

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

May 9, 2011

Pursuant to 10 C.F.R. § 2.1207(a)(1), the Atomic Safety and Licensing Board’s (“Board’s”) Scheduling Order dated March 11, 2011, and the Board’s Initial Scheduling Order dated October 20, 2009, Applicant Nuclear Innovation North America LLC (“NINA”)¹ hereby submits its Initial Statement of Position on Contention CL-2 regarding replacement power cost estimates in the evaluation of severe accident mitigation design alternatives (“SAMDAs”) in Section 7.5S of the Environmental Report (“ER”) for STP Units 3 and 4. This Initial Statement of Position is supported by the direct testimony from Jeffrey L. Zimmerly and Adrian Pieniazek and exhibits submitted with this Initial Statement of Position.² For the reasons set forth below, Contention CL-2 should be resolved in favor of NINA.

Contention CL-2 challenges the ER's estimated replacement power costs used in the SAMDA evaluation for STP Units 3 and 4. As admitted by the Board, Contention CL-2 states:

² Direct Testimony of Applicant Witnesses Jeffrey L. Zimmerly and Adrian Pieniazek Regarding Contention CL-2 (May 9, 2011) (“Zimmerly/Pieniazek Direct Testimony”) (Exh. STP000011).

The Applicant's calculation in ER Section 7.5S of replacement power costs in the event of a forced shutdown of multiple STP Units is erroneous because it underestimates replacement power costs and fails to consider disruptive impacts, including [Electric Reliability Council of Texas ("ERCOT")] market price spikes.³

The record in this proceeding, including the Zimmerly/Pieniazek Direct Testimony and exhibits accompanying this Initial Statement of Position, demonstrates that (1) the Applicant's evaluation of replacement power costs in ER Section 7.5S is reasonable under the National Environmental Policy Act ("NEPA"); (2) there are no cost-effective SAMDAs for STP Units 3 and 4; and (3) consideration of all issues raised by the Intervenor does not change the conclusion that there are no cost-effective SAMDAs. Intervenor's issues include ERCOT pricing data, the Intervenor's own estimates for replacement power costs, and market effects of outages, price spikes, and loss of the grid.

Following this introductory section, Section II of this Initial Statement of Position outlines the procedural history of this proceeding. Section III presents the legal standards governing contested proceedings on NEPA issues. Section IV provides a background on NINA's two witnesses, and an overview of their testimony. Section V provides the bases for NINA's position that there are no cost-effective SAMDAs. Section VI provides NINA's conclusions.

II. PROCEDURAL BACKGROUND

On September 20, 2007, the Applicant submitted an application to the Nuclear Regulatory Commission ("NRC") for combined licenses ("COLs") for STP Units 3 and 4.⁴ The

³ *South Texas Project Nuclear Operating Co.* (South Texas Project Units 3 and 4), LBP-10-14, 72 NRC ___, slip op. at 30 (July 2, 2010).

⁴ *South Texas Project Nuclear Operating Company*; Notice of Receipt and Availability of Application for a Combined License, 72 Fed. Reg. 60,394, 60,394 (Oct. 24, 2007).

Intervenors⁵ filed a “Petition for Intervention and Request for Hearing” (“Petition”) on April 21, 2009, alleging 28 separate contentions. The Petition included Contention 21, which claimed that the ER for STP Units 3 and 4 failed to consider the impacts from severe radiological accident scenarios on the operation of other units at the STP site.⁶ The Board admitted Contention 21 on August 27, 2009.⁷

On November 11, 2009, the Applicant submitted a notification to the Board regarding Contention 21.⁸ That notification informed the Board that the Applicant had submitted a letter to the NRC identifying revisions to the ER for STP Units 3 and 4 on November 10, 2009.⁹ Specifically, the Applicant had created a new ER Section 7.5S that evaluates the impacts that a design basis accident or severe accident at one of the new or existing units at the STP site would have on the other units at the site.¹⁰ ER Section 7.5S.5 provided an evaluation of SAMDAs, assuming that a severe accident in one unit would result in extended shutdowns of the three co-located units at the STP site.

On November 30, 2009, the Applicant requested that the Board dismiss Contention 21 as moot based on the new ER Section 7.5S.¹¹ The Intervenors opposed this request and requested that the Board modify Contention 21.¹² On December 22, 2009, the Intervenors sought

⁵ The “Intervenors” are the Sustainable Energy and Economic Development Coalition, Susan Dancer, the South Texas Association for Responsible Energy, Daniel A. Hickl, Public Citizen, and Bill Wagner.

⁶ Petition at 46.

⁷ *South Texas Project Nuclear Operating Co.* (South Texas Project Units 3 and 4), LBP-09-21, 70 NRC 581, 617-20 (2009).

⁸ Letter from S. Burdick, Counsel for STPNOC, to the Board, Notification of Filing Related to Contention 21 (Nov. 11, 2009) (“Notification Letter”), *available at* ADAMS Accession No. ML093150002.

⁹ Attachment to Notification Letter, Letter from S. Head, STPNOC, to NRC, Proposed Revision to Environmental Report (Nov. 10, 2009) (“ER Letter”), *available at* ADAMS Accession No. ML093150002.

¹⁰ ER Letter, Attachment, at 1-9.

¹¹ Applicant’s Motion to Dismiss Contention 21 as Moot, at 1, 5 (Nov. 30, 2009).

¹² Intervenors’ Response to Applicant’s Motion to Dismiss Contention 21 as Moot, at 1, 5 (Dec. 14, 2009).

admission of four new contentions, Contentions CL-1 through CL-4, related to ER Section 7.5S.¹³ These new contentions were supported by the December 21, 2009 report prepared by Clarence L. Johnson, titled “Review of Replacement Power Costs for Unaffected Units at the STP Site” (“Johnson Report 1”). The Applicant opposed the new and revised contentions and requested that the Board reject them.¹⁴ The NRC Staff agreed with the Applicant that the four new contentions and proposed revisions to Contention 21 should be rejected.¹⁵ On January 29, 2010, the Intervenors filed their response.¹⁶

The Board issued Order LBP-10-14 on July 2, 2010.¹⁷ Among other things, LBP-10-14 dismissed Contention 21, denied the Intervenors’ request to amend Contention 21, denied the Intervenors’ request to admit Contention CL-1, and admitted Contention CL-2, which is a reformulation of Contentions CL-2, CL-3, and CL-4.¹⁸ In particular, the Board dismissed issues related to whether a severe accident at one of the STP units could cause an accident at a co-located unit.¹⁹

On July 22, 2010, the NRC Staff submitted a Motion for Summary Disposition of Contention CL-2 on the legal grounds that the SAMDA analysis for the Advanced Boiling Water

¹³ Intervenors’ Contentions Regarding Applicant’s Proposed Revision to Environmental Report Section 7.5S and Request for Hearing, at 2-3 (Dec. 22, 2009) (“Intervenors’ Request”).

¹⁴ Applicant’s Answer Opposing New and Revised Contentions Regarding Environmental Report Section 7.5S, at 25 (Jan. 22, 2010).

¹⁵ NRC Staff’s Answer to the Intervenors’ Amended and New Accident Contentions, at 1, 30 (Jan. 22, 2010).

¹⁶ Intervenors’ Consolidated Response to NRC Staff’s Answer to the Intervenors’ New Accident Contentions and Applicant’s Answer Opposing New Contentions Regarding Applicant’s Environmental Report Section 7.5S (Jan. 29, 2010).

¹⁷ *South Texas Project*, LBP-10-14, slip op. at 1.

¹⁸ *Id.* at 57.

¹⁹ *See id.* at 12-24.

Reactor (“ABWR”) to be used at STP Units 3 and 4 has finality, and therefore issues related to SAMDAs are not open to litigation in this proceeding.²⁰ The Applicant supported that motion.²¹

On September 14, 2010, the Applicant also filed a Motion for Summary Disposition of Contention CL-2, arguing that the material facts demonstrate that SAMDAs are not cost-effective even after accounting for the factors identified by the Intervenor.²² That motion was supported by the “Joint Affidavit of Jeffrey L. Zimmerly and Adrian Pieniazek” (“Joint Affidavit”). The Intervenor²³ opposed both the Applicant’s and Staff’s motions.²³ Intervenor’s opposition to the Applicant’s Motion for Summary Disposition of Contention CL-2 was supported by Mr. Johnson’s October 6, 2010 “Affidavit in Response to Motion for Summary Disposition” (“Johnson Report 2”). The NRC Staff supported the Applicant’s motion,²⁴ and submitted the “Affidavit of James V. Ramsdell and Davis M. Anderson Concerning the Staff’s Review of STPNOC’s Updated SAMDA Evaluation” (“Staff Affidavit”).

Following oral argument,²⁵ the Board issued Order LBP-11-07 on February 28, 2011 and, among other things, denied both motions for summary disposition.²⁶ In ruling on the Applicant’s Motion for Summary Disposition of Contention CL-2, the Board concluded “that genuine disputes over issues of material fact remain regarding whether Intervenor’s Contention CL-2

²⁰ NRC Staff Motion for Summary Disposition, at 14 (July 22, 2010).

²¹ STP Nuclear Operating Company’s Answer Supporting the NRC Staff Motion for Summary Disposition of Contention CL-2, at 1, 4 (July 29, 2010).

²² STP Nuclear Operating Company’s Motion for Summary Disposition of Contention CL-2, at 27 (Sept. 14, 2010).

²³ Intervenor’s Response to Staff’s Motion for Summary Disposition (Aug. 11, 2010); Intervenor’s Response to Applicant’s Motion for Summary Disposition of Contention CL-2 (Oct. 8, 2010) (“Intervenor’s Response”).

²⁴ NRC Staff Answer to Applicant’s Motion for Summary Disposition of Contention CL-2, at 13-14 (Oct. 7, 2010).

²⁵ Board Notice (Regarding Oral Argument) (July 30, 2010).

²⁶ *Nuclear Innovation North America* (South Texas Project Units 3 & 4), LBP-11-07, 73 NRC ___, slip op. at 2, 74 (Feb. 28, 2011).

challenges are bounded by the Applicant's SAMDA analysis conclusion . . . [and must be] resolved at hearing."²⁷

As admitted by the Board, Contention CL-2 is limited to issues related to replacement power costs and the economic impacts of outages of the STP units following a severe accident. Other issues related to the SAMDA analysis have been resolved and are not in dispute under Contention CL-2, including:

- the probability of severe accidents at STP Units 3 and 4, as discussed in ER Sections 7.2, 7.3, and 7.5S;
- the identity, cost (in 1991 dollars), and risk-reduction factors of the SAMDAs, as specified in the ABWR Technical Support Document ("TSD"); and
- the onsite and offsite exposure costs and cleanup costs, as discussed in ER Sections 7.2, 7.3, and 7.5S.

