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Fred Dacimo
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NL-13-075

May 6, 2013

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

SUBJECT: License Renewal Application-Completed Engineering Project Cost Estimates for SAMAs Previously Identified as Potentially Cost-Beneficial
Indian Point Nuclear Generating Units Nos. 2 & 3
Docket Nos. 50-247 and 50-286
License Nos. DPR-26 and DPR-64

REFERENCE:

1. Entergy Nuclear Operations Inc. Letter NL-07-039, "Indian Point Energy Center License Renewal Application" dated April, 23, 2007
2. Entergy Nuclear Operations Inc. Letter NL-09-165, "SAMA Reanalysis Using Alternate Meteorological Data" dated December 11, 2009
3. NRC Order Number EA-12-049, "Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design Basis External Events," dated March 12, 2012
4. Entergy Nuclear Operations Inc. Letter NL-13-042, "Overall Integrated Plan in Response to March 12, 2012 Commission Order to Modify Licenses With Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," dated February 28, 2013

Dear Sir or Madam:

As further explained in the Attachment to this letter, the Indian Point Energy Center Unit 2 and 3 (IP2 and IP3) Severe Accident Mitigation Alternatives (SAMA) analysis described in the Environmental Report (ER) for the IP2 and IP3 license renewal application (LRA), dated April 23, 2007 (Reference 1), included SAMA implementation cost estimates. As described in ER Sections E.2.3 and E.4.3, Entergy Nuclear Operations, Inc. (Entergy) developed conceptual estimates of the SAMA implementation costs to allow it to reach reasonable conclusions

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regarding the economic viability of the proposed modifications. None of the SAMAs identified as potentially cost-beneficial in the ER is related to the adequate management of aging effects during the period of extended operation, which is the focus of the NRC's license renewal regulations in 10 C.F.R. Part 54. Nonetheless, Entergy stated in the ER its intention to develop additional, more refined engineering project cost estimates for those SAMAs identified as potentially cost-beneficial in accordance with current plant processes for evaluating possible plant modifications.

In December 2009, Entergy submitted a revised SAMA analysis (SAMA reanalysis) using corrected meteorological data (Reference 2). The 2009 SAMA reanalysis also included SAMA implementation cost estimates. As noted in Reference 2, Entergy again conceptually estimated SAMA implementation costs to enable it reach reasonable conclusions regarding the economic viability of the identified modifications. The SAMA reanalysis identified six additional, potentially cost-beneficial SAMAs.

Attachment 1 to this letter provides the results of Entergy's completed, refined engineering project cost estimates and a comparison to the benefits previously calculated for the SAMAs identified in 2009 as being potentially cost-beneficial. Some of the previous potentially cost-beneficial SAMAs are no longer cost-beneficial based on the completed engineering project cost estimates and are identified in Table 1 of Attachment 1 as "Not Cost Beneficial."

Attachment 1 also identifies those SAMAs for which the completed engineering project cost estimates are less than the calculated benefits. Entergy has implemented, or elected to implement, four of those SAMAs, even though it is not required to do so as part of license renewal. In addition, Attachment 1 describes why implementation of the remaining cost-beneficial SAMAs does not warrant further consideration at this time under Entergy's current licensing basis processes for evaluating potential plant modifications. Among other things, several of the remaining SAMAs may be affected by actions Entergy is already taking at IP2 and IP3 in response to Nuclear Regulatory Commission (NRC) Order EA-12-049, which imposes substantial additional requirements to mitigate certain beyond-design-basis events in response to the accident at Fukushima Dai-ichi (Fukushima) (References 3 and 4).

Entergy is submitting this information to support resolution of certain issues identified by the Atomic and Safety Licensing Board (Board) in its July 14, 2011, decision (Attach. 1, Reference 11) granting New York State's (NYS) motion for summary disposition of Consolidated Contention NYS-35/36 (Attach. 1, Reference 8). This information also addresses certain statements by the Commission in its December 22, 2011 ruling (Attach. 1, Reference 13) on Entergy's Petition for Review (Attach. 1, Reference 12) of that same decision. By doing so, Entergy is not waiving any rights to appeal the Board's decision on that motion or Entergy's related cross-motion for summary disposition of the same contention.

There are no new commitments identified in this submittal. If you have any questions, or require additional information, please contact Mr. Robert Walpole at 914-254-6710.

I declare under penalty of perjury that the foregoing is true and accurate. Executed on
May 6, 2013.

