS2 code for performing SAMA analyses.").

B. Technical Background

Entergy relied on the NRC-endorsed guidance in NEI 05-01 in preparing the IPEC SAMA analysis and, in accordance with that guidance, used MACCS2 to calculate the offsite consequences. MACCS2 is divided into three primary modules—ATMOS, EARLY, and CHRONC—and supports dispersion and transport on a radial-polar grid (16 compass sectors over a 50-mile radius).³⁴ Plant-specific input to MACCS2 includes the source terms for each release category and the reactor core radionuclide inventory, site-specific meteorological data, projected population distribution, emergency planning data, and economic data.³⁵

ATMOS performs all calculations pertaining to atmospheric transport, dispersion, and deposition of radioactive material, and to radioactive decay of that material both before and after its release into the atmosphere.³⁶ It calculates air and ground concentrations, plume size, and timing information for all plume segments as a function of downwind distance.³⁷ The results of the ATMOS calculations are used by the other MACCS2 modules. Specifically, EARLY and CHRONC use radioactivity concentrations calculated by ATMOS and other inputs (*e.g.*, population) to calculate consequences due to radiation exposure in the emergency phase (first seven days from the time of release), and the long-term doses due to exposure after the emergency phase (beginning at the end of the seven-day emergency phase and extending to 30 years post-release), respectively.³⁸

³⁴ See NUREG/CR-6613, SAND97-0594, *Vol. 1, Code Manual for MACCS2, User's Guide* at 2-1, 2-3 (May 1998) ("MACCS2 User's Guide") (Entergy Contention NYS-12C Att. 5), available at ADAMS Accession No. ML110030976.

³⁵ See *id.* at 2-1 to 2-3.

³⁶ See *id.* at 2-2.

³⁷ See *id.*

³⁸ See *id.*

Relevant here, CHRONC also calculates the economic impacts from each accident sequence.³⁹ Chapter 7.0 (CHRONC Input File) of the *MACCS2 User's Guide* provides information regarding the MACCS2 economic consequences model.⁴⁰ As stated therein, economic costs calculated by the CHRONC module of MACCS2 include:

- Food, lodging, lost income associated with evacuation and relocation (including those incurred in early, or plume-passage phase);
- Losses associated with crop and property destruction, and value of crops not grown because they would be contaminated by root uptake;
- Decontamination labor and materials for decontaminating and repairing land and buildings;
- Loss of building/land/produce use and any corresponding lost return on investment and depreciation associated with decontamination/interdiction; and
- Value of condemned land and improvements.⁴¹

MACCS2 provides results in terms of offsite population dose and offsite economic cost that are used to compute the offsite risk measures; *i.e.*, population dose risk ("PDR") expressed in units of person-rem/year,⁴² and offsite economic cost risk ("OECR") expressed in dollars/year.⁴³ Thus, the primary results developed by MACCS2 for use in the SAMA analysis are two values: (1) the population dose and (2) the economic impacts. These two values

³⁹ See *id.* at 6-41, 7-1.

⁴⁰ See *id.* at 7-9 to 7-14, 7-48 to 7-52.

⁴¹ See *id.*; see also NEI 05-01 at 13-14. The MACCS2 code will invoke user-specified condemnation if dose criteria are not met following decontamination/interdiction efforts. With respect to loss of use and return on property, as part of interdiction, costs the MACCS2 code provides for (1) a depreciation rate on property improvements to account for loss of value, of buildings and other structures, and (2) an expected rate of return from land, building, equipment, etc. See *MACCS2 User's Guide* at 7-13.

⁴² A "rem" is a unit of radiation dose and "person" refers to the number of people exposed to the particular amount of rem. These two factors are multiplied to obtain the population dose in person-rem. Under NRC practice, for a particular weather sequence, SAMA analysis calculates the total population dose, the sum of the estimated dose commitments to populations located in all the sectors on a spatial grid-map out to a defined distance (usually 50 miles) from the plant. See *Pilgrim*, CLI-10-11, slip op. at 22 n.88, 38-39.

⁴³ See *id.* at 22 & n.86.

represent the *mean cumulative impacts* from postulated severe accidents (*i.e.*, dose or economic costs) to all individuals and land within a 50-mile radius of the plant.⁴⁴

C. Summary of FSEIS Section G.2.3 Discussion Relevant to NYS-12/12A/12B

As noted above, the Staff substantially augmented Appendix G to the FSEIS with new technical analysis in Section G.2.3 that directly responds to the allegations made in NYS-12/12A/12B.⁴⁵ Importantly, the Staff emphasized that it does *not* consider the methodology for clean-up of a nuclear weapons accident relevant to the clean-up that would be necessary following a nuclear power plant severe accident.⁴⁶ Nonetheless, the Staff asked Sandia, an NRC technical contractor, to review the inputs and assumptions regarding particle size distribution and decontamination costs used in the IPEC SAMA analysis, and to perform a comparison of the decontamination cost factors derived from Sandia's *Site Restoration Study* cited by NYS to those used in the IPEC SAMA analysis.⁴⁷ According to the FSEIS, the approach used by Sandia included identifying basic considerations of each type of accident (*e.g.*, contaminants, half life of contaminants, and health and safety considerations), identifying the decontamination methods required, and comparing the *Site Restoration Study* cost values (as applied to the urban area of New York City) to those used in Entergy's SAMA analysis.⁴⁸

Based upon this evaluation, the Staff and Sandia provided the following key observations and conclusions:

⁴⁴ *See id.* at 38-39.

⁴⁵ *See* FSEIS, Vol. 3, App. G at G-22 to G-24.

⁴⁶ *See id.* at G-23.

⁴⁷ *See id.* The FSEIS states that the NRC Staff and Sandia performed a comprehensive review of relevant documents and references, including the ER, the draft SEIS, the MACCS2 input decks for Indian Point and associated documentation, the NYS contentions and supporting documents and references, the Board's rulings on the contentions, and other relevant filings in the adjudicatory proceeding. *See id.* at G-22.

⁴⁸ *See id.* at G-23.

- The MACCS2 dispersion model does not assume that the dispersion will consist of large-sized radionuclide particles. In the MACCS2 input files, Entergy used a dry deposition velocity value of 0.01 meters per second (m/s) for all aerosol particles. This corresponds to a 5 to 10-micron radius particle (*i.e.*, small particle based on NYS's definition),⁴⁹ based on gravitational settling of small spheres in dilute laminar flow fields.⁵⁰
- The primary constituent in weapons grade plutonium, Pu239, is an alpha emitter, whereas the primary contaminant from a nuclear power plant accident, Cs137, is a gamma emitter. Pu239 is more difficult and expensive to characterize and verify in the field than gamma emitters like Cs137. In addition, Pu239 is primarily an inhalation hazard with half-life of 24,000 years, whereas Cs137 is primarily an external health hazard with half-life of about 30 years. The need for evacuating the public is much greater with plutonium because, if inhaled, the health consequences can be severe.⁵¹
- The *Site Restoration Study* provides cost estimates for remediation of light contamination (decontamination factor or "DF" = 2 to 5), moderate contamination (DF = 5 to 10), and heavy contamination (DF > 10). Appendix F of the *Site Restoration Study* describes the decontamination methods for light, moderate, and heavy contamination by plutonium. In view of the decontamination activities described in the *Site Restoration Study* and the differences in health hazards posed by Pu239 and Cs137, the activities required to support clean-up of moderate plutonium contamination align more closely with clean-up activities for heavy cesium contamination. Thus, Sandia performed a comparison of decontamination cost values on this basis.⁵²
- In the MACCS2 input files, Entergy used decontamination cost parameters that were typically higher than the MACCS2 "Sample Problem A" values by a factor of 1.7. As described in the ER, the values were obtained by adjusting the generic "Sample Problem A" economic data with the consumer price index of 195.3, which accounts for inflation between 1986 and 2005. Farm and nonfarm values for IPEC were based on site-specific data and were not extrapolated from Sample Problem A.⁵³
- The decontamination cost from the *Site Restoration Study* (\$14,900 per person) is not significantly different than the value used by Entergy in the SAMA analysis (\$13,824 per person). Even if the *Site Restoration Study* values were escalated to 2005 dollars, as were the values used in the SAMA analysis, the difference would be greater, but still would be within a factor of about 2.⁵⁴

⁴⁹ NYS defines large-sized particles as ranging in size from "tens to hundreds of microns" and defines small particles as ranging in size from "a fraction of a micron to a few microns." Amended Contention 12C at 10. See also FSEIS, Vol. 3, App. G at G-23.

⁵⁰ See FSEIS, Vol. 3, App. G at G-23.

⁵¹ See *id.*

⁵² See *id.* at G-24.

⁵³ See *id.* at G-23.

⁵⁴ See *id.* at G-24.

- Considering the uncertainties inherent in such predictions, Entergy's decontamination cost estimates appear reasonable, acceptable, and consistent with the estimates used in prior NRC-approved SAMA analyses for other nuclear power plants.⁵⁵

IV. APPLICABLE LEGAL STANDARDS

A. Legal Standards Governing Admission of New and Amended NEPA Contentions

1. Timeliness Criteria

NYS-12C is a NEPA contention filed in response to a new NRC Staff NEPA document, the FSEIS. The requirements for determining the timeliness of such a new NEPA contention are set forth in 10 C.F.R. § 2.309(f)(2). That regulation states that “[o]n issues arising under the National Environmental Policy Act, the petitioner shall file contentions based on the applicant's environmental report.”⁵⁶ Section 2.309(f)(2) further provides, however, that a petitioner “may amend those contentions or file new contentions if there are data or conclusions in the NRC draft or final environmental impact statement, . . . or any supplements relating thereto, that differ significantly from the data or conclusions in the applicant's documents.”⁵⁷

If an intervenor fails to show that the FSEIS contains new data or conclusions that differ significantly from those in the ER or DSEIS, then the intervenor may file amended or new contentions “only with leave of the presiding officer” upon a showing that all of the following criteria are met: (1) the information upon which the amended or new contention is based was not previously available; (2) the information upon which the amended or new contention is based is materially different than information previously available; and (3) the amended or new

⁵⁵ *Id.*

⁵⁶ 10 C.F.R. § 2.309(f)(2).

⁵⁷ *Id.*

contention has been submitted in a timely fashion based on the availability of the subsequent information.⁵⁸

If an intervenor cannot satisfy the criteria of 10 C.F.R. § 2.309(f)(2), then a contention is considered nontimely, and the intervenor must successfully address the late-filing criteria in Section 2.309(c)(1)(i)-(viii).⁵⁹ The first factor identified in that regulation, whether “good cause” exists for the failure to file on time, is entitled to the most weight.⁶⁰ Without good cause, a “petitioner’s demonstration on the other factors must be particularly strong.”⁶¹

2. Substantive Admissibility Criteria

A proposed contention also must satisfy, without exception, each of the criteria set out in 10 C.F.R. § 2.309(f)(1)(i) through (vi).⁶² Failure to meet each of the criteria is grounds for dismissal of a proposed new or amended contention.⁶³ Among other things, the petitioner must demonstrate that the issue raised in the contention is within the scope of the proceeding, is material to the findings the NRC must make to support the action that is involved in the proceeding, and provide sufficient information to show that a genuine dispute exists on a

⁵⁸ *Id.* § 2.309(f)(2)(i)-(iii). However, a new contention is not an occasion to raise additional arguments that could have been raised previously. *See Duke Energy Corp.* (McGuire Nuclear Station, Units 1 & 2; Catawba Nuclear Station, Units 1 & 2), CLI-02-28, 56 NRC 373, 385-86 (2002).

⁵⁹ *See* Scheduling Order at 5-6 (July 1, 2010); 10 C.F.R. § 2.309(c)(2) (“The requestor/petitioner shall address the factors in paragraphs (c)(1)(i) through (c)(1)(viii) of this section in its nontimely filing.”).

⁶⁰ *See New Jersey* (Dep’t of Law & Pub. Safety’s Requests Dated Oct. 8, 1993), CLI-93-25, 38 NRC 289, 296 (1993).

⁶¹ *Tex. Utils. Elec. Co.* (Comanche Peak Steam Elec. Station, Units 1 & 2), CLI-92-12, 36 NRC 62, 73 (1992) (quoting *Duke Power Co.* (Perkins Nuclear Station, Units 1, 2, & 3), ALAB-431, 6 NRC 460, 462 (1977)).

⁶² *S.C. Elec. & Gas Co.* (Virgil C. Summer Nuclear Station, Units 2 & 3), LBP-10-6, slip op. at 3 (Mar. 17, 2010).

⁶³ *See* Changes to Adjudicatory Process, 69 Fed. Reg. at 2221. *See also Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), CLI-99-10, 49 NRC 318, 325 (1999).

material issue of law or fact.⁶⁴ A dispute is material only if its resolution would make a difference in the outcome of the licensing proceeding.⁶⁵

In view of NYS's specific allegations in NYS-12C, several key points warrant emphasis here. First, with respect to factual information or expert opinion proffered in support of a contention, the Board is not to accept uncritically the assertion that a document or other factual information or an expert opinion supplies the basis for a contention.⁶⁶ Any supporting material provided by a petitioner or its expert, including those portions thereof not relied upon, is subject to scrutiny, "both for what it does and does not show."⁶⁷ Thus, a licensing board should examine documents to confirm that they support the proposed contentions.⁶⁸ A petitioner's imprecise reading or characterization of a document cannot be the basis for a litigable contention.⁶⁹

Second, an allegation that some aspect of the Staff's analysis is inadequate does not establish a genuine dispute unless it is supported by facts and a reasoned statement of why the analysis is unacceptable in some *material* respect.⁷⁰ In this regard, a petitioner must demonstrate that the challenged "analysis fails to meet a statutory or regulatory requirement."⁷¹ As this Board

⁶⁴ See 10 C.F.R. § 2.309(f)(1)(iii), (iv), (vi).

⁶⁵ See *Summer*, LBP-10-6, slip op. at 4 (*Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2 & 3), CLI-99-11, 49 NRC 328, 333-34 (1999)).

⁶⁶ *Private Fuel Storage, L.L.C.* (Indep. Spent Fuel Storage Installation), LBP-98-7, 47 NRC 142, 181, *aff'd*, CLI-98-13, 48 NRC 26 (1998).

⁶⁷ See *Yankee Atomic Elec. Co.* (Yankee Nuclear Power Station), LBP-96-2, 43 NRC 61, 90, *rev'd in part on other grounds*, CLI-96-7, 43 NRC 235 (1996).

⁶⁸ See *Vt. Yankee Nuclear Power Corp.* (Vt. Yankee Nuclear Power Station), ALAB-919, 30 NRC 29, 48 (1989), *vacated in part on other grounds and remanded*, CLI-90-4, 31 NRC 333 (1990).

⁶⁹ *Ga. Inst. of Tech.* (Ga. Tech Research Reactor, Atlanta, Ga.), LBP-95-6, 41 NRC 281, 300, *aff'd*, CLI-95-12, 42 NRC 111 (1995).

⁷⁰ See *Fla. Power & Light Co.* (Turkey Point Nuclear Generating Plant, Units 3 & 4), LBP-90-16, 31 NRC 509, 521, 521 n.12 (1990).

⁷¹ *Indian Point*, LBP-08-13, 68 NRC at 187.

observed: “Presentation of an alternative analysis is, without more, insufficient to support a contention alleging that the original analysis failed to meet applicable requirements.”⁷²

B. Controlling NEPA Principles

SAMA analysis is a NEPA-derived requirement.⁷³ Therefore, SAMA analyses must be “bounded by some notion of feasibility.”⁷⁴ Although NEPA does not necessarily foreclose an agency’s duty to consider remote but potentially severe impacts,⁷⁵ it “grounds the duty in evaluation of scientific opinion rather than in the framework of a conjectural ‘worst case analysis.’”⁷⁶ NEPA’s intent is to generate information and discussion on those consequences of greatest concern to the public and of greatest relevance to the agency’s decision rather than distorting the decisionmaking process by overemphasizing highly speculative harms.⁷⁷ As such, an “EIS need only furnish such information as appears to be reasonably necessary under the circumstances for evaluation of the project.”⁷⁸

Although NEPA requires that an EIS contain reasoned scientific explanations that are based on complete and accurate information, federal agencies have the discretion to determine how this mandate is met.⁷⁹ An agency “is entrusted with the responsibility of considering the

⁷² *Id.*

⁷³ *Duke Energy Corp.* (McGuire Nuclear Station, Units 1 & 2; Catawba Nuclear Station, Units 1 & 2), CLI-03-17, 58 NRC 419, 431 (2003) (quoting *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 352 (1989)) (internal quotation marks omitted).

⁷⁴ *Duke Energy Corp.* (McGuire Nuclear Station, Units 1 & 2; Catawba Nuclear Station, Units 1 & 2), CLI-02-17, 56 NRC 1, 12 (2002) (quoting *Vt. Yankee Nuclear Power Corp. v. Natural Res. Def. Council, Inc.*, 435 U.S. 519, 551 (1978)) (applying NEPA’s rule of reason and rejecting proposed SAMA contention for failure to provide “any notion of cost”).

⁷⁵ *See Robertson*, 490 U.S. at 354-56.

⁷⁶ *Id.* at 354-55 (citation omitted).

⁷⁷ *Id.* at 356 (citation omitted).

⁷⁸ *Lee v. U.S. Air Force*, 354 F.3d 1229, 1245 (10th Cir. 2004)

⁷⁹ *Sierra Club v. U.S. Dep’t of Transp.*, 753 F.2d 120, 128 (D.C. Cir. 1985) (citing *Ethyl Corp. v. EPA*, 541 F.2d 1, 12 & n. 16 (D.C. Cir.), *cert. denied*, 426 U.S. 941 (1976)).

various modes of scientific evaluation and theory and choosing the one appropriate for the given circumstances.”⁸⁰ The requisite “hard look” does not require adherence to a particular analytic protocol.⁸¹ Rather, the specific methodology appropriate in a given circumstance will depend on the variable factors peculiar to that case.⁸² Furthermore, “[w]hen specialists express conflicting views, an agency must have discretion to rely on the reasonable opinions of its own qualified experts.”⁸³ Courts generally will not “second-guess” methodological choices made by an agency in its area of expertise.⁸⁴

V. ARGUMENT

A. Entergy Does Not Oppose the Admission of the NYS-12C Insofar As It Simply Reasserts Previously-Admitted Challenges to the ER and DSEIS

NYS states that its new contention “updates” previously-admitted and consolidated contentions NYS-12/12A/12B. Entergy does not oppose NYS’s characterization of NYS-12C as an “update” to NYS-12/12A/12B, or NYS’s incorporation by reference of supporting evidence *previously* identified by NYS in support of NYS-12/12A/12B.⁸⁵ However, Entergy does not

⁸⁰ *Id.* at 129.

⁸¹ *Ass’n of Pub. Agency Customers, Inc. v. Bonneville Power Admin.*, 126 F.3d 1158, 1188 (9th Cir. 1997).

⁸² *Id.*

⁸³ *Pac. Gas & Elec. Co. (Diablo Canyon Power Plant Indep. Spent Fuel Storage Installation)*, CLI-08-26, 68 NRC 509, 518 (2008) (quoting *Marsh v. Or. Natural Res. Council*, 490 U.S. 360, 378 (1989)).

⁸⁴ See *Marsh*, 490 U.S. at 376, 378 (“When specialists express conflicting views, an agency must have discretion to rely on the reasonable opinions of its own qualified experts”); *Browning-Ferris Indus., Inc. v. Muszynski*, 899 F.2d 151, 160 (2d Cir. 1990) (“Courts should be particularly reluctant to second-guess agency choices involving scientific disputes that are in the agency’s province of expertise.”). See also *Salmon River Concerned Citizens v. Robertson*, 32 F.3d 1346, 1359 (9th Cir. 1994) (citation omitted) (“NEPA does not require that we decide whether an [EIS] is based on the best scientific methodology available, nor does NEPA require us to resolve disagreements among various scientists as to methodology”); *City of Carmel-By-The-Sea v. U.S. Dep’t of Transp.*, 123 F.3d 1142, 1151 (9th Cir. 1997) (stating that NEPA does not require “unanimity of opinion, expert or otherwise”).

⁸⁵ See *Indian Point*, LBP-10-13, slip op. at 10 (noting Entergy’s lack of opposition to the admission of NYS-12B “to the degree New York is relying on the same analytic framework that the Board accepted in admitting NYS-12/12A.”).

waive its prior arguments opposing the admissibility NYS-12/12A/12B and, for the reasons stated below, opposes the admission of NYS-12C insofar as it challenges the FSEIS.

B. Entergy Opposes the Admission of NYS-12C Because It Does Not Meet Each of the Admissibility Criteria in 10 C.F.R. § 2.309(f)(1)

1. NYS-12C Lacks an Adequate Factual Basis Because the Opinion of NYS's Expert is Not Fully and Adequately Supported By the Referenced Documents

In challenging the analysis contained in Section G.2.3 of the FSEIS, NYS and Mr. Chanin rely heavily on the following technical papers:⁸⁶

- R.E. Luna, H.R. Yoshimura, and M.S. Soo Hoo, *Survey of Costs Arising from Potential Radionuclide Scattering Events*, WM2008 Conference (Feb. 2008) ("Luna Paper");⁸⁷
- Reichmuth, et al., *Economic Consequences of a Rad/Nuc Attack: Cleanup Standards Significantly Affect Cost*, Proceedings of Working Together R&D Partnerships in Homeland Security, Boston, MA (Apr. 2005) (Pacific Northwest National Laboratory, PNNL-SA-45256) ("Reichmuth Paper");⁸⁸ and
- OECD Nuclear Energy Agency, *Pathway Parameter Evaluation, A Survey Conducted by an OECD/NEA Group of Experts* (July 1987) (Committee on the Safety of Nuclear Installations, CSNI 87-139) ("CSNI 87-139").⁸⁹

Notwithstanding its own failure to previously cite these studies (the most recent of which is dated February 2008) in admitted contentions NYS-12/12A/12B,⁹⁰ NYS accuses the Staff of ignoring these reports, which NYS claims support its position that the *Site Restoration Study*

⁸⁶ See Amended Contention NYS-12C at 6-7, 9-15; Chanin Report at 3-9, 12.

