

RECORD OF DECISION  
U.S. NUCLEAR REGULATORY COMMISSION  
DOCKET NOS. 50-352 AND 50-353  
LICENSE RENEWAL APPLICATION FOR THE  
LIMERICK GENERATING STATION, UNITS 1 AND 2

BACKGROUND:

The U.S. Nuclear Regulatory Commission (NRC or Commission) received an application, dated June 22, 2011, from Exelon Generation Company, LLC (Exelon), filed pursuant to Section 103 of the Atomic Energy Act of 1954, as amended, and Title 10 of the *Code of Federal Regulation* (CFR) Part 54, to renew the operating licenses for the Limerick Generating Station (LGS), Units 1 and 2. Renewal of the licenses would authorize the applicant to operate each unit for an additional 20 year period beyond that specified in the respective current operating licenses.

LGS is a two-unit nuclear powered steam electric generating facility that began operations in February 1986 (Unit 1) and January 1990 (Unit 2). The nuclear reactor for each unit is a General Electric Mark II boiling-water reactor (BWR) producing a reactor core rated thermal power of 3,515 megawatts (MW(t)). The nominal net electric capacity is 1,170 megawatts electric (MW(e)). The current operating license for LGS, Unit 1 (NPF-39), expires on October 26, 2024. The current operating license for LGS, Unit 2 (NPF-85), expires on June 22, 2029.

The NRC accepted Exelon's application and began the environmental review process on August 24, 2011. Section 102 of the National Environmental Policy Act of 1969, as amended (NEPA), directs that an environmental impact statement (EIS) be prepared for major Federal actions that have the potential to significantly affect the quality of the human environment. The NRC's Federal action is to decide whether to renew the licenses for LGS for an additional 20 years.

As described in 10 CFR Part 51 the NRC staff published in the *Federal Register* (FR) a Notice of Intent to prepare an EIS and conduct scoping. On September 22, 2011, the NRC held two public meetings in Pottstown, Pennsylvania to obtain public input on the scope of the environmental review. The NRC staff reviewed the oral and written comments received during the scoping process and contacted Federal, State, Tribal, regional and local agencies to solicit comments. A Scoping Summary Report was issued on March 11, 2013.

The NRC's environmental review involved preparation of an EIS, which is a supplement to the Commission's NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants" (GEIS). See 10 CFR 51.95(c). The GEIS documented the results of the NRC staff's systematic approach to evaluate the environmental consequences of renewing the licenses of individual nuclear power plants and operating them for an additional 20 years. NRC staff analyzed in detail and resolved those environmental issues that could be resolved generically in the GEIS.

The GEIS identified generic issues (Category 1) and site specific issues (Category 2). For Category 1 issues, no additional site-specific analysis is required in the supplemental EIS (SEIS) unless new and significant information is identified. For Category 2 issues, an additional site-specific review is required, and the results are documented in the SEIS.

Exelon submitted its license renewal application and environmental report under NRC's 1996 rule governing license renewal environmental reviews (61 FR 28467, as amended)<sup>1</sup>, as codified in NRC's environmental protection regulation, 10 CFR Part 51. The 1996 GEIS<sup>2</sup> and Addendum 1<sup>3</sup> to the GEIS provided the technical basis for the list of NEPA issues and associated environmental impact findings for license renewal contained in Table B-1 in Appendix B to Subpart A of 10 CFR Part 51. For LGS, the NRC staff initiated its environmental review in accordance with the 1996 rule and GEIS. Neither Exelon nor NRC staff identified information that is both new and significant related to Category 1 issues that would call into question the conclusions in the GEIS. This conclusion is supported by the NRC staff's review of the applicant's environmental report and other documentation relevant to Exelon's activities, the public scoping process and substantive comments raised, and the findings from the environmental site audit conducted by the NRC staff.