Sincerely,



FRD/rw

Attachment: 1. License Renewal Application—Completed Engineering Project
Cost Estimates for SAMAs Previously Identified as Potentially
Cost Beneficial

cc: Mr. William Dean, Regional Administrator, NRC Region I
Mr. David Wrona, NRC Branch Chief, Division of License Renewal
Ms. Lois James, NRC Environmental Project Manager, IPEC License Renewal
Mr. Nathaniel Ferrer, NRC Project Manager, Division of License Renewal
Mr. Sherwin E. Turk, NRC Office of General Counsel, Special Counsel
NRC Resident Inspectors Office, Indian Point
Ms. Bridget Frymire, New York State Department of Public Service
Mr. Francis J. Murray, Jr., President and CEO, NYSERDA

ATTACHMENT 1 TO NL-13-075

**License Renewal Application—Completed Engineering Project Cost Estimates
for SAMAs Previously Identified as Potentially Cost Beneficial**

**ENERGY NUCLEAR OPERATIONS, INC.
INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2 & 3
DOCKET NOS. 50-247 AND 50-286**

**License Renewal Application—Completed Engineering Project Cost Estimates
for SAMAs Previously Identified as Potentially Cost Beneficial**

I. Introduction and Background

The Indian Point Energy Center Unit 2 and 3 (IP2 and IP3) Severe Accident Mitigation Alternatives (SAMA) analysis originally described in the Environmental Report (ER) for the IP2 and IP3 license renewal application (LRA), dated April 23, 2007 (Reference 1), included SAMA implementation cost estimates. As described in ER Sections E.2.3 and E.4.3, Entergy developed conceptual estimates of the SAMA implementation costs. Specifically, in accordance with NEI 05-01, “Severe Accident Mitigation Alternatives (SAMA) Analysis Guidance Document” (Reference 2), Entergy developed a conceptual cost estimate for each SAMA sufficient to allow it to make a reasonable, informed judgment about the economic viability of the proposed improvement. The ER stated Entergy’s intention to develop additional, more refined engineering project cost estimates for those SAMAs identified as potentially cost-beneficial in accordance with current plant processes for evaluating possible plant modifications.

In response to an NRC staff request for additional information (RAI), Entergy subsequently identified an additional SAMA as potentially cost-beneficial for both IP2 and IP3 (Reference 3). That SAMA involved providing a device to gag a stuck-open main steam safety valve (MSSV) following a steam generator tube rupture (SGTR) event. (The IP2 and IP3 MSSV gagging device SAMAs do not have a numerical designation, because they were identified after submission of the ER in response to the RAI.) Entergy noted that these two additional SAMAs also would be submitted for more detailed engineering project cost-benefit analysis in accordance with current plant processes.

In December 2009, Entergy submitted a revised SAMA analysis (SAMA reanalysis) that used corrected meteorological data. The revised meteorological data caused the estimated benefit of each SAMA to increase (Reference 4). As a result of the SAMA reanalysis (which included an additional sensitivity case described therein and revised, more comprehensive implementation cost estimates for certain SAMAs), Entergy found three additional SAMA candidates to be potentially cost-beneficial for IP2, and three additional SAMA candidates to be potentially cost-beneficial for IP3—for a total of 22 potentially cost-beneficial SAMAs (which includes the two MSSV gagging device SAMAs). Tables 4 through 7 of Reference 4 provide the results of the 2009 cost-benefit reanalysis of the numbered IP2 and IP3 SAMA candidates.

In addition, in Reference 4, Entergy explained that because some of the potentially cost-beneficial SAMAs address the same risk contributors, implementation of an optimal subset of these SAMAs could achieve a large portion of the total risk reduction at a fraction of the cost.

On March 11, 2010, in response to Entergy’s SAMA reanalysis, the State of New York (NYS) proposed two new contentions (NYS-35 and NYS-36) as part of the ongoing adjudicatory proceeding before the Atomic Safety and Licensing Board (ASLB) (Reference 5). NYS-35 alleged that, with respect to the potentially cost-beneficial SAMAs identified in the SAMA reanalysis, Entergy improperly postponed the engineering cost-benefit analyses required to

determine whether a proposed SAMA is cost-effective. NYS-36 alleged that the SAMA reanalysis was deficient because Entergy failed to commit to implement nine “substantially cost-effective” SAMAs (IP2-028, 044, 054, 060, 061, 065 and IP3-055, 061, and 062). The Board subsequently admitted and consolidated the two contentions as NYS-35/36 (Reference 6). The Board admitted NYS-35 as a contention of omission insofar as it claimed that Entergy’s SAMA cost-benefit analysis was incomplete, and admitted NYS-36 to the extent it requested that the NRC Staff either require implementation of “substantially” cost-beneficial SAMAs prior to approving the LRA or offer a rational explanation for not doing so.

NRC’s review of Entergy’s SAMA analysis, including the 2009 reanalysis, is documented in the NRC’s Final Supplemental Environmental Impact Statement for Indian Point License Renewal (FSEIS), issued on December 3, 2010 (Reference 7). Table G-6 of the FSEIS lists the 20 (numbered) potentially cost-beneficial SAMAs for IP2 and IP3 identified in the SAMA reanalysis. Appendix G of the FSEIS also states that because the cost-beneficial SAMAs do not relate to the management of aging effects during the period of extended operation, they need not be implemented as part of the license renewal process. The Staff noted that “there is no regulatory basis to suggest that potentially cost-beneficial SAMAs that are unrelated to Part 54 requirements must be imposed as a backfit to the CLB, as a condition for license renewal.”

