



OFFICE OF THE  
GENERAL COUNSEL

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

August 29, 2014

Mark Langer, Clerk  
United States Court of Appeals  
for the District of Columbia Circuit  
United States Courthouse  
333 Constitution Avenue, NW  
Washington, DC 20001

Re: *NRDC v. NRC et. al.*, No. 13-1311 (scheduled for oral argument November 21, 2014)

Dear Mr. Langer:

Pursuant to Rule 28(j) of the Federal Rules of Appellate Procedure, Respondent Nuclear Regulatory Commission (NRC), on behalf of the Federal Respondents, hereby informs the Court of two recent developments.

First, on August 26, 2014, the Commission issued an adjudicatory order (Enclosure 1) in a number of NRC proceedings directing dismissal of pending contentions on the issue of "waste confidence"—referred to in the order as "continued storage"—including a pending contention that petitioner Natural Resources Defense Council (NRDC) had filed in the Limerick Generating Station license renewal proceeding. This adjudicatory order was issued in connection with a Commission decision, finalized on the same day, to issue a final rule and generic environmental impact statement regarding continued storage. The Federal Respondents' brief discusses the now-dismissed NRDC continued-storage/waste-confidence contention at pages 18-20, 31, and 33, demonstrating that the pendency of that contention at the time NRDC filed its petition for review renders the petition incurably premature and deprives this Court of jurisdiction under the Hobbs Act. The Commission's August 26<sup>th</sup> order does not alter that result. The Federal Respondents' brief, at page 36, also addresses NRDC's continued-storage/waste-confidence contention in demonstrating that this case is not yet ripe for judicial review. That conclusion holds true for a number of reasons, including that NRDC may decide to file new contentions in the Limerick license renewal proceeding in response to the new continued storage rule and generic environmental impact statement.

Second, on August 27, 2014, the NRC released the Final Supplemental Environmental Impact Statement associated with NRC's review of the Limerick license renewal application. This document includes an analysis of the information referred by the Commission to the NRC Staff in CLI-13-07. The Federal Respondents' brief discusses the significance of this document to the jurisdictional and ripeness issues (at page 32 and 36) and to the merits (at pages 63-64).

Chapter 5 of the document, entitled "Environmental Impacts of Postulated Accidents," is provided as Enclosure 2 and includes an extended discussion of severe accident mitigation alternatives. The entire document may be found in NRC's public "ADAMS" database (<http://adams.nrc.gov/wba>) using accession number ML14238A284.

Respectfully submitted,

/s/ James E. Adler

James E. Adler  
Senior Attorney  
Office of the General Counsel  
U.S. Nuclear Regulatory Commission

Enclosures:   1. Commission Memorandum and Order (CLI-14-08) dated August 26, 2014  
                  2. Supplement 49 to Generic Environmental Impact Statement for License  
                      Renewal of Nuclear Plants, Regarding Limerick Generating Station  
                      Units 1 and 2 (excerpts)

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

COMMISSIONERS:

Allison M. Macfarlane, Chairman  
Kristine L. Svinicki  
William D. Magwood, IV  
William C. Ostendorff

---

In the Matter of

CALVERT CLIFFS 3 NUCLEAR PROJECT, LLC, and  
UNISTAR NUCLEAR OPERATING SERVICES, LLC  
(Calvert Cliffs Nuclear Power Plant, Unit 3)

)  
)  
)  
) Docket No. 52-016-COL  
)  
)

DTE ELECTRIC CO.  
(Fermi Nuclear Power Plant, Unit 3)

) Docket No. 52-033-COL  
)  
)

DUKE ENERGY CAROLINAS, LLC  
(William States Lee III Nuclear Station, Units 1 and 2)

) Docket Nos. 52-018-COL,  
) 52-019-COL  
)  
)

ENTERGY NUCLEAR OPERATIONS, INC.  
(Indian Point Nuclear Generating Units 2 and 3)

) Docket Nos. 50-247-LR,  
) 50-286-LR  
)  
)

ENTERGY OPERATIONS, INC.  
(Grand Gulf Nuclear Station, Unit 1)

) Docket No. 50-416-LR  
)  
)

ENTERGY OPERATIONS, INC.  
(Grand Gulf Nuclear Station, Unit 3)

) Docket No. 52-024-COL  
)  
)

EXELON GENERATION CO., LLC  
(Limerick Generating Station, Units 1 and 2)

) Docket Nos. 50-352-LR,  
) 50-353-LR  
)  
)

FIRSTENERGY NUCLEAR OPERATING CO.  
(Davis-Besse Nuclear Power Station, Unit 1)

) Docket No. 50-346-LR  
)  
)

FLORIDA POWER & LIGHT CO.  
(Turkey Point Units 6 and 7)

) Docket Nos. 52-040-COL,  
) 52-041-COL  
)  
)

LUMINANT GENERATION CO. LLC  
(Comanche Peak Nuclear Power Plant, Units 3 and 4)

) Docket Nos. 52-034-COL,  
) 52-035-COL  
)  
)

NEXTERA ENERGY SEABROOK, LLC  
(Seabrook Station, Unit 1)

) Docket No. 50-443-LR  
)  
)  
)  
)  
)  
)

---

NORTHERN STATES POWER CO. (Prairie Island Nuclear Generating Plant Independent Spent Fuel Storage Installation)	) ) ) ) )	Docket No. 72-10-ISFSI
NUCLEAR INNOVATION NORTH AMERICA LLC (South Texas Project Units 3 and 4)	) ) )	Docket Nos. 52-012-COL, 52-013-COL
PACIFIC GAS & ELECTRIC CO. (Diablo Canyon Nuclear Power Plant, Units 1 and 2)	) ) )	Docket Nos. 50-275-LR, 50-323-LR
PPL BELL BEND, LLC (Bell Bend Nuclear Power Plant)	) ) )	Docket No. 52-039-COL
PROGRESS ENERGY CAROLINAS, INC. (Shearon Harris Nuclear Power Plant, Units 2 and 3)	) ) )	Docket Nos. 52-022-COL, 52-023-COL
PROGRESS ENERGY FLORIDA, INC. (Levy County Nuclear Power Plant, Units 1 and 2)	) ) )	Docket Nos. 52-029-COL, 52-030-COL
SOUTH TEXAS PROJECT NUCLEAR OPERATING CO. (South Texas Project, Units 1 and 2)	) ) )	Docket Nos. 50-498-LR, 50-499-LR
TENNESSEE VALLEY AUTHORITY (Bellefonte Nuclear Power Plant Units 3 and 4)	) ) )	Docket Nos. 52-014-COL, 52-015-COL
TENNESSEE VALLEY AUTHORITY (Sequoyah Nuclear Plant, Units 1 and 2)	) ) )	Docket Nos. 50-327-LR, 50-328-LR
TENNESSEE VALLEY AUTHORITY (Watts Bar Nuclear Plant, Unit 2)	) ) )	Docket No. 50-391-OL
UNION ELECTRIC CO. (Callaway Nuclear Power Plant, Unit 1)	) ) )	Docket No. 50-483-LR
VIRGINIA ELECTRIC AND POWER CO. d/b/a DOMINION VIRGINIA POWER and OLD DOMINION ELECTRIC COOPERATIVE (North Anna Power Station, Unit 3)	) ) ) ) )	Docket No. 52-017-COL

CLI-14-08

**MEMORANDUM AND ORDER**

Today we lift the suspension on final licensing decisions that we imposed in CLI-12-16, in view of the issuance of a revised rule codifying the NRC's generic determinations regarding the environmental impacts of continued storage of spent nuclear fuel beyond a reactor's licensed operating life. Further, we provide direction on the disposition of pending contentions associated with continued storage.

**I. BACKGROUND**

In 2012, the U.S. Court of Appeals for the District of Columbia Circuit found that the NRC failed to comply with the National Environmental Policy Act (NEPA) in issuing its 2010 update to the Waste Confidence Decision and accompanying Temporary Storage Rule.<sup>1</sup> As had previous iterations of the Decision and Rule, the 2010 versions supported generic findings in 10 C.F.R. § 51.23 regarding the impacts of spent fuel storage after the cessation of licensed operation of a nuclear power plant. Section 51.23(a) reflected several findings, including, first, that spent fuel "can be stored safely and without significant environmental impacts for at least 60 years beyond the licensed life for operation" and, second, that "there is reasonable assurance that sufficient mined geologic repository capacity will be available . . . when necessary."<sup>2</sup> Section 51.23(b) relied on these findings, among others, to exclude "discussion of any environmental impact of spent fuel storage . . . [during] the period following the term of the reactor operating license" in

---

<sup>1</sup> *New York v. NRC*, 681 F.3d 471 (D.C. Cir. 2012); *see generally* Final Rule: Consideration of Environmental Impacts of Temporary Storage of Spent Fuel After Cessation of Reactor Operation, 75 Fed. Reg. 81,032 (Dec. 23, 2010); Waste Confidence Decision Update, 75 Fed. Reg. 81,037 (Dec. 23, 2010).

<sup>2</sup> 10 C.F.R. § 51.23(a) (2011).

any environmental impact statement, environmental assessment, environmental report, or other analysis prepared in connection with enumerated power reactor and dry cask licenses.<sup>3</sup>

The court identified three particular deficiencies in the 2010 analysis. First, related to the Commission's conclusion that permanent disposal will be available "when necessary," the court held that the NRC needed to examine the environmental impacts of failing to establish a repository. Second, related to the continued storage of spent fuel, the court held that the Commission had not adequately examined the risk of spent fuel pool leaks. And third, also related to continued storage, the court held that the NRC had not adequately examined the consequences of potential spent fuel pool fires.

In response to the court's ruling, we determined in CLI-12-16 that the NRC would not issue licenses dependent upon the Decision and Rule, pending completion of action on the remanded proceeding.<sup>4</sup> In the same decision, we opted to hold in abeyance a number of new contentions and associated filings concerning continued storage of spent nuclear fuel beyond a reactor's licensed life for operation and prior to ultimate disposal.<sup>5</sup>

We have now approved a final Continued Storage Rule<sup>6</sup> and associated generic environmental impact statement (GEIS).<sup>7</sup> In the GEIS, the NRC has assessed generically the

---

<sup>3</sup> *Id.* § 51.23(b) (2011).

<sup>4</sup> CLI-12-16, 76 NRC 63, 67 (2012).

<sup>5</sup> *Id.* at 68-69.

<sup>6</sup> The title of the rule has been changed to reflect issuance of a generic environmental impact statement in lieu of a separate Waste Confidence Decision. See "Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel," NUREG-2157 (Aug. 2014), at xxiii; D-11 to D-12 (discussing public comments on the name change) (ADAMS accession no. ML14188B749) (GEIS).

<sup>7</sup> Staff Requirements—SECY-14-0072—Final Rule, Continued Storage of Spent Nuclear Fuel (RIN 3150-AJ20) (Aug. 26, 2014) (ML14237A092); see "Final Rule: Continued Storage of Spent Nuclear Fuel (RIN 3150-AJ20)," Commission Paper SECY-14-0072 (July 21, 2014) (attaching

(continued . . .)

environmental impacts of continued storage of spent nuclear fuel and has addressed the issues raised in the D.C. Circuit's decision. The revised rule, in turn, codifies the environmental impacts reflected in the GEIS and reflects that these impact determinations will inform the decision-makers in individual licensing proceedings of the impacts of continued storage.<sup>8</sup> The NRC also addressed in the GEIS the three specific deficiencies identified by the court.<sup>9</sup> Because we have approved this rule today, the time is ripe to address the suspension that we imposed in CLI-12-16.

## II. DISCUSSION

### A. Suspension of Final Licensing Decisions

Following the court's 2012 remand, substantively identical petitions were filed in conjunction with nineteen pending reactor license applications.<sup>10</sup> The petitioners asked that we suspend final licensing decisions in reactor licensing cases pending the completion of our action on the remanded Waste Confidence proceeding.<sup>11</sup> We did so, observing that waste confidence undergirds certain licensing decisions, particularly new reactor licensing and power reactor

---

the GEIS and the draft Final Rule, Continued Storage of Spent Nuclear Fuel (Continued Storage Rule)). The Commission paper and its attachments may be found at ML14177A482 (package).

<sup>8</sup> Continued Storage Rule at 4, 39-40; *see id.* at 74-75 (setting forth the revised section 51.23). The rule, which adopts the generic impact determinations made in the GEIS, satisfies the NRC's NEPA obligations with respect to continued storage for initial, renewed, and amended licenses for reactors, independent spent fuel storage installations (ISFSIs), construction permits, and early site permits. Further, consistent with the rule, these determinations generally may not be challenged in individual licensing proceedings. *Id.* at 19-20.

<sup>9</sup> Continued Storage Rule at 14. *See generally* GEIS at xxx, 1-4 (explaining that the GEIS includes an analysis of an indefinite time frame, which assumes that a repository does not become available); GEIS, App. E, "Analysis of Spent Fuel Pool Leaks"; GEIS, App. F, "Spent Fuel Pool Fires."

<sup>10</sup> As noted in CLI-12-16, the suspension petition was not filed in the *Indian Point* or *Limerick* matters, or in the then-pending *Victoria County* matter. CLI-12-16, 76 NRC at 68 n.10.

<sup>11</sup> CLI-12-16, 76 NRC at 66.

license renewal.<sup>12</sup> Historically, the Waste Confidence Decision represented the NRC's generic determination (and supporting generic environmental analysis) that spent nuclear fuel can be stored safely and without significant impacts for a period of time past a reactor's licensed life, but before permanent disposal. Because it made this determination generically, the NRC did not need to undertake site-specific identification of the environmental impacts associated with continued storage of spent nuclear fuel.<sup>13</sup> Vacatur of the Decision and Rule therefore left a gap in the NEPA analyses associated with these licensing reviews.<sup>14</sup>

In September 2012, we directed the Staff to develop a generic environmental impact statement to identify the environmental impacts of continued storage, address the issues raised by the court, and support an updated rule.<sup>15</sup> We approved publication of a proposed rule and associated draft generic environmental impact statement the next year.<sup>16</sup> Following a robust public comment period that included an extensive campaign of public meetings across the United States (discussed further below), the Staff has crafted a generic environmental impact

---

<sup>12</sup> *Id.* at 66 & n.5 (citing 10 C.F.R. § 51.23(b) (2012)).

<sup>13</sup> Proposed Rule, Waste Confidence—Continued Storage of Spent Nuclear Fuel, 78 Fed. Reg. 56,776, 56,776 (Sept. 13, 2013) (Proposed Continued Storage Rule).

<sup>14</sup> See *Small Refiner Lead Phase-Down Task Force v. EPA*, 705 F.2d 506, 545 (D.C. Cir. 1983) (observing that, where the reviewing court vacates a rule without reinstating the old rule, “failure to reinstate the old rule creates a temporary regulatory vacuum”). In this case, even had the court expressly reinstated the prior version of the Waste Confidence Decision, a gap still would have been present—the court identified specific deficiencies in the Staff's analysis; the NRC was obliged to address these deficiencies. See *New York*, 681 F.3d at 478, 481-82 (holding that the NRC must include an evaluation of failure to secure permanent disposal, as well as an improved analysis of spent fuel pool leaks and spent fuel pool fires).

<sup>15</sup> See Staff Requirements—COMSECY-12-0016—Approach for Addressing Policy Issues Resulting from Court Decision to Vacate Waste Confidence Decision and Rule (Sept. 6, 2012) (ML12250A032) (SRM-COMSECY-12-0016).

<sup>16</sup> See Staff Requirements—SECY-13-0061—Proposed Rule: Waste Confidence—Continued Storage of Spent Nuclear Fuel (RIN 3150-AJ20) (Aug. 5, 2013) (ML13217A358); Proposed Continued Storage Rule, 78 Fed. Reg. at 56,776; Draft Waste Confidence Generic Environmental Impact Statement, 78 Fed. Reg. 56,621 (Sept. 13, 2013).



statement and revised rule that cure the deficiencies identified by the court. We have adopted that rule today. Upon consideration of the final Continued Storage Rule and associated GEIS, we lift the suspension on all final licensing decisions for affected applications as of the effective date of the final rule. To be sure, the results of the continued storage proceeding must be accounted for before finalizing individual licensing decisions. But once the Staff has otherwise completed its review of the affected applications and has implemented the Continued Storage Rule as appropriate for each affected application, it may make decisions regarding final license issuance.<sup>17</sup>

## **B. Pending Contentions Concerning Continued Storage**

In CLI-12-16, we observed that, to the extent that the NRC addressed waste confidence on a case-by-case basis, “litigants can challenge such site-specific agency actions in our adjudicatory process.”<sup>18</sup> Twenty-two continued storage contentions, most filed concurrently with the suspension petitions, are pending before us<sup>19</sup> or before the Atomic Safety and Licensing Boards.<sup>20</sup> All but two of these contentions are substantively similar. Echoing the court’s decision, the petitioners argued in a general way that the environmental review for each

---

<sup>17</sup> Consistent with our direction in CLI-12-16, licensing reviews and adjudications continued apace. See CLI-12-16, 76 NRC at 67; “Implementation of Commission Memorandum and Order CLI-12-16 Regarding Waste Confidence Decision and Rule,” Commission Paper SECY-12-0132 (ML12276A054) (package) (explaining the Staff’s approach for continuing licensing reviews during the pendency of the rulemaking); Continued Storage Rule at 19-20, 36-37, 39-40 (explaining how the impact determinations in the GEIS will be used in NRC environmental reviews).

<sup>18</sup> CLI-12-16, 76 NRC at 67 (footnote omitted).

<sup>19</sup> The filings before the Commission are listed in an Appendix to this decision.

