RAS E-339

UNITED STATES
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

In re:	Docket Nos. 50-247-LR; 50-286-LR
License Renewal Application Submitted by	ASLBP No. 07-858-03-LR-BD01
Entergy Nuclear Indian Point 2, LLC, Entergy Nuclear Indian Point 3, LLC, and Entergy Nuclear Operations, Inc.	DPR-26, DPR-64 March 11, 2010

STATE OF NEW YORK'S MOTION FOR LEAVE TO FILE NEW AND AMENDED CONTENTIONS CONCERNING THE DECEMBER 2009 REANALYSIS OF SEVERE ACCIDENT MITIGATION ALTERNATIVES

A. Introduction

Pursuant to 10 C.F.R. § 2.309(f)(2) the State of New York seeks leave to file the attached Contentions 12B, 16B, 35, and 36. The Contentions are based on Entergy's filing on December 14, 2009 of a new severe accident mitigation alternatives ("SAMA") analysis ("December 2009 SAMA Reanalysis"). The new December 2009 SAMA Reanalysis is not merely a minor alteration in the previous analysis, but represents an entirely new SAMA analysis using different assumptions and input values and producing markedly different results. The new analysis does not merely modify a few parts of the prior analysis but is, rather, a replacement of that prior analysis.

Review of the December 2009 SAMA Reanalysis and its supporting documentation reflects that many modifications were made in the MACCS2 and SAMA reanalysis and the result is an entirely new analysis.[1] Thus, Entergy not only substantially altered the meteorological

[1] This reanalysis replaces substantial portions of Appendix E to the ER and Attachment E to Appendix E, and as such is a *de facto* amendment to the ER.

TEMPLATE = SECY-041

DS 03

inputs to account for an erroneous wind direction in the initial SAMA, it also chose to use one year, the year 2000, as the only year of meteorological inputs rather than its previous approach of averaging five years (years 2000-2004). December 2009 SAMA Reanalysis at 4-5. It further incorporated in to the "base case" analysis additional factors related to lost tourism and business as the result of a severe accident. *Id.* at 5. It ran new sensitivity analyses incorporating a new severe accident scenario. *Id.* at 4. It also recalculated the costs for several previously-identified SAMAs by engaging in more detailed engineering cost analyses of proposed mitigation measures. *Id.* at 7-8.[2] It appears that Entergy may also have corrected a formatting error when it prepared the December 2009 SAMA Reanalysis. *See* Statement of David Chanin, ¶ 11. The 2009 SAMA Reanalysis reflects substantial increases in population dose risk and off site economic cost risk. *See id.* at ¶ 8-10. Moreover, in the new SAMA reanalysis, Entergy identifies six new mitigation measures, three for each reactor, which it believes may be cost-effective but that it previously reported were not cost-effective. In addition, three other mitigation measures, which were also previously not identified as cost-effective, also are now cost-effective. Nine other SAMAs that were found to be marginally cost-effective in the original SAMA analysis are now, in the December 2009 SAMA Reanalysis, substantially more cost-effective. *See and Compare* ER, Appendix E, at 4-74 to 4-78 to December 2009 SAMA Reanalysis at 10-28. In short, the December 2009 SAMA Reanalysis reflects a "do over" of the Severe Accident Mitigation Alternative analysis required by 10 C.F.R. § 51.53(c)(3)(ii)(L).

[2] However, Entergy has not completed the necessary economic analysis to confirm that all the newly identified cost-effective mitigation measures and all the substantially more beneficial cost-effective mitigation measures are actually cost-effective. Rather, it asserts that it is not obligated to do so within the confines of this relicensing proceeding because it has already demonstrated that its aging management program will adequately deal with all potential safety issues and thus, pursuant to Part 54, none of the mitigation measures are appropriate for consideration in the relicensing hearing. December 2009 SAMA Reanalysis at 32.

New York State's proposed Contentions 12B, 16B, 35, and 36 are based on the December 2009 SAMA Reanalysis. Pursuant to two Orders of this Board granting extensions of time to file proposed new contentions based on that filing, these contentions are all timely, having been filed within the time limits set by those two Orders. *See* ASLB Order dated January 22, 2010 (Granting New York's Motion To Establish February 25, 2010 As The Date By Which New York May File Contentions Related To Entergy's Revised Submission Concerning Severe Accident Mitigation Alternatives) and ASLB Order, dated February 24, 2010 (Extending Time Within Which To File New Contentions [to March 11, 2010]).

B. Additional Factual Background

The State of New York provides the following information in further support of its motion for leave to file the accompanying four contentions.

Following receipt of the December 2009 SAMA Reanalysis, the State of New York asked Entergy various questions about the Reanalysis and MACCS2 inputs and outputs. The requests were made in December 2009 and January and February 2010. Entergy responded to the State's requests. Specifically, on December 15, 2009, the State asked Entergy's counsel to produce electronic versions of the output files and results Entergy used in the December 2009 SAMA Reanalysis as well as for the original SAMA analysis. *See* Letter, John Sipos to Kathryn Sutton and Paul Bessette (Dec. 15, 2009). Entergy responded and provided some of the requested information on December 18, 2009, including input files (electronic files bearing a suffix ".inp") and two reports. *See* Letter, Kathryn M. Sutton and Paul M. Bessette to Janice A. Dean and John Sipos (Dec. 18, 2009). The State received this information on December 21, 2009.

On December 30, 2009, the State again asked Entergy's counsel to produce electronic versions of the output files (electronic files bearing a suffix ".out") and results Entergy used in

the December 2009 SAMA Reanalysis. *See* Letter, John Sipos to Kathryn Sutton and Paul Bessette (Dec. 30, 2009). Entergy's counsel provided the requested information on January 6, 2010. *See* Letter, Paul M. Bessette to Janice Dean and John Sipos (Jan. 6, 2010). The State received this information on January 7, 2010.

On January 14, 2010, the State sought clarification from Entergy concerning the availability of a report entitled "ENERCON Services Site Specific MACCS2 Input Data for Indian Point Energy Center, Rev. 1." *See* Letter, John Sipos to Kathryn M. Sutton, Paul M. Bessette, and Jonathan M. Rund (Jan. 14, 2010). Entergy clarified that it had listed this document in its December 30, 2009 supplemental disclosure log and delivered the ENERCON site specific input data to the State. *See* Letter, Paul M. Bessette to Janice Dean and John Sipos (Jan. 19, 2010). The State received this ENERCON document on January 20, 2010.

On January 21, 2010, the State filed a formal motion requesting that the Board set a date of February 25 as the date for filing new SAMA-related contentions; on January 22, 2010, the ASLB granted the State's motion. *See* Order, In the Matter of Entergy Nuclear Operations, Inc. (Indian Point Nuclear Generating Units 2 and 3), Docket Nos. 50-0247-LR and 50-286-LR, ASLBP No. 07-858-03-LR-BD01 (Jan. 22, 2010). At the request of the State of New York, that date was subsequently extended to March 11, 2010. *See* Order, 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, ASLPB No. 07-858-03-LR-BD01 (February 24, 2010).

On February 8, 2010, the State sent Entergy's counsel a letter seeking, among other things, meteorological data inputs for the years with which Entergy compared the year 2000 in determining that results from the year 2000 were the "most conservative"; the output files from the original SAMA analysis for each of the five years analyzed; information identifying whether

Entergy or its affiliate, Enercon, used "weather bin catalog sampling" or some other method of selecting the 120 hours that constitute a weather sequence and explaining which of the five methods set forth in NUREG/CR 4691constitutes "weather bin sampling," and annual precipitation totals for years 2001 through 2004, and 2005 through 2009 as measured by the meteorological data collection system used for the MACCS2/SAMA analysis. *See* Letter, John Sipos to Kathryn M. Sutton, Paul M. Bessette, and Jonathan M. Rund (Feb. 8, 2010). The State also requested wind roses for 2000 through 2009 and precipitation data for the years 2001 through 2009 as measured by Entergy's meteorological data collection system used by Entergy to prepare the MACCS2/SAMA analysis. *Id.* Entergy responded to the State's request on February 16, 2010. *See* Letter, Paul M. Bessette and Kathryn M. Sutton to Janice A. Dean and John Sipos (Feb. 16, 2010). Entergy did not provide wind roses, nor did it provide precipitation date from 2005 through 2009. *Id.* In addition, on February 17, 2010, the State received a compact disc containing the MACCS2 computer code from NRC Staff. *See* Letter, Beth N. Mizuno to Janice Dean (Feb. 16, 2010).

The magnitude of the changes made by the December 2009 SAMA Reanalysis are graphically represented in the following tables which illustrate, first, that the consequences of a severe accident have increased almost four fold and second, that the economic benefit to be achieved by implementing certain mitigation measures has increased dramatically in comparison to the cost of the mitigation measure.

COMPARISON OF 2007 AND 2009 SAMA ANALYSIS				
Consequence	Reactor Unit	2007 SAMA	December 2009 SAMA	Difference
Mean Population Dose Risk (PDR)	IP2	2.20×10^{1}	8.74×10^{1}	3.97x
	IP3	2.45×10^{1}	9.48×10^{1}	3.87x
Mean Off-site Economic Cost Risk(OECR)	IP2	4.49×10^{4}	2.12×10^{5}	4.72x
	IP3	5.28×10^{4}	2.61×10^{5}	4.95x

Source: Entergy Engineering Report IP-RPT-09-00044 (Dec. 3, 2009), Tables 1 & 2, p. 11 of 39
Entergy NL-09-165, (Dec. 11, 2009), Tables 1 & 2, p. 6 of 33
Entergy Environmental Report, Attachment E (April 2007), p. E.1-92 to 93
Entergy Environmental Report, Attachment E (April 2007), p. E.3-86 to 87
See also Statement of David Chanin, ¶ 8-10.

Comparison of Changes in Benefits and Cost Calculations						
SAMA Number and Description	**Original Baseline Benefit**	**New Baseline Benefit**	**Original Baseline Benefit with Uncertainty**	**New Baseline Benefit with Uncertainty**	**Old Cost**	**New Cost**
IP2 SAMA 028: Provide a portable diesel-driven battery charger.	$420,459	$1,357,046	$885,176	$2,856,939	$494,000	$938,000
IP2 SAMA 044: Use fire water system as backup for steam generator inventory.	$984,503	$2,350,530	$2,072,638	$4,948,485	$1,656,000	$1,656,000
IP2 SAMA 054: Install flood alarm in the 480VAC switchgear room.	$1,722,733	$5,591,781	$3,626,807	$11,772,170	$200,000	$200,000
IP2 SAMA 060: Provide added protection against flood propagation from stairwell 4 into the 480VAC switchgear room.	$387,828	$1,275,337	$816,481	$2,684,920	$216,000	$216,000

Comparison of Changes in Benefits and Cost Calculations						
SAMA Number and Description	**Original Baseline Benefit**	**New Baseline Benefit**	**Original Baseline Benefit with Uncertainty**	**New Baseline Benefit with Uncertainty**	**Old Cost**	**New Cost**
IP2 SAMA 061: Provide added protection against propagation from the deluge room into the 480V switchgear room.	$853,187	$2,754,991	$1,796,183	$5,799,982	$192,000	$192,000
IP2 SAMA 065: Upgrade the ASSS to allow timely restoration of seal injection and cooling.	$1,722,733	$5,591,781	$3,626,807	$11,772,170	$560,000	$560,000
IP3 SAMA 055: Provide hardwired connection to one SI or RHR pump from the Appendix R bus (MCC312A).	$1,274,884	$4,073,152	$1,847,657	$5,903,118	$1,288,000	$1,288,000
IP3 SAMA 061: Upgrade the ASSS to allow timely restoration of seal injection and cooling.	$1,365,046	$4,359,371	$1,978,328	$6,317,929	$560,000	$560,000
IP3 SAMA 062: Install flood alarm in the 480VAC switchgear room.	$1,365,046	$4,359,371	$1,978,328	$6,317,929	$196,800	$196,800

In addition as discussed in the accompanying Statement of David Chanin, who has substantial expertise with the MACCS2 code, it also appears that a column formatting error was contained in the initial SAMA analysis, and that the December 2009 SAMA Reanalysis was

changed in this regard. corrected this error. *See* Statement of David Chanin, at ¶ 11. It appears that the correction of this error in the December 2009 SAMA Reanalysis increased the value of "non-farm wealth" and, in turn, contributed to the increase of economic costs reflected in the December 2009 SAMA Reanalysis. *Id.*

C. The Contentions Meet All The Requirements of 10 C.F.R. § 2.309(f)(2)

These contentions fully meet 10 C.F.R. § 2.309(f)(2) which requires for admissibility, in pertinent part, a showing that:

> (i) The information upon which the amended or new contention is based was not previously available;
>
> (ii) The information upon which the amended or new contention is based is materially different than information previously available; and
>
> (iii) The amended or new contention has been submitted in a timely fashion based on the availability of the subsequent information.

Id.

1. Information Not Previously Available

Since these four contentions are based upon a document first filed on December 14, 2009, and on the new information contained in that document regarding the cost-effectiveness of SAMAs, the contentions rely on information not previously available and thus meet the first prong of the test set forth in 10 C.F.R. § 2.309(f)(e)(i).

2. The New Information Is Materially Different Than Previously Available Information

It was not until Entergy had completed its new December 2009 SAMA Reanalysis, that the State of New York was able to determine that (1) deficiencies identified in previously admitted Contentions 12A and 16A were being perpetuated in a new SAMA analysis, (2) nine

mitigation measures, not previously identified as cost-effective, were to have their cost analyses truncated in a way that would impede NRC Staff and this Board from making a final determination as to whether implementation of those nine mitigation measures as a condition of any extended operating license was warranted (proposed Contention 35), and (3) that certain previously identified mitigation measures that were marginally cost-effective, but as to which completed cost analyses had not been conducted, were now so substantially more cost-effective that it was unlikely that further cost estimates would tip the balance against the mitigation measure thus requiring implementation of these mitigation measures as a condition for any extended license (proposal Contention 36).

3. The Contentions Are Timely

Pursuant to Orders issued by the Board and referenced above, Contentions based on the December 2009 SAMA Reanalysis were due to be filed on or before March 11, 2010. These Contentions have been filed on March 11, 2010.

Thus, the State of New York State has demonstrated that its four proposed new Contentions meet the requirements for admissibility set forth in 10 C.F.R. § 2.309(f)(2).