On January 14, 2011, NYS submitted a motion for summary disposition (Motion) of NYS-35/36, and contended that Entergy’s LRA should be denied due to Entergy’s and the Staff’s purportedly inadequate analysis of potentially cost-beneficial SAMAs (Reference 8). In the alternative, NYS requested that there be no final decision on Entergy’s LRA until the FSEIS is supplemented to include the information called for in NYS-35/36. Both Entergy and NRC opposed the Motion and filed separate cross-motions to dismiss NYS-35/36 as a matter of law (References 9, 10). On July 14, 2011, the Board granted NYS’s Motion and denied Entergy’s and NRC’s Cross-Motions (Reference 11). The Board held that:

Entergy’s licenses cannot be renewed unless and until the NRC Staff reviews Entergy’s completed SAMA analyses and either incorporates the result of these reviews into the FSEIS or, in the alternative, modifies the FSEIS to provide a valid reason for recommending the renewal of the licenses before the analysis of potentially cost-effective SAMAs is complete and for not requiring the implementation of cost-beneficial SAMAs.

Citing Commission adjudicatory precedent, the Board further stated that a SAMA need not be implemented as part of a particular plant’s license renewal review when the Commission is concurrently resolving the safety improvement achieved by the SAMA through a generic process applicable to the agency’s review of all plants’ current licensing bases (Reference 11).

Entergy appealed the Board’s decision to the Commission (Reference 12). The Commission found that Entergy’s appeal was interlocutory and, therefore, must await the Board’s final merits decision in this proceeding. The Commission noted, however, that in granting NYS’s Motion, the Board was careful not to require the Staff to impose the cost-beneficial SAMAs as a condition for license renewal. Rather, it provided the Staff with the option to further explain its reasoning for not requiring implementation of cost-beneficial SAMAs in the context of license renewal. The Commission noted, for example, that it would be reasonable for the Staff to further

explain in the FSEIS why it believes the cost-beneficial SAMAs are appropriately excluded from further consideration in license renewal, and whether the staff believes that any of the cost-beneficial SAMAs may warrant further consideration as a safety matter outside of the license renewal review (Reference 13).

II. Preparation of Detailed Engineering Project Cost-Benefit Analyses

As noted above, none of the 22 SAMAs identified as potentially cost-beneficial is necessary for, or related to, adequately managing the effects of aging during the period of extended operation. Nonetheless, in response to the Board's decision on NYS-35/36, and in accordance with current plant processes for evaluating possible plant modifications, Entergy has completed more refined and comprehensive engineering project cost estimates for those SAMAs identified as potentially cost-beneficial. The results are discussed below.

Table 1 below lists the 20 numbered SAMAs found to be potentially cost-beneficial in the 2009 SAMA reanalysis. The Estimated Costs for the 20 SAMAs (fourth column of Table 1) are derived from the new, more comprehensive engineering project cost estimates discussed herein. Consistent with NRC practice, Entergy has compared the Estimated Cost for each SAMA with the Benefit with Uncertainty (third column of Table 1). As explained in FSEIS Appendix G, Entergy applied an uncertainty multiplier to the internal and external events estimated benefit for each of those SAMAs. The resulting, appreciably larger estimated benefit is the Benefit with Uncertainty. Table 1 also shows the two SAMAs associated with the MSSV gagging devices, which were added later. The value shown in the "Benefit with Uncertainty" column for those additional SAMAs is a bounding value, which was considered sufficient to reach a meaningful cost benefit decision.

The completed SAMA engineering project cost estimates were prepared by RCM Technologies for Entergy in accordance with sound engineering practices and have been reviewed and approved by Entergy management. The format and level of detail of the SAMA cost estimates are consistent with other IP2 and IP3 engineering project cost estimates prepared for purposes of Entergy capital project funding. The estimates include, as applicable, costs associated with:

- (1) Entergy engineering support, including study, design, and project management;
- (2) Contract engineering support, including field engineers and planners;
- (3) Materials and equipment;
- (4) Plant craft labor;
- (5) Other Entergy support, including Quality Control, Training, and Operations Department;
and
- (6) Other contract support, including security, health physics, and radwaste processing and storage.

The cost estimates are based on 2012 craft labor billing rates at Indian Point and are projected (for purposes of implementation assumptions) to 2014. The estimates also incorporate a site encumbrance premium to reflect NRC-imposed site access restrictions, including security and personnel access training and controls, some of which were not in effect when the initial conceptual cost estimates were prepared. Also, each cost estimate incorporates project

contingencies reflecting the location and complexity of the work and consistency with Association for Advancement for Cost Engineering (AACE) guidance (Reference 14).