On June 20, 2013, the NRC published a final rule (78 FR 37282)<sup>4</sup> revising 10 CFR Part 51, including the list of NEPA issues and findings in Table B-1. A revised GEIS<sup>5</sup>, which updates the 1996 GEIS, provides the technical bases for the final rule. The revised GEIS specifically supports the revised list of NEPA issues and associated environmental impact findings for license renewal contained in Table B-1 in Appendix B to Subpart A of the revised 10 CFR Part 51. The revised GEIS and final rule reflect lessons learned and knowledge gained during previous license renewal environmental reviews. Under NEPA, the NRC must consider and analyze in the SEIS the potential significant impacts described by the final rule's new Category 2 issues. If any new and significant information is identified for the final rule's new Category 1 issues, the potential significant impacts must be described.

Therefore, the NRC staff also reviewed information relating to the new issues identified in the final rule and 2013 GEIS, specifically, geology and soils; radionuclides released to the groundwater; effects on terrestrial resources (noncooling system intake); exposure of terrestrial organisms to radionuclides; exposure of aquatic organisms to radionuclides; human health impacts from chemicals; physical occupational hazards; environmental justice; and cumulative impacts. These issues are documented in the final SEIS (FSEIS) for LGS license renewal.

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<sup>1</sup>61 FR 28467. U.S. Nuclear Regulatory Commission. "Environmental Review for Renewal of Nuclear Power Plant Operating Licenses." *Federal Register* 61 (109): 28467-28497. June 5, 1996.

<sup>2</sup>U.S. Nuclear Regulatory Commission. 1996. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants*. Washington, DC. NUREG-1437. May 1996. Agencywide Documents Access & Management System (ADAMS) Accession Nos. ML040690705 and ML040690738.

<sup>3</sup>U.S. Nuclear Regulatory Commission. 1999. 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 Accession No. ML040690720.

<sup>4</sup>78 FR 37282. U.S. Nuclear Regulatory Commission. "Revisions to Environmental Review for Renewal of Nuclear Power Plant Operating Licenses." *Federal Register* 78 (119): 37282-37324. June 20, 2013.

<sup>5</sup>U.S. Nuclear Regulatory Commission. 2013. *Generic Environmental Impact Statement for License Renewal of Nuclear Plants*. Washington, DC. NUREG-1437, Revision 1, Volumes 1, 2, and 3. June 2013. ADAMS Accession Nos. ML13106A241, ML13106A242, and ML13106A244.

The NRC issued a draft plant-specific SEIS for public comment in support of the LGS license renewal application on April 30, 2013 (ADAMS Accession No. ML13120A078). A 45-day comment period began on the date of publication of the U.S. Environmental Protection Agency (EPA) Notice of Availability of the filing of the draft SEIS to allow members of the public and agencies to comment on the results of the environmental review. On May 23, 2013, the NRC conducted two public meetings at the Sunnybrook Ballroom, in Pottstown, Pennsylvania to describe the results of the environmental review, respond to questions, and accept public comments. All comments received during the comment period are included in Appendix A of the final SEIS.

The NRC issued the final plant-specific SEIS in support of the LGS license renewal application on August 27, 2014 (ADAMS Accession Nos. ML14238A284 and ML14238A290). In the FSEIS, the NRC staff concluded that the adverse environmental impacts of license renewal for LGS are not great enough to deny the option of license renewal for energy-planning decision-makers.

Pursuant to 10 CFR 51.102(b) and 51.103(a)(1)-(5), the NRC staff has prepared this Record of Decision (ROD) to accompany its action on the LGS license renewal application. This ROD incorporates by reference materials contained in the FSEIS. See 10 CFR 51.103(c).