⁸⁷ Entergy Contention NYS-12C Att. 6, available at <http://www.energy.ca.gov/nuclear/yucca/documents/AG-155-2007-005295.pdf>.

⁸⁸ Entergy Contention NYS-12C Att. 7, available at http://www.nuclearfiles.org/menu/key-issues/nuclear-weapons/issues/effects/PDFs/economic_consequences_report.pdf.

⁸⁹ Entergy Contention NYS-12C Att. 8, available at <http://www.oecd-nea.org/nsd/docs/1987/csni87-139.pdf>.

⁹⁰ Entergy does not oppose NYS-12C on timeliness grounds, insofar as that contention seeks to challenge the new discussion contained in Section G.2.3 of the FSEIS. However, Entergy does not waive any arguments or objections that might exist relative to the timeliness of NYS's reliance on the Luna Paper, Reichmuth Paper, and CSNI 87-139 as support for its contention. The most recent of these documents, the Luna Paper, was published in February 2008. It appears that NYS could have identified these documents as supporting references for its contention as early as February 2009, when it filed NYS-12A in response to the DSEIS.

“analytical framework” can be applied to the IPEC SAMA analysis.⁹¹ Closer review of these documents, however, casts serious doubt on this claim and the relevance of the cited studies to Entergy’s SAMA analysis.

This represents a critical and fatal flaw in NYS-12C and the Chanin Report, particularly in view of the Commission’s recent ruling in the *Pilgrim* license renewal proceeding. There, the Commission considered a similar “economic costs” claim made by the *Pilgrim* intervenor, which also cited the *Site Restoration Study* in support of its contention.⁹² The Commission found that the intervenor had failed to “demonstrate a *supported* genuine material issue—bearing on the overall SAMA cost-benefit results—for these new economic cost analysis claims.”⁹³ Directly relevant here, the Commission pointed out Pilgrim Watch’s failure to identify a “direct connection” between the *Site Restoration Study* and the applicant’s SAMA cost-benefit results:⁹⁴

Repeatedly, as we examined Pilgrim Watch’s evidence (when it had any) on economic costs, we could not discern any *direct connection* to the Pilgrim SAMA cost-benefit results. For example, as support for a claim that clean-up costs are underestimated, Pilgrim Watch cites to a page in a Sandia National Laboratories report. *See, e.g.*, Petition for Review at 18; Pilgrim Watch Initial Brief at 12 (citing to SAND96-0957, “Site Restoration: Estimation of Attributable Costs from Plutonium-Dispersion Accidents” (May 1996)) But the cited page merely states that after the Chernobyl accident it became recognized that decontamination of urban areas and particularly porous surfaces can be very difficult, although the acknowledged difficulties of the Chernobyl clean-up may largely have been due to poor training, lack of equipment, and a nearly complete break-down in leadership. Pilgrim Watch provided no specific argument of error in the SAMA cost-benefit analysis calculations or conclusions. Merely citing to pages in diverse reports *without any additional explanation or other*

⁹¹ See Amended Contention NYS-12C at 1, 12; Chanin Report at 1, 3.

⁹² See *Pilgrim*, CLI-10-11, slip op. at 29-31.

⁹³ *Id.* at 31.

⁹⁴ *Id.* n.21.

*obvious link to the SAMA analysis is insufficient to raise a genuine material dispute for hearing.*⁹⁵

The Commission's statements in *Pilgrim* apply here too insofar as NYS and its expert fail to adequately explain how the newly-cited studies on which they rely are relevant, if at all, to the nature and purpose of Entergy's SAMA analysis.

First, the Luna Paper states that it reviews "several of the more important efforts to estimate the costs of remediation or razing and reconstruction of radioactively contaminated areas" that have been contaminated by radiological dispersal devices ("RDDs") or "dirty bombs."⁹⁶ Mr. Chanin makes a significant omission when he fails to explain how accidents involving nuclear weapons or deliberate attacks using RDDs are relevant to an NRC-required SAMA analysis using the MACCS2 code, which the Commission still considers to be "the most current, established code for NRC SAMA analysis."⁹⁷

For example, Mr. Chanin makes no attempt to compare the specific fission product source terms or source-term release fractions associated with a nuclear power plant severe accident (including those at IPEC) and the energetic release caused by detonation of an RDD. Instead, he states only that RDDs "could" release the same types of fission products as those released in reactor accidents, because Cs-137 is a "possible source" for a dirty bomb because it is commonly used in commercial irradiator facilities and cancer treatment machines.⁹⁸ Thus, Mr. Chanin leaves the Board and parties to speculate about whether and to what extent the fission

⁹⁵ *Id.* (emphasis added).

⁹⁶ Luna Paper at 1, 6.

⁹⁷ *Pilgrim*, CLI-10-22, slip op. at 9.

⁹⁸ Chanin Report at 5-6.

product product source terms and release characteristics of an unknown and undefined RDD would resemble those of a postulated severe accident at IP2 or IP3.⁹⁹

In addition, there clearly would be significant differences in the manner in which radiological material is released and dispersed into the atmosphere during a severe accident at IPEC (some 35 miles away from New York City) and an RDD explosion in the middle of Manhattan.¹⁰⁰ Mr. Chanin completely fails to address this obvious disparity and makes no attempt to bridge the gap through any sound scientific explanation.

NYS's and Mr. Chanin's reliance on the other studies cited above is similarly misplaced and perplexing. The 2005 Reichmuth Paper—on which the Luna Paper relies—discusses the economic consequences of a “rad/nuc” attack; *i.e.*, “the detonation, atmospheric dispersion, and deposition of the fallout from the *weapon*.”¹⁰¹ As noted above, the fission product source terms and plume dispersal mechanisms associated with such events (*i.e.*, nuclear weapon or dirty bomb attacks) would differ significantly from those associated with a nuclear power plant severe accident.¹⁰² NYS ignores this obvious fact. Therefore, the Reichmuth Paper, whose relevance to

⁹⁹ See *USEC, Inc. (Am. Centrifuge Plant)*, CLI-06-10, 63 NRC 451, 472 (2006) (emphasis added) (*quoting Private Fuel Storage*, LBP-98-7, 47 NRC at 181) (stating that an “expert opinion that merely states a conclusion . . . without providing a *reasoned basis or explanation* for that conclusion is inadequate because it deprives the Board of the ability to make the necessary, reflective assessment of the opinion” alleged to provide a basis for the contention).

¹⁰⁰ Indeed, the *Site Restoration Study* states: “The area contaminated in any specific hypothetical accident scenario would need to be estimated by calculations involving scenario-specific parameter values for the amount of material at risk, initial cloud size and thermal buoyancy, particle size distribution, ambient meteorology, and surrounding terrain characteristics, all of which are outside the scope of the present study.” *Site Restoration Study* at 2-2.

¹⁰¹ Reichmuth Paper at 1 (emphasis added).

¹⁰² Additionally, one of the two major sources of economic data examined in the Reichmuth Paper is a Federal Reserve Bank of New York (“FRBNY”) study of the economic effects of the 9/11 terrorist attack on New York City, entitled “Measuring the Effects of the September 11 Attack on New York City” (Nov. 2002). See Reichmuth Paper at 5-7. Notably, the Reichmuth Paper explicitly states that the world Trade Center site is not representative of New York City in general or any other major population center in the United States because of the unique and very high value buildings that stood on this site, and that the replacement value reported in the FRBNY study is therefore likely to be much higher than would be expected for the average high density urban area. *Id.* at 7.

a nuclear power plant severe accident is unclear and left entirely unexplained by NYS and Mr. Chanin, does not provide adequate support NYS-12C.¹⁰³

The third paper largely relied on by NYS and Mr. Chanin, CSNI 87-139, also fails to lend any support to the admissibility of NYS-12C as a challenge to the FSEIS. Mr. Chanin claims that, like the *Site Restoration Study*, CSNI 87-139 indicates that achieving DFs greater than 10 in both farm and non-farm areas would require the demolition of all structures, the removal and disposal of all the rubble, scraping of the remaining surface soil until the selected clean-up level was reached, and disposal of all rubble and scraped soil as radioactive waste.¹⁰⁴ Again, Mr. Chanin makes no attempt to explain why such assumptions would be reasonable or appropriate for New York City or its metropolitan area in the event of a severe accident at IPEC. He also neglects to mention that CSNI 87-139, which is nearly 25 years old, is based on information and data that preceded the Chernobyl accident and thus does not account for any lessons learned from the associated clean-up effort.¹⁰⁵

In summary, NYS has failed to provide adequate support for the admission of NYS-12C insofar as it challenges the FSEIS.¹⁰⁶ The Chanin Report, on its face, suffers from technical and factual flaws that fatally undermine its adequacy as an alleged source of support for the contention. As explained above, careful review of the Chanin Report and the principal technical papers cited therein make clear that the studies on which NYS and Mr. Chanin rely have no

¹⁰³ *Private Fuel Storage*, LBP-98-7, 47 NRC at 180 (stating that a petitioner must set forth “the necessary technical analysis to show why the proffered bases support its contention.”).

¹⁰⁴ *See* Chanin Report at 10.

¹⁰⁵ *See* CSNI 87-139, at i, 1-2.

¹⁰⁶ *See* 10 C.F.R. § 2.309(f)(1)(v).

“obvious link” to SAMA analysis,¹⁰⁷ much less provide “conclusive proof” that Entergy or the NRC have grossly underestimated decontamination or clean-up costs of a severe accident.¹⁰⁸

2. NYS and Mr. Chanin Fail to Directly Controvert Key Portions of the FSEIS Section G.2.3 Related to Clean-up and Decontamination Costs

NYS-12C also is inadmissible because it does not establish a genuine dispute on a material issue of law or fact by directly controverting relevant portions of the Staff’s analysis in Section G.2.3 of the FSEIS.¹⁰⁹

First, the central premise of NYS’s contention is that a nuclear power plant severe accident will likely result in the dispersion of “small-sized” radionuclide particles that are significantly more expensive to remove and clean up than large-sized radionuclide particles.¹¹⁰ Again, NYS merely presupposes some similarity or nexus between the plutonium dispersal accidents discussed in the *Site Restoration Study* and a severe accident at IPEC. In any case, as noted above, based on the dry deposition velocity value Entergy input into MACCS2, the particle size used in the IPEC SAMA analysis was “small”—by NYS’s own definition—and consistent with accepted SAMA analyses performed for other nuclear power plants.¹¹¹ Notably, NYS and Mr. Chanin do not dispute or refute this conclusion by Sandia and the Staff.

Second, the FSEIS states that, in performing its assessment, Sandia considered the half lives and health and safety considerations associated with cesium and plutonium.¹¹² Sandia indicated that Pu239 is more difficult and expensive to characterize and verify in the field than

¹⁰⁷ *Pilgrim*, CLI-10-11, slip op. at 31 n.21.

¹⁰⁸ Chanin Report at 8.

¹⁰⁹ See 10 C.F.R. § 2.309(f)(1)(vi).

¹¹⁰ Amended Contention 12C at 4-6, 8, 10; Chanin Report at 10-12.

¹¹¹ See FSEIS, Vol. 3, App. G at G-23.

¹¹² See *id.*

gamma emitters like Cs137.¹¹³ Mr. Chanin merely claims, without providing adequate substantive support, that the FSEIS's reference to site characterization "is a red herring since site characterization is a relatively small portion of the overall cost of a remediation project."¹¹⁴ Sandia concluded that Pu239 is primarily an inhalation hazard with half-life of 24,000 years, whereas Cs137 is primarily an external health hazard with half-life of about 30 years, and that the need for evacuating the public is much greater with plutonium because, if inhaled, the health consequences can be severe.¹¹⁵ Mr. Chanin does not directly dispute this conclusion, but instead pursues red herrings of his own by focusing on asserted differences in the solubilities of Pu239 and Cs137 in the environment.¹¹⁶

Third, the FSEIS states that, to further simplify the cost analysis and provide a comparison of the highest cost areas, the cost comparison was performed only for New York City, which includes five counties (the Bronx, Kings, New York, Queens, and Richmond).¹¹⁷ The FSEIS states that the population density of New York City is about 12,000 persons/km.²¹¹⁸ Mr. Chanin asserts that the Staff relies on cleanup cost estimates for a city with 1,344 person/sq-km and made no adjustment to account for the population characteristics of NYC, with its assumed population density of 12,000 persons/sq-km², an underestimation by a multiplication factor of 8.93.¹¹⁹ However, he provides no adequate technical basis for the conclusion that the application of a multiplier of 8.93 is warranted in these circumstances; *i.e.*, no explicit

¹¹³ *See id.*

¹¹⁴ Chanin Report at 13.

¹¹⁵ FSEIS, Vol. 3, App. G at G-23.

¹¹⁶ *See* Chanin Report at 14.

¹¹⁷ FSEIS, Vol. 3, App. G at G-24.

¹¹⁸ *Id.*

¹¹⁹ *See* Chanin Report at 3, 16.

explanation of the apparently assumed one-to-one correlation between population density and decontamination costs, as those parameters are discussed in the *Site Restoration Study*.¹²⁰

Fourth, in asserting that the SAMA analysis should incorporate the region's property values, NYS and Mr. Chanin ignore the contents of the FSEIS. Section G.2.3 states that farm and nonfarm values for Indian Point were based on site-specific data.¹²¹ The discussion on page G-21 of the FSEIS provides additional details on the manner in which Entergy obtained economic cost data and adjusted that data for inflation using the consumer price index for the year 2005.¹²²

Finally, as a legal matter, NYS and Mr. Chanin misconstrue the very nature and purpose of an NRC-required SAMA analysis. As the Commission recently emphasized, SAMA analysis is neither a worst-case nor a best-case impacts analysis.¹²³ Rather, “[i]t is NRC practice to utilize the mean values of the consequence distributions for each postulated release scenario or category—the mean estimated value for predicted total population dose *and predicted off-site economic costs*.”¹²⁴ Plainly, using the data and assumptions advocated by Mr. Chanin—which relate to plutonium weapons and RDD dispersal events and purportedly would increase Entergy's decontamination cost estimate by as much as a multiplication factor of 20—would transform Entergy's SAMA analysis into precisely the type of “worst-case” analysis that U.S.

¹²⁰ Indeed, the 1996 *Site Restoration Study* relied on by NYS indicates that cost estimates will depend on the size of the affected area, which is a function of many variables, including the masses of material at risk, accident phenomenology, release fractions, accident location, local terrain, and meteorological conditions. *Site Restoration Study* at 7-1 to 7-2. That study further states that in modeling the dispersion and deposition occurring in urban areas, analysts are urged to consider the influence of meteorological phenomena to avoid *overestimating* accident costs. *Id.* at 7-2. The *Site Restoration Study* cautions that “[r]eaders are thus urged to critically evaluate the applicability of our estimates to the application at hand.” *Id.* at 6-1.

¹²¹ FSEIS, Vol. 3, App. G at G-23.

¹²² *See id.* at G-21.

¹²³ *Pilgrim*, CLI-10-11, slip op. at 38.

¹²⁴ *Id.* at 38-39.

Supreme Court precedent and federal regulations make clear are not required by NEPA. The NRC Staff's good faith attempt to reasonably apply the "analytical framework" of the *Site Restoration Study* (despite its dubious relevance) to the IPEC SAMA analysis is adequate under NEPA, especially in view of the agency's discretion to rely on the reasonable opinions of its qualified experts.¹²⁵

VI. CONCLUSION

For the reasons set forth above, Entergy does not oppose re-designation of NYS-12/12A/12B as NYS-12C in view of the Staff's issuance of the FSEIS. However, Entergy opposes the admission of NYS-12C insofar as it raises new challenges based on the FSEIS, because it does not meet the requirements of 10 C.F.R. § 2.309(f)(1)(v) and (vi).

¹²⁵ See *Diablo Canyon*, CLI-08-26, 68 NRC at 518.

CERTIFICATION OF COUNSEL UNDER 10 C.F.R. § 2.323(b)

Counsel for Entergy certifies that he has made a sincere effort to make himself available to listen and respond to the moving parties, and to resolve the factual and legal issues raised in the motion, and that his efforts to resolve the issues have been unsuccessful.

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COUNSEL FOR ENTERGY NUCLEAR
OPERATIONS, INC.

Dated in Washington, D.C.
this 7th day of March 2011

LIST OF ENERGENCY CONTENTION NYS-12C ATTACHMENTS

Attachment	No.
D. Chanin and W. Murfin, Site Restoration: Estimation of Attributable Costs from Plutonium-Dispersal Accidents, SAND96-0957, Unlimited Release, <i>UC-502</i> (May 1996) (excerpts).....	1
NUREG-1437, Generic Environmental Impact Statement for License Renewal of Nuclear Plants (May 1996) (excerpts).....	2
NEI 05-01, Severe Accident Mitigation Alternatives (SAMA) Analysis, Guidance Document (Rev. A, Nov. 2005) (excerpts).....	3
Final License Renewal Interim Staff Guidance, LR-ISG-2006-03: Staff Guidance for Preparing Severe Accident Mitigation Alternatives Analyses (Aug. 2007).....	4
NUREG/CR-6613, SAND97-0594, Vol. 1, Code Manual for MACCS2, User's Guide (May 1998) (excerpts).....	5
R.E. Luna, H.R. Yoshimura, and M.S. Soo Hoo, Survey of Costs Arising from Potential Radionuclide Scattering Events, WM2008 Conference (Feb. 2008).....	6
Reichmuth, et al., Economic Consequences of a Rad/Nuc Attack: Cleanup Standards Significantly Affect Cost, Proceedings of Working Together R&D Partnerships in Homeland Security, Boston, MA (Apr. 2005) (PNNL-SA-45256).....	7
OECD Nuclear Energy Agency, Pathway Parameter Evaluation, A Survey Conducted by an OECD/NEA Group of Experts (July 1987) (Committee on the Safety of Nuclear Installations, CSNI 87-139) (excerpts).....	8

**Energy Contention NYS-12C
Attachment 1**

JUN 25 1996

CONTRACTOR REPORT

SAND96-0957
Unlimited Release
UC-502

Site Restoration: Estimation of Attributable Costs From Plutonium-Dispersal Accidents

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Site Restoration: Estimation of Attributable Costs From Plutonium-Dispersal Accidents

1.0 Introduction

In the extremely unlikely event of an accident involving nuclear weapons, it is possible that plutonium could be dispersed to the environment. The principal mechanisms for dispersal would be fire or the non-nuclear detonation of high explosive. Such an event is termed a **plutonium-dispersal accident**. In such an event, the dispersed plutonium could be transported by winds and deposited on soil, vegetation, or structures. The principal phenomenon of concern during cloud passage is direct inhalation. Unintended nuclear explosions are not being considered.

Conventional analyses of the consequences of plutonium-dispersal accidents generally focus on the inhalation dose during cloud passage. However, because of the long-term hazard posed by resuspension of the deposited plutonium and ingestion of contaminated foods, some fraction of the area in which plutonium was deposited could be considered uninhabitable or unusable without remediation. Remediation of these contaminated areas should almost always be technically feasible, but might be very costly in some cases, depending on the local conditions.

Previous U.S. work estimating the cost to protect public health and safety in a post-accident environment has generally focused on purely technical factors such as the cost of cleaning surfaces, sometimes extending the scope to include a weighing of cleanup costs against the benefits to be achieved by the cleanup. In contrast, our study considers current and proposed legal requirements, social/political factors, and current Federal policies and plans, as well as technical factors.

Industry-standard methods have been used to estimate the costs of remediation if rangeland, farmland, forests, highways, airport runways, or mixed-use urban areas were to become contaminated with plutonium. The cost estimates thus derived are applicable to the majority of the U.S. land area. Not addressed, because of their complexity, are coastal regions, wetlands, and the centers of large cities.

Although only publicly available information has been utilized, the results of this study are intended to be useful for classified research undertaken by the government to minimize the risks of operations, as well as for public information documents such as Environmental Impact Statements (EISs).

In a textbook for British military personnel, Grace (1994) states that the crash of an airplane carrying a nuclear weapon poses the greatest risk of plutonium dispersal; a fire is likely, and the HE might burn or detonate. He states that this could contaminate an area of "perhaps a few square kilometers," with fissile material," and in such an event, "thorough removal of contaminated soil is essential."

In the unlikely event that a plutonium-dispersal accident were to occur, there are many factors which would combine to determine the size of the contaminated area and the degree of contamination. Bounding estimates of the contaminated area and distance such as that presented by Drell *et al.* (1990) should not be used to estimate the likely costs of accidents.

The area exceeding the criterion for continuous occupation, a highly uncertain parameter, could range from a small fraction of a square kilometer in the case of a fire to a few square kilometers for an accident involving HE detonation. HE detonation is less likely than involvement of weapons in a fire. The area contaminated in any specific hypothetical accident scenario would need to be estimated by calculations involving scenario-specific parameter values for the amount of material at risk, initial cloud size and thermal buoyancy, particle size distribution, ambient meteorology, and surrounding terrain characteristics, all of which are outside the scope of the present study.

2.2 Likelihood of Occurrence

Cuddihy and Newton (1985) present a summary of the nuclear weapons accidents that occurred between 1950 and 1980. The vast majority of those accidents occurred during the height of the Cold War and were associated with strategic bombers on either airborne or ground alert, *i.e.* with nuclear weapons loaded on aircraft and either in the air or ready for take-off.