D. The Contentions Also Meet the Requirements of 10 C.F.R. § 2.309(c)

Although a party is not required to demonstrate compliance with 10 C.F.R. § 2.309(c) where, as here it meets the requirements of 10 C.F.R. § 2.309(f)(2), NRC Staff has argued in other proceedings that a new contention is required to meet the provisions of both sections.[3] Since the State easily meets both sets of standards and, out of an abundance of caution, it

[3] 10 C.F.R. § 2.309(c) is only applicable to "late filed contentions." Contentions that meet the requirements of 10 C.F.R. § 2.309(f)(2) are, by meeting subpart iii, "timely" and thus do not need to meet the provisions of § 2.309(c). *See In the Matter of Entergy Nuclear Vermont Yankee L.L.C. and Entergy Nuclear Operations, Inc.* (Vermont Yankee Nuclear Power Station) Docket No. 50-271-OLA, ASLBP No. 04-832-02-OLA (December 2, 2005) LBP-05-32, slip op. at 9-10. *See also In the Matter of Entergy Nuclear Vermont Yankee L.L.C. and Entergy Nuclear Operations, Inc.* (Vermont Yankee) LBP 07-015 (November 7, 2007), ML073110424, slip op. at 6, n. 12.

provides the following demonstration of its compliance with the requirements of 10 C.F.R. § 2.309(c).

1. Good Cause

Contention 12B and 16B update Admitted Contentions 12A and 16A. Those admitted contentions identify fundamental defects in the SAMA analysis that was part of the original ER and that were embraced by NRC Staff in the DSEIS. Since the original SAMA analysis now is no longer operative for Entergy's Application and has been replaced by the December 2009 SAMA Reanalysis, it is necessary to reassert those admitted Contentions as being applicable to the new SAMA Reanalysis. This is particularly important because Entergy has made substantial alterations in the December 2009 SAMA Reanalysis upon which it now relies, several of which deal with meteorology and calculations of post accident economic losses. None of the numerous modifications made by Entergy in the SAMA reanalysis address either the failure to properly determine the population exposed or the cost of clean up following a severe accident. Nor do these changes correct the fundamental flaw in the meteorological model which continues to make non-conservative dispersion assumptions using the straight line Gaussian plume model and thus cannot account for the numerous complex terrain and topographical features of the site and its surrounding environment including its need to rely on a single meteorological tower, thus missing precipitation variations, the river valley effect on wind directions, differing mixing heights, to mention only a few of the ways in which the simplistic ATMOS model fails to provide a reasonably accurate depiction of how radiation from a severe accident will be dispersed among the 19 million people who are projected to be within 50 miles of Indian Point by 2035.

Contention 35 is focused on nine SAMAs that were identified as potentially cost-effective for the first time in the December 2009 SAMA Reanalysis. The failure to complete the engineering cost analysis for any of these nine SAMAs was not relevant until, following a complete reanalysis of the SAMAs by Entergy and the substantial increase in the benefits of these nine SAMAs as a result of the reanalysis, it was revealed that the nine SAMAs were now deemed potentially cost-effective. Once the SAMA screening process used by Entergy had reached that point, it was then relevant to insist that the engineering cost analyses be completed in order to determine, whether in fact, the nine SAMAs were cost-effective and thus eligible to be implemented as license conditions for an extended operating license for either IP 2 or IP 3.

Contention 36 is focused on nine mitigation measures in the new SAMA reanalysis as to which substantially new information, not previously available, makes a challenge to the failure to require implementation of these nine measures as part of an extended license, viable for the first time. Now that Entergy has recalculated the benefits of all SAMAs and substantially increased the benefit of previously cost-effective measures, in many cases by more than a factor of 2 and in some cases by as much as a factor of 5, the ratio between estimated cost and baseline benefit has increased dramatically such that, in some cases, the baseline benefit now exceeds the estimated cost by an order of magnitude or more and in several other instances the dollar difference between baseline benefit and estimated cost has widened considerably.[4] As a result of this new

[4] *See* IP 2 SAMA 054 where the baseline benefit is now $5.4 million greater than the estimated cost but was only $1.2 million greater before; IP 2 SAMA 060 where the baseline benefit is now six times greater than the cost ($1.275 million to $216,000) but was only $160,000 greater before; IP 2 SAMA 061 where the baseline benefit is now over 14 times greater than the cost compared to a mere $800,000 difference between benefit and cost (less than twice as much); IP 3 SAMA 061 where the benefit now exceeds the cost by more than $3.75 million, which is 8 times the cost where before the benefit exceeded the cost by less than $1 million and less than 3 times; and IP 3 SAMA 062 where the benefit is now more than $4.1 million greater than the cost, which is 21 times the cost, compared to a mere $1.1 million before and only 6 times the cost. In three instances a mitigation measure that was previously only cost-effective when the cost estimate was compared to the "benefit with uncertainty" calculation has now become cost-effective even for the baseline benefit case. *See* IP 2 SAMAs 028 and 044 and IP 3 SAMA 055. In addition, one previously cost-effective measure has had a more detailed cost estimate and still remains cost-

SAMA reanalysis the State believes, for the first time, it can make a credible argument that, even though the cost estimates have not yet been completed, the difference between estimated cost and calculated benefit is so great that refined cost estimates are unlikely to dramatically change the outcome, that the safety advantages are and will remain "substantial", as the Commission has interpreted that term (*see* S. Chilk, Staff Requirements Memorandum ("SRM") to J.M. Taylor and W.C. Parler, "SECY-93-086—Backfit Considerations," June 30, 1993, PDR Accession No. 9307300095 930630) and thus, the failure to require implementation of the nine identified SAMAs is not consistent with NEPA, the Atomic Energy Act and the Administrative Procedure Act.

Additionally, in Contention 36 the State has singled out only those SAMAs where: (1) the reduction in the population dose risk is substantial – 10% or more; (2) the difference between the economic cost and the benefit is substantial both in terms of the actual dollar difference and also how many times the benefit is larger than the cost; and/or (3) the cost has been further refined to a point where additional engineering cost analyses are not likely to substantially increase the cost.

The State has taken seriously the admonition that "[a]ll parties are obligated, in their filings before the presiding officer and the Commission, to ensure that their arguments and assertions are supported by appropriate and accurate references to legal authority and factual basis, including, as appropriate, citations to the record. Failure to do so may result in appropriate sanctions, including striking a matter from the record or, in extreme circumstances, dismissal of the party." 10 C.F.R. § 2.323(d); *see* 69 Fed. Reg. 2182, 2183, Statement of Considerations, Changes to Adjudicatory Process (Jan. 14, 2004) referring to "existing requirements . . . to

---

effective. *See* IP 2 SAMA 028. Thus, as to this measure, the new SAMA reanalysis provides a substantially stronger case for requiring its implementation than if the further cost estimate remained to be completed.

proffer specific, adequately supported contentions in order to be admitted as a party to the proceeding. In order to make the argument that a cost-effective SAMA must, absent a rational basis for exclusion, be included as a condition for an extended operating license, the case for including SAMAs as license conditions should not be vague or marginal. In the December 2009 SAMA Reanalysis the benefit calculations increased many times over the initial analysis and made a number of SAMAs, for which full engineering cost analyses had not been completed, so substantially more beneficial that the record now strongly supports the State's argument that such SAMAs should be added to any extended operating license.

2. The State of New York's Interest In This Proceeding, Its Standing And Its Unique Position As A Sovereign State Have Been Established

As an admitted party, the State of New York has already demonstrated that it has a right to be in the proceeding, that it has a substantial interest in the proceeding and that its interest will be substantially impacted by any order entered in this proceeding. *See also* 42 U.S.C. § 2021(l) (recognizing important role of States in AEA matters). Thus, it fulfills the provisions of 10 C.F.R. §§ 2.309(c)(ii, iii, and iv). Similarly, no other party can adequately represent the interests of the State of New York, a sovereign governmental entity, particularly on the issues raised here, which issues have not been raised by any other party. Thus, the State also fulfills the provisions of 10 C.F.R. §§ 2.309(c)(v and vi).

3. Admission Of These New Contentions Will Not Delay the Hearing And Will Assist In Developing The Record

Contentions 12B and 16B merely reaffirm the relevance of previously admitted Contentions 12/12A and 16/16A. Their admission will not delay the hearing and will avoid any dispute over whether they are actually addressed to the SAMA analysis which is relevant to this proceeding.

Contention 35 and 36 are essentially based on legal deficiencies in the December 2009 SAMA Reanalysis.[5] The facts upon which they are based are taken directly from the December 2009 SAMA Reanalysis and do not necessarily depend upon expert testimony. It is the December 2009 SAMA Reanalysis that fails to complete the engineering cost analyses required by law. It is the December 2009 SAMA Reanalysis that quantifies both the percentage risk reduction and economic advantage that would be gained and thus, the substantial safety benefits that could be obtained, if certain SAMAs were implemented. It is the December 2009 SAMA Reanalysis that fails to include a commitment to implement those substantially cost-effective SAMAs and provides no rational basis for the refusal to make that commitment. Thus, these two new contentions are likely to only add additional briefing – and probably cross motions for summary disposition – to the record in the case and thus are likely to be resolved before any hearings commence.

At this point in the case, two and a half months before NRC Staff currently predicts it will publish the SEIS, the admission of new Contentions, particularly ones based primarily on non-disputed facts, are not likely to delay the commencement of the hearings. In addition, since the December 2009 SAMA Reanalysis, which Entergy filed at least in part because of several major problems it and Staff belatedly identified in the previously filed SAMA, represents "significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts" within the meaning of 40 C.F.R. § 1502.9(c)(ii), NRC Staff is obligated to circulate a new DSEIS that will likely cause its current date for publishing the SEIS to slip, unless it publishes the supplemental DSEIS promptly.

[5] As outlined above in Parts A and B of this motion, the State of New York carefully evaluated the December 2009 SAMA Reanalysis and several supporting documents and electronic files subsequently provided by Entergy at New York's request.

Finally, new Contentions 35 and 36 will facilitate the development of a fuller record upon which the Board will be able to base its decision on whether certain SAMAs are cost-effective and, if so, whether they need to be added as conditions to any extended operating license. Since the obligation to analyze SAMAs is imposed by statute, case law and Commission regulation, it will beneficial to have this fuller record in carrying out the Board's obligations under 10 C.F.R. § 2.340(a).

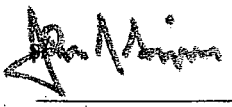
E. Consultation with Parties Pursuant to 10 C.F.R. § 2.323

The State of New York has discussed the proposed filing schedule with Entergy and NRC Staff. On Tuesday March 9, 2010, Assistant Attorney General John Sipos spoke with Kathryn Sutton and Martin O'Neill, counsel for Entergy, as well as Sherwin Turk, counsel for NRC Staff. During those conversations with counsel, Mr. Sipos summarized the four proposed contentions. The State agreed with Entergy that Entergy and Staff would have 25 days to file answers to the proposed contentions and the motion for leave. Neither Entergy nor NRC Staff took a position concerning the State's request for leave and reserved their right to respond thereto once they had received the filing.

F. Conclusion

For the reasons stated, the State of New York respectfully requests that the Atomic Safety and Licensing Board grant the State leave to file the four accompanying contentions.

Respectfully submitted,



John J. Sipos
Janice A. Dean
Lisa Feiner
Assistant Attorneys General
Office of the Attorney General
for the State of New York
The Capitol
Albany, New York 12227
(518) 402-2251

dated: March 11, 2010

UNITED STATES
NUCLEAR REGULATORY COMMISSION
ATOMIC SAFETY AND LICENSING BOARD

In re:	Docket Nos. 50-247-LR; 50-286-LR
License Renewal Application Submitted by	ASLBP No. 07-858-03-LR-BD01
Entergy Nuclear Indian Point 2, LLC, Entergy Nuclear Indian Point 3, LLC, and Entergy Nuclear Operations, Inc.	DPR-26, DPR-64 March 11, 2010

STATEMENT OF DAVID CHANIN

Summary of Experience

1. I have more than 25 years of professional experience in the development, application, maintenance, and verification/validation of large scientific codes, primarily for assessing the environmental impacts of radiological releases, and have worked with various federal agencies and contractors, including the United States Department of Energy (DOE), the United States Nuclear Regulatory Commission (NRC), and Sandia National Laboratories, as a senior risk analyst, project leader, and as a consulting expert, to review, evaluate, and develop risk models to assess the economic and environmental impacts of radiological releases in commercial, military, and government sectors.

2. I also consult as an independent expert to assess the consequences of accidental or intentional releases of radioactive materials to the atmosphere.

3. Through Sandia National Laboratories, I was an architect and developer of the MACCS2 computer code, and I am familiar with the code. MACCS2 is used by the DOE, NRC staff, and NRC licensees to model the doses, health effects, and economic consequences that result from unintended radiological releases into the atmosphere. NRC and its licensees use the MACCS2 code as part of the Severe Accident Mitigation Alternatives (SAMA) analysis.

4. As a consultant to DOE, I was involved in the review and finalization of the MACCS2 Guidance Document and the Final MACCS2 SQA Gap Analysis. I also wrote the User's Guide Code Manual for MACCS2.

5. Along with a colleague, Walter Murfin, I pioneered a model for analyzing the economic impacts if land and structures were contaminated with plutonium from a weapons accident. *Site Restoration: Estimation of Attributable Costs from Plutonium-Dispersal Accidents*, SAND96-0957 (1996).

6. I have been the principal or collaborating author of a number of scientific and technical publications concerning nuclear risk modeling on behalf of Sandia National Laboratories, Los Alamos National Laboratory, American Nuclear Society Transactions, as well as for private industry and technical workshops.

Entergy's December 2009 SAMA Reanalysis

7. I have reviewed the December 2009 Severe Accident Mitigation Alternatives SAMA Reanalysis submitted by ENERCON and Entergy Nuclear Operations, Inc., as part of Entergy's application to NRC for permission to renew the operating licenses for the Indian Point power reactors, December 14, 2009 letter to ASLB Judges and Parties and December 11, 2009 letter to NRC from Fred Dacimo, Entergy, NL-09-165 (Entergy December 2009 SAMA Reanalysis). I have also compared Entergy's December 2009 SAMA Reanalysis filing with Entergy's initial SAMA/MACCS2 analysis that accompanied its 2007 license renewal application. I have also reviewed the following documents which support the December 2009 SAMA Reanalysis: Enercon, Site Specific MACCS2 Input Data for Indian Point Energy Center, Revision 1 (Dec. 1, 2009) IPEC00208853; Entergy, IP-CALC-09-00265, "Re-analysis of MACCS2 Models for IPEC" (Dec. 2, 2009); Energy, IP-RPT-09-00044, "Re-Analysis of IP2 and IP3 Severe Accident Mitigation Alternatives (SAMAs)" (Dec. 3, 2009); and various input (.inp) and output (.out) files in an attempt to understand the difference between the December 2009 SAMA Reanalysis and the initial SAMA analysis.

