RECORD OF DECISION
U.S. NUCLEAR REGULATORY COMMISSION
DOCKET NOS. 50-373 AND 50-374
LICENSE RENEWAL APPLICATION FOR
LASALLE COUNTY STATION,
UNITS 1 AND 2

BACKGROUND

The U.S. Nuclear Regulatory Commission (NRC or Commission) received an application dated December 9, 2014, from Exelon Generation Company, LLC (Exelon), filed pursuant to Section 103 of the Atomic Energy Act of 1954, as amended (AEA), and Title 10 of the *Code of Federal Regulation* (CFR) Parts 51 and 54, to issue renewed operating licenses for LaSalle County Station, Units 1 and 2 (LSCS). The renewed operating licenses would authorize the applicant to operate LSCS for an additional 20-year period beyond that specified in the respective current operating licenses, NPF-11 and NPF-18. LSCS began commercial operation in January 1984 (Unit 1) and October 1984 (Unit 2). The current operating licenses expire on April 17, 2022, and December 16, 2023, respectively.

LSCS is a two-unit nuclear power plant in LaSalle County, Illinois. The plant is located approximately 75 miles southwest of downtown Chicago, Illinois. Units 1 and 2 are a boiling water reactor design. General Electric (Nuclear Energy Division) supplied the nuclear steam supply system and Sargent & Lundy originally designed and constructed the balance of the plant. Unit 1 and Unit 2 each have a licensed core power output of 3,546 megawatts thermal. The annual mean net electrical power capacity for LSCS is 2,327 megawatts electric (MWe). LSCS uses a 2,058-acre (ac) (833-hectare (ha)) diked cooling pond for core cooling and holds appropriate permits to withdraw makeup water from, and discharge cooling pond blowdown water to, the Illinois River.

The NRC accepted Exelon's application and began the environmental review of it on February 3, 2015 (80 *Federal Register* (FR) 5822). Section 102 of the National Environmental Policy Act of 1969, as amended (NEPA), directs that a detailed statement be prepared for major Federal actions significantly affecting the quality of the human environment. By Commission regulation, the NRC prepares an environmental impact statement (EIS) or a supplement to an EIS for all issuances of renewed operating licenses, regardless of the action's environmental impact significance (10 CFR 51.20(b)(2)). In this instance, the NRC's major Federal action is to decide whether to issue renewed operating licenses for LSCS for an additional 20-year period beyond that specified in the operating licenses.

Consistent with NEPA and 10 CFR Part 51, the NRC staff published a Notice of Intent to prepare a supplemental EIS (SEIS) and to conduct scoping in the *Federal Register* on February 3, 2015 (80 FR 5793). In addition, Federal, State, Tribal, and local agencies, as well as the public, were notified and asked to provide comments on and to participate in the environmental review. On March 10, 2015, the NRC staff held two public meetings in

Ottawa, Illinois, to obtain public input on the scope of the environmental review related to the LSCS license renewal application. All oral and written comments received during the scoping period were reviewed to identify individual comments. A Scoping Summary Report of this review was issued on July 2, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15147A380). From May 5-7, 2015, the NRC staff conducted a site audit at LSCS. During the site audit, the NRC staff met with plant personnel, reviewed specific documentation, toured the facility, and met with interested local agencies (ADAMS Accession No. ML15132A674). Following the site audit, on July 2, 2015, Exelon submitted responses to NRC staff requests for additional information (ADAMS Accession No. ML15195A351) and, on July 31, 2015, submitted a revision to the environmental report that had been submitted with the application (ADAMS Accession No. ML15212A259).

The NRC's environmental review involves the preparation of a site-specific SEIS, which is a supplement to the Commission's NUREG-1437, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (GEIS), in accordance with 10 CFR 51.95(c). The GEIS documents the results of a systematic approach to evaluate the environmental consequences of renewing the operating licenses of nuclear power plants for an additional 20 years beyond the current license term.

The GEIS serves to facilitate NRC's environmental review process by identifying and evaluating environmental impacts that are considered generic and common to all nuclear power plants (Category 1 issues). Plant-specific impact issues are addressed in separate SEISs to the GEIS (Category 2 issues). Generic impacts will be reconsidered in SEISs only if there is new and significant information that would change the conclusions in the GEIS.