<sup>20</sup> The filings before the Boards are listed in the Appendix to this decision, together with the Board orders implementing our direction in CLI-12-16. The continued storage issue had been raised before the Board in the *Victoria County Station* early site permit proceeding; that proceeding has since been terminated. *Exelon Nuclear Texas Holdings, LLC* (Victoria County Station Site), LBP-12-20, 76 NRC 215 (2012) (granting the motion to withdraw the application without prejudice and terminating the proceeding).

proposed facility (the environmental report, draft environmental impact statement, or final environmental impact statement, depending on the status of the application in question) does not satisfy NEPA. To cite one example:

The [draft environmental impact statement] for the proposed Fermi 3 does not satisfy NEPA, because it does not include a discussion of the environmental impacts of spent fuel storage after cessation of operation, including the impacts of spent fuel pool leakage, spent fuel pool fires, and failing to establish a spent fuel repository, as required by the U.S. Court of Appeals in *State of New York v. NRC*, No. 11-1045 (June 8, 2012). Therefore, unless and until the NRC conducts such an analysis, no license may be issued.<sup>21</sup>

At bottom, the petitioners argued that, in view of the court's decision invalidating the 2010 Decision and Rule, the NRC could no longer rely on 10 C.F.R. § 51.23(b), "which relies on those findings to exempt both the agency staff and license applicants from addressing spent fuel storage impacts in individual licensing proceedings."<sup>22</sup>

As we acknowledged in CLI-12-16 and again earlier this year, due to the special circumstances presented by waste confidence, we directed that such contentions be held in abeyance pending our further direction.<sup>23</sup> As discussed in the GEIS, the NRC considered

---

<sup>21</sup> *Intervenors' Motion for Leave to File a New Contention Concerning Temporary Storage and Ultimate Disposal of Nuclear Waste at Proposed Fermi 3 Nuclear Power Plant* (July 9, 2012), at 4.

<sup>22</sup> *Id.* at 4-5.

<sup>23</sup> *Tennessee Valley Authority* (Sequoyah Nuclear Plant, Units 1 and 2), CLI-14-3, 79 NRC \_\_\_, \_\_ (Feb. 12, 2014) (slip. op. at 3, 8-9) (indicating that further direction regarding pending contentions would be provided "concurrent with issuance of the final rule"); CLI-12-16, 76 NRC at 68-69. At the time we directed the Staff to prepare a final rule and environmental impact statement, we expressly reserved the option to conduct some environmental analyses of continued storage issues on a site-specific basis if necessary, although we cautioned the Staff that "such a step should be used only in rare circumstances in which there is an exceptional or compelling need to proceed otherwise and proceeding with the site-specific review would not delay or create inconsistencies with development of the generic [environmental impact statement]." SRM-COMSECY-12-0016 at 2 (unnumbered).

addressing the environmental impacts of continued storage in site-specific reviews.<sup>24</sup> As part of the analysis underpinning the GEIS, however, we concluded that the impacts of continued storage will not vary significantly across sites; the impacts of continued storage at reactor sites, or at away-from-reactor sites, can be analyzed generically.<sup>25</sup> Further, “the assumptions used in the analysis are sufficiently conservative to bound the impacts such that variances that may occur between sites are unlikely to result in environmental impact determinations greater than those presented in the GEIS.”<sup>26</sup> Because these generic impact determinations have been the subject of extensive public participation in the rulemaking process, they are excluded from litigation in individual proceedings.<sup>27</sup>

---

<sup>24</sup> GEIS at 1-6 to 1-9 (discussing, among other things, review of impacts on a site-specific basis, preparation of a GEIS whose findings could be used in individual licensing reviews without the binding effect of a rule, or preparation of a policy statement).

<sup>25</sup> Continued Storage Rule at 15-17. As the final rule acknowledges, the court of appeals endorsed a generic approach. *Id.* at 15 (citing *New York*, 681 F.3d at 480 (“[W]e see no reason that a comprehensive general analysis would be insufficient to examine on-site risks that are essentially common to all plants.”)).

<sup>26</sup> GEIS at D-101 to D-102 (response to Comment D.2.11.6); *see also id.* at D-94 to D-109 (providing, *inter alia*, responses to comments requesting site-specific reviews instead of a generic analysis); *id.* at D-68 to D-71 (providing responses to comments expressing concerns related to particular power plants or spent fuel storage facilities).

<sup>27</sup> Contentions that are the subject of general rulemaking by the Commission may not be litigated in individual license proceedings. *Duke Energy Corp.* (Oconee Nuclear Station, Units 1, 2, and 3), CLI-99-11, 49 NRC 328, 345 (1999) (quoting *Potomac Electric Power Co.* (Douglas Point Nuclear Generating Station, Units 1 and 2), ALAB-218, 8 AEC 79, 85 (1974)); *see also* 10 C.F.R. §§ 2.309(f)(1)(iii), 2.335(a); GEIS at 1-7 (“Requiring the NRC to prepare site-specific discussions of generic issues, like those associated with continued storage, would result in the considerable expenditure of public, NRC, and applicant resources. Further, licensing boards could be required to hear nearly identical issues in each proceeding on these generic matters. Adopting the generic impacts of continued storage in a rule, on the other hand, allows the NRC and the participants in its licensing proceedings to focus their limited resources on site-specific issues that are unique to each licensing action.”).

We therefore decline to accept for litigation those contentions pending before us.<sup>28</sup> The motions pending before us in the *William States Lee, Grand Gulf, Shearon Harris, Comanche Peak*, and *North Anna* combined license matters, and in the *South Texas* and *Grand Gulf* license renewal matters, are dismissed; those proceedings are terminated.<sup>29</sup>

Likewise, we direct the Atomic Safety and Licensing Boards to reject the contentions pending before them, consistent with our decision today,<sup>30</sup> with the exception of the two contentions pending in the *Indian Point* matter. These proposed contentions appear to include issues beyond the scope of the Continued Storage Rule.<sup>31</sup> To the extent that Contentions CW-SC-4 and NYS-39/RK-EC-9/CW-EC-10 raise issues resolved by the Continued Storage Rule, the Board is directed to dismiss them consistent with our opinion today. To the extent that these contentions raise other matters, the Board should assess their admissibility under our generally applicable rules of practice.<sup>32</sup>

---

<sup>28</sup> As the Staff made clear in the GEIS, the Continued Storage Rule does not address the environmental impacts of spent fuel storage *during the license term*; these impacts are assessed as part of the site-specific environmental review for a proposed action. See, e.g., GEIS at D-95. The site-specific environmental review may be subject to challenge, provided all other procedural requirements are satisfied.

<sup>29</sup> See the Appendix to this decision for a list of contentions pending before us. Because the proposed continued storage contentions are inadmissible, we need not, and do not, reach the other procedural issues raised by these motions.

<sup>30</sup> See *id.*

<sup>31</sup> See *Hudson River Sloop Clearwater, Inc.'s Motion for Leave to Add a New Contention Based Upon New Information and Petition to Add New Contention* (July 9, 2012) (Contention CW-SC-4); *State of New York, Riverkeeper, and Clearwater's Joint Motion for Leave to File a New Contention Concerning the On-Site Storage of Nuclear Waste at Indian Point* (July 8, 2012); *State of New York, Riverkeeper, Inc., and Hudson River Sloop Clearwater's Joint Contention NYS-39/RK-EC-9/CW-EC-10 Concerning the On-Site Storage of Nuclear Waste at Indian Point* (July 8, 2012).

<sup>32</sup> See 10 C.F.R. § 2.309(c), (f).

\* \* \* \* \*

One other matter merits mention. The petitioners sought “an opportunity for public comment on any generic determinations that [the Commission] may make in either an environmental assessment . . . or environmental impact statement . . . .”<sup>33</sup> In CLI-12-16, we committed that the public “will be afforded an opportunity to comment in advance on any generic waste confidence document that the NRC issues on remand—be it a fresh rule, a policy statement, an [environmental assessment], or an [environmental impact statement].”<sup>34</sup> The rulemaking record reflects that the Staff provided a variety of opportunities for public participation over the course of the rulemaking and received extensive public comment.<sup>35</sup> Many—if not most—of the petitioners in the captioned matters availed themselves of the opportunity to participate.<sup>36</sup> We are satisfied that the Staff amply fulfilled the assurances we made in CLI-12-16.

---

<sup>33</sup> CLI-12-16, 76 NRC at 66.

<sup>34</sup> *Id.* at 67.

<sup>35</sup> The proposed rule was published for a seventy-five-day comment period on September 13, 2013; the comment period ultimately was extended until December 20, 2013. Proposed Continued Storage Rule, 78 Fed. Reg. at 56,776; Proposed Rule, Waste Confidence—Continued Storage of Spent Nuclear Fuel, 78 Fed. Reg. 66,858 (Nov. 7, 2013) (extension of comment period). During the comment period, the NRC staff held thirteen public meetings across the country. Overall, the NRC received over 33,000 comment submissions and recorded approximately 1,600 pages of public meeting transcripts. Continued Storage Rule at 52-53; GEIS at 1-12, C-1 to C-18, D-1 to D-3.

<sup>36</sup> See, e.g., *Comments by Environmental Organizations on Draft Waste Confidence Generic Environmental Impact Statement and Proposed Waste Confidence Rule and Petition to Revise and Integrate All Safety and Environmental Regulations Related to Spent Fuel Storage and Disposal* (Dec. 20, 2013, corrected Jan. 7, 2014) (ML14030A152) (package) (transmitting comments made on behalf of 33 organizations); *Comments Submitted by the Attorneys General of the States of New York, Vermont, Connecticut, and the Commonwealth of Massachusetts, the Vermont Department of Public Service, and the Prairie Island Indian Community on the Nuclear Regulatory Commission’s Draft Waste Confidence Generic Environmental Impact Statement and Proposed Rule* (Jan. 2, 2013) (ML13365A345). See generally GEIS at D-554 to D-602 (listing individuals who provided unique comments on the draft GEIS and proposed rule).

### III. CONCLUSION

For the reasons discussed above, and in view of our approval of the final Continued Storage Rule and associated GEIS, we *lift* the suspension on all final licensing decisions for affected applications as of the effective date of the final rule. Further, the proposed “continued storage” contentions referenced herein are inadmissible, and we *decline to accept them* for litigation. As such, we *dismiss* the petitions pending before us in *William States Lee*, *Grand Gulf*, *Shearon Harris*, *Comanche Peak*, *North Anna*, and *South Texas* and *terminate* those proceedings. We *direct* the Atomic Safety and Licensing Boards, with the exception of the *Indian Point* Board, to likewise dismiss the contentions pending before them. Finally, we *direct* the *Indian Point* Board to dismiss the “continued storage” contentions pending before it; to the extent that the Board finds that these contentions raise issues outside the scope of the Continued Storage Rule, the Board should assess the admissibility of these contentions under the applicable rules of practice.

IT IS SO ORDERED.

For the Commission

**NRC SEAL**

**/RA/**

---

Annette L. Vietti-Cook  
Secretary of the Commission

Dated at Rockville, Maryland,  
this 26<sup>th</sup> day of August, 2014

## APPENDIX

### CONTENTIONS PENDING BEFORE THE COMMISSION

1. *Motion to Reopen the Record for William States Lee III Units 1 and 2* (July 9, 2012), together with *Intervenors' Motion for Leave to File a New Contention Concerning Temporary Storage and Ultimate Disposal of Nuclear Waste at William States Lee III Units 1 and 2* (July 9, 2012).
2. *Beyond Nuclear Motion for Leave to File a New Contention Concerning Temporary Storage and Ultimate Disposal of Nuclear Waste at Grand Gulf Unit 1* (July 9, 2012).
3. *Beyond Nuclear Motion for Leave to File a New Contention Concerning Temporary Storage and Ultimate Disposal of Nuclear Waste at Grand Gulf Unit 3* (July 9, 2012).
4. *Intervenors' Motion for Leave to File a New Contention Concerning Temporary Storage and Ultimate Disposal of Nuclear Waste at Comanche Peak Nuclear Power Plant* (July 9, 2012).
5. *NC WARN's Motion to Reopen the Record and Admit Contention Concerning Temporary Storage and Ultimate Disposal of Nuclear Waste at the Shearon Harris Nuclear Power Plant* (July 9, 2012).
6. *Petition for Intervention to File a New Contention Concerning Temporary Storage and Ultimate Disposal of Nuclear Waste at STP Units 1 & 2* (July 9, 2012).
7. *Motion to Reopen the Record for North Anna Unit 3* (July 9, 2012), filed with *Intervenors' Motion for Leave to File a New Contention Concerning Temporary Storage and Ultimate Disposal of Nuclear Waste at North Anna Unit 3* (July 9, 2012).

### CONTENTIONS PENDING BEFORE THE ATOMIC SAFETY AND LICENSING BOARDS

1. *Intervenors' Motion for Leave to File a New Contention Concerning Temporary Storage and Ultimate Disposal of Nuclear Waste at Proposed Fermi 3 Nuclear Power Plant* (July 9, 2012); Order (Holding New Contention in Abeyance) (Aug. 29, 2012) (unpublished).
2. *Intervenors' Motion for Leave to File a New Contention Concerning Temporary Storage and Ultimate Disposal of Nuclear Waste at Davis-Besse Nuclear Power Station* (July 9, 2012); Order (Suspending Procedural Date Related to Proposed Waste Confidence Contention) (Aug. 8, 2012) (unpublished).
3. *Intervenors' Motion for Leave to File a New Contention Concerning Temporary Storage and Ultimate Disposal of Nuclear Waste at Turkey Point Nuclear Power Plant* (July 9, 2012) (two motions, one filed by Southern Alliance for Clean Energy, National Parks Conservation Association, Dan Kipnis, and Mark Oncavage, and the other by Citizens Allied for Safe Energy, Inc.); Order (Suspending Deadlines for Submission of Reply Briefs Related to Proposed Waste Confidence Contention) (Aug. 9, 2012) (unpublished).
4. *Intervenors' Motion for Leave to File a New Contention Concerning Temporary Storage and Ultimate Disposal of Nuclear Waste at Seabrook Station, Unit 1* (July 9, 2012); Order (Holding Intervenors' Motion for Leave to File a New Contention in Abeyance) (Aug. 15, 2012) (unpublished).

5. *San Luis Obispo Mothers for Peace Motion for Leave to File a New Contention Concerning Temporary Storage and Ultimate Disposal of Spent Reactor Fuel at Diablo Canyon Nuclear Power Plant* (July 9, 2012); Order (Holding Proposed New Contention in Abeyance) (Aug. 16, 2012) (unpublished).
6. *Intervenors' Motion for Leave to File a New Contention Concerning Temporary Storage and Ultimate Disposal of Spent Reactor Fuel at Levy Nuclear Power Plant* (July 9, 2012); Order (Holding Proposed New Contention in Abeyance) (Aug. 16, 2012) (unpublished).
7. *Intervenors' Motion for Leave to File a New Contention Concerning Temporary Storage and Ultimate Disposal of Nuclear Waste at South Texas Units 3 & 4* (July 9, 2012).
8. *Intervenors' Motion for Leave to File a New Contention Concerning Temporary Storage and Ultimate Disposal of Nuclear Waste at Bellefonte* (July 9, 2012); Memorandum and Order (Suspending Date for Submission of Reply Pleading) (Aug. 8, 2012) (unpublished).
9. *Southern Alliance for Clean Energy's Motion for Leave to File a New Contention Concerning Temporary Storage and Ultimate Disposal of Spent Reactor Fuel at Watts Bar Unit 2* (July 9, 2012); Order (Holding Waste Confidence Contention in Abeyance) (Aug. 9, 2012) (unpublished).
10. *Intervenor's Motion for Leave to File a New Contention Concerning Temporary Storage and Ultimate Disposal of Nuclear Waste at Callaway Nuclear Power Plant* (July 9, 2012); Memorandum and Order (Suspending Date for Submission of Reply Pleading) (Aug. 8, 2012) (unpublished).
11. *Hudson River Sloop Clearwater, Inc.'s Motion for Leave to Add a New Contention Based Upon New Information and Petition to Add New Contention* (July 9, 2012); *State of New York, Riverkeeper, and Clearwater's Joint Motion for Leave to File a New Contention Concerning the On-Site Storage of Nuclear Waste at Indian Point*, filed with *State of New York, Riverkeeper, Inc., and Hudson River Sloop Clearwater's Joint Contention NYS-39/RK-EC-9/CW-EC-10 Concerning the On-Site Storage of Nuclear Waste at Indian Point* (July 8, 2012); Order (Holding Contentions NYS-39/RK-EC-9/CW-EC-10 and CW-SC-4 in Abeyance) (Aug. 8, 2012) (unpublished).
12. *NRDC's Waste Confidence Contention* (July 9, 2012); Order (Suspending Procedural Date Related to Proposed Waste Confidence Contention) (Aug. 8, 2012) (unpublished) (suspending briefing in the *Limerick* license renewal proceeding).
13. *Prairie Island Indian Community's Request for Hearing and Petition to Intervene in License Renewal Proceeding for the Prairie Island Independent Spent Fuel Storage Installation* (Aug. 24, 2012), at 23-26 (Contention 1); LBP-12-24, 76 NRC at 510-11 (2012) (holding Contention 1 in abeyance); *Prairie Island Indian Community Motion to Admit New and Amended Contentions after Issuance of NRC's Draft Environmental Assessment* (Dec. 12, 2013); Memorandum and Order (Ruling on Motion to Admit New and Amended Contentions) (Apr. 30, 2014), at 5-7 (unpublished) (holding an amended Contention 1, challenging the draft environmental impact statement, in abeyance).
14. *Petition for Leave to Intervene and Request for Hearing by the Blue Ridge Environmental Defense League, Bellefonte Efficiency and Sustainability Team, and Mothers Against Tennessee River Radiation* (May 6, 2013), at 12-14 (Contention B in the *Sequoyah* license



renewal proceeding); LBP-13-8, 78 NRC 1, 15-16 (2013) (holding Contention B in abeyance), *interlocutory appeal denied*, CLI-14-3, 79 NRC \_\_ (Feb. 12, 2014) (slip op.).