III. LEGAL STANDARDS

A. Law Governing Contested Hearings on NEPA Issues

The Board reviews contested issues *de novo*, applying the same substantive standard applicable to the NRC Staff's NEPA review. According to the Commission: "[W]hen resolving contentions litigated through the adversary process, [boards must] bring their own '*de novo*' judgment to bear. In such cases, boards must decide, based on governing regulatory standards and the evidence submitted, whether the applicant has met its burden of proof (except where the NRC Staff has the burden)."²⁸

²⁷ *Id.* at 20-21.

²⁸ *Exelon Generation Co., LLC* (Early Site Permit for Clinton ESP Site), CLI-05-17, 62 NRC 5, 39 (2005).

An applicant generally has the burden of proof in a licensing proceeding.²⁹ In cases involving NEPA contentions, the burden shifts to the NRC, because the NRC, not the Applicant, has the burden of complying with NEPA.³⁰ However, because “the Staff, as a practical matter, relies heavily upon the Applicant’s ER in preparing the [Environmental Impact Statement (“EIS”)], should the Applicant become a proponent of a particular challenged position set forth in the EIS, the Applicant, as such a proponent, also has the burden on that matter.”³¹

B. Law Governing Environmental Impacts

Contention CL-2 raises environmental issues under NEPA. NEPA requires that federal agencies, such as the NRC, prepare an EIS for “major Federal actions significantly affecting the quality of the human environment.”³² NEPA does not mandate substantive results; rather, it imposes procedural restraints on agencies, requiring them to take a “hard look” at the environmental impacts of a proposed action and reasonable alternatives to that action.³³

This “hard look” is subject to the “rule of reason.”³⁴ This means that an “agency’s environmental review, rather than addressing every impact that could possibly result, need only account for those that have some likelihood of occurring or are reasonably foreseeable.”³⁵

Consideration of “remote and speculative” or “inconsequentially small” impacts is not

²⁹ 10 C.F.R. § 2.325.

³⁰ See, e.g., *Duke Power Co.* (Catawba Nuclear Station, Units 1 & 2), CLI-83-19, 17 NRC 1041, 1049 (1983).

³¹ *La. Energy Servs., L.P.* (Claiborne Enrichment Center), LBP-96-25, 44 NRC 331, 338-39 (1996) (citing *Pub. Serv. Co. of N.H.* (Seabrook Station, Units 1 & 2), ALAB-471, 7 NRC 477, 489 n.8 (1978)), *rev’d on other grounds*, CLI-97-15, 46 NRC 294 (1997).

³² 42 U.S.C. § 4332(2)(C) (2006).

³³ See *La. Energy Servs., L.P.* (Claiborne Enrichment Ctr.), CLI-98-3, 47 NRC 77, 87-88 (1998); see also *Balt. Gas & Elec. Co. v. NRDC*, 462 U.S. 87, 97-98 (1983) (holding that NEPA requires agencies to take a “hard look” at environmental consequences prior to taking major actions).

³⁴ *La. Energy Servs., L.P.* (Nat’l Enrichment Facility), LBP-06-8, 63 NRC 241, 258-59 (2006) (citing *Long Island Lighting Co.* (Shoreham Nuclear Power Station), ALAB-156, 6 AEC 831, 836 (1973)); see also *Dep’t of Transp. v. Pub. Citizen*, 541 U.S. 752, 767-69 (2004) (stating that the rule of reason is inherent in NEPA and its implementing regulations).

³⁵ *Nat’l Enrichment Facility*, LBP-06-8, 63 NRC at 258-59 (citing *Shoreham*, ALAB-156, 6 AEC at 836).

required.³⁶ As the Commission explained, “NEPA also does not call for certainty or precision, but an *estimate* of anticipated (not unduly speculative) impacts.”³⁷ When faced with uncertainty, NEPA only requires “reasonable forecasting.”³⁸ Similarly, the U.S. Supreme Court has held that NEPA does not require a “worst case analysis.”³⁹

Additionally, economic forecasts under NEPA are legally sufficient if they are reasonable. The Commission stated in *Pilgrim*:

There is no NEPA requirement to use the best scientific methodology, and NEPA “should be construed in the light of reason if it is not to demand” virtually infinite study and resources. Nor is an environmental impact statement intended to be a “research document,” reflecting the frontiers of scientific methodology, studies and data. NEPA does not require agencies to use technologies and methodologies that are still “emerging” and under development, or to study phenomena “for which there are not yet standard methods of measurement or analysis.” And while there “will always be more data that could be gathered,” agencies “must have some discretion to draw the line and move forward with decisionmaking.” In short, NEPA allows agencies “to select their own methodology as long as that methodology is reasonable.”⁴⁰

The Commission has stated that consideration should be given to “whether the economic assumptions . . . were so distorted as to impair fair consideration of . . . environmental effects.”⁴¹

Similarly, in the context of power forecasts, the Appeal Board held in *Nine Mile Point* that “inherent in any forecast . . . is a substantial margin of uncertainty,” and therefore the forecast

³⁶ See *Vt. Yankee Nuclear Power Corp.* (Vermont Yankee Nuclear Power Station), ALAB-919, 30 NRC 29, 44 (1989) (citing *Limerick Ecology Action, Inc. v. NRC*, 869 F.2d 719, 739 (3d Cir. 1989)).

³⁷ *La. Energy Servs. L.P.* (Nat’l Enrichment Facility), CLI-05-20, 62 NRC 523, 536 (2005).

³⁸ *Scientists’ Inst. for Pub. Info., Inc. v. AEC*, 481 F.2d 1079, 1092 (D.C. Cir. 1973).

³⁹ *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 354-55, 359 (1989).

⁴⁰ *Entergy Nuclear Generation Co.* (Pilgrim Nuclear Power Station), CLI-10-11, 71 NRC ___, slip op. at 37 (Mar. 26, 2010) (citations omitted).

⁴¹ *Private Fuel Storage, LLC* (Indep. Spent Fuel Storage Installation), CLI-04-22, 60 NRC 125, 145 (2004).

should be accepted if it is “reasonable.”⁴² Therefore, economic forecasts are subject to substantial uncertainty and, as long as they are reasonable, they are not open to criticism because some other person has an opposing view.⁴³

C. The Board’s Decision Supplements and Amends the EIS

In determining whether the EIS should have contained additional information, the Board may consider the record as a whole. Established Commission precedent has held that the adjudicatory record and the Board decision become part of the EIS.⁴⁴ In NRC licensing proceedings, “the ultimate NEPA judgments regarding a facility can be made on the basis of the entire record before a presiding officer, such that the EIS can be deemed amended pro tanto.”⁴⁵ Therefore, the Board may consider the full record before it, including the testimony to conclude that “the aggregate is sufficient to satisfy the agency’s obligation under NEPA” to take a “hard look” at the environmental consequences of issuing a COL.⁴⁶

IV. APPLICANT’S WITNESSES

The Applicant’s direct testimony on Contention CL-2 is sponsored by the following witnesses:

⁴² *Niagara Mohawk Power Corp.* (Nine Mile Point Nuclear Station, Unit 2), ALAB-264, 1 NRC 347, 365-67 (1975). The Commission has endorsed the Nine Mile Point rule. *See Carolina Power & Light Co.* (Shearon Harris Nuclear Power Plant, Units 1, 2, 3, & 4), CLI-79-5, 9 NRC 607, 609-10 (1979).

⁴³ *See Nw. Env’tl. Advocates v. Nat’l Marine Fisheries Serv.*, 460 F.3d 1125, 1143-44 (9th Cir. 2006) (finding no merit in the petitioner’s argument that a multi-port analysis should have been included in the agency’s economic analysis, where the assumptions and overall conclusions of the agency’s economic analysis were “reasonable”); *S. La. Env’tl. Council, Inc. v. Sand*, 629 F.2d 1005, 1014 (5th Cir. 1980) (rejecting plaintiffs’ argument that the estimate of fair rental value of equipment moving through a project’s waterways should have been calculated differently when the agency’s calculation was fair and reasonable).

⁴⁴ *See, e.g., La. Energy Servs.* (Nat’l Enrichment Facility), CLI-06-15, 63 NRC 687, 707 n. 91 (“Adjudicatory findings on NEPA issues, including our own in this decision, become part of the environmental ‘record of decision’ and in effect supplement the FEIS.”); *LES*, CLI-98-3, 47 NRC at 89 (“In NRC licensing adjudications . . . it is the Licensing Board that compiles the final environmental ‘record of decision’ The adjudicatory record and Board decision . . . become, in effect, part of the FEIS.”).

⁴⁵ *La. Energy Svs., L.P.* (Nat’l Enrichment Facility), LBP-05-13, 61 NRC 385, 404 (2005).

⁴⁶ *Nat’l Enrichment Facility*, LBP-06-8, 63 NRC at 286.

A. Mr. Jeffrey L. Zimmerly

Mr. Zimmerly is an Environmental Engineer and the Corporate Quality Assurance Manager for Tetra Tech NUS, Inc. (“Tetra Tech”).⁴⁷ He has more than 10 years of experience supporting various government, utility, and industrial clients in the areas of environmental impact assessment, radiological transportation risk assessment, accident analysis, human health and ecological risk assessment, air quality modeling and compliance, occupational and environmental health physics, and radioactive waste management.⁴⁸

Mr. Zimmerly participated in the preparation of the ER for STP Units 3 and 4, including authoring and reviewing parts of the SAMDA evaluation. He also authored and reviewed portions of ER Section 7.5S that the Applicant submitted to the NRC on November 10, 2009. Mr. Zimmerly also has performed analyses and calculations to support ERs for other new reactor and license renewal applications.⁴⁹

Mr. Zimmerly testifies that the SAMDA evaluation for STP Units 3 and 4 is reasonable, and that there are no cost-effective SAMDAs for STP Units 3 and 4. Mr. Zimmerly also considers various issues raised by the Intervenors and the NRC Staff regarding replacement power costs, and testifies that these issues do not change the conclusion that there are no cost-effective SAMDAs for STP Units 3 and 4.

B. Mr. Adrian Pieniazek

Mr. Pieniazek is the Director of Market Policy for NRG Energy, Inc. (“NRG Energy”).⁵⁰ He has more than 27 years of experience in the energy industry and has been in his current

⁴⁷ Mr. Zimmerly’s *curriculum vitae* is provided as Exh. STP000012.