It should be noted that these few accidents dispersing plutonium occurred during a period when the number of nuclear weapons actively deployed was much larger than at present, and that the frequency of accidents per weapon-year was extremely low.

Airborne alert flights were terminated after the B-52 crash at Thule, Greenland in 1968. Further, as of September 1991, the U.S. no longer maintains a ground alert status for its strategic bomber force. That is, nuclear weapons are no longer routinely loaded onto bombers as part of readiness exercises. The termination of air and ground alert status for the strategic bomber force has yielded great reductions in accident risks, see Simmons (1993).

Also notable is the extremely low probability of such accidents because of the extensive precautions taken in nuclear weapon operations. Safety precautions and operational rules have been made more stringent. There have also been several important safety-related changes to the stockpile, such as the use of insensitive high explosive (IHE), crash-resistant containers, and fire-resistant pits. As a result of these changes (many of which were at least partially motivated by the weapons accidents of the 1950s and 1960s) very large reductions in accident risks have been achieved, see Drell (1993).

6.0 Integration of Cost Estimates

Costs of extended remediation were estimated, using industry-standard methods, for mixed-use urban areas at average population density, Midwest farmland, arid Western rangeland, and forested areas. The types of land uses considered represent the overwhelming majority of the U.S. land area and population. Accident costs were highest for urban areas. Accident costs for Midwest farmland and arid Western rangeland were found to be similar.

Costs of expedited remediation were estimated for mixed-use urban areas, highways, and airport runways. Cost estimates are separately provided for three types of areas that are defined as having **light, moderate, and heavy** contamination. Light contamination is that for which a DF of 2-5 would be appropriate. Similarly, moderate contamination is that for which a DF of 5-10 would be appropriate, and heavy contamination is that for which a DF in excess of 10 would be appropriate.

We evaluated the operations necessary to meet the chosen remediation goal for these "typical" land-use patterns. Often alternative operations would be possible. We tried to balance the cost of each operation against speed and effectiveness, using experience and engineering judgment. Each operation was broken down into the steps needed to complete it. The costs of these sub-operations were taken from standard contractor's handbooks or other data. The process we utilized is very similar to what a contractor would do before bidding for a job.

Neither the strategies chosen nor the cost information are unique or necessarily optimum. There are countless alternative strategies and operations for achieving the desired end result. It would be an overwhelming task, and far beyond the scope of this study, to attempt to evaluate all possible strategies. It would also be pointless; political and social pressures or inadequacy of resources might mandate an less than optimal strategy for an actual accident.

In regard to the nuclear safety convention of applying a conservative bias, it inevitable that this has occurred to some extent, largely as a result of the paucity of certain types of data. However, we do not see our estimates as being bounding in any respect. The most that we can claim is that our calculations represent a well-founded estimate of the costs for various strategies to remediate several "typical" sites. We have attempted to generate what we believe are defensible estimates, and have strived to avoid biased sources of data, but make no claim that the present results are appropriate for all applications. Readers are thus urged to critically evaluate the applicability of our estimates to the application at hand.

All of the important assumptions and parameter values are embedded in a set of Lotus 1-2-3® spreadsheets, which are reproduced in their entirety in Appendix G. Qualified analysts may request copies of the spreadsheets in electronic format from the authors.

groups, and government officials. If mistakes or deficiencies were found, it is possible that some actions might need to be redone or augmented, at additional expense. We have not attempted to account for those possible additional costs.

Although we have mentioned waivers of sovereign immunity, possible litigation costs are not addressed. If litigation ensued, costs could increase over what has been estimated. Because of the adverse impact of delays, costs could increase even if lawsuits proved unsuccessful.

6.2 Cost Estimates for Extended Remediation of Farmland and Urban Land

The economic impact of a plutonium-dispersal accident depends strongly on land use. Acquisition cost is dependent on land value, which is clearly higher for city land than for farmland or rangeland. Decontamination cost is higher if the land includes structures. Disposal costs in urban areas are high because of our assumption that all structures would need to be demolished and disposed of as waste. Restoration cost depends on the final ecological community to be achieved, which might differ from the existing ecosystem.

Appendix F describes the cost calculations. A summary of the cost components for two land uses (average urban and Midwest farmland) and two waste disposal options (on-site and off-site) is given in Table 6-1.

Table 6-1
Cleanup Costs For Two Land Uses and Two Waste Disposal Options
(\$ million / km²)

Cost Item	Midwest Farmland	Average Urban
Characterization and Certification	0.6	0.8
Acquisition and Compensation	1.0	180.0
Long-Term Access Control	0.3	1.2
Emergency Actions	0.2	1.1
Demolition/Decontamination	0.9	40.5
Ecological Restoration	3.6	5.3
Option 1—On-Site Waste Disposal	32.2	82.7
Option 2—Off-Site Waste Disposal	67.3	173.2
Option 1—TOTAL for On-Site Disposal	38.8	311.7
Option 2—TOTAL for Off-Site Disposal	74.0	402.2

For a given postulated accident location, risk assessors would need to determine whether on-site waste disposal could be utilized. Many factors could influence the decision. First, if State or local laws would prohibit it, on-site disposal should not be assumed in risk assessments. Three CERCLA cleanups now in progress (see Appendix A) are planning to ship LSA soil and debris to shallow burial grounds in Nevada and Utah. For accidents postulated to occur in the sparsely populated arid Western states, on-site disposal would be more likely than in urban regions on the East or West Coasts.

7.0 Conclusion

Because of (1) the stringency of current environmental law, (2) the need for consensus of multiple government agencies, (3) requirements for public participation and provision for citizen lawsuits, (4) the need for detailed analyses under CERCLA and NEPA preceding actual site cleanup, (5) deterioration of structures over time, and (6) the difficulty in decontaminating surfaces with long-standing contamination, it was determined that condemnation of all property in the affected area might be a prerequisite to delayed remediation of the affected area under the current regulatory structure.

Condemnation would not be a necessary prerequisite to cleanup. Both CERCLA and NEPA allow for waivers. If necessary approvals were obtained, an expedited remediation could be conducted. We evaluated both the costs and the effectiveness of such an expedited response. This evaluation was performed for (1) accidents postulated to occur in urban areas and (2) those affecting highways and airport runways. We did not analyze the expedited remediation of Western rangeland, Midwest farmland, or forests.

The following costs were addressed: (1) emergency actions to promptly characterize the site and protect the public, (2) compensation for lost property and income, (3) detailed site characterization, (4) removal of contaminated material, (5) shallow land burial of waste, (6) post-cleanup certification, and (7) ecological restoration.

In an appendix, we looked at the history of government-funded programs for medical monitoring and care and concluded that there could be a basis for establishment of such a program in the event of an accident. However, there are insufficient data on which to base a quantitative cost estimate for such programs.

The estimates provided are intended to be used as nominal values for risk assessments. Actual costs would vary depending on location. There was no attempt to bias the results for conservatism. We assumed, based on historical experience and our assessment of the current social and political climate, that a very protective stance would be taken. The degree of protectiveness we used is consistent with the criteria being utilized for current CERCLA cleanups of radiation sites, and proposed regulations for the same.

Costs would be lower if a set of less protective actions were implemented. Also, technological advances in the detection of plutonium, decontamination techniques, and the treatment of waste to minimize its volume could decrease costs in comparison to the provided estimates.

In order to derive the cost estimates presented, we assumed that the size of the affected area could range from a few hundred square meters to a few square kilometers. Our choice of the potential size of the affected area should not be used to predict the costs of accidents. Those predictions require detailed data on the masses of material at risk, accident phenomenology,

release fractions, accident location, local terrain, and meteorological conditions, which are outside the scope of this report. For average weather conditions and flat terrain, even for HE detonation, the size of the affected area might be only a very few square kilometers.

An important consideration for accidents postulated to occur in urban areas is the influence of local meteorology. In the presence of large buildings and trees, deposition can become localized, decreasing the size of the affected area. Also, stable weather conditions in cities, minimizing dilution of the cloud, are extremely rare because of surface roughness and heat-island effects. In modeling the dispersion and deposition occurring in urban areas, analysts are urged to consider the influence of these phenomena in order to avoid overestimating accident costs. This would entail the derivation of dispersion and deposition parameters appropriate for use in urban areas and their use in computer simulations of accidents postulated to occur in those areas.

A simple calculational methodology has been developed that can either be incorporated into existing computer codes, or used by an analyst external to such codes, in order to estimate accident costs. It is a simple matter to determine the land usage characteristics of each sector in the area exceeding a specified interdiction criterion and multiply the area of each land use type by the parameter values that have been provided.

Our results show that there are two major components of attributable cost: (1) compensation for acquired property, and (2) decontamination and waste disposal. Both of these components of cost are uncertain to possibly large degree, and revisions to the parameter values we used could result in one or another of these components becoming the "major" component of cost. As a result of the uncertainties, it is not possible to identify the major cost component with any confidence, and there would be little value in making such a choice.

We believe that variation of parameter values within plausible ranges would not result in a change in our judgement that remediation of an accident site in a populated area would probably be slow, complex, and expensive, absent waivers from current environmental laws. Moreover, even if such waivers were used to expedite the process, decontamination of urban areas could still prove to be difficult, or prove to be of limited effectiveness.

For a worst-case release under worst-case weather occurring in or near a mid-sized city, attributable costs could be on the order of few billion dollars (including overhead and miscellaneous expenses). An unanticipated Federal cost of that magnitude is not unusual. A recent example of a high cost event was the massive failure of savings and loan banks; after liquidation of the Resolution Trust Corporation in 1995, the net cost to the Federal government amounted to over \$100 billion dollars.

Another large liability of the government is the cleanup of residual material in the DOE weapons complex, with, by most accounts, an estimated cost of several hundred billions of dollars. DOE (1995b) currently estimates that for its "base-case" strategy, it may cost \$200-350 billion (in 1995 dollars) over the next 75 years to remediate the vast majority of its sites; for the maximal "green fields" cleanup, the cost is estimated to be \$500 billion.

**Entergy Contention NYS-12C
Attachment 2**

NUREG-1437
Vol. 1

Generic Environmental Impact Statement for License Renewal of Nuclear Plants

Main Report

Final Report

Manuscript Completed: April 1996
Date Published: May 1996

**Division of Regulatory Applications
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001**



site-specific consideration of severe accident mitigation for license renewal will only identify procedural and programmatic improvements (and perhaps minor hardware changes) as being cost-beneficial in reducing severe accident risk or consequence. Therefore, a site-specific consideration of alternatives to mitigate severe accidents shall be performed for license renewal unless such a consideration has already been included in a previous EIS or related supplement. Staff evaluations of alternatives to mitigate severe accidents have already been completed and included in an EIS or supplement for Limerick, Comanche Peak, and Watts Bar; therefore, severe accident mitigation need not be reassessed for these plants for license renewal.

5.5 SUMMARY AND CONCLUSIONS

The foregoing discussions have dealt with the environmental impacts of accidents during operation after license renewal. The primary assumption for this evaluation is that the frequency (or likelihood of occurrence) of an accident at a given plant would not increase during the plant lifetime (inclusive of the license renewal period) because regulatory controls ensure the plant's licensing basis is maintained and improved, where warranted. However, it was recognized that the changing environment around the plant is not subject to regulatory controls and introduces the potential for changing risk. Estimation of future severe accident consequences and risk was based upon existing risk and consequence analyses found in FES for recently licensed plants because these include severe accident analyses and constitute a representative set of plants and sites for the United States.

5.5.1 Impacts from Design-Basis Accidents

The environmental impacts of postulated accidents were evaluated for the license renewal period in GEIS Chapter 5. All plants have had a previous evaluation of the environmental impacts of design-basis accidents. In addition, the licensee will be required to maintain acceptable design and performance criteria throughout the renewal period. Therefore, the calculated releases from design-basis accidents would not be expected to change. Since the consequences of these events are evaluated for the hypothetical maximally exposed individual at the time of licensing, changes in the plant environment will not affect these evaluations. Therefore, the staff concludes that the environmental impacts of design-basis accidents are of small significance for all plants. Because the environmental impacts of design basis accidents are of small significance and because additional measures to reduce such impacts would be costly, the staff concludes that no mitigation measures beyond those implemented during the current term license would be warranted. This is a Category 1 issue.

5.5.2 Impacts from Severe Accidents

5.5.2.1 Atmospheric Releases

The evaluation of health and dose effects caused by atmospheric releases used a prediction process to identify those plant sites that are bounded by existing analyses. Existing analyses represent only a subset of operating plants. A particular portion of this subset, specifically those plants having severe accident analyses in their respective FESs, was used in this evaluation. EI (which is a function of population and wind direction), in conjunction with the FES severe accident analyses, was then used to develop a means to predict

consequences for all plants. Average values and 95 percent UCB values were estimated. Table 5.6 provides the results of this prediction process.

Results indicate that the predicted effects of a severe accident during MYR at the 74 sites of nuclear power plants in the United States are not expected to exceed a small fraction of that risk to which the population is already exposed. In addition, the dose to individuals was also predicted. Results indicate that the highest average individual dose would be 3×10^{-4} rem/R.Y. This dose compares to an average of 3×10^{-1} rem/person/year for all other causes, including radon. Therefore, the probability-weighted consequences from atmospheric releases associated with severe accidents is judged to be of small significance for all plants.

5.5.2.2 Fallout onto Open Bodies of Water

The results of comparative analyses for the drinking-water pathway concluded that Great Lakes sites have the same order-of-magnitude risk that was calculated in the Fermi 2 FES, which is only a small fraction of the risk from atmospheric pathway releases. River sites with potentially greater risk than in the Fermi FES are amenable to interdiction, which can significantly reduce risk. In the case of the aquatic food pathway, interdicted population exposures are less than or essentially the same as atmospheric pathway releases. For both the drinking water and aquatic food pathways, the probability-weighted consequences from fallout due to severe accidents is of small significance.

5.5.2.3 Releases from Groundwater

The comparative analyses for this pathway were done by first segregating all sites into

six general categories as called out in the NRC LPGS (NUREG-0440) and then estimating if the risk consequences calculated in existing analyses (including the LPGS) bounds the risks for all other plants within each category.

Of the six categories, three are judged to be bound by existing analyses. These categories are Great Lake sites, estuaries, and dry sites.

For the other categories, estimates were made of the degree to which groundwater releases could exceed existing analyses. For all six categories, the staff concluded that the risk to the population was either a small fraction of that for atmospheric releases or, in a few cases, comparable to that from atmospheric releases. Therefore, the probability-weighted consequences from groundwater releases due to severe accidents is judged to be of small significance for all plants.

5.5.2.4 Societal and Economic Risks

The expected costs resulting from a severe accident at nuclear power plants during their renewal periods have been predicted from evaluations presented in 27 FESs. Estimates of the extent of land contamination have also been presented. In both cases, the conditional impacts are judged to be of small significance for all plants.

5.5.2.5 SAMDAs

The staff concluded that the generic analysis summarized above applies to all plants and that the probability-weighted consequences of atmospheric releases, fallout onto open bodies of water, releases to ground water, and societal and economic impacts of severe accidents are of small significance for all plants. However, not all

plants have performed a site-specific analysis of measures that could mitigate severe accidents. Consequently, severe accidents are a Category 2 issue for plants that have not performed a site-specific consideration of severe accident mitigation and submitted that analysis for Commission review.

5.6 ENDNOTES

1. While a dose as low as 10 rem may cause such observable physiological changes as chromosomal aberrations, these changes are not classified as clinical injury.
2. Also referred to as the Rogovin report.
3. Grand Gulf, Sequoyah, Surry, Peach Bottom, and Zion.
4. The FitzPatrick and Nine Mile Point units are located closely enough to assume that they are located on the same site. A similar observation can be made for the Hope Creek and Salem units.
5. Because the hypothetical sites were to be modeled as either PWRs or BWRs, those using population data of actual PWR sites utilized updated WASH-1400 source terms taken from the Byron FES (NUREG-0848), while those using population data for BWRs utilized updated WASH-1400 source terms taken from the Clinton FES (NUREG-0854).

5.7 REFERENCES

Acharya, S., and R. M. Blond, Transcript of Testimony Before the Atomic Safety and Licensing Board in the Matter of Consolidated Edison of New York (Indian Point, Unit 2) and Power Authority of the State of New York (Indian Point, Unit 3) (Docket

- Nos. 50-247-SP and 50-286-SP), Sections III.C.A and III.C.B, n.d.
- BEIR-I, *The Effects on Populations of Exposure to Low Levels of Ionizing Radiations*, National Research Council, Advisory Committee on the Biological Effects of Ionizing Radiation, National Academy of Sciences, Washington, D.C., 1972.
- BEIR-III, *The Effects on Populations of Exposure to Low Levels of Ionizing Radiation: 1980*, National Research Council, Advisory Committee on the Biological Effects of Ionizing Radiation, National Academy of Sciences, Washington, D.C., 1980.
- BEIR-V, *Health Effects of Exposure to Low Levels of Ionizing Radiation*, National Research Council, Advisory Committee on the Biological Effects of Ionizing Radiation, National Academy of Sciences, Washington, D.C., 1990.
- Bertini, H. W., *Descriptions of Selected Accidents That Have Occurred at Nuclear Reactor Facilities*, ORNL/NSIC-176, Oak Ridge National Laboratory, Oak Ridge, Tennessee, April 1980.
- Codell, R. B., "Potential Contamination of Surface Water Supplies by Atmospheric Releases from Nuclear Plants," *Health Physics* 49(5), 713-30, November 1985.
- ConEd (Consolidated Edison Company), *Indian Point Nuclear Power Plant, Unit 2 Final Safety Analysis Report*, June 1982.
- Crick, M. J., and G. S. Linsley, *An Assessment of the Radiological Impact of the Windscale Reactor Fire*, National Radiological Protection Board, Chilton, United Kingdom, 1983.
- DOE/ER-0332, M. Goldman et al., *Health and Environmental Consequences of the Chernobyl Nuclear Power Accident*, U.S. Department of Energy, Washington, D.C., 1987.

**Energy Contention NYS-12C
Attachment 3**

NEI 05-01 [Rev A]

Nuclear Energy Institute

**Severe Accident
Mitigation Alternatives
(SAMA) Analysis**

Guidance Document

November 2005

EXECUTIVE SUMMARY

This document provides a template for completing the severe accident mitigation alternatives (SAMA) analysis in support of license renewal. Its purpose is to identify the information that should be included in the SAMA portion of a license renewal application environmental report to reduce the necessity for Nuclear Regulatory Commission (NRC) requests for additional information (RAIs). The method described relies upon NUREG/BR-0184 regulatory analysis techniques, is a result of experience gained through past SAMA analyses, and incorporates insights gained from review of NRC evaluations of SAMA analyses and associated RAIs.

3.4 LEVEL 3 PSA MODEL

Level 3 PSA models determine off-site dose and economic impacts of severe accidents based on Level 1 PSA results, Level 2 PSA results, atmospheric transport, mitigating actions, dose accumulation, early and latent health effects, and economic analyses.

Provide a description of the Level 3 analysis method and input data. In many SAMA analyses, the MELCOR Accident Consequence Code System (MACCS2) (Reference 2) is used to calculate the off-site consequences of a severe accident. Some SAMA analyses have used previous Level 3 analyses such as those included in NUREG/CR-4551. Description of the method may be no more than a reference to the document describing the method. However, the various input parameters and associated assumptions must still be described.

The following sections describe input data if MACCS2 (Reference 2) is the analysis tool. If another code is used, similar description of the input parameters must be documented.

3.4.1 POPULATION DISTRIBUTION

Provide a predicted population within a 50-mile radius of the site. The predicted population distribution may be obtained by extrapolating publicly available census data. Transient population included in the site emergency plan should be added to the census data before extrapolation. Explain why the population distribution used in the analysis is appropriate and justify the method used for population extrapolation. Typically, with increasing population, the predicted population is estimated for a year within the second half of the period of extended operation. Extrapolation to a later date, and therefore a larger population, adds conservatism to the analysis. Of course, if a population reduction is projected, extrapolation to an earlier date would be more reasonable.

The population distribution should be by location in a grid consisting of sixteen directional sectors, the first of which is centered on due north, the second on 22.5 degrees east of north, and so on. The direction sectors should be divided into a number of radial intervals extending out to at least 50 miles. A sample population distribution is provided in Table 4.

3.4.2 ECONOMIC DATA

Provide economic data from publicly available information (e.g., from the U.S. Census Bureau, U.S. Department of Agriculture, or state tax office) on a region-wide basis. Economic data should be expressed in today's dollars (dollars for the year in which the SAMA analysis is being performed), not extrapolated to the end of the period of extended operation. Economic data from a past census can be converted to today's dollars using the ratio of current to past consumer price indices.

Describe the values and bases for the following economic estimates.

- Cost of evacuation
- Cost for temporary relocation (food, lodging, lost income)
- Cost of decontaminating land and buildings

- Lost return on investments from properties that are temporarily interdicted to allow contamination to be decreased by decay of nuclides
- Cost of repairing temporarily interdicted property
- Value of crops destroyed or not grown because they were contaminated by direct deposition or would be contaminated by root uptake
- Value of farmland and of individual, public, and non-farm commercial property that is condemned

Sample MACCS2 economic data is provided in Table 5.

3.4.3 NUCLIDE RELEASE

Provide a discussion of the source of core inventory values and a list of those values. Table 6 shows sample core inventory values. The actual list of radioisotopes may differ from the list in Table 6.

MACCS2 default core inventory values are for a reference plant with a power level of 3,412 megawatts-thermal. Since actual core inventory is usually fuel vendor proprietary information, plant-specific core inventory values may be obtained by scaling the MACCS2 default values by the ratio of power level to reference plant power level. Additional adjustment of the core inventory values may be necessary to account for differences between fuel cycles expected during the period of extended operation and the fuel cycle upon which the MACCS2 default core inventory values are based.