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
Exelon Generation Company, LLC	)	Docket Nos. 50-352-LR and 50-353-LR
(Limerick Generating Station, Units 1 and 2)	)	
	)	ASLBP No. 12-916-04-LR-BD01
(License Renewal)	)	

CERTIFICATE OF SERVICE

I hereby certify that copies of the foregoing **COMMISSION MEMORANDUM AND ORDER (CLI-14-08)** have been served upon the following persons by Electronic Information Exchange or via Electronic Mail as indicated by an asterisk.

U.S. Nuclear Regulatory Commission  
Atomic Safety and Licensing Board  
Mail Stop T-3F23  
Washington, DC 20555-0001

William J. Froehlich, Chair  
Administrative Judge  
E-mail: [william.froehlich@nrc.gov](mailto:william.froehlich@nrc.gov)

Michael F. Kennedy  
Administrative Judge  
E-mail: [michael.kennedy@nrc.gov](mailto:michael.kennedy@nrc.gov)

William E. Kastenberg  
Administrative Judge  
E-mail: [William.kastenberg@nrc.gov](mailto:William.kastenberg@nrc.gov)

Matthew Flyntz  
Law Clerk  
E-mail: [matthew.flyntz@nrc.gov](mailto:matthew.flyntz@nrc.gov)

Onika Williams, Law Clerk  
Email: [onika.williams@nrc.gov](mailto:onika.williams@nrc.gov)

U.S. Nuclear Regulatory Commission  
Office of Commission Appellate Adjudication  
Mail Stop O-16C1  
Washington, DC 20555-0001  
OCA Mail Center: [ocaamail@nrc.gov](mailto:ocaamail@nrc.gov)

U.S. Nuclear Regulatory Commission  
Office of the Secretary of the Commission  
Mail Stop O-16C1  
Washington, DC 20555-0001  
Hearing Docket: [hearingdocket@nrc.gov](http://hearingdocket@nrc.gov)

U.S. Nuclear Regulatory Commission  
Office of the General Counsel  
Mail Stop O-15D21  
Washington, DC 20555-0001  
Catherine Kanatas, Esq.  
Mary Spencer, Esq.  
Edward Williamson, Esq.  
Christina England, Esq.  
Esther Houseman, Esq.  
Joseph Lindell, Esq.  
John Tibbetts, Paralegal  
[catherine.kanatas@nrc.gov](mailto:catherine.kanatas@nrc.gov)  
[mary.spencer@nrc.gov](mailto:mary.spencer@nrc.gov)  
[edward.williamson@nrc.gov](mailto:edward.williamson@nrc.gov)  
[christina.england@nrc.gov](mailto:christina.england@nrc.gov)  
[esther.houseman@nrc.gov](mailto:esther.houseman@nrc.gov)  
[joseph.lindell@nrc.gov](mailto:joseph.lindell@nrc.gov)  
[john.tibbetts@nrc.gov](mailto:john.tibbetts@nrc.gov)

Limerick Generating Station, Units 1 and 2, Docket Nos. 50-362-LR and 50-363-LR  
**COMMISSION MEMORANDUM AND ORDER (CLI-14-08)**

Exelon Generation Company, LLC  
Exelon Business Services Company  
200 Exelon Way, Suite 305  
Kennett Square, PA 19348  
Donald Ferraro, Asst. General Counsel  
[donald.ferraro@exeloncorp.com](mailto:donald.ferraro@exeloncorp.com)

Exelon Generation Company, LLC  
4300 Warrenville Road  
Warrenville, IL 60555  
J. Bradley Fewell, Dep. General Counsel  
[bradley.fewell@exeloncorp.com](mailto:bradley.fewell@exeloncorp.com)

Natural Resources Defense Counsel  
Meyer Glitzenstein & Crystal  
1601 Connecticut Ave., N.W. Suite 700  
Washington, D.C. 20009  
Howard M. Crystal, Esq.  
[hcrystal@meyerglitz.com](mailto:hcrystal@meyerglitz.com)

Natural Resources Defense Council (NRDC)  
1152 – 15<sup>th</sup> Street, N.W., #300  
Washington, DC 20005  
Geoffrey H. Fettus, Sr. Project Attorney  
[gfettus@nrdc.org](mailto:gfettus@nrdc.org)

National Legal Scholars Law Firm, P.C.  
241 Poverty Lane, Unit 1  
Lebanon, New Hampshire 03766  
Anthony Roisman, Managing Partner  
[aroisman@nationallegalscholars.com](mailto:aroisman@nationallegalscholars.com)

Morgan, Lewis & Bockius, LLP  
1111 Pennsylvania Avenue, N.W.  
Washington, DC 20004  
Alex Polonsky, Esq.  
Kathryn Sutton, Esq.  
Anna Jones, Esq.  
Laura Swett, Esq.  
Angela Tieperman, Paralegal  
Mary Freeze, Legal Secretary  
Doris Calhoun, Legal Secretary  
[apolonsky@morganlewis.com](mailto:apolonsky@morganlewis.com)  
[ksutton@morganlewis.com](mailto:ksutton@morganlewis.com)  
[anna.jones@morganlewis.com](mailto:anna.jones@morganlewis.com)  
[lszett@morganlewis.com](mailto:lszett@morganlewis.com)  
[atieperman@morganlewis.com](mailto:atieperman@morganlewis.com)  
[mfreeze@morganlewis.com](mailto:mfreeze@morganlewis.com)  
[dcalhoun@morganlewis.com](mailto:dcalhoun@morganlewis.com)

Morgan, Lewis & Bockius, LLP  
1701 Market Street  
Philadelphia, PA 19103-2921  
Brooke Leach, Esq.  
[bleach@morganlewis.com](mailto:bleach@morganlewis.com)

Erich Pica, President\*  
Friends of the Earth  
1100 15<sup>th</sup> Street, NW  
11<sup>th</sup> Floor  
Washington, D.C. 20005  
[mkeever@foe.org](mailto:mkeever@foe.org)

[Original signed by Herald M. Speiser \_\_\_\_\_]  
Office of the Secretary of the Commission

Dated at Rockville, Maryland  
this 26<sup>th</sup> day of August, 2014

# **Generic Environmental Impact Statement for License Renewal of Nuclear Plants**

## **Supplement 49**

### **Regarding Limerick Generating Station, Units 1 and 2**

#### **Chapters 1 to 12**

#### **Final Report**

## AVAILABILITY OF REFERENCE MATERIALS IN NRC PUBLICATIONS

### NRC Reference Material

As of November 1999, you may electronically access NUREG-series publications and other NRC records at NRC's Public Electronic Reading Room at <http://www.nrc.gov/reading-rm.html>. Publicly released records include, to name a few, NUREG-series publications; *Federal Register* notices; applicant, licensee, and vendor documents and correspondence; NRC correspondence and internal memoranda; bulletins and information notices; inspection and investigative reports; licensee event reports; and Commission papers and their attachments.

NRC publications in the NUREG series, NRC regulations, and Title 10, "Energy," in the *Code of Federal Regulations* may also be purchased from one of these two sources.

1. The Superintendent of Documents  
U.S. Government Printing Office  
Mail Stop SSOP  
Washington, DC 20402-0001  
Internet: [bookstore.gpo.gov](http://bookstore.gpo.gov)  
Telephone: 202-512-1800  
Fax: 202-512-2250
2. The National Technical Information Service  
Springfield, VA 22161-0002  
[www.ntis.gov](http://www.ntis.gov)  
1-800-553-6847 or, locally, 703-605-6000

A single copy of each NRC draft report for comment is available free, to the extent of supply, upon written request as follows:

Address: U.S. Nuclear Regulatory Commission  
Office of Administration  
Publications Branch  
Washington, DC 20555-0001

E-mail: [DISTRIBUTION.RESOURCE@NRC.GOV](mailto:DISTRIBUTION.RESOURCE@NRC.GOV)

Facsimile: 301-415-2289

Some publications in the NUREG series that are posted at NRC's Web site address <http://www.nrc.gov/reading-rm/doc-collections/nuregs> are updated periodically and may differ from the last printed version. Although references to material found on a Web site bear the date the material was accessed, the material available on the date cited may subsequently be removed from the site.

### Non-NRC Reference Material

Documents available from public and special technical libraries include all open literature items, such as books, journal articles, transactions, *Federal Register* notices, Federal and State legislation, and congressional reports. Such documents as theses, dissertations, foreign reports and translations, and non-NRC conference proceedings may be purchased from their sponsoring organization.

Copies of industry codes and standards used in a substantive manner in the NRC regulatory process are maintained at—

The NRC Technical Library  
Two White Flint North  
11545 Rockville Pike  
Rockville, MD 20852-2738

These standards are available in the library for reference use by the public. Codes and standards are usually copyrighted and may be purchased from the originating organization or, if they are American National Standards, from—

American National Standards Institute  
11 West 42<sup>nd</sup> Street  
New York, NY 10036-8002  
[www.ansi.org](http://www.ansi.org)  
212-642-4900

Legally binding regulatory requirements are stated only in laws; NRC regulations; licenses, including technical specifications; or orders, not in NUREG-series publications. The views expressed in contractor-prepared publications in this series are not necessarily those of the NRC.

The NUREG series comprises (1) technical and administrative reports and books prepared by the staff (NUREG-XXXX) or agency contractors (NUREG/CR-XXXX), (2) proceedings of conferences (NUREG/CP-XXXX), (3) reports resulting from international agreements (NUREG/IA-XXXX), (4) brochures (NUREG/BR-XXXX), and (5) compilations of legal decisions and orders of the Commission and Atomic and Safety Licensing Boards and of Directors' decisions under Section 2.206 of NRC's regulations (NUREG-0750).

**DISCLAIMER:** This report was prepared as an account of work sponsored by an agency of the U.S. Government. Neither the U.S. Government nor any agency thereof, nor any employee, makes any warranty, expressed or implied, or assumes any legal liability or responsibility for any third party's use, or the results of such use, of any information, apparatus, product, or process disclosed in this publication, or represents that its use by such third party would not infringe privately owned rights.

# **Generic Environmental Impact Statement for License Renewal of Nuclear Plants**

## **Supplement 49**

### **Regarding Limerick Generating Station, Units 1 and 2**

#### **Chapters 1 to 12**

#### **Final Report**

Manuscript Completed: August 2014  
Date Published: August 2014

## 5.0 ENVIRONMENTAL IMPACTS OF POSTULATED ACCIDENTS

This chapter describes the environmental impacts from postulated accidents that Limerick Generating Station, Units 1 and 2 (LGS or Limerick) might experience during the period of extended operation. The term “accident” refers to any unintentional event outside the normal plant operational envelope that results in a release or the potential for release of radioactive materials into the environment. The two classes of postulated accidents listed in Table 5–1 are evaluated in detail in the generic environmental impact statement (GEIS). These two classes of accidents are:

- design-basis accidents (DBAs), and
- severe accidents.

**Table 5–1. Issues Related to Postulated Accidents**

Issues	GEIS Section	Category
DBAs	5.3.2; 5.5.1	1
Severe accidents	5.3.3; 5.3.3.2; 5.3.3.3; 5.3.3.4; 5.3.3.5; 5.4; 5.5.2	2

### 5.1 Design-Basis Accidents

To receive U.S. Nuclear Regulatory Commission (NRC) approval to operate a nuclear power plant, an applicant for an initial operating license must submit a safety analysis report (SAR) as part of its application. The SAR presents the design criteria and design information for the proposed reactor and comprehensive data on the proposed site. The SAR also discusses various hypothetical accident situations and the safety features that prevent and mitigate accidents. The NRC staff (the staff) reviews the application to determine if the plant design meets the NRC’s regulations and requirements and includes, in part, the nuclear plant design and its anticipated response to an accident.

Design-basis accidents (DBAs) are those accidents that both the licensee and the staff evaluate to ensure that the plant can withstand normal and abnormal transients and a broad spectrum of postulated accidents, without undue hazard to the health and safety of the public. Many of these postulated accidents are not expected to occur during the life of the plant but are evaluated to establish the design basis for the preventive and mitigative safety systems of the nuclear power plant. Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50 and 10 CFR Part 100 describe the acceptance criteria for DBAs.

The environmental impacts of DBAs are evaluated during the initial licensing process, and the ability of the nuclear power plant to withstand these accidents is demonstrated to be acceptable before issuance of the operating license. The results of these evaluations are found in license documentation such as the applicant’s final safety analysis report (FSAR), the staff’s safety evaluation report (SER), the final environmental statement (FES), and Section 5.1 of this supplemental environmental impact statement (SEIS). A licensee is required to maintain the acceptable design and performance criteria throughout the life of the nuclear power plant, including any period of extended operation. The consequences for these events are evaluated for the hypothetical maximum exposed individual. Because of the requirements that continuous acceptability of the consequences and aging management programs be in effect for license

renewal, the environmental impacts, as calculated for DBAs, should not differ significantly from initial licensing assessments over the life of the nuclear power plant, including the license renewal period. Accordingly, the design of the nuclear power plant, relative to DBAs during the extended period, is considered to remain acceptable; therefore, the environmental impacts of those accidents were not examined further in the GEIS.

The NRC has determined in the GEIS that the environmental impacts of DBAs are of SMALL significance for all nuclear power plants because the plants were designed to successfully withstand these accidents. Therefore, for the purposes of license renewal, DBAs are designated as a Category 1 issue in 10 CFR Part 51, Subpart A, Appendix B, Table B-1. The early resolution of the DBAs makes them a part of the current licensing basis (CLB) of the plant; the CLB of the plant is to be maintained by the licensee under its current license and, therefore, under the provisions of 10 CFR 54.30, is not subject to review under license renewal. This issue is applicable to LGS.

Exelon Generation Company, LLC (Exelon) stated in its environmental report (ER) (Exelon 2011c) that it is not aware of any new and significant information related to DBAs associated with the renewal of the LGS. The staff did not find any new and significant information during its independent review of Exelon's ER, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts related to DBAs beyond those discussed in the GEIS (NRC 2013a).

### 5.2 Severe Accidents

Severe nuclear accidents are those that are more severe than DBAs because they could result in substantial damage to the reactor core, whether or not there are serious offsite consequences. In the GEIS, the staff assessed the effects of severe accidents during the period of extended operation, using the results of existing analyses and site-specific information to conservatively predict the environmental impacts of severe accidents for each plant during the period of extended operation.

The impacts from severe accidents initiated by external phenomena such as tornadoes, floods, earthquakes, fires, and sabotage were specifically considered in the GEIS. The GEIS evaluated existing impact assessments—performed by the staff and by the industry at 44 nuclear power plants (including LGS) in the United States—and concluded that the risk from beyond design-basis earthquakes at existing nuclear power plants is SMALL. The GEIS also performed a discretionary analysis of sabotage, in connection with license renewal, and concluded that the core damage and radiological release from such acts would be no worse than the damage and release expected from internally initiated events. In the GEIS, the NRC concludes that the risk from sabotage at existing nuclear power plants is SMALL and, additionally, that the risks from other external events are adequately addressed by a generic consideration of internally initiated severe accidents (NRC 1996, 2013a).

Based on information in the GEIS, the NRC determined in its regulations that:

The probability-weighted consequences of severe accidents are SMALL for all plants. However, alternatives to mitigate severe accidents must be considered for all plants that have not considered such alternatives.

The staff found no new and significant information related to severe accidents during the review of Exelon's ER (Exelon 2011c), the scoping process, the review of public comments, NRDC's waiver petition, or evaluation of other available information. Therefore, there are no impacts related to these issues, beyond those already discussed in the GEIS.



### 5.3 Severe Accident Mitigation Alternatives

The purpose of the evaluation of severe accident mitigation alternatives (SAMAs) is to identify design alternatives, procedural modifications, or training activities that are cost-beneficial and further reduce the risks of severe accidents (NRC 1999a). The analysis of SAMAs includes the identification and evaluation of alternatives that reduce the radiological risk from a severe accident by preventing substantial core damage (i.e., preventing a severe accident) or by limiting releases from containment in the event that substantial core damage occurs (i.e., mitigating the impacts of a severe accident) (NRC 1999b). In accordance with 10 CFR 51.53(c)(3)(ii)(L) and Table B-1 of Part 51, license renewal ERs must provide a consideration of alternatives to mitigate severe accidents if the staff has not previously evaluated SAMAs for the applicant's plant in an environmental impact statement (EIS) or related supplement or in an environmental assessment.