⁴⁸ Zimmerly/Pieniazek Direct Testimony, at Q3.

⁴⁹ Zimmerly/Pieniazek Direct Testimony, at Q3.

⁵⁰ NRG Energy is an owner of NINA. Mr. Pieniazek’s *curriculum vitae* is provided as Exh. STP000002.

position since 2003. Currently, Mr. Pieniazek represents NRG Energy's interests at ERCOT and the Public Utility Commission of Texas ("PUCT"), as well as providing analysis and policy recommendations to numerous NRG Energy business units, with a specific emphasis on wholesale electricity market design issues. Prior to his current position, Mr. Pieniazek was the Director of Asset Management for Reliant Energy, Inc. in Texas. Prior to that, he served as the Director of Generation Planning for CPS Energy, the municipal power utility serving San Antonio, Texas.⁵¹

Similar to Mr. Zimmerly, Mr. Pieniazek testifies that the SAMDA evaluation for STP Units 3 and 4 is reasonable, and that there are no cost-effective SAMDAs for STP Units 3 and 4. Mr. Pieniazek also considers various issues raised by the Intervenors and the NRC Staff regarding replacement power costs, and testifies that these issues do not change the conclusion that there are no cost-effective SAMDAs for STP Units 3 and 4.

Through the attached Zimmerly/Pieniazek Direct Testimony and supporting exhibits, NINA's expert witnesses demonstrate that there are no cost-effective SAMDAs, even after considering all issues raised by the Intervenors and the NRC Staff regarding replacement power costs.

V. INITIAL STATEMENT OF POSITION

A. Overview of the SAMDA Evaluation in ER Sections 7.3 and 7.5S

Section 7.3 of the ER for STP Units 3 and 4 presents a site-specific analysis of Severe Accident Mitigation Alternatives ("SAMAs").⁵² SAMAs consist of two types of alternatives: 1)

⁵¹ Zimmerly/Pieniazek Direct Testimony, at Q7.

⁵² Zimmerly/Pieniazek Direct Testimony, at Q17; Exh. STP000013, at 7.3-1.

SAMDAs; and 2) alternatives involving administrative controls, such as procedures and training.⁵³

With respect to SAMAs involving administrative controls, ER Section 7.3.3 states that evaluation of specific administrative controls will occur when the design for STP Units 3 and 4 is finalized and plant administrative processes and procedures are being developed.⁵⁴ Under the licensing process established in 10 C.F.R. Part 52, procedures and training do not need to be finalized in order to obtain a COL and instead can be developed during construction.⁵⁵ Prior to fuel load, appropriate administrative controls on plant operations will be developed and incorporated into the management systems for STP Units 3 and 4.⁵⁶ Therefore, because procedures and training materials have not and do not need to be developed at this time, and because appropriate procedures and training to mitigate accidents will be developed before fuel load, there is no further evaluation of alternative administrative controls that can fruitfully be conducted at this time.⁵⁷ The Intervenor has not contested this evaluation in ER Section 7.3.3, which applies equally to SAMA evaluations involving co-located units. As a result, only the evaluation of SAMDAs remains.

⁵³ Zimmerly/Pieniazek Direct Testimony, at Q17; Exh. STP000013, at 7.3-2 to -3.

⁵⁴ Zimmerly/Pieniazek Direct Testimony, at Q18; Exh. STP000013, at 7.3-2 to -3.

⁵⁵ See, e.g., 10 C.F.R. § 52.79(a)(10), (11), (13), (14), (15), (29), (33), (40), which require COL applications to provide a description of various operational and training programs and plans, as distinct from procedures themselves. As the Commission has stated, descriptions of operational programs are provided and reviewed by the Commission as part of the COL application and subsequently the more detailed procedures are implemented by the applicant and inspected by the NRC before plant operation. Power Reactor Security Requirements, 74 Fed. Reg. 13,926, 13,933 (Mar. 27, 2009). The Board has previously recognized this principle in this proceeding in the context of 10 C.F.R. § 52.80(d). See *South Texas Project Nuclear Operating Co.* (South Texas Project Units 3 and 4), LBP-10-02, 71 NRC ___, slip op. at 24-25 (Jan. 29, 2010).

⁵⁶ Zimmerly/Pieniazek Direct Testimony, at Q18.

⁵⁷ Zimmerly/Pieniazek Direct Testimony, at Q18.

To perform a SAMDA evaluation, the cost of each SAMDA is compared against the benefit of implementing the SAMDA.⁵⁸ As discussed in ER Section 7.3.1, the analysis determines the maximum benefit from averting all severe accidents through the risk reduction of implementing each of the SAMDAs.⁵⁹ If the maximum benefit from averting all severe accidents is lower than the lowest cost of the SAMDAs, then the SAMDAs are screened out and the analysis is complete.⁶⁰ However, if the maximum benefit from averting all severe accidents is greater than the cost of any of the SAMDAs, each of those SAMDAs is evaluated further.⁶¹ The cost of each of those individual SAMDAs is evaluated against the benefit of implementing each of those individual SAMDAs.⁶² For example, if a SAMDA would eliminate 10% of the total risk of severe accidents, then the benefit of the SAMDA would be approximately 10% of the maximum averted costs of severe accidents.⁶³

The identities and costs of SAMDAs for designs certified under 10 C.F.R. Part 52 are determined as part of the design certification process.⁶⁴ For the ABWR, the design selected for STP Units 3 and 4, the SAMDAs and their costs were identified in the TSD submitted as part of the ABWR design certification application on December 21, 1994.⁶⁵ The TSD evaluated a wide variety of ABWR modifications as potential SAMDAs, but narrowed the list to 21 after excluding modifications already incorporated or not applicable.⁶⁶ The lowest-cost SAMDA for

⁵⁸ Zimmerly/Pieniazek Direct Testimony, at Q19.

⁵⁹ Zimmerly/Pieniazek Direct Testimony, at Q19.

⁶⁰ Zimmerly/Pieniazek Direct Testimony, at Q19.

⁶¹ Zimmerly/Pieniazek Direct Testimony, at Q19.

⁶² Zimmerly/Pieniazek Direct Testimony, at Q19.

⁶³ Zimmerly/Pieniazek Direct Testimony, at Q19.

⁶⁴ Zimmerly/Pieniazek Direct Testimony, at Q20.

⁶⁵ Zimmerly/Pieniazek Direct Testimony, at Q20; Exh. NRC00009A, at 1.

⁶⁶ Zimmerly/Pieniazek Direct Testimony, at Q21.

the ABWR was estimated to be \$100,000 (1991 dollars).⁶⁷ This lowest-cost corresponds to SAMDAs for improved vacuum breakers, drywell head flooding, and Reactor Building sprays.⁶⁸

The benefits of SAMDAs are determined using a probabilistic-based approach for estimating the maximum averted cost-risk of the severe accidents.⁶⁹ This approach accounts for exposure costs, cleanup costs, and replacement power costs associated with the postulated severe accident and corresponding outages, and factors in the likelihood of the severe accident as reflected in the reactor's Core Damage Frequency ("CDF").⁷⁰

In calculating the benefits of SAMDAs (*i.e.*, the maximum averted cost-risk) in ER Sections 7.3 and 7.5S, the Applicant conservatively assumed that each SAMDA would completely prevent all severe accidents.⁷¹ Additionally, for purposes of the Applicant's SAMDA evaluation, accidents originating at STP Units 1 and 2 were not considered because there are no SAMDAs for STP Units 3 and 4 that could prevent or mitigate an accident at STP Units 1 and 2.⁷²

The SAMDA evaluation for an ABWR experiencing a severe accident is provided in ER Section 7.3, which does not address the economic impacts on co-located units. The SAMDA evaluation which considers the economic impacts on co-located units is provided in ER Section 7.5S.5. The replacement power costs used in these SAMDA evaluations followed NRC's

⁶⁷ Zimmerly/Pieniazek Direct Testimony, at Q22.

⁶⁸ Zimmerly/Pieniazek Direct Testimony, at Q22.

⁶⁹ Zimmerly/Pieniazek Direct Testimony, at Q23.

⁷⁰ Zimmerly/Pieniazek Direct Testimony, at Q23.

⁷¹ Zimmerly/Pieniazek Direct Testimony, at Q24. This is conservative, because there are no SAMDAs that would prevent all severe accidents. Zimmerly/Pieniazek Direct Testimony, at Q27.

⁷² Zimmerly/Pieniazek Direct Testimony, at Q28; Exh. STP000013, at 7.5S-1. This is supported by the Board's conclusion that "any allegations involving only STP Units 1 and 2 are outside the scope of this proceeding and cannot be considered by this Board, which is solely concerned with the licensing of proposed STP Units 3 and 4." *South Texas Project*, LBP-10-14, slip op. at 25 n.140.

guidance in NUREG/BR-0184, “Regulatory Analysis Technical Evaluation Handbook” (Jan. 1997).⁷³

NUREG/BR-0184 states that typical short-term replacement power costs for a 910 MWe power plant are \$310,000 per day (1993 dollars).⁷⁴ To determine replacement power costs for the co-located units following a severe accident at the STP site, this value was first multiplied by the estimated outage duration of the co-located units to determine the generic replacement power costs.⁷⁵ For a hypothetical severe accident at an ABWR unit, the Applicant assumed that the outage duration at the co-located ABWR is six years and the outage duration at the co-located STP Units 1 and 2 is two years.⁷⁶ The Intervenor has not contested these assumptions, which were used in Johnson Report 1.⁷⁷

These generic replacement power costs were then used in an equation specified in NUREG/BR-0184 to calculate the net present value of replacement power costs over the life of the facility, based on a discount rate of 7% (and 3% in a sensitivity analysis).⁷⁸ The ER then scaled up the net present value from a 910 MWe plant to a 1,350 MWe plant for the ABWR and 1,280 MWe each for STP Units 1 and 2.⁷⁹ Finally, the ER used the CDF for an ABWR (1.56×10^{-7} per year) to obtain the replacement power costs for use in the SAMDA evaluation.⁸⁰

⁷³ Zimmerly/Pieniazek Direct Testimony, at Q33; Exh. STP000013, at 7.5S-6. NRC guidance documents are entitled to substantial weight. *See, e.g., Private Fuel Storage, L.L.C.* (Indep. Spent Fuel Storage Installation), CLI-01-22, 54 NRC 255, 264 (2001) (“Where the NRC develops a guidance document to assist in compliance with applicable regulations, it is entitled to special weight.”).