#### DECISION:

The NRC makes the decision to grant or deny the license renewal based on whether the applicant has demonstrated that the environmental and safety requirements in the agency's regulations can be met during the period of extended operation. The results of the safety review are documented in the safety evaluation reports (SER) (ADAMS Accession Nos. ML12354A349 and ML14190B070). By letter dated February 14, 2013, the Advisory Committee of Reactor Safeguards (ACRS) notified the Commission of the ACRS's recommendation to approve the application for renewal of LGS's operating licenses (ADAMS Accession No. ML13050A506). By letter dated September 10, 2014, the ACRS informed the Executive Director for Operations that it has no objections to the staff's Supplement 1 to the SER (ADAMS Accession No. ML14247A648).

This ROD and the FSEIS document the NRC's decision for the environmental review that the adverse environmental impacts of license renewal for LGS are not so great that preserving the option of license renewal for energy planning decision-makers would be unreasonable. See 10 CFR 51.103(a)(5). Under its renewed licenses, Exelon will be able to continue operating LGS Generating Station Units 1 and 2 for an additional 20 years beyond the expiration of the operating licenses, as requested in the license renewal application, plus the remaining number of years on the operating licenses currently in effect.

#### PURPOSE AND NEED:

As identified in Section 1.2, "Purpose and Need for the Proposed Action," of the FSEIS, the purpose and need for the proposed action (issuance of a renewed license) is to provide an option that allows for power generation capability beyond the term of a current nuclear power plant operating license to meet future system generating needs, as such needs may be determined by energy-planning decision-makers, such as state, utility, and, where authorized, Federal agencies (other than NRC). This definition of purpose and need reflects the Commission's recognition that, unless there are findings in the safety review required by the Atomic Energy Act or findings in the NEPA environmental analysis that would lead the NRC to

reject a license renewal application, the NRC does not have a role in the energy-planning decisions as to whether a particular nuclear power plant should continue to operate.

Ultimately, the appropriate energy-planning decision-makers and Exelon will decide whether the plant will continue to operate based on factors such as the need for power or other matters within the state's jurisdiction or the purview of the owners.

#### NRC EVALUATION OF ALTERNATIVES:

Section 102(2)(C)(iii) of NEPA states that EISs are to include a detailed statement analyzing alternatives to the proposed action. In this case the proposed action is issuance of renewed licenses for the LGS, which will allow the plant to operate for 20 years beyond its current license expiration dates. Chapter 8, "Environmental Impacts of Alternatives," of the SEIS presents the NRC staff's evaluation and analysis of alternatives to license renewal. The evaluation of each alternative considered the environmental impacts across several impact categories: air quality, groundwater use and quality, surface water use and quality, terrestrial ecology, aquatic ecology, human health, socioeconomics, transportation, aesthetics, historic and archaeological resources, environmental justice, and waste management. A three level standard of significance was used to indicate the intensity of the environmental effects for each alternative that were considered in-depth. NRC's standard of significance for impacts was established using the Council on Environmental Quality (CEQ) terminology for "significant." The three levels of significance for potential impacts are SMALL, MODERATE, and LARGE, as defined below.

**SMALL:** Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.

**MODERATE:** Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.

**LARGE:** Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

In evaluating alternatives to license renewal, the NRC considered energy technologies or options currently in commercial operation, as well as some technologies not currently in commercial operation but likely to be commercially available by the time the current LGS operating licenses expire. The current operating licenses for LGS reactors will expire on October 26, 2024, and June 22, 2029, and reasonable alternatives must be available (constructed, permitted, and connected to the grid) by the time the current LGS licenses expire to be considered likely to become available.

In some cases, the NRC staff considered the environmental effects of locating a replacement power alternative at the existing nuclear plant site. Selecting the existing plant site allows for the maximum use of existing transmission and cooling system infrastructures and minimizes the overall environmental impact. However, LGS does not have a sufficient amount of land available for all of the replacement power alternatives because LGS would continue to operate while the replacement alternative is being built to prevent a gap in energy generation during the period of construction, which would take several years. As a result, the NRC staff evaluated the impacts of locating replacement power facilities at other existing power plant sites within the PJM Interconnection (PJM). Installing replacement power facilities at existing power plants and connecting to existing transmission and cooling system infrastructure would reduce the overall environmental impact.