The staff has previously performed a site-specific analysis of severe accident mitigation in a National Environmental Policy Act of 1969 (NEPA) document for LGS in the Final Environmental Statement Related to Operation of LGS, Units 1 and 2 in NUREG-0974, Supplement 1 (NRC 1989) ("1989 SAMDA Analysis"). Therefore, no analysis of SAMAs for LGS is required in Exelon's ER or the staff's SEIS. The NRC staff uses the term SAMA to refer to SAMAs at the license renewal phase. In contrast, the term severe accident mitigation design alternative (SAMDA) refers to SAMAs at the initial licensing phase. The site-specific SAMDAs reviewed for applicability to LGS were evaluated in the 1989 SAMDA Analysis and also documented in GEIS Table 5.35. The staff examined each SAMDA (individually and, in some cases, in combination) to determine the potential SAMDA individual risk reduction potential. This risk reduction was then compared with the cost of implementing the SAMDA to provide cost-benefit evidence of its value. The staff concluded that:

The risks of early fatality from potential accidents at the site are small in comparison with risks of early fatality from other human activities in a comparably sized population, and the accident risk will not add significantly to population exposure and cancer risks. Accident risks from Limerick are expected to be a small fraction of the risks the general public incurs from other sources. Further, the best estimates show that the risks of potential reactor accidents at Limerick are within the range of such risks from other nuclear power plants.

However, in the LGS specific 1989 SAMDA Analysis, the staff acknowledged:

In the longer term, these same severe accident issues are currently being pursued by the NRC in a systematic way for all utilities through the Severe Accident Program described in SECY-88-147, "Integration Plan for Closure of Severe Accident Issues." The plan includes provisions for an Individual Plant Examination (IPE) for each operating reactor, a Containment Performance Improvement (CPI) program, and an Accident Management (AM) program. These programs will produce a more complete picture of the risks of operating plants and the benefits of potential design improvements, including SAMDAs. The staff believes that the severe accident program is the proper vehicle for further review of severe accidents at nuclear power plants, including Limerick.

Therefore, the Commission considers ways to mitigate severe accidents at a given site more than once. The Commission has considered alternatives for mitigating severe accidents at many sites, including LGS, multiple times through a variety of NRC programs. When it promulgated Table B-1 of 10 CFR Part 51, the Commission explained:

The Commission has considered containment improvements for all plants pursuant to its Containment Performance Improvement (CPI) program...and the Commission has additional ongoing regulatory programs whereby licensees

search for individual plant vulnerabilities to severe accidents and consider cost-beneficial improvements [(the individual plant examination “IPE” and individual plant examination of external events “IPEEE” programs)]. [61 FR 28467]

In light of these studies, the Commission believed that if the staff has already considered severe accident mitigation under NEPA once for a facility, it was “unlikely that any site-specific consideration of SAMAs for license renewal will identify major plant design changes or modifications that will prove to be cost-beneficial for reducing severe accident frequency or consequences” (61 FR 28467). In CLI-13-7, the Commission reaffirmed the conclusions in Table B-1 and 10 CFR 51.53(c)(3)(ii)(L) and stated that it promulgated those regulations “because we determined that one SAMA analysis would uncover most cost-beneficial measures to mitigate both the risk and the effects of severe accidents, thus satisfying our obligations under NEPA” (NRC 2013d).. Given the significant costs of a major plant design change, such an improvement must result in a substantial reduction in risk to be cost-beneficial. As discussed below, the NRC has thoroughly considered severe accidents and ways to mitigate their impacts, in the original SAMDA analysis for Limerick and other studies, and did not identify cost-beneficial major plant design changes or modifications for mitigating the impacts of severe accidents.

### 5.3.1 Containment Performance Improvement Program

One of the programs the Commission relied on in determining that SAMAs need not be performed at license renewal if the staff had already performed a SAMA review in an earlier NEPA document is the CPI program. With this program, the NRC examined each of five U.S. reactor containment types (BWR Mark I, II, and III; PWR Ice Condenser; and PWR Dry) with the purpose of examining the potential failure modes, potential fixes, and the cost benefit of such fixes. Tables 5.32 through 5.34 in the GEIS summarize the results of this program. As can be seen from these tables, many potential changes were evaluated but only a few containment improvements were identified for site-specific review. The items evaluated in the CPI program were also included in the list of plant-specific SAMDAs examined in the LGS FES supplement (NRC 1996). Furthermore, the CPI program issues applicable to Limerick were effectively subsumed into the IPE process in Supplements 1 and 3 to Generic Letter 88-20. Additionally, the Emergency Procedure Guidelines (EPG) and Severe Accident Management Guidelines (SAMGs) developed by the BWR Owners’ Group (BWROG) and implemented at Limerick incorporate the accident management strategies identified in the CPI program (Exelon 2014a).

### 5.3.2 Individual Plant Examination

Another program the Commission relied on in determining that SAMAs need not be performed at license renewal if the staff had already performed a SAMA review in an earlier NEPA document is the Individual Plant Examination (IPE). The IPE’s specific objective was to develop an appreciation of severe accident behavior, and to identify ways in which the overall probabilities of core damage and fission product releases could be reduced if deemed necessary. In general, the IPEs have resulted in plant procedural and programmatic improvements (i.e., accident management) and, in only a few cases, minor plant modifications, to further reduce the risk and consequences of severe accidents (NRC 1996).

In accordance with NRC’s policy statement on severe accidents, the licensee performed an IPE to look for vulnerabilities to both internal and external initiating events (NRC 1988a). This examination considered potential improvements on a plant-specific basis. The core damage frequency (CDF) was found to be considerably less in the LGS IPE ( $4.3 \times 10^{-6}$ ) than in the

original CDF value provided in NUREG-1068 ( $1.0 \times 10^{-5}$ ) for LGS and the 1989 PRA Update ( $1.0 \times 10^{-5}$ ) used in the 1989 SAMDA Analysis review. The staff further notes that the 2009 PRA Update ( $3.2 \times 10^{-6}$ ) is approximately an order of magnitude less than the 1989 PRA Update (Exelon ER) used in the 1989 SAMDA Analysis review. Plant improvements identified and implemented for LGS as a result of the IPE included: (1) relaxing restrictions on the drywell spray initiation curve in the Emergency Operating Procedures; (2) creating a procedure to cross-tie the 4-kilovolt (kV) safeguards electrical buses; (3) creating a procedure to power Unit 2 emergency service water (ESW) pumps from Unit 1; and (4) creating a cross-connection between the fire water and residual heat removal (RHR) systems (PECO 1992). Exelon request for additional information (RAI) response dated March 12, 2014, confirms these and other improvements were implemented to reduce risk at LGS as a result of the IPE (Exelon 2014a). These results at Limerick are also consistent with other IPEs in that they have resulted in only plant procedural and programmatic improvements (i.e., accident management) and, in only a few cases, minor plant modifications to further reduce the risk and consequences of severe accidents.

### 5.3.3 Individual Plant Examination of External Events

Another program the Commission relied on in determining that SAMAs need not be performed at license renewal if the staff had already performed a SAMA review in an earlier NEPA document is the Individual Plant Examination of External Events (IPEEE) program. While the IPE takes into account events that could challenge the design from things that could go awry internally (in the sense that equipment might fail because components do not work as expected), the IPEEE considers challenges such as earthquakes, internal fires, and high winds. The IPEEE program was initiated in the early 1990s. All operating plants in the United States (including LGS) performed an assessment to identify vulnerabilities to severe accidents initiated by external events and reported the results to the NRC, along with any identified improvements and/or corrective actions. *Perspectives Gained from the Individual Plant Examination of External Events (IPEEE) Program*, NUREG-1742 documents the perspectives derived from the technical reviews of the IPEEE results (NRC 2002). As a result of conducting the LGS IPEEE, PECO Energy identified seismic event and fire event findings. Actions were taken to address minor housekeeping and maintenance issues related to the seismic analysis such as unrestrained tools, lockers, hoist controllers and lifting devices for low voltage switchgear. In addition, fire brigade drill activities and fire brigade awareness were increased for three areas in the common control structure. Furthermore, actions credited in the fire analysis such as improved transient combustible controls, creation of transient combustible free zones and formal designation of certain fire rated doors as “fire” doors were implemented at LGS (PECO 1995). Exelon RAI response dated March 12, 2014, confirms these and other improvements were implemented to reduce risk at LGS as a result of the IPEEE (Exelon 2014a). These results at Limerick are also consistent with other IPEEEs in that they have resulted in only plant procedural and programmatic improvements (i.e., accident management) and, in only a few cases, minor plant modifications to further reduce the risk and consequences of severe accidents.

### 5.3.4 Accident Management Program

The staff specifically relied on the Accident Management Program as the proper avenue for addressing the improvements considered in the 1989 SAMDA Analysis. Accident management involves the development of procedures that promote the most effective use of available plant equipment and staff in the event of an accident. The staff indicated its intent (NRC 1988a) that licensees develop an accident management framework that will include implementation of

accident management procedures, training, and technical guidance. Exelon developed an accident management program at LGS which factored insights gained as a result of the IPE. As discussed earlier, the improvements identified from the completed IPEs to date have been in the area of accident management or other procedural and programmatic improvements (NRC 1996 and NRC 1997). Additionally the EPG and SAMGs developed by the BWROG and implemented at Limerick incorporate the accident management strategies identified in the CPI program. Exelon RAI response dated March 12, 2014, confirms these and other improvements were implemented to reduce risk at LGS as a result of the IPE (Exelon 2014a).

### **5.3.5 NRC Efforts to Address Severe Accident-Related Issues Since the Publication of the 1996 GEIS**

The evaluation of Limerick's 1989 SAMDA analysis is summarized in the 1996 GEIS. The NRC has continued to address severe accident-related issues since the GEIS was published and 10 CFR Part 51 changes related to license renewal were promulgated. The NRC and licensee efforts have reduced risks from accidents beyond that considered in the 1996 GEIS (summarized below) and the 2013 GEIS (NRC 2013a). In some cases, such as the agency response to Fukushima, these activities are ongoing. Each of the activities applied or continues to apply to all reactors, including LGS. The specific requirement for any given reactor was based either on a site-specific evaluation or a design-specific requirement.

### **5.3.6 10 CFR 50.54(hh) Conditions of License Regarding Loss of Large Areas of the Plant Caused by Fire or Explosions**

Following September 11, 2001, the Commission issued Order EA-02-026 and ultimately a new regulation (10 CFR 50.54(hh)), which required commercial power reactor licensees to, among other things, adopt mitigation strategies using readily available resources to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities to cope with the loss of large areas of the facility because of large fires and explosions from any cause, including beyond-design-basis aircraft impacts (See 74 FR 13926). The final rule also added several new requirements developed as a result of insights gained from implementation of the security orders, reviews of site security plans, and implementation of the enhanced baseline inspection program, and updated the NRC's security regulatory framework for the licensing of new nuclear power plants. Compliance with the final rule was required by March 31, 2010, for licensees, including Exelon, currently licensed to operate under 10 CFR Part 50. Exelon has updated its plant and procedures accordingly, and the NRC has inspected the guidelines and strategies that Exelon has implemented to meet the requirements of 10 CFR 50.54(hh)(2). The specifics of the enhancements are security related and not publicly available but are described, in general, in the 2013 GEIS. These enhancements include: (1) significant reinforcement of the defense capabilities for nuclear facilities, (2) better control of sensitive information, (3) enhancements in emergency preparedness (EP) to further strengthen the NRC's nuclear facility security program, and (4) implementation of mitigating strategies to deal with postulated events potentially causing loss of large areas of the plant caused by explosions or fires, including those that an aircraft impact might create. These measures are outlined in greater detail in NUREG/BR-0314 (NRC 2004), NUREG-1850 (NRC 2005), and Sandia National Laboratory's "Mitigation of Spent Fuel Loss-of-Coolant Inventory Accidents and Extension of Reference Plant Analyses to Other Spent Fuel Pools" (Wagner and Gaunt 2006).

As discussed in Section 5.3.3.1 of the 1996 GEIS, security-related events are addressed via deterministic criteria in 10 CFR Part 73, rather than by risk assessments or SAMAs. However, as provided above in the severe accident introduction (Section 5.3), the purpose of the evaluation of SAMAs is to identify design alternatives, procedural modifications, or training

activities that are cost-beneficial and further reduce the risks of severe accidents (NRC 1999a). The analysis of SAMAs includes the identification and evaluation of alternatives that reduce the radiological risk from a severe accident by preventing substantial core damage (i.e., preventing a severe accident) or by limiting releases from containment in the event that substantial core damage occurs (i.e., mitigating the impacts of a severe accident) (NRC 1999b). Exelon's efforts to implement the deterministic requirements of 10 CFR 50.54(hh) and 10 CFR Part 73 were similar to the purpose of evaluating SAMAs because they mitigate the consequences of a beyond design basis accident. However, the implementation of deterministic 10 CFR 50.54(hh) and 10 CFR Part 73 requirements are required regardless of whether they are cost-beneficial or not. Nevertheless, these activities have further contributed to the reduction of risk at Limerick.

### **5.3.7 Severe Accident Management Guidelines**

Exelon has also developed and implemented severe accident mitigation guidelines (SAMGs) at LGS, which further reduce risk at the facility. SAMGs were developed by the industry during the 1980s and 1990s in response to the Three Mile Island (TMI) Nuclear Station accident and follow-up activities. SAMGs are meant to “enhance the ability of the operators to manage accident sequences that progress beyond the point where emergency operating procedures (EOPs) and other plant procedures are applicable and useful” (NRC 2011a). The CPI program issues applicable to Limerick were effectively subsumed into the IPE process in Supplements 1 and 3 to Generic Letter 88-20. Additionally, the EPG and SAMGs developed by the BWROG and implemented at Limerick incorporate the accident management strategies identified in the CPI program and elsewhere (Exelon 2014a). The development and implementation of these guidelines are similar to SAMAs in that they are procedural modifications that further reduce the risks of severe accidents.

### **5.3.8 Fukushima-Related Activities**

On March 11, 2011, a massive earthquake off the east coast of Honshu, Japan, produced a tsunami that struck the coastal town of Fukushima. The six-unit Fukushima Dai-ichi nuclear power plant was directly impacted by these events. The resulting damage caused the failure of several of the units' safety systems needed to maintain cooling water flow to the reactors. As a result of the loss of cooling, the fuel overheated, and there was a partial meltdown of the fuel contained in three of the reactors. Damage to the systems and structures containing reactor fuel resulted in the release of radioactive material to the surrounding environment (NRC 2013a).

In response to the earthquake, tsunami, and resulting reactor accidents at Fukushima Dai-ichi (hereafter referred to as the “Fukushima events”), the Commission directed the staff to convene an agency task force of senior leaders and experts to conduct a methodical and systematic review of the relevant NRC regulatory requirements, programs, and processes, including their implementation, and to recommend whether the agency should make near-term improvements to its regulatory system. As part of the short-term review, the task force concluded that, while improvements are expected to be made as a result of the lessons learned from the Fukushima events, the continued operation of nuclear power plants and licensing activities for new plants do not pose an imminent risk to public health and safety. During the time that the task force was conducting its review, groups of individuals and nongovernmental organizations petitioned the Commission to suspend all licensing decisions in order to conduct a separate, generic NEPA analysis to determine whether the Fukushima events constituted “new and significant information” under NEPA that must be analyzed as part of environmental reviews. The Commission found the request premature and noted, “In short, we do not know today the full implications of the [Fukushima] events for U.S. facilities.” However, the Commission found that if “new and significant information comes to light that requires consideration as part of the

ongoing preparation of application-specific NEPA documents, the agency will assess the significance of that information, as appropriate.” The Federal courts of appeal and the Commission have interpreted NEPA such that an EIS must be updated to include new information only when that new information provides “a seriously different picture of the environmental impact of the proposed project from what was previously envisioned” (NRC 2013a).

The NRC also ensured U.S. nuclear power plants [took action](#) to prepare for a Fukushima-like event. The [NRC told its inspectors](#) to independently assess each plant’s level of preparedness. The inspections covered procedures that compensate for extensive onsite damage, loss of all alternating current (AC) power, and seismic and flooding issues, as well as procedures for dealing with a damaged reactor.

The agency also created the Japan Lessons Learned-Project Directorate, or JLD, to lead the NRC efforts relating to Fukushima. The JLD’s approximately 20 full-time employees work with experts from across the agency. The JLD is directed by a steering committee made up of NRC senior managers.

The agency issued three Orders in March 2012 requiring U.S. reactors to:

- Obtain and protect additional emergency equipment, such as pumps and generators, to support all reactors at a given site simultaneously following a natural disaster
- Install enhanced equipment for monitoring water levels in each plant’s spent fuel pool.
- Improve/install emergency venting systems that can relieve pressure in the event of a serious accident (only for reactors with designs similar to the Fukushima plant).

The NRC strengthened the venting Order in 2013, requiring the vents to handle the pressures, temperatures, and radiation levels from a damaged reactor. The revised Order also calls for plants to ensure their personnel could operate the vents under those conditions (NRC 2013b).

The NRC has also asked all U.S. reactors to reconfirm their flooding and earthquake preparedness, as well as reanalyze their earthquake and flooding hazards. Other NRC activities include creating or revising rules related to maintaining key safety functions, if a plant loses all AC power, and several aspects of EP. The NRC’s Web site includes more information on Fukushima-related actions.

Significantly, while the Commission did impose additional safety requirements on operating reactors following Fukushima as provided in the preceding paragraphs, the Commission did so on the basis of a safety analysis conducted under the Backfit Rule, not the results of a SAMA analysis conducted for NEPA purposes. Those SAMA analyses had long assumed that prolonged station blackouts, such as the one experienced by the Fukushima reactors, could yield devastating consequences. Therefore, subsequent events, including the Fukushima events, have confirmed the Commission’s twin expectations that (1) future SAMA analyses would not likely find major plant improvements cost-beneficial and that (2) the NRC would continue to reduce risk at regulated facilities through its ongoing safety oversight (61 FR 28467; NRC 1996).