⁷⁴ Zimmerly/Pieniazek Direct Testimony, at Q34; Exh. NRC00008B, at 5.51.

⁷⁵ Zimmerly/Pieniazek Direct Testimony, at Q34.

⁷⁶ Zimmerly/Pieniazek Direct Testimony, at Q34.

⁷⁷ *See* Johnson Report 1, at 4.

⁷⁸ Zimmerly/Pieniazek Direct Testimony, at Q34; Exh. NRC00008B, at 5.21.

⁷⁹ Zimmerly/Pieniazek Direct Testimony, at Q34.

⁸⁰ Zimmerly/Pieniazek Direct Testimony, at Q34.

The CDF of 1.56×10^{-7} per year is for internal events at full power.⁸¹ As the Board has already ruled in rejecting Contention CL-1 Parts B and C, the risk of low power and shutdown events is low and the impact from external events is small.⁸² Therefore, accounting for the probability of external events and low power and shutdown events would not have a material impact on the total CDF for STP Units 3 and 4.⁸³

The replacement power costs calculated using the methodology in NUREG/BR-0184 were added to the other monetized impacts (e.g., onsite exposure cost and onsite cleanup cost) to provide the total monetized impacts for each unit.⁸⁴ Using this methodology, the ER determined that the lowest-cost SAMDA is much more costly than the total monetized impacts of the accident; therefore, the ER concluded that there are no cost-effective SAMDAs.⁸⁵

B. The Replacement Power Cost Estimates in the ER Are Reasonable

As discussed above, economic forecasts are subject to substantial uncertainty, and NEPA only requires that they be reasonable.⁸⁶ The calculation of replacement power costs in ER Section 7.5S is reasonable, and therefore satisfies the requirements of NEPA.

First, the ER used NUREG/BR-0184 to calculate replacement power costs, which provides NRC guidance for calculating such costs.⁸⁷ NUREG-1555, “Standard Review Plans for Environmental Reviews for Nuclear Power Plants,” permits use of NUREG/BR-0184 for

⁸¹ Zimmerly/Pieniazek Direct Testimony, at Q34.

⁸² *South Texas Project*, LBP-10-14, slip op. at 20, 22.

⁸³ Zimmerly/Pieniazek Direct Testimony, at Q34.

⁸⁴ Zimmerly/Pieniazek Direct Testimony, at Q35.

⁸⁵ Zimmerly/Pieniazek Direct Testimony, at Q38; Exh. STP000013, at 7.3-1.

⁸⁶ See *Pilgrim*, CLI-10-11, slip op. at 37; *Private Fuel Storage*, CLI-04-22, 60 NRC at 145; *Nine Mile*, ALAB-264, 1 NRC at 365-67.

⁸⁷ Zimmerly/Pieniazek Direct Testimony, at Q57; Exh. STP000013, at 7.5S-6.

SAMDA evaluations.⁸⁸ Specifically, NUREG-1555, Section 7.3, states that “[r]egulatory positions and specific criteria necessary to meet the regulations” are provided in “NUREG/BR-0184 (NRC 1997b) with respect to the value impact methodology.”⁸⁹ Thus, NUREG/BR-0184 provides an accepted NRC methodology for use in SAMDA analyses.⁹⁰

Second, NUREG/BR-0184 specifies replacement power costs from a similar time period as the SAMDA analysis for the ABWR.⁹¹ As noted above, the ABWR SAMDA costs from the TSD are provided in 1991 dollars.⁹² The replacement power costs in NUREG/BR-0184 are provided in 1993 dollars.⁹³ Therefore, these costs are from similar years and can be compared.⁹⁴ In contrast, the replacement power costs in Johnson Report 1 are in 2008 dollars, which should not be directly compared to the ABWR SAMDA costs from 17 years earlier.⁹⁵ When the NUREG/BR-0184 replacement power costs are escalated to account for inflation (using a 1.45 producer price index-commodities Bureau of Labor Statistics multiplier), the replacement power cost estimates in 2008 dollars are substantially higher, and are closer to those in Johnson Report 1.⁹⁶

In summary, the replacement power costs in the SAMDA evaluation in the ER are reasonable, which is all that is required by NEPA. Although the Intervenors have claimed that the actual ERCOT prices will be higher than the replacement power costs in NUREG/BR-0184,

⁸⁸ Zimmerly/Pieniazek Direct Testimony, at Q57; Exh. STP000018, at 7.3-3.

⁸⁹ Exh. STP000018, at 7.3-3.

⁹⁰ Zimmerly/Pieniazek Direct Testimony, at Q29.

⁹¹ Zimmerly/Pieniazek Direct Testimony, at Q58.

⁹² Zimmerly/Pieniazek Direct Testimony, at Q58.

⁹³ Zimmerly/Pieniazek Direct Testimony, at Q58.

⁹⁴ Zimmerly/Pieniazek Direct Testimony, at Q58.

⁹⁵ Zimmerly/Pieniazek Direct Testimony, at Q59.

⁹⁶ Zimmerly/Pieniazek Direct Testimony, at Q59.

they have not claimed that the replacement power costs in NUREG/BR-0184 are unreasonable.

As discussed above, an economic forecast that is reasonable is not subject to attack on the grounds that another party has a different forecast.⁹⁷ Therefore, Contention CL-2 should be resolved in favor of NINA.

Nevertheless, as discussed in the following section, even if the methodology suggested by the Intervenor, Johnson Report 1, and Johnson Report 2 is used, the resulting monetized impacts would still be less than the lowest cost of the SAMDAs; *i.e.*, there would be no cost-effective SAMDAs.

C. The Issues Previously Raised by the Intervenor Do Not Change the Conclusion that There Are No Cost-Effective SAMDAs

The only relevant information raised by the Intervenor consists of their late-filed contentions on the replacement power cost estimates for the co-located units following a severe accident at the STP site, including Johnson Report 1, and their response to the Applicant's Motion for Summary Disposition of Contention CL-2, including Johnson Report 2.⁹⁸ The Intervenor raised the following issues:

- Appropriate discount rate for the SAMDA evaluation;
- Proper escalation of SAMDA costs;
- Use of ERCOT pricing data for replacement power cost estimates;
- Use of the Intervenor's own replacement power cost estimates;

⁹⁷ See, e.g., *Pilgrim*, CLI-10-11, slip op. at 37; see also *Nw. Envtl. Advocates*, 460 F.3d at 1143-44; *Sand*, 629 F.2d at 1014.

⁹⁸ The Intervenor has provided a series of mandatory discovery disclosures pursuant to 10 C.F.R. § 2.336. All of those disclosures have stated that the Intervenor does not have "any documents that require disclosure." See, e.g., Intervenor's Nineteenth Update to Disclosures (May 2, 2011). Therefore, the Intervenor has not provided any information through mandatory disclosures to challenge the Applicant's conclusion that there are no cost-effective SAMDAs.

- Impact of ERCOT market effects on replacement power cost estimates, including consumer impacts;
- Impact of ERCOT price spikes on replacement power cost estimates; and
- Impact of loss of the grid on replacement power cost estimates.

As demonstrated below, appropriate consideration of these issues does not change the conclusion that there are no cost-effective SAMDAs for STP Units 3 and 4.

The NRC Staff agrees with the Applicant that there are no cost-effective SAMDAs. However, in its response supporting the Applicant's Motion for Summary Disposition of Contention CL-2, the Staff raised the following issues:

- Proper net electrical output of STP Units 3 and 4;
- Proper escalation of SAMDA costs; and
- Effect of a higher capacity factor on replacement power cost estimates.

As demonstrated below, appropriate consideration of these issues also does not change the conclusion that there are no cost-effective SAMDAs for STP Units 3 and 4.

1. Use of a Different Net Electrical Output for STP Units 3 and 4 Would Not Affect the Conclusions of the SAMDA Evaluation

The Staff Affidavit stated that the Applicant should have used 1,300 MWe instead of 1,350 MWe for the net electrical output of the ABWR units in the replacement power cost calculations.⁹⁹ The value of 1,350 MWe approximates the gross electrical output of each ABWR unit.¹⁰⁰ After reducing for the plant and site equipment loads, the net electrical output is approximately 1,300 MWe.¹⁰¹ The Applicant's use of 1,350 MWe for the calculation of

⁹⁹ Staff Affidavit, at 2.

¹⁰⁰ Zimmerly/Pieniazek Direct Testimony, at Q34.

¹⁰¹ Zimmerly/Pieniazek Direct Testimony, at Q34.

replacement power costs was conservative, because it results in higher replacement power cost estimates than use of 1,300 MWe.¹⁰²

The Staff agreed that use of 1,350 MWe is conservative. The Staff stated: “This error is not material because the costs for the STPNOC motion are based on scaling to 1350 MW(e), which would increase the potential benefits of SAMDAs over scaling to 1300 MW(e). Thus, the STPNOC analysis is conservative.”¹⁰³

2. Use of a Different Discount Rate for STP Units 3 and 4 Does Not Affect the Conclusions of the SAMDA Evaluation

As noted above, the Applicant’s calculation of replacement power costs used a long-term 7% discount rate, and a 3% discount rate as part of a sensitivity analysis.¹⁰⁴ The Intervenors claim that the 3% discount rate is not necessarily “conservative” and “should not be viewed as exceeding normal standards for cost benefit analyses.”¹⁰⁵

As discussed in the Zimmerly/Pieniazek Direct Testimony, use of a 7% discount rate is reasonable because it is consistent with both NRC and other federal government guidance and expectations. Section 5.7 of NUREG/BR-0184 states that a 7% discount rate, and 3% discount rate sensitivity analysis, should be used to be consistent with OMB guidance in Circular A-94, “Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs.”¹⁰⁶ OMB has not modified this guidance for regulatory analyses in Circular A-94 since it was referenced in NUREG/BR-0184.¹⁰⁷ The NRC has provided additional guidance in NUREG/BR-0058, “Regulatory Analysis Guidelines of the U.S. Nuclear Regulatory Commission” (Rev. 4, Sept.

¹⁰² Zimmerly/Pieniazek Direct Testimony, at Q34.

¹⁰³ Staff Affidavit, at 2.

¹⁰⁴ Zimmerly/Pieniazek Direct Testimony, at Q24.

¹⁰⁵ See Intervenors’ Response, at 9; Johnson Report 2, at 3.

¹⁰⁶ Zimmerly/Pieniazek Direct Testimony, at Q25; Exh. NRC00008B, at 5.21; Exh. STP000016.

¹⁰⁷ Zimmerly/Pieniazek Direct Testimony, at Q25.