To ensure that the alternatives analysis is consistent with state or regional energy policies, the NRC staff reviewed energy related statutes, regulations, and policies within the Commonwealth of Pennsylvania and the PJM, including, for example, state renewable portfolio standards. As a result, the NRC staff considered several alternatives that included wind power or solar photovoltaic power, as well as combinations that include them.

The NRC staff initially considered a number of additional alternatives for analysis as alternatives to the license renewal of LGS; these were later dismissed because of technical, resource availability, or commercial limitations that currently exist and that the NRC staff believes are likely to continue to exist when the existing LGS license expires rendering these alternatives not feasible and commercially viable. The no action alternative (i.e., not renewing the LGS operating licenses and the effects it would have were also considered by the NRC staff.

Where possible, the NRC staff evaluated potential environmental impacts for these alternatives located both at the LGS site and at some other unspecified alternate location. Alternatives considered, but dismissed, were:

- solar power;
- combination alternative of wind, solar, and natural-gas-fired combined-cycle (NGCC);
- combination alternative of wind and compressed-air energy storage (CAES);
- wood waste;
- conventional hydroelectric power;
- ocean wave and current energy;
- geothermal power;
- municipal solid waste (MSW);
- biofuels;
- oil-fired power;
- delayed retirement;
- fuel cells;
- coal-fired integrated gasification combined-cycle (IGCC); and
- demand-side management (DSM).

Each alternative eliminated from detailed study and the basis for its removal is provided in Section 8.6 of the final SEIS.

The alternatives analyzed in detail include other methods of power generation and not renewing the LGS operating license (the no-action alternative). Impacts of all alternatives considered in

detail are summarized in Table 8-11 of the final SEIS. The feasible and commercially viable replacement power alternatives considered in-depth were:

- NGCC;
- supercritical pulverized coal (SCPC);
- new nuclear;
- wind power; and
- purchased power.

#### ALTERNATIVE EVALUATION:

##### *i. No Action Alternative*

The No Action alternative refers to a scenario in which the NRC denies the renewed operating licenses for LGS and the licenses expire at the end of the current license terms, 2024 and 2029. If the NRC denies the renewed operating licenses, the plant will shut down at or before the end of the current licenses. After shut down, the plant operators will initiate decommissioning in accordance with 10 CFR 50.82.

Assuming that a need currently exists for the power generated by LGS, the no-action alternative would require the appropriate energy planning decision-makers (not NRC) to rely on an alternative to replace the capacity of LGS, rely on energy conservation or power purchases to offset parts of the LGS capacity, or rely on some combination of measures to offset and replace the generation provided by the facility. Therefore, the no-action alternative does not satisfy the purpose and need for the FSEIS, as it neither provides power-generation capacity nor meets the needs currently met by LGS or that the alternatives evaluated in detail would satisfy.

##### *ii. Alternative Energy Sources*

For NGCC, the FSEIS assumes that the typical power-trains for large-scale NGCC power generation would involve one, two, or three combined-cycle units, available in a variety of standard sizes, mated to a heat-recovery steam generator. To complete the assessment of an NGCC alternative, the NRC presumed that appropriately sized units could be assembled to annually produce electrical power in amounts equivalent to LGS. The NRC staff evaluated an alternative that consists of four General Electric (GE) Advanced F Class units, 530 MW(e) each, equipped with dry-low-nitrogen-oxide combustors to suppress nitrogen oxide formation and selective catalytic reduction (SCR) of the exhaust with ammonia for post-combustion control of nitrogen oxide emissions. This alternative provides 2,120 MW(e) of capacity, and thus underestimates the potential environmental impacts of replacing the full 2,340 MW(e) produced by LGS by about 10 percent. Air emissions effects will be greater for NGCC during construction and operation. Socioeconomic impacts would also be greater due the construction jobs and power plant operation jobs created by this alternative. Impacts to land use and historical and archeological resources would be greater depending on site location and land required for a new pipeline.