Given the many ways the NRC has and continues to address severe accident-related issues since the publication of the 1996 GEIS (Sections 5.3.5 to 5.3.8) and the 1989 SAMDA, the NRC concludes that the NRC does not need to reconsider SAMAs for LGS at the license renewal phase. See 10 CFR 51.53(c)(3)(ii)(L) and 10 CFR Part 51 Table B–1. As provided above,

10 CFR 51.53(c)(3)(ii)(L) and 10 CFR Part 51 Table B–1 rely on more than just the prior 1989 SAMDA Analysis; they also rest on the IPE, IPEEE, and CPI programs, to consider SAMAs in cases like LGS in which the NRC has already analyzed SAMAs. These plant-specific analyses did not identify major cost-beneficial mitigation measures that could substantially reduce offsite risk. Rather, they mostly uncovered minor improvements and programmatic fixes. The volume of plant-specific analyses cited by the Commission, and their ongoing nature, provide the type of “hard look” the Commission understood it must apply to the issue of SAMAs in its NEPA review for every license renewal proceeding (61 FR 28481). This approach is all the more reasonable in light of the Commission’s finding that the probability-weighted environmental impacts of severe accidents are small.

Furthermore, the 2013 GEIS mentions the vast operating experience to support the safety of U.S. nuclear power plants. As with any technology, experience generally leads to improved plant performance and public safety. This additional experience has contributed to improved plant performance (e.g., as measured by trends in plant-specific performance indicators), a reduction in operating events, and lessons learned that improve the safety of all of the operating nuclear power plants. The items above contribute to improved safety as do those safety improvements not related to license renewal such as generic safety issues (e.g., Generic Safety Issue 191 on sump performance). Thus, the performance and safety record of nuclear power plants operating in the United States, including Limerick, continues to improve. This is also confirmed by analysis which indicates that, in many cases, improved plant performance and design features have resulted in reductions in initiating event frequency, CDF, and containment failure frequency (NRC 2013a).

### 5.3.9 Evaluation of Other New Information

Additionally, both the applicant and the NRC must consider whether new and significant information affects environmental determinations in the NRC’s regulations, including the determination in 10 CFR 51.53(c)(3)(ii)(L) and Table B-1 that the agency need not reconsider SAMAs at license renewal if it has already done so in a NEPA document for the plant. See 61 FR 28467 to 28468; see *Marsh v. Oregon Natural Resources Council*, 490 U.S. 360, 373–374 (1989). As the Commission observed in CLI-13-7, the staff must consider whether there is new and significant information pertaining to the 1989 SAMDA analysis for Limerick’s original operating licenses in the SEIS. If new and significant information is available, “then the original SAMA analysis may be inadequate to satisfy NEPA at the license renewal stage, and may require supplementation.”

The 1989 SAMDA concluded, “The risks and environmental impacts of severe accidents at Limerick are acceptably low.” We have found no new information that would call into question the FES conclusion that:

[T]he risks of early fatality from potential accidents at the site are small in comparison with risks of early fatality from other human activities in a comparably sized population, and the accident risk will not add significantly to population exposure and cancer risks. Accident risks from Limerick are expected to be a small fraction of the risks the general public incurs from other sources. Further, the best estimate calculations show that the risks of potential reactor accidents at Limerick are within the range of such risks.

Furthermore, the 1989 SAMDA stated, “In light of these considerations, the staff has no clear basis at this time for concluding that modifications to the plant are justified for the purpose of further mitigating severe accident risks” and “The staff believes that the severe accident program is the proper vehicle for further review of severe accidents at nuclear power plants, including Limerick.”

New information is significant if it provides a seriously different picture of the impacts of the Federal action under consideration. Thus, for mitigation alternatives such as SAMAs, new information is significant if it indicates that a mitigation alternative would substantially reduce an impact of the Federal action on the environment. Consequently, with respect to SAMAs, new information may be significant if it indicated a given cost-beneficial SAMA would substantially reduce the impacts of a severe accident or the probability or consequences (risk) of a severe accident occurring. As discussed below, none of the information identified by the applicant, commenters on the EIS, waiver petitions, or the staff indicates that any SAMAs would be cost-beneficial and likely to result in such a reduction of risk. Rather, new information indicates that further SAMA analyses are unlikely to identify a SAMA that substantially reduces the risk of a severe accident, such as major, cost-beneficial plant improvements, and that the overall probability of a severe accident has decreased at LGS. The following evaluation for new and significant information is to determine whether any new and significant information exists that provides a “seriously different picture of the environmental impacts than what was previously envisioned” regarding the determination in 10 CFR 51.53(c)(3)(ii)(L) Table B-1 and the clarifications in the statement of considerations.

The applicant relied on these requirements and did not submit a new SAMA analysis for license renewal. Specifically, the applicant cited 10 CFR 51.53(c)(3)(ii)(L) and stated that no SAMA was submitted as none was required as a matter of law (Exelon 2011c). Because the Commission stated in the statements of consideration for 10 CFR 51.53(c)(3)(ii)(L) that the 1989 SAMDA was a SAMA for purposes of the rule (61 FR 28481), the staff concluded that Exelon’s treatment of SAMA in its ER was in accordance with the Commission’s regulations. Exelon evaluated whether there was new and significant information with respect to the Commission’s regulation (Exelon 2011c). Specifically, Exelon analyzed whether potentially new and significant information would change the results of its 1989 SAMDA Analysis review. The Commission stated in CLI-12-19 that if the staff identifies new information that could invalidate the 1989 SAMDA Analysis, it should evaluate whether that information is significant under NEPA. The staff reviewed the applicant’s submitted information to assess if any of that information invalidated the 1989 SAMDA and also assessed if any new and significant information has been found that would change the generic conclusion codified by the NRC that Exelon need not reassess SAMAs at LGS for license renewal (10 CFR 51.53(c)(3)(ii)(L)) and the staff need not reconsider SAMAS at this stage (10 CFR 51, Table B-1). The following summarizes Exelon’s evaluation and the staff’s review of this information. In addition, the staff’s independent assessment did not identify any other new and significant information with respect to those regulations or the 1989 SAMDA. Hence, no new and significant information has been found with respect to the generic conclusion codified by the NRC that LGS need not reassess SAMAs for license renewal (10 CFR 51.53(c)(3)(ii)(L)) because neither the staff nor applicant uncovered any new and significant information that suggested another cost-beneficial SAMA that could substantially reduce the risk of a severe accident at Limerick.

### **5.3.10 The Applicant’s Evaluation of New and Significant Information**

The applicant explained the process it used to identify any potentially new and significant information related to its existing 1989 SAMDA review in Section 5.3.1 of the ER (Exelon 2011c). As provided in Section 5.1 of Appendix E of the ER (Exelon 2011c), the new and significant assessment that Exelon conducted during preparation of this license renewal application included: (1) interviews with Exelon Generation subject-matter experts on the validity of the conclusions in the GEIS as they relate to LGS, (2) an extensive review of documents related to environmental issues at LGS, (3) a review of correspondence with State and Federal agencies to determine if the agencies had concerns relevant to their resource areas that had not been addressed in the GEIS, (4) a review of the results of LGS



environmental monitoring and reporting, as required by regulations and oversight of plant facilities and operations by State and Federal regulatory agencies (i.e., the results of ongoing routine activities that could bring significant issues to Exelon Generation's attention), (5) a review for issues relevant to the LGS application of certain license renewal applications that have previously been submitted to the NRC by the operators of other nuclear plants, and (6) a review of information related to severe accident mitigation. The significance and materiality of the new information identified through this process was discussed further in ER Section 5.3.2, "Significance of New Information." Exelon used a methodical approach to identify new and significant information and the staff finds Exelon's process adequate to ensure a reasonable likelihood that the applicant would be aware of any new and significant information.

The following four items of new information were identified and evaluated by the applicant by comparing assumptions for the 1989 SAMDA Analysis with assumptions used for current-day assessments of SAMAs:

- (1) population increase;
- (2) consideration of offsite economic cost risk;
- (3) changed criteria for assigning cost per person-rem averted; and
- (4) changed seismic hazard proposed by GI-199, "Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants."

Each item of new information was evaluated by the applicant and reviewed by the staff to determine whether it would materially alter the NRC's conclusions, as documented in the 1989 SAMDA Analysis. None of the items of new information led to the identification of a SAMA that was cost-beneficial. Consequently, the applicant's and staff's review of new and significant information with respect to the 1989 SAMDA review did not uncover any cost-beneficial plant improvements or SAMAs that would substantially decrease the risk of a severe accident. Instead, it indicated that no plant improvements that led to a substantial reduction in risk would be cost-beneficial. Therefore, the staff finds that none of the new information identified by the applicant affects the generic conclusion codified by the NRC that applicants need not reassess SAMAs for license renewal at facilities like LGS (10 CFR 51.53(c)(3)(ii)(L)) or the 1989 SAMDA analysis.

### 5.3.11 Risk

As provided in the discussion earlier regarding LGS's IPE, the CDF in the 2009 PRA Update ( $3.2 \times 10^{-6}$ ) is more than an order of magnitude less than the 1989 PRA Update (Exelon ER). Any change in the likelihood of accidents that release substantial amounts of radioactive material to the environment not only affects the human impact but also any environmental impact. For LGS, this decrease in CDF would demonstrate less impact to dose, economic, and environmental impact. The overall reduction in risk indicates that further SAMA analyses for LGS would be unlikely to uncover cost-beneficial major plant improvements or plant improvements that could substantially reduce risk. Furthermore, as improvements are implemented and risk decreases, not only is it more difficult to find a SAMA that yields significant reduction in CDF, but SAMAs which lead to a small reduction in risk are more likely not to be cost-beneficial. In light of the significant reductions in CDF at Limerick, no new information is likely to significantly affect the Commission's generic determination that the NRC need not reanalyze SAMAs at LGS for license renewal or invalidate the 1989 SAMDA.

### 5.3.12 Population Increase

A summary of Exelon's evaluation of population increase provided in the ER is as follows. Exelon provided population values within 50 miles growing from 6,819,505 in 1980 to 9,499,925 in 2030. They further assumed that this 39 percent increase in population would yield an approximate 39 percent increase in total off-site dose values. Assuming 2030 population numbers, the applicant determined that the highest benefit/cost ratio SAMDA (ATWS Vent) based on cost per person-rem averted would still not be cost-beneficial in the 1989 SAMDA Analysis.

There were also public comments that provided site specific information regarding population increases and economics around Limerick Generating Station. Comment 30-39-PA indicates that the impact of a severe accident at Limerick erroneously relies on data from an analysis done at TMI, a site that involves a markedly different and less economically developed area than the area within 50 miles of Limerick, which includes the densely populated urban environments of Philadelphia, PA; Camden and Trenton, NJ; and Wilmington, DE.

The staff reviewed the calculation provided by the applicant and considered the public comments regarding population growth.

GEIS section E.3.9.2 provides an evaluation of the population increase for multiple plants to determine the effect of population increases on the plants evaluated in the GEIS. The 2013 GEIS states,

To adjust the impacts estimated in the NUREGs and NUREG/CRs to the mid-year of the assessed plant's license renewal period, the information (i.e., exposure indexes [EIs]) in the 1996 GEIS can be used. The EIs adjust a plant's airborne and economic impacts from the year 2000 to its mid-year license renewal period based on population increases. These adjustments result in anywhere from a 5- to a 30-percent increase in impacts, depending upon the plant being assessed. Given the range of uncertainty in these types of analyses, a 5- to 30-percent change is not considered significant. Therefore, the effect of increased population around the plant does not generally result in significant increases in impacts.

Exelon's population calculation was reviewed by the staff and found to be reasonable. Furthermore, the 39-percent increase in impacts determined at Limerick was more conservative than any of the other plants evaluated in the GEIS (a maximum of a 30-percent increase). Thus the Exelon calculation was determined to be reasonable and found acceptable by the staff. The staff also confirmed that the population increase would not make any of the 1989 SAMDAs cost-effective.

The staff acknowledges that a more precise estimate of this relationship could be obtained by using the MACCS2 code, performing a level 3 PRA, and completing a new SAMA analysis. However, the staff notes that improvements or mitigating strategies as a result of population increases at Limerick would be implemented as part of the current licensing basis in the plant's emergency plan. A key component of the mission of the NRC is to ensure adequate protective actions are in place to protect the health and safety of the public. Protective actions are taken to avoid or reduce radiation dose and are sometimes referred to as protective measures. The overall objective of emergency preparedness (EP) is to ensure that the nuclear power plant operator is capable of implementing adequate measures to protect public health and safety in the event of a radiological emergency. As a condition of their license, operators of these nuclear power plants must develop and maintain EP plans that meet comprehensive NRC EP requirements. Increased confidence in public protection is obtained through the combined inspection of the requirements of EP and the evaluation of their implementation. The NRC

assesses the capabilities of the nuclear power plant operator to protect the public by requiring the performance of a full-scale exercise at least once every 2 years that includes the participation of government agencies. These exercises are performed in order to maintain the skills of the emergency responders and to identify and correct weaknesses. They are evaluated by NRC inspectors and FEMA evaluators. Between these 2-year exercises, additional drills are conducted by the nuclear power plant operators that are evaluated by NRC inspectors (NRC Website). An example where population is evaluated in the current term is found in the Limerick Generating Station Evacuation Time and Plume Exposure Pathway Estimates using 2010 Census population data (Exelon 2013b). Thus, Limerick's population-related mitigating alternatives are considered in the current term regardless of whether they are pursuing license renewal or not. The 2013 GEIS evaluation of population and economic consequences is described in Section 5.3.13.

Since Limerick's calculation was reasonable, more conservative than any of the population increase evaluations in the GEIS, and mitigation alternatives as a result of population increases are implemented in the current term, the staff finds Limerick's evaluation acceptable and population increases at Limerick are not new and significant information. Moreover, even if population increase led to another SAMA becoming cost-beneficial, that SAMA would still not likely result in a substantial reduction in offsite risk, given the substantial reduction in CDF at Limerick since the 1989 SAMDA analysis. In addition, the implementation of Limerick's improvements to reduce the CDF makes it more difficult to identify additional cost beneficial SAMAs, thus, it is unlikely that further consideration of economic risk would yield many cost-beneficial SAMAs. Consequently, the population increase within 50 miles of LGS does not suggest that additional cost-beneficial SAMAs could substantially reduce the risk of severe accidents and therefore does not constitute new and significant information with respect to the 1989 SAMDA or the generic conclusion codified by the NRC that SAMAs need not be reassessed at facilities like LGS for license renewal (10 CFR 51.53(c)(3)(ii)(L)).

### **5.3.13 Consideration of Offsite Economic Cost Risk**

The applicant indicated that the 1989 SAMDA Analysis did not consider offsite economic cost risk. To account for the offsite economic cost risk, the applicant estimated these impacts by using data from the TMI license renewal application (Amergen 2008; Exelon 2011b). Using TMI data, the applicant determined offsite economic cost risk was approximately 70 percent larger than the offsite exposure cost risk at TMI. In order to apply the TMI data to LGS, the applicant applied a factor of 3 (300 percent) to analyze the impact on the 1989 SAMDA Analysis for LGS. Applying a factor of 3 reduction to the closest potential cost-beneficial SAMDA (ATWS Vent) would not result in a cost-beneficial SAMDA (Exelon 2011c).

The staff assessed the calculation provided by the applicant. The staff confirmed the applicant's value by using similar ratios to evaluate the cost impact of onsite exposure and economic costs for LGS (\$2,000 and \$400,000, respectively) to obtain the total offsite and onsite economic and exposure cost. The net value was determined by the staff to be -\$284,000, indicating that the ATWS Vent SAMDA was still not cost-effective. Since this was applied to the SAMDA (ATWS Vent) that was closest to being cost-effective, none of the SAMDAs identified in the 1989 SAMDA Analysis would be cost-effective.

Additional conservatisms not mentioned by the applicant include converting the \$3,000,000 cost of the ATWS Vent SAMA to 2012 dollars that would increase the cost of the SAMDA to over \$5,000,000 (assuming similar engineering and construction practices). Considering the large conservatisms in the Exelon analysis, it is reasonable. Moreover, even if consideration of offsite economic risk increase led to another SAMA becoming cost-beneficial, that SAMA would still not likely result in a substantial reduction in offsite risk, given the substantial reduction in CDF at

Limerick since the 1989 SAMDA analysis. In addition, the implementation of Limerick's improvements to reduce the CDF makes it more difficult to identify additional cost beneficial SAMAs, therefore, it is unlikely that further consideration of economic risk would yield many cost-beneficial SAMAs. Therefore, consideration of offsite costs would not likely lead to discovery of a cost-beneficial SAMA that would substantially reduce risk of severe accidents and, therefore, does not constitute new and significant information with respect to the 1989 SAMDA or the generic conclusion codified by the NRC that applicants need not reassess SAMAs for facilities such as LGS for license renewal.

There were also public comments that provided site-specific information regarding offsite economic cost risk around Limerick Generating Station. Comment 30-39-PA indicates that the impact of a severe accident at Limerick erroneously relies on data from an analysis done at TMI. The commenter states that it was erroneous to rely on TMI data because TMI involves a markedly different and less economically developed area than the area within 50 miles of Limerick, which includes the densely populated urban environments of Philadelphia, PA; Camden and Trenton, NJ; and Wilmington, DE. The commenter also stated that the ER ignores new and significant information regarding the likely cost of cleanup from a severe accident in a metropolitan area like Philadelphia and thus understates the impact of a properly conducted economic analysis on the environmental consequences of a severe accident at Limerick.