2004), which also states that a 7% discount rate with a 3% discount rate sensitivity analysis should be performed.¹⁰⁸ Moreover, Johnson Report 1 also uses a 7% discount rate.¹⁰⁹

Additionally, use of a 3% discount rate would not change the conclusions of the SAMDA evaluation. As discussed above, ER Section 7.5S estimates replacement power costs using both 7% and 3% discount rates.¹¹⁰ The Zimmerly/Pieniazek Direct Testimony continues this methodology and evaluates changes to the replacement power costs assuming both a 7% and a 3% discount rate.¹¹¹ As shown in ER Section 7.5S and in the Zimmerly/Pieniazek Direct Testimony, whether the 7% or the 3% discount rate is used, there are no cost-effective SAMDAs.¹¹²

3. Adjusting the SAMDA Costs Does Not Affect the Conclusions of the SAMDA Evaluation

a. SAMDA Cost Escalation

As discussed above, SAMDA costs for the ABWR were determined during the design certification process and are listed in the TSD. The lowest-cost SAMDA for the ABWR was estimated to be \$100,000 (1991 dollars). The ER did not escalate the TSD SAMDA costs because it also did not escalate replacement power costs.¹¹³

However, in order to address the Intervenors' contentions, the Joint Affidavit submitted by the Applicant in support of its Motion for Summary Disposition converted 1991 dollars to both 2008 or 2009 dollars using a multiplication factor of 1.58 from the consumer price index of

¹⁰⁸ Zimmerly/Pieniazek Direct Testimony, at Q25; Exh. NRC000010, at 32.

¹⁰⁹ See Johnson Report 1, at 4.

¹¹⁰ Zimmerly/Pieniazek Direct Testimony, at Q25.

¹¹¹ Zimmerly/Pieniazek Direct Testimony, at Q26.

¹¹² Zimmerly/Pieniazek Direct Testimony, at Q26.

¹¹³ Zimmerly/Pieniazek Direct Testimony, at Q40.

the Bureau of Labor Statistics (“CPI”).¹¹⁴ Using the CPI, the Joint Affidavit calculated that, in 2008 or 2009 dollars, the lowest-cost SAMDA is \$158,000.¹¹⁵ The CPI is a widely accepted methodology for escalating costs that is a reasonable method for NEPA purposes.¹¹⁶ Use of the CPI also is consistent with OMB Circular A-94 and the approach used in the TSD.¹¹⁷

Mr. Johnson stated that “[t]he CPI is not the only available measure of inflation, nor is it necessarily the best measure.”¹¹⁸ He also stated: “A weakness of the CPI is that it is based on fixed proportions of expenditure components and does not account for households’ ability to change those proportions over time in response to price or other factors. Some economists also criticize the CPI because of it[s] sensitivity to volatile price components.”¹¹⁹ As the Zimmerly/Pieniazek Direct Testimony demonstrates, Mr. Johnson’s criticism is not applicable to escalation of SAMDA costs, because the issue of whether households can change proportions over time does not directly apply to the escalation of SAMDA costs, which are largely manufacturing costs.¹²⁰ In any event, Mr. Johnson did not disagree that the CPI is a reasonable method for calculating inflation.

In place of the CPI, Mr. Johnson suggested use of the Core Personal Consumption Expenditures (“PCE”) price index.¹²¹ As the Zimmerly/Pieniazek Direct Testimony discusses, the CPI and the PCE are the two primary indices for tracking the prices paid by consumers for

¹¹⁴ Zimmerly/Pieniazek Direct Testimony, at Q41.

¹¹⁵ Zimmerly/Pieniazek Direct Testimony, at Q41.

¹¹⁶ Zimmerly/Pieniazek Direct Testimony, at Q42.

¹¹⁷ Zimmerly/Pieniazek Direct Testimony, at Q42; Exh. NRC00009B, at 47.

¹¹⁸ Johnson Report 2, at 2.

¹¹⁹ *Id.*

¹²⁰ Zimmerly/Pieniazek Direct Testimony, at Q46.

¹²¹ Johnson Report 2, at 2.

goods and services in the United States.¹²² While there are some differences in their purpose and their calculations, they generally track the same prices and are equally applicable and reasonable for escalating SAMDA costs.¹²³ The Zimmerly/Pieniazek Direct Testimony demonstrates that use of these two indices results in similar SAMDA costs.¹²⁴

Mr. Johnson also stated that the cost escalation should account for the regional cost of living index.¹²⁵ As addressed in the Zimmerly/Pieniazek Direct Testimony, use of regional price differences is not relevant.¹²⁶ The TSD already conservatively used lower bounding costs, and therefore accounts for regional price differences.¹²⁷ Furthermore, SAMDAs involve components that can be manufactured anywhere in the United States, not just in the region of Texas in which the plant is located.¹²⁸ Thus, use of a regional cost of living index in Texas would not be appropriate for components that are manufactured elsewhere.¹²⁹

Using the PCE, Mr. Johnson estimated SAMDA costs of \$141,300 and \$143,700 in 2008 and 2009 dollars, respectively.¹³⁰ Using a regional cost index of 0.91 for the part of Texas that encompasses the STP site, Mr. Johnson concluded that the SAMDA cost in 2009 dollars would be \$131,000.¹³¹ In other words, Mr. Johnson would use a factor of 1.31 to escalate the TSD SAMDA costs from 1991 dollars to 2009 dollars.

¹²² Zimmerly/Pieniazek Direct Testimony, at Q45; Exh. STP000019, at n.1.

¹²³ Zimmerly/Pieniazek Direct Testimony, at Q45.

¹²⁴ Zimmerly/Pieniazek Direct Testimony, at Q45.

¹²⁵ Johnson Report 2, at 2.

¹²⁶ Zimmerly/Pieniazek Direct Testimony, at Q47.

¹²⁷ Zimmerly/Pieniazek Direct Testimony, at Q47; Exh. NRC00009B, at 47-52.

¹²⁸ Zimmerly/Pieniazek Direct Testimony, at Q47.

¹²⁹ Zimmerly/Pieniazek Direct Testimony, at Q47.

¹³⁰ Johnson Report 2, at 2.

¹³¹ *Id.* at 3.

On this topic, the NRC Staff stated in its affidavit in response to the Applicant's Motion for Summary Disposition: "[T]he Bureau of Economic Analysis' Gross Domestic Product Implicit Price Deflator for Nonresidential Structures is the appropriate index to use to adjust the cost of SAMDAs for inflation because SAMDAs relate to structural alternatives in plant design and the GDP deflators are more specific to private capital investment than the CPI."¹³² The Staff also stated that "[t]he CPI measures changes in price faced by retail consumers across a typical 'market basket' and would not be appropriate for escalating the costs of SAMDAs."¹³³ The Staff concluded using its index that the lowest-cost SAMDA would be approximately \$225,000.¹³⁴

The Staff's methodology for escalating SAMDA costs is reasonable.¹³⁵ The Staff's methodology would result in a higher cost SAMDA in 2009 dollars by a factor of approximately 1.4 (*i.e.*, \$225,000/\$158,000) than if the CPI were used, or a factor of approximately 1.7 (*i.e.*, \$225,000/\$131,000) than if Mr. Johnson's methodology were used.¹³⁶ The Staff acknowledged this conservatism by stating that using its methodology versus the CPI is not material and does not change the outcome of the SAMDA evaluation.¹³⁷

To be conservative, the Zimmerly/Pieniazek Direct Testimony uses Mr. Johnson's 1.31 factor to escalate SAMDA costs from 1991 dollars to 2009 dollars.¹³⁸ The conclusion that there are no cost-effective SAMDAs holds even if Mr. Johnson's cost escalation methodology is used.¹³⁹

¹³² Staff Affidavit, at 3.

¹³³ *Id.*

¹³⁴ *Id.*

¹³⁵ Zimmerly/Pieniazek Direct Testimony, at Q50.

¹³⁶ Zimmerly/Pieniazek Direct Testimony, at Q51.

¹³⁷ Staff Affidavit, at 3.

¹³⁸ Zimmerly/Pieniazek Direct Testimony, at Q48.

¹³⁹ Zimmerly/Pieniazek Direct Testimony, at Q48.

b. Accounting for Risk Reduction in SAMDA Costs

As discussed above, the ER evaluation compares the cost benefit of implementing each of the SAMDAs to the cost of each individual SAMDA.¹⁴⁰ For this comparison, the ER evaluation assumes that the cost benefit of implementing each of the SAMDAs reduces the severe accident risk to zero.¹⁴¹ The ER evaluation is extremely conservative, because no SAMDA would reduce the risk of severe accidents to zero.¹⁴²

The actual risk reduction can be factored into the SAMDA evaluation by accounting for the specific reduction in CDF that could be achieved by implementing a specific SAMDA.¹⁴³ For example, if implementing a SAMDA would only reduce the CDF by 2%, then the maximum averted cost-risk is reduced by a factor of approximately 50 to perform the cost-benefit analysis with this particular SAMDA.¹⁴⁴

The TSD provides the reduction in CDF for many of the ABWR SAMDAs.¹⁴⁵ The lowest-cost SAMDA for which CDF reduction information is not provided in the TSD is SAMDA 3d (Improved Bottom Head Penetration Design), which costs \$750,000 in 1991 dollars.¹⁴⁶ The Zimmerly/Pieniazek Direct Testimony considers the actual risk reduction for all of the SAMDAs that cost less than \$750,000. Based upon the TSD, the Joint Affidavit shows that each of the SAMDAs that costs less than \$750,000 would achieve only a small reduction in CDF—at most, only a 14% reduction in CDF (for SAMDA 2b that costs \$598,600 in 1991 dollars), and the remainder would all achieve a reduction in CDF of less than 10%. Thus, the

¹⁴⁰ Zimmerly/Pieniazek Direct Testimony, at Q52.

¹⁴¹ Zimmerly/Pieniazek Direct Testimony, at Q52.

¹⁴² Zimmerly/Pieniazek Direct Testimony, at Q52.

¹⁴³ Zimmerly/Pieniazek Direct Testimony, at Q53.

¹⁴⁴ Zimmerly/Pieniazek Direct Testimony, at Q53.

¹⁴⁵ Zimmerly/Pieniazek Direct Testimony, at Q53.

¹⁴⁶ Zimmerly/Pieniazek Direct Testimony, at Q54.

Zimmerly/Pieniazek Direct Testimony demonstrates that once the actual risk reduction of the SAMDAs is taken into account, all of the SAMDAs have a risk-adjusted cost higher than \$750,000.¹⁴⁷ Therefore, the risk-adjusted lowest-cost SAMDA becomes SAMDA 3d.¹⁴⁸ This cost for SAMDA 3d conservatively does not account for any risk reduction.¹⁴⁹ If risk reduction were taken into account for all of the SAMDAs, the lowest cost would be even higher.¹⁵⁰

This \$750,000 cost for SAMDA 3d is in 1991 dollars. Using Mr. Johnson's methodology, the SAMDA cost would be multiplied by a factor of 1.31 to escalate from 1991 dollars to 2009 dollars.¹⁵¹ Therefore, the resulting lowest risk-adjusted cost SAMDA in 2009 dollars is \$982,500.¹⁵²

4. Use of a Higher Capacity Factor and a Higher Net Electrical Output of STP Units 1 and 2 Does Not Affect the Conclusions of the SAMDA Evaluation

In calculating replacement power costs, the ER began with a replacement power cost estimate based upon a capacity factor of 60 to 65% directly from NUREG/BR-0184.¹⁵³ The Staff claimed that the replacement power cost estimates from NUREG/BR-0184 should have been scaled up from 60 to 65% capacity factor to a 95% capacity factor.¹⁵⁴ To account for a higher capacity factor, the replacement power cost values from NUREG/BR-0184 can be

¹⁴⁷ Zimmerly/Pieniazek Direct Testimony, at Q54. The risk-adjusted cost of a SAMDA is the actual cost of the SAMDA divided by the percent of the CDF eliminated by the SAMDA. Thus, if a SAMDA actually costs \$100,000 and would achieve a reduction in CDF of 10%, the risk-adjusted cost of the SAMDA would be \$100,000 divided by 0.10, or \$1,000,000.

¹⁴⁸ Zimmerly/Pieniazek Direct Testimony, at Q54.

¹⁴⁹ Zimmerly/Pieniazek Direct Testimony, at Q55.

¹⁵⁰ Zimmerly/Pieniazek Direct Testimony, at Q55.

¹⁵¹ Zimmerly/Pieniazek Direct Testimony, at Q56.

¹⁵² Zimmerly/Pieniazek Direct Testimony, at Q56.

¹⁵³ Zimmerly/Pieniazek Direct Testimony, at Q64.

¹⁵⁴ Staff Affidavit, at 3-4.

multiplied by the ratio of the higher capacity factor (95%) and the lower capacity factor (conservatively 60%).¹⁵⁵

Additionally, ERCOT's most current generating capacity data indicate that the net electrical output of STP Units 1 and 2 is 1,362 MW each.¹⁵⁶ This is higher than the 1,280 MW net electrical output assumed in determining replacement power costs in the ER SAMDA evaluation. To account for a higher net electrical output for STP Units 1 and 2, the replacement power cost values for STP Units 1 and 2 can be multiplied by the ratio of the higher net electrical output (1,362 MW) and the lower net electrical output (1,280 MW).¹⁵⁷

As shown in the Zimmerly/Pieniazek Direct Testimony, even if the ER's replacement power costs are increased to account for a higher capacity factor and a higher net electrical output of STP Units 1 and 2, there is a substantial margin between the monetized impacts and the lowest risk-adjusted cost of the SAMDAs.¹⁵⁸ Therefore, the conclusion that there are no cost-effective SAMDAs is unaffected by a higher capacity factor and higher net electrical output of STP Units 1 and 2.¹⁵⁹

5. Use of ERCOT Pricing Data Would Not Affect the Conclusions of the SAMDA Evaluation

Johnson Report 1 states that rather than using the values in NUREG/BR-0184 to calculate replacement power costs, the ER should have used ERCOT pricing data.¹⁶⁰ However, even if

¹⁵⁵ Zimmerly/Pieniazek Direct Testimony, at Q64.

¹⁵⁶ Zimmerly/Pieniazek Direct Testimony, at Q64; Exh. STP000006, at 15.

¹⁵⁷ Zimmerly/Pieniazek Direct Testimony, at Q64.

¹⁵⁸ Zimmerly/Pieniazek Direct Testimony, at Q64.

¹⁵⁹ Zimmerly/Pieniazek Direct Testimony, at Q64.

¹⁶⁰ Johnson Report 1, at 3.

ERCOT pricing data is used for the replacement power costs, the conclusions of the SAMDA evaluation would not be affected.¹⁶¹

ERCOT pricing data is available for all of 2010 and for previous years.¹⁶² The Zimmerly/Pieniazek Direct Testimony, however, focuses on the 2009 ERCOT prices instead of the 2010 prices for a number of reasons.¹⁶³ First, the 2009 and 2010 ERCOT prices are very similar. Second, the wholesale market design was changed during 2010, and so the 2010 ERCOT prices would not all be from the same market design. Third, earlier pleadings used 2009 dollars. To be consistent, 2009 ERCOT prices and 2009 dollars are continued in the Zimmerly/Pieniazek Direct Testimony. Finally, as discussed below, a sensitivity analysis using much higher 2008 ERCOT prices was performed, which bounds the costs from 2009 and 2010.¹⁶⁴

As shown in the Zimmerly/Pieniazek Direct Testimony, even if the Applicant's replacement power costs are increased to account for the 2009 ERCOT pricing data, the resulting total monetized impacts are still well below the lowest risk-adjusted cost of the SAMDAs.¹⁶⁵ Therefore, even using the 2009 ERCOT price of electricity for the replacement power costs, the conclusion that there are no cost-effective SAMDAs remains unchanged.¹⁶⁶

In order to determine the sensitivity of the above conclusion to changes in ERCOT prices, the Zimmerly/Pieniazek Direct Testimony also performed a sensitivity analysis using ERCOT pricing data from the year with the highest prices since the ERCOT market was

¹⁶¹ Zimmerly/Pieniazek Direct Testimony, at Q82.

¹⁶² Zimmerly/Pieniazek Direct Testimony, at Q66. For example, 2009 pricing data is provided in Exh. STP000020 and 2008 pricing data is provided in Exh. STP000022.

¹⁶³ Zimmerly/Pieniazek Direct Testimony, at Q68.

¹⁶⁴ Zimmerly/Pieniazek Direct Testimony, at Q68.

¹⁶⁵ Zimmerly/Pieniazek Direct Testimony, at Q71.

¹⁶⁶ Zimmerly/Pieniazek Direct Testimony, at Q71.

deregulated in 2002, which was 2008.¹⁶⁷ The elevated 2008 energy prices were attributable to significant transmission congestion, and the inefficient way by which congestion was relieved in ERCOT's zonal market structure, coupled with relatively strong natural gas prices.¹⁶⁸ ERCOT's change to a nodal dispatch model in 2010 significantly improves transmission congestion relief processes and therefore help to avoid a repeat of the high 2008 prices.¹⁶⁹

Nonetheless, as shown in the Zimmerly/Pieniazek Direct Testimony, even if the ER's replacement power costs are increased to account for the 2008 ERCOT prices, there is a substantial margin between the monetized impacts and the lowest risk-adjusted cost of the SAMDAs.¹⁷⁰ Therefore, the conclusion that there are no cost-effective SAMDAs is unaffected even if the highest ERCOT prices (*i.e.*, from 2008) are used to calculate the replacement power costs.¹⁷¹

6. Use of the Intervenor's Replacement Power Costs Would Not Affect the Conclusions of the SAMDA Evaluation

The Intervenor has stated that the replacement power costs in the SAMDA evaluation should be based on a forecast of baseline ERCOT market prices rather than on the replacement power costs specified in NUREG/BR-0184.¹⁷² The Intervenor relies upon Johnson Report 1, which states that the replacement power costs using ERCOT prices "are roughly 3 to 3.8 times the \$430 thousand/day cost used by the Applicant."¹⁷³

¹⁶⁷ Zimmerly/Pieniazek Direct Testimony, at Q73.

¹⁶⁸ Zimmerly/Pieniazek Direct Testimony, at Q76; Exh. STP000021.

¹⁶⁹ Zimmerly/Pieniazek Direct Testimony, at Q76.

¹⁷⁰ Zimmerly/Pieniazek Direct Testimony, at Q79.

¹⁷¹ Zimmerly/Pieniazek Direct Testimony, at Q79.

¹⁷² Intervenor's Request, at 7; Johnson Report 1, at 2-4.

¹⁷³ Johnson Report 1, at 4.

Even if the replacement power cost values proposed in Johnson Report 1 were used, they would not impact the conclusions in the SAMDA analysis.¹⁷⁴ As shown in the Zimmerly/Pieniazek Direct Testimony, multiplying the replacement power cost estimates in ER Section 7.5S.5 by 3.8 to account for Johnson Report 1 results in total monetized impacts that are well below the lowest risk-adjusted cost of the SAMDAs.¹⁷⁵ Therefore, acceptance of the Intervenors' position that the ER's estimated replacement power costs were up to 3.8 times too low does not affect the conclusion that there are no cost-effective SAMDAs.¹⁷⁶ The same is true if the value of \$63.19 per MWh from Johnson Report 1 is used for calculation of replacement power costs.¹⁷⁷

7. Consideration of ERCOT Market Effects Would Not Affect the Conclusions of the SAMDA Evaluation

The Intervenors have stated:

The Applicant's quantification of the replacement power costs in the event of a forced shutdown of nuclear units on the STP site is inadequate in that it does not take into account the increase of ERCOT market prices due to the market effects of a STP outage.¹⁷⁸

The Intervenors rely upon Johnson Report 1 for this conclusion.¹⁷⁹ Johnson Report 1 does not quantify the change in replacement power costs due to these market effects, and states that the impact should be evaluated by the Applicant.¹⁸⁰

As discussed in the Zimmerly/Pieniazek Direct Testimony, the loss of the STP units would not have significant long-term market effects in the ERCOT region, and would not

¹⁷⁴ Zimmerly/Pieniazek Direct Testimony, at Q82.

¹⁷⁵ Zimmerly/Pieniazek Direct Testimony, at Q83.

¹⁷⁶ Zimmerly/Pieniazek Direct Testimony, at Q83.

¹⁷⁷ Zimmerly/Pieniazek Direct Testimony, at Q84.

¹⁷⁸ Intervenors' Request, at 8.

¹⁷⁹ *See id.*

¹⁸⁰ Johnson Report 1, at 5.

dramatically increase annualized replacement power costs.¹⁸¹ First, the combined capacity of the four STP units (approximately 5,324 MWe) is less than the generation capacity represented by the 13.75% ERCOT planning reserve margin for peak load conditions.¹⁸² Additionally, during most of the year, ERCOT also operates well below the peak hour demand.¹⁸³ Furthermore, the potential multi-year outages for the STP units would stimulate new generation sources to enter the market.¹⁸⁴ ERCOT has indicated that 5,505 MW of mothballed capacity will exist in 2016, which could be brought back into service and be used to offset some of the lost generation from STP Units 3 and 4.¹⁸⁵ For these reasons, ERCOT should have enough reserve margin to supply demand, even if all four STP units were to be off-line.¹⁸⁶

Furthermore, consideration of the market effects of the shutdown of the STP units would not change the conclusions in the SAMDA evaluation.¹⁸⁷ As shown in the Zimmerly/Pieniazek Direct Testimony, the market effects can be estimated by the difference between the 2009 ERCOT prices if it is assumed that all four STP units are operating and the 2009 ERCOT prices if all four STP units are shut down for the entire year.¹⁸⁸ If the economic impact from this change in the market prices is added to the replacement power costs using the conservative 2008 ERCOT pricing data, then the total monetized impacts are still well below the lowest risk-adjusted cost of the SAMDAs.¹⁸⁹ Therefore, acceptance of the Intervenors' position that the

¹⁸¹ Zimmerly/Pieniazek Direct Testimony, at Q86.

¹⁸² Zimmerly/Pieniazek Direct Testimony, at Q87.

¹⁸³ Zimmerly/Pieniazek Direct Testimony, at Q88.

¹⁸⁴ Zimmerly/Pieniazek Direct Testimony, at Q89.

¹⁸⁵ Zimmerly/Pieniazek Direct Testimony, at Q89.

¹⁸⁶ Zimmerly/Pieniazek Direct Testimony, at Q87.

¹⁸⁷ Zimmerly/Pieniazek Direct Testimony, at Q86.

¹⁸⁸ Zimmerly/Pieniazek Direct Testimony, at Q90. The underlying model to evaluate these market effects relies upon information from Exh. STP000023.

¹⁸⁹ Zimmerly/Pieniazek Direct Testimony, at Q100.

ER's estimated replacement power costs should account for market effects does not affect the conclusion that there are no cost-effective SAMDAs.¹⁹⁰

Mr. Johnson raises a few issues with the model discussed in the Joint Affidavit to determine the impact of these market effects. First, he states that the "model's treatment of ancillary services appears simplistic."¹⁹¹ However, as discussed in the Zimmerly/Pieniazek Direct Testimony, the model accounts for ancillary services (*e.g.*, generation resources that are held in reserve to ensure reliable service) by including the ancillary services in the hourly loads evaluated in the model.¹⁹²

Second, Mr. Johnson claims that the model's "assumption that no market power will affect power prices is unrealistic."¹⁹³ Mr. Johnson is correct that the model assumes perfect competition. However, as discussed in the Zimmerly/Pieniazek Direct Testimony, consideration of market power would have minimal effect on the results, because the model calculates the differences in costs of two scenarios (one with operation of STP units and one without operation of the STP units). Because the model calculates a differential cost, any assumptions regarding market power would affect both scenarios, and the net effect on the differential cost would be minimal.¹⁹⁴ Additionally, ERCOT has never made a finding of market power abuse and has programs to detect such abuse, and abuse of market power is illegal in Texas. Furthermore, there is no practical method to estimate the impacts of abuse of market power, since such abuse would occur as a result of intentional wrongdoing by a supplier that cannot be predicted in advance.¹⁹⁵

¹⁹⁰ Zimmerly/Pieniazek Direct Testimony, at Q100.

¹⁹¹ Johnson Report 2, at 4.

¹⁹² Zimmerly/Pieniazek Direct Testimony, at Q92.

¹⁹³ Johnson Report 2, at 4.

¹⁹⁴ Zimmerly/Pieniazek Direct Testimony, at Q94.

¹⁹⁵ Zimmerly/Pieniazek Direct Testimony, at Q94.

Therefore, an assumption that a supplier would attempt to exercise market power is speculative and inappropriate under NEPA and NRC case law.¹⁹⁶

Finally, Mr. Johnson claims that the assumptions in the Joint Affidavit regarding wind capacity factor are too high.¹⁹⁷ However, as discussed in the Zimmerly/Pieniazek Direct Testimony, because the model compares two scenarios that include the same wind capacity factors, any effect tends to offset.¹⁹⁸ Additionally, NINA's witness re-ran the model conservatively assuming that the wind capacity factor is zero.¹⁹⁹ Even using that conservative assumption, the Zimmerly/Pieniazek Direct Testimony demonstrates that there are no cost-effective SAMDAs.

Johnson Report 1 also states that the replacement power cost evaluation should not just account for the cost of replacement power, but should also account for the impacts to consumers due to the higher market prices.²⁰⁰ As shown in the Zimmerly/Pieniazek Direct Testimony, the impact on the SAMDA evaluation from these consumer impacts was determined by using the incremental market cost of energy from losing the four STP units and multiplying by the total generation in ERCOT.²⁰¹ When the costs to consumers are included in the total monetized cost, the costs are still below the lowest risk-adjusted cost of the SAMDAs.²⁰² Therefore, acceptance

¹⁹⁶ See, e.g., *Vt. Yankee*, ALAB-919, 30 NRC at 44 (citing *Limerick Ecology Action*, 869 F.2d at 739) (holding that consideration of "remote and speculative" impacts is not required); *Nat'l Enrichment Facility*, CLI-05-20, 62 NRC at 536 (holding that NEPA does not require consideration of speculative impacts).

¹⁹⁷ Johnson Report 2, at 4.

¹⁹⁸ Zimmerly/Pieniazek Direct Testimony, at Q96.

¹⁹⁹ Zimmerly/Pieniazek Direct Testimony, at Q96.

²⁰⁰ Johnson Report 1, at 5.

²⁰¹ Zimmerly/Pieniazek Direct Testimony, at Q103. The total generation in ERCOT was derived from Exh. STP000024.

²⁰² Zimmerly/Pieniazek Direct Testimony, at Q104.

of the Intervenor's position that the ER's estimated replacement power costs should account for impacts to consumers does not affect the conclusion that there are no cost-effective SAMDAs.²⁰³

8. Consideration of ERCOT Price Spikes Would Not Affect the Conclusions of the SAMDA Evaluation

The Intervenor has stated:

The Applicant's Environmental Report is inadequate in that it does not evaluate or take into account the impacts on ERCOT consumers and the disruptive impacts of potential price spikes and grid outages, which could be triggered by the simultaneous shutdown of all four units at STP.²⁰⁴

The Intervenor relies upon Johnson Report 1 for this conclusion.²⁰⁵ Although Johnson Report 1 does not quantify the change in replacement power costs due to these price spikes, it states that price spikes increased ERCOT average prices in 2008 by 20%.²⁰⁶

Price spikes occur in ERCOT every year.²⁰⁷ The price spikes are of short duration.²⁰⁸ The short duration is due to ERCOT carrying responsive reserves, regulation reserves, and non-spin reserves, all of which are carried 24 hours a day to handle contingencies.²⁰⁹ The impact of these price spikes on average prices was estimated by ERCOT to be between 10% and 20% from 2006 through 2009.²¹⁰ This price impact is already accounted for by ERCOT's average prices used in the evaluations discussed above.²¹¹

²⁰³ Zimmerly/Pieniazek Direct Testimony, at Q104.

²⁰⁴ Intervenor's Request, at 9.

²⁰⁵ *Id.*

²⁰⁶ Johnson Report 1, at 6.

²⁰⁷ Zimmerly/Pieniazek Direct Testimony, at Q107.

²⁰⁸ Zimmerly/Pieniazek Direct Testimony, at Q107.

²⁰⁹ Zimmerly/Pieniazek Direct Testimony, at Q107.

²¹⁰ Zimmerly/Pieniazek Direct Testimony, at Q108.

²¹¹ Zimmerly/Pieniazek Direct Testimony, at Q108.

One recent high-profile price spike event occurred on February 2, 2011, when ERCOT ordered 4,000 MW of firm load to be shed from the grid following a record breaking arctic cold front that disabled 50 generating units representing more than 7,000 MW (*i.e.*, more than the capacity of the four STP units combined).²¹² Even during this event, the price spikes were short lived.²¹³

As discussed in the Zimmerly/Pieniazek Direct Testimony, the potential for increases in ERCOT average market prices due to additional price spikes attributable to outages of the STP units would be limited by many of the same factors that would minimize other market effects of shutting down the four STP units, such as market adjustment, restoring mothballed capacity, reserve margins, and demand response.²¹⁴ Additionally, the historical price spikes primarily have been due to inefficient zonal management techniques rather than outages of generation stations, and those grid management techniques no longer existed beginning December 1, 2010, when ERCOT implemented a nodal market design.²¹⁵ A nodal market design provides improved dispatch efficiencies and unit specific management of transmission congestion, a significant improvement over the pre-December 2010 zonal market design.²¹⁶

However, even if additional price spikes were to increase ERCOT prices by an additional 20% beyond the 20% impact already accounted for in the average ERCOT prices for 2008, there still would be no change to the conclusions of the SAMDA evaluation.²¹⁷ As shown in the Zimmerly/Pieniazek Direct Testimony, even if the conservative 2008 ERCOT *annual prices* are

²¹² Zimmerly/Pieniazek Direct Testimony, at Q109.

²¹³ Zimmerly/Pieniazek Direct Testimony, at Q109.

²¹⁴ Zimmerly/Pieniazek Direct Testimony, at Q110.

²¹⁵ Zimmerly/Pieniazek Direct Testimony, at Q110.

²¹⁶ Zimmerly/Pieniazek Direct Testimony, at Q110.

²¹⁷ Zimmerly/Pieniazek Direct Testimony, at Q110.

conservatively increased by 20% to account for additional price spikes, and after accounting for the additional ERCOT market effects and impacts to consumers discussed above, the total monetized impacts are still below the lowest risk-adjusted cost of the SAMDAs.²¹⁸ Therefore, even when the potential impacts of price spikes are taken into account in a very conservative manner, there are no cost-effective SAMDAs.²¹⁹

9. Consideration of the Loss of the Grid Would Not Affect the Conclusions of the SAMDA Evaluation

Johnson Report 1 states that the simultaneous loss of four STP units “could increase the likelihood of outages on the ERCOT grid which result in load shedding, or even uncontrolled blackouts.”²²⁰ Although Johnson Report 1 does not quantify the change in costs due to these grid outages, it states that the grid outages will increase the economic costs.²²¹

As Johnson Report 1 states, the probability of an ERCOT grid outage following a shutdown of all four STP units “may not be high.”²²² ERCOT is responsible for running the grid reliably and avoiding the loss of load.²²³ In addition, since the Northeast United States Blackout of 2003, ERCOT, as well as all other electricity regions in the United States, are under strict federally enforced reliability standards.²²⁴ These rigorous standards are monitored and enforced by the Texas Reliability Entity, which has the responsibility of ensuring the reliability of the bulk

²¹⁸ Zimmerly/Pieniazek Direct Testimony, at Q110.