TABLE 1
Results of Cost Benefit Analysis of IP2 SAMA Candidates

IP2 Phase II SAMA	Benefit	Benefit with Uncertainty	Estimated Cost	Conclusion¹
009 – Create a reactor cavity flooding system.	\$6,347,528	\$13,363,217	\$1,738,982	Cost Beneficial (Deferred)
021 – Install additional pressure or leak monitoring instrumentation for inter-system loss of coolant accident (ISLOCAs).	\$2,093,852	\$4,408,109	\$4,607,051	Not Cost Beneficial
022 – Add redundant and diverse limit switches to each containment isolation valve.	\$1,071,465	\$2,255,716	\$7,685,460	Not Cost Beneficial
028 – Provide a portable diesel-driven battery charger.	\$1,357,046	\$2,856,939	\$2,137,804	Cost Beneficial (Deferred)
044 – Use fire water system as backup for steam generator inventory.	\$2,350,530	\$4,948,485	\$3,046,418	Cost Beneficial (Deferred)
053 – Keep both pressurizer power-operated relief valves (PORV) block valves open.	\$659,715	\$1,388,873	\$1,467,848	Not Cost Beneficial
054 – Install flood alarm in the 480V switchgear room.	\$5,591,781	\$11,772,170	\$456,985	Cost Beneficial (Deferred)
056 – Keep residual heat removal (RHR) heat exchanger discharge motor operated valves (MOVs) normally open.	\$48,723	\$102,574	\$1,705,367	Not Cost Beneficial
060 – Provide added protection against flood propagation from stairwell 4 into the 480V switchgear room.	\$1,275,337	\$2,684,920	\$715,145	Cost Beneficial (Deferred)
061 – Provide added protection against flood propagation from the deluge room into the 480V switchgear room.	\$2,754,991	\$5,799,982	\$933,981	Cost Beneficial (Deferred)
062 – Provide a hard-wired connection to an SI pump from alternate safe shutdown system (ASSS) power supply.	\$850,165	\$1,789,822	\$1,624,840	Cost Beneficial (Deferred)
065 – Upgrade the ASSS to allow timely restoration of seal injection and cooling.	\$5,591,781	\$11,772,170	\$1,789,771	Cost Beneficial (Deferred)
IP2-GAG	N/A	\$13,000,000	\$458,617	Cost Beneficial (To Be Implemented)

¹ Bases for conclusions are discussed further below.

Results of Cost Benefit Analysis of IP3 SAMA Candidates

IP3 Phase II SAMA	Benefit	Benefit with Uncertainty	Estimated Cost	Conclusion²
007 – Create a reactor cavity flooding system.	\$5,038,071	\$7,301,552	\$1,869,811	Cost Beneficial (Deferred)
018 – Route the discharge from the main steam safety valves through a structure where a water spray would condense the steam and remove most of the fission products.	\$4,821,779	\$14,637,545	\$35,676,701	Not Cost Beneficial
019 – Install additional pressure or leak monitoring instrumentation for ISLOCAs.	\$2,126,663	\$3,082,120	\$6,462,470	Not Cost Beneficial
052 – Open city water supply valve for alternative AFW pump suction.	\$249,398	\$361,446	\$138,378	Cost Beneficial (Implemented)
053 – Install an excess flow valve to reduce the risk associated with hydrogen explosions.	\$498,795	\$722,892	\$340,790	Cost Beneficial (To Be Implemented)
055 – Provide hard-wired connection to a safety injection (SI) or RHR pump from the Appendix R bus (MCC 312A).	\$4,073,152	\$5,903,118	\$1,589,189	Cost Beneficial (Deferred)
061 – Upgrade the ASSS to allow timely restoration of seal injection and cooling.	\$4,359,371	\$6,317,929	\$2,258,137	Cost Beneficial (Deferred)
062 – Install flood alarm in the 480 VAC switchgear room.	\$4,359,371	\$6,317,929	\$494,175	Cost Beneficial (Deferred)
IP3-GAG	N/A	\$19,000,000	\$458,617	Cost Beneficial (To Be Implemented)

As noted in Table 1 above, six SAMAs previously identified as potentially cost-beneficial (IP2-021, IP2-022, IP2-053, IP2-056, IP3-018, IP3-019) are not cost-beneficial based on the now-completed, more comprehensive engineering project cost estimates. Further information regarding the cost estimates for the six no-longer-cost-beneficial SAMAs is provided below.

1. IP2-021: Install Additional Pressure and Leak Monitoring Instrumentation for ISLOCAs

IP2-021 involves the installation of pressure transmitters at nine separate inter-system loss of coolant accident (ISLOCA) paths (inside containment) in order to measure pressure changes within an isolation boundary. The installed pressure transmitters would transmit information to a location outside containment for remote display and monitoring. The previous cost estimate for IP2-021 was \$3.2 million. That estimate was updated in accordance with the methodology described above, including use of more detailed plant-specific design information, current labor billing rates, updated contingency factors, and accounting for site access restrictions. The

² Bases for conclusions are discussed further below.

completed engineering project cost estimate for IP2-021 is approximately \$4.6 million, which exceeds the estimated Benefit with Uncertainty of \$4.4 million.