The GEIS evaluated the economic impacts of accidents using plant-specific information. Chapter 5 of the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), Volumes 1 and 2 (NRC 1996), assessed the impacts of postulated accidents at nuclear power plants on the environment. The postulated accidents included design-basis accidents and severe accidents (e.g., those with core damage). The impacts considered included dose and health effects of accidents (Sections 5.3.3.2 through 5.3.3.4), economic impacts of accidents (Section 5.3.3.5), and the effect of uncertainties on the results (Section 5.3.4). Similar to Limerick:

...the performance and safety record of nuclear power plants operating in the United States continues to improve. This is also confirmed by analysis which indicates that, in many cases, improved plant performance and design features have resulted in reductions in initiating event frequency, core damage frequency, and containment failure frequency (NRC 2013a).

To assess the impacts from the airborne pathway, the 1996 GEIS relied on severe accident analyses provided in 28 nuclear power plants (including Limerick) that included severe accident analyses in their plant-specific EISs. These 28 nuclear power plants are provided in Table 5-1 in the 1996 GEIS. These plant-specific EISs used site-specific meteorology, land topography, population distributions, and offsite emergency response parameters, along with generic or plant-specific source terms, to calculate offsite health and economic impacts. The offsite health effects included those from airborne releases of radioactive material and contamination of surface water and groundwater. The 1996 GEIS used the environmental impact information from the 28 plant-specific EISs and a metric called the exposure index (EI) to (1) scale up the radiological impact of severe accidents on the population due to demographic changes from the time the original EIS was done until the year representing the mid-license renewal period and (2) estimate the severe accident environmental impacts for the earlier plants (whose EISs did not include a quantitative assessment of severe accidents). The EI method uses the projected population distribution around each nuclear power plant site at the middle of its license renewal period and meteorology data for each site to provide a measure of the degree to which the population would be exposed to the release of radioactive material resulting from a severe accident (i.e., the EI method weights the population in each of 16 sectors around a nuclear power plant by the fraction of time the wind blows in that direction on an annual basis). The EI

metric was also used to project economic impacts at the mid-year of the license renewal period. A more detailed description of the EI method is contained in Appendix G of the 1996 GEIS. The use of the EI method remains valid. Regarding economic impacts, the GEIS specifically provides that the “probability-weighted consequences of atmospheric releases, fallout onto open bodies of water, releases to ground water, and societal and economic impacts from severe accidents are small for all plants.”

The 2013 GEIS compares the CDFs that formed the basis for the 1996 GEIS, and offsite doses directly from the 1996 GEIS, to the newer information. The comparison is done for pressurized water reactors (PWRs) and boiling water reactors (BWRs) and covers each of the plants listed in Table 5.1 of the 1996 GEIS, which included Limerick Units 1 and 2. Changes in source terms (i.e., the quantity, form, and timing of radioactive material released to the environment) are assessed in Section E.3.3 of the 2013 GEIS. The 2013 GEIS concluded, “Given the discussion in this appendix, the staff concludes that the reduction in environmental impacts from the use of new information (since the 1996 GEIS analysis) outweighs any increases resulting from this same information.”

Therefore, the 2013 GEIS analysis using plant-specific information was consistent with the evaluation for Limerick. The staff acknowledges that a more precise estimate of this relationship could be obtained by using the MACCS2 code, performing a Level 3 PRA, and completing a new SAMA analysis using site-specific data. However, most mitigation alternatives are identified at the Level 1 and Level 2 stages because relevant Level 1 and Level 2 improvements are physical or process changes to the plant to protect the reactor core in the case of Level 1 PRA, or containment in the case of Level 2 PRA. The Level 3 portion deals with the magnitude of the consequences. The change in magnitude of the consequences could possibly make some mitigation alternatives cost-beneficial. However, most of the benefit is ascertained by focusing on protecting the reactor core and the containment in the Level 1 and Level 2 stages. As provided in Section 5.3.17, specific improvements at Limerick have been implemented to drive the risk downward. Furthermore, if there is higher economic cost and dose consequence, more SAMAs could become cost-effective, however no SAMA is expected to be a major design change that will reduce the risk significantly because of the continuous implementation of improvements since the 1989 SAMDA.

The result of the applicant’s and staff’s analysis in this case is consistent with the GEIS. As provided in GEIS Table 3.8-8, the populations at both Limerick and TMI are considered high. Furthermore, the GEIS states, “The expected costs resulting from a severe accident at nuclear power plants during their renewal periods have been predicted from evaluations presented in 27 FESs. Estimates of the extent of land contamination have also been presented. In both cases, the conditional impacts are judged to be of small significance for all plants” (NRC 2013a).

#### **5.3.14 Changed Criterion for Assigning Cost Per Person-Rem Averted**

The 1989 SAMDA Analysis calculated the benefit of each proposed SAMDA based on a criterion of \$1,000 per person-rem averted. Using a value of \$2,000 per person-rem averted would increase the threshold and potentially result in new cost-beneficial SAMDAs. As described in the 1989 SAMDA Analysis, changing the cost/benefit threshold using the \$2,000 per person-rem averted conversion would still not result in this or any other of the 1989 SAMDAs becoming cost-beneficial. Therefore, Exelon concludes that changing the criterion for assigning benefit (i.e., cost per person-rem averted) from \$1,000 per person-rem averted to \$2,000 per person-rem averted would not change the conclusions in the 1989 SAMDA Analysis. Hence, the new information represented by the changed criterion for assigning cost per person-rem averted was judged not to be significant by Exelon.

The staff reviewed the LGS analysis provided in the License Renewal ER and agrees that changing the criterion for assigning cost per person-rem averted would not result in a cost-beneficial SAMDA or change the conclusions in the 1989 SAMDA. As provided above, the ATWS Vent has the lowest cost/benefit ratio for the set, and it represents the SAMDA with the largest benefit potential. Even for this limiting SAMDA, changing the cost/benefit threshold to \$2,000 per person-rem averted would still not result in this or any other of the SAMDAs becoming cost-beneficial. Since this was applied to the SAMDA (ATWS Vent) closest to being cost-effective, none of the 1989 SAMDAs are cost-effective. This conclusion is even more reasonable given that the 2013 GEIS concluded that the population dose estimates presented in Table E-3 demonstrate the conservatism in the older studies, both from the standpoint of reduced population dose from more recent estimates and the conservatism built into the earlier methodology (NRC 2013a). Additional conservatisms not mentioned by the applicant include that converting the \$3,000,000 cost of the ATWS Vent SAMA to 2012 dollars would increase the cost of the SAMDA to over \$5,000,000 (assuming similar engineering and construction practices). Considering all of the large conservatisms in the analysis, the applicant's analysis is reasonable. Moreover, even if the increase in cost per person-rem averted led to another SAMA becoming cost-beneficial, that SAMA would still not likely result in a substantial reduction in offsite risk, given the substantial reduction in CDF at Limerick since the 1989 SAMDA analysis. Therefore, consideration of the increased costs per person-rem averted would not likely lead to discovery of a cost-beneficial SAMA, let alone one that would substantially reduce offsite risk and therefore does not constitute new and significant information with respect to the generic conclusion codified by the NRC that Exelon need not reassess LGS SAMAs for license renewal.

### 5.3.15 Changed Seismic Hazard Proposed in GI-199

On June 9, 2005, the NRC opened GI-199 to assess the implications of updated seismic data and methods for Central and Eastern U.S. (CEUS) operating plants. The staff's confirmatory analysis of the seismic hazard concluded that the calculated seismic hazard for some operating plants in the CEUS had increased. The NRC issued IN 2010-18 to nuclear power plants and independent spent fuel storage installations. This information notice stated that the NRC would follow the appropriate regulatory process to request that operating plants provide specific information about their facilities to enable the staff to complete the regulatory assessment and to identify and evaluate candidate backfits. NRR developed a draft Generic Letter to request needed data from power reactor licensees. The NRC originally intended the request to apply only to power reactor licensees in the CEUS, but, in light of the March 2011 Japanese earthquake, NRR expanded the scope of the request to include all U.S. power reactor licensees. On March 12, 2012, the NRC issued a request for information pursuant to 10 CFR 50.54(f) (hereafter referred to as the 50.54(f) letter) (Agencywide Documents Access and Management System (ADAMS) Accession No. ML 12053A340). The purpose of that request was, in part, to gather updated information concerning the seismic hazards at operating reactor sites and to enable the NRC staff to determine whether licenses should be modified, suspended, or revoked. The "Required Response" section of Enclosure 1 of the 50.54(f) letter indicated that licensees and construction permit holders should provide a Seismic Hazard Evaluation and Screening report within 1.5 years from the date of the 50.54(f) letter for CEUS nuclear power plants and within 3 years of the 50.54(f) for western United States plants (NRC 2012f).

Limerick provided its submittal regarding the new seismic hazard. Limerick's response concluded:

For LGS, the Safe Shutdown Earthquake envelopes the ground motion response spectra (GMRS) in the frequency range from 1 to 10 Hz. Therefore per the SPID Sections 3.2 and 7 (Reference 3), LGS screens out of further seismic risk assessments in response to NTTF 2.1: Seismic, including seismic probabilistic risk assessment (SPRA) or seismic margin assessment (SMA), as well as spent fuel pool integrity evaluations. Additionally, LGS screens out of the Expedited Seismic Evaluation Process (ESEP) interim action per the 'Augmented Approach' guidance document, Section 2.2 (Reference 4). Due to the GMRS exceeding the SSE in the frequency range above 10 Hz, high-frequency confirmations are needed for LGS in accordance with the SPID Sections 3.2 and 3.4 (Reference 3). Actions to address NTTF 2.1: Seismic for central and eastern United States nuclear plants will be performed in accordance with the schedule provided in the April 9, 2013, letter from the industry to the NRC (Reference 5), as agreed to by the NRC in the May 7, 2013, letter to the industry (Reference 23). [Exelon 2014b]

In a May 9, 2014, letter titled, "Screening And Prioritization Results Regarding Information Pursuant To Title 10 Of The *Code Of Federal Regulations* 50.54(F) Regarding Seismic Hazard Re-Evaluations For Recommendation 2.1 Of The Near-Term Task Force Review Of Insights From The Fukushima Dai-Ichi Accident," Limerick is conditionally screened in as a group 3 plant which means:

Group 3 plants have GMRS to SSE ratios that are greater than 1, but the amount of exceedance in the 1–10 Hz range is relatively small, and the maximum ground motion in the 1–10 Hz range is also not high. Given the limited level of exceedance of the Group 3 plants, staff is evaluating the need for licensees to conduct a seismic risk evaluation in order for the staff to complete its regulatory decision making. However, the staff has had insufficient review time with the recently submitted seismic hazard submittals to reach a conclusion. After further review of the seismic hazard re-evaluations and the Expedited Approach submittals, the staff will decide which Group 3 plants need to complete a risk evaluation. Risk evaluations for Group 3 plants are due by December 31, 2020. [NRC 2014b]

As provided above, these evaluations and actions are ongoing and the regulatory response is independent of whether or not the plant is seeking license renewal or not. The applicant indicated that GI-199 issues related to the seismic hazard will not result in postulated accident scenarios not already considered for LGS. Seismologists are frequently refining seismic methodologies and results, which may increase the estimated frequency of seismic events with very low probability. Results from the LGS June 1989 PRA Update indicate that the contribution from seismic risk to the total CDF is approximately 25 percent, with fire risk contributing 31 percent to the total risk (Exelon 2011c). Therefore, based on the June 1989 Update, the major risk contributors for external hazards are approximately equal to the CDF computed for internal events only. Based on the ER, total CDF for internal and external events can generally be approximated by multiplying the CDF for internal events by a factor of 2. With a multiplication factor of 2 applied to the CDF estimated by the current model of record ( $\text{CDF}=3.2 \times 10^{-6}$ ), the revised CDF that accounts for both internal and external hazards ( $\text{CDF}=6.4 \times 10^{-6}$ ) would still be a factor of 6.5 below the value used in the 1989 SAMDA Analysis ( $\text{CDF}=4.2 \times 10^{-5}$ ). This demonstrates the excess margin in the 1989 SAMDA Analysis. A possible increase in risk beyond this assumption caused by an even larger seismic CDF would be more than offset by the factor of 6.5 reduction in the current CDF. Therefore, Exelon concludes that the new information represented by the changed seismic hazard proposed in GI-199 is not significant because it would not materially alter the SAMDA conclusions in the 1989 SAMDA (Exelon 2011c).

## Environmental Impacts of Postulated Accidents

The staff reviewed the method the applicant used in determining the external events multiplier and its use and determined that it was consistent with the guidance provided in Nuclear Energy Institute (NEI) 05-01. Limerick's analysis is also consistent with similar analyses provided in section E.3.2.3 of the 2013 GEIS. The staff also confirmed that the risk has decreased since the 1989 SAMDA and agrees with Exelon's analysis that the new information represented by the changed seismic hazard proposed in GI-199 is not significant because it would not materially alter the SAMDA conclusions in the 1989 SAMDA Analysis. Considering the large conservatism in the 1989 SAMDA Analysis, the applicant's approach is reasonable. Moreover, even if the change in seismic hazard led to another SAMA becoming cost-beneficial, that SAMA would still not likely result in a substantial reduction in offsite risk, given the substantial reduction in CDF at Limerick since the 1989 SAMDA analysis. Therefore, consideration of GI-199 is not likely to lead to the discovery of a cost-beneficial SAMA that would substantially reduce offsite risk and, therefore, does not constitute new and significant information with respect to the generic conclusion codified by the NRC that SAMAs need not be reassessed at LGS for license renewal.

However, the NRC continues to review earthquakes as part of the reactor oversight process. As provided in the conclusions in Exelon's response to the 50.54(f) letter regarding Near-Term Task Force (NTTF) recommendation 2.3 (NRC 2011c):

In response to NTTF 2.3, the 50.54(f) letter (Reference 1) also requested licensees to perform seismic walkdowns in order to, in the context of seismic response: (1) verify that the current plant configuration is consistent with the licensing basis; (2) verify the adequacy of current strategies, monitoring, and maintenance programs; and (3) identify degraded, nonconforming, or unanalyzed conditions. Exelon committed to and performed seismic walkdowns in accordance with the seismic walkdown guidance (Reference 27) as initially documented and supplemented in Exelon Correspondence Numbers RS-12-171 and RS-13-138 (References 11 and 29), respectively. The remaining walkdowns for initially inaccessible equipment are scheduled to be completed during the next Unit 1 Refueling Outage, 1 R 15, or during the next scheduled system outage window, whichever is applicable. The results will be reported to the NRC after completion of the follow-on walkdowns. [Exelon 2014b]

Exelon further confirmed that seismic vulnerabilities (similar to SAMAs) identified in the Limerick IPEEE have been implemented:

Based on the successful completion of seismic walkdowns for all components to date in response to NTTF 2.3, and the lack of adverse seismic conditions identified, Exelon has directly concluded that the LGS current plant configuration is consistent with the plant licensing basis and can safely shut down the reactor and maintain containment integrity following the design-basis SSE event. Additionally, the findings of the seismic walkdown program indirectly verify that the current LGS strategies, monitoring, and maintenance programs are adequate for ensuring seismic safety consistent with the licensing basis. Plant vulnerabilities and commitments identified in the LGS IPEEE (Reference 10) were reviewed as part of the NTTF 2.3 seismic walkdowns (References 11 and 29). The seismic walkdown reports confirmed that there are no outstanding IPEEE vulnerabilities or commitments, and all previously identified IPEEE vulnerabilities and commitments have been resolved (References 11 and 29). [Exelon 2014b]

Exelon also confirmed that Limerick has significant seismic margin beyond design basis.

An evaluation of beyond-design-basis ground motions was performed for LGS as part of the IPEEE program. The LGS IPEEE program demonstrated plant-level seismic capacity, which can be expressed in terms of a HCLPF. This plant-level



seismic capacity is defined in Section 3.3.2 of the SPID (Reference 3) as the IHS. The LGS IPEEE seismic evaluation was initially submitted as a reduced scope SMA (Reference 10). Subsequent to the IPEEE submittal, LGS responded to a series of Requests for Additional Information (RAI) and provided additional information that justified the LGS IPEEE SMA as achieving the intent of a focused-scope EPRI SMA anchored at 0.3g PGA (References 19, 20, and 21). The IHS for LGS is defined by the median-shaped NUREG/CR-0098 spectra for rock sites per LGS IPEEE seismic demand analysis (Reference 22). As a result of the LGS IPEEE seismic evaluations, plant processes for seismic housekeeping were made to enhance the reliability and safety of the plant. There are no outstanding IPEEE vulnerabilities or commitments, and all previously identified IPEEE vulnerabilities and commitments have been resolved (Reference 11). The results of the LGS IPEEE showed there were no vulnerabilities to severe accident risk from external events, including seismic events (Reference 10). Based on the results of the IPEEE program for LGS, it may be qualitatively concluded that the plant has significant seismic margin beyond the design basis (Reference 28, Section 2.3.4) as evidenced by a comparison between the site SSE and the IHS in Figure 5.4-1. [Exelon 2014b]

Exelon's confirmation regarding Limerick having significant seismic margin beyond the design basis reinforces the NRC staff conclusion that further evaluation of GI-199 related issues is not likely to lead to the discovery of a cost-beneficial SAMA that would substantially reduce offsite risk and, therefore, does not constitute new and significant information with respect to the 1989 SAMDA or the generic conclusion codified by the NRC that SAMAs need not be reassessed at LGS for license renewal.