A standard of significance was established for each NEPA issue evaluated in the GEIS based on the Council on Environmental Quality (CEQ) terminology for "significantly" (see 40 CFR 1508.27). Since the significance and severity of an impact can vary with the setting of the proposed action, both "context" and "intensity," as defined in CEQ regulations 40 CFR 1508.27, were considered. Context is the geographic, biophysical, and social context in which the effects will occur. In the case of license renewal, the context is the environment surrounding the nuclear power plant. Intensity refers to the severity of the impact in whatever context it occurs. Based on this, the NRC established three levels of significance for potential impacts, 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.

Regarding the LSCS license renewal application, the NRC staff did not identify any new and significant information related to Category 1 issues that would call into question the conclusions in the GEIS. This finding is supported by:

- the NRC staff's review of the applicant's environmental report and other documentation relevant to Exelon's activities at LSCS,
- consideration of comments received during scoping and the public comment period on the draft SEIS,
- consultation with Federal, State, Tribal, and local agencies, and
- the environmental site audit conducted by the NRC staff.

The NRC issued a draft site-specific SEIS for public comment in February 2016 (ADAMS Accession No. ML16033A103). A 45-day comment period began on the date that the U.S. Environmental Protection Agency (EPA) published a Notice of Availability of the filing of the draft SEIS. This allowed members of the public and agencies time to comment on the environmental review. On March 22, 2016, the NRC staff held two public meetings in Ottawa, Illinois, to describe the results of the environmental review, respond to questions, and accept public comments.

All comments received during the comment period on the draft SEIS are included in Appendix A to the final SEIS. The NRC issued the final SEIS for the LSCS license renewal application in August 2016 (ADAMS Accession No. ML16238A029). In the final SEIS, the NRC concludes that the environmental impacts of renewing the LSCS operating licenses are not so great that preserving the option of license renewal for energy-planning decisionmakers would be unreasonable.

On Septembe 0020r 9, 2016, the EPA issued the Notice of Availability for the final SEIS for the LSCS license renewal application (81 FR 62500). During the 30 days following publication of the notice, the NRC received no comments on the final SEIS.

Pursuant to 10 CFR 51.102 and 51.103(a)(1)-(5), the NRC staff has prepared this concise public record of decision (ROD) to document its action on the LSCS license renewal application. In accordance with 10 CFR 51.103(c), this ROD incorporates by reference the material contained in the final SEIS.

DECISION

Pursuant to 10 CFR 54.29, a renewed license may be issued by the Commission if the Commission finds that actions have been identified and have been or will be taken with respect to (1) managing the effects of aging during the period of extended operation on the functionality of structures and components that have been identified to require review and (2) time-limited aging analyses that have been identified to require review, such that there is reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the current licensing basis, and that any changes made to the plant's current

licensing basis in order to comply with this requirement are in accord with the AEA and the Commission's regulations, and that any applicable requirements of Subpart A of 10 CFR Part 51 have been satisfied. The results of the NRC's safety review of the LSCS license renewal application are documented in a safety evaluation report dated June 2016 (ADAMS Accession No. ML16126A503). By letter dated July 18, 2016, the Advisory Committee on Reactor Safeguards (ACRS) notified the Commission of its recommendation to approve the LSCS license renewal application (ADAMS Accession No. ML16200A156).

This ROD and the final SEIS, which is incorporated by reference herein, document the NRC's final decision for the environmental review of the LSCS license renewal application that the adverse environmental impacts of license renewal for LSCS are not so great that preserving the option of license renewal for energy-planning decisionmakers would be unreasonable. See 10 CFR 51.103(a)(5). Under its renewed operating licenses, Exelon will be authorized to continue operating LSCS, Units 1 and 2, for an additional 20 years beyond the expiration of the current operating licenses, as requested in the license renewal application.

PURPOSE AND NEED

As identified in Section 1.2, "Purpose and Need for Proposed Federal Action," of the final SEIS, the purpose and need for the proposed action (issuance of renewed licenses) 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 decisionmakers, such as State, utility, and, where authorized, Federal agencies (other than the NRC). This definition of purpose and need reflects the NRC's recognition that, unless there are findings in the safety review required by the AEA 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.

A renewed operating license is just one of a number of factors that licensees must meet in order to operate a nuclear plant during the license renewal term. State regulators, system operators, the licensee, and other agencies ultimately decide whether LSCS will continue to operate based on factors such as the need for power or other factors within the state's jurisdiction or owner's control.