2. IP2-022: Add Redundant and Diverse Limit Switches to Each Containment Isolation Valve

IP2-022 involves the installation of limit switches to monitor the position of 22 check valves and 2 motor operated valves (MOVs) within containment associated with an ISLOCA. Each limit switch would transmit information on valve position to a remote location outside containment. The previous cost estimate for IP2-022 was \$2.2 million. That estimate was updated in accordance with the methodology described above, including use of more detailed plant-specific design information, current labor billing rates, updated contingency factors, and accounting for site access restrictions. In addition, Entergy determined that given the age of the currently installed check valves and installation configurations, retrofitting positioning devices on the check valves would be very difficult, if even feasible. In view of these challenges and the availability of new check valves equipped with position indicators, Entergy determined that removing the existing check valves (which are welded in position) and replacing them with new check valves that transmit their position would be the most effective solution. The completed engineering project cost estimate for IP2-022 is approximately \$7.7 million, which exceeds the estimated Benefit with Uncertainty of \$2.3 million.

3. IP2-053: Keep Both Pressurizer PORV Block Valves Open

IP2-053 involves modifying the control circuit of two PORV Block Valves to be open when the plant is operating under normal conditions. IP2-053 also requires removal of a prior Appendix R (fire protection)-related modification that installed an interlock in each block valve's control circuit to keep it closed during normal operations and also a new Appendix R compliance analysis. The previous conceptual cost estimate for IP2-053 was \$0.8 million. That estimate was updated in accordance with the methodology described above, including use of more detailed plant specific design information, current labor billing rates, updated contingency factors, and accounting for site access restrictions. The completed engineering project cost estimate for IP2-053 is approximately \$1.5 million, which exceeds the estimated Benefit with Uncertainty of \$1.4 million.

4. IP2-056: Keep RHR Heat Exchanger Discharge MOVs Normally Open

IP2-056 initially considered changes to plant procedures and required analytical confirmation to maintain two RHR heat exchanger discharge valves normally open when the plant is operating under normal conditions. The previous cost estimate for IP2-056 was \$82k. Entergy subsequently determined that this change could not be implemented with the current system configuration without increasing the potential over-pressurization risk to the RHR heat exchangers and piping. Therefore, plant modifications to add additional RHR system pressure relief valves and a more detailed system design review are also required. The estimate was updated for the revised approach in accordance with the methodology described above, including use of more detailed plant-specific design information, current labor billing rates, updated contingency factors, and accounting for site access restrictions. The completed engineering

project cost estimate for IP2-056 is \$1.7 million, which exceeds the estimated Benefit with Uncertainty of \$103k.

5. IP3-018: Route the Discharge from the Main Steam Safety Valves Through a Structure Where a Water Spray Would Condense the Steam and Remove Most of the Fission Products

IP3-018 involves the proposed installation of a system or facility that captures the steam released from the MSSVs and processes the steam to remove fission products. There are four main steam lines, each of which contains five MSSVs, for a total of 20 MSSVs. Any one valve or combination of valves is considered a potential release path. The proposed modification consists of four large vessels (one for each main steam line), each enclosed in its own structure. Each vessel would require a piped water supply and pumps to spray the steam with water in order to condense the steam. Additional controls for maintaining the water level and its recirculation also would be needed, as well as electrical power for pumps, controls, heaters, and exhaust fans. The previous cost estimate for IP3-018 was \$12 million. That estimate was updated in accordance with the methodology described above, including use of more detailed plant specific design information, current labor billing rates, updated contingency factors, and accounting for site access restrictions. The completed engineering project cost estimate for IP3-018 is \$35.7 million, which exceeds the estimated Benefit with Uncertainty of \$14.6 million.

6. IP3-019: Install Additional Pressure and Leak Monitoring Instrumentation for ISLOCAs

IP3-019 involves the proposed installation of pressure transmitters at 15 separate ISLOCA paths (inside containment) in order to measure pressure changes within an isolation boundary. The installed pressure transmitters would transmit information to a location outside containment for remote display and monitoring. The previous cost estimate for IP3-019 was \$2.8 million. That estimate was updated in accordance with the methodology described above, including use of more detailed plant specific design information, current labor billing rates, updated contingency factors, and accounting for site access restrictions. The completed engineering project cost estimate for IP3-019 is \$6.5 million, which exceeds the estimated Benefit with Uncertainty of \$3.1 million.

III. Analysis of Cost Beneficial SAMAs Under NEPA

Table 1 of this submission identifies 16 cost-beneficial SAMAs for IP2 and IP3 based on the completed engineering project cost estimates. As noted by the Commission in this proceeding, “NEPA is a procedural statute—although it requires a ‘hard look’ at mitigation measures, it does not, in and of itself, provide the statutory basis for their implementation” (Reference 13). The Commission further noted that “in granting New York’s motion for summary disposition of Contention NYS-35/36, the Board was careful not to require that the Staff impose the cost-beneficial SAMAs as a condition” for license renewal (Reference 13). Rather, it provided the Staff with the option to further explain its reasoning for not requiring implementation of cost-beneficial SAMAs in the context of license renewal. The following information is provided for such further consideration by the NRC Staff as Entergy’s rationale for not implementing the 16

cost-beneficial SAMAs at IPEC as a condition for license renewal. This rationale further supplements the detailed information already set forth in Appendix G to the FSEIS.