For SCPC, the FSEIS assumes that four equal-sized boiler/steam turbine generator power-trains, operating independently and simultaneously, would likely be used to match the power output of LGS. To complete this analysis, the NRC staff presumed that all powertrains would

have the same features, operate at generally the same conditions, have similar impacts on the environment, and be equipped with the same pollution-control devices such that once all parasitic loads are overcome, the net power available would be equal to 2,120 MWe. The NRC staff assumed that 6 percent of an SCPC boiler's gross capacity is needed to supply typical parasitic loads (plant operation plus control devices for criteria pollutants to meet New Source Performance Standards). Air emissions effects will be greater for SCPC due to increased greenhouse gas emissions during operation. Impacts to land use would also be greater due to construction and because additional land may be needed for frequent coal and limestone deliveries by rail or barge. The impacts to socioeconomics would greatly increase due to the loss of high paying jobs at LGS, with corresponding reduction in purchasing activity and tax contributions to the regional economy. Additionally, transportation impacts related to construction activities would be greater because train deliveries of power plant components and material could cause additional traffic delays at railroad crossings.

For new nuclear, several designs are possible for a new nuclear facility. However, a two-unit nuclear power plant similar to the existing LGS in output is most likely. While two Westinghouse AP1000 reactors would provide equivalent output, it is possible that other designs also would be available. The new nuclear alternative would rely on a closed-cycle cooling system, similar to the cooling system currently in place at LGS. Impacts to terrestrial resources could increase during construction of a new facility because of significant land requirements for the site and would vary depending on the amount of previously undisturbed land that would be cleared for the new nuclear alternative. Socioeconomics impacts would increase due to the increase in workforce during construction and operation of the facility.

For wind, the NRC staff determined that the feasibility of wind as a baseload power source depends on the availability, accessibility, and constancy of the wind resource within the region of interest. Wind installations, which may consist of several hundred turbines, produce variable amounts of electricity. LGS, however, produces electricity almost constantly. Because wind installations deliver variable output when wind conditions change, wind cannot substitute for existing baseload generation on a one-to-one basis. The NRC staff considered a wind alternative that relies on numerous, interconnected wind installations scattered across PJM interconnection. This arrangement ensures that generators are sufficiently dispersed so that low-wind or no-wind conditions are unlikely to occur at all or most locations at any given time. For a lower range of the capacity factor used in this analysis, the NRC staff reviewed PJM's 13 percent capacity factor to wind. Assuming a 13 percent capacity factor for wind, 18,000 MW(e) of wind would be necessary to replace 2,340 MW(e) of LGS because of the intermittency of wind. Assuming a range of 13 to 52 percent capacity factor, the NRC staff, in this alternative, evaluated a wind-powered alternative that contains between 4,500 MW(e) and 18,000 MW(e) of installed capacity. Relying on commonly available 2-MW(e) turbines, 2,250 to 9,000 turbines would be required to replace LGS. Installations of wind turbines would increase the impacts to terrestrial resources as a result of habitat loss and habitat fragmentation, especially for wind turbines installed in forested areas. Operation of wind turbines could also affect terrestrial species through noise, collision with turbines and meteorological towers, site maintenance activities, disturbances associated with activities of the project workforce, and interference with migratory behavior. Impacts to land use would increase because wind farms would require a substantial amount of open land. The construction of wind farms and their supporting infrastructure have the potential to notably impact historic and archaeological resources due to earthmoving activities and the aesthetic changes they may bring to the view shed of historic properties located nearby.

For purchase power, the impacts depend substantially on the generation technologies used to supply the purchased power. Given PJM's market-based system operations, replacement power could come from different generators at different times of the year, so impacts are not necessarily predictable. Impacts from operation of other generators would likely occur in Pennsylvania or elsewhere in PJM.