NRC EVALUATION OF ALTERNATIVES

In license renewal environmental reviews, the NRC considers the environmental consequences of the proposed action (i.e., renewing the operating licenses), the environmental consequences of the no-action alternative (i.e., not renewing the operating licenses), and the environmental consequences of various alternatives for replacing the nuclear power plant's generating capacity. Section 102(2)(C)(iii) of NEPA and the NRC's regulations require the consideration of alternatives to the proposed action in the EIS. In this case, the proposed action is whether to issue renewed operating licenses for LSCS, which would authorize the licensee to operate the

plant for an additional 20-year period beyond the expiration dates of the licenses. Chapter 2 of the final SEIS, "Alternatives Including the Proposed Action," presents alternatives to the proposed action that were considered in detail and those that were eliminated from detailed study. Chapter 4, "Environmental Consequences and Mitigating Actions," compares the impacts of renewing the LSCS operating licenses and continued plant operations to the environmental impacts of alternatives. The evaluation considered environmental impacts across the following impact areas: land use and visual resources; air quality and noise; geologic environment; water resources; terrestrial resources; aquatic resources; special status species and habitats; historic and cultural resources; socioeconomics; human health; environmental justice; and waste management.

In evaluating alternatives to license renewal, the NRC considered energy technologies in commercial operation, as well as technologies not currently in commercial operation, but likely to be commercially available by the time the current LSCS operating licenses expire. The current operating licenses for LSCS, Units 1 and 2, expire on April 17, 2022, and December 16, 2023, respectively, and, therefore, to be considered in this evaluation, reasonable power alternatives must be available (i.e., constructed, permitted, and connected to the grid) by the time the current LSCS licenses expire.

The NRC staff initially considered 17 alternatives; 12 of these were eliminated from detailed study because of existing technical, resource availability, or commercial limitations. These limitations are likely to continue when the LSCS operating licenses expire, rendering these alternatives not feasible or commercially viable. The no-action alternative was also considered. Alternatives considered, but eliminated from detailed study were:

- energy efficiency and conservation,
- supercritical pulverized coal,
- wind power,
- solar power,
- hydroelectric power,
- wave and ocean energy,
- geothermal power,
- municipal solid waste,
- biomass,
- oil-fired power,
- fuel cells, and
- delayed retirement.

The basis for the elimination of these alternatives is explained in Chapter 2 of the final SEIS. The five remaining alternatives and the no-action alternative were analyzed in detail in the final SEIS. The five alternatives were:

- new nuclear,
- coal-integrated gasification combined-cycle (IGCC),

- natural gas combined-cycle (NGCC),
- combination alternative (NGCC, wind, and solar), and
- purchased power.

ALTERNATIVE EVALUATION

i. No-Action Alternative

The No-Action alternative refers to a scenario in which the NRC decides not to renew the operating licenses for LSCS and the licenses expire at the end of the current license terms in 2022 and 2023. The environmental consequences of this alternative are the impacts from the termination of nuclear power plant operations and the impacts of a range of energy sources that might be used if a nuclear power plant operating license were not renewed. As described in Chapter 2 of the final SEIS, the separate environmental impacts from decommissioning and related activities are addressed in several other NRC documents, which either directly address or bound the environmental impacts of decommissioning whenever the licensee ceases to operate LSCS, whether at the end of the current license terms or at the end of renewed license terms.

ii. Alternative Energy Sources

This section summarizes the impact analysis of the five replacement power alternatives considered in detail in the final SEIS.

New Nuclear

For the new nuclear alternative, the NRC staff assumed that two new nuclear reactors would be constructed and operated on an existing nuclear or coal power plant site, allowing for the maximum use of existing ancillary facilities at those locations, such as support buildings and transmission infrastructure. In 1987, Illinois enacted a moratorium preventing the construction of new nuclear power plants within the State. Therefore, while this moratorium is in place, a new nuclear alternative would require siting elsewhere in the region of influence (ROI), defined as the confines of the States of Illinois, Indiana, Iowa, Kentucky, Michigan, Missouri, and Wisconsin. This analysis assumed that two Westinghouse AP1000 reactors with a net electrical output of 2,240 MWe would replace LSCS's current reactors. The new reactors may require a new cooling system (including natural draft cooling towers and intake and discharge structures). The NRC staff assumed that water requirements for the new nuclear alternative would be similar to current water use at LSCS. New onsite transmission lines and drinking water wells may be required if insufficient infrastructure occurs on the site. The NRC staff estimated that 556 ac (225 ha) of land would be required.