Recent SAMA-Related Decisions (CLI-12-01, CLI-12-06, CLI-12-10, CLI-12-15)

Beginning in February 2012, following the Board's ruling granting NYS's motion for summary disposition on NYS-35/36 and publication of the FSEIS, the Commission issued a series of decisions in the *Pilgrim* license renewal proceeding that provide further guidance on the nature of the SAMA analysis, its role in the NRC staff's review of license renewal applications, and its relationship to the NRC's ongoing Fukushima-related review (References 15, 16, 17, 18). The Commission explained in the first decision (CLI-12-01, Reference 15) that a SAMA analysis is part of the NRC's license renewal review under the National Environmental Policy Act (NEPA). Specifically, it is a NEPA mitigation alternatives analysis performed to identify additional mitigation measures that may *further reduce* severe accident risk (probability or consequences) and be cost-beneficial to implement. The mitigation measures examined in a SAMA analysis are *supplemental* to those the Commission already requires under NRC's safety regulations for reasonable assurance of safe operation. And in response to the Fukushima accident in Japan, the Commission is conducting a separate, comprehensive safety review that involves a review of requirements and guidance associated with severe accident mitigation measures (Reference 15).

In CLI-12-06 (Reference 16), the Commission affirmed a Board ruling denying the admission of a SAMA contention based on the Fukushima accident. In that decision, the Commission emphasized that its current regulatory and oversight processes provide reasonable assurance that each plant continues to comply with its current licensing basis, which can be adjusted by future Commission order or by modification to the facility's operating license "outside the renewal proceeding." The Commission further stated that "[a]ll affected nuclear plants ultimately will be required to comply with NRC direction resulting from lessons learned from the Fukushima accident, regardless of the timing of issuance of the affected licenses."

In a third decision issued in the *Pilgrim* proceeding (CLI-12-10, Reference 17), the Commission revisited the purpose and scope of the SAMA analysis. In response to intervenor's claim that NRC must "require" Entergy to implement "all possible" mitigation alternatives, the Commission confirmed that such a demand is inconsistent with NEPA, "which neither requires nor authorizes the NRC to order implementation of mitigation measures analyzed in an environmental analysis." Notably, the U.S. Court of Appeals for the First Circuit agreed in a recent judicial decision that stemmed from the *Pilgrim* license renewal proceeding. The court stated: "To the extent Massachusetts seeks to impose a substantive requirement that the NRC must require certain mitigation measures under NEPA, that is foreclosed by the fact that NEPA is not outcome driven." *Massachusetts v. NRC*, Nos. 12-1404 and 12-1772, slip op. at 39 n.27 (1st Cir. Feb. 25, 2013) (affirming the NRC's decision to renew the license for the *Pilgrim* plant). The Commission provided further SAMA-related guidance in a fourth decision in the *Pilgrim* license renewal proceeding issued in June 2012 (CLI-12-15, Reference 18). In that decision, the Commission again confirmed that a SAMA analysis is not part of the agency's safety review. It also reiterated that while the limited focus of a license renewal safety review does *not* encompass a SAMA analysis, safety matters pertaining to severe accident mitigation are assessed on an ongoing basis through NRC's ongoing regulatory oversight function, which includes generic and

plant-specific issues. Importantly, the Commission confirmed that a SAMA analysis must be understood against the backdrop of the NRC's Generic Environmental Impact Statement (GEIS), which includes a bounding, generic severe accident impacts analysis that is applicable to all plants. Therefore, although NRC regulations require that SAMAs be considered for license renewal (as a NEPA mitigation alternatives analysis), no site-specific severe accident impacts analysis need be done. (Reference 18). Accordingly, the Commission reiterated that any mitigation measures determined to be cost-beneficial in a SAMA analysis are "*supplemental* to those we already require under our safety regulations for reasonable assurance of safe operation" and "*supplemental* to those that we may otherwise order or require under our ongoing regulatory oversight over reactor safety, pursuant to the AEA" (Reference 18, emphasis added).

Based on the Staff's discussion in Appendix G to the FSEIS regarding implementation of potentially cost-beneficial SAMAs and the recent additional Commission precedent discussed above, Entergy believes there is no legal or regulatory basis to require implementation of the cost-beneficial SAMAs at IPEC in the context of Part 54 license renewal review. First, the SAMAs were identified and analyzed for purposes of compliance with NEPA. As the Commission confirmed in this proceeding, NEPA provides no independent statutory basis to require their implementation as part of license renewal. Moreover, implementation of cost-beneficial SAMAs is not required or warranted at IPEC for reasonable assurance of safe operation under the AEA, particularly in light of the extensive, additional, safety-based accident mitigation actions the Commission is already requiring in response to Fukushima.