8. Entergy's December 2009 SAMA Reanalysis contains significant differences from the SAMA Analysis contained in Entergy's April 2007 Environmental Report. The December 2009 SAMA Reanalysis essentially replaces the original SAMA analysis and reflects a new analysis.

9. For example, when Entergy redid its SAMA analysis in December 2009, the population dose risk and off site economic cost risk both increased significantly. The December 2009 SAMA Reanalysis reflected a baseline population dose risk (PDR) to be 87.4 person - rem/year for IP2 and 94.8 person-rem/year for IP3. *See* IP-RPT-09-00044 (Dec. 3, 2009) at 11. This new result reflects increases of a factor of 3.97 and 3.87, respectfully, when compared to the initial 2007 SAMA analysis. Additionally, the December 2009 SAMA Reanalysis reflected baseline off-site economic cost risk (OECR) to be $212,000/yr for IP2 and $261,000 for IP3. *See* IP-RPT-09-00044, at 11. These new results reflect increases of a factor of 4.72 and 4.95, respectfully, when compared to the initial 2007 SAMA analysis. The following chart depicts these differences:

COMPARISON OF 2007 AND 2009 SAMA ANALYSIS				
Consequence	Reactor Unit	2007 SAMA	December 2009 SAMA	Difference
Mean Population Dose Risk (PDR)	IP2	2.20×10^{1}	8.74×10^{1}	3.97x
	IP3	2.45×10^{1}	9.48×10^{1}	3.87x
Mean Off-site Economic Cost Risk(OECR)	IP2	4.49×10^{4}	2.12×10^{5}	4.72x
	IP3	5.28×10^{4}	2.61×10^{5}	4.95x

Source: Entergy Engineering Report IP-RPT-09-00044 (Dec. 3, 2009), Tables 1 & 2, p. 11 of 39
Entergy NL-09-165, (Dec. 11, 2009), Tables 1 & 2, p. 6 of 33
Entergy Environmental Report, Attachment E (April 2007), p. E.1-92 to 93
Entergy Environmental Report, Attachment E (April 2007), p. E.3-86 to 87

10. Another illustrative difference between the recent analysis and the earlier exercise is reflected in the population dose results from various accident sequences or release modes. For example, if one were to examine the collective dose resulting from the "Early High" Release Mode accident sequence in the December 2009 SAMA Reanalysis, one would see that the collective dose increased by a factor of approximately 4.1 when compared with Entergy's initial SAMA analysis. Changes of similar magnitudes occurred for the "Early High" Release Mode accident sequence for IP3 and the "Early Medium" Release Mode accident sequences for IP2 and IP3. These illustrative changes are reflected in the following chart: These illustrative changes are reflected in the following chart:

COMPARISON OF POPULATION DOSE RESULTS BETWEEN 2007 AND 2009 SAMA ANALYSES			
Accident/Release Mode	2007 SAMA	December 2009 SAMA	Difference
"Early High" Accident Scenario for IP2	1.58×10^5	6.51×10^5	4.12x
"Early Medium" Accident Scenario for IP2	4.86×10^4	1.94×10^5	3.99x
"Early High" Accident Scenario for IP3	1.31×10^5	5.08×10^5	3.87x
"Early Medium" Accident Scenario for IP3	5.13×10^4	2.00×10^5	3.89x

Source: Entergy Engineering Report No. IP-RPT-09-00044 (December 3, 2009), p. 11 of 39
Entergy NL-09-165, (Dec. 11, 2009), p. 6 of 33
Entergy Environmental Report, Attachment E (April 2007), p. E.1-93

11. It also appears that a column formatting error contained in the initial SAMA analysis did not reappear in the December 2009 SAMA Reanalysis. This column error was contained in the "ECONOMIC COST" data block in the 2006 input file named "sitei.inp" that accompanied the initial SAMA analysis; the error appears to have resulted in a three column shift to the left that resulted in a smaller number being recognized by the MACCS2 code. Based on the text of the December 2009 SAMA Reanalysis, it is difficult to understand the reason for the column formatting/shifting error; it may relate to the issues related to the SECPOP2000 code (referenced in NRC RAI 4g), although Entergy stated that the "problems related to use of the SECPOP2000 code have no impact on the IP2 and IP3 SAMA analysis" (Response to SAMA RAI 4g). *See* Entergy Reply to NRC Requests for Additional Information, NL-08-028 (Feb. 5, 2008) ML080420264. In any event, it appears that this error was corrected in the 2009 input file named "siteiec.inp" that supported the December 2009 SAMA Reanalysis. Correction of this error in the December 2009 SAMA Reanalysis increased the value of "non-farm wealth" and, in turn, contributed to the increase of economic costs reflected in the December 2009 SAMA Reanalysis.

12. In addition, it appears that the December 2009 SAMA Reanalysis also reexamined the impact of lost tourism and business as a "baseline" or "base case" analysis in response to RAI 4e. *See* December 2009 SAMA Reanalysis, NL-09-165, at p. 5 of 33. The initial SAMA analysis addressed this issue as part of a sensitivity analysis. *See generally*

Entergy Reply to NRC Requests for Additional Information, NL-08-028 (Feb. 5, 2008) at p. 22 and 25 of 59.

13. Further examples of the differences contained in the December 2009 SAMA Reanalysis are the changes to the benefit and costs calculations in various specific SAMA mitigation measures. *See, e.g.*, IP2 SAMA 062, NL-09-165 (Dec. 11, 2009), at p. 18 of 33.

Albuquerque, New Mexico
March 11, 2010

UNITED STATES
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

In re:	Docket Nos. 50-247-LR; 50-286-LR
License Renewal Application Submitted by	ASLBP No. 07-858-03-LR-BD01
Entergy Nuclear Indian Point 2, LLC, Entergy Nuclear Indian Point 3, LLC, and Entergy Nuclear Operations, Inc.	DPR-26, DPR-64 March 11, 2010

STATE OF NEW YORK'S NEW AND AMENDED CONTENTIONS CONCERNING THE DECEMBER 2009 SEVERE ACCIDENT MITIGATION ALTERNATIVE REANALYSIS

Office of the Attorney General
for the State of New York
The Capitol
State Street
Albany, New York 12224

TABLE OF CONTENTS

CONTENTION 12-B

THE DECEMBER 14, 2009 SAMA RE-ANALYSIS FOR IP2 AND IP3 UNDERESTIMATES DECONTAMINATION AND CLEAN UP COSTS ASSOCIATED WITH A SEVERE ACCIDENT IN THE NEW YORK METROPOLITAN AREA AND, THEREFORE, UNDERESTIMATES THE COST OF A SEVERE ACCIDENT AND FAILS TO CONSIDER MITIGATION MEASURES WHICH ARE RELATED TO LICENSE RENEWAL IN VIOLATION OF NEPA

BASES

1. On December 14, 2009, Entergy submitted to the ASLB, the State of New York, and the other parties in this proceeding an entirely new SAMA analysis which modified various inputs and outputs in the original SAMA analysis ("December 2009 SAMA Reanalysis"). The December 2009 SAMA Reanalysis relies on the MACCS2 computer program and uses an outdated and inaccurate proxy to represent the decontamination and cleanup costs resulting from a severe accident. The cost formula contained in the Indian Point MACCS2 analysis underestimates the costs likely to be incurred as a result of a dispersion of radiation. Therefore, the December 2009 SAMA Reanalysis significantly understates the costs associated with such an accident and may have resulted in the rejection of mitigation measures that might be cost-effective under a proper analysis.

2. The SAMA Reanalysis relies on the cost formula contained in the MACCS2 code which underestimates the costs likely to be incurred as a result of a dispersion of radiation.

3. MACCS2's cost calculation subroutine relies on an assumption that the dispersion will consist of large-sized radionuclide particles.

4. MACCS2's cost calculations subroutine does not take into account the additional costs that would be incurred in decontaminating a suburban/urban area such as the one that exists within the 50-mile Emergency Planning Zone around Indian Point.

5. A severe accident resulting in the dispersion of radionuclides from a nuclear power plant likely will result in the dispersion of small-sized radionuclides.

6. Large-sized radionuclide particles are easier and less expensive to remove and clean up than small-sized radionuclide particles.

7. Conversely, it will be more expensive to decontaminate and clean up a suburban/urban area in which small-sized radionuclide particles have been dispersed, than it would be to clean up large-sized radionuclide particles.

8. Because MACCS2's decontamination and clean up costs are based on large-sized radionuclide particles, it underestimates the costs of decontaminating a suburban/urban area following the dispersion of radionuclides from a nuclear power plant.

9. If the MACCS2 decontamination cost input reflected the accurate cost of cleaning up small-sized radionuclide particles in the suburban/urban areas within the Indian Point 50 mile Emergency Planning Zone, the result would be a significantly higher cost value for an accident at Indian Point.

10. Therefore, there is no reliable basis on which to conclude that the December 14, 2009 SAMA Reanalysis has accurately determined which mitigation measures are cost-effective. Accordingly, the December 2009 SAMA Reanalysis is faulty and inadequate.

11. In place of the outdated decontamination cost figure contained in the MACCS2 code, the December 2009 SAMA Reanalysis for IP2 and/or IP3 should have incorporated the analytical framework contained in the 1996 Sandia National Laboratories report concerning site restoration costs as well as recent studies examining the cost consequences in the New York metropolitan area. *See* D. Chanin and W. Murfin, *Site Restoration: Estimation of Attributable Costs from Plutonium-Dispersal Accidents*, SAND96-0957, Unlimited Release, UC-502, (May 1996); Beyea, Lyman, von Hippel, *Damages from a Major Release of ^{137}Cs into the Atmosphere of the United States*, Science and Global Security, Vol. 12 at 125-136 (2004) (discussing accident costs at Indian Point and four other sites); Lyman, *Chernobyl on the Hudson? The Health and Economic Impacts of a Terrorist Attack at the Indian Point Nuclear Power Plant*, Union of Concerned Scientists (September 2004). These three publicly-available reports should be used to determine the present and future value of decontamination costs for the four counties in the 10-mile Emergency Planning Zone, as well other cities and towns in the New York City-Connecticut-New Jersey metropolitan area that are within the 50-mile Emergency Planning Zone.

SUPPORTING EVIDENCE

12. The support for Contention 12-B, listed below, is the same as the supporting evidence for the State of New York's Contentions 12 and 12-A, which were accepted by the Board.

13. The Sandia *Site Restoration* study analyzed the expected financial costs for cleaning up and decontaminating a mixed-use urban land and Midwest farm and range land.

14. The *Site Restoration* study, which was commissioned by the U.S. Department of Energy, estimated the activities likely to be involved in the decontamination of an accident involving the dispersal of plutonium. Although *Site Restoration* studied a scenario in which plutonium from a nuclear weapon is dispersed as a result of an accident resulting from a fire or non-nuclear detonation of the weapon's explosive trigger device, the study's methodology and conclusions to estimate decontamination costs are directly useful to the LRA.

15. The Sandia study recognized that it is extremely difficult to clean up and decontaminate small radioactive particles (*i.e.*, particles ranging in size from a fraction of a micron to a few microns). *See Site Restoration*, SAND96-0957, at p. 5-7. Such small-sized particles adhere more readily to objects and become more easily lodged in small cracks, crevices, masonry, fabric, or grass and other vegetation. *Id.* at 5-7 to 5-10. The study examined the costs for extended remediation for mixed-use urban land (defined as having the national average population density of 1,344 persons/km_2), Midwest farmland, arid western rangeland, and forested area, and concluded that accident costs would be highest for urban areas. *Id.*, Executive Summary, at x, xiii.

16. *Site Restoration* recognized that earlier estimates (such as those incorporated within the MACCS/MAACS2 codes) of decontamination costs are incorrect because they examined fallout from the nuclear explosion of nuclear weapons that produce large particles and high mass loadings (*i.e.*, particles ranging in size from tens to hundreds of microns). *Id.* at 2-9 to2-10, 5-7. In the words of SAND96-0957, "[d]ata on recovery from nuclear explosions that have been publicly available since the 1960's appear to have been misinterpreted, which has led

to long-standing underestimates of the potential economic costs of severe reactor accidents." *Id.*, at 2-10.

17. For an extended decontamination and remediation operation in a mixed-use urban area with an average national population density, *Site Restoration* predicted a clean up cost of $311,000,000/km$_2$ with on-site waste disposal and $402,000,000/km$_2$ with off-site disposal. SAND96-0957 at p. 6-4. For a so-called expedited clean up of a heavily-contaminated urban area, *i.e.*, one that is finished within one year, the cost was predicted to be $398,000,000/km$_2$ using off-site disposal and $309,000,000/km$_2$ using on-site waste disposal. *Id.* at 6-5.[1]

18. The costs could be much higher. For a tourism, educational, transportation, and financial center such as the New York metropolitan area, the economic losses stemming from the stigma effects of the dispersion of radioactive material would likely be staggering. The Sandia *Site Restoration* study further recognized that:

> In comparing the numbers of cancer health effects that could result from a plutonium-dispersal accident to those that could result from a severe accident at a commercial nuclear power plant, it is readily apparent that the health consequences and costs of a severe reactor accident could greatly exceed the consequences of even a "worst-case" plutonium-dispersal accident because the quantities of radioactive material in nuclear weapons are a small fraction of the quantities present in an operating nuclear power plant.

Id. at 2-3 to 2-4. All of these costs must be taken into account.

[1] These Sandia *Site Restoration* projections are in 1996 dollars for an area of average population density and did "not include downtown business and commercial districts, heavy industrial areas, or high rise apartment buildings. Inclusion of these areas would increase costs." SAND96-0957, at p. 6-2.

19. Moreover, many areas within the Indian Point Emergency Planning Zones have higher population densities and property values than those examined in the Sandia *Site Restoration* report. Accordingly, as part of its analysis, the NRC in its FSEIS should revise the Sandia results for the densely populated and developed New York City area, incorporate the region's property values, and ensure that the resulting financial costs are expressed in present value (in 2008/2009/2010 dollars) and future value (until 2035, the likely term of any renewed operating license).

20. As noted, two recent studies provide additional information concerning the appropriate cost inputs for evacuation, temporary housing, decontamination, replacement, and disposal activities. Beyea, Lyman, von Hippel, *Damages from a Major Release of ^{137}Cs into the Atmosphere of the United States*, Science and Global Security, Vol. 12, p. 125-136 (2004) (discussing costs of Indian Point accident); Lyman, *Chernobyl on the Hudson? The Health and Economic Impacts of a Terrorist Attack at the Indian Point Nuclear Power Plant*, Union of Concerned Scientists (September 2004).