Also provide a description of the characteristics associated with the release (i.e., elevation of release, thermal content of release). Use of a release height equal to half the height of the containment is acceptable, because it provides adequate dispersion of the plume to the surrounding area. Table 7 shows example release characteristics.

3.4.4 EMERGENCY RESPONSE

Discuss emergency response and evacuation parameter assumptions.

Provide an evacuation start time delay and a radial evacuation speed based on site-specific information. Since population dose is highly dependent on radial evacuation speed, and uncertainties may be introduced during derivation of a single evacuation speed from emergency plan information, sensitivity analyses should be documented to show that the radial evacuation speed used in the SAMA analysis is reasonable (Section 8.4).

Best-estimate values for groundshine and cloudshine shielding factors are acceptable (e.g., Grand Gulf values found in Table 3.28 of Reference 3).

MACCS2 default values are acceptable for other parameter inputs, such as inhalation and skin protection factors, acute and chronic exposure effects, and long-term protective data.

3.4.5 METEOROLOGICAL DATA

Describe the meteorological data used in the analysis, including wind speed, wind direction, stability class, seasonal mixing heights, and precipitation. Indicate the sources of the data (e.g., site meteorological tower, National Climatic Data Center).

Also indicate the span of the data. Examples include, "*a full year (2003) of consecutive hourly values,*" or "*an average of five years (1995-2003) of consecutive hourly values.*"

Explain why the data set and data period are representative and typical.

For example,

Annual meteorology data sets from 1998 through 2000 were investigated for use in MACCS2. The 1998 data set was found to result in the largest doses and was subsequently used to create the one-year sequential hourly data set used in MACCS2. The conditional dose from each of the other years was within 10 percent of the chosen year.

If data is not from the plant meteorological tower, discuss why the data is acceptable.

3.5 SEVERE ACCIDENT RISK RESULTS

Provide the mean annual off-site dose and economic impact due to a severe accident for each of the release categories analyzed. Report results for all release categories, including those with normal containment leakage (intact containment). Provide total off-site dose and total economic impact, which are the baseline risk measures from which the maximum benefit is calculated (Section 4). Table 8 provides a sample summary of severe accident risk results.

**Entergy Contention NYS-12C
Attachment 4**

August 2, 2007

Mr. James H. Riley
Nuclear Energy Institute
1776 I Street, NW, Suite 400
Washington, DC 20006-3708

SUBJECT: FINAL LICENSE RENEWAL INTERIM STAFF GUIDANCE
LR-ISG-2006-03: STAFF GUIDANCE FOR PREPARING SEVERE ACCIDENT
MITIGATION ALTERNATIVES ANALYSES

Dear Mr. Riley:

By letter dated August 10, 2006, we issued our proposed License Renewal Interim Staff Guidance, LR-ISG-2006-03, for public comments. By letter dated September 15, 2006, Dr. Jill Lipoti, State of New Jersey, Department of Environmental Protection, provided comments and requested that the staff take this opportunity to include a review of the impacts of terrorist attacks on nuclear facilities as part of the National Environmental Policy Act in the interim staff guidance. The staff reviewed Dr. Lipoti's comments and provided responses in a letter dated July 31, 2007, which can be found in the Agencywide Document Access and Management System (ADAMS) under Accession Number ML071380307. No changes were incorporated in the Final LR-ISG-2006-03 based on these comments.

Enclosure 1 is our Final LR-ISG-2006-03. A notice relating to this Final LR-ISG will be published in the *Federal Register*. If you have any questions regarding this matter, please contact Mr. Richard L. Emch, Jr., by telephone at 301-415-1590 or by e-mail at RLE@nrc.gov.

An identical letter was sent to Mr. David Lochbaum at the Union of Concerned Scientists.

Sincerely,
/RA/

Pao-Tsin Kuo, Director
Division of License Renewal
Office of Nuclear Reactor Regulation

Project No. 690

Enclosure:
Final LR-ISG-2006-03

cc w/encl: See next page

DISTRIBUTION: See next page
Adams Accession No. **ML071640133**

OFFICE	PM:DLR:REBB	LA:DLR	PM:DLR:RLRB	OGC
NAME	REmch	YEdmonds	LTran	SUttal (NLO w/ comments)
DATE	06/15/07	06/26/07	07/3/07	07/13/07
OFFICE	BC:DLR:REBB	BC:DLR:RRLRB	D:DLR	
NAME	RFranovich	RAuluck	PTKuo	
DATE	07/23/07	07/27/07	08/2/07	

OFFICIAL RECORD COPY

Letter to: James H. Riley, David Lochbaum, from: Pao-Tsin Kuo, dated: August 2, 2007

SUBJECT: FINAL LICENSE RENEWAL INTERIM STAFF GUIDANCE
LR-ISG-2006-03: STAFF GUIDANCE FOR PREPARING SEVERE ACCIDENT
MITIGATION ALTERNATIVES ANALYSES

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RidsNrrDlrRebb
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DLR Staff

FINAL LICENSE RENEWAL INTERIM STAFF GUIDANCE LR-ISG-2006-03:
STAFF GUIDANCE FOR PREPARING SEVERE ACCIDENT MITIGATION
ALTERNATIVES ANALYSES

Introduction

A Severe Accident Mitigation Alternatives (SAMA) analysis is required as part of a license renewal application, if a SAMA analysis has not already been performed for the plant and reviewed by the NRC staff. SAMA analyses have been performed and submitted to the NRC for all applications for license renewal received by the staff thus far. Therefore, this LR-ISG is being recommended as guidance consistent with our goal to more effectively and efficiently resolve license renewal issues identified by the staff or the industry.

Background and Discussion

After receiving extensive requests for additional information regarding the SAMA analyses, several applicants for license renewal concluded that they did not fully understand the kind of information that the NRC staff was expecting to see in SAMA analyses.

The Nuclear Energy Institute (NEI) developed a generic guidance document to help clarify the NRC staff's expectations regarding the information that should be submitted in SAMA analyses. On April 8, 2005, NEI submitted NEI 05-01, "Severe Accident Mitigation Alternatives (SAMA) Analysis - Guidance Document." The NRC staff reviewed this guidance document, and by letter, dated July 12, 2005, provided comments on NEI 05-01. The NRC staff's comments were discussed during a public meeting between NEI and NRC on July 21, 2005.

On February 17, 2006, NEI submitted its NEI 05-01, Revision A, dated November 2005. The NRC staff reviewed and concluded that this version fully resolved the NRC staff's comments. In addition, the NRC staff concluded that NEI 05-01, Revision A, describes existing NRC regulations and facilitates complete preparation of SAMA analysis submittals.

Some applicants for license renewal have submitted SAMA analyses using the guidance provided in NEI 05-01, Revision A. The NRC staff found improved quality in the submitted SAMA analyses and a reduction in the number of requests for additional information for those applications that followed the guidance provided in NEI 05-01, Revision A.

Recommended Action

The staff is recommending that applicants for license renewal follow the guidance provided in NEI 05-01, Revision A, when preparing their SAMA analyses. The staff finds that NEI 05-01, Revision A, describes existing NRC regulations, and facilitates complete preparation of SAMA analysis submittals.

Although this final LR-ISG does not convey a change in the NRC's regulations or how they are interpreted, it is being provided to facilitate complete preparation of future SAMA analysis submittals in support of applications for license renewal. The NRC staff plans to incorporate the guidance provided in NEI 05-01, Revision A, into a future update of Supplement 1 to Regulatory Guide 4.2, "Preparation of Supplemental Environmental Reports for Applications to

Enclosure

Renew Nuclear Power Plant Operating Licenses.” This LR-ISG provides a clarification of existing guidance with no additional requirements. For those that are interested in reviewing NEI 05-01, Revision A, the Agencywide Documents Access and Management System (ADAMS) Accession Number is ML060530203.

**Energy Contention NYS-12C
Attachment 5**

NUREG/CR-6613
SAND97-0594
Vol. 1

Code Manual for MACCS2: Volume 1, User's Guide

Manuscript Completed: March 1997
Date Published: May 1998

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NRC JC W6231**

**Office of Technical and Environmental Support
Defense Programs
U.S. Department of Energy
Washington, DC 20585
US DOE Contract DE-AC04-94AL85000**

ABSTRACT

This report describes the use of the MACCS2 code. The document is primarily a user's guide, though some model description information is included. MACCS2 represents a major enhancement of its predecessor MACCS, the MELCOR Accident Consequence Code System. MACCS, distributed by government code centers since 1990, was developed to evaluate the impacts of severe accidents at nuclear power plants on the surrounding public. The principal phenomena considered are atmospheric transport and deposition under time-variant meteorology, short- and long-term mitigative actions and exposure pathways, deterministic and stochastic health effects, and economic costs. No other U.S. code that is publicly available at present offers all these capabilities. MACCS2 was developed as a general-purpose tool applicable to diverse reactor and nonreactor facilities licensed by the Nuclear Regulatory Commission or operated by the Department of Energy or the Department of Defense. The MACCS2 package includes three primary enhancements: (1) a more flexible emergency-response model, (2) an expanded library of radionuclides, and (3) a semidynamic food-chain model. Other improvements are in the areas of phenomenological modeling and new output options. Initial installation of the code, written in FORTRAN 77, requires a 486 or higher IBM-compatible PC with 8 MB of RAM.

2.0 Basic Code Features Preserved in MACCS2

This section presents an overview of the MACCS features that have been preserved unchanged in MACCS2. The present version of the code will be referred to as MACCS2, although the features discussed in this chapter apply to both MACCS and MACCS2.

2.1 Overview of Code Structure

The structure of MACCS2 is based on that of CRAC2 (Ritchie *et al.* 1984), as descended from the *Reactor Safety Study* (NRC 1975). Additional information on the technical background of reactor-based assessment codes can be found in the *PRA Procedures Guide* (American Nuclear Society and Institute of Electrical and Electronic Engineers 1983).

MACCS2 is used to estimate the radiological doses, health effects, and economic consequences that could result from postulated accidental releases of radioactive materials to the atmosphere. The specification of the release characteristics, designated a "source term," can consist of up to four Gaussian plumes (Systems Applications 1982), with these often referred to simply as "plumes."

The radioactive materials released are modeled as being dispersed in the atmosphere while being transported by the prevailing wind. During transport, whether or not there is precipitation, particulate material can be modeled as being deposited on the ground. If contamination levels exceed a user-specified criterion, mitigative actions can be triggered to limit radiation exposures. If mitigative actions are triggered, the economic costs of these actions are calculated and can be reported.

There are two aspects of the code's structure that are basic to understanding its calculations: (1) the calculations are divided into modules and phases and (2) the region surrounding the facility is divided into a polar-coordinate grid. These concepts are described in the following subsections.

2.1.1 Division of Calculations into Modules and Phases

MACCS2 is divided into three primary modules: ATMOS, EARLY, and CHRONC. The input data they require are described in Sections 5, 6, and 7, respectively.³

There is also another fundamental division in the code's calculations. This division is based on the sequence of societal responses that would follow the occurrence of an accident. These phases are defined by the Environmental Protection Agency (EPA) (1992) in its *Protective Action*

³ As stated in Section 1.4, the original design of MACCS incorporated five separate FORTRAN programs executed in sequence. These were named ATMOS, EARLY, CHRONC, MERGER, and SUMMER. Functions of the former MERGER and SUMMER are now performed by the OUTPUT module. Results generated by ATMOS, EARLY, and CHRONC are written to binary files, which are then processed by OUTPUT in order to generate CCDFs.

Guides, and referred to as the emergency, intermediate, and long-term phases. Because these concepts are basic to an understanding of the code, the relationships among the code's three modules and the three phases of exposure are summarized below.

2.1.1.1 The ATMOS Module: Atmospheric Transport and Deposition

ATMOS performs all of the calculations pertaining to atmospheric transport, dispersion, and deposition, as well as the radioactive decay that occurs prior to release and while the material is in the atmosphere. The results of the calculations are stored for use by EARLY and CHRONC. The downwind transport of up to four plumes can be modeled. A number of parameters are stored. In addition to the air and ground concentrations, ATMOS stores information on wind direction, arrival and departure times, and plume dimensions.

2.1.1.2 The EARLY Module: Emergency-Phase Calculations

EARLY performs all of the calculations pertaining to the emergency phase. The emergency phase begins, at each successive downwind distance point, when the first plume of the release arrives. The duration of the emergency phase is specified by the user, and it can range between 1 and 7 days. The exposure pathways considered during this period are cloudshine, groundshine, and resuspension inhalation. Mitigative actions that can be specified for the emergency phase include evacuation, sheltering, and dose-dependent relocation.

2.1.1.3 The CHRONC Module: Intermediate- and Long-Term-Phase Calculations

CHRONC performs all of the calculations pertaining to both the intermediate and long-term phases, as is summarized below. The mitigative action models that can be utilized for these periods are not fully described in the *MACCS Model Description*. For that reason, and because MACCS2 incorporates some changes to the corresponding models of MACCS, an expanded description of the CHRONC mitigative action models is presented in Section 7.1. This description supersedes the *MACCS Model Description*.

2.1.1.4 Intermediate Phase

The intermediate phase begins, at each successive downwind distance point, upon the conclusion of the emergency phase. The duration of the intermediate phase is specified by the user, and it can range between 0 and 1 year. The exposure pathways considered during this period are groundshine and resuspension inhalation. Potential doses from food and water ingestion during this period are not considered.

These models are implemented on the assumption that the radioactive plume has passed and the only exposure source is from ground-deposited material. It is for this reason that MACCS2 requires that the total duration of a radioactive release be limited to no more than 4 days. The only mitigative action that can be specified for the intermediate phase is dose-dependent relocation. If a user-specified dose criterion is exceeded, resident individuals are assumed to be relocated for the duration of the intermediate phase.

Variable Name: DDREFA
 Variable Type: Real, array
 Allowed Range: $1.0 \leq \text{value} \leq 10.0$
 Purpose: Dose-dependent reduction factor. If the lifetime dose commitment incurred during the EARLY exposure period is less than DDTHRE, the risk of cancer from irradiation of that organ is reduced by a factor of DDREFA. The user must supply NUMACA values in column 8 of the data block.

Example use of ACNAME, ACSUSC, DOSEFA, DOSEFB, CFRISK, CIRISK, and DDREFA based on EPA (1994) (*Estimating Radiogenic Risks: EPA 402-R-93-076*):

* EXAMPLE OF CANCER RISK FACTOR DEFINITION IMPLEMENTING EPA (1994: PP. 25-26)

```

*
LCNUMACA001      7
LCDDTHRE001     0.2
LCACTHRE001     0.0
*
*          ACNAME          ORGNAM          ACSUSC DOSEFA DOSEFB CFRISK CIRISK DDREFA
*
LCANCERS001 'Bladder'      'L-BLAD WAL'      1.0  1.0  0.0  4.97E-3  9.94E-3  2.0
LCANCERS002 'Bone Sur'     'L-BONE SUR'     1.0  1.0  0.0  1.90E-4  2.71E-4  2.0
LCANCERS003 'Breast'       'L-BREAST'       1.0  1.0  0.0  4.62E-3  9.24E-3  1.0
LCANCERS004 'Colon'        'L-LOWER LI'     1.0  1.0  0.0  1.96E-2  3.56E-2  2.0
LCANCERS005 'Leukemia'    'L-RED MARR'     1.0  1.0  0.0  9.91E-3  1.00E-2  2.0
LCANCERS006 'Liver'         'L-LIVER'        1.0  1.0  0.0  3.00E-3  3.16E-3  2.0
LCANCERS007 'Lung'          'L-LUNGS'        1.0  1.0  0.0  1.43E-2  1.51E-2  2.0
LCANCERS008 'Stom./Eso.'  'L-STOMACH'     1.0  1.0  0.0  1.07E-2  1.18E-2  2.0
LCANCERS009 'Thyroid'     'L-THYROID'     1.0  1.0  0.0  6.40E-4  6.40E-3  2.0
LCANCERS010 'Remainder'    'L-EFFECTIVE'    1.0  1.0  0.0  2.92E-2  1.41E-1  2.0

```

Note: In regard to the above risk coefficients, the relative biological effectiveness (RBE) for alpha radiation for RED MARR dose is defined to be 1; for all other organs, the alpha radiation RBE is defined to be 20 (EPA 1994).

Example use of ACNAME, ACSUSC, DOSEFA, DOSEFB, CFRISK, CIRISK, and DDREFA based on ICRP 60 (International Commission on Radiological Protection 1991):

* EXAMPLE OF ICRP 60 CANCER RISK FACTOR DEFINITION

```

*
LCNUMACA001      1
LCDDTHRE001     0.2
LCACTHRE001     0.0
*
*          ACNAME          ORGNAM          ACSUSC DOSEFA DOSEFB CFRISK CIRISK DDREFA
*
LCANCERS001 'ICRP60'      'L-EFFECTIVE'    1.0  1.0  0.0  0.10  0.12  2.0

```

6.10 Generation of Consequence Distributions

Under the control of parameters supplied by the user on the EARLY and CHRONC input files, the EARLY and CHRONC modules can calculate a variety of different consequence measures to portray the impact of a facility accident on the surrounding region. The user has total control

over the results that will be produced. By choosing appropriate values in the user input files, the user can ensure that the code does not perform unnecessary calculations. This affords a great deal of flexibility but it also requires that the user anticipate which results will be of interest. If any are omitted, it is necessary to correct the user input and rerun the program.

In this regard, please remember that a result can only be produced if the model needed for its calculation has been previously defined in the appropriate section. If any results pertaining to health effects are requested, risk factors for that model must have been supplied in the sections entitled Early Fatality (EF), Early Injury (EI), and Latent Cancer (LC).

EARLY can produce ten different types of results. These are described in the next ten sections. Some of these types of results can also be calculated by CHRONC, but some cannot. For instance, both EARLY and CHRONC calculate cancer cases and population dose, but EARLY alone calculates early fatalities, and CHRONC alone calculates economic costs.

If the user requests EARLY to produce a result that can also be produced by CHRONC, the code will ensure that it will be produced by both EARLY and CHRONC. Whenever a result can be produced by both modules, this will be indicated in the following ten sections.

Neither EARLY nor CHRONC generate complementary cumulative distribution functions of the results that they calculate. As EARLY and CHRONC generate the requested consequence measures, those numbers are written to binary files for later processing into CCDFs.

CCDFs are generated by the OUTPUT module of MACCS2. It reads the binary files of consequence measures and automatically combines the results in a predetermined way. The user has no direct control over the OUTPUT module other than through the EARLY and CHRONC data blocks that control the generation of consequence measures.

The CCDF is an estimate of the distribution of consequence magnitudes. The variability of consequence values in MACCS2 CCDFs is due solely to the uncertainty of the weather conditions existing at the time of the accident.

If a consequence measure was calculated by both EARLY and CHRONC, the output module will present those results and their CCDFs separately for EARLY and CHRONC. Also, the output module will sum the results of EARLY and CHRONC and provide the CCDFs of their sums. The contribution of up to three sets of results generated by EARLY can be combined according to the weighting fractions described in Sections 6.1 and 6.6. The weighted sum of all consequence measures, calculated by summation of results from separate runs of EARLY, is presented at the beginning of each section of the listing produced by OUTPUT. Following the overall weighted sum, the results from each of its components are presented.

The following material describes the format of the listing produced by the OUTPUT module.

7.0 CHRONC Input File

The CHRONC module simulates the events that occur following the emergency-phase time period modeled by EARLY. Various long-term protective actions may be taken during this period to limit radiation doses to acceptable levels. The parameters defining these protective actions are under user control, and all of them are described in this chapter.

CHRONC calculates the individual health effects that result from both (1) direct exposure to contaminated ground and from inhalation of resuspended materials as well as (2) indirect health effects caused by the consumption of contaminated food and water by individuals who could reside both on and off of the computational grid. CHRONC also calculates the economic costs of the long-term protective actions as well as the cost of the emergency response actions that were modeled in the EARLY module.

It is up to the user to specify the various parameters needed for these calculations. There are no default values for the parameters described in this section. In addition to specifying the characteristics of the model, the user has complete control over the output produced by CHRONC and must explicitly specify which results are to be produced. All of this information is supplied through the CHRONC input file, and all of the input parameters are described in this chapter.

Four long-term exposure pathways are modeled in MACCS2 to predict the long-term radiation exposures from accidental radiological releases: groundshine, resuspension inhalation, ingestion of contaminated food, and ingestion of contaminated drinking water. The models utilized in predicting the doses from these four pathways are described individually in the following sections. The dose from each of the long-term pathways is evaluated for each spatial element surrounding the accident site. For the intermediate phase, only the groundshine and resuspension inhalation exposure pathways are considered.

MACCS2 incorporates two options for the user regarding food ingestion models: (1) the food ingestion model of MACCS and (2) the new COMIDA-based food ingestion model. A brief discussion of the differences between these two models is provided in Section 3.1.2 of this document. The MACCS food ingestion model is based on the simple principle that the long-term dose produced by any radionuclide to an organ via a pathway is the product of (1) the ground concentration of the radionuclide, (2) the integrated transfer factor for the radionuclide to human intake for the pathway, and (3) the ingestion dose conversion factor. There are a number of limitations of the MACCS food ingestion model. A main drawback of this model is that the integrated transfer factors for food pathway radionuclides not included in the MACCS sample problems must be derived by the user external to the code. The calculational procedures are difficult and error prone. In contrast, the COMIDA2-based ingestion model is based on a preprocessor that can be exercised by the user, with consideration of site-specific data, if such data are available.