Implementation of Certain Cost-Beneficial SAMAs at IP2 and IP3

As the Commission's recent decisions make clear, implementation of the cost-beneficial SAMAs is not required as a condition for license renewal under NEPA or 10 CFR Part 54, and current IP2 and IP3 plant configurations and operational measures already provide for reasonable assurance of safe operation under the AEA. Nevertheless, Entergy has evaluated whether certain of the cost-beneficial SAMAs should be considered for implementation as part of its current operating (10 CFR Part 50) processes in order to *further reduce* the already very small severe accident risk. As a result, and as discussed further below, Entergy already has implemented one SAMA (IP3-052) and plans to implement three additional SAMAs (IP3-053 and IP2 and IP3 MSSV gagging devices). Entergy plans to implement IP3-053 by April 30, 2014 and IP2 and IP3 MSSV gagging SAMAs by August 31, 2014.

In accordance with NEI 05-01 guidance (Reference 2), Entergy evaluated the benefit of implementing each SAMA individually (*i.e.*, on a per SAMA candidate basis). When this is done, and the individual risk reductions achieved by each SAMA are summed, implementing all of the cost-beneficial SAMAs could remove more than 100% of the severe accident risk, which is not possible. This reflects the fact that certain SAMA candidates are acting on the same accident sequences. Therefore, as certain SAMAs (or post-Fukushima actions) mitigating the dominant accident sequences are implemented, the baseline risk, as recalculated, is reduced. This reduces the likelihood that other SAMA candidates acting on the same accident sequences will remain potentially cost-beneficial. In other words, as the total severe accident risk decreases, the incremental benefit of implementing additional SAMAs also decreases. Therefore, once Entergy has implemented the above-mentioned three SAMAs and post-

Fukushima severe accident mitigation actions, it is likely that many, if not all, of the remaining SAMAs will no longer be cost-beneficial.

In this case, the decision to implement certain SAMAs is a company prerogative; *i.e.*, Entergy does not concede that any cost-beneficial SAMAs are required for either license renewal or reasonable assurance of safe operation, as evaluated under NEPA or the AEA. And, as discussed further below, Entergy does not agree to implement any additional SAMAs, but will evaluate other potentially cost-beneficial SAMAs on a case-by-case basis, including consideration of relevant factors such as potential costs and other ongoing regulatory requirements and corporate obligations. Specifically, Entergy intends to defer consideration of any additional cost-beneficial SAMAs until after implementation of the Commission's numerous, ongoing Fukushima action items which, by themselves, are intended and expected to substantially mitigate the risks of certain beyond-design-basis accidents.

A summary of the actions to address the 22 cost-beneficial SAMAs is as follows:

- Six SAMAs are no longer cost beneficial (IP2-021, 022, 053, 056, IP3-018, 019);
- One SAMA has already been implemented (IP3-052);
- Three SAMAs are to be implemented (IP3-053 and IP2 and IP3 MSSV gagging devices);
- Six SAMAs may be impacted by NRC Orders and other actions resulting from Fukushima and are deferred (IP2-009, 028, 044, 065 and IP3-007, 061); and
- Given the likelihood that the benefit associated with the remaining six SAMAs (IP2-054, 060, 061, 062 and IP3-055, 062) will also be reduced by the risk reduction achieved by implementing certain SAMAs and Fukushima-required actions, consideration of these SAMAs is also deferred pending completion of above activities.

Deferral of Certain Cost-Beneficial SAMAs Pending Implementation of Fukushima Action Items

In granting NYS's Motion, the Board stated that a SAMA need not be implemented during a particular plant's license renewal review where the Commission is concurrently resolving the safety improvement achieved by the SAMA through a generic process attached to the agency's review of all plants' current licensing bases (Reference 11). The Commission, in the *Pilgrim* decisions cited above, confirmed that in response to the Fukushima accident in Japan, the Commission is conducting a comprehensive safety review of all power reactors that involves a review of requirements and guidance associated with severe accident mitigation measures.

Specifically, following the accident at the Fukushima Dai-ichi nuclear power plant in March 2011, the NRC established the Near-Term Task Force (NTTF) to conduct a systematic and methodical review of NRC processes and regulations and determine whether changes or improvements to its regulatory system are warranted. On September 9, 2011, the NTTF issued SECY-11-0124, "Recommended Actions to be Taken Without Delay From the Near Term Task Force Report" (Reference 19). On October 18, 2011, the Commission approved the staff's proposed actions in SECY-11-0124. (Reference 20)

Among other actions, the NRC, on March 12, 2012, issued Order EA-12-049, "Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design Basis External Events" (Reference 21). That Order, which applies to IP2 and IP3, requires additional measures and strategies by licensees to increase the capability to mitigate certain beyond-design-basis events to ensure adequate protection of public health and safety, including during extended loss of AC power events. The required strategies include additional multiple ways to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities in order to improve the defense-in-depth of licensed reactors (Reference 21). The strategies are also intended to be diverse and flexible to encompass a wide range of possible conditions.