21. These two studies and the economic model found in the Sandia *Site Restoration* study are currently available to the NRC staff.[2] The results from this readily-available model, as updated and revised for the New York-Connecticut-New Jersey metropolitan area, should be included in the FSEIS and any SAMA analysis conducted as part of this license renewal proceeding.

---

[2] Copies of the *Site Restoration* study are available from the U.S. Department of Energy's Office of Scientific and Technical Information ("OSTI"). *See* http://www.osti.gov/bridge/ product. biblio.jsp?osti_id=249283; *see also* http://www.osti.gov/bridge//searchresults.jsp?formname=searchform&Author=%22Chanin,%20D.%22 (last visited Mar. 10, 2010).

CONTENTION 16-B

THE DECEMBER 2009 SAMA REANALYSIS FOR IP2 AND IP3 USES AN AIR DISPERSION MODEL WHICH WILL NOT ACCURATELY PREDICT THE GEOGRAPHIC DISPERSION OF RADIONUCLIDES RELEASED IN A SEVERE ACCIDENT AND WILL NOT PRESENT AN ACCURATE ESTIMATE OF THE COSTS OF HUMAN EXPOSURE.

BASES

1. The SAMA analysis for IP2 and IP3 assumed a scenario in which no one would be evacuated from a fifty-mile radius around the plant and asserted that this "no evacuation scenario" would "conservatively estimate the population dose" of radiation because no one in the area would have his or her exposure minimized by leaving.

2. On December 14, 2009, Entergy submitted to the ASLB, the State of New York, and the other parties in this proceeding an entirely new SAMA analysis which modified various inputs and outputs in the original SAMA analysis ("December 2009 SAMA Reanalysis"). The December 2009 SAMA Reanalysis assumed the same "no evacuation" scenario.

3. The "no evacuation" scenario in the December 2009 SAMA Reanalysis was selected to demonstrate that the mitigation alternatives it rejected were not cost effective, even when assuming that the reduction in exposure from a mitigation alternative would affect the maximum number of people and would therefore result in the maximum financial benefit to which the cost of a mitigation alternative would be compared.

4. The accuracy of the assertion that a "no evacuation" scenario will yield the most "conservative" or highest estimate of population dose depends on whether the air dispersion model accurately portrays the geographic areas that will be most affected within the 10-mile Emergency Planning Zone around the plant that actually would be evacuated during a severe accident.[3] The accuracy of the air dispersion model is essential to the assertion that the reanalysis is "conservative" because population concentrations vary substantially within the ten mile radius around the reactors (LRA Appendix E at 2-1). Therefore, the population dose of radiation within that area will depend on the geographic dispersion and concentration of the radionuclides that are released.

[3] In addition, the December 2009 SAMA Reanalysis projections of the 2035 population likely to be living within 50 miles of Indian Point are suspect and underestimate the potential exposed population. For example, Table 2-5 State and County Population, 50-Mile Radius of IP2 and IP3 on page 2-36 of the ER contains a projection that in 2035 the population of New York County (Manhattan) will be 1,570,657. The United State Census Bureau estimates that in 2008 Manhattan's population was 1,634,795, over 60,000 more than what the ER asserts would be at risk 29 years later. *See, e.g.*, U.S. Department of Commerce, U.S. Census Bureau, State and County QuickFacts, New York County, New York, *available at* http://quickfacts.census.gov/qfd/ states/36/36061.html (last visited on Mar. 10, 2010). NRC Staff questioned Entergy about the assumptions concerning permanent and transient population and economic impact of lost tourism and business contained in the original SAMA analysis. *See* NRC Staff RAI 4(c), (e) (Dec. 7, 2007); Entergy RAI Response RAI 4(c), (e) (Feb. 5, 2008); Summary of Telephone Conference Held on Nov. 9, 2009 (requesting among other things revised estimates of the offsite population dose and offsite economic costs). The December 2009 SAMA Reanalysis relies, in part, on a revised analysis prepared by Entergy's consultant, Enercon. *See* Enercon Site Specific MACCS2 Input Data for Indian Point Energy Center, Revision 1, (Dec. 1, 2009) IPEC00208853. The December 2009 SAMA Reanalysis does not adequately take into account tourists and daily commuters – individuals who are not included in New York City's resident population, but who nevertheless could be affected by a severe accident while they are in the City. The U.S. Census Bureau estimates that New York City's daytime population as of 2000 was approximately 8,570,000 people – reflecting a daily influx of approximately 563,000 people in addition to the City's resident population. In addition, New York City estimates that 47 million tourists (domestic and foreign) visited the City in 2008. *See* U.S. Department of Commerce, U.S. Census Bureau, Census 2000 PHC-T-40, Estimated Daytime Population and Employment-Residence Ratios: 2000; *see also* New York City tourism data available at http://www.nycgo.com. The December 2009 SAMA Reanalysis does not adequately take into account such additional people and thus further underestimates the population that would be exposed to a severe accident release of radiation and the benefit of any mitigation measure that would reduce such exposure.

5. For example, if an air dispersion model predicts that the highest concentration of radionuclides will center over Peekskill, with a population of 22,400, or Haverstraw, with a population of 33,000, *id.*, then more people will be exposed at a higher dollar cost then if the model predicts that the highest concentration of radionuclides will center over Bear Mountain State Park to the northwest or the U.S. Army Reservation to the north. Because the cost effectiveness of any mitigation alternative depends on the dollar value of a reduction in exposure, then a reduction in exposure in Peekskill or Haverstraw will affect more people and be more valuable than will a reduction in exposure in Bear Mountain State Park.

6. The ability of the December 2009 SAMA Reanalysis' air dispersion model to accurately predict the geographic dispersion and concentration of radionuclides in the area between the 10-mile and 50-mile radius around the plant is also essential to its to its determination of whether SAMA mitigation measures are cost effective. According to the U.S. Census Bureau, New York City has the highest population of any city in the Nation. All of New York City and its densely-populated suburbs are within that 50-mile radius and, thus, the population dose will be substantially greater if more radioactivity reaches the Bronx or Manhattan than reaches Orange County west of the Hudson River. If the air dispersion model inaccurately predicts that more radioactivity will reach Orange County than the Bronx or Manhattan, the population dose cost will then be inaccurately lower and mitigation alternatives improperly rejected as not cost effective.

7. In determining the geographic dispersion of radionuclides released in a severe accident, the December 2009 SAMA Reanalysis used an atmospheric dispersion model known as

ATMOS. That model is a straight line Gaussian plume model incorporated in the MAACS2 Code. ATMOS will not as accurately predict the dispersion and concentration of radionuclides as will newer EPA-approved models such as AERMOD or CAL PUFF. Indeed, the EPA has not authorized the use of the ATMOS air dispersion model to demonstrate compliance with regulatory standards under the Clean Air Act.[4]

8. Moreover, the accuracy of a straight line steady state Gaussian air dispersion model decreases with distance from the source of the release. For that reason, EPA does not approve the use of a straight line steady state Gaussian plume model to predict the dispersion of a pollutant beyond 50 kilometers, or thirty-two miles. Therefore, the December 2009 SAMA Reanalysis' use of the ATMOS model to predict dispersion in a 50 *mile* radius of the plant, an area which includes the highest population concentrations, is unacceptable.

9. As a straight line steady state Gaussian plume model, ATMOS assumes that meteorological conditions are constant and uniform across the study area for each time period of simulation. It therefore does not account for changes in wind speed or direction during the simulation time period, nor can it incorporate differences in terrain that will affect the way in which the release will travel. *See* November 27, 2007 Declaration of Bruce Egan, ¶¶ 22-29, 46.

[4] As the State of New York noted in Contention 16, to the extent the Applicant intends to use, and NRC accepts the use of, ATMOS or any similar model that does not incorporate the factors and analyses detailed in the Declaration of Dr. Bruce Egan submitted in support of the State of New York's petition filed November 30, 2007, to make predictions about the direction and radionuclide content of any off-site release of radionuclides, those calculations will be equally deficient and will provide false information to the public and to emergency response teams. As a result, the Applicant will be unable to meet its obligations under 10 C.F.R. § 50.47(b)(9)("Adequate methods, systems, and equipment for assessing and monitoring actual or potential offsite consequences of a radiological emergency condition are in use") and NRC Staff will be unable to meet its concurrent obligations under NEPA.

ATMOS assumes that released material travels downwind in a straight line and the concentrations of material in the horizontal and vertical dimensions are assumed to disperse in the shape of a Gaussian or bell curve.

10. Because of the simplicity of its assumptions, the ATMOS model will not yield the most accurate portrayal of the geographic dispersion and concentration of a radioactive release and will therefore not yield the most accurate population dose.

11. In sum, the December 2009 SAMA Reanalysis underestimates population projections, relies on an air dispersion model that will lead to a non-conservative geographical distribution of radioactive dose within a 50-mile radius of Indian Point, and uses that model beyond its geographical range of validity. Unless a more accurate SAMA analysis, based on a remodeling of the atmospheric dispersion of a release of radionuclides using a more accurate EPA-approved air dispersion model, is used, the environmental analysis of mitigation alternatives to the proposed action will be deficient and in violation of NEPA. *See* § 10 C.F.R. 51.53(c)(3)(ii)(L); 40 C.F.R. § 1502.14(f).

SUPPORTING EVIDENCE

12. This contention is supported by the Declaration of Bruce Egan, Sc.D., originally submitted in support of Contention NYS-16.

13. This contention is also supported by the references contained in the bases of Contention NYS-16, NYS-16A, and in the bases for this Contention.

14. The NRC itself has acknowledged the limitations of the ATMOS model. In 1999, the NRC chaired a Joint Action Group for Atmospheric Transport and Diffusion which created a

directory of atmospheric transport and diffusion consequence assessment models which expressed the same criticism of the ATMOS model as the State of New York's expert witness, Dr. Bruce A. Egan. The directory's descriptions of the strengths and weaknesses of various atmospheric diffusion models, including the ATMOS model in the MACCS2 Code, was based on questionnaires to model custodians and project managers and on the results of a U.S. Department of Energy evaluation of consequence assessment methodologies. The directory was produced for the Office of the Federal Coordinator for Meteorology, and stated in a section entitled "strengths/limitations" of the MACCS2 Code that "the weakest model in MACCS may be the straight-line Gaussian plume model of atmospheric transport and diffusion." *See Directory of Atmospheric Transport and Diffusion Consequence Assessment Models, Appendix A,* Office of the Federal Coordinator for Meteorology, FCM-13-1999 (Mar. 1999), available at www.ofcm.gov/atd_dir/pdf/maccs2.pdf.

CONTENTION 35

THE DECEMBER 2009 SEVERE ACCIDENT MITIGATION ALTERNATIVES ("SAMA") REANALYSIS DOES NOT COMPLY WITH THE REQUIREMENTS OF THE NATIONAL ENVIRONMENTAL POLICY ACT (42 U.S.C. SECTIONS 4332(2)(C)(iii) AND (2)(E)), THE PRESIDENT'S COUNCIL ON ENVIRONMENTAL QUALITY'S REGULATIONS (40 C.F.R. SECTION 1502.14), THE NUCLEAR REGULATORY COMMISSION'S REGULATIONS (10 C.F.R. SECTION 51.53 (c)(3)(ii)(L)) OR CONTROLLING FEDERAL COURT PRECEDENT (*Limerick Ecology Action, Inc., v. NRC*, 869 F.2d 719 (3d Cir. 1989)) BECAUSE IT IDENTIFIES NINE MITIGATION MEASURES WHICH HAVE NOT YET BEEN FINALLY DETERMINED TO BE COST-EFFECTIVE AND WHICH, IF THEY ARE SUFFICIENTLY COST-EFFECTIVE, MUST BE ADDED AS LICENSE CONDITIONS BEFORE A NEW AND EXTENDED OPERATING LICENSE CAN BE ISSUED

BASES

1. On December 14, 2009, Entergy submitted a new analysis of severe accident mitigation alternatives in connection with the continued operation of the Indian Point power reactors ("December 2009 SAMA Reanalysis"). This new analysis replaces Entergy's previously submitted SAMA analysis.

2. NRC Staff have described a SAMA analysis as a "systematic search for potentially cost-beneficial enhancements to further reduce nuclear power plant risk." Ghosh, Tina; Palla, Robert; and Helton, Donald; Perspectives on Severe Accident Mitigation Alternatives for U.S. Plant License Renewal (ML092750488).

3. 10 C.F.R. § 51.53 (c)(3)(ii)(L) says that "[i]f the staff has not previously considered severe accident mitigation alternatives for the applicant's plant in an environmental

impact statement or related supplement or in an environmental assessment, a consideration of alternatives to mitigate severe accidents must be provided." 10 C.F.R. § 51.53 (c)(3)(ii)(L).

4. Alternative safety measures that are found to be, on balance, sufficiently cost-effective, are to be added to the license conditions in the event a license to renew is granted or else the final decision will be without a rational basis and will not be sustainable. *See* NUREG 1555, Supplement 1 (Oct. 1999) at 5.1.1-8 to 5.1.1-9; *see, e.g., Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co.*, 463 U.S. 29, 57 (1983). NRC Staff has an obligation to evaluate the SAMAs submitted by an applicant to determine whether the applicant's proposed mitigation measures are "appropriate" and whether any other mitigation measures are "warranted." *See* NRC Standard Review Plan for Environmental Reviews for Nuclear Power Plants – Supplement 1: Operating License Renewal (Oct. 1999) at 5.1.1-9. Moreover, the NRC staff has stated that the Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission apply to evaluating SAMAs; under those guidelines SAMAs should be implemented if they provide a "substantial benefit. *See* NUREG/BR-0058, Revision 4 (September 2004). Therefore, a cost-benefit analysis is required in order to permit NRC Staff to evaluate an applicant's choice of mitigation measures and to order implementation of those which are sufficiently cost-effective and which an applicant has not agreed to implement. Because agencies must provide a rational basis for their actions, a refusal to compel implementation of a mitigation measure which provides a substantial benefit that far exceeds its cost will violate the obligations of the Administrative Procedure Act. *Bowman Transp., Inc. v. Arkansas-Best Freight System, Inc.* 419 U.S. 281, 285-286 (1974), *quoting Burlington Truck*

Lines v. United States, 371 U.S. 156, 168 (1962)(the "agency must articulate a 'rational connection between the facts found and the choice made'").