The staff has also estimated the seismic CDFs (ADAMS No. ML100270756) using various seismic hazard curves. The values cited for Limerick indicate that the seismic CDF is higher than used in the 1989 SAMDA. Note that these values were calculated using a simplified conservative methodology and have very large uncertainties, and more realistic values may be calculated by Limerick as a result of the NRC letter dated May 9, 2014, "Seismic Screening and Prioritization Results Regarding Information Pursuant to Title 10 of the *Code of Federal Regulations* 50.54(f) Regarding Seismic Hazard Reevaluations for Recommendation 2.1 of the Near-Term Task Force Review of Insights" (NRC 2014c). Even though the new seismic CDF is larger than the seismic value used in 1989, Fukushima orders have essentially bounded anything seismically the NRC could do as a result of SAMA analysis since Limerick has implemented the IPEEE seismic recommendations and performed a recent thorough formal seismic walkdown as provided above. Thus, it is unlikely that Exelon will identify any cost-beneficial SAMAs that would substantially reduce the off-site seismic risk and, therefore, does not constitute new and significant information with respect to the generic conclusion codified by the NRC that SAMAs need not be reassessed at LGS for license renewal.

### 5.3.16 Additional Staff Evaluation for New and Significant Information

The staff reviewed records of public meetings and correspondence related to the application and compared information presented by the public with information considered in NUREG-1437 to determine if there was any new and significant information with respect to the generic conclusion codified by the NRC, which indicates that SAMAs need not be reassessed at LGS for license renewal (10 CFR 51.53(c)(3)(ii)(L)). This consideration included an evaluation of whether any new information invalidated the 1989 SAMDA analysis.

### 5.3.17 Cost-Effective SAMAs Identified at Other Plants

SAMA evaluations have been completed for operating plant license renewal applications that were approved for over 75 nuclear power plants. Numerous potentially cost-beneficial SAMAs have been identified in U.S. operating nuclear power plant license renewal applications that have been approved. Most of these SAMAs are low-cost improvements such as modifications to plant procedures or training, minimal hardware changes to enable cross-tying existing pipes or electrical buses, and using portable equipment (e.g., generators and pumps) as backups.

Many of the SAMA recommendations identified from other plants are compiled in an NRC published paper entitled “Perspectives on Severe Accident Mitigation Alternatives for U.S. Plant License Renewal” (NRC 2009). The paper concludes, “SAMAs that are found to be potentially cost-beneficial tend to be low-cost improvements such as modifications to plant procedures or training, minimal hardware changes, and use of portable equipment.” These potential cost-beneficial SAMAs are further evaluated and many times not found cost-beneficial because sufficient risk is not eliminated by the modification (which was assumed) or other factors. Furthermore, the staff found that SAMA analyses that have been performed to date have found SAMAs that were cost-beneficial, or at least possibly cost-beneficial subject to further analysis, in approximately half of the plants. In general, the cost-beneficial SAMAs were identified and considered by the licensee under the current operating license. In several cases, SAMA-related modifications were implemented at LGS, further reducing that probability of an additional SAMA substantially reducing severe accident risk (PECO 1992)(Exelon 2014). Examples are provided below.

As provided in the statement of considerations for 10 CFR 51.53(c)(3)(ii)(L), in forming its basis for determining which plants needed to submit a SAMA, the Commission noted that all licensees had undergone, or were in the process of undergoing, more detailed site-specific severe accident mitigation analyses through processes separate from license renewal, specifically the CPI, IPE, and IPEEE programs (61 FR 28467). These programs for LGS were discussed earlier. In light of these studies, the Commission stated that it did not expect future SAMA analyses in the license renewal stage to uncover “major plant design changes or modifications that will prove to be cost-beneficial” (61 FR 28467). As discussed above, the NRC’s experience in completed license renewal proceedings has confirmed this assumption (NRC 2009). As a result, potentially cost-beneficial SAMAs at other facilities do not constitute new and significant information with respect to the 1989 SAMDA or the NRC’s determination not to perform a second SAMA analysis at license renewal in the event the agency has previously considered such analysis, because even if cost-beneficial the NRC staff’s experience shows that a new SAMA analysis will not likely yield a major reduction of risk, particularly in light of the many improvements already implemented at Limerick.

From the public comments (NRDC 2011) there was a recommendation that potential cost-effective SAMAs identified at other similar plants be addressed at LGS. Specifically, comment 30-38 from NRDC stated that Exelon omitted a required analysis of new and significant information regarding the potential new SAMAs previously considered for other BWR Mark II Containment reactors from its ER. In response, the staff sent a letter dated February 12, 2014 (NRC 2014a), to Exelon requesting additional information regarding potentially new SAMAs previously considered for other BWR Mark II Containment reactors. Exelon responded in a letter dated March 12, 2014 (Exelon 2014). In their response, Exelon provided a summary of the evaluation of each potentially cost-beneficial SAMA identified in the February 12, 2014, RAI. The evaluation identifies and eliminates from further consideration SAMAs that have already been implemented at Limerick. Then, the percent change in the maximum averted cost-risk (MACR) from implementing each remaining SAMA at the plant for

which it was potentially cost-beneficial is estimated using cost benefit information from the respective plant's ER from which the SAMA was taken, and/or the GEIS. To determine whether the SAMA should be considered "new and significant information" with respect to the 1989 Limerick SAMDA analysis, the percent change in the MACR was verified to be less than 50 percent. Exelon selected a 50-percent reduction in the MACR as the threshold for what may be "significant" based on criteria provided in the American Society of Mechanical Engineers (ASME)/American Nuclear Society PRA Standard, NUMARC 93-01 and NEI 00-04 (Exelon 2014).

Changes at Limerick that are functionally equivalent but not identical to those named in a SAMA are also identified in the RAI response. Exelon determined that either the SAMA had already been implemented at Limerick or that there were no SAMAs that exceeded the 50-percent reduction in the MACR. Thus, there were no SAMAs identified at other plants with Mark II containments that were determined to be "new and significant" at Limerick. Hence, further assessment of such information was not needed (Exelon 2014).

The staff reviewed the information provided by Exelon. The staff determined that either the SAMA had already been implemented at Limerick or that there were no SAMAs that exceeded the 50-percent reduction in the MACR. The staff also found exceeding a 50-percent reduction in the MACR was a reasonable significance value based on the guidance provided in the ASME standard, NUMARC 93-01, and NEI 00-04. This determination is particularly reasonable in light of the already significant reductions achieved in severe accident risk at Limerick since 1989. Even 50-percent reduction in current MACR would represent a small reduction in estimated risk at the facility in 1989 because the CDF today is an order of magnitude smaller than used in the 1989 SAMDA. . Thus, there were no SAMAs identified at other plants with Mark II containments that were determined to be "new and significant" at Limerick.

The staff noted that many of the potential cost-beneficial SAMAs identified at the other Mark II containment plants were for SAMAs relating to loss of power. According to the LGS IPE, loss of power provided 31 percent of the CDF at Limerick (PECO 1992).

Table 6.2-2 of the Limerick IPE (PECO 1992) listed four improvement items that were planned as part of the IPE and which were implemented prior to or shortly after the 1992 IPE submittal. Three of the improvements related to loss of power. These improvements are listed below along with their current status.

- (1) Create procedure to crosstie 4-kV electrical buses. (Capability maintained in current site response procedures which allow for alignment of alternate power supply for any 4-kV safeguard bus using any diesel generator.)
- (2) Create procedure to power C & D ESW pumps from Unit 1, Division 3 & 4 respectively. (Capability maintained in a current station procedure.)
- (3) Create cross connection between diesel driven fire pump and fire water system and RHR. (Capability maintained in a current station procedure.)

Thus Limerick has continued to improve the risk associated with loss of power by implementing related items.

The staff further notes that Limerick is implementing the Fukushima orders and provided the Limerick Generating Station, Units 1 and 2, "Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)," dated February 28, 2013 (RS-13-022). This order specified that these strategies must be capable of mitigating a simultaneous loss of all AC power and loss of normal access to the

ultimate heat sink and have adequate capacity to address challenges to core cooling, containment, and SFP cooling capabilities at all units on a site subject to the Order.

By letter dated January 10, 2014, the NRC staff determined that, based on a review of Exelon's plan, including the 6-month update dated August 28, 2013, and information obtained through the mitigation strategies audit process, the NRC concludes that the licensee has provided sufficient information to determine that there is reasonable assurance that the plan, when properly implemented, will meet the requirements of Order EA-12-049 at Limerick Generating Station, Units 1 and 2 (NRC 2014b). Thus, as a result of this order, Limerick will be implementing several improvements or mitigation alternatives whether they are cost-beneficial or not.

Therefore, the staff does not expect further SAMA analyses at the license renewal stage to uncover major plant design changes or modifications that will prove to be cost-beneficial. As discussed above, the NRC's experience in completed license renewal proceedings has confirmed this assumption (Ghosh 2009). As a result, potentially cost-beneficial SAMAs at other facilities do not constitute new and significant information with respect to Limerick's 1989 SAMDA or the NRC's determination not to perform a second SAMA analysis at license renewal in the event the agency has previously considered the issue, because, even if cost-beneficial, the NRC staff's experience shows that they will not likely yield a major reduction of risk, particularly in light of the many improvements already implemented at Limerick. Moreover, in light of Limerick's reduction in CDF and the propensity of cost-beneficial SAMAs to further eliminate risk and thereby make it less likely for other SAMA candidates to be cost-beneficial, it is unlikely that further consideration of these other SAMA candidates would yield many cost-beneficial SAMAs.

### 5.3.18 Current State of the Art Knowledge for Performing SAMA Analysis

Modern SAMA analysis has evolved over the years. Currently, SAMA analyses typically follow the guidance provide in NEI guidance (NEI O5-01), which is endorsed by the NRC in Regulatory Guide 4.2, supplement 1 (NRC 2013c). Offsite consequence codes used in SAMA analyses use plant-specific inputs related to core inventory, meteorology, population, evacuation, and economic impacts.

A current detailed SAMA analysis has the ability to analyze numerous plant-specific variables and the sensitivity of a SAMA analysis to these variables. In the scoping comments, numerous variables were identified that could potentially cast doubt on the results of the initial 1989 SAMDA Analysis. To thoroughly evaluate all of these variables would require a *de novo* SAMA analysis, which is not required by 51.53(c)(3)(ii)(L) and Table B-1. However, the applicant evaluated some of the changes at LGS that could have a significant impact on the SAMDA analysis such as population increase, consideration of offsite economic cost risk, changed criteria for assigning cost per person-rem averted, and changed seismic hazard proposed by GI-199 and found that none of the items of new information was found to be significant. As provided earlier, the staff independently reviewed the applicant's information, independently evaluated other potentially new and significant information, and determined that they would not lead to identification of a SAMA that would significantly reduce offsite risks, but acknowledges that a more precise answer could be found with a detailed modern SAMA analysis. However, the staff believes that this more precise answer would still not identify significant cost-beneficial SAMAs. As explained above, new and significant information must provide a seriously different picture of the consequences of the Federal action under consideration. With respect to SAMAs, new information may be significant if it indicated a given SAMA would substantially reduce the probability or consequences of a severe accident. None of the information identified by the applicant or the staff indicates that any SAMAs would be

likely to lead to such results. Instead, as discussed above, new information indicates that further SAMA analyses are unlikely to identify many cost-beneficial SAMAs or major, cost-beneficial plant improvements, particularly in light of the substantial reduction in the CDF for Limerick since the 1989 SAMDA analysis.

The GEIS evaluated some of the differences in older methods and newer methods for performing risk analysis, which is the basis for SAMAs. The data selected for use in the 1996 GEIS analysis were taken from the FESs published since 1981, which is near the time of Limerick's 1989 SAMDA analysis. As discussed previously, these FES analyses are based upon source terms resulting from the Reactor Safety Study (NUREG-75/014, formerly WASH-1400), rebaselined in NUREG-0773. As such, these source terms (and the resulting risk and environmental impacts calculated using them) reflect the plant designs used in WASH-1400. However, this approach is considered conservative because the source terms developed in WASH-1400 generally reflect a 1970s-era plant and, as such, do not reflect the improvements that have been made in nuclear industry plant design and operations since the early 1980s. Accordingly, the use of WASH-1400 source terms in the FESs may, in many cases, tend to overestimate the actual environmental consequences and risks.

Furthermore, as provided in Section 5.3.3.1 of the 1996 GEIS, the source terms (i.e., the magnitude, timing, and characteristics of the radioactive material released to the environment) used in the EIS analyses for the 28 sites, including Limerick, were generally based on the 95 percent upper confidence bound (UCB) and analysis documented in NUREG-0773. The NUREG-0773 source terms represented an update (re-baseline) of the source terms used in WASH-1400 (NRC 1996).

NUREG-0773 indicates that the provided source terms are based on models that tend to give overestimates of the magnitude of the releases." Based on the comparisons with newer information such as NUREG/CR 6295, the expected impacts (i.e., the frequency-weighted consequences) from the airborne pathway using the updated source term information would be much lower than previously predicted (NRC 2013). Therefore, the source terms used in the 1989 SAMDA were more conservative than the source terms used today. This provides additional support for the conclusion that SAMA analyses for LGS would be unlikely to uncover cost-beneficial major plant improvements or plant improvements that could substantially result in lower doses to offsite populations in the event of a severe accident.

### **5.3.19 Enrichment of Fuel (Power Upgrades)**

Another potentially new and significant item that could impact the 1989 SAMDA analysis is increases in the enrichment of the fuel in the core. The following is the staff's review for any substantial changes to the fuel enrichment design basis at LGS by reviewing LGS docketed information regarding power upgrades. Extended power upgrades require using fuel with a higher percentage of uranium-235 or additional fresh fuel to derive more energy from the operation of the reactor. This results in a larger radionuclide inventory (particularly short-lived isotopes, assuming no change in burnup limits) in the core, than the same core at a lower power level. The larger radionuclide inventory represents a larger source term for accidents and can result in higher doses to offsite populations in the event of a severe accident. Typically, short-lived isotopes are the main contributor to early fatalities. As stated in NUREG-1449 (NRC 1993), short-lived isotopes make up 80 percent of the dose following early release. The staff found that LGS had received two power upgrade approvals since 1989. One upgrade occurred in 1995, and was based on a 1993 license amendment request that requested an increase in the licensed thermal power level of the reactor from 3,293 megawatts thermal (MWt) to 3,458 MWt, primarily by increasing the licensed core flow. In the staff's Environmental Assessment and Finding of No Significant Impact related to the LGS application for the amendment, the staff found, "the

radiological and nonradiological environmental impacts associated with the proposed small increase in power are very small and do not change the conclusion in the FES that the operation of LGS, Units 1 and 2, would cause no significant adverse impact upon the quality of the human environment.” Furthermore, in the January 23, 1995 submittal relating to increasing core flow, the licensee indicated that while fuel burnup and enrichment levels may increase as a result of operation at uprated power, the burnup and enrichment will remain within the 5 percent enrichment and 60,000 MWd/MT value previously evaluated by the staff. Thus, the fuel enrichment did not exceed the previously licensed value (NRC 1995).

By application dated March 25, 2010 (Exelon 2010), Exelon submitted a license amendment request for the LGS Units 1 and 2 Facility Operating Licenses and Technical Specifications. The proposed amendment consisted of a 1.65 percent measurement uncertainty recapture (MUR) power uprate that will increase each unit’s rated thermal power from 3,458 megawatts (MWt) to 3,515 MWt. The proposed amendment was characterized as a MUR power uprate, which uses a Cameron International (formerly Caldon) CheckPlus™ Leading Edge Flow Meter (LEFM) system to improve plant calorimetric heat balance measurement accuracy. This flowmeter provides a more accurate measurement of feedwater (FW) flow and thus reduces the uncertainty in the FW flow measurement. This submittal did not change the fuel enrichment design basis (NRC 2011b).

Neither of these power uprates increased the fuel enrichment any higher than was previously evaluated by the staff before the 1989 SAMDA Analysis was completed. Since the fuel enrichment was not increased, further SAMA analyses for LGS would be unlikely to uncover cost-beneficial major plant improvements or plant improvements that could substantially result in lower doses to offsite populations in the event of a severe accident.

Furthermore, as provided in Section 5.3.3.1 of the 1996 GEIS, the source terms (i.e., the magnitude, timing, and characteristics of the radioactive material released to the environment) used in the GEIS analyses for the 28 sites, including Limerick, were generally based on the 95-percent UCB and analysis documented in NUREG-0773 (NRC 1996).

NUREG-0773 states that the provided source terms are based on models that tend to give overestimates of the magnitude of the releases. Based on the comparisons with newer information such as NUREG/CR 6295, the expected impacts (i.e., the frequency-weighted consequences) from the airborne pathway using the updated source term information would be much lower than previously predicted (NRC 2013a). Therefore, the source terms used in the 1989 SAMDA were more conservative than the source terms used today, providing additional confidence that SAMA analyses for LGS would be unlikely to uncover cost-beneficial major plant improvements or plant improvements that could substantially result in lower doses to offsite populations in the event of a severe accident. Also, it reinforces the Commission’s generic determinations that the NRC need not reanalyze SAMAs at LGS for license renewal and that a subsequent SAMA analysis would not likely uncover many cost-beneficial SAMAs.

### 5.3.20 Conclusion

In conclusion, 10 CFR 51.53(c)(3)(ii)(L) states that, “[i]f the staff has not previously considered SAMAs for the applicant’s plant, in an environmental impact statement or related supplement or in an environmental assessment, a consideration of alternatives to mitigate severe accidents must be provided.” Table B-1 in 10 CFR Part 51, which governs the scope of the staff’s environmental review for license renewal, echoes this regulation. Applicants for plants that have already had a SAMA analysis considered by the NRC as part of an EIS, supplement to an EIS, or EA, do not need to have a SAMA analysis reconsidered for license renewal. In forming its basis for determining which plants needed to submit a SAMA at license renewal, the

Commission noted that all licensees had undergone, or were in the process of undergoing, more detailed site-specific severe accident mitigation analyses through processes separate from license renewal, specifically the CPI, IPE, and IPEEE programs (61 FR 28467). In light of these studies, the Commission stated that it did not expect future SAMA analyses to uncover “major plant design changes or modifications that will prove to be cost-beneficial” (61 FR 28467). The NRC’s experience in completed license renewal proceedings has confirmed this assumption.