Purchased power would likely come from one or more of the other types of alternatives considered. As a result, operational impacts would be similar to the operational impacts of the other alternatives considered. Unlike the other alternatives considered, the facilities from which power would be purchased would not likely be constructed solely to replace LGS. Purchased power may, however, require new transmission lines (which may require new construction), and may also rely on slightly older and less efficient power plants operating at higher capacities than they currently operate.

Impacts from the operations of existing coal and natural gas-fired plants would likely be greater than the operations of new plants because older plants are more likely to be less efficient and without modern emissions controls. Air quality impacts from the combination of all sources would likely be greater than license renewal because a large portion of the purchased power would likely be from coal- and natural gas-fired plants. In general, the impacts would likely be greater than license renewal because of potential new construction and because continued operation of older plants could result in higher emissions.

### *iii. Summary*

In the August 2014 LGS FSEIS, the NRC staff considered the environmental impacts associated with alternatives to license renewal, including other methods of power generation and not renewing the LGS operating license (the no-action alternative). The LGS FSEIS concluded that the continued operation of LGS during the license renewal term would have SMALL environmental impacts in all areas. The LGS FSEIS concluded that the environmental impacts of renewal of the operating license for LGS would be smaller than those of the feasible and commercially viable replacement power alternatives considered. The FSEIS concluded that under the no action alternative, the act of shutting down LGS on or before its license expiration would have mostly SMALL impacts, although socioeconomic impacts would be SMALL to MODERATE.

As further detailed below, the NRC has published a revised rule at 10 CFR 51.23 (79 FR 56238) and associated Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel (NUREG-2157, ADAMS Accession No. ML14196A105 and ML14196A107). As a result, for the time-frame beyond the licensed life for reactor operations, the impacts associated with the continued storage of spent nuclear fuel, as assessed in NUREG-2157, have a range of impacts (i.e., SMALL to LARGE) for certain resource areas. These impact determinations are deemed incorporated by the revised 10 CFR 51.23 rule into the LGS FSEIS. The analysis in NUREG-2157 supports the conclusion that the most likely impacts of continued storage are those discussed for at-reactor storage. For continued at-reactor storage, impacts in the short-term timeframe (i.e., 60 years after the end of the renewed license period) would be SMALL, as further described below. With respect to LGS, the impacts of continued storage would occur under the proposed action (license renewal) as well as the no action alternative. Spent nuclear fuel generated during the initial licensing period would continue to be managed onsite in the spent fuel pool and in an independent spent fuel storage installation. Under 10 CFR Part 50, Exelon has a general license to store spent fuel from both units in NRC approved dry storage casks in accordance with the requirements in 10 CFR Part 72, Subpart K. In the LGS FSEIS

the NRC staff concluded that the environmental impacts of onsite storage of spent nuclear fuel for an additional 20 years of operations and spent nuclear fuel generation would be SMALL. Therefore, the NRC staff concludes that continued operation of LGS is the environmentally-preferred alternative.

#### CONTINUED STORAGE OF SPENT NUCEARL FUEL:

The environmental impacts for two issues; “Onsite spent fuel” and “Offsite radiological impacts (spent fuel and high-level waste disposal),”<sup>6</sup> were not completed prior to the August 2014 publication of the LGS FSEIS. As discussed in Chapter 6 of the LGS FSEIS, these two issues, which were contained in NRC’s generic findings for license renewal of nuclear power plants codified in Table B-1 of Appendix B to Subpart A of 10 CFR Part 51, relied on the Commission’s Waste Confidence Decision and Rule (10 CFR 51.23), which were vacated in *New York v. NRC*, 681 F.3d 471 (D.C. Cir. 2012). Therefore, the LGS FSEIS did not have an analysis of or make an impact determination on the environmental impacts associated with the onsite storage of spent nuclear fuel for the period after the licensed life for operation of a reactor and the offsite impacts of spent nuclear fuel and high-level waste disposal, including possible disposal in a deep geologic repository. Instead, the LGS FSEIS stated that it would rely on the revised 10 CFR 51.23 and its supporting Generic Environmental Impact Statement (GEIS) to provide the NEPA<sup>7</sup> analyses of the environmental impacts of spent fuel storage at the reactor site or at an away-from-reactor storage facility beyond the licensed life for reactor operations.