5. The December 2009 SAMA Reanalysis identified several potentially cost-effective measures that could reduce the risk to the State of New York and its citizens in the event of a severe accident at Indian Point and that were not previously identified as potentially cost-effective.[5] However, contrary to the above-referenced requirements, the cost estimates for these safety measures has not been completed. Rather, the December 2009 SAMA Reanalysis has identified SAMAs which are only "potentially" cost-effective, and stated that it will conduct another step, an engineering project cost-benefit analysis, at some undetermined time in the future, outside of this proceeding to determine whether these measures are actually cost-effective. In doing so, the December 2009 SAMA Reanalysis has deprived NRC and this Board of the ability to evaluate, and render a rational decision regarding which mitigation measures, if any, are sufficiently cost-effective that their inclusion as a condition for an extended operating license period and a new operating license is warranted.

6. The December 2009 SAMA Reanalysis asserts that the newly-discovered, potentially cost-effective SAMAs need not be fully evaluated or implemented as part of license renewal since the measures outlined in the integrated plant assessment are sufficient to manage

[5] Several mitigation measures previously identified as not cost-effective and now found to be cost-effective were not included in the list of such mitigation measures provided by Entergy in its December 2009 SAMA Reanalysis. *See, e.g., compare* December 2009 SAMA Reanalysis at 31-32 (listing IP2 SAMAs 021, 022, 062 and IP3 SAMAs 007, 018, 019 as cost-effective) *with* Entergy's Environmental Report, Attachment E at E.2-38 (where IP2 SAMA 009 was initially identified as "Not cost-effective") and December 2009 SAMA Reanalysis at 11 (now listing IP2 SAMA 009 as cost-effective and now identifying it as a SAMA to be "retain[ed]"). In addition, Entergy's Environmental Report initially listed IP2 SAMA 053 and IP3 SAMA 053 as not cost-effective, but the December 2009 SAMA Reanalysis now indicates that these measures are cost-effective and states that they should be "retain[ed]." *See* December 2009 SAMA Reanalysis at 17, 27.

the effects of aging during the license renewal period without them and that, pursuant to 10 C.F.R. Part 54, further analysis or adoption of these SAMAs is excluded from this relicensing process.

7. However, Part 54 specifically requires full compliance with the requirements of 10 C.F.R. Part 51 (*see* 10 C.F.R. § 54.29(b)). The SAMA analysis is conducted pursuant to Part 51, particularly 10 C.F.R. § 51.53(c)(3)(ii)(L), as well as the legal obligations imposed by the United States Court of Appeals for the Third Circuit in *Limerick Ecology Action, Inc. v. NRC*, 869 F.2d 719 (3d Cir. 1989). Those authorities do not grant, to any mitigation measure, an exemption from consideration in a license renewal proceeding. By considering those measures in the SAMA analysis both Entergy and NRC Staff essentially concede as much.[6]

8. By failing to conduct a thorough cost-benefit analysis on the SAMAs identified in the December 2009 SAMA Reanalysis, that reanalysis fails to meet the requirements under NEPA and 10 C.F.R. § 51.53(c)(3)(ii)(L), and ignores the guidance for conducting SAMA analyses provided by NRC Staff and the Nuclear Energy Institute ("NEI").

9. These failures in the December 2009 SAMA Reanalysis prevent NRC Staff and this Board from being able to render a rational decision on Entergy's proposed license renewal application and alternatives to it, including alternatives deemed cost-effective following a

[6] The only prohibition on consideration of issues in a license renewal proceeding is contained in 10 C.F.R. § 54.30. That section merely prohibits consideration of issues related to an applicant's non-compliance with its current licensing basis ("CLB"). That consideration is unrelated to the SAMA analysis which is focused on imposition of additional safety requirements not because of non-compliance with the CLB but because, under an appropriate NEPA alternatives analysis, an alternative license, with more safety requirements, is deemed preferable to the proposed action because the human, economic and environmental consequences of a severe accident will be substantially reduced and the reduction will be cost-effective.

completed SAMA analyses. Refusal to complete the cost benefit analysis of measures that are identified as potentially cost-effective frustrates the objective of NRC's Standard Review Plan for license renewal that directs NRC to determine whether "the mitigation alternatives committed to by the applicant are appropriate, and no further mitigation measures are warranted." Standard Review Plan for Environmental Reviews for Nuclear Power Plants – Supplement 1: Operating License Renewal (Oct. 1999) ("Standard Review Plan") at 5.5.1-9.

SUPPORTING EVIDENCE

10. The Indian Point reactors are located 24 miles north of New York City. More than 17 million people live within 50 miles of Indian Point, a total that is projected to grow to 20 million by 2035. According to the Atomic Energy Commission ("AEC"), the NRC, and the Federal Emergency Management Agency ("FEMA"), more people live within 10 and 50 miles of the Indian Point reactors than at any other operating power reactor in the nation. The communities within the 50-mile radius around Indian Point also contain some of the most densely-developed and expensive real estate in the country, critical natural resources, centers of national and international commerce, transportation arteries and hubs, and historic sites. Thus, a severe accident at Indian Point has the potential to affect more people than an accident at any other reactor in the country.

11. The Indian Point location was selected as the site of one of the first commercial power reactors in the nation in March 1955 – before the Atomic Energy Commission or the Nuclear Regulatory Commission developed any regulations concerning the siting of such reactors, before passage of the NEPA, before CEQ promulgated any regulations implementing

NEPA, before the 1989 ruling by the United States Court of Appeals for the Third Circuit that told NRC to promulgate regulations to require the examination of the impacts of severe accidents, and before NRC promulgated regulations requiring the examination of ways to mitigate the impacts caused by severe accidents. Until this proceeding, the Indian Point power reactors have not been subject to a SAMA analysis under NEPA.

12. Of all the power reactors in the United States, the Indian Point reactors have the highest surrounding population both within a 50-mile radius and a 10-mile radius. *See, e.g.*, AEC, Population Distribution Around Nuclear Power Plant Sites, Figure 2: Typical Site Population Distribution (5-50 Miles) (April 17, 1973); FEMA, Nuclear Facilities & Population Density Within 10 Miles (June 2005). With more than 17 million people living within 50 miles of Indian Point, no other operating reactor site in the country comes close to Indian Point in terms of surrounding population. The Indian Point reactors and spent fuel pools are approximately 24 miles north of the New York City line, and approximately 37 miles north of Wall Street in lower Manhattan. The U.S. Census Bureau recognizes that New York City is the largest city in the Nation with an estimated resident population of 8,214,426 (as of 2006).[7] The facilities are approximately 3 miles southwest of Peekskill, with a population of 22,441; 5 miles northeast of Haverstraw, with a population of 33,811, 16 miles southeast of Newburgh, with a population of 31,400, and 17 miles northwest of White Plains, with a population of 52,802. Indian Point is also 23 miles northwest of Greenwich, Connecticut, 37 miles west of Bridgeport, Connecticut, and 37-39 miles north northeast of Jersey City and Newark, New Jersey. Portions

[7] New York City experiences a substantial influx of additional people each day. *See* U.S. Census Bureau, Census 2000 PHC-T-40, Estimated Daytime Population and Employment-Residence Rations: 2000.

of four New York counties – Westchester, Rockland, Orange, and Putnam – fall within the inner 10-mile Emergency Planning Zone. Additional population centers in New York, such as New York City's five boroughs and Nassau County, lie within the 50-mile Emergency Planning Zone, as do significant population centers in Connecticut and New Jersey. Under NRC's current siting regulations, which were not in place when AEC approved the Indian Point site in 1956, it is highly unlikely that the Indian Point reactors could be located today in this densely populated area. *See* 10 C.F.R. § 100.21(h).

13. The three power reactors located at Indian Point were not subjected to a severe accident mitigation alternatives analysis when AEC and NRC issued the construction permits and operating licenses for those facilities. According to AEC and NRC documents, the Consolidated Edison Company ("ConEd") received the following construction permits and operation licenses on the following dates:

	CONSTRUCTION PERMIT ISSUED	OPERATING LICENSE ISSUED
IP Unit 1	May 4, 1956	March 26, 1962
IP Unit 2	October 14, 1966	September 28, 1973
IP Unit 3	August 13, 1969	December 12, 1975

Source: Federal Register and NRC Information Digest.[8]

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

14. When ConEd announced its selection of the Indian Point site back in March 1955 and filed an application for the necessary construction permit, the AEC did not have site selection regulations that addressed population or seismic issues.

15. To place this initial siting decision in perspective, ConEd selected, and AEC approved, Indian Point as the site for a power reactor before the Windscale (1957), Three Mile Island (1979), and Chernobyl (1986) events. The 1955 selection of Indian Point also came before the enactment of NEPA (1970), the promulgation of CEQ regulations (1978), the Third Circuit's *Limerick* decision (1989), and NRC promulgation of the 10 C.F.R. § 51.53 regulation (1996) that requires an analysis of ways to mitigate the impacts of severe accidents during license renewal proceedings. In 1979, NRC's Director of State Programs said of the Indian Point site "I think it is insane to have a three-unit reactor on the Hudson River in Westchester County, 40 miles from Times Square, 20 miles from the Bronx."[9] The fact that a commitment was made to the Indian Point site before these statutes and regulations were enacted does not excuse NRC today from the fullest possible compliance with the statutes and regulations when taking a major federal action related to Indian Point. *Calvert Cliffs' Coordinating Com. v. AEC,* 449 F.2d 1109, 1128-29 (D.C. Cir. 1971).

16. By letter dated December 11, 2009, Entergy provided NRC Staff with the following information related to its newly-prepared SAMA analysis:

- The meteorological data and justification supporting its use in the SAMA analysis (*e.g.*, if a single year is used or an average of several years);

[9] Robert Ryan, NRC Director of State Programs, *quoted in* Staff Reports to the President's Commission on the Accident at Three Mile Island, Report of the Office of Chief Counsel on Emergency Preparedness, at p. 8.

- Revised estimates of the offsite population dose and offsite economic costs;
- Identification of the meteorological tower elevation from which meteorological data were obtained and the rationale for selecting the data from that tower elevation;
- Revised SAMA analysis results, specifically for the analysis case discussed in response to NRC Staff Request for Additional Information (RAI) 4e, dated February 5, 2008; and
- The complete MACCS2 input file used for the reanalysis (in electronic format).

Attached to the letter was a SAMA reanalysis, entitled: Indian Point Nuclear Generating Unit Nos. 2 and 3 License Renewal Application SAMA Reanalysis Using Alternate Meteorological Tower Data ("December 2009 SAMA Reanalysis"). This letter was sent to the Board, the State of New York and other parties electronically on December 14, 2009. The State received a hard copy version on December 21, 2009.

17. Following receipt of the December 2009 SAMA Reanalysis, the State of New York asked Entergy various questions about the Reanalysis and MACCS2 inputs and outputs. The requests were made in December 2009 and January and February 2010. Entergy responded to the State's requests.

18. The December 2009 SAMA Reanalysis indicated that it was substantially modified from the initial SAMA analysis submitted as part of Entergy's initial Environmental Report ("ER"). This is evident from the fact that the "Conclusion" section of the December 2009

SAMA Reanalysis has now affirmatively identified six new mitigation measures that are potentially cost-effective that were not previously identified as cost-effective.

19. The December 2009 SAMA Reanalysis concluded that:

> In the SAMA reanalysis using a conservatively representative, single year of meteorological data (2000), the following additional three SAMA candidates were found to be potentially cost beneficial for mitigating the consequences of a severe accident for IP2 (in addition to those previously designated as cost beneficial in Section 4.21.6 of the ER and References 2 and 3).
>
> 021 - Install additional pressure or leak monitoring instrumentation for interfacing system loss of coolant accidents (ISLOCAs)
>
> 022 - Add redundant and diverse limit switches to each containment isolation valve
>
> 062 - Provide a hard-wired connection to a safety injection (SI) pump from the alternate safe shutdown system (ASSS) power supply
>
> In the SAMA reanalysis using a conservatively representative, single year of meteorological data, the following three SAMA candidates were found to be potentially cost beneficial for mitigating the consequences of a severe accident for IP3 (in addition to those previously designated as cost beneficial in Section 4.21.6 of the ER and References 2 and 3).
>
> 007 - Create a reactor cavity flooding system
>
> 018 - Route the discharge from the main steam safety valves through a structure where a water spray would condense the steam and remove most of the fission products (cost beneficial in TI-SGTR sensitivity in Section [8])
>
> 019 - Install additional pressure or leak monitoring instrumentation for ISLOCAs

> *As described in the aging management review results for the integrated plant assessment presented in Sections 3.1 through 3.6 of the license renewal application, IP2 and IP3 have programs for managing aging effects for components within the scope of license renewal (Reference 1). Since these programs are sufficient to manage the effects of aging during the license renewal period without implementation of the above SAMA candidates for IP2 and IP3, these potentially cost beneficial SAMAs need not be implemented as part of license renewal pursuant to 10 CFR Part 54. However, consistent with those SAMAs identified previously as cost beneficial, the above potentially cost beneficial SAMAs have been submitted for engineering project cost-benefit analysis.*

December 2009 SAMA Reanalysis at 31-32 (emphasis added). In addition to the six identified mitigation measures that are now identified in the "Conclusion" section as potentially cost-effective, there are three other mitigation measures that, although not included in the list quoted above, now have been identified in the December 2009 SAMA Reanalysis as cost-effective, but which were previously identified as not cost-effective in the original SAMA analysis. These three additional mitigation measures are SAMAs 009 (create a reactor cavity flooding system) and 053 (keep both pressurizer PORV block valves open) both for Indian Point 2 and SAMA 053 (install an excess flow valve to reduce the risk associated with hydrogen explosions) for Indian Point 3. *See* December 2009 SAMA Reanalysis at 11, 17 and 27 and Environmental Report, Appendix E, Attachment E.3 at E.2-38 and E.2-56 and E.4 at E.4-60 (listing each of these SAMAs as "Not cost-effective"). There is no legal basis for not providing the "engineering project cost-benefit analysis"[10] as part of the SAMA, nor is there any legal basis for not implementing cost-effective mitigation alternatives.

[10] The cost portion of the cost-benefit balance appears to be a moving target which can be increased at each step of the SAMA process at Entergy's initiative. For example, the December 2009 SAMA Reanalysis identifies certain of

20. NRC Staff Guidance for conducting the SAMA analysis is contained in Reg. Guide 4.2, Supplement 1 (September 2000) and provides in relevant part that the SAMA analysis should include the following information:

> 4. Estimate the value of the reduction in risk. Value is usually calculated for public health, occupational health, offsite property, and onsite property. A detailed discussion of calculating values is found in Chapter 5 of NUREG/BR-0184.
>
> 5. Estimate the approximate cost of each modification and procedural and administrative change found to reduce the dose consequence risk of severe accidents. Potential SAMAs that are not expected to be cost beneficial, even when uncertainties in the analysis (e.g., a factor of 10) are taken into consideration, may be screened out based on a bounding analysis.
>
> 6. Perform a more detailed value-impact analysis for remaining SAMAs to identify any plant modifications and procedural changes that may be cost-effective (see Chapter 5 of NUREG/BR-0184).
>
> 7. List plant modifications and procedural changes (if any) that have or will be implemented to reduce the severe accident dose consequence risk.