The radiation dose for the exposure pathways of the intermediate and long-term phases is calculated for each of the coarse spatial elements using the initial ground concentration under the

plume centerline calculated by the ATMOS module. Similar to the early exposure pathways, MACCS2 uses an off-centerline correction factor and the ground concentration under the plume centerline to estimate the initial ground concentration at the off-centerline region of various spatial elements. In contrast to EARLY, however, which utilizes a Gaussian histogram subdividing each 22.5-degree compass sector, the CHRONC calculations do *not* utilize the Gaussian histogram subdivisions in any respect.

For all of the CHRONC calculations, relating to both direct exposure (groundshine and resuspension as well as food and water ingestion) the Gaussian is averaged over the entire 22.5-degree compass sector to yield a single off-centerline geometric adjustment factor. A description of the intermediate and long-term phase off-centerline correction factor is provided in Section 3.2.1 of the *MACCS Model Description*.

7.1 Overview of CHRONC Mitigative Action Models

CHRONC incorporates calculations for two distinct periods of time, the intermediate phase and the long-term phase, as follows.

7.1.1 Intermediate Phase

The mitigative action model for the intermediate phase is very simple. If the intermediate-phase dose criterion is satisfied, the resident population is assumed to be present and subject to radiation exposure from groundshine and resuspension for the entire intermediate phase. If the intermediate-phase exposure leads to doses in excess of DSCRTI, then the population is assumed to be relocated to uncontaminated areas for the entire intermediate phase, with a corresponding per-capita economic cost defined by the user through the input variable POPCST (see Section 7.6).

The user can configure the calculations with an intermediate phase having a duration as short as zero (essentially, no intermediate phase, and a long-term phase beginning immediately upon conclusion of the emergency phase), or as long as 1 year. The calculations of food and water ingestion doses are based on the ground contamination levels estimated to be present at the beginning of the intermediate phase.

7.1.2 Long-Term Phase

The mitigative action models for the long-term exposure phase implemented in MACCS2 differ slightly from the corresponding models implemented in MACCS. The reason for this is that the decisions on mitigative action in the long-term phase are based on two sets of independent actions: (1) decisions relating to whether land at a specific location and time is suitable for human habitation, "habitability," and (2) decisions relating to whether land at a specific location and time is suitable for agricultural production, "farmability."

Since the COMIDA2-based food-chain model of MACCS2 differs markedly from the MACCS food-chain model, it is necessary to provide a description of how both of these food-chain models interact with the long-term mitigative actions triggered by habitability considerations. As a start, several concepts fundamental to MACCS2 that are unchanged from MACCS are

The ingestion of contaminated food and water is assumed to result in doses to an unspecified population.

Example Usage:

*
CHEXPTIM001 9.45E8 (30 YEARS PER EPA STANDARD DEFAULT EXPOSURE FACTORS)

Variable Name: CRTOCR
Variable Type: Character, Scalar
Allowed Range: $2 \leq \text{length} \leq 10$
Purpose: Defines the long-term phase critical organ. If the total direct exposure dose commitment to this organ in a grid element would exceed the dose criteria in either the intermediate phase period (TMIPND) or the long-term phase period (TMPACT), protective actions would be taken to limit that dose to acceptable levels.

Example Usage:

*
CHCRTOCR001 'L-EFFECTIVE'

7.5 Decontamination Plan Data

The decontamination plan data block defines the decontamination actions that may be taken during the long-term period to reduce doses to acceptable levels. These data define the decontamination strategies that are possible, their effectiveness, and their cost. Each decontamination level represents an alternative strategy that would reduce the projected long-term groundshine and resuspension doses by a factor called the "dose reduction factor." Up to three levels of decontamination can be defined.

The objective of decontamination is to reduce projected doses below the long-term dose criterion in a cost-effective manner. If the maximum decontamination level is insufficient to restore an area to immediate habitability, a period of temporary interdiction following the maximum decontamination level is considered in order to allow for dose reduction through radioactive decay and weathering. If the property cannot be made habitable within 30 years or if the cost of reclaiming the habitability of the property exceeds the cost of condemning it, the property will be condemned and permanently withdrawn from use.

Decontamination cost is divided into two categories and these two types of cost are calculated separately. Farm-dependent decontamination cost represents the cost of farmland decontamination in a grid element. Farm-dependent decontamination cost is a function of the area of the grid element devoted to agriculture. Population-dependent decontamination represents the cost of nonfarmland decontamination. Population-dependent decontamination cost is a function of the population residing in the grid element. The strategy of decontamination within a grid element is independent of the type of area being decontaminated.

For a given decontamination level, the same decontamination time and effectiveness apply to both farmland and nonfarmland, but the two costs are unique and are maintained independently for each type of decontamination. Owing to the requirement that the recovery of property must be cost-effective, it is possible, in a given element, that decontamination of nonfarmland is not performed, but farmland is instead condemned.

Decontamination of a grid element serves to reduce the contamination level in that element by the dose reduction factor associated with the decontamination effort being applied. Everything else being equal, a decontamination factor of 10 will cause the integrated dose over any exposure period to be reduced by a factor of 10.

During the decontamination period, which is assumed to begin at the end of the intermediate-phase time period (beginning of the long-term phase period), the population from areas that will be decontaminated is assumed to be relocated to uncontaminated areas, and the associated cost from loss of use is calculated in the same manner as temporary interdiction.

While engaged in cleanup efforts, decontamination workers are assumed to wear respiratory protection devices. Therefore, they accumulate only groundshine doses. These doses and the cancer fatalities that they induce contribute to the aggregated doses and cases of cancer fatalities tabulated in the MACCS2 output.

Decontamination reduces direct exposure doses (both groundshine and resuspension) caused by contamination of land and buildings. Many decontamination processes (e.g., plowing, fire-hosing) reduce groundshine and resuspension doses by washing surface contamination down into the ground. Since these processes may not move contamination out of the root zone, the WASH-1400-based economic cost model of MACCS2 assumes that farmland decontamination reduces direct exposure doses to farmers without reducing uptake of radioactivity by root systems. Thus, decontamination of farmland does not reduce the ingestion doses produced by consumption of crops that are contaminated by root uptake.

Variable Name: LVLDEC
Variable Type: Integer, Scalar
Allowed Range: $1 \leq \text{value} \leq 3$
Purpose: Defines the number of decontamination levels that can be utilized.
Example Usage:
*
CHLVLDEC001 2

Variable Name: TIMDEC
Variable Type: Real, Array
Allowed Range: $1.E-6 \leq \text{value} \leq 3.15E7$ (seconds) (1 year)
Purpose: Defines the time required for completion of each of the decontamination levels. The user must define a decontamination time for each of the LVLDEC decontamination levels. Decontamination begins at the end of the

intermediate phase (TMIPND). The values must be monotonically increasing.

Example Usage:

*
CHTIMDEC001 5.184E6 1.0368E7 (60, 120 DAYS)

Variable Name: DSRFCT
Variable Type: Real, Array
Allowed Range: $1.01 \leq \text{value} \leq 100.0$ (unitless)
Purpose: Defines the effectiveness of the various decontamination levels in reducing dose. A dose reduction factor of 3 means that the resulting population dose at that location will be reduced to one-third of what it would be without decontamination. The values specified must be monotonically increasing.

Example Usage:

*
CHDSRFCT001 3. 15.

Variable Name: CDFRM
Variable Type: Real, Array
Allowed Range: $1.0 \leq \text{value} \leq 1.E+5$ (dollars/hectare)
Purpose: Defines the farmland decontamination cost. A value must be supplied for each of the LVLDEC decontamination levels and the values must be monotonically increasing.

Example Usage:

*
CHCDFRM0001 562.5 1250.

Variable Name: CDNFRM
Variable Type: Real, Array
Allowed Range: $1.0 \leq \text{value} \leq 1.E+5$ (dollars/person)
Purpose: Defines the nonfarmland decontamination cost. A value must be supplied for each of the LVLDEC decontamination levels and the values must be monotonically increasing.

Example Usage:

*
CHCDNFRM001 3000. 8000.

Note: The remaining parameters in this section are used only to calculate the dose received from decontamination activities.

Variable Name: FRFDL
Variable Type: Real, Array
Allowed Range: $0.0 \leq \text{value} \leq 1.0$ (unitless)

Purpose: Defines the fraction of the farmland decontamination cost that is due to labor. A value must be supplied for each of the LVLDEC decontamination levels.

Example Usage:

*
CHFRFDL0001 .3 .35

Variable Name: FRNFDL

Variable Type: Real, Array

Allowed Range: $0.0 \leq \text{value} \leq 1.0$ (unitless)

Purpose: Defines the fraction of the nonfarmland decontamination cost that is due to labor. A value must be supplied for each of the LVLDEC decontamination levels.

Example Usage:

*
CHFRNFDL001 .7 .5

Variable Name: TFWKF

Variable Type: Real, Array

Allowed Range: $0.0 \leq \text{value} \leq 1.0$ (unitless)

Purpose: Defines the fraction of the decontamination period (TIMDEC) that a farmland decontamination worker spends in the contaminated area. A value must be supplied for each of the LVLDEC decontamination levels.

Example Usage:

*
CHTFWKF0001 .10 .33

Variable Name: TFWKNF

Variable Type: Real, Array

Allowed Range: $0.0 \leq \text{value} \leq 1.0$ (unitless)

Purpose: Defines the fraction of the decontamination period (ITMDEC) that a nonfarmland decontamination worker spends in the contaminated area during the decontamination period. A value must be supplied for each of the LVLDEC decontamination levels.

Example Usage:

*
CHTFWKNF001 .33 .33

Variable Name: DLBCST

Variable Type: Real, Scalar

Allowed Range: $1.0 \leq \text{value} \leq 1.E+6$ (dollars/man-year)

Purpose: Defines the labor cost of a decontamination worker.

Example Usage:

*

CHDLBCST001 35000.

7.6 Interdiction Plan Cost Data

The interdiction plan cost data block defines the parameters needed to calculate the cost of interdiction. The data supplied here are combined with data in the Site Data file and the regional characteristics data in the course of the calculations.

The model used in MACCS2 for assessing the cost of interdiction is based on the model described in WASH-1400, Appendix 6. It is currently used to calculate the economic cost of loss of use during both decontamination and temporary interdiction periods.

Variable Name: DPRATE
Variable Type: Real, Scalar
Allowed Range: $0.0 \leq \text{value} \leq 1.0$ (per year)
Purpose: Defines the depreciation rate that applies to property improvements during a period of interdiction. This depreciation rate is intended to account for the loss of value of buildings and other structures resulting from a lack of habitation and maintenance.

Example Usage:

*

CHDPRATE001 .20

Variable Name: DSRATE
Variable Type: Real, Scalar
Allowed Range: $0.0 \leq \text{value} \leq 1.0$ (per year)
Purpose: Defines the expected rate of return from land, buildings, equipment, *etc.* For example, the inflation-adjusted real mortgage rate for land and buildings could be used.

Example Usage:

*

CHDSRATE001 .12

Variable Name: POPCST
Variable Type: Real, Scalar
Allowed Range: $1.E-6 \leq \text{value} \leq 1.E+6$ (dollars/person)
Purpose: Defines the per capita removal cost for temporary or permanent relocation of population and businesses in a region rendered uninhabitable during the long-term phase time period. This cost is assessed if any of the following actions are required: decontamination alone, decontamination followed by

interdiction, or condemnation. This value should be derived in a way that takes account of both personal and corporate income losses for a transitional period as well as moving expenses.

Example Usage:

*
CHPOPCST001 5000.

7.7 Groundshine Weathering Data

The groundshine weathering definition data block defines the groundshine weathering equation from Gale, Miller, and Fisher (1964). The groundshine weathering relationship is defined as

$$GW(t) = GWCOEF(1) \cdot \exp[-\ln(2) \cdot t/TGWHLF(1)] + \dots + GWCOEF(n) \cdot \exp[-\ln(2) \cdot t/TGWHLF(n)]$$

where $GW(t)$ represents the groundshine weathering at time t , given the weathering coefficients, $GWCOEF$, and the weathering half-lives, $TGWHLF$. The user must specify the number of terms, n , in the relationship and the values for the weathering coefficients and weathering half-lives.

Variable Name: NGWTRM
Variable Type: Integer, Scalar
Allowed Range: $1 \leq \text{value} \leq 2$
Purpose: Defines the number of terms in the groundshine weathering relationship.
Example Usage:
*
CHNGWTRM001 2

Variable Name: GWCOEF
Variable Type: Real, Array
Allowed Range: $1.0E-20 \leq \text{value} \leq 1.0$ (unitless)
Purpose: Defines the array of NGWTRM coefficients in the groundshine weathering equation.
Example Usage:
*
CHGWCOEF001 0.5 0.5

Variable Name: TGWHLF
Variable Type: Real, Array
Allowed Range: $1.E-6 \leq \text{value} \leq 1.E+12$ (seconds)
Purpose: Defines the array of NGWTRM half-lives in the groundshine weathering equation.

7.15 Economic Cost Results

The CHRONC module calculates the economic costs of all the long-term protective actions as well as the cost of the emergency response actions that were modeled by EARLY. The option to print these economic results is controlled by the user.

No economic costs are printed unless the user specifically requests them. Each request for economic results produces the block of 13 economic results described below. All of the economic cost measures are reported in dollars.

TOTAL ECONOMIC COSTS—the sum of population- and farm-dependent costs.

POP.-DEPENDENT COSTS—the sum of population-dependent decontamination, interdiction, and condemnation costs.

FARM-DEPENDENT COSTS—the sum of farm-dependent decontamination, interdiction, and condemnation costs as well as milk and crop disposal costs.

POP.-DEPENDENT DECONTAMINATION COST—nonfarm property (*i.e.*, property associated with resident population) decontamination cost.

FARM-DEPENDENT DECONTAMINATION COST—farm property decontamination cost.

POP.-DEPENDENT INTERDICTION COST—depreciation and deterioration of nonfarm property during the period it cannot be used during both decontamination and interdiction plus the cost of population removal (see POPCST in Section 7.6).

FARM-DEPENDENT INTERDICTION COST—depreciation and deterioration of farm property during the period it cannot be used during both decontamination and interdiction.

POP.-DEPENDENT CONDEMNATION COST—compensation paid for permanent loss of nonfarm property plus the cost of population removal.

FARM-DEPENDENT CONDEMNATION COST—compensation paid for permanent loss of farm property because it could not be returned to production within 8 years of the accident.

EMERGENCY PHASE COSTS—per-diem costs to compensate people for being away from home due to evacuation and relocation during the emergency phase.

Note: When more than one emergency-response scenario is being evaluated by the EARLY module, the presentation of evacuation and relocation cost is calculated on the basis of the scenario that was defined last in sequence on the EARLY input file.

INTERMEDIATE PHASE COSTS—per-diem costs to compensate people for being away from home due to relocation for the duration of the intermediate phase if DSCRTI is exceeded.

MILK DISPOSAL COSTS—compensation for lost milk sales during a quarter of a year if the first year's crops require disposal. This cost is incurred if the accident occurs during the growing season *and* any of the following conditions are found:

1. the growing-season milk action guide is exceeded, or
2. any decontamination actions are required, or
3. (for MACCS food model only) if COUPLD=.TRUE. *and* any long-term interdiction is required.

CROP DISPOSAL COSTS—compensation for lost nonmilk crop sales during a full year. This cost is incurred if the accident occurs during the growing season and any of the following conditions are found:

1. the growing-season nonmilk action guide is exceeded, or
2. any decontamination actions are required, or
3. (for MACCS food model only) if COUPLD=.TRUE. *and* any long-term interdiction is required.

Variable Name: NXUM10
Variable Type: Integer, Scalar
Allowed Range: $0 \leq \text{value} \leq 10$
Purpose: Specifies the number of economic result blocks to be printed.

Variable Name: I1DS10
Variable Type: Integer, Scalar
Allowed Range: $1 \leq \text{value} \leq \text{NUMRAD}$
Purpose: Defines the inner spatial interval of the region of interest for this result block. The user must supply NXUM10 values in column 1 of the data block.

Variable Name: I2DS10
Variable Type: Integer, Scalar
Allowed Range: $I1DS10 \leq \text{value} \leq \text{NUMRAD}$
Purpose: Defines the outer spatial interval of the region of interest for this result block. The user must supply NXUM10 values in column 2 of the data block.

Note: In order to obtain the CCDF tables of a consequence measure requested in this section, append the character string 'CCDF' to the line requesting that result as the third item on the data record. The CCDF tables will be printed on the output file.

Example Usage:

```
*  
* ECONOMIC COST RESULTS BROKEN DOWN BY 13 TYPES OF COSTS  
*
```

```

* NUMBER OF RESULTS OF THIS TYPE THAT ARE BEING REQUESTED
* FOR EACH RESULT YOU REQUEST, THE CODE WILL PRODUCE A SET OF 13
*
TYP10NUMBER      2          (UP TO 10 ALLOWED)
*
*                INNER      OUTER
*
TYP10OUT001      1          26      CCDF   (0-1000 MILES)
TYP10OUT002      1          19      CCDF   (0-50 MILES)

```

7.16 Action Distance Results

The long-term protective actions that result from the calculations of the CHRONC module depend on the data supplied by the user. Associated with the long-term actions of decontamination, interdiction, and crop disposal are the maximum distances to which these actions are implemented. The user must specify whether these maximum action distance results are to be printed.

The option to print or not print these long-term action distances is controlled by a flag specified by the user. The flag value `.TRUE.` will produce the eight maximum action distance results that are described below. Each result is identified by the result name used on the output file together with a description of the result. All of the distances are reported in kilometers.

FARM-DEPENDENT DECONTAMINATION DIST.—maximum distance at which farmland decontamination is required.

POP.-DEPENDENT DECONTAMINATION DIST.—maximum distance at which nonfarmland decontamination is required.

FARM-DEPENDENT INTERDICTION DIST.—maximum distance at which farmland decontamination or interdiction is required.

POP.-DEPENDENT INTERDICTION DIST.—maximum distance at which nonfarmland decontamination or interdiction is required.

FARM-DEPENDENT CONDEMNATION DIST.—maximum distance at which farmland condemnation is required.

POP.-DEPENDENT CONDEMNATION DIST.—maximum distance at which nonfarmland condemnation is required.

MILK DISPOSAL DIST.—maximum distance at which the loss of 3 months of milk and dairy products sales is required.

CROP DISPOSAL DIST.—maximum distance at which the loss of 1 year of nonmilk crop sales is required.

The flag value `.FALSE.` will eliminate the maximum action distance results from the output.

Variable Name: FLAG11
Variable Type: Logical, Scalar
Allowed Value: .TRUE. or .FALSE.
Purpose: Specifies the print flag for the maximum action distance results.

Note: In order to obtain the CCDF tables of a consequence measure requested in this section, append the character string 'CCDF' to the line requesting that result as the second item on the data record. The CCDF tables will be printed on the output file.

Example Usage:

*
TYP11FLAG11 .TRUE.

7.17 Impacted Area/Population Results

The long-term protective actions that result from the calculations of the CHRONC module depend on the data supplied by the user. Associated with the long-term actions of decontamination, interdiction, condemnation, and crop disposal are the farm areas and populations that are affected by these actions. The option to print these impacted area/population results is controlled by the user.

No impacted farm-area/population results are printed unless the user specifically requests them. Each request for impacted farm-area/population results produces the block of eight results identified below. All farm-area results are reported in hectares and all population results are reported as number of individuals.

FARM DECONTAMINATION (HECTARES)—area within which farmland decontamination was required.

POP. DECONTAMINATION (INDIVIDUALS)—population of areas that required decontamination of nonfarm property.

FARM INTERDICTION (HECTARES)—farmland area which required either decontamination or interdiction.

POP. INTERDICTION (INDIVIDUALS)—population of areas that required either decontamination or interdiction of nonfarm property.

FARM CONDEMNATION (HECTARES)—area within which farmland condemnation was required.

POP. CONDEMNATION (INDIVIDUALS)—population of areas that required condemnation of nonfarm property.

MILK DISPOSAL AREA (HECTARES)—affected area requiring the loss of milk and dairy products sales for 3 months.

CROP DISPOSAL AREA (HECTARES)—affected area requiring the loss of nonmilk crop sales for a year.

Variable Name: NUM12
Variable Type: Integer, Scalar
Allowed Range: $0 \leq \text{value} \leq 10$
Purpose: Specifies the number of impacted farm-area/population result blocks to be printed.

Variable Name: I1DS12
Variable Type: Integer, Scalar
Allowed Range: $1 \leq \text{value} \leq \text{NUMRAD}$
Purpose: Defines the inner spatial interval of the region of interest for this result block. The user must supply NUM12 values in column 1 of the data block.

Variable Name: I2DS12
Variable Type: Integer, Scalar
Allowed Range: $I1DS12 \leq \text{value} \leq \text{NUMRAD}$
Purpose: Defines the outer spatial interval of the region of interest for this result block. The user must supply NUM12 values in column 2 of the data block.

Note: In order to obtain the CCDF tables of a consequence measure requested in this section, append the character string 'CCDF' to the line requesting that result as the third item on the data record. The CCDF tables will be printed on the output file.

Example Usage:

```
*
TYP12NUMBER      2          (UP TO 10 ALLOWED)
*
*                INNER      OUTER
TYP12OUT001      1          26      CCDF (0-1000 MILES)
TYP12OUT002      1          19      (0-50 MILES)
```

7.18 Maximum Individual Food Ingestion Dose at a Distance

This result is available only when the COMIDA2-based food model option is specified (FDPATH='NEW'). If requested, MACCS2 will report statistics on the maximum food ingestion dose calculated for the 16 wind directions within a user-specified spatial interval, for effective dose or thyroid dose. No other organs are available for this result.