On August 26, 2014, the Commission approved a revised rule at 10 CFR 51.23 and associated “Generic Environmental Impact Statement for Continued Storage of Spent Nuclear Fuel” (NUREG-2157, ADAMS Accession No. ML14196A105 and ML14196A107). Subsequently, on September 19, 2014, the NRC published the revised rule (79 FR 56238) and NUREG-2157 (79 FR 56263). The revised rule adopts the generic impact determinations made in NUREG-2157 and codifies the NRC’s generic determinations regarding the environmental impacts of continued storage of spent nuclear fuel beyond a reactor’s operating license (i.e., those impacts that could occur as a result of the storage of spent nuclear fuel at at-reactor or away-from-reactors sites after a reactor’s licensed life for operation and until a permanent repository becomes available). As directed by 10 CFR 51.23(b), the impacts assessed in NUREG-2157 regarding continued storage are deemed incorporated into the LGS FSEIS for a license renewal application.

In CLI-14-08 (ADAMS Accession No. ML14238A242), the Commission held that the revised 10 CFR 51.23 and associated NUREG-2157 cure the deficiencies identified by the court in *New York*) and stated that the rule satisfies the NRC’s NEPA obligations with respect to continued storage for initial, renewed, and amended licenses for reactors. Therefore, the August 2014 LGS FSEIS, which by rule now incorporates the impact determinations in NUREG-2157 regarding continued storage, contains an analysis for the generic issues of “Onsite storage of spent nuclear fuel” and “Offsite radiological impacts of spent nuclear fuel and high-level waste disposal” that satisfies NEPA. As the Commission noted in CLI-14-08, the NRC staff must account for these environmental impacts before finalizing its licensing decision in this proceeding. To account for these impact determinations, the NRC staff analyzed whether the

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<sup>6</sup> These two issues were renamed, “Onsite storage of spent nuclear fuel” and “Offsite radiological impacts of spent nuclear fuel and high-level waste disposal,” respectively, by the 2013 license renewal rulemaking. See “Revisions to Environmental Review for Renewal of Nuclear Power Plant Operating Licenses,” 78 FR 37282–37324 (June 20, 2013).

<sup>7</sup> National Environmental Policy Act of 1969 (NEPA). 42 USC 4321 et seq.

revised rule at 10 CFR 51.23 and the associated NUREG-2157 present new and significant information such that a supplement to the August 2014 LGS FSEIS is required.

As detailed in the NRC staff's evaluation (ADAMS Accession No. ML14281A237), NUREG-2157 and the revised rule do not constitute new and significant information because they do not present a "seriously different picture" of the environmental impacts of the proposed action (license renewal) as compared to the impacts analysis presented in the August 2014 LGS FSEIS. As noted, the August 2014 LGS FSEIS did not evaluate or make an impact determination on the impacts of continued storage of spent fuel beyond the licensed life for reactor operations. Instead, the August LGS FSEIS stated that it would rely on the revised 10 CFR 51.23 and its supporting GEIS (i.e., NUREG-2157) to provide the NEPA analyses of the environmental impacts of spent fuel storage at the reactor site or at an away-from-reactor storage facility beyond the licensed life for reactor operations. By virtue of revised 10 CFR 51.23, the LGS FSEIS now incorporates the impact determinations in NUREG-2157 regarding continued storage such that there is a complete analysis of the environmental impacts associated with spent fuel storage beyond the licensed life for reactor operations and prior to disposal in a geologic repository.