Id. at 4.2-S-50.

---

the cost estimates provided with a dagger ("†") and explains that for each of the cost estimates so identified "Cost estimate revised from what was previously reported." *Id.* at 19 and 28. This process is explained as follows:

> SAMAs in the reanalysis that appeared to be cost beneficial with the new benefit estimate and the old implementation cost estimate were subjected to more comprehensive and precise cost estimating techniques to determine if they are indeed potentially cost beneficial. The cost estimates for SAMAs noted with "†" in Table 4 and Table 5 are those that were developed in more detail.

Id. at 8. Apparently, as explained in the December 2009 SAMA Reanalysis at 32, more engineering cost calculations are to be applied to the SAMA mitigation measures that are still cost-effective, but those calculations are not being offered in this proceeding.

21. NRC Staff has acknowledged that the additional steps needed to complete the SAMA analysis are the very steps the December 2009 SAMA Reanalysis asserts are allowed to be postponed to some future date, outside the relicensing process:

> The final step in the process is a more detailed analysis of the SAMAs that were identified as being potentially cost-beneficial in the steps above. This may include a more detailed (*i.e.*, more realistic and less bounding) evaluation of the potential benefits of the SAMA (*i.e.*, rather than assuming that the SAMA eliminates all CDF contributors, only those sequences relevant to the SAMA are included). It may also include a more detailed development of the cost associated with the proposed modification (including such things as engineering support, training, hardware costs, and implementation costs).

See Ghosh, Tina; Palla, Robert; and Helton, Donald; Perspectives on Severe Accident Mitigation Alternatives for U.S. Plant License Renewal (ML092750488) at 5.

22. Rather than "perform[ing] a more detailed value-impact analysis for remaining SAMAs to identify any plant modifications and procedural changes that may be cost-effective" as required by Reg. Guide 4.2, Supplement 1, which would enable NRC Staff to determine the appropriateness of "plant modifications and procedural changes (if any) that have or will be implemented to reduce the severe accident dose consequence risk," the December 2009 SAMA Reanalysis indefinitely postpones the engineering cost-benefit analyses required to determine whether a proposed mitigation measure is cost-effective and thus will be implemented for nine mitigation measures – five for Unit 2 and four for Unit 3. December 2009 SAMA Reanalysis at 32.

23. The failure to properly conduct the SAMA analysis also prevents NRC Staff from making the necessary findings in the SEIS as identified in the Standard Review Plans for Environmental Reviews for Nuclear Power Plants – Supplement 1: Operating License Renewal, NUREG-1555 (Oct. 1999) ("NRC Standard Review Plan") which provides in pertinent part:

> If the reviewer determines that there was no previous consideration of SAMAs for the plant, then the reviewer should prepare a statement for the SEIS similar to the following:
>
> > The staff has concluded that the applicant completed a comprehensive, systematic effort to identify and evaluate the potential plant enhancements to mitigate the consequences of severe accidents. The staff has considered the robustness of this conclusion relative to critical assumptions in the analysis—specifically the impact of uncertainties in the averted offsite risk estimates and the use of alternative benefit-cost screening criteria. The staff has concluded that the findings of the analysis would be unchanged even considering these factors. *Therefore, the staff concludes that the mitigation alternatives committed to by the applicant are appropriate, and no further mitigation measures are warranted.*

NRC Standard Review Plan at 5.1.1-7 to 5.1.1-8 (emphasis added). As the italicized sentence illustrates, NRC Staff recognizes that once a SAMA analysis is properly completed, it is required to compel an applicant to commit to implement those SAMA mitigation measures that are "warranted," *i.e.*, those that are found to be sufficiently cost-effective. Stated differently, this NRC document confirms that before a SEIS for a license renewal application is complete, NRC and its staff must ensure, based on the SAMA analysis, that the applicant has committed to implement all sufficiently the cost-effective mitigation measures revealed by that analysis and

that, because of that binding commitment, no further mitigation measures are warranted. The NRC Standard Review Plan makes clear that a SAMA analysis is not a mere academic exercise with no consequences in the real world; rather, the SAMA analysis is an integral and substantive part of the license renewal process whose results bind the applicant to implement sufficiently cost-effective mitigation measures. Since the December 2009 SAMA Reanalysis does not contain a completed engineering cost analysis for all potentially cost-effective SAMAs, it cannot be used to determine which mitigation alternatives are actually cost-effective. Thus, NRC Staff cannot make a finding that the "mitigation alternatives committed to by [Entergy] are appropriate, and no further mitigation measures are warranted." *Id.*

24. The State's argument is supported by the Nuclear Energy Institute ("NEI"), the trade association for the nuclear industry, which has also developed guidance for conducting a SAMA analysis (*see* NEI 05-01(Rev. A) Severe Accident Mitigation Alternatives (SAMA) Guidance Document ("NEI 05-01(Rev. A)")), and which was formally approved by NRC Staff for use in conducting SAMA analyses. *See* 74 Fed. Reg. 45466 (Notice of Availability of the Final License Renewal Interim Staff Guidance LR–ISG–2006–03: Staff Guidance for Preparing Severe Accident Mitigation Alternatives Analyses) (Aug. 14, 2007)("The NRC staff recommends that applicants for license renewal follow the guidance provided in Nuclear Energy Institute (NEI) 05–01, 'Severe Accident Mitigation Alternatives (SAMA) Analysis—Guidance Document,' Revision A, when preparing their SAMA analyses"). NEI 05-01(Rev. A) provides in relevant part that:

> As SAMA analysis focuses on establishing the economic viability of potential plant enhancement when compared to attainable benefit, often detailed cost estimates are not required to make informed decisions regarding the economic viability of a particular modification. SAMA implementation costs may be clearly in excess of the attainable benefit estimated from a particular analysis case. For less clear cases, engineering judgment may be applied to determine if a more detailed cost estimate is necessary to formulate a conclusion regarding the economic viability of a particular SAMA. *Nonetheless, the cost of each SAMA candidate should be conceptually estimated to the point where economic viability of the proposed modification can be adequately gauged.*

Id. at 28 (emphasis added). Entergy is a member of NEI and holds a position on the Executive Committee.[11] Although the December 2009 SAMA Reanalysis asserts that it follows NEI guidance and even quotes this same portion of the NEI guidance document, it is evident that the SAMA Reanalysis has not been completed to the point where the "economic viability of the proposed modification can be adequately gauged" since the Reanalysis acknowledges that further engineering cost analysis is required. *Id.* at 8 and 32.

25. The December 2009 SAMA Reanalysis specifically rejects the NEI guidance and chooses instead to postpone to an indefinite future date the necessary cost-benefit analysis to allow the potential mitigation modification to "be adequately gauged." *Id.* at 32.

26. NRC guidance documents related to the proper methodology for conducting a regulatory analysis cost-benefit evaluation provide further confirmation of the obligation to conduct a complete cost-benefit evaluation as part of a SAMA analysis and to commit to

[11] http://www.nei.org/resourcesandstats/documentlibrary/how_it_works/reports/governance-and-member-roster.

implement those measures which, following such an analysis, are found to be sufficiently cost-effective.

27. Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission NUREG/BR-0058, Revision 4 (September 2004) set forth the guidelines to be used for determining when a safety measure – which is not otherwise required to be implemented – should be implemented because it is deemed cost-effective. The Regulatory Analysis includes the following:

> [T]he principal purposes of a regulatory analysis are to help ensure the following:
>
> - The NRC's regulatory decisions made in support of its statutory responsibilities are based on adequate information concerning the need for and consequences of proposed actions.
> - Appropriate alternative approaches to regulatory objectives are identified and analyzed.
> - *No clearly preferable alternative is available to the proposed action.*
> - Proposed actions subject to the backfit rule (10 CFR 50.109), and not within the exceptions at 10 CFR 50.109(a)(4), provide a substantial[3] increase in the overall protection of the public health and safety or the common defense and security and that the direct and indirect costs of implementation are justified in view of this substantial increase in protection.
>
> [3]The Commission has stated that *"substantial" means important or significant in a large amount, extent, or degree* (Ref. 21)[[12]]. Applying such a standard, the Commission would not ordinarily expect that safety-applying improvements would be required as backfits that result in an insignificant or small benefit to the public health and safety, regardless of costs. On the other hand, *the standard is not intended to be interpreted in a manner*

[12] Reference 21 is "S. Chilk, Staff Requirements Memorandum to J.M. Taylor and W.C. Parler, 'SECY-93-086—Backfit Considerations,' June 30, 1993."

> *that would result in disapprovals of worthwhile safety or security improvements having costs that are justified in view of the increased protection that would be provided. This approach is flexible enough to allow for qualitative arguments that a given proposed rule would substantially increase safety.*

Id. at 4 (emphasis added).

33. Since the NRC Staff portion of the SAMA analysis will require it to determine whether a clearly preferable alternative exists to the proposed relicensing, *i.e.*, whether a new license should include additional safety measures to be undertaken by Entergy as a condition of obtaining a license to operate another 20 years, it must have a full cost-benefit analysis to make that determination.

34. NRC Staff has acknowledged that the guidance provided in NUREG/BR-0058 is directly relevant to conducting SAMA analyses. "To identify SAMAs that may be cost-beneficial, the net value of each SAMA is estimated. The NRC maintains two documents that provide guidance in this area: NUREG/BR-00586 and NUREG/BR-0184 [Regulatory Analysis Technical Evaluation Handbook, U.S. Nuclear Regulatory Commission, January 1997]." Ghosh, Tina; Palla, Robert; and Helton, Donald; Perspectives on Severe Accident Mitigation Alternatives for U.S. Plant License Renewal (ML092750488) at 4.

35. The December 2009 SAMA Reanalysis asserts that the newly-discovered, potentially cost-effective SAMAs need not be implemented as part of license renewal since the measures outlined in the integrated plant assessment are sufficient to manage the effects of aging during

the license renewal period without them, pursuant to 10 CFR Part 54. *Id.* at 32. But Part 54 specifically requires full compliance with the requirements of 10 C.F.R. Part 51 (*see* 10 C.F.R. § 54.29(b)), and the SAMA analysis is conducted pursuant to Part 51, particularly 10 C.F.R. § 51.53(c)(3)(ii)(L), as well as the legal obligations imposed by the United States Court of Appeals for the Third Circuit in *Limerick Ecology Action v. NRC*, 869 F.2d 719 (3d Cir. 1989). Those authorities do not grant an exemption from consideration in a license renewal proceeding to any mitigation measure. By considering those measures in the SAMA analysis both Entergy and NRC Staff essentially concede as much.[13]

36. Nothing in Part 54 justifies the failure to complete the engineering cost analyses. Part 51 requires that "[i]f the staff has not previously considered severe accident mitigation alternatives for the applicant's plant in an environmental impact statement or related supplement or in an environmental assessment, a consideration of alternatives to mitigate severe accidents must be provided." 10 C.F.R. § 51.53 (c)(3)(ii)(L).[14]

---

[13] The only prohibition on consideration of issues in a license renewal proceeding is contained in 10 C.F.R. § 54.30. That section merely prohibits consideration of issues related to an applicant's non-compliance with its current licensing basis ("CLB"). That consideration is unrelated to the SAMA analysis which is focused on imposition of additional safety requirements not because of non-compliance with the CLB but because, under an appropriate NEPA alternatives analysis, an alternative license, with more safety requirements, is deemed preferable to the proposed action because the human, economic and environmental consequences of a severe accident will be reduced and the reduction will be cost-effective.

[14] Until the Staff has evaluated the December 2009 SAMA Reanalysis and issued a supplemental DSEIS (*see* 40 C.F.R. Section 1502.9(c)(a)(ii)(supplemental DSEIS required if "[t]here are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts")) or the FSEIS, it is not possible to know if the Staff will fail to include substantial changes which have occurred since the initial DEIS and, will merely accept the December 2009 SAMA Reanalysis "as-is." However, if the Staff merely accepts the December 2009 SAMA Reanalysis "as is," the Contention as worded will be equally applicable to NRC Staff. For now, the only contention that is ripe for consideration is one focused on the December 2009 SAMA Reanalysis' failure to comply with 10 C.F.R. § 51.53 (c)(3)(ii)(L). However, according to 10 C.F.R. § 2.309(f)(2), on "issues arising under the National Environmental Policy Act, the petitioner shall file contentions based on the applicant's

37. *Limerick Ecology Action, Inc. v. NRC*, 869 F.2d 719 (3d Cir. 1989), is the most significant court case that bears on the issue of whether a SAMA analysis can ignore the full analysis of mitigation alternatives based on the assertion that such full analysis can be avoided because the mitigation measures alternatives are barred from consideration in license renewal by safety regulations (*i.e.*, Part 54). *Limerick* held, in pertinent part:

> Although NEPA imposes responsibilities that are purely procedural, *see Vermont Yankee*, 435 U.S. at 558, there is no language in NEPA itself that would permit its procedural requirements to be limited by the AEA. Moreover, there is no language in AEA that would indicate AEA precludes NEPA.
>
> ***
>
> [C]ourts have repeatedly held that, as suggested by the legislative history, compliance with NEPA is required unless specifically excluded by statute or existing law makes compliance impossible. *See, e.g., Public Service Co. of New Hampshire v. NRC*, 582 F.2d 77, 81 (1st Cir.) ("The directive to agencies to minimize all unnecessary adverse environmental impact obtains except when specifically excluded by statute or when existing law makes compliance with NEPA impossible."), *cert. denied*, 439 U.S. 1046, 99 S. Ct. 721, 58 L. Ed. 2d 705 (1978). Accordingly, "unless there are specific statutory provisions which necessarily collide with NEPA, the Commission was under a duty to consider and, to the extent within its authority, minimize environmental damage. . . ." *Public Service*, 582 F.2d at 81 (footnote omitted). On the basis, therefore, of the language of NEPA and AEA, the legislative history of NEPA, and the existing case law, we find no intent by Congress that the AEA preclude application of NEPA.

Id. at 729-730 (footnotes omitted).