**Entergy Contention NYS-12C
Attachment 6**

Survey of Costs Arising From Potential Radionuclide Scattering Events

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ABSTRACT

The potential effects from scattering radioactive materials in public places include health, social, and economic consequences. These are substantial consequences relative to potential terror activities that include use of radioactive material dispersal devices (RDDs). Such an event with radionuclides released and deposited on surfaces outside and inside people's residences and places of work, commerce, and recreation will require decisions on how to recover from the event. One aspect of those decisions will be the cost to clean up the residual radioactive contamination to make the area functional again versus abandonment and/or razing and rebuilding.

Development of cleanup processes have been the subject of experiment from the beginning of the nuclear age, but formalized cost breakdowns are relatively rare and mostly applicable to long term releases in non-public sites. Pre-event cleanup cost estimation of cost for cleanup of radioactive materials released to the public environment is an issue that has seen sporadic activity over the last 20 to 30 years. This paper will briefly review several of the more important efforts to estimate the costs of remediation or razing and reconstruction of radioactively contaminated areas. The cost estimates for such recoveries will be compared in terms of 2005 dollars for the sake of consistency. Dependence of cost estimates on population density and needed degree of decontamination will be shown to be quite strong in the overall presentation of the data.

LITERATURE OVERVIEW

Techniques used for cases of released radioactive materials in the event of an accident during transport have been a principal source of cost estimating techniques. These are contained in the RADTRAN transport risk assessment codes that were first produced in 1974 for use in preparing NUREG-0170 (NRC, 1977). That version, RADTRAN I, had several revisions in succeeding issues of the code to the present version contained in RADTRAN VI. Two non-RADTRAN

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methodologies are also notable. First, is an analysis completed to estimate the cost of cleaning up plutonium scattered as a result of a nuclear weapons accident that was completed in 1996 (Chanin, 1996). Second is a computer code developed in the UK (and apparently only usable for UK government purposes) called CONDO (Charnock, 2003). In addition, some cleanup cost estimates have been put forward in a paper (Reichmuth, 2005) for the Department of Homeland Security that gives cleanup cost estimates for high population density areas based on RADTRAN IV calculations and actual costs for remediation of the World Trade Center (WTC) site in New York City.

PROCESS USED

The methodology for estimating cleanup costs uses two principal parameters. The first and most basic is the acceptable residual level of contamination determined for each nuclide released that will avoid a given level of radiological dose to persons who will remain living/working in the contaminated area. The acceptable dose and, hence, the residual contamination level for each nuclide, is likely to be negotiated for each release event (DHS, 2007). The second parameter is the Decontamination Factor, DF, which can be rationalized in two ways:

- At any point at the site of the radioactive material release, it is the ratio of the local contamination level for a released nuclide to the acceptable residual contamination level, (DF_s)
- A measure of the capability of a given cleanup method (like water hosing) to reduce the contamination level for a given surface material. Thus, it is the ratio of contamination level before treatment to contamination level after treatment, (DF_m)

Specific cleanup technologies applied to specific surfaces and nuclides are characterized by the maximum DF_m achievable. If the DF_s is less than the effects of all the cleanup processes that could be applied sequentially, $DF_s < \sum DF_m$, then cleanup is successful, but if the DF_s is greater than the effects of all the cleanup processes that are applied sequentially, $DF_s > \sum DF_m$, then other alternatives, like razing and rebuilding, or interdiction must be applied.

The methodologies used in all of the cited literature recognized the limitations of cleanup and employ razing or interdiction in the event that the required DF_s for a given situation could not be achieved by standard cleanup processes. For most of the early cost estimation techniques, it was assumed that a DF_m of 50 was generally attainable, but more recent data, nicely summarized in the CONDO report, suggest that a DF_m greater than 10 or so (with some isolated exceptions) is unlikely to be attained. This suggests that the earlier cost estimates would be expected to be somewhat low, since cleanup costs are generally lower than raze and rebuild or interdiction methods.

For the data presented below the original cleanup cost estimates presented in the source documents were extracted and converted to 2005 costs using standard cost deflators (Williamson, 2006). In general, costs were stratified by the initial level of contamination as represented by DF_s values. Light contamination corresponded to a $DF_s < 5$; medium, $5 < DF_s < 10$; and heavy, $DF_s > 10$. Costs in the RADTRAN reports were further stratified by a specification relating to population density (rural, suburban, and urban) corresponding to mean population densities of about 10, 750, and 3800 persons per km^2 respectively. In the Chanin report, the urban population density values were taken to be about 1350 persons/ km^2 (corresponding to a mean population density in areas identified as urbanized by the census bureau). Reichmuth stated that population densities (PD in persons/ km^2) were as follows:

Rural	$0 < PD < 50$
Urban	$50 < PD < 3000$
High Density Urban	$3000 < PD < 10,000$
Hyper Density Urban	$10,000 < PD$

As is obvious from the above, there is no strict translation of words describing population density terminology in quantitative terms, but there is enough specificity to compare various costs estimates as a function of population density.

The SNL study (Chanin, 1996) provided a fairly detailed methodology in which to estimate costs. For an urban area, the overall results that came out of the effort is shown in Table I.

Table I. Urban Area (1344 persons/ km^2) Remediation Costs for Year 2005 in $\$/km^2$ from Appendix G (Chanin, 1996).

Area Usage Type	Costs per sq. km			Area Fraction	Area Weighted Costs		
	Light ($2 < DF_s < 5$)	Moderate ($5 < DF_s < 10$)	Heavy ($DF_s > 10$)		Light ($2 < DF_s < 5$)	Moderate ($5 < DF_s < 10$)	Heavy ($DF_s > 10$)
Residential ^a	\$72.4	\$163.9	\$301.2	0.316	\$22.9	\$51.8	\$95.2
Commercial	\$195.3	\$295.5	\$851.2	0.173	\$33.8	\$51.1	\$147.3
Industrial	\$674.0	\$704.2	\$1,245.9	0.064	\$43.1	\$45.1	\$79.7
Streets	\$15.9	\$18.5	\$247.7	0.175	\$2.8	\$3.2	\$43.3
Vacant Land	\$81.1	\$85.7	\$95.2	0.272	\$22.1	\$23.3	\$25.9
Overall Cost per sq. km					\$124.6	\$174.5	\$391.4

^a includes single and multiple family dwellings and apartment houses

Table I demonstrates the methodology used as well as results. Costs were estimated for generic land use areas and then weighted by the fraction of the overall area in that land use class. Short of repeating the considerable effort in developing the report results, what options exist for estimating the cleanup cost for higher population density areas? If data is available for the land use area fractions in the higher population area, then an estimate can be made by plugging in those values in the 5th column of Table I. In addition, an adjustment for population density can

be made by noting that higher population density implies that there are more dwelling units per km² and that the costs shown in Table I are based on individual dwellings. As a result, multiplying the residential costs by a ratio of population density should adjust for higher populations in the same area. In addition, since commercial space is likely to expand with population density, the commercial values would also be adjusted in a similar manner. These are approximate methods and useful only for order of magnitude estimates. The result of such adjustments is shown in Table II.

Table II. Estimated Remediation Costs for New York City Reflecting Land Use Distribution and Population Density.

Land Use	Area Fraction ^a	Area Weighted				Population and Area Weighted		
		Light (2<DF _s <5)	Moderate (5<DF _s <10)	Heavy (DF _s >10)	PD Multiple	Light (2<DF _s <5)	Moderate (5<DF _s <10)	Heavy (DF _s >10)
Residential	0.287	\$20.31	\$45.99	\$84.51	6.82 ^b	\$138.55	\$313.64	\$576.38
Commercial	0.164	\$32.09	\$48.55	\$139.84	6.82 ^b	\$218.84	\$331.12	\$953.80
Industrial	0.068	\$45.51	\$47.55	\$84.12	1.00	\$45.51	\$47.55	\$84.12
Streets	0.250	\$3.97	\$4.62	\$61.88	1.00	\$3.97	\$4.62	\$61.88
Vacant Land	0.238	\$19.29	\$20.38	\$22.64	1.00	\$19.29	\$20.38	\$22.64
	1.00							
Overall Cost (\$M/km ²)		\$121.2	\$167.1	\$393.0		\$426	\$717	\$1,699

^a derived from New York City data (http://www.nyc.gov/html/dcp/pdf/landusefacts/landuse_tables.pdf)

^b ratio of New York City population density to that in Table I (9166/1344 = 6.82)

The process used to produce Table II can be used to derive remediation cost estimates for other population density areas as shown by the triangle points in Figure 1. Figure 1 also contains remediation cost data from the source documents discussed above.

The Legend in Figure 1 is quite large, but is color keyed for some addition clarity. Red lines and symbols are for (DF_s >10), orange for (5 < DF_s < 10), and green for (1 < DF_s < 5). Purple symbols are for estimates that are unspecific about the DF_s they apply to, but the values could be as large as 50.

Figure 1 shows a fair amount of variability in the costs estimated by the various methods and sources covered in this overview. The three straight lines penciled in on the plot are intended to suggest how the costs might vary with population density and degree of contamination. The lines are a reasonable representation of much of the information, but some data points deviate substantially and will be discussed here. The two red disc points that are well above the curves are from the paper by Reichmuth and are based on estimates of cost derived to clean up and restore (not rebuild) the 16 acre WTC site in New York City after 9/11. The cost to replace the facilities is estimated to be an order of magnitude larger (not shown on the plot).

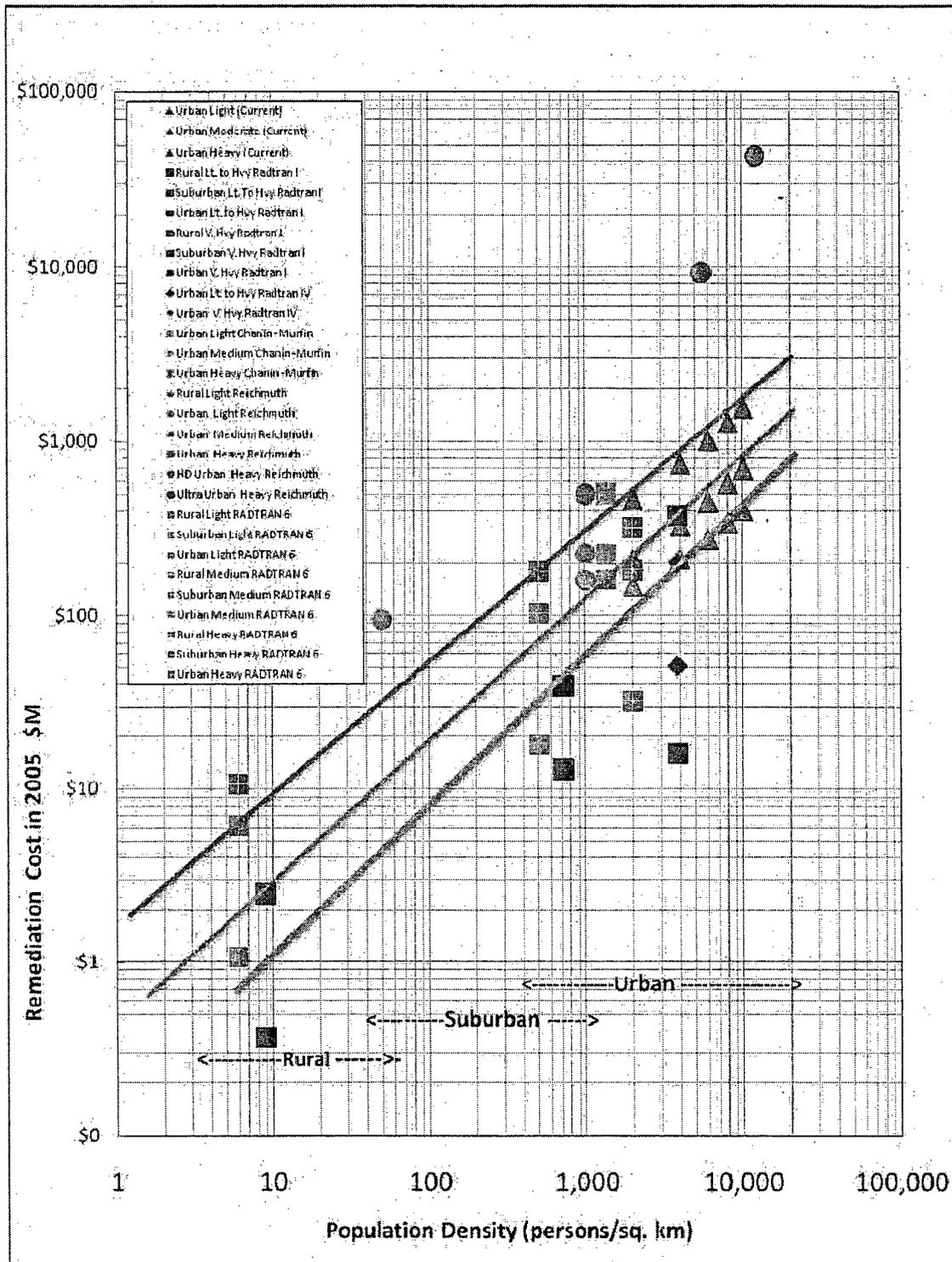


Figure 1: Remediation Cost Estimates Compared.

Since the estimated cost was based on the area of the WTC site, but the actual expenditure covered actions made over the surrounding areas and included actions somewhat beyond what would be expected in response to an RDD event, the actual cost/km² could be overestimated by 50% to 60%.

The purple squares below the curve represent the estimates that were done using RADTRAN I in the mid 1970's with an unsophisticated methodology. Moreover, the estimates are the oldest and most subject to uncertainty associated with selecting the best deflator statistic for updating costs. The RADTRAN 6 estimates (purple diamonds) also are below the trend lines but not as pronounced an effect as with RADTRAN 6 (Osborn, 2007). Note that the RADTRAN 6 values (squares with center crosses) fit much more closely with the other estimates and the trend lines. The trend lines favor the cost values generated by the Sandia study (Chanin, 1996), because of the detail involved in the initial estimates and the ability to project the costs to other population densities and land use area fractions.

CONCLUSION

The likelihood of a "Dirty Bomb" attack in the US or elsewhere is unknown. Most sources suggest (e. g., Karam, 2005) that the radiological consequences of such an attack are unlikely to be life threatening and that the greatest mortal danger is to persons exposed to blast from the device (assuming that is its mode of operation). However, the expenditures needed to recover from a successful attack using an RDD type device, as depicted in Figure 1, are likely to be significant from the standpoint of resources available to local or state governments. Even a device that contaminates an area of a few hundred acres (a square kilometer) to a level that requires modest remediation is likely to produce costs ranging from \$10M to \$300M or more depending on intensity of commercialization, population density, and details of land use in the area. As a result, it is important to put appropriate emphasis on the efforts now being taken by the Department of Energy, Nuclear Regulatory Commission, and the Department of Homeland Security to provide accountancy for radioactive materials used in the public and private sectors and to detect, as fully as possible, traffic in potential dirty bomb materials within and on the borders of the USA.

REFERENCES

(Chanin, 1996): Chanin, David I. and Murfin Walter B., "Site Restoration: Estimation of Attributable Costs From Plutonium-Dispersion Accidents", Sandia National Laboratories, Report SAND 96-0957, May 1996.

(Charnock, 2003): Charnock, T. et al, "CONDO: Software for Estimating the Consequences of Decontamination Options", National Radiological Protection Board, Report NRPB-W43, May 2003).

(DHS, 2007): Department of Homeland Security, Preparedness Directorate; "Protective Action Guides for Radiological Dispersion Device (RDD) and Improvised Nuclear Device (IND)", Federal Register, Vol. 71, No. 1, January 3, 2006, p174-196.

(Kanipe, 1992): Kanipe, F and Neuhauser, K. S., "RADTRAN 4: Volume 4 Programmers Manual", Sandia National Laboratories, Report SAND89-2370, July 1992.

(Karam, 2005): Karam, Andrew, "Radiological Terrorism," Human and Ecological Risk Assessment, Vol. 11, 2005, pp. 501-523.

(Neuhauser, 1992): Neuhauser, K. S. and Kanipe, F., "RADTRAN 4: Volume 3 User Guide", Sandia National Laboratories, Report SAND89-2370, January 1992.

(Neuhauser, 1993): Neuhauser, K. S. and Kanipe, F., "RADTRAN 4: Volume 2 Technical Manual", Sandia National Laboratories, Report SAND89-2370, August 1993.

(Osborn, 2007): Private Communication with Douglas Osborn, SNL relative to estimated cleanup cost estimated by RADTRAN VI, October 2007.

(Penisten, 2007): Penisten, J. P., and Weiner, R., "An Economic Model of a Radioactive Materials Transportation Accident for the RADTRAN Risk Assessment Code", Proceedings of Waste Management 2005, February 27-March 3, 2005, Tucson, AZ (SAND2005-3802C).

(NRC, 1977): "Final Environmental Statement on the Transportation of Radioactive Materials by Air and Other Modes", NUREG-0170, US Nuclear Regulatory Commission, Washington, DC, December 1977.

(Reichmuth, 2005): Reichmuth, B., et al, "Economic Consequences of a RAD/NUC Attack: Cleanup Standards Significantly Affect Cost", Proceedings of Working Together R&D Partnerships in Homeland Security, Boston, MA, April 2003 (Pacific Northwest National Laboratory, PNNL-SA-45256).

(Williamson, 2006): Williamson, Samuel H., "Five Ways to Compute the Relative Value of a U.S. Dollar Amount, 1790 - 2005," MeasuringWorth.Com, 2006

(<http://www.measuringworth.com/calculators/uscompare/result.php> .

**Energy Contention NYS-12C
Attachment 7**

ECONOMIC CONSEQUENCES OF A RAD/NUC ATTACK: CLEANUP STANDARDSSIGNIFICANTLY AFFECT COST

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ABSTRACT

Property destruction, loss of life, and injuries sustained from a nuclear or radiological attack have significant economic consequences. The loss of productive assets can extend for long periods and generate significant economic loss. Economic impacts caused by an event need to be addressed in sequential order beginning with the detonation, atmospheric dispersion, and deposition of the fallout from the weapon. Weapon characteristics provide the boundary conditions for the response, including defining how large the response area is and what specific actions need to be taken to protect the population in the target area. These economic consequences are highly dependent on the magnitude of the weapon event and do not scale in a linear fashion.

The cost to clean up or remediate the affected area will depend on the cleanup standard applied to the event and is highly sensitive to this standard. Currently, there are no cleanup standards specifically designed for Rad/Nuc terrorist events, but it is likely that the existing Environmental Protection Agency (EPA) and Nuclear Regulatory Commission (NRC) standards would apply defacto. The Department of Energy (DOE) has spent billions of dollars on superfund cleanup, under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) guidance, at former weapons production sites, and the cleanup is expected to continue through 2035. This paper offers an economic perspective on the magnitude of the consequences for a selected class of targets in the United States, with an emphasis on cost sensitivity as the cleanup standard changes.

INTRODUCTION

The prospect of a nuclear attack on the United States was long thought to be restricted to the domain of state actors. Following the terrorist events of September 11, 2001, and other more recent terrorist activities around the world, concerns about all types of terror attacks, including potential radiological and nuclear attacks, have been magnified. The spotlight has shifted to countermeasures that will either reduce the likelihood or reduce the consequences of a radiological or nuclear (Rad/Nuc) terrorist attack.

The decision to invest in Rad/Nuc countermeasures can be viewed as a tradeoff between investment cost of the countermeasure and the consequences of the event. There are both physical consequences and economic consequences that would result from a Rad/Nuc event. Economic impacts caused by an event, and the subsequent response to the event, need to be addressed in sequential order and begin with the physical impacts of the detonation, atmospheric

¹ The Pacific Northwest National Laboratory is operated by Battelle for the U.S. Department of Energy.

dispersion, and deposition of the fallout from the weapon. Physical consequences dictate the response function including the long-term cleanup and site restoration actions taken. One of the recurring themes regarding event response is that there are currently no federal standards that cover the long-term site restoration and cleanup following a radiological or improvised nuclear device (IND) terrorist attack.

The cost to clean up or remediate the affected area is highly sensitive to the cleanup standard applied to the event. There are currently no cleanup standards specifically designed for Rad/Nuc terrorist events, but it is likely that the existing EPA and NRC standards would apply defacto [1].

The General Accounting Office (GAO) reports that the current EPA and NRC cleanup standards differ and these differences have implications for both the pace and ultimate cost of cleanup [2].

The Department of Energy (DOE) has spent billions of dollars on superfund cleanup at former weapons production sites and the cleanup is expected to continue through 2035 [3]. In 2003 recognizing the importance of this issue, the Department of Homeland Security (DHS) tasked an interagency working group to address the issue of Protective Action Guidelines (PAGs) for radiological dispersal devices (RDDs) and improvised nuclear device (IND) incidents. DHS anticipates a draft of that guidance to be issued in the *Federal Register* in June of 2005.

This paper offers an economic perspective on the magnitude of the consequences for selected targets with an emphasis on cost sensitivity as the cleanup standard changes. The work described provides a framework within which the physical consequences of a Rad/Nuc attack can be translated into the economic consequences in U.S. dollars. These effects need to be understood in order to prescribe appropriate countermeasures and policy remedies.

A METHODOLOGY FOR ECONOMIC CONSEQUENCE CALCULATIONS

For this study, "Rad/Nuc" spans a range of possible nuclear weapons and one large radiological dispersion device:

- 0.7 kT nuclear weapon
- 13 kT nuclear weapon
- 100 kT nuclear weapon
- 10 kCi Cs-137 RDD

Five potential targets were selected ranging from an isolated rural area to very high density urban areas. All of the following targets are located on U.S. Borders and/or Ports of Entry into the United States:

- Lukeville, AZ
- Charleston, SC
- Detroit, MI
- San Ysidro, CA
- New York City, NY

The taxonomy of location, weapon yield, and contamination contours was parameterized and fed into the National Atmospheric Release Advisory Center (NARAC) Model to generate the physical consequences. Consequences vary based upon assumptions about where the population is at the time of the attack (home vs. work, indoors vs. outdoors), on what meteorological conditions are assumed, and on the prompt versus fallout effects of the weapon. Those assumptions are classified and not discussed in this paper.