LGS is a plant that had a previous SAMA documented in a NEPA document. Therefore, Exelon was not required to, and did not, submit a SAMA in its license renewal ER. Exelon and staff did evaluate whether there was new and significant information with respect to the Commission’s prior determination not to require a SAMA analysis at license renewal for those plants that were already the subject of a SAMA analysis by the staff. This evaluation included an evaluation of whether any new information invalidated the 1989 SAMDA. The staff analyzed information in the applicant’s ER with respect to the 1989 SAMDA Analysis for LGS, public comments, and its own review of information relevant to LGS to search for new and significant information with respect to the NRC’s determination not to conduct a second SAMA analysis at LGS for license renewal and the studies and assumptions underlying that determination. In conducting that search, the staff considered whether new information provided a seriously different picture of the environmental impact of the proposed project from what was previously envisioned. For a mitigation analysis, such as a SAMA analysis, such information would need to demonstrate a substantial change in the environmental impact sought to be mitigated, in this case severe accidents. In doing its review of new information, the staff found that since the 1989 SAMDA Limerick’s CDF has decreased, past current licensing bases initiatives have addressed known weaknesses, and implementation costs are high for design retrofits.

Given the discussion above, it is unlikely that further SAMA analyses for LGS could uncover many cost-beneficial SAMAs or cost-beneficial SAMAs that would substantially reduce the risk of severe accidents because of implementation of programs to reduce the severe accident risk outweighs any increases resulting from the new considerations described above. Therefore, the staff did not identify any new and significant information that would invalidate the 1989 SAMDA.

The staff also did not identify any new and significant information that rises to a level that requires staff to seek Commission approval to conduct a new SAMA analysis (similar to the waiver requirement that applies for Category 1 issues when staff identifies new and significant information). The impacts of all other new information do not contribute sufficiently to the environmental impacts to warrant their inclusion in a SAMA analysis, since the likelihood of finding cost-effective plant improvements that substantially reduce risk is small. Additionally, the staff did not identify a significant environmental issue not covered in the GEIS, or that was not considered in the analysis in the GEIS and leads to an impact finding that is different from the finding presented in the GEIS.

The staff identified no new and significant information related to postulated accidents during the review of LGS’s ER (Exelon 2011c) or evaluation of other available information. Therefore, there are no impacts related to these issues beyond those discussed in the GEIS. In accordance with 10 CFR 51.53(c)(3)(ii)(L), the staff did not repeat the review of SAMAs for LGS.

Therefore, as provided in the 1989 SAMDA, “The risks and environmental impacts of severe accidents at Limerick are acceptably low.”

The staff has found no new information that would call into question the FES conclusion that:

[T]he risks of early fatality from potential accidents at the site are small in comparison with risks of early fatality from other human activities in a comparably sized population, and the accident risk will not add significantly to population

exposure and cancer risks. Accident risks from Limerick are expected to be a small fraction of the risks the general public incurs from other sources. Further, the best estimate calculations show that the risks of potential reactor accidents at Limerick are within the range of such risks.

### 5.4 References

10 CFR Part 50. *Code of Federal Regulations*, Title 10, *Energy*, Part 50, “Domestic licensing of production and utilization facilities.”

10 CFR Part 51. *Code of Federal Regulations*, Title 10, *Energy*, Part 51, “Environmental protection regulations for domestic licensing and related regulatory functions.”

10 CFR Part 54. *Code of Federal Regulations*, Title 10, *Energy*, Part 54, “Requirements for renewal of operating licenses for nuclear power plants.”

10 CFR Part 100. *Code of Federal Regulations*, Title 10, *Energy*, Part 100, “Reactor site criteria.”

61 FR 28467. U.S. Nuclear Regulatory Commission. Environmental review for renewal of nuclear power plant operating licenses. *Federal Register* 61(109):28467-28481. June 5, 1996.

74 FR 13926. U.S. Nuclear Regulatory Commission. Power reactor security requirements. *Federal Register* 74(58): 13926-13993. March 27, 2009.

[Amergen] Amergen Energy Company, LLC. 2008. “Three Mile Island Nuclear Station, Applicant’s Environmental Report, License Renewal Operating Stage.” Kennett Square, PA: Amergen. ADAMS Nos. ML080220255, ML080220257, ML080220261, and ML080220282.

[Exelon] Exelon Generation Company, LLC. 2010. Letter from M. Jesse, Manager, Licensing-Power Uprate, to NRC Document Control Desk. Limerick Generating Station, Units 1 and 2: Request for license amendment regarding measurement uncertainty recapture power uprate. March 25, 2010. ADAMS No. ML100850380.

[Exelon] Exelon Generation Company, LLC. 2011a. Letter from M.P. Gallagher, Vice President, License Renewal Projects, to NRC Document Control Desk. Limerick Generating Station, Units 1 and 2: Application for renewed operating licenses. June 22, 2011. ADAMS No. ML11179A096.

[Exelon] Exelon Generation Company, LLC. 2011b. License Renewal Application [LRA], Limerick Generating Station, Units 1 and 2. June 22, 2011. ADAMS No. ML11179A101.

[Exelon] Exelon Generation Company, LLC. 2011c. *Environmental Report–Operating License Renewal Stage* [ER], Limerick Generating Station, Units 1 and 2. June 22, 2011. ADAMS No. ML11179A104.

[Exelon] Exelon Generation Company, LLC. 2013a. “Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049),” February 28, 2013. ADAMS No. ML14071A738.

[Exelon] Exelon Generation Company, LLC. 2013b. “Updated Evacuation Time Estimates for Limerick Generating Station Plume Exposure Pathway and ETE Review Criteria Checklist.” September 5 2013. 246 p. ADAMS No. ML13254A120.

[Exelon] Exelon Generation Company, LLC. 2014a. *Response to Request for Additional Information*. Kennett Square, PA: Exelon. March 12, 2014. 17 p. ADAMS No. ML14071A378.



[Exelon] Exelon Generation Company, LLC. 2014b. *Limerick, Units 1 & 2 - Seismic Hazard and Screening Report (Central and Eastern United States (CEUS) Sites), Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1 of the Near-Term Task Force Review of Insights From the Fukushima Dai-ichi Accident*. Chicago, IL: Exelon. EXLNLIM065-PR-001. March 31, 2014. 51 p. ADAMS No. ML14090A236.

Ghosh T, Palla R, Helton D. 2009. *Perspectives on Severe Accident Mitigation Alternatives for U.S. Plant License Renewal*. U.S. Nuclear Regulatory Commission. September 2009. ADAMS No. ML092750488.

[NRC] U.S. Nuclear Regulatory Commission. 1988a. Generic Letter No. 88-20, "Individual Plant Examination for Severe Accident Vulnerabilities." November 23, 1988. ADAMS No. ML031150465.

[NRC] U.S. Nuclear Regulatory Commission. 1988b. Generic Letter No. 88-20, Supplement No. 4, "Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities –10 CFR 50.54(f)." June 28, 1991. ADAMS No. ML031150485.

[NRC] U.S. Nuclear Regulatory Commission. 1989. *Final Environmental Statement Related to Operation of LGS, Units 1 and 2*. Washington, DC: NRC. NUREG-0974, Supplement 1. August 1989. ADAMS No. ML112221A204.

[NRC] U.S. Nuclear Regulatory Commission. 1991. *Procedural and Submittal Guidance for the Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities*. Washington, DC: NRC. NUREG-1407. June, 1991. ADAMS No. ML063550238.

[NRC] U.S. Nuclear Regulatory Commission. 1993. *Shutdown and Low-Power Operation at Commercial Nuclear Power Plants in the United States*. Washington, DC: NRC. NUREG-1449. September 1993. ADAMS No. ML063470582.

[NRC] U.S. Nuclear Regulatory Commission. 1995. Letter from F. Rinaldi, Project Director, Division of Reactor Projects, to G. Hunger, Director–Licensing, PECO Energy Company. Environmental assessment and finding of no significant impact, power uprate with increased core flow, Limerick Generating Station, Unit Nos. 1 and 2 (TAC Nos. M88392 and M88393). February 7, 1995. ADAMS No. ML011560483.

[NRC] U.S. Nuclear Regulatory Commission. 1996. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants*. Washington, DC: NRC. NUREG–1437. May 1996. ADAMS Nos. ML040690705 and ML040690738.

[NRC] U.S. Nuclear Regulatory Commission. 1997. Status of the Integration Plan for Closure of Severe Accident Issues and the Status of Severe Accident Research. Washington, DC: NRC. SECY 97-132. June 1997. ADAMS No. ML992930144

[NRC] U.S. Nuclear Regulatory Commission. 1999a. *Standard Review Plans For Environmental Reviews for Nuclear Power Plants, Supplement 1*. Washington, DC: NRC. NUREG-1555. October 1999. ADAMS No. ML003702019.

[NRC] U.S. Nuclear Regulatory Commission. 1999b. Section 6.3 – Transportation, Table 9.1, Summary of findings on NEPA issues for license renewal of nuclear power plants. In: *Generic Environmental Impact Statement for License Renewal of Nuclear Plants*. Washington, DC: NRC. NUREG–1437, Volume 1, Addendum 1. August 1999. ADAMS No. ML04069720.

[NRC] U.S. Nuclear Regulatory Commission. 2002. *Perspectives Gained from the Individual Plant Examination of External Events (IPEEE) Program*. Washington, DC: NRC. NUREG-1742. April 2002. ADAMS No. ML021270070.

[NRC] U.S. Nuclear Regulatory Commission. 2004. *Protecting Our Nation—Since 9-11-01*. Washington, DC: NRC. NUREG/BR-0314. September 2004.

[NRC] U.S. Nuclear Regulatory Commission. 2005. *Frequently Asked Questions on License Renewal of Nuclear Power Reactors*. Washington, DC: NRC. NUREG-1850. Mar 31, 2005. ADAMS No. ML061110022

Wagner K., Gauntt R. 2006. *Mitigation of Spent Fuel Pool Loss-of-Coolant Inventory Accidents and Extension of Reference Plant*. Albuquerque, NM: Sandia National Laboratories. NUREG-1850. November 2006. 120 p. ADAMS No. ML120970086.

[NRC] U.S. Nuclear Regulatory Commission. 2011a. "Recommendations for Enhancing Reactor Safety in the 21st Century: The Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident." July 12, 2011. ADAMS No. ML111861807

[NRC] U.S. Nuclear Regulatory Commission. 2011b. Letter from P. Bamford, Project Manager, Division of Operating Reactor Licensing, to MJ Pacilio, President and Chief Nuclear Officer, Exelon Nuclear. Limerick Generating Station, Units 1 and 2 – Issuance of amendments re: measurement uncertainty recapture power uprate and standby liquid control system changes (TAC Nos. ME3589, ME3590, ME3591, and ME3592). April 8, 2011. ADAMS No. ML110691095.

[NRC] U.S. Nuclear Regulatory Commission. 2011c. SECY-11-0093, "Near-Term Report and Recommendations for Agency Actions Following the Events in Japan." ADAMS No. ML11186A950.

[NRC] U.S. Nuclear Regulatory Commission. 2012a. Order EA-12-049, Issuance of Order to Modify Licenses With Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events. March 12, 2012. ADAMS No. ML012054A735

[NRC] U.S. Nuclear Regulatory Commission. 2012b. Order EA-12-050, "Issuance of Order to Modify Licenses with Regard to Reliable Hardened Containment Vents." March 12, 2012. ADAMS No. ML012054A694.

[NRC] U.S. Nuclear Regulatory Commission. 2012c. Order EA-12-051, "Subject: Issuance of Order to Modify Licenses With Regard to Reliable Spent Fuel Pool Instrumentation." March 12, 2012. ADAMS No. ML012054A679.

[NRC] U.S. Nuclear Regulatory Commission. 2012d. "Request For Information Pursuant to Title 10 of The *Code of Federal Regulations* 50.54(F) Regarding Recommendations 2.1, 2.3, and 9.3, of The Near-Term Task Force Review of Insights From the Fukushima Dai-Ichi Accident." March 12, 2012. ADAMS No. ML012053A340.

[NRC] U.S. Nuclear Regulatory Commission. 2012e. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants Regarding Columbia Generating Station (NUREG-1437, Supplement 47) Final Report for Comment*. Washington, DC: NRC. NUREG-1437. April 2012. ADAMS No. ML11227A007.

[NRC] U.S. Nuclear Regulatory Commission. 2012f. Letter from E. Leeds, Director, to all power reactor licensees and holders of construction permits in active or deferred status. Subject: Request for information pursuant to Title 10 of the *Code of Federal Regulations* 50.54(f) regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force review of insights from the Fukushima Dai-ichi accident. March 12, 2012. ADAMS No. ML12053A340.

[NRC] U.S. Nuclear Regulatory Commission. 2013a. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants*. Washington, DC: NRC. NUREG-1437, Revision 1, Volume 3. June 2013. ADAMS No. ML13106A244.

[NRC] U.S. Nuclear Regulatory Commission. 2013b. NRC Order Number EA-13-109, "Issuance of Order to Modify Licenses with Regard to Reliable Hardened Containment Vents Capable of Operation Under Severe Accident Conditions." June 6, 2013. ADAMS No. ML13130A067.

[NRC] U.S. Nuclear Regulatory Commission. 2013c. *Preparation of Environmental Reports for Nuclear Power Plant License Renewal Applications*. Revision 1. Regulatory Guide 4.2, Supplement 1. June 20, 2013. 60 p. ADAMS No. ML13067A354.

[NRC] U.S. Nuclear Regulatory Commission. 2013d. Memorandum and Order In the Matter of EXELON GENERATION COMPANY, LLC (Limerick Generating Station, Units 1 and 2) CLI-13-07 October 31, 2013 (ADAMS No. ML13304B417)

[NRC] U.S. Nuclear Regulatory Commission. 2014a. Letter from L. Perkins, Environmental Project Manager, to M. Gallagher, Vice President License Renewal Projects, Exelon Generation Company, LLC. Subject: Requests for additional information for the review of the Limerick Generating Station license renewal application. February 12, 2014. ADAMS No. ML14029A162.

[NRC] U.S. Nuclear Regulatory Commission. 2014b. Interim Staff Evaluation and Audit Report and Technical Evaluation Report Related To Order EA-12-049 Modifying Licenses With Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events, Exelon Generation Company, LLC, Limerick Generating Station, Units 1 and 2. Washington, DC: NRC. January 10, 2014. 72 p. ADAMS No. ML13337A600.

[NRC] U.S. Nuclear Regulatory Commission. 2014c. Letter from E. Leeds, Director, to all power reactor licensees and holders of construction permits in active or deferred status. Subject: Screening and prioritization results regarding information pursuant to Title 10 of the *Code of Federal Regulations* 50.54(f) regarding seismic hazard reevaluations for Recommendation 2.1 of the Near-Term Task Force review of insights from the Fukushima Dai-ichi accident. May 9, 2014. ADAMS No. ML14111A147.

[NRDC] Natural Resources Defense Council. 2011. Letter from NRDC to C. Bladley. "Natural Resources Defense Council comments on Limerick EIS scoping process." October 28, 2011. ADAMS No. ML11307A456.

[PECO] Philadelphia Electric Company. 1992. Limerick Generating Station, Units 1 and 2: Individual plant examination volume 1. July 1992. ADAMS No. ML080030106 and ML080030104.

[PECO] Philadelphia Electric Company. 1995. Limerick Generating Station, Units 1 and 2 response to NRC Generic Letter 88-20, supplement 4, "Individual Plant Examination of External Events (IPEEE) for Severe Accident Vulnerabilities." June 1995. ADAMS No. ML073610238.

[PECO] Philadelphia Electric Company. 1996. Letter from G.A. Hungar, Jr., Director-Licensing, to NRC Document Control Desk. Limerick Generating Station, Units 1 and 2: Response to request for additional information regarding review of individual plant examination of external events. June 28, 1996. ADAMS No. ML073610237.

## **CERTIFICATE OF SERVICE**

I hereby certify that on August 29, 2014, the undersigned counsel for Respondent U.S. Nuclear Regulatory Commission filed the foregoing letter and its enclosures in Case Number 13-1311 with the U.S. Court of Appeals for the District of Columbia Circuit by filing the same with the Court's CM/ECF filing system. That method is calculated to serve:

Howard M. Crystal, Esq.  
Meyer Glitzenstein & Crystal  
Email: [howardcrystal@meyerglitz.com](mailto:howardcrystal@meyerglitz.com)

Geoffrey H. Fettus, Esq.  
Natural Resources Defense Council, Inc.  
Email: [gfettus@nrdc.org](mailto:gfettus@nrdc.org)

Brad Fagg, Esq.  
Morgan, Lewis & Bockius LLP  
Email: [bfagg@morganlewis.com](mailto:bfagg@morganlewis.com)

John E. Arbab, Esq.  
U.S. Department of Justice  
Environment & Natural Resources Division  
Email: [john.arbab@usdoj.gov](mailto:john.arbab@usdoj.gov)

/s/ James E. Adler

James E. Adler  
Senior Attorney  
Office of the General Counsel  
U.S. Nuclear Regulatory  
Commission  
11555 Rockville Pike  
Rockville, MD 20852