---

environmental report." Thus, under NRC regulations, once Entergy submitted its revised SAMA in December 2009, essentially amending its Environmental Report, the State of New York has an opportunity to prepare and submit NEPA-based contentions as challenges to the Environmental Report and its new SAMA analysis as though they were challenges to an environmental impact statement under NEPA.

38. The *Limerick* court also reaffirmed the obligation on NRC to take a "hard look" at alternatives to the proposed action by thoroughly discussing those alternatives:

> to qualify, the [final environmental statement] must contain sufficient discussion of the relevant issues and opposing viewpoints to enable the decisionmaker to take a "hard look" at the environmental factors and to make a reasoned decision. *Kleppe v. Sierra Club*, 427 U.S. 390, 410 n.21, 49 L. Ed. 2d 576, 96 S. Ct. 2718 (1976). The impact statement must be sufficient to enable those who did not have a part in its compilation to understand and consider meaningfully the factors involved. *Environmental Defense Fund, Inc. v. Corps of Engineers*, 492 F.2d 1123, 11367 (5th Cir. 1974). *Cf. Dunlop v. Bachowski*, 421 U.S. 560, 572, 44 L. Ed. 2d 377, 95 S. Ct. 1851 (1975) (noting that a statement by an agency of the reasons for its determination is crucial to effective judicial review). Here, as we discussed *supra* ... the FES neither considered nor specifically rejected [severe accident mitigation design alternatives].

Id. at 737 (footnotes omitted). Failing to complete the economic analysis necessary to determine whether a mitigation measure is cost-effective prevents a "hard look" at the alternative.

39. The December 2009 SAMA Reanalysis identified the following six mitigation measures as potentially cost-effective:

> IP2 021 - Install additional pressure or leak monitoring instrumentation for interfacing system loss of coolant accidents (ISLOCAs);
>
> IP2 022 - Add redundant and diverse limit switches to each containment isolation valve;
>
> IP2 062 - Provide a hard-wired connection to a safety injection (SI) pump from the alternate safe shutdown system (ASSS) power supply;
>
> IP3 007 - Create a reactor cavity flooding system;

> IP3 018 - Route the discharge from the main steam safety valves through a structure where a water spray would condense the steam and remove most of the fission products (cost beneficial in TI-SGTR sensitivity in Section [8]); and
>
> IP3 019 - Install additional pressure or leak monitoring instrumentation for ISLOCAs.

The documentation accompanying the December 2009 SAMA Reanalysis reflects that IP2 009, IP2 053, and IP3 053 are also cost-effective. The refusal to complete the economic analysis for these mitigation measures prevents the NRC from determining which cost-effective mitigation measures should be imposed as a condition of license renewal. The failure to implement substantially beneficial measures will subject the State of New York and its residents, in the event of a severe accident at the Indian Point reactors, to additional and unnecessary adverse impacts that could have been mitigated had the mitigation alternatives proven to be "warranted" following completion of the necessary cost-benefit analysis.[15] The human health and economic benefits of these mitigation measures are substantial. For example, according to the December 2009 SAMA Reanalysis implementation of SAMA 021 for IP2 would reduce the Population Dose Risk ("PDR") by 11.33% and the Offsite Economic Cost Risk ("OECR") by 14.62% and implementation of SAMA 07 for IP3 would reduce the PDR by 24.16% and the OECR by

[15] If Entergy and/or NRC Staff argue that no further current engineering cost estimates are required, then Entergy should be required to implement at least IP2 SAMA 009, and IP3 SAMA 007 because, based on the current cost-effectiveness analysis: (1) each of these SAMAs is cost-effective using both the baseline and the conservative benefit calculation; (2) some additional engineering cost estimates have already been done making it less likely further analysis will change the outcome; (3) the safety benefit of each mitigation measure is substantial – reducing the population dose risk by 47.03% and 24.16% respectively; and (4) the difference between the cost and the benefit is significant – amounting to $1-2 million for each one. See paragraph 4, *supra,* for a further discussion of why implementation of cost-effective mitigation measures that meet these criteria is required under prevailing law because neither the December 2009 SAMA Reanalysis nor the DSEIS provide a rational basis for not requiring implementation.

14.94%. In addition, implementation of the three additional SAMAs not mentioned in the Reanalysis' Conclusion would also reduce the risk to the densely-populated surrounding communities. By failing to complete the required analyses and by its insupportable claim that Part 54 excuses an applicant from implementing these SAMAs, the December 2009 SAMA Reanalysis proposes to subject the people in New York State, and surrounding states, to a substantially greater risk of harm than is justifiable, a proposal which is not only contrary to law but appears to be economically indefensible.

40. In sum, the December 2009 SAMA Reanalysis now identifies nine mitigation measures which appear to be cost-effective, but fails to complete the economic analyses to determine whether they are sufficiently cost-effective to require implementation and indicates that implementation of these risk reduction measures, even though they prove to be sufficiently cost-effective, is not required. In an attempt to justify this failure to complete the SAMA analysis and implement its results, the December 2009 SAMA Reanalysis cites Part 54. However, the reliance on Part 54 is misplaced. It is not justified by any language in Part 54 and it conflicts with NRC regulations and the guidance provided by NRC and NEI as well as the legal mandate imposed by *Limerick*.

CONTENTION 36

THE DECEMBER 2009 SEVERE ACCIDENT MITIGATION ALTERNATIVES ("SAMA") REANALYSIS DOES NOT COMPLY WITH THE REQUIREMENTS OF THE NATIONAL ENVIRONMENTAL POLICY ACT ("NEPA") (42 U.S.C. SECTIONS 4332(2)(C)(iii) AND (2)(E)), THE PRESIDENT'S COUNCIL ON ENVIRONMENTAL QUALITY'S REGULATIONS (40 C.F.R. SECTION 1502.14), THE NUCLEAR REGULATORY COMMISSION'S REGULATIONS (10 C.F.R. SECTION 51.53 (c)(3)(ii)(L)), THE ADMINISTRATIVE PROCEDURE ACT (5 U.S.C. SECTIONS 553(c), 554(d), 557(c), AND 706), OR CONTROLLING FEDERAL COURT PRECEDENT (*Limerick Ecology Action, Inc., v. NRC*, 869 F.2d 719 (3d Cir. 1989)) BECAUSE THIS SAMA REANALYSIS IDENTIFIES A NUMBER OF MITIGATION ALTERNATIVES WHICH ARE NOW SHOWN, FOR THE FIRST TIME, TO HAVE SUBSTANTIALLY GREATER BENEFITS IN EXCESS OF THEIR COSTS THAN PREVIOUSLY SHOWN YET ARE NOT BEING INCLUDED AS CONDITIONS OF THE PROPOSED NEW OPERATING LICENSE

BASES

1. The original SAMA analysis Entergy submitted with the Environmental Report ("ER"), identified a number of mitigation measures which appeared to be cost-effective but for which full engineering cost estimates had not been completed and for which the difference between cost and benefit, either in absolute dollars or percentages, was relatively small.

2. According to the original SAMA analysis and the ER, some of these mitigation measures were cost-effective only if the "benefit with uncertainty" value was used for the comparison but not with the baseline value.

3. On December 14, 2009, Entergy submitted a new analysis of severe accident mitigation alternatives in connection with the continued operation of the Indian Point power reactors ("December 2009 SAMA Reanalysis"). The December 2009 SAMA Reanalysis

replaced the prior SAMA analysis, substantially altered the benefit calculation for all of the SAMAs for both Indian Point Units 2 and 3 and did additional cost analyses for some of the SAMAs. As a result of the reanalysis, several mitigation measures that were previously, at best, only marginally cost-effective became substantially cost-effective.

4. As to all of the SAMAs (those newly found to be cost-effective and those newly found to be substantially more cost-effective than previously claimed), the December 2009 SAMA Reanalysis states that it will conduct additional engineering analyses. *See* December 2009 SAMA Reanalysis, at 32 ("consistent with those SAMAs identified previously as cost beneficial, the above potentially cost beneficial SAMAs have been submitted for engineering project cost benefit analysis."). However, there is no indication that additional cost analyses will be completed in the near future or be submitted as part of the record in this case. Moreover, the State is not aware that any such "additional" engineering / cost analyses were previously conducted and disclosed by Entergy or NRC Staff pursuant to 10 C.F.R. § 2.336 or submitted in this proceeding for the potentially cost-effective SAMAs identified in the original ER filed in 2007.

5. The mitigation measures that are the subject of this Contention are those (1) for which the baseline benefit is now, for the first time, greater than the cost estimate, (2) for which the gap between the benefit and cost is so great that it is extremely unlikely that further engineering cost work could tilt the balance against the mitigation measure, and/or (3) for which additional engineering cost work has already been completed and the benefit still outweighs the cost, thus reducing the likelihood that further work will tip the scale against cost-effectiveness.

6. An alternatives analysis conducted pursuant to sections 102(2)(C)(iii) and (2)(E) of NEPA (as implemented by NRC's NEPA regulations (10 C.F.R. § 54.23 and 10 CFR Part 51)) must reflect the "study, develop[ment], and descr[iption of] appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." 42 U.S.C. § 4332(E)).[16]

7. NEPA's obligation to thoroughly explore alternatives was applied to severe accident alternatives and licensing decisions in *Limerick Ecology Action, Inc., v. NRC*, 869 F.2d 719 (3d Cir. 1989), which held that NRC had a duty under NEPA to take a "hard look" at alternatives to the proposed action, including alternatives that would mitigate the impacts of severe accidents.

8. NRC acknowledged *Limerick* when it modified Part 51 in the 1990s. Part 51 provides in relevant part that: "[i]f the staff has not previously considered severe accident mitigation alternatives for the applicant's plant in an environmental impact statement or related supplement or in an environmental assessment, a consideration of alternatives to mitigate severe accidents must be provided." 10 C.F.R. § 51.53(c)(3)(ii)(L).

9. In addition, both NRC Staff and the Nuclear Energy Institute ("NEI") have provided guidance to applicants on how to perform the SAMA analysis, with an emphasis on clearly delineating those alternatives that are cost-effective. *See* Severe Accident Mitigation

[16] Although NEPA's obligations traditionally attach only to governmental actions, NRC, in its regulations, requires the initial Environmental Report (that is, the initial environmental review required by NEPA) to be performed by the applicant. *See* 10 C.F.R. 2.309(f)(2); *see also* NRC Statement of Considerations, 54 Fed. Reg. 33,168, 33,172 (Aug. 11, 1989) ("Any license or permit application subject to NEPA's impact statement requirement must contain a complete Environmental Report (ER) which is essentially the applicant's proposal for the DES").

Alternatives (SAMA) Guidance Document ("NEI 05-01(Rev. A)") at 28; NRC Reg. Guide 4.2, Supplement 1 (September 2000) at 4.2-S-50; NRC Standard Review Plan for Environmental Reviews for Nuclear Power Plants - Supplement 1: Operating License Renewal (Oct. 1999) ("Standard Review Plan") at 5.1.1-8 to 5.1.1-9; and NRC Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission NUREG/BR-0058, Revision 4 (September 2004) at 4.

10. NRC Staff has recognized that a part of its obligations are to evaluate the SAMAs submitted by an applicant and determine whether all the mitigation measures an applicant has agreed to implement are "appropriate" and whether any other implementation measures are "warranted." *See* Standard Review Plan at 5.1.1-9 (Staff recognizes that part of its task in reviewing an applicant's SAMA analysis is to determine whether "mitigation alternatives committed to by the applicant are appropriate, and . . . [whether] further mitigation measures are warranted.").

11. A SAMA requirement which does not result in the implementation of cost-effective SAMAs would be rendered meaningless. Yet, the December 2009 SAMA Reanalysis fails to commit to implementing any cost-effective SAMAs.

12. The document's sole basis provided for not implementing cost-effective SAMAs is the following:

> As described in the aging management review results for the integrated plant assessment presented in Sections 3.1 through 3.6 of the license renewal application, IP2 and IP3 have programs for managing aging effects for components within the scope of license renewal (Reference 1). Since these programs are sufficient to manage the effects of aging during the license renewal period without implementation of the above SAMA candidates for IP2

> and IP3, these potentially cost beneficial SAMAs need not be implemented as part of license renewal pursuant to 10 CFR Part 54.

December 2009 SAMA Reanalysis at 32.

13. NRC Staff has taken the same position in the DSEIS asserting that cost-effective SAMAS need not be implemented as a condition of license renewal.

> Given the potential for cost-beneficial risk reduction, the staff considers that further evaluation of these SAMAs by Entergy is warranted. However, none of the potentially cost-beneficial SAMAs relate to adequately managing the effects of aging during the period of extended operation. Therefore, they need not be implemented as part of the license renewal pursuant to 10 CFR Part 54.

Draft Supplemental Environmental Impact Statement ("DSEIS") at 5-10.

14. However, the process of determining which, if any, alternatives to the proposed action should be adopted is subject to the requirements of the Administrative Procedure Act, particularly the provisions of 5 U.S.C. §§ 553(c), 554(d), 557(c), and 706. These provisions impose on a federal agency the obligation to provide a rational basis for actions taken by it, whether in rulemaking or adjudicatory type proceedings. That obligation has been strictly enforced by the federal courts. The United States Supreme Court has held that the "agency must articulate a 'rational connection between the facts found and the choice made.'" *Bowman Transp., Inc. v. Arkansas-Best Freight System, Inc.* 419 U.S. 281, 285-286 (1974), *quoting Burlington Truck Lines v. United States*, 371 U.S. 156, 168 (1962).

15. The December 2009 SAMA Reanalysis makes no other attempt to justify the refusal to commit to implement any SAMA that is clearly cost-effective and that would, if

implemented, substantially increase human health and safety and environmental protection. Nor does the NRC in its DSEIS attempt to justify its position that clearly cost-effective SAMAS need not be implemented as a condition of license renewal simply because they do not relate to aging management. Thus, the December 2009 SAMA Reanalysis' refusal to commit to implement a clearly cost-effective SAMA that has a substantial benefit to health, safety, and/or the environment is without a rational basis, and renders the SAMA analysis required by the courts, Congress, and the NRC meaningless.

16. The position taken in the December 2009 SAMA Reanalysis is without any legal basis. Part 54 provides no support for the proposition that an applicant may ignore a mitigation measure that is clearly cost-effective - *i.e.*, where the benefit to the public substantially outweighs the cost to the applicant.