IGCC

For the IGCC alternative, the NRC staff evaluated the construction and operation of four IGCC units, each with a net capacity of 618 MWe. An IGCC power plant consists of coal gasification and combined-cycle power generation. Coal gasifiers convert coal into a gas (synthesis gas, also referred to as syngas), which fuels the combined-cycle power generating units. The combined-cycle system for a 618-MWe IGCC power plant includes two combustion turbines, two heat recovery steam generators, and a steam turbine. The IGCC alternative would be located at an existing site (such as an existing power plant site) to maximize availability of infrastructure and to reduce other environmental impacts. The NRC staff assumed that the cooling system would use a closed-cycle system with mechanical draft cooling towers. Cooling water withdrawal would be approximately 25 million gallons per day (gpd) (95 million liters per day (Lpd)) and consumptive water use would be approximately 20 million gpd (75 million Lpd). The NRC staff estimated that 2,000 ac (800 ha) of land would be required.

NGCC

For the NGCC alternative, the NRC staff evaluated the construction and operation of five NGCC units, each with a net capacity of 560 MWe. An NGCC system consists of a turbine that burns natural gas. This 2,800-MWe NGCC plant would consume 124 billion cubic feet (ft^3) (3,500 million cubic meters (m^3)) of natural gas annually. The NGCC alternative would be located on undeveloped land at LSCS to maximize availability of infrastructure and to reduce other environmental impacts. Depending on where it is located on the site, there might be a need to construct new intake and discharge facilities and a new cooling system. Because NGCC power plants generate much of their power from a gas-turbine combined-cycle plant and because the overall thermal efficiency of this type of plant is high, an NGCC alternative would require less cooling water than LSCS would. The NRC staff assumed that the cooling system would use a closed-cycle system with mechanical draft cooling towers. Cooling water withdrawal would be approximately 17 million gpd (64 million Lpd) and consumptive water use would be approximately 13 million gpd (49 million Lpd). The NRC staff estimated that 94 ac (38 ha) of land would be required.

Combination (NGCC, Wind, Solar)

For the combination alternative (NGCC, wind, solar), the NRC staff evaluated the combination of an NGCC facility constructed at an existing power plant site, operating in conjunction with land-based wind farms as well as solar energy facilities, all of which would be located within the ROI. This alternative would produce 2,400 MWe.

For the NGCC portion of the combination alternative, the NRC staff assumed that one new NGCC unit of the type previously described would be constructed and installed at an existing power plant site with a total net capacity of 360 MWe. The types of impacts of an NGCC unit would be similar to that of the full NGCC alternative considered previously, although lesser in scope as only one unit would be constructed. The NRC staff assumed that the NGCC portion of

this alternative, which is assumed to be located at an existing power plant site, would utilize existing electrical switchyards, substations, and transmission lines. The NRC staff assumed that the cooling system for the NGCC portion would use a closed-cycle system with mechanical draft cooling towers. The cooling water for the combination alternative would be 15 percent of that required for the NGCC alternative. The NRC staff estimated that the land required for the NGCC portion would remain approximately the same as the NGCC alternative at 94 ac (38 ha).

For the wind portion of the combination alternative, the NRC staff assumed that the wind-generated power would come from land-based wind farms, which would be located in the ROI. The NRC staff assumed a capacity factor of 30 percent, resulting in an estimated total net capacity of 1,813 MWe. Wind turbines must be well separated from each other to avoid interferences to wind flowing through the wind farm, resulting in wind farms requiring substantial amounts of land. Each wind turbine may require as much as 1 to 3 ac (0.4 to 1.2 ha) of land. Based on the size of the turbines and the amount of land required between each turbine, approximately 3,376 turbines and 3,376 to 10,127 ac (1,366 to 4,098 ha) of land would be required. The water use would be minimal.

For the solar portion of the combination alternative, the NRC staff assumed solar photovoltaic facilities with a capacity factor of 19 percent that would require approximately 7,397 ac (2,993 ha) of land to support an installed net capacity of 227 MWe. In this analysis, the NRC staff did not speculate on the number and size of individual solar facilities nor their locations within the ROI. Solar photovoltaic systems do not require water for cooling purposes, but a small amount of water is needed to clean the panels and for potable water for the workforce.

Purchased Power

Purchased power would likely come from the most common types of electricity generation within the ROI: coal, natural gas, nuclear, and wind. All of these power sources are discussed as alternatives to license renewal of LSCS. Purchased power may require new transmission lines (which may require new construction) and may also rely on older and less-efficient power plants operating at higher capacities than they currently operate or on new facilities that would be constructed. During operations, impacts from nuclear, coal-fired, and natural gas-fired plants, and from wind and solar energy projects would be similar to those described under the new nuclear, coal, natural gas, and combination alternatives.

iii. Summary

The environmental impacts of license renewal and alternatives to license renewal, including other methods of power generation, and not renewing the LSCS operating licenses (the no-action alternative) were evaluated in the final SEIS.