The NRC staff also considered whether the revised rule and NUREG-2157 altered the NRC staff's recommendation in the August 2014 LGS FSEIS that the adverse environmental impacts of license renewal for LGS are not great enough to deny the option of license renewal for energy planning decision-makers.

As described in the NRC staff's evaluation (ADAMS Accession No. ML14281A237), NUREG-2157 analyzes continued storage of spent fuel at-reactor and away-from-reactor sites during three timeframes: the short-term timeframe (60 years beyond the licensed life of a reactor), the long-term timeframe (an additional 100 years after the short-term timeframe), and an indefinite timeframe. The analysis in NUREG-2157 supports the conclusion that the most likely impacts of continued storage are those discussed for at-reactor storage. For continued at-reactor storage, impacts in the short-term timeframe would be SMALL. Over the longer timeframes, impacts to certain resource areas would be a range (for historic and cultural resources during both the long-term and indefinite timeframes the range is SMALL to LARGE and for nonradioactive waste during the indefinite timeframe the range is SMALL to MODERATE). In NUREG-2157, the NRC stated that disposal of the spent fuel before the end of the short-term timeframe is most likely. There are inherent uncertainties in determining impacts for the long-term and indefinite timeframes, and, with respect to some resource areas, those uncertainties could result in impacts that, although less likely, could be larger than those that are to be expected at most sites and have therefore been presented as ranges rather than as a single impact level. Those uncertainties exist, however, regardless of whether the impacts are analyzed generically or site-specifically. As a result, these impact ranges provide correspondingly more limited insights to the decision-maker in the overall picture of the environmental impacts from the proposed action (i.e., license renewal).

The NRC staff concludes that when weighed against the array of other fuel cycle impacts presented in the August 2014 LGS FSEIS, and the more-likely impacts of continued storage during the short-term timeframe in NUREG-2157, which are SMALL, the uncertainties associated with the impact ranges for the long-term and indefinite timeframes also do not present a seriously different picture of the direct, indirect, and cumulative environmental impacts compared to the NRC staff's analysis of the impacts from issuance of a renewed operating license for LGS attributable to the uranium fuel cycle and waste management (which includes the impacts associated with spent fuel storage).

The NRC staff therefore concludes that the revised rule and the impact determinations related to continued storage in NUREG-2157 do not alter the NRC staff's recommendation in the August 2014 LGS FSEIS that the adverse environmental impacts of license renewal for LGS are not great enough to deny the option of license renewal for energy planning decision-makers.

#### MITIGATION MEASURES:

The NRC has taken all practicable measures within its jurisdiction to avoid or minimize environmental harm from the alternative selected. Continued operation of LGS would have SMALL environmental impacts in all resources areas. While NRC is not requiring any mitigation measures for continued operation of LGS, the Delaware River Basin Commission (DRBC) and National Pollutants Discharge Elimination System (NPDES) permits do impose mitigation measures to ensure that the impacts to water quality are minimal during the continued operation of LGS. Additionally, as a result of consultation with the National Marine Fisheries Service (NMFS) under the Magnuson-Stevens Fishery Conservation and Management ACT, as amended, NMFS provided essential fish habitat (EFH) conservation recommendations to minimize adverse effects on migrating and spawning activities of anadromous fish. The NRC staff forwarded NMFS' EFH conservation recommendations to Exelon. The NRC is not imposing any license conditions in connection with mitigation measures. Additionally the NRC is not requiring any new environmental monitoring programs outside what is required for the NPDES and DRBC permits.

#### DETERMINATION:

Based on an independent review, analysis and evaluation contained in the license renewal FSEIS; careful consideration of all the identified social, economic, environmental factors, and input received from other agencies, organizations and the public; and the factors and mitigation measures outlined above, it is determined that the standards for issuance of a renewed license, as described in 10 CFR 54.29 have been met and the requirements of Section 102 of NEPA have been satisfied.

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