

RECORD OF DECISION
U.S. NUCLEAR REGULATORY COMMISSION
DOCKET NO. 50-483
LICENSE RENEWAL APPLICATION FOR
CALLAWAY PLANT, UNIT 1

March 6, 2015

BACKGROUND:

The U.S. Nuclear Regulatory Commission (NRC or Commission) received an application, dated December 15, 2011, from Union Electric Company as Ameren Missouri (Ameren), 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 license for the Callaway Plant, Unit 1 (Callaway). Renewal of the license would authorize the applicant to operate the unit for an additional 20 year period beyond that specified in the respective current operating license.

Callaway is a one-unit nuclear powered steam electric generating facility that began commercial operations on April 9, 1985. The nuclear reactor is a Westinghouse pressurized-water reactor (PWR) