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Attachments: NRC Staff Ex NRC000062 - Rebuttal Testimony for Contention DEIS-1.pdf; NRC Staff Ex NRC000058 - Rebuttal Testimony for Contention CL-2.pdf

FYI. Just to see what STP did and to get a feel for writing rebuttal testimony.
Thanks
Laura

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May 31, 2011

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
NUCLEAR INNOVATION NORTH AMERICA LLC	)	Docket Nos. 52-012 & 52-013
	)	
(South Texas Project, Units 3 & 4)	)	

PREFILED REBUTTAL TESTIMONY OF DANIEL C. MUSSATTI AND DR. MICHAEL J. SCOTT REGARDING CONTENTION DEIS-1

Q1. Please state your names.

A1a. [DCM][1] My name is Daniel C. Mussatti.

A1b. [MJS] My name is Dr. Michael J. Scott.

Q2. Have you previously submitted testimony concerning Contention DEIS-1 in this proceeding?

A2. [DCM, MJS] Yes. Our direct testimony was provided in the "Prefiled Direct Testimony of Daniel C. Mussatti and Dr. Michael J. Scott Regarding Contention DEIS-1" (May 9, 2011) (Ex. NRC000031) ("Staff DEIS-1 Direct Testimony"). Statements of our professional qualifications were included as Exs. NRC000032 and NRC000033.

Q3. Are you familiar with the direct testimony submitted by the Intervenors concerning Contention DEIS-1, "Direct Testimony of Philip H. Mosenthal on Behalf of Sustainable Energy and Economic Development (SEED) Coalition, Public Citizen, and South Texas Association for Responsible Energy (Intervenors)" (May 16, 2011) (INT000001) ("Mosenthal Direct Testimony")?

A3. [DCM, MJS] Yes.

[1] In this testimony, the identity of the witness who supports each numbered paragraph is indicated by the notation of his initials in brackets.

Q4. Did the Intervenors' expert, Mr. Mosenthal, reach a conclusion about the need for power that would be provided by proposed STP units 3 and 4?

A4. [DCM, MJS] Mr. Mosenthal concluded that, after he accounted for the effects of the new building energy codes, in the year 2020, there would be a net need for 1,828 MW with no retirements and a net need for 14,265 MW with retirements of units older than 50 years. *See* Mosenthal Direct Testimony at Table 1 (Ex. INT000001). Mr. Mosenthal determined that the need for power would begin around 2017 or 2018. *Id.* at 10.

Q5. How do Mr. Mosenthal's estimates of the need for power, taking into account the new building energy codes in Texas, compare to the NRC staff's estimates in the Staff DEIS-1 Direct Testimony?

A5. [MJS] In the Staff DEIS-1 Direct Testimony, we concluded that, after accounting for the new building energy codes in Texas, in the year 2020, there would be a need for 748 MW of baseload power with no retirements and 5,598 MW of baseload power with retirements of units older than 50 years. *See* Staff DEIS-1 Direct Testimony at Table 5 & A57 (Ex. NRC000031). Table 1 compares the results of the Staff DEIS-1 Direct Testimony (Ex. NRC000031) with my interpretation of Mr. Mosenthal's estimates. There is virtually no difference in the need for power.

Table 1. Summary of Building Energy Code Impacts on Demand in Staff DEIS-1 and Mosenthal Direct Testimonies

Forecasts	Firm Load, Less Additional Efficiency, plus 13.75% (MW)		Need for Generation at Peak (MW) Without and With Retirements of Plants >50 Years Old		Need for Baseload (MW) Without and With Retirements of Plants >50 Years Old	
	2015	2020	2015	2020	2015	2020
ERCOT/Review Team Sensitivity Forecast Resource Needs[a]	77,510	82,818	(734) to 5,389	3,233 to 15,669	(286) to 2,102	1,261 to 6,111
Staff DEIS-1 Direct Testimony: After Savings from New Building Energy Codes[b]	76,854	81,491	(1,389) to 4,734	1,906 to 14,342	(539) to 1,849	748 to 5,598
Mosenthal Direct Testimony: After Savings from New Building Energy Codes[c]	77,016	81,414	(1,229) to 4,894	1,828 to 14,265	(479) to 1,909	713 to 5,563

(a) Values taken from FEIS at Table 8-6 (Ex. NRC00003C).

(b) Total Savings from Staff DEIS-1 Direct Testimony, Table 4 (Ex. NRC000031) subtracted from the ERCOT/Review Team Sensitivity forecast. (Table 4 peak demand savings values adjusted in first four columns above to include a 13.75% target reserve margin. Last two columns did not require addition of a reserve margin.)

(c) First four columns: Mosenthal Direct Testimony at Table 1 (Ex. INT000001). Mr. Mosenthal's adjustments to demand due to building energy code savings were -494 MW in 2015 and -1,404 MW in 2020. *Id.* Last two columns were calculated by multiplying columns 3 and 4 by 39%.

*Parentheses indicate that the value is negative.

Q6. In his testimony, did the Intervenors' expert, Mr. Mosenthal, make any adjustments to the ACEEE analysis (Ex. STP000008)?

A6. [MJS] Yes. Mr. Mosenthal modified the ACEEE analysis in five ways. First, he began his analysis with the 2010 ERCOT forecast rather than the 2006 forecast that was used in the ACEEE study. Mosenthal Direct Testimony at 7 (Ex. INT000001). Second, he delayed the starting point for savings from 2009 until 2011. *Id.* at 6. Third, he adjusted the initial percentages of improvement from the existing building energy codes in Texas to the new building energy codes, which he estimated at 20.0% for residential and 11.4% for commercial. *Id.* at 7. Fourth, he assumed that that the residential and commercial standards savings rates

would be further increased in the future every 3 years. *Id.* at 9. Fifth, he assumed that initial compliance would be below 100% (80% for commercial buildings and 60% for single-family residential, increasing to 90% by 2017). *Id.* at 8.

Q7. What is your opinion on the five adjustments that Mr. Mosenthal made to the ACEEE analysis?

A7. [MJS] I agree with his first two adjustments: use of the 2010 ERCOT forecast and delaying savings until 2011. These adjustments make the analysis more relevant because Mr. Mosenthal uses more current data and delays in compliance are highly probable. I disagree with his third and fourth adjustments: using percentages of improvement from the existing codes to the new codes of 20.0% for residential and 11.4% for commercial and assuming that these rates would increase every three years. His choice of initial savings rates (20% and 11.4%) and his assumptions about future improvements in these rates are too speculative. With respect to the fifth adjustment, although I agree that achieving 100% compliance as assumed in the Staff DEIS-1 Direct Testimony (Ex. NRC000031) is unlikely, it maximizes the potential savings from building energy codes.

Q8. In adjusting the percentage of savings from the existing building energy codes in Texas to the new building energy codes, what assumptions did Mr. Mosenthal make regarding the existing codes used as a baseline for comparison to the new codes?

A8. [MJS] Mr. Mosenthal assumed that the 2001 International Energy Conservation Code (IECC) building energy code would be a reasonable baseline. Mosenthal Direct Testimony at 7 n.6 (Ex. INT000001). He noted "that a few municipalities have had somewhat stricter codes in place in recent years, however, we assume 2000 IECC with 2001 supplement represents a reasonable baseline practice prior to 2011 in Texas…." *Id*.

Q9. What is your opinion on using the 2001 IECC as the baseline for comparison?

A9. [MJS] Available evidence suggests that early adoption occurred in far more than just a few municipalities. In the Staff DEIS-1 Direct Testimony (Ex. NRC000031), I provided Attachment 2, which shows that, due to early local adoption of the 2003, 2006, and 2009 IECC

codes, the Texas average baseline practice by early 2010 was actually closer to the IECC 2006 standard than to the IECC 2001 standard. Local jurisdictions with either the 2006 or 2009 IECC standard represented 78% of the population surveyed. *Id.* The assumption that 2000 IECC with the 2001 supplement represents a reasonable baseline prior to 2011 in Texas is not supported by the available evidence.

Q10. What is your opinion on using 20% and 11.4% as the initial improvement rates from the existing building energy codes to the new ones?

A10. [MJS] I do not believe that they are correct values to use, since I do not believe that the average Texas baseline building practice was guided by the 2001 IECC code at the time that the State adopted the 2009 IECC code.

Q11. What impact would the change in baseline from the 2001 IECC to the 2006 IECC have on the analysis, assuming you used the savings rates that Mr. Mosenthal used?

A11. [MJS] Based on a Pacific Northwest National Laboratory (PNNL) study (Ex. INT000015), Mr. Mosenthal assumes an initial decrease in electric usage for the 2009 IECC compared to the 2001 IECC of 11.4% for the non-residential sector. Mosenthal Direct Testimony at 7 & n.8 (Ex. INT000001). Savings for the residential sector is assumed to be 20%, based on an analysis done by Energy Systems Laboratory (ESL) at Texas A&M University (Ex. INT000016). *Id.* at 7 & n.8. Exhibits INT000003 and INT000004 show these factors. *Id.* at 7.

The average of savings in electricity intensity in Texas non-residential buildings at five locations (Austin, Houston, El Paso, Fort Worth and Amarillo) as computed by Mr. Mosenthal from PNNL 2009 at 151 (Ex. INT000015) is indeed 11.4% if the baseline energy use is IECC 2001. However, a later report for PNNL (Halverson et al. 2010 at 11.3 (Ex. NRC000053)) shows an overall average non-residential savings of 3% between the 2006 and 2009 versions of the code, and in Texas for the specific non-residential building type used in PNNL 2009 (Ex. INT000015), a medium-sized office building, the average of the electricity savings in the

relevant climate zones, Zones 2A, 2B, 3A, 3B, and 4B, equals 3.71%.[2] The average of the ESL values cited by Mr. Mosenthal for residential buildings is 19.97% if the baseline is 2001, but from the same source the average value when the baseline is 2006 rather than 2001 is 8.35%. The actual new building practice in Texas was closer to complying with the 2006 IECC standard, as noted in the answer to Q9 above. Therefore, Mr. Mosenthal's estimates for electricity savings for the commercial building sector are over three times too high, and for the residential sector about 2.4 times too high. Correcting this would reduce savings considerably.

Q12. Did Mr. Mosenthal make any assumptions about future changes to the building energy codes?

A12. [MJS] Yes. He assumed that, in 2014, commercial saving rates would approximately double from 11.4% to 22% and that residential savings rates would increase to 39% in 2015. Mosenthal Direct Testimony at 9 (Ex. INT000001). Thereafter, at three-year intervals, based on Ex. INT000004, residential and commercial savings rates would increase by 4%, declining to 3% for commercial buildings in 2020 and increase by 6%, declining to 4% in 2024 for residential buildings.

Q13. What is your opinion on the assumption that every three years the building energy codes will be upgraded and result in a considerable energy savings increase?

A13. [MJS] As noted in the Staff DEIS-1 Direct Testimony at A52 n.19 (Ex. NRC000031) and Mosenthal Direct Testimony at 7 n.7 (Ex. INT000001), the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 90.1-2007 is treated as roughly equivalent to the IECC 2009. ASHRAE does update its model building energy codes periodically, but beyond the update currently in process we do not have an estimate of how much electricity these codes are likely to save. In addition, the ASHRAE codes take about two years to be analyzed and adopted (in whole or in part) as IECC codes.

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[2] *See* Ex. NRC000063 for the spreadsheet displaying the calculation of the 3.71% average savings, which is based on data from U.S. Department of Energy (DOE). 2011. Building Energy Codes Program. 90.1 Prototype Building Models. Available at: http://www.energycodes.gov/commercial/901models/ (Ex. NRC000064).

The IECC (or other code updates) are often adopted with a considerable lag by states, and effective implementation lags behind that. Texas did adopt the 2009 IECC standard, for example, but declined to adopt the 2003 and 2006 standards. The impacts in my view are speculative, since none of the future codes has been adopted. ERCOT takes a similar view in that it does not include in its forecasts the effects of regulations that do not yet exist.

Q14. Does Mr. Mosenthal discuss how improved efficiency due to building energy codes would affect peak load and demand for baseload power?

A.14. [DCM, MJS] Yes. He gave quantitative estimates for demand reduction at peak demand and its effect on the need for resources. Mosenthal Direct Testimony at Table 1 (Ex. INT000001). He argued that, because baseload demand can be addressed by peaking units and intermediate units, the reduction in total loads (demand at peak) translates directly into an equal reduction in demand for baseload power. *Id.* at 11. He argued that energy conservation is load-following and that the savings would be larger at peak than at baseload, flattening the load duration curve. *Id.*

Q15. Do you agree that reducing peak load will result in an equal reduction in the demand for baseload power, and that flattening of the load curve would reduce the need for baseload power?

A15. [DCM, MJS] Building electricity consumption varies as a result of variation in building occupancy and energy-use habits of the occupants; weather; and other factors. Many of the changes included in building energy code improvements address end uses such as ventilation, hot water, and lighting, which contribute to daily peak electricity consumption, but primarily depend on building occupancy and energy-use habits and are not climate-sensitive. This is especially true of commercial buildings. Some building energy code improvements, including improved insulation practices and windows, are likely to make building energy demand less climate-sensitive. The lowest hours for electricity consumption occur when buildings are neither heating nor cooling due to mild weather and buildings either are not occupied (commercial buildings) or the occupants are asleep and not using much electricity (residential).

Building energy codes would do relatively little to address these minimum demand hours. Consequently, we believe it unlikely that savings would be as large at baseload demand as at either intermediate demand or peak demand and think that many of the largest proportional electricity savings may well occur during intermediate demand hours. Because energy code improvements load follow (*i.e.,* produce more or less savings as demand increases or decreases) but address both climate-sensitive and climate-insensitive loads, we do not know whether the overall impact of building energy codes would be proportionately greater, the same, or less at the annual peak. In the Staff DEIS-1 Direct Testimony (Ex. NRC000031), we assumed that impacts of improved energy building codes are roughly proportional among the hours of the year. If Mr. Mosenthal's argument that the load duration curve would be flattened due to greater proportional savings at peak is correct, then the reduction in demand for baseload resources due to building energy codes as computed in the Staff DEIS-1 Direct Testimony (Ex. NRC000031) would not necessarily be affected for the reasons stated above concerning lowest demand hours. What would be affected would be the relationship between the peak and baseload demand, with baseload demand representing a greater percentage of peak demand but a largely unchanged absolute demand. Therefore, to assume as we did in the Staff DEIS-1 Direct Testimony (Ex. NRC000031) that baseload demand is reduced proportionately whenever peak demand is reduced by adoption of new building energy codes likely overstates the impact on baseload demand.

In addition, Mr. Mosenthal argues that reduction in peak demand would reduce the demand for baseload power because any peaking resource that could help meet the peak load also is available to compete in ERCOT's competitive electricity market during baseload demand hours. Mosenthal Direct Testimony at 11. However, as Mr. Mosenthal notes, baseload demand is typically served by nuclear, hydroelectric, and coal power plants because they have relatively low variable fuel and operations and maintenance costs and are reliably available nearly all of the time, while other resources are dispatched more sporadically because they either have high

variable costs (*e.g.*, combustion turbines) or because they cannot be counted on as available (*e.g.*, wind and solar). *Id.*; *see also* Staff DEIS-1 Direct Testimony at A14 (Ex. NRC000031). The plants that are available are dispatched roughly in order of lowest to highest variable costs. While we understand that peaking resources would be available during baseload demand hours, they would provide relatively high-cost power, while baseload power resources would be less expensive and more reliably available. Relying more extensively on peak load plants to supply baseload power would increase the cost of the power. Therefore, even if the availability of peaking units increases during baseload demand hours, we conclude that there would still be a need for the baseload power represented by STP Units 3 and 4.

Q16. After reviewing Mr. Mosenthal's testimony, did you reach any conclusions about whether his calculations of savings from the new building energy codes in Texas accurately reflect the energy savings that can be expected?

A16. [DCM, MJS] We do believe Mr. Mosenthal's adjustments, taken as a whole, overestimate the energy savings available from the promulgation of new building codes in the ERCOT region. We think that he started appropriately by using the 2010 ERCOT forecast and beginning the savings in 2011. However, we believe that the use of IECC 2001 as the baseline building practice makes his savings estimates higher than they should be by a factor of 2.4 for residential buildings and by a factor of 3 for commercial buildings. He compounds this by adopting speculative future improvements in these standards, which approximately doubled the already high annual savings by 2015 and increases the savings by another third by 2020. The effect of these adjustments is to make the annual impacts of building energy codes higher than they should be. Mr. Mosenthal's assumed delay in compliance offsets this effect to some extent, but his estimate of the net effect of building codes is still too high.

May 31, 2011

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
NUCLEAR INNOVATION NORTH AMERICA LLC	)	Docket Nos. 52-012 & 52-013
	)	
(South Texas Project, Units 3 & 4)	)	

AFFIDAVIT OF DANIEL C. MUSSATTI CONCERNING
PREFILED REBUTTAL TESTIMONY REGARDING CONTENTION DEIS-1

I, Daniel C. Mussatti, do declare under penalty of perjury that my statements in the "Prefiled Rebuttal Testimony of Daniel C. Mussatti and Dr. Michael J. Scott Regarding Contention DEIS-1" are true and correct to the best of my knowledge and belief.

Executed in Accord with 10 CFR § 2.304(d)

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this 31st day of May, 2011

May 31, 2011

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
NUCLEAR INNOVATION NORTH AMERICA LLC	)	Docket Nos. 52-012 & 52-013
	)	
(South Texas Project, Units 3 & 4)	)	

AFFIDAVIT OF DR. MICHAEL J. SCOTT CONCERNING
PREFILED REBUTTAL TESTIMONY REGARDING CONTENTION DEIS-1

I, Michael J. Scott, do declare under penalty of perjury that my statements in the "Prefiled Rebuttal Testimony of Daniel C. Mussatti and Dr. Michael J. Scott Regarding Contention DEIS-1" are true and correct to the best of my knowledge and belief.

Executed in Accord with 10 CFR § 2.304(d)

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May 31, 2011

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
NUCLEAR INNOVATION NORTH AMERICA LLC	)	Docket Nos. 52-012 & 52-013
	)	
(South Texas Project, Units 3 & 4)	)	

PREFILED REBUTTAL TESTIMONY OF RICHARD L. EMCH, JR., JEREMY P. RISHEL, AND DAVID M. ANDERSON REGARDING CONTENTION CL-2

Q1. Please state your names.

A1a. [RLE][1] My name is Richard L. Emch, Jr.

A1b. [JPR] My name is Jeremy P. Rishel.

A1c. [DMA] My name is David M. Anderson.

Q2. Have you previously submitted testimony concerning Contention CL-2 in this proceeding?

A2. [RLE, JPR, DMA] Yes. Our direct testimony was provided in the "Prefiled Direct Testimony of Richard L. Emch, Jr., Jeremy P. Rishel, and David M. Anderson Regarding Contention CL-2" (May 9, 2011) (Exhibit NRC000004) ("Staff CL-2 Direct Testimony"). Statements of our professional qualifications were included as Exhibits NRC000005 to NRC000007.

Q3. Are you familiar with the direct testimony submitted by the Intervenors concerning Contention CL-2, "Direct Testimony of Clarence L. Johnson on Behalf of the Intervenors" (May 16, 2011) (Exhibit INT000021) ("Johnson Direct Testimony")?

A3. [RLE, JPR, DMA] Yes.

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[1] In this testimony, the identity of the witness who supports each numbered paragraph is indicated by the notation of his initials in parentheses.

Q4. In his testimony, what inflation index did the Intervenors' expert, Mr. Johnson, use to adjust the costs of SAMDAs for inflation?

A4. [DMA] Mr. Johnson suggests that the Core Personal Consumption Expenditures (PCE) index is "a more accurate measure of the long term inflation trend."[2]

Q5. What is your opinion on the use of the PCE price index to adjust SAMDA costs for inflation?

A5. [DMA] As explained in Answer 42 of the Staff CL-2 Direct Testimony, while such indices contain rich product detail, ultimately they reflect retail inflation faced by persons and households,[3] not inflation associated with large-scale capital expenditures like those of nuclear power plant construction. Severe Accident Mitigation Design Alternatives (SAMDAs) are design modifications to a nuclear power station and would not feature items typically purchased by persons or households. As such, the Staff believes that the proper inflation index to use for scaling SAMDA costs should be one that is reflective of private capital investment. The Staff identified the Bureau of Economic Analysis' Gross Domestic Product Implicit Price Deflator for Nonresidential Structures as the appropriate index. This index is designed to reflect inflation associated with costs of large buildings and other structures and all related systems.[4] The Staff believes general measures of inflation should give way to specific and more refined estimates when such estimates would be applicable. In his direct testimony, Mr. Johnson does not address any of the issues raised by the Staff regarding the use of the PCE index.

Q6. Did Mr. Johnson include any region-specific adjustments to SAMDA costs?

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[2] Johnson Direct Testimony at 16 (Ex. INT000021).

[3] Bureau of Economic Analysis, NIPA Handbook: Chapter 5: Personal Consumption Expenditures, at 5-2. (retrieved May 4, 2011) (NIPA Handbook available at http://www.bea.gov/national/Index.htm. Chapter 5 specifically available at http://www.bea.gov/national/pdf/NIPAhandbookch5.pdf) (Ex. NRC000021).

[4] Bureau of Economic Analysis, NIPA Handbook: Chapter 6: Private Fixed Investment, at 6-3, Table 6.1 (retrieved May 2, 2011) (NIPA Handbook available at http://www.bea.gov/national/Index.htm. Chapter 6 specifically available at http://www.bea.gov/national/pdf/NIPAhandbookch6.pdf) (Ex. NRC000022).

A6. [DMA] Yes. In discussing use of regional versus generic costs he states that it is appropriate to use “SAMDA costs which are location specific rather than generic."[5]

Q7. What is your opinion on the region-specific adjustments made by Mr. Johnson?

A7. [DMA] Essentially, Mr. Johnson is attempting to show that the scaling of SAMDA costs applicable to STP should be further discounted because a cost of living index for the Houston metro area is roughly 10 percent less than the national average. However, Mr. Johnson does not show why the cost of living index he selected should apply to SAMDA costs. The index Mr. Johnson chose is the ACCRA Cost of Living Index. According to documentation explaining this index, the index authors indicate: “Items on which the Index is based have been carefully chosen to reflect the different categories of consumer expenditures.”[6] The Staff disagrees with the use of inflation indices or regional cost indices designed for consumer goods for the escalation of SAMDA costs because, as explained above in Answer 5, SAMDAs are design modifications to a nuclear power station and would not be represented by items typically purchased by persons or households. In addition, even if SAMDA costs were discounted by an additional 10 percent to reflect consumer cost of living differences from the national average, which would reduce the Staff’s estimate of the least costly SAMDA from $225,000 as reported in Answer 37 of the Staff CL-2 Direct Testimony, to $202,500, the ultimate conclusions of the SAMDA analysis are unchanged – there are no cost-beneficial SAMDAs.

Q8. With respect to the calculation of averted costs in the SAMDA analysis, what discount rate did Mr. Johnson claim should be used?

A8. [DMA] 3 percent.[7]

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[5] Johnson Direct Testimony at 17 (Ex. INT000021).

[6] The Council for Community and Economic Research, “About the ACCRA Cost Of Living Index” (retrieved on 5/23/2011) (available at http://www.coli.org/AboutIndex.asp) (Ex. NRC000059).

[7] Johnson Direct Testimony at 18 (Ex. INT000021).

Q9. Do you agree that a 3 percent discount rate should be used instead of a 7 percent discount rate?

A9. [DMA] No.

Q10. What does NRC guidance provide regarding the use of discount rates in a SAMDA analysis?

A10. [DMA] NUREG BR-0184 suggests[8] that the discount rate mandated by the Office of Management and Budget (OMB) Circular A-94 (1992) be used, which is 7 percent. It further suggests that 3 percent be used to illustrate the sensitivity to the choice of discount rate.

Q11. What does Office of Management and Budget (OMB) guidance provide regarding the default discount rate for cost-benefit analyses?

A11. [DMA] As noted by the Intervenors, and confirmed by the Staff, OMB Circular A-94 (1992) provides guidance about the selection of discount rates to evaluate Federal actions or projects. The Staff also determined that OMB Circular A-4 (2003) reaffirmed the use of Circular A-94 and provided additional, more specific, guidance on this topic. The default interest rate to be used for discounting financial flows from Federal actions is 7 percent.[9]

Q12. Does Mr. Johnson recognize that OMB specifies a 7 percent rate as the default discount rate for cost-benefit analyses?

A12. [DMA] Yes.[10]

Q13. What reasons does Mr. Johnson give to justify the use of a 3 percent discount rate instead of a 7 percent discount rate?

A13. [DMA] The Intervenors indicate that “societal time preference” pertains to such analyses.[11] The Intervenors also suggest that because the applicant would be pursuing Federal

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[8] NUREG/BR-0184, *Regulatory Analysis Technical Evaluation Handbook*, Section B.2.1, at B.2 (1997) (ML050190193) (Ex. NRC00008B).

[9] OMB Circular A-4, “Regulatory Analysis,” at 33 (Sept. 17, 2003) (retrieved May 17, 2011) (available at http://www.whitehouse.gov/sites/default/files/omb/assets/omb/circulars/a004/a-4.pdf) (Ex. NRC000060).

[10] *See* Johnson Direct Testimony at 19 (Ex. INT000021).

[11] Johnson Direct Testimony at 18-19 (Ex. INT000021).

loan guarantees, historic Treasury bill yields should be used as the discount rate.[12] They also suggest that a SAMDA analysis is really a cost effectiveness analysis, and therefore, long-term Treasury bill yields reflect the discount rate that should be used.[13]

Q14. What is your opinion of Mr. Johnson's claim that a 3 percent discount rate should be used to reflect society's time preference for money, rather than the 7 percent rate suggested by OMB?

A14. [DMA] Mr. Johnson advocates using a default discount rate that already is suggested for sensitivity analysis when discounting financial flows from Federal actions. The Staff believes that the default rate of 7 percent, as prescribed by OMB, should be used. The OMB guidance is specific and recommends the use of a 7 percent default rate and also explicitly recommends the use of a 3 percent rate in addition to the 7 percent rate, per an EPA example analysis.[14] The 7 percent discount rate reflects the opportunity cost of private capital[15] (pre-tax expected return on investment in lieu of undertaking the project). This is the appropriate rate to use as a default discount rate because SAMDAs are alternatives in plant design that would be purchased using private (the applicant's) capital construction funding, and it implies that if the funds would be invested elsewhere in lieu of plant construction, at least a 7 percent return would be required. As suggested by the Intervenors,[16] OMB's guidance also allows for discount rates that reflect the rate at which society discounts future consumption flows to their present value.[17] In other words, OMB guidance suggests, and the Staff agrees, that while the discount rate for private capital investment is 7 percent, society (those receiving the

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[12] Johnson Direct Testimony at 19 (Ex. INT000021).

[13] Johnson Direct Testimony at 19 (Ex. INT000021).

[14] OMB Circular A-4 at 33-34 (Ex. NRC000060).

[15] OMB Circular A-4 at 33 (Ex. NRC000060).

[16] Johnson Direct Testimony at 18 (Ex. INT000021).

[17] OMB Circular A-4 at 33 (Ex. NRC000060).

benefits from the proposed action) requires a return of 3 percent. OMB guidance is clear and the Staff agrees that the discount rate is one of the more sensitive variables in the estimation of the present value of benefits and costs, and thus alternative rates should be used to indicate the sensitivity of the results to the choice of discount rate.[18] As stated in previous answers, the Staff has no issue with the use of 3 percent to indicate the sensitivity of the estimates to the choice of discount rate.

Q15. What is your opinion of Mr. Johnson's claim that a SAMDA analysis should be considered a cost-effectiveness analysis and that because the applicant would be pursuing Federal loan guarantees, long-term Treasury bill yields should be the discount rate?

A15. [DMA] The Staff believes that these issues are irrelevant to this proceeding. The Intervenors suggest that the SAMDA analysis should be considered a cost-effectiveness analysis and, therefore, that the default discount rate for the analysis should be 3 percent (based on long term Treasury bill yields). OMB guidance suggests,[19] and the Staff agrees, that because all the costs and benefits are monetized in the SAMDA analysis, the analysis is a true cost-benefit analysis, as opposed to a cost-effectiveness analysis, where some costs or benefits have not been monetized. Mr. Johnson also suggests that because the applicant may receive Federal loan guarantees, long-term Treasury bill yields (3 percent) should be the default discount rate. The Intervenors do not provide any evidence to suggest how the potential for receiving loan guarantees should translate into a need to make the default discount rate 3 percent, rather than the 7 percent favored by the Staff. The guidance recommends that the cost-benefit analysis be conducted using a default discount rate of 7 percent, and the Staff continues to believe that the appropriate default discount rate is 7 percent for SAMDA cost-benefit analyses. The guidance also recommends that analyses should be conducted using a

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[18] OMB Circular A-94, "Guidelines And Discount Rates for Benefit-Cost Analysis of Federal Programs," at 9, 11-12 (Oct. 29, 1992) (retrieved May 26, 2011) (available at http://www.whitehouse.gov/sites/default/files/omb/assets/a94/a094.pdf) (Ex. NRC000061).

[19] OMB Circular A-4 at 10 (Ex. NRC000060).

discount rate of 3 percent to show the sensitivity of the SAMDA analysis to discount rate as was done by the Staff. This illustrates precisely why financial discounting is typically reported using multiple discount rates – so that results can be viewed showing their sensitivity to the chosen discount rate.

Q16. In the Staff CL-2 Direct Testimony, did the Staff perform a refined analysis that evaluated the potential of the SAMDAs to reduce core damage frequency (CDF)?

A16. [RLE, JPR] Yes. In the Staff CL-2 Direct Testimony, the Staff performed an initial screening analysis, which conservatively assumed the lowest-cost SAMDA resulted in a 100% reduction in CDF, and then refined the analysis to include consideration of the actual CDF reduction potential of each SAMDA.

Q17. Why did the Staff consider CDF reduction in its analysis?

A17. [RLE, JPR] As discussed in Answer 86 of the Staff CL-2 Direct Testimony, several of the averted cost components that are considered in a SAMDA analysis, including replacement power costs, require a reduction in CDF in order for there to be any averted cost. The initial screening analysis conservatively assumed that the lowest-cost SAMDA resulted in a 100% reduction in CDF, thereby resulting in the maximum averted costs listed in Table 13 of the Staff CL-2 Direct Testimony. Even with the additional replacement power costs for the other units and consideration of various market factors contributing to price escalation, the lowest-cost SAMDA was still 1.3 times greater than the total maximum averted cost—meaning the screening analysis did not result in the identification of potential cost-beneficial SAMDAs for the STP site. Even though the screening analysis is performed in a manner that maximizes the opportunity for SAMDAs to appear to be cost-beneficial, a refined analysis would typically be performed for SAMDAs as close as 1.3 to the cost-beneficial criterion. Therefore, the Staff refined the SAMDA analysis to consider the actual CDF reduction for each SAMDA. As noted in Answer 86 of the Staff CL-2 Direct Testimony, many of the ABWR SAMDAs, including the

lowest-cost SAMDAs, are mitigative; these SAMDAs do not reduce CDF appreciably[20] and therefore are not beneficial to a significant degree at averting onsite costs, including replacement power costs. Of the 21 potential SAMDAs identified by GE, only 8 SAMDAs are preventative and reduce the CDF by at least 2%. Table 14 of the Staff CL-2 Direct Testimony summarized the percent reduction in CDF, the corresponding averted costs, and the implementation cost for each of these preventative SAMDAs.[21] SAMDA 9b was the closest to being cost-beneficial and it had an implementation cost that was 29.3 times greater than its total averted cost. Clearly, the refined analysis demonstrated that when the actual CDF reduction potential of each SAMDA is considered with respect to the SAMDA's implementation cost, the SAMDAs become even less likely to be cost beneficial to implement.

Q18. What would the results of this refined analysis be if the Staff used a 3 percent discount rate for actual averted costs and adjusted SAMDA costs in the way that Mr. Johnson prefers?

A18. [RLE, JPR, DMA] Table 14 of the Staff CL-2 Direct Testimony used a 7 percent discount rate for actual averted costs and the Bureau of Economic Analysis' Gross Domestic Product Implicit Price Deflator for Nonresidential Structures (i.e., a factor of 2.25) to adjust SAMDA implementation costs to 2009 dollars.[22] The Staff believes these are the appropriate values to use to evaluate costs in the STP SAMDA analysis. Nevertheless, to demonstrate the sensitivity of the analysis to the parameter values suggested by the Intervenor, the Staff has revised the Table 14 values (see Table 15, below) (1) using a 3 percent discount rate for actual

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[20] Table 3 of the Staff CL-2 Direct Testimony lists the reduction in CDF associated with each SAMDA. *See* Staff CL-2 Direct Testimony at A13 (Table 3) (Ex. NRC000004). As discussed in footnote "d" to this Table, GE only estimated averted onsite costs for SAMDAs that reduce CDF. *Id.* Therefore, for SAMDAs where GE estimated an averted onsite cost of $0, the Staff assumed a CDF reduction of 0.0% even though some of these SAMDAs may reduce the CDF by a small amount as assumed in the Applicant's testimony. The Applicant conservatively estimated reductions in CDF for these SAMDAs based on the descriptions of the release categories in GE's analysis that would be impacted by the SAMDAs.

[21] Staff CL-2 Direct Testimony at A86 (Table 14) (Ex. NRC000004).

[22] *See* Staff CL-2 Direct Testimony at A86 (Table 14) (Ex. NRC000004).

averted costs, (2) using the Core PCE to scale for inflation (i.e., a factor of 1.413), and (3) applying a region-specific adjustment based on the ACCRA Cost of Living Index for the Houston area (i.e., the final SAMDA implementation cost is 90.7 percent of the inflation-adjusted SAMDA cost). Even with these adjustments, the closest SAMDA to being cost-beneficial—SAMDA 9b—has an implementation cost that is 14.1 times greater than the total averted cost. Even after adjusting the SAMDA analysis using the discount rate, inflation rate, and cost of living adjustment suggested by Mr. Johnson, there are still no cost-beneficial SAMDAs.

Table 15: Summary of GE ABWR Preventative SAMDA Modifications that Lead to a Reduction in CDF Using Cost Adjustment Preferences from Mr. Johnson's Direct Testimony[23] (Including a 3% Discount Rate for Averted Costs, a 1.413 Inflation Factor for SAMDA Implementation Costs, and a 90.7% Regional Cost of Living Adjustment to SAMDA Implementation Costs).

SAMDA[(a)]	CDF Reduction %	Actual Averted Offsite Cost[(b)] ($)	Actual Averted Onsite Cost[(b)] ($)	Total Actual Averted Cost[(b)] ($)	Implementation Cost[(c)] ($)	Implementation Cost/Actual Averted Cost
2c Suppression Pool Jockey Pump	2.0%[(d)]	$4	$4,201	$4,205	$153,791	36.6
1b Computer Aided Instrumentation	3.0%[(d)]	$6	$6,302	$6,308	$768,955	121.9
8a Additional Service Water Pump	9.0%[(e)]	$19	$18,906	$18,925	$7,689,546	406.3
1c Improved Maintenance Procedures/Manuals	9.0%[(d)]	$19	$18,906	$18,925	$384,477	20.3
2b Improved Depressurization	14.0%[(d)]	$29	$29,409	$29,438	$768,955	26.1
9a Steam Driven Turbine Generator	50.0%[(e)]	$103	$105,031	$105,134	$7,689,546	73.1
9b Alternate Pump Power Source	52.0%[(e)]	$107	$109,232	$109,339	$1,537,909	14.1
2a Passive High Pressure System	52.0%[(e)]	$107	$109,232	$109,339	$2,242,784	20.5

(a) From GE 1994 TSD, Table 6, at 29-30 (Ex. NRC00009A) (Includes only SAMDAs that result in a reduction in CDF).

(b) Calculated using the actual CDF (column 2) and the Staff's maximum averted cost estimates at a 3% discount rate (Staff CL-2 Direct Testimony at A78 (Ex. NRC000004) (last column of Table 12)).

(c) From GE 1994 TSD, attach. A, Section A.5 (Ex. NRC00009B) (GE's estimated minimum SAMDA implementation cost using cost adjustment preferences from Mr. Johnson's direct testimony, including a 1.413 inflation factor and a 90.7% regional cost of living adjustment. Note that in Mr.

[23] Johnson Direct Testimony at 18 (Ex. INT000021).

Johnson's direct testimony, a cost range of $141,300 to $145,000 was cited to scale GE's lowest-cost SAMDA ($100,000) for inflation.[24] The Staff conservatively used the smallest inflation factor ($141,300/$100,000, or 1.413) when scaling the SAMDA implementation costs.)

(d) Reduction in CDF from GE 1994 TSD, Section A.4 (Ex. NRC00009B).

(e) Reduction in CDF estimated by Staff using the method described in Table 3, footnote "f" of the Staff's direct testimony. Staff CL-2 Direct Testimony at A13 (Ex. NRC000004) (Table 3).

[24] Johnson Direct Testimony at 18 (Ex. INT000021).

May 31, 2011

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
NUCLEAR INNOVATION NORTH AMERICA	)	
LLC	)	Docket Nos. 52-012 & 52-013
	)	
(South Texas Project, Units 3 & 4)	)	

AFFIDAVIT OF RICHARD L. EMCH, JR.,
CONCERNING PREFILED REBUTTAL TESTIMONY REGARDING CONTENTION CL-2

I, Richard L. Emch, Jr., do declare under penalty of perjury that my statements in the "Prefiled Rebuttal Testimony of Richard L. Emch, Jr., Jeremy P. Rishel, and David M. Anderson Regarding Contention CL-2" are true and correct to the best of my knowledge and belief.

Executed in Accord with 10 CFR § 2.304(d)

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Executed at Rockville, MD
this 31st day of May 2011

May 31, 2011

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
NUCLEAR INNOVATION NORTH AMERICA	)	
LLC	)	Docket Nos. 52-012 & 52-013
	)	
(South Texas Project, Units 3 & 4)	)	

AFFIDAVIT OF JEREMY P. RISHEL
CONCERNING PREFILED REBUTTAL TESTIMONY REGARDING CONTENTION CL-2

I, Jeremy P. Rishel, do declare under penalty of perjury that my statements in the "Prefiled Rebuttal Testimony of Richard L. Emch, Jr., Jeremy P. Rishel, and David M. Anderson Regarding Contention CL-2" are true and correct to the best of my knowledge and belief.

Executed in Accord with 10 CFR § 2.304(d)

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Executed at Richland, WA
this 31st day of May 2011

May 31, 2011

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
NUCLEAR INNOVATION NORTH AMERICA	)	
LLC	)	Docket Nos. 52-012 & 52-013
	)	
(South Texas Project, Units 3 & 4)	)	

AFFIDAVIT OF DAVID M. ANDERSON
CONCERNING PREFILED REBUTTAL TESTIMONY REGARDING CONTENTION CL-2

I, David M. Anderson, do declare under penalty of perjury that my statements in the "Prefiled Rebuttal Testimony of Richard L. Emch, Jr., Jeremy P. Rishel, and David M. Anderson Regarding Contention CL-2" are true and correct to the best of my knowledge and belief.

Executed in Accord with 10 CFR § 2.304(d)

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