²¹⁹ Zimmerly/Pieniazek Direct Testimony, at Q112.

²²⁰ Johnson Report 1, at 7.

²²¹ *See id.*

²²² *Id.*

²²³ Zimmerly/Pieniazek Direct Testimony, at Q115.

²²⁴ Zimmerly/Pieniazek Direct Testimony, at Q115.

power system as per the requirements of the North American Electric Reliability Corporation (“NERC”).²²⁵

As explained in the Final Safety Analysis Report (“FSAR”) Section 8.2.2.3 for STP Units 3 and 4,²²⁶ the ERCOT grid is designed to simultaneously lose the two largest generators without a loss of the grid.²²⁷ In the event of a severe accident at one STP unit, the other units would be shut down in an orderly fashion, *i.e.*, all four units would not be taken off the grid simultaneously.²²⁸ Given the orderly shutdown, ERCOT would have time to adjust to the loss of the four units and to bring other generation sources online, invoke certain demand response programs, and shed load in a controlled manner, if necessary.²²⁹

Additionally, as discussed in the Zimmerly/Pieniazek Direct Testimony, the low probability for loss of the grid also would be limited by many of the same factors that would minimize other market effects and price spikes due to shutting down the four STP units, such as market adjustment, restoring mothballed capacity, reserve margins, and demand response.²³⁰ Given all of the protective measures established by ERCOT, the Texas Reliability Entity, and NERC, as discussed above, it is extremely unlikely that a shutdown of all four STP units would result in a loss of the ERCOT grid.²³¹ In fact, the protective measures have been successful in the past, and there has never been a loss of the entire ERCOT grid due to any event.²³²

²²⁵ Zimmerly/Pieniazek Direct Testimony, at Q115.

²²⁶ Zimmerly/Pieniazek Direct Testimony, at Q116. *See also* Exh. STP000027.

²²⁷ Zimmerly/Pieniazek Direct Testimony, at Q116.

²²⁸ Zimmerly/Pieniazek Direct Testimony, at Q116.

²²⁹ Zimmerly/Pieniazek Direct Testimony, at Q116. For example, Exh. STP000025 provides guides for ensuring adequate system frequency.

²³⁰ Zimmerly/Pieniazek Direct Testimony, at Q116.

²³¹ Zimmerly/Pieniazek Direct Testimony, at Q114.

²³² Zimmerly/Pieniazek Direct Testimony, at Q114.

The Zimmerly/Pieniazek Direct Testimony discusses how this conclusion is bolstered by the recent February 2011 severe weather event. During that event, the quantity of generation disabled by cold and ice was greater than 7,000 MW, which exceeds the capacity of all four STP units combined.²³³ While the February event did result in a controlled process of shedding 4,000 MW of load, at no time during the extended emergency was the entire grid in peril of collapsing.²³⁴ This event provides a real-life example of how a complete loss of the entire grid is a remote possibility, even when generating capacity larger than the four STP units is lost.²³⁵

Although it is difficult to quantify a probability for loss of the ERCOT grid due to shutdown of the four STP units, the Zimmerly/Pieniazek Direct Testimony states that the probability is far less than 0.1.²³⁶ As discussed above, the CDF for the ABWR is 1.56×10^{-7} per year.²³⁷ Thus, the probability of a severe accident at one of the ABWR units at the STP site, followed by a shutdown of the other three STP units, followed by a loss of the ERCOT grid, is far less than 10^{-8} per year.²³⁸

Given the very low probability of a severe accident, times the low probability that the STP shutdown would result in a loss of the grid, loss of the grid is a remote and speculative event. Consideration of such “remote and speculative” impacts is not required by NEPA.²³⁹ As the Commission explained, “NEPA also does not call for certainty or precision, but an *estimate* of anticipated (not unduly speculative) impacts.”²⁴⁰ The Applicant has provided a very

²³³ Zimmerly/Pieniazek Direct Testimony, at Q117.

²³⁴ Zimmerly/Pieniazek Direct Testimony, at Q117; Exh. STP000025 § 4.5.

²³⁵ Zimmerly/Pieniazek Direct Testimony, at Q117.

²³⁶ Zimmerly/Pieniazek Direct Testimony, at Q118.

²³⁷ Zimmerly/Pieniazek Direct Testimony, at Q118.

²³⁸ Zimmerly/Pieniazek Direct Testimony, at Q118.

²³⁹ See *Vt. Yankee*, ALAB-919, 30 NRC at 44.

²⁴⁰ *Nat’l Enrichment Facility*, CLI-05-20, 62 NRC at 536.

conservative estimation of replacement power costs for the co-located units; the speculative impacts of the unlikely loss of the grid are not required.

Consideration of the loss of the ERCOT grid would be akin to a worst-case analysis. It is well established that NEPA does not require a worst-case analysis.²⁴¹ The Commission has noted that the purpose of an EIS is to “inform the decisionmaking agency and the public of a broad range of environmental impacts that will result, with a fair degree of likelihood, from a proposed project, rather than to speculate about ‘worst-case’ scenarios and how to prevent them.”²⁴² Similarly, the Commission stated in *Pilgrim* that “[a]s a mitigation analysis, NRC SAMA analysis is neither a worst-case nor a best-case impacts analysis.”²⁴³

Furthermore, even if the impact of grid outages caused by the shutdown of the STP units is considered, it would not change the conclusions in the SAMDA evaluation.²⁴⁴ As shown in the Zimmerly/Pieniazek Direct Testimony, the impact due to grid outages can be estimated by conservatively assuming that a grid outage similar to the 2003 Northeast blackout occurs with a \$10 Billion impact as estimated in Johnson Report 1.²⁴⁵ If this impact is added to the replacement power costs using the conservative 2008 ERCOT pricing data, and accounting for the consumer impacts due to market effects and increases in price spikes, then the total monetized impacts are still below the lowest risk-adjusted cost of the SAMDAs.²⁴⁶ Therefore, acceptance of the Intervenors’ position that the ER’s estimated replacement power costs should

²⁴¹ *Robertson*, 490 U.S. at 359; *Private Fuel Storage, LLC* (Indep. Spent Fuel Storage Installation), CLI-02-25, 56 NRC 340, 352 (2002).

²⁴² *Private Fuel Storage*, CLI-02-25, 56 NRC at 347.

²⁴³ *Pilgrim*, CLI-10-11, slip op. at 38.

²⁴⁴ Zimmerly/Pieniazek Direct Testimony, at Q122.

²⁴⁵ Zimmerly/Pieniazek Direct Testimony, at Q119.

²⁴⁶ Zimmerly/Pieniazek Direct Testimony, at Q122.

account for grid outages does not affect the conclusion that there are no cost-effective SAMDAs.²⁴⁷

The Intervenor argue that the economic impacts (\$45 billion) of the California rolling blackouts should be considered.²⁴⁸ However, as explained in Johnson Report 1, the cited value of \$45 billion is based upon a “combination of high prices and rolling blackouts in the 2000/2001 California energy crisis.”²⁴⁹ As explained in the Zimmerly/Pieniazek Direct Testimony, of that \$45 billion, only \$0 to \$5 billion came from blackouts, which is less than the \$10 billion cost assumed for the Northeast blackout.²⁵⁰ However, even if the impact of \$45 billion is added to the replacement power costs using the conservative 2008 ERCOT pricing data, and accounting for the consumer impacts due to market effects and increases in price spikes, then the total monetized impacts are still below the lowest risk-adjusted cost of the SAMDAs.²⁵¹ Therefore, acceptance of the Intervenor’s position does not affect the conclusion that there are no cost-effective SAMDAs.²⁵²

10. The Evaluation in the Zimmerly/Pieniazek Direct Testimony Is Conservative

The evaluation in the Zimmerly/Pieniazek Direct Testimony is conservative.²⁵³ For example, the Zimmerly/Pieniazek Direct Testimony:

- Only accounts for actual risk reduction for the SAMDAs that cost less than \$750,000; other SAMDAs are assumed to prevent all severe accidents;
- Uses the SAMDA costs provided in the TSD, which are biased on the low side, and are lower than expected actual plant costs;

²⁴⁷ Zimmerly/Pieniazek Direct Testimony, at Q122.

²⁴⁸ Intervenor’s Response, at 8; Exh. STP000026, at 3-4.

²⁴⁹ Johnson Report 1, at 7.

²⁵⁰ Zimmerly/Pieniazek Direct Testimony, at Q120.

²⁵¹ Zimmerly/Pieniazek Direct Testimony, at Q123.

²⁵² Zimmerly/Pieniazek Direct Testimony, at Q123.

²⁵³ Zimmerly/Pieniazek Direct Testimony, at Q125.

- Includes a sensitivity analysis for the replacement power cost estimates based on a 3% discount rate, which is more conservative than the 7% discount rate typically used;
- Uses the 2008 ERCOT pricing data (highest prices since the ERCOT market was deregulated in 2002) as the basis for the replacement power cost estimates;
- Assumes that price spikes would occur due to the outages of the STP units (even though historical price spikes have often been due to grid congestion and not station outages) and that the price spikes from the STP outages would increase the annual market price by an additional 20% (even though any actual price spikes are likely to be limited in duration);
- Assumes that a grid outage due to shutting down the STP units is equivalent to the 2003 Northeast blackout or the cost of deregulation of the California electricity markets; and
- Assumes no discount rate when estimating the consumer impacts from market effects, price spikes, and grid outages.²⁵⁴

This conservatism provides additional assurance for the conclusion that there are no cost-effective SAMDAs. This conservatism goes beyond the requirements of NEPA, which only requires that an evaluation be reasonable and does not require that a SAMDA analysis use worst case assumptions.²⁵⁵

²⁵⁴ Zimmerly/Pieniazek Direct Testimony, at Q126.

²⁵⁵ See, e.g., *Pilgrim*, CLI-10-11, slip op. at 37.

VI. CONCLUSIONS

For the reasons set forth in this Initial Statement of Position, as supported by the testimony and evidence filed herewith, there are no cost-effective SAMDAs. Accordingly, NINA respectfully requests that the Board issue an initial decision resolving Contention CL-2 in NINA's favor.

Respectfully submitted,

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