17. Part 54 specifically requires full compliance with the requirements of 10 C.F.R. Part 51 (*see* 10 C.F.R. § 54.29(b)); the SAMA analysis is conducted pursuant to Part 51, particularly 10 C.F.R. § 51.53(c)(3)(ii)(L). In addition, the United States Court of Appeals for the Third Circuit in *Limerick Ecology Action, Inc., v. NRC*, 869 F.2d 719 (3d Cir. 1989), rejected the assertion that requirements of the Atomic Energy Act ("AEA") can be used to excuse a failure to obey the mandates of NEPA:

> Although NEPA imposes responsibilities that are purely procedural, *see Vermont Yankee*, 435 U.S. at 558, there is no language in NEPA itself that would permit its procedural requirements to be limited by the AEA. Moreover, there is no language in AEA that would indicate AEA precludes NEPA.

Id. 869 F.2d at 729. Thus, even if Part 54 purported to restrict full compliance with NEPA –

which it does not – its provisions imposing such restrictions would be contrary to law. In fact, Part 54 does not grant an exemption from consideration in a license renewal proceeding to any mitigation measure. By considering those measures in the SAMA analysis, both Entergy and NRC Staff essentially concede as much.

18. In addition to the December 2009 SAMA Reanalysis that demonstrates there are several cost-effective mitigation measures that should be implemented as a condition of any license renewal, there are other compelling reasons why these measures should be implemented.

19. Of all the power reactors in the United States, the Indian Point reactors have the highest surrounding population both within a 50-mile radius and a 10-mile radius. *See, e.g.*, AEC, Population Distribution Around Nuclear Power Plant Sites, Figure 2: Typical Site Population Distribution (5-50 Miles) (April 17, 1973); FEMA, Nuclear Facilities & Population Density Within 10 Miles (June 2005). With more than 17 million people living within 50 miles of Indian Point, no other operating reactor site in the country comes close to Indian Point in terms of surrounding population – and attendant potential risk. The Indian Point reactors and spent fuel pools are approximately 24 miles north of the New York City line, and approximately 37 miles north of Wall Street, in lower Manhattan. The U.S. Census Bureau recognizes that New York City is the largest city in the Nation with an estimated resident population of 8,214,426 (as of 2006).[17] The facilities are approximately 3 miles southwest of Peekskill, with a population of 22,441; 5 miles northeast of Haverstraw, with a population of 33,811, 16 miles southeast of Newburgh, with a population of 31,400, and 17 miles northwest of White Plains, with a

[17] New York City experiences a substantial influx of additional people each day. *See* U.S. Census Bureau, Census 2000 PHC-T-40, Estimated Daytime Population and Employment-Residence Rations: 2000.

population of 52,802. Indian Point is also 23 miles northwest of Greenwich, Connecticut, 37 miles west of Bridgeport, Connecticut and 37-39 miles north northeast of Jersey City and Newark, New Jersey. Portions of four New York counties - Westchester, Rockland, Orange, and Putnam - fall within the inner 10-mile Emergency Planning Zone. Additional population centers in New York, such as New York City's five boroughs and Nassau County, lie within the 50-mile Emergency Planning Zone, as do significant population centers in Connecticut and New Jersey. Under NRC's current siting regulations, which were not in place when AEC approved the Indian Point site in 1956, it is highly unlikely that the Indian Point reactors would or could be located today in this densely populated area. *See* 10 C.F.R. § 100.21(h).

20. Moreover, the Indian Point site was selected by the Consolidated Edison Company in 1955 and approved by AEC in 1956, before the AEC had implemented siting design criteria that would likely have made this heavily populated and potentially seismically active site unacceptable for a nuclear facility. It was also approved before the Windscale (1957), Three Mile Island (1979), and Chernobyl (1986) events. The 1955 selection of Indian Point also came before the enactment of NEPA (1970), the promulgation of CEQ regulations (1978), the Third Circuit's *Limerick* decision (1989), and NRC promulgation of the 10 C.F.R. § 51.53 regulation (1996) that requires an analysis of ways to mitigate the impacts of severe accidents during license renewal proceedings. The fact that a commitment was made to the Indian Point site before these statutes and regulations were enacted does not excuse Entergy or NRC today from the fullest possible compliance with the statutes and regulations when taking a major federal action related to Indian Point. *See Calvert Cliffs' Coordinating Comm. v. AEC,* 449 F.2d 1109,

1128-29 (D.C. Cir.1971).

21. As a result of all these factors, identified in Paragraphs 19 and 20, Indian Point has a higher risk of a severe accident than plants whose construction and/or operation were approved after the promulgation of siting and design criteria and the occurrence of incidents like TMI, or whose design was more compatible with various backfit requirements implemented as a result of those events.[18] In addition, because of the greater population concentration in the vicinity of the plant, a percentage reduction in the population dose risk or the offsite economic cost risk at Indian Point has a profoundly larger impact than the same risk percentage reduction at other facilities. In the case of Indian Point, such reductions literally impact millions of people and hundreds of billions of dollars of economic investment. Thus, there is even less of a rational basis to refuse to implement a mitigation measure, such as installing a flood alarm in the 480V switchgear room (SAMA 054 for IP2), which is estimated to reduce population dose risk by almost 40% and off-site economic cost risk by almost 29% (December 2009 SAMA Reanalysis at 17) than if that same mitigation measure were available at any other plant even with the same risk reduction.

22. NRC has not established a quantitative measure of when a mitigation measure is sufficiently cost-effective that its implementation is required. However, the Regulatory Analysis

[18] By way of example, the Indian Point facilities continue to rely on the 1950's era systems, structures, and components within the Indian Point Unit 1 facility. AEC approved the construction of IP1 before the promulgation of seismic regulations. As the Atomic Licensing Appeal Board ruled in 1977: "This plant [Unit 1] was built prior to any specific requirement for earthquake protection and is not designed to withstand a 0.15g acceleration." *In re Consolidated Edison Co.*, (Indian Point Units 1, 2 and 3), 6 NRC 547, 585 (ALAB 1977). In a submission to NRC about a spent fuel crane, Entergy stated: "No response spectra were specifically generated for the Unit 1 site during original design." Entergy Reply to Request for Additional Information (RAI) Regarding Indian Point 1 License Amendment Request for Fuel Handling Building Crane, p. 12 of 24 (Oct. 3, 2007), Indian Point, Unit No.1, Docket No. 50-003, ML073050247.

Guidelines of the U.S. Nuclear Regulatory Commission NUREG/BR-0058, Revision 4 (September 2004) discuss the concept of "substantial" benefit:

> [T]he principal purposes of a regulatory analysis are to help ensure the following:
>
> - The NRC's regulatory decisions made in support of its statutory responsibilities are based on adequate information concerning the need for and consequences of proposed actions.
> - Appropriate alternative approaches to regulatory objectives are identified and analyzed.
> - *No clearly preferable alternative is available to the proposed action.*
> - Proposed actions subject to the backfit rule (10 CFR 50.109), and not within the exceptions at 10 CFR 50.109(a)(4), provide a substantial[3] increase in the overall protection of the public health and safety or the common defense and security and that the direct and indirect costs of implementation are justified in view of this substantial increase in protection.
>
> [3]The Commission has stated that *"substantial" means important or significant in a large amount, extent, or degree* (Ref. 21)[[19]]. Applying such a standard, the Commission would not ordinarily expect that safety-applying improvements would be required as backfits that result in an insignificant or small benefit to the public health and safety, regardless of costs. On the other hand, *the standard is not intended to be interpreted in a manner that would result in disapprovals of worthwhile safety or security improvements having costs that are justified in view of the increased protection that would be provided. This approach is flexible enough to allow for qualitative arguments that a given proposed rule would substantially increase safety. . . .*

Id. at 4 (emphasis added).

23. NRC Staff has stated that the Regulatory Analysis Guidelines are applicable to

[19] Reference 21 is "S. Chilk, Staff Requirements Memorandum to J.M. Taylor and W.C. Parler, 'SECY-93-086—Backfit Considerations,' June 30, 1993."

evaluating SAMAs. "To identify SAMAs that may be cost-beneficial, the net value of each SAMA is estimated. The NRC maintains two documents that provide guidance in this area: NUREG/BR-0058 and NUREG/BR-0184 [Regulatory Analysis Technical Evaluation Handbook, U.S. Nuclear Regulatory Commission, January 1997]." Ghosh, Tina; Palla, Robert; and Helton, Donald; Perspectives on Severe Accident Mitigation Alternatives for U.S. Plant License Renewal (ML092750488) at 4 (footnotes omitted).

24. Even though the engineering cost analysis has not been fully completed for any SAMAs (*see* December 2009 SAMA Reanalysis at 8), and a more complete cost analysis can add substantially to the cost of a SAMA, the December 2009 SAMA Reanalysis concluded that a number of previously marginally beneficial SAMAs (including SAMAs that were only beneficial when the "benefit with uncertainty" figure was used) are now beneficial by a much larger margin and with the standard benefit calculation. This makes it feasible to base a contention, as this contention is based, on the failure to commit to implement those SAMAs which now, for the first time, have been shown to provide both a substantial increase in safety *and* where the margin of benefit over cost is so high that there is little chance that even a more complete cost estimate will be able to eliminate the substantial benefit.[20]

[20] In this contention, the State of New York focuses on SAMAs for which the benefit is substantially greater than the cost; however, the State does not take the position that these are the only SAMAs which should be implemented. In the event that Contention 35 is admitted and is successful, completion of cost estimates for all SAMAs that appear to be beneficial should be required, at which time other SAMAs may emerge that do provide a substantial increase in safety and are cost-effective and, if a commitment to implement them is not made, that may form the basis for a new contention.

SUPPORTING EVIDENCE

25. The ER, Appendix E, Attachments E.2 and E.4 contain the results of the initial SAMA analysis. The reanalysis, submitted on December 14, 2009, substantially altered the input values and techniques used for the SAMA analysis. December 2009 SAMA Reanalysis at 3-4. As a result the new SAMA reanalysis included major alterations in the cost-benefit portion. *Compare* ER, Appendix E, Attachment E.2 pp. E.2-35 to E.2-63 and E.4 pp. E.4-34 to E.4-64 *with* December 2009 SAMA Reanalysis at pp. 10-32.

26. As a result of the entirely new SAMA analysis, several previously marginally cost-effective SAMAs have now become clearly cost-effective and are no longer likely to be able to be dismissed even as the result of more engineering cost analysis. Those SAMAs are identified in the following chart which provides the information on the SAMA as originally presented in the ER and the information on the SAMA following the entirely new SAMA analysis filed on December 14, 2009. *See also* the accompanying Statement of David Chanin (Mar. 11, 2010).

SAMA Number and Description	Original Baseline Benefit	New Baseline Benefit	Original Baseline Benefit with Uncertainty	New Baseline Benefit with Uncertainty	Old Cost	New Cost
IP2 SAMA 028: Provide a portable diesel-driven battery charger.	$420,459	$1,357,046	$885,176	$2,856,939	$494,000	$938,000
IP2 SAMA 044: Use fire water system as backup for steam generator inventory.	$984,503	$2,350,530	$2,072,638	$4,948,485	$1,656,000	$1,656,000
IP2 SAMA 054: Install flood alarm in the 480VAC switchgear room.	$1,722,733	$5,591,781	$3,626,807	$11,772,170	$200,000	$200,000
IP2 SAMA 060: Provide added protection against flood propagation from stairwell 4 into the 480VAC switchgear room.	$387,828	$1,275,337	$816,481	$2,684,920	$216,000	$216,000
IP2 SAMA 061: Provide added protection against flood propagation from the deluge room into the 480V switchgear room.	$853,187	$2,754,991	$1,796,183	$5,799,982	$192,000	$192,000

SAMA Number and Description	Original Baseline Benefit	New Baseline Benefit	Original Baseline Benefit with Uncertainty	New Baseline Benefit with Uncertainty	Old Cost	New Cost
IP2 SAMA 065: Upgrade the ASSS to allow timely restoration of seal injection and cooling.	$1,722,733	$5,591,781	$3,626,807	$11,772,170	$560,000	$560,000
IP3 SAMA 055: Provide hardwired connection to one SI or RHR pump from the Appendix R bus (MCC 312A).	$1,274,884	$4,073,152	$1,847,657	$5,903,118	$1,288,000	$1,288,000
IP3 SAMA 061: Upgrade the ASSS to allow timely restoration of seal injection and cooling.	$1,365,046	$4,359,371	$1,978,328	$6,317,929	$560,000	$560,000
IP3 SAMA 062: Install flood alarm in the 480VAC switchgear room.	$1,365,046	$4,359,371	$1,978,328	$6,317,929	$196,800	$196,800

27. As this chart discloses, IP2 SAMAs 028 and 044 and IP3 SAMA 055 have now become cost-effective for the baseline benefit comparison and not just for the benefit with uncertainty comparison. In addition, IP2 SAMA 028 has been subjected to an upwardly revised cost estimate. *See* December 2009 SAMA Reanalysis at 7-9, 14 and the note at the bottom of 19. Thus, these SAMAs are more likely to remain cost-effective even after further upward ratcheting of the cost estimate.

28. As this chart also discloses, the remaining SAMAs are ones in which the differences between the original calculation and the new calculation are dramatic, particularly the sheer dollar value of the difference - *e.g.*:

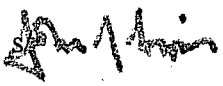
- IP2 SAMA 054, where the baseline benefit is now $5.4 million greater than the estimated cost, which was only $1.2 million greater before;
- IP2 SAMA 060, where the baseline benefit is now six times greater than the cost ($1.275 million to $216,000) which was only $160,000 greater before;
- IP2 SAMA 061, where the baseline benefit is now over 14 times greater than the cost compared to a mere $800,000 difference between benefit and cost (less than twice as much);
- IP3 SAMA 061, where benefit now exceeds the cost by more than $3.75 million, which is 8 times the cost while previously the benefit exceeded the cost by less than $1 million and less than 3 times; and
- IP3 SAMA 062 where the benefit is now more than $4.1 million greater than the cost, which is 21 times the cost compared to a mere $1.1 million before only 6 times the cost.

28. The December 2009 SAMA Reanalysis required by NRC and the court in *Limerick* is deficient because it fails to include a commitment to implement IP2 SAMAS 028, 044, 054, 060, 061, and 065, and IP3 SAMAS 055, 061, and 062.

CONCLUSION

The issues raised in the State of New York's proposed Contentions 12B, 16B, 35, and 36 concerning the analysis of severe accident mitigation alternatives are material to the findings the NRC must make to support the applicant's request. For all the reasons stated, the State of New York respectfully requests that the Atomic Safety and Licensing Board admit these additional contentions in this proceeding.

Respectfully submitted,



Janice A. Dean
Lisa Feiner
Lisa Burianek
John J. Sipos
Assistant Attorneys General
Office of the Attorney General
for the State of New York
The Capitol
Albany, New York 12227
(518) 402-2251

dated: March 11, 2010

///