The continued operation of LSCS during the license renewal term would have SMALL environmental impacts with the exception of impacts on aquatic resources. For aquatic resources, the impacts of the proposed action would be SMALL except for the thermal impacts

on shad in the LSCS cooling pond, which would be MODERATE. Fish kills in the LSCS cooling pond would continue during the license renewal term and would decrease the shad population in the pond immediately following the fish kill. This would have a temporary, noticeable effect on shad populations. Fish kills, however, would not be destabilizing to these shad populations, because they tend to recover within a year. Because the cooling pond is a highly managed system, any cascading effects resulting from the loss of shad (such as a reduction in prey for stocked species, which in turn could affect a stocked species' population) could be mitigated through the Illinois Department of Natural Resource's annual stocking and continual management of the pond. Therefore, thermal impacts on aquatic resources from the proposed action are SMALL to MODERATE.

The environmentally preferable alternative is the granting of renewed licenses for LSCS. All other alternatives capable of meeting the needs currently served by LSCS entail potentially greater impacts than those of the proposed action of renewing the licenses for LSCS.

CONSIDERATION OF PUBLIC COMMENTS ON THE FINAL SEIS AND EMERGING INFORMATION

Public Comments on the Final SEIS

The NRC received no comments on the final SEIS from any source, including State or local agencies, other Federal agencies, Tribal governments, or other stakeholders such as members of the public who requested direct distribution of the final SEIS.

CEQ Final Guidance on Greenhouse Gas Emissions and Climate Change

On August 1, 2016, CEQ released "Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews." The NRC is in the process of reviewing this final guidance. Implementation of CEQ's final guidance, as applicable, will be conducted in accordance with the AEA, the NRC's environmental protection regulations (10 CFR 51), and the NRC's NEPA processes and guidance to NRC staff.

CEQ's final guidance states that "[a]gencies should exercise judgment when considering whether to apply this guidance to the extent practicable to an on-going NEPA process," as is the case for the LSCS license renewal application. In conducting its environmental review of the LSCS license renewal application, the NRC staff considered the impacts of greenhouse gas (GHG) emissions from the continued operation of LSCS and the impacts caused by potential climate change in accordance with the NRC's 2013 final rule (78 FR 37282) revising 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions." Chapter 4 of the final SEIS for the LSCS license renewal application includes a site-specific analysis of GHG emissions from the continued operation of LSCS and alternatives to this proposed action, as well as the impacts on affected resources during the license renewal term, which is generally consistent with CEQ's final guidance. Therefore, the NRC has

determined that the final SEIS for the LSCS license renewal application provides sufficient information on GHG emissions and climate change to inform its decision and that no further NEPA analysis is necessary.

MITIGATION MEASURES

The NRC has taken all practicable measures within its jurisdiction to avoid or minimize environmental harm from the proposed action (license renewal). The continued operation of LSCS would have SMALL environmental impacts in all resources areas except for thermal impacts to shad within the LSCS cooling pond, which would be MODERATE. While the NRC is not requiring any mitigation measures for the continued operation of LSCS, the National Pollutant Discharge Elimination System (NPDES) permits do impose effluent limitations and monitoring requirements as well as best management practices to ensure that the impacts to water quality and aquatic life are minimized. Also, within the LSCS cooling pond, any cascading effects resulting from the loss of shad (such as a reduction in prey for stocked species, which in turn could affect a stocked species' population) could be mitigated through the Illinois Department of Natural Resource's annual stocking and continual management of the pond. The NRC is not imposing any license conditions involving mitigation measures. Additionally, the NRC is not requiring any new environmental monitoring programs outside what is required for the NPDES permits.

DETERMINATION

Based on the NRC staff's independent review, analysis, and evaluation contained in the final SEIS for the LSCS license renewal application; careful consideration of all of the identified social, economic, and environmental factors, as well as input received from other agencies, organizations, and the public; and the consideration of mitigation measures outlined above, the NRC has determined that the standards for the issuance of renewed operating licenses, as described in 10 CFR 54.29, have been met and that the requirements of Section 102 of NEPA have been satisfied.

The adverse environmental impacts of license renewal are not so great that preserving the option of license renewal for energy-planning decisionmakers would be unreasonable.

APPROVED BY:

/RA/

Jane E. Marshall, Acting Director
Division of License Renewal
Office of Nuclear Reactor Regulation

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