Our focus here was primarily on the economic consequences of a nuclear weapon attack; the impacts of an RDD are still under investigation and will merit further research.

Weapon characteristics, including the type of weapon, the quantity of material, and how the dispersion is achieved, provide the boundary conditions for the response including how much area is impacted and what actions need to be taken to protect human health and the environment. The physical consequences derived from weapon characteristics were then used to calculate economic consequences in five broad categories of cost:

1. Loss of productivity from earnings forgone
2. Indirect economic effects or “multiplier”
3. Loss and damage to building structures and building contents
4. Decontamination and decommissioning referred to as cleanup cost
5. Evacuation cost

These economic consequences, including the cost and time to clean up from the event, are highly dependent on the magnitude of the weapon event and do not scale in a linear fashion.

The consequences of a nuclear weapon detonation are estimated to have both significant loss of human life and substantial cleanup and reconstruction costs. A high degree of outright destruction of property (buildings, public infrastructure, and productive capital equipment of all sorts) will occur due to the detonation. In general, the economic cost of this type of loss is just the lost productivity of the capital (including human capital) destroyed. In a market economy, it is a reasonable approximation to use market values as a surrogate for the value of this production.

The economic and psychosocial effects of an RDD attack are expected to be more significant than the potential loss of human life and building destruction [4]. In the event of a radiological dispersion event, there is a set of economic consequences generated as a result of the event and a set of economic consequences that is independent of the magnitude of a radiological event because of public perception about the dangers associated with RDDs.

In order to derive consequence estimates, an economic evaluation taxonomy was established to determine what potential targets and cleanup levels should be evaluated for the five broad categories of economic consequences.

The responses to nuclear weapon events can be thought of as phases: 1) the initial emergency response and evacuation, 2) the intermediate response where most emergencies have been handled and the focus shifts to cleanup, and 3) the cleanup phase where recovery and cleanup actions are designed to reduce radiation levels in order for land/buildings to be re-used or re-inhabited.

Our primary focus is on phase 3. The cleanup cost for an area is highly dependent on the cleanup standard used, the cleanup technology employed, and the radiological (and other safety) conditions under which cleanup is conducted. Decontamination efforts will include cleaning or sandblasting the exterior or completely demolishing affected buildings, safely disposing of generated radioactive waste, decontaminating the emergency vehicles used in the response and

recovery process, and many other activities. These efforts alone could cost billions of dollars and take decades to accomplish, depending on the magnitude of the radiological event and the cleanup level employed.

Because of our interest in the impacts of cleanup levels on the cost, we considered a range of potential cleanup levels from existing standards and protective action guidelines that might ultimately apply to a terrorist attack (Figure 1). This taxonomy was applied to all five potential targets for the purpose of providing a consequence valuation methodology. On a scale of most conservative to least conservative, the Environmental Protection Agency (EPA) standard governing cleanup at sites with radioactive contamination represents the most conservative level that we evaluated. The intent of this paper was to assess the sensitivity, not to determine which cleanup standard is best.

15 mrem/yr	EPA, "Establishment of Cleanup Levels for CERCLA Sites With Radioactive Contamination" (e.g., Hanford Site)
25 mrem/yr	NRC, Final Rule on Radiological Criteria for License Termination (10 CFR Part 20, Subpart E)
100 mrem/yr	Health Physics Society Position Statement, "Guidance for Protective Actions Following a Radiological Terrorist Event"
500 mrem/yr	EPA, "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents" 400-R-92-001, "... doses in any single year after the first will not exceed 0.5 rem"
2 rem/yr	EPA, "Manual of Protective Action Guides and Protective Actions for Nuclear Incidents" 400-R-92-001, "... doses in first year will not exceed 2 rem"
5 rem/yr	NRC, "Standards for Protection Against Radiation," recommendation and established dose limit for workers of 5 rem/yr (10 CFR 20 Subpart C)

Figure 1. Cleanup Levels Evaluated for Economic Consequences

There are a large number of economic variables that could potentially be included in the calculation of impacts. These include psychological impacts and long-term societal impacts of living under enduring heightened security conditions. Our intent was to quantify those elements we believed were most representative of this type of terrorist attack. A discussion of those five variables follows:

Loss of Productivity from Earnings Forgone

To calculate the loss of human capital due to death from a weapon event, we used a "lifetime-earnings loss" method outlined in a study by the Federal Reserve Bank of New York [5]. This method estimates individual economic losses by estimating a worker's annual earnings over his or her remaining working lifetime. The estimated earnings are then discounted to the current time period (net present value) using a discount factor of 7%, which is the OMB rate to discount lifetime earnings lost and includes a "social factor" to account for the other societal losses that result from premature death. Ex ante, the number of affected workers is tied to the geographic size of the event.

There will be "indirect" economic impacts associated with the consequences of a nuclear or radiological attack. For example, during the decontamination process, buildings in the affected area would not be functional. Residents would have to be relocated. Businesses would have to do the same or simply halt their activities until completion of the decontamination. Depending on the nature of business conducted inside those buildings, the regional and national economy could be negatively impacted. A resulting decrease in the area's real estate prices, tourism, and commercial transactions could have long-term negative effects on the area's economy.

There are several economic methods whereby "multipliers" are applied to the estimated direct costs (lost income) to estimate the indirect economic impacts. These values may be estimated on the basis of information about the nature of the affected businesses in the response area. The indirect impacts will be larger if the markets for directly affected sectors are beyond the local economic area. In essence, these sectors are "export" driven. If these sectors are no longer allowed to operate, then the impacts will be severe because supporting businesses in the local area will be forced to scale back. We derived multipliers from the FRBNY 9/11 study [5] as follows:

- Low impact scenario (10 kCi Cs-137 RDD, and 0.7 kT nuclear weapon) – 46% of lost earnings
- High impact scenario (13 kT and 100 kT nuclear weapon) – 82% of lost earnings

Decontamination and Decommissioning or Cleanup Cost

Cleanup and restoration of buildings and land after a Rad/Nuc event will be complicated by the need to decontaminate and, potentially, demolish radiologically contaminated buildings and land. The cost of this cleanup will be highly dependent on the areal extent of cleanup, which, in turn, is highly dependent on the level of cleanup required. The cost of cleanup of any given area will be dependent on the relative level of economic development or financial investment that has been made in the area of concern. The approach taken in this study was to develop unit cost factors (\$/km²) for the cleanup of areas having different levels of population density; population density being used as a surrogate for economic activity. Cleanup cost data primarily came from two sources:

- The economic model provided as a companion to the RADTRAN 5 computer program developed for analysis of the consequences and risks of radioactive material transportation (see <http://ttd.sandia.gov/risk/radtran.htm>). [6] This economic model was initially developed to estimate the economic consequences of plutonium-dispersal accidents.
- The FRBNY study of the economic effects of the 9/11 terrorist attack on New York City, "Measuring the Effects of the September 11 Attack on New York City" [5].

RADTRAN 5's companion economic model includes estimated unit costs (\$/km²) for: emergency actions (e.g., applying fixatives) following the event; access control (e.g., guards) to prevent unauthorized access to the contaminated areas; radiological characterization; decontamination/demolition operations; and disposal of radiologically contaminated waste. These elements were summed together to obtain the total cost of cleanup and site restoration.

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 RADTRAN 5 varies these costs depending on whether the area is an urban area that is lightly contaminated, moderately contaminated, or heavily contaminated or whether the area is farm or range land. The unit costs from the economic model, assuming offsite disposal of radioactive waste, are summarized in Table 1.

Table 1. Summary of Unit Costs for D&D, Building Replacement, and Evacuation Valuation

Area Description	D&D Unit Cost Per km ² (2005\$)	Replacement Unit Cost Per km ² (2005\$)	Evacuation Cost Per Person	Comments
Farm or Range Land	\$93 million	\$1.2 million	\$4,500	Applied to contaminated areas having a population density of less than 50 people/km ² .
Lightly Contaminated Urban	\$130 million	\$29 million	\$2,600	Applied to urban areas having a population density greater than 50 people/km ² and less than 3,000 people/km ² and requiring a decontamination factor (DF) of 1-2 to remediate to the required cleanup standard.
Moderately Contaminated Urban	\$182 million	\$45 million	\$3,300	Applied to urban areas having a population density greater than 50 people/km ² and less than 3,000 people/km ² and requiring a DF of 2-10 to remediate to the required cleanup standard.
Heavily Contaminated Urban	\$275 million	\$220 million	\$4,500	Applied to urban areas having a population density greater than 50 people/km ² and less than 3,000 people/km ² and requiring a DF greater than 10 to remediate to the required cleanup standard. This level of decontamination is difficult to achieve and cost may exceed the property value. RADTRAN 5 assumes that heavily contaminated buildings and structures are demolished rather than decontaminated.
High Density Urban	\$2.7 billion	\$6.6 billion	\$4,500	Applied to urban areas having a population density greater than 3,000 people/km ² but less than 10,000 people/km ² and requiring a DF greater than 10 to remediate to the required cleanup standard.
Very High Density Urban	\$24 billion	\$19 billion	\$4,500	Applied to urban areas having a population density greater than 10,000 people/km ² and requiring a DF greater than 10 to remediate to the required cleanup standard.

The urban area upon which the RADTRAN 5 economic model derives its unit cleanup costs is assumed to have an average population density of 1,344 people/km². This is significantly lower than high density metropolitan areas such as New York City, which has an average population density of over 20,000 people/km². For this reason, the unit costs derived from RADTRAN 5 were not considered to be a good estimate for the cleanup of higher density population areas.

To estimate the impacts on New York City, a proxy for high density urban areas was derived from the FRBNY study, [5] which reported a value of \$1.5 billion to clean up and restore the 16-acre World Trade Center site after the terrorist attack. This equates to \$24 billion/km² in 2005 dollars. This is almost two orders of magnitude greater than the RADTRAN 5 economic model unit cost for cleanup of a heavily contaminated urban area. Furthermore, the cost of cleanup of the WTC site would undoubtedly have been much higher had it been destroyed by a Rad/Nuc event. On the other hand, the WTC site is not representative of New York City in general or any other major population center in the United States because of the unique and very high value buildings that stood on this site. Taking these important points into consideration, this FRBNY data was used to derive the unit cleanup costs for the high and very high density urban areas reported in Table 1.

The costs to replace and/or rebuild property damaged or destroyed as the result of a Rad/Nuc event, or to compensate owners for the loss of use of this property (including business income loss), were also calculated using unit costs derived from the RADTRAN 5 companion economic model and the FRBNY 9/11 study. As with site cleanup and restoration, these costs are highly dependent on the areal extent and level of contamination. These unit costs are also presented in Table 1.

The unit costs for lightly, moderately, and heavily contaminated urban areas and for farm and range land were derived from the RADTRAN 5 economic model. Again, for the reasons presented previously, the unit costs derived from the RADTRAN 5 economic model were not considered to be a good estimate of the cost to rebuild high population density areas after a Rad/Nuc event. The unit costs for these areas were derived from the FRBNY 9/11 study.

The FRBNY 9/11 study reported a value of \$11.9 billion to replace the buildings and contents of the WTC complex, equating to \$193 billion/km² in 2005 dollars (and which does not include business income loss). This is almost three orders of magnitude greater than the RADTRAN 5 economic model unit cost for replacement of destroyed property in a heavily contaminated urban area having an average population density of 1,344 people/km². As discussed previously, however, the WTC site is not representative of New York City in general or any other major population center in the United States because of the unique and very high value buildings that stood on this site and which will be replaced with equally high value buildings. The replacement value reported in the FRBNY study is therefore likely to be much higher than would be expected for the average high density urban area. Taking this important point into consideration, the FRBNY data were used to derive the unit cleanup costs for high and very high density urban areas reported in Table 1.

Evacuation Cost

The cost to evacuate and relocate the population living within areas contaminated as a result of the Rad/Nuc event was calculated using unit costs derived from the RADTRAN 5 economic model. This cost is assumed to depend on the level of contamination; at higher contamination levels, the population is denied access for longer periods of time. RADTRAN 5 varies these costs in the same major categories as the D&D and Replacement Costs. Unit costs used for evacuation are presented in Table 1.

OBSERVATIONS FROM APPLICATION OF THIS METHODOLOGY

The effects of nuclear weapons have been studied and documented intensively. Fallout will decay based on the individual isotopic half-lives, the most energetic (and most dangerous) decaying in hours or days while longer-lived isotopes persist for months and years. The dose rate from fallout drops by a factor of 1,000 48 hours after detonation, and over 90% of the dose is received in the first year after a nuclear weapon event [7]. This dose response time after detonation is important when estimating the cost of cleanup, site restoration, and rebuild after a Rad/Nuc event. Figure 2 illustrates this by showing the land area requiring cleanup for different cleanup criteria (residual dose rates) for different time periods following detonation of a 13 -kT nuclear weapon. As shown, the surface area requiring cleanup decreases by a factor of 10 to 100 during the second year following detonation as compared with the first year following

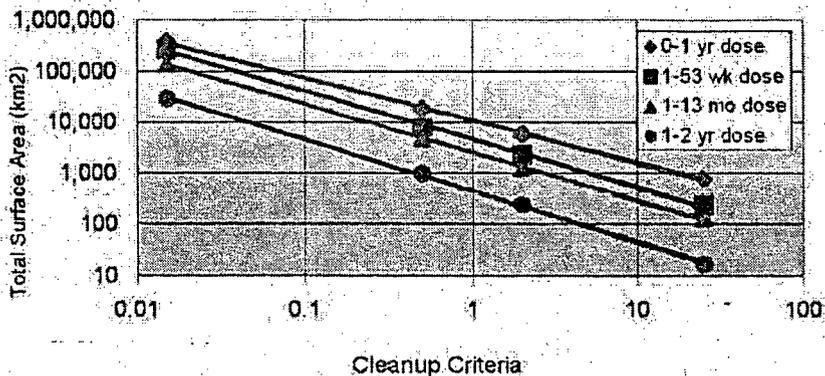


Figure 2. Area Requiring Remediation for Different Cleanup Criteria

detonation. Since cleanup would likely not be completed during the first year following detonation, this analysis estimated the cost of cleanup of that land area remaining contaminated above the cleanup criteria 1 year after detonation.

In the case of the RDD event, however, little radioactive decay will occur during the time period of remediation (first year or two). For this reason, the cost of cleanup of an RDD event was based on the land contaminated by fallout over the first year following the event.

We then took the physical plume contours for each of the three nuclear weapon yields and the five cleanup levels and plotted those in the five target locations. Figure 3 illustrates this concept with the plume 1-2 yr contour for the 100-kT nuclear weapon in New York City, NY, and San Ysidro, CA.



Figure 3. Hypothetical Plume Contours for 100-kT and 5 Cleanup Levels

The plume contours used represent a generic “wind condition.” Clearly, wind conditions impact the radioactive fallout after a nuclear weapon event and the ability to value damage depends on where the damage occurs. The plume in New York City blows into the Atlantic Ocean; although not depicted here, the plume for Detroit goes into Canada and Lake Erie. For this high-level

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analysis, our damage assessment is limited to the continental United States and represents surface area cleanup excluding groundwater contamination.

The results of our analysis are shown in Figure 4. As anticipated, the economic consequences are highest for the largest nuclear weapon yield and the most conservative cleanup level. New York City nets the highest economic damage across the cleanup spectrum, because of its dense population and high value real estate. Note that the economic consequences for New York City across almost every cleanup level meet or exceed \$10 trillion, which is roughly equivalent to the annual Gross Domestic Product (GDP) of the U.S. economy.

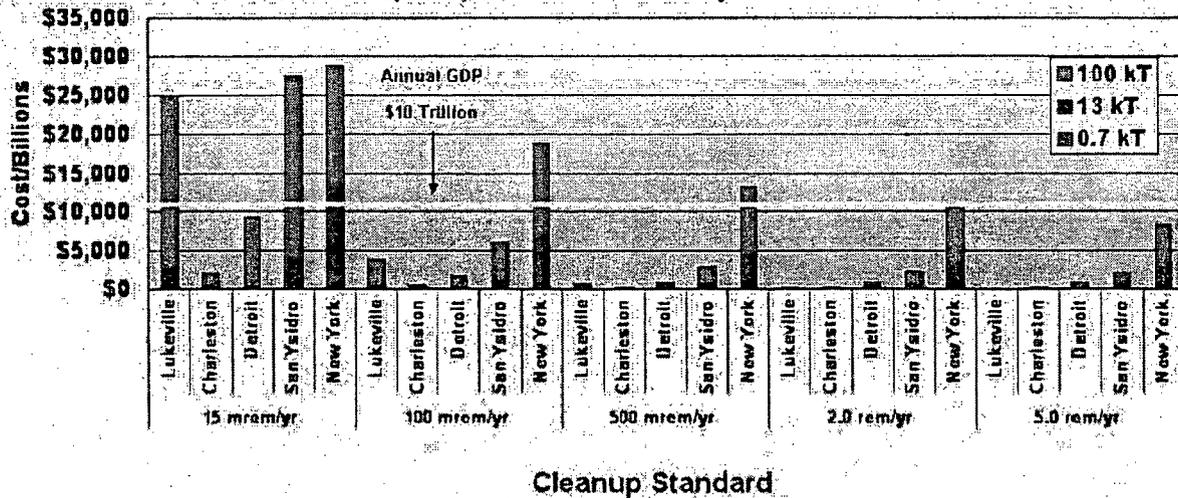
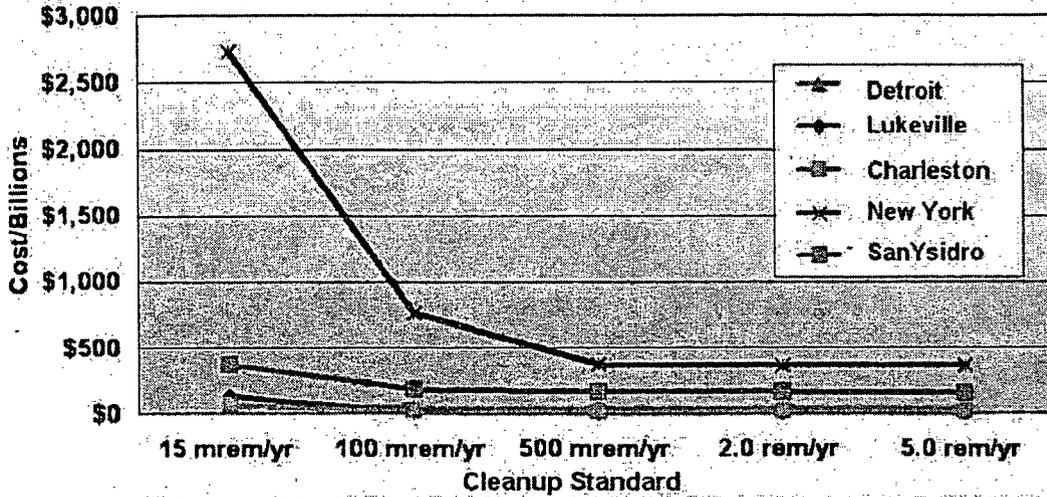


Figure 4. Consequence Summary for Hypothetical Weapon Events and Cleanup Levels

Figures 5, 6, and 7 represent the consequence summaries for each nuclear weapon event. The area impacted and requiring long-term cleanup is a function of the standard selected as represented in the data table under the graph. Individually and collectively, the economic consequences are highest for the most conservative standard evaluated.

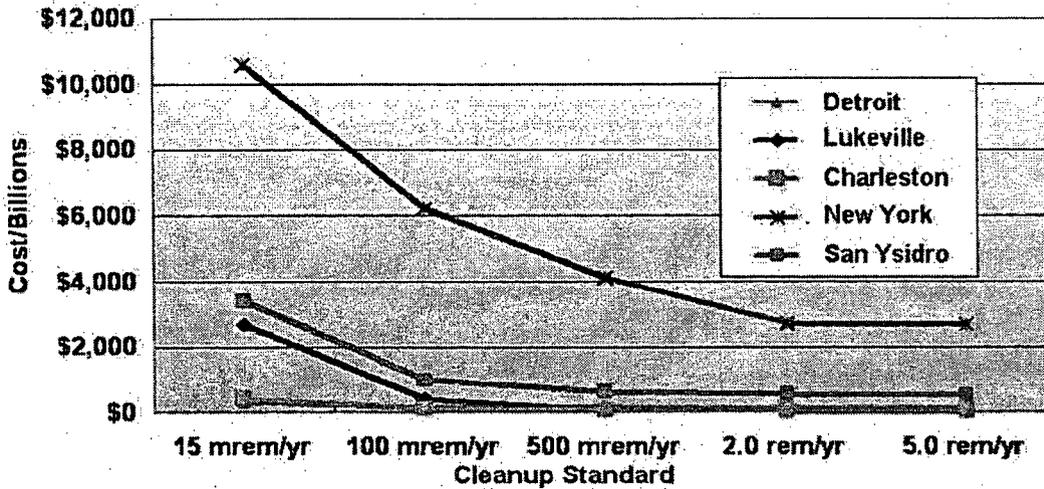
Figure 8 provides a summary of the economic consequences by the five broad categories evaluated. This representation demonstrates that it is the cleanup cost (or D&D cost) that is the largest individual contributor to economic consequences across the cleanup level spectrum until we reach the least conservative cleanup level, at which point the loss of life is the largest cleanup cost.