Entergy filed its response to Order EA-12-049 on February 28, 2013 (Reference 22), which included an Overall Integrated Plan prepared in accordance with industry guidance in NEI 12-06 (Reference 23). Entergy noted that it has not identified any impediments to compliance with the Order, *i.e.*, within two refueling cycles after submittal of the Overall Integrated Plan, or December 31, 2016 whichever comes first (Reference 22).

As noted above, evaluations for complying with Fukushima-related items, including Order EA-12-049, are in progress. Certain Fukushima actions, once implemented, also may address or impact a SAMA candidate. For example, a low leakage Reactor Coolant Pump (RCP) seal upgrade strategy identified in NEI 12-06 (Reference 23) may address SAMA IP2-065 and IP3-061 associated with the loss of RCP seal injection and cooling. Therefore, any potential accident mitigation improvement achieved by these SAMAs may already be addressed, at least in part, through a generic process attached to the agency's review of all plants' current licensing bases. Other SAMAs potentially impacted by ongoing Fukushima action items include IP2-009, 028, 044, 065 and IP3-007, 061, as they also involve actions to maintain reactor core cooling and inventory, including during extended loss of AC power events. Accordingly, Entergy is deferring further consideration of these SAMAs to avoid any potential conflicts or redundancies that could arise between implementation of the Order and these SAMAs and to allow for consideration of lessons learned and risk reduction from implementation of the Order.³ This provides an additional, valid rationale for not implementing these cost-beneficial SAMAs in connection with license renewal.

Consideration of Remaining Cost-Beneficial SAMAs

As described above, Entergy has implemented one cost-beneficial SAMA and plans to implement three additional cost-beneficial SAMAs, and is taking substantial actions to further mitigate the risks of beyond-design-basis accidents in response to NRC-mandated actions that arose from Fukushima and which potentially impact another six cost-beneficial SAMAs.

For the remaining six cost-beneficial SAMAs, Entergy is deferring further consideration until after it implements the three identified SAMAs and takes action on the numerous pending severe accident mitigation measures resulting from Fukushima. Entergy believes this is a prudent and

³ In addition to NRC Order EA-12-049, there are several other pending NRC Fukushima-driven actions, including seismic and flood evaluations and rulemaking associated with station blackout and spent fuel pool instrumentation, all of which could similarly impact the IP2 and IP3 risk profile and benefits of certain SAMAs.

reasonable approach because, as stated in Reference 4 and explained above, some of the cost-beneficial SAMAs address the same risk contributors. Also, mitigation of certain severe accident risks through implementation of Fukushima action items may render some or all of the remaining SAMAs no longer cost-beneficial. Accordingly, at an appropriate time, Entergy will evaluate implementation of any remaining cost-beneficial SAMAs on a case-by-case basis considering, among other things, potential costs and remaining risk benefits, other regulatory obligations, and available company resources.

References:

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3. Entergy Letter NL-08-086, Supplemental Reply to Request for Additional Information Regarding License Renewal Application-Severe Accident Mitigation Alternatives, May 22, 2008
4. Entergy Letter NL-09-165, SAMA Reanalysis Using Alternate Meteorological Data, December 11, 2009
5. NYS, Motion for Leave to File New and Amended Contentions Concerning the December 2009 Reanalysis of Severe Accident Mitigation Alternatives, March 11, 2010
6. LBP-10-13, Memorandum and Order Ruling on the Admissibility of New York's New and Amended Contentions 12B, 16B, 35, and 36, June 30, 2010
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10. NRC, Cross-Motion for Summary Disposition, and Response to New York State's Motion for Summary Disposition, of Contention NYS-35/36 (Severe Accident Mitigation Alternatives), February 7, 2011
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16. CLI-12-06, Pilgrim Nuclear Power Station, Memorandum and Order Denying Petition for Review of LBP-11-35, March 8, 2012
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18. CLI-12-15, Pilgrim Nuclear Power Station, Memorandum and Order Denying Petition for Review of LBP-12-1, June 7, 2012
19. SECY-11-0124, Recommended Actions to be Taken Without Delay From the Near Term Task Force Report, September 9, 2011
20. SRM-SECY-11-0124, Staff Requirements- SECY-11-0124 - Recommended Actions to be Taken Without Delay From the Near Term Task Force Report, October 18, 2011
21. NRC Order Number EA-12-049, “Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design Basis External Events,” dated March 12, 2012
22. Entergy Nuclear Operations Inc. Letter NL-13-042, “Overall Integrated Plan in Response to March 12, 2012 Commission Order to Modify Licenses With Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events,” dated February 28, 2013
23. Nuclear Energy Institute (NEI) 12-06, Diverse and Flexible Coping Strategies (FLEX) Implementation Guide, Revision 0, dated August 2012