In the case of an RDD, the type of contamination depends only on the source material(s) (no nuclear process is involved), and the extent of contamination depends on the physical form of the source and the effectiveness of the dispersal mechanisms. The ultimate fate of the contamination (and thus long-term consequences) is dependent on a complex chain of transport, uptake, exposure, and remediation processes. Fallout from an RDD explosion would be very different from that of a nuclear weapon detonation because there would be no large thermal cloud to inject the radioactive material into the atmosphere, and the amount of radioactive material would be much less than that generated in a nuclear weapon event. A preliminary assessment of the economic consequences of a 10 kCi Cs-137 RDD in New York City is presented in Figure 9.



0.7-kT	Cleanup Area (km ²)				
	15 mrem/yr	100 mrem/yr	500 mrem/yr	2.0 rem/yr	5.0 rem/yr
Lukeville, AZ	1,450	179	45	10	4
Charleston, SC	557	97	29	6	3
Detroit, MI	90	42	25	10	4
San Ysidro, CA	1,450	179	45	10	4
New York, NY	600	179	45	10	4

Figure 5. The 0.7-kT Weapon Event



13-kT	Cleanup Area (km ²)				
	15 mrem/yr	100 mrem/yr	500 mrem/yr	2.0 rem/yr	5.0 rem/yr
Lukeville, AZ	28,587	4,249	950	238	95
Charleston, SC	2,679	630	275	117	52
Detroit, MI	502	134	57	40	28
San Ysidro, CA	28,555	4,239	950	238	95
New York, NY	9,753	2,584	474	237	95

Figure 6. The 13-kT Weapon Event

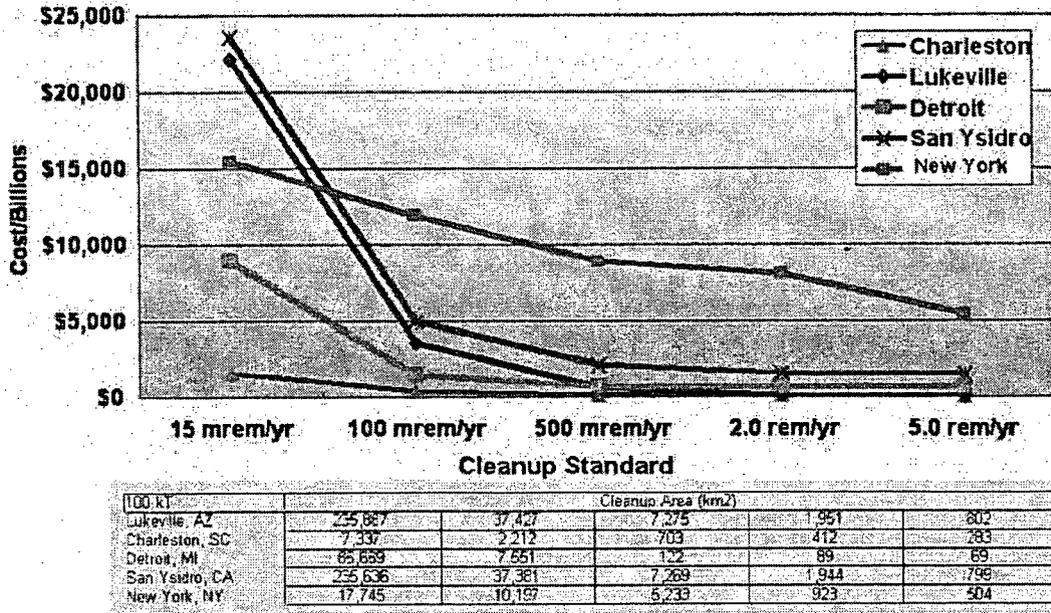


Figure 7. The 100-kT Weapon Event

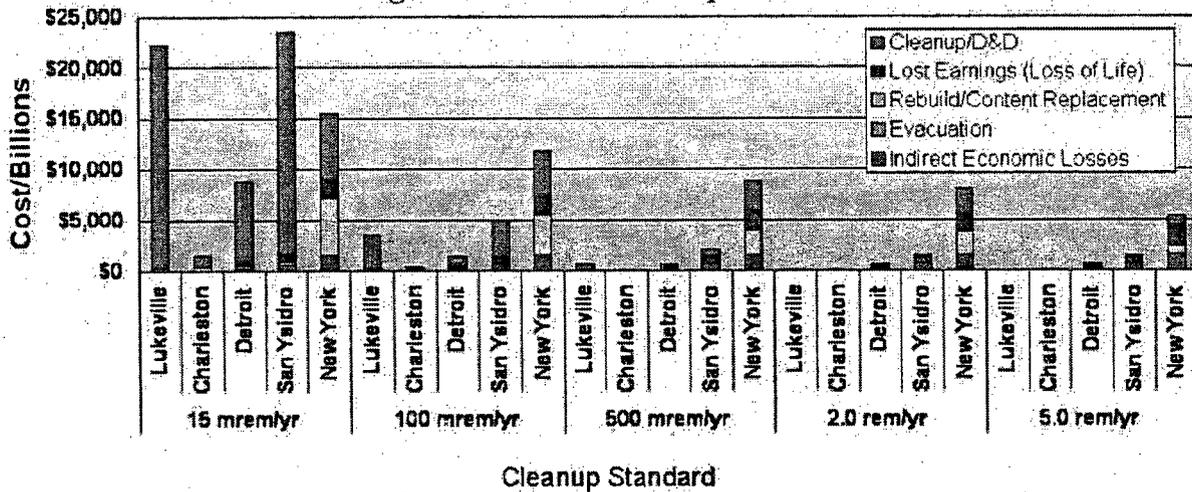


Figure 8. Summary by Five Categories Evaluated

There is virtually no loss of life with the Cs-137 event, but the cleanup cost and the cost to rebuild and/or replace buildings is once again significant, particularly for the most conservative standard (one-half of the annual U.S. GDP).

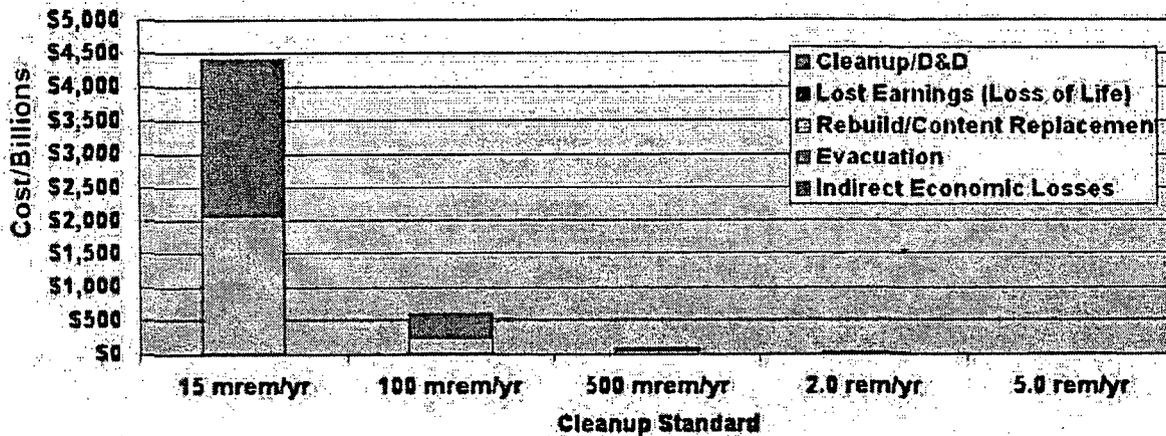


Figure 9. 10-kCi Cs-137 Detonation in New York City

CONCLUSIONS

The methodology described in this paper provides a framework for evaluating the major cost components following a nuclear weapon event. There are several observations that can be made from the results thus far:

- The economic consequences of a Rad/Nuc event are highly dependent on and closely coupled to the cleanup level selected.
- Cleanup costs generally increase dramatically for standards more stringent than 500 mrem/yr.
- Cleanup to the most conservative standard evaluated (15 mrem/yr) magnifies the economic consequences of the event irrespective of the class of target or weapon yield.
- Because such an event could potentially spread contamination very widely, even an event in a "remote" location could have huge economic consequences.
- A risk-based approach to the development and application of standards is needed.

There are no national standards for acceptable decontamination of a radiological weapon event, and the EPA standards used under CERCLA were enacted to address growing concerns about the need to clean up uncontrolled, abandoned hazardous waste sites and to address future releases of hazardous substances into the environment. Cleanup after a weapon event such as one of those described in this paper will be vastly different from the cleanup of a contaminated industrial facility or former weapons production facility. The standard selected will impact both the cost and the pace of the cleanup. Policy level attention to cleanup standards is warranted.

ACKNOWLEDGMENTS

The authors would like to acknowledge the close cooperation and the valuable comments and suggestions provided by the other members of the Radiological Countermeasures Systems Analysis Working Group, as well as similarly valuable input from other staff and management at Pacific Northwest National Laboratory (PNNL). The Radiological Countermeasures Systems Analysis Working Group includes Lawrence Livermore National Laboratory (LLNL),

Los Alamos National Laboratory (LANL), Sandia National Laboratory (SNL), and PNNL. The authors would like to acknowledge the Science and Technology Directorate, Department of Homeland Security for sponsoring the study.

REFERENCES

[1] Deborah Elcock, Gladys A. Klemic, and Anibal L. Tobias. "Establishing Remediation Levels in Response to a Radiological Event (or "Dirty Bomb"):" *Environmental Sciences & Technology*, Vol. 38, No. 9, 2004.

[2] United States General Accounting Office, "Radiation Standards Scientific Basis Inconclusive, and EPA and NRC Disagreement Continues," June 2004.

[3] Statement of Robert G. Card, Under Secretary, and Jessie H. Roberson, Assistant Secretary for Environmental Management, U.S. Department of Energy, House Subcommittee on Strategic Forces Committee on Armed Services.

http://www.energy.gov/engine/content.do?PUBLIC_ID=13609&BT_CODE=PR CONGRESSTEST&TT_CODE=PRESSSPEECH

[4] Peter D. Zimmerman with Cheryl Loeb, "Dirty Bombs: The Threat Revisited," *Defense Horizons* Number 38, January 2004.

[5] Jason Bram, James Orr, and Carol Rapaport, "Measuring the Effects of the September 11 Attack on New York City," *FRBNY Economic Policy Review*, November 2002.
<http://www.geo.arizona.edu/~ldix/g256/hurricanes.html>

[6] Chanin, David I. and Walter B. Murfin, "Site Restoration: Estimation of Attributable Costs from Plutonium-Dispersion Accidents," SAND96-0957, Sandia National Laboratories, 1996.

[7] Glasstone, Samuel and Philip J. Dolan, "The Effects of Nuclear Weapons," United States Department of Defense and the Energy Research and Development Administration, 1977.

**Entergy Contention NYS-12C
Attachment 8**

NUCLEAR SAFETY DIVISION

PARAMETER EVALUATION

A survey conducted by

GRECA

GROUP OF EXPERTS ON THE ACCIDENT CONSEQUENCES

It is important to note that the information
contained in this report is a survey of the status
before the Chernobyl accident.

Kjeller, June 1987

Compiled by Ulf Tveten
Institute for Energy Technology
Norway

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INTRODUCTION

It is important to note that the information contained in this report is a survey of the status before the Chernobyl accident.

The survey was first formulated at the First GRECA meeting, on 9th and 10th March 1983. In the summary records (SEN/SIN(83)12) from this meeting, the discussions on this undertaking are summed up as follows:

"Considerable effort had been spent in recent years on improving accident consequence modelling techniques. There were, however, large uncertainties about many of the data one needed to input, especially with respect to pathway parameters. It was decided that the Group would collect pathway parameter values (and associated data) used in the various countries represented, with their range of uncertainty, evaluate these uncertainties, and determine the sensitivity of consequence assessments to the uncertainties. The Group will also collect information about existing experimental programs in this area and the timescale on which new data are likely to emerge."

In the same document the parameters included in the task are identified, along with the coordinators who volunteered to collect and systematize the information. The strategy for carrying out the task is also outlined:

"It was agreed that the members of the Group would send to a number of identified coordinators all information available in their organisations and countries on the parameters listed below, including information about current and planned experimental programs. An important piece of information would be the range of uncertainty affecting the parameter values. The coordinators would then perform a preliminary evaluation of all this information for the next meeting of the Group, which would decide on how to proceed in each case. The exercise would be organised, from a practical point of view (type of information needed, distribution of tasks, deadlines, etc.) by the Technical Secretary, who undertook to send letters to all participants as quickly as possible.

It was stressed that the aim of this activity was not to come up with a best value for the parameters, which everybody should then use, but rather to pool and summarize the available information and assess its adequacy for accident consequence modelling.

The following list of parameters/coordinators was agreed upon:

- | | | |
|----|--|---|
| a) | Decontamination (including effectiveness and cost) | Mr. Thykier-Nielsen/
Mr. Roed |
| b) | Radionuclide behaviour in urban areas (including run-off and rainstorm events) | Dr. Aldrich/
Prof. Helton |
| c) | Shielding (particularly, but not exclusively, in urban areas) | Prof. Bayer/
Dr. Burkart/
Mr. Manesse |
| d) | Filtering effect of houses and deposition indoors | Mr. Tveten/
Dr. Burkart |

- | | | |
|----|---|-----------------------------|
| e) | Wet and dry deposition (velocities) | Dr. Nixon/
Dr. Alpert |
| f) | Migration of radionuclides in soil | Mr. Devell |
| g) | Decontamination under winter conditions | Mr. Devell/
Mr. Sundblad |
| h) | Agricultural pathways (deposition on crops and root uptake) | Dr. Nair/
Mr. Iijima" |

One additional task was formulated at a later meeting:

- | | | |
|----|------------------------------------|------------|
| i) | Meteorological sampling techniques | Ms. Morrey |
|----|------------------------------------|------------|

At the First meeting a few additional topics for survey were suggested. These were somewhat different in character, as the participation would not be as wide as in the parameter tasks. Only one of these tasks, however, was adopted and completed:

Characteristics of accident source term important for consequence modelling (such as particle size, chemical form, categorization of release categories etc.). This task was requested by GREST* and GENAC** in previous communications. Dr. Nair acted as coordinator, assisted by Dr. Nixon and Dr. Alpert. It is included in this survey under the title: "Influence of source term characteristics on offsite consequences and priorities for future research".

The following two tasks were extensively discussed, but were finally abandoned:

Dosimetric data. It was agreed that a review paper summarizing existing data bases, and also what part of this information could be used in consequence modelling, would be very useful. It was later found that the amount of work needed to prepare such a review paper had been underestimated, and the task was finally abandoned.

Applications of consequence modelling as an aid to decision-making. This type of activity was considered as a longer term objective. It was agreed that a working paper, discussing in general terms how consequence modelling could be used in connection with emergency planning and emergency response, would be useful. This task was also dropped, mainly because none of the delegates were in a position to be able to undertake this resource-demanding task at the time.

RESULTS OF THE EXERCISE

The value of the exercise has been considerable, in bringing all available information together in a systematic way, both on data routinely used, the basis of this data, and on experiments being conducted or being planned. But - this is a survey of the situation pre-Chernobyl.

Although the information collected shows that the parameter values used in different countries in some cases agree very well and in other cases differ considerably, the uncertainties can not be evaluated on this basis alone. The parameter values used in different countries are

* GREST: Group of Experts on the Source Term

** GENAC: Group of Experts on Air Cleaning and Containment Atmosphere Control Systems Under Accident Conditions

**UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION**

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of) ENTERGY NUCLEAR OPERATIONS, INC.) (Indian Point Nuclear Generating Units 2 and 3))	Docket Nos. 50-247-LR and 50-286-LR March 7, 2011
---	---

**APPLICANT'S ANSWER TO RIVERKEEPER, INC. AND
HUDSON RIVER SLOOP CLEARWATER, INC.'S FILING REGARDING
CONSOLIDATED CONTENTION RIVERKEEPER EC-3/CLEARWATER EC-1**

Pursuant to 10 C.F.R. § 2.309(h)(1), Entergy Nuclear Operations, Inc. ("Entergy") submits this Answer to the "Riverkeeper, Inc. and Clearwater, Inc. Challenge to NRC Staff's Assessment of Impacts of Spent Fuel Pool Leaks in the Final Supplemental Environmental Impact Statement" ("Filing"), filed by Riverkeeper, Inc. and Hudson River Sloop Clearwater, Inc. (jointly, "Riverkeeper") on February 3, 2011. In response to the U.S. Nuclear Regulatory Commission ("NRC") Staff's issuance of its Final Supplemental Environmental Impact Statement ("FSEIS"),¹ Riverkeeper requests that the Atomic Safety and Licensing Board ("Board") recognize that previously-admitted Consolidated Contention Riverkeeper EC-3/Clearwater EC-1 ("Consolidated Contention") applies to the relevant analysis and conclusions in the FSEIS.²

¹ NUREG-1437, Supp. 38, *Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supp. 38, Regarding Indian Point Nuclear Generating Units Nos. 2 and 3, Final Report, Vol. 1, Main Report and Comments Responses* (Dec. 2010) ("FSEIS"), available at ADAMS Accession Nos. ML103350405.

² Riverkeeper, Inc. and Clearwater, Inc. Challenge to NRC Staff's Assessment of Impacts of Spent Fuel Pool Leaks in the Final Supplemental Environmental Impact Statement at 3 (Feb. 3, 2011) ("Filing"), available at ADAMS Accession No. ML110410362.

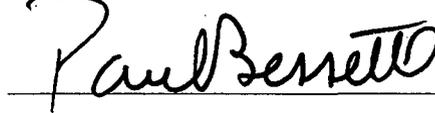
As a procedural matter, Entergy does not object to the request that the Board treat the Consolidated Contention as a challenge to the FSEIS. Furthermore, Entergy does not object to Riverkeeper's position that no formal amendment of the Consolidated Contention is necessary at this time, based on the representation that "there is no significantly different information in the FSEIS."³ That said, Entergy continues to disagree with Riverkeeper's claims regarding the adequacy or merits of the Staff's assessment of the impacts of spent fuel pool leakage in the FSEIS.

³ *Id.*

CERTIFICATION OF COUNSEL UNDER 10 C.F.R. § 2.323(b)

Counsel for Entergy certifies that he is unaware of any attempt by the moving parties to contact Entergy regarding the factual and legal issues raised in the Filing.

Respectfully submitted,



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COUNSEL FOR ENTERGY NUCLEAR
OPERATIONS, INC.

Dated in Washington, D.C.
this 7th day of March 2011

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	Docket Nos. - 50-247-LR and
	)	50-286-LR
ENTERGY NUCLEAR OPERATIONS, INC.)	
)	
(Indian Point Nuclear Generating Units 2 and 3)	)	March 7, 2011

**APPLICANT'S ANSWER TO HUDSON RIVER SLOOP CLEARWATER, INC.'S
REQUEST FOR EXTENSION OF TIME TO FILE REPLY RELATED TO
AMENDED ENVIRONMENTAL JUSTICE CONTENTION**

Pursuant to 10 C.F.R. § 2.323(c), Entergy Nuclear Operations, Inc. ("Entergy") submits this Answer to the "Hudson River Sloop Clearwater, Inc.'s Urgent Request for Extension of Time to Reply to NRC Staff and Entergy's Answer to Amended Environmental Justice Contention" ("Request"), dated March 4, 2011. In the Request, Hudson River Sloop Clearwater, Inc. ("Clearwater") seeks a 7-day extension of the March 14, 2011 deadline, in which to file a reply to the answers of the NRC Staff and Entergy relating to Clearwater's February 3, 2011 amendments to previously-admitted Contention EC-3.

As discussed below, the Request should be denied because Clearwater fails to show unavoidable and extreme circumstances justifying the requested extension of time¹ and because Clearwater's requested extension to the scheduling requirements established by the Atomic Safety and Licensing Board ("Board") threatens to delay the evidentiary hearing in this proceeding.

¹ See *Baltimore Gas & Elec. Co.* (Calvert Cliffs Nuclear Power Plant, Units 1 & 2), CLI-98-25, 48 NRC 325, 342-43 (1998).

The Commission has made clear that the standard for granting extensions of time requires a demonstration of unavoidable and extreme circumstances.² Although Entergy understands from Clearwater's Request that one of Clearwater's representatives is attempting to scale back his participation in this proceeding, Clearwater has provided no evidence or explanation demonstrating that this amounts to unavoidable and extreme circumstances.³ For example, Clearwater never indicates why its other identified representatives and employees assisting on the environmental justice contention in this proceeding are unable to prepare any necessary reply brief. Furthermore, Clearwater fails to acknowledge that any extension of time for submission of replies will have a direct impact on the schedule for the evidentiary hearing because the "trigger" date for the various filings prior to the evidentiary hearing are directly linked to the date of the last timely reply arising from new or amended contentions based on the FSEIS.⁴ Therefore, Clearwater has not shown unavoidable and extreme circumstances warranting an extension of time, with respect to relief that will have a direct adverse impact on the hearing schedule in this proceeding.

For the foregoing reasons, the Request should be denied.

² Statement of Policy on Conduct of Adjudicatory Proceedings, CLI-98-12, 48 NRC 18, 21 (1998).

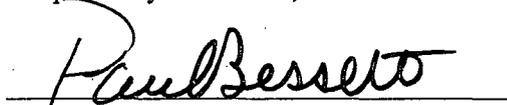
³ See Request at 2.

⁴ Licensing Board Scheduling Order at 13 (July 1, 2010) (unpublished).

CERTIFICATION OF COUNSEL UNDER 10 C.F.R. § 2.323(b)

Counsel for Entergy certifies that he has made a sincere effort to make himself available to listen and respond to the moving parties, and to resolve the factual and legal issues raised in the motion, and that his efforts to resolve the issues have been unsuccessful.

Respectfully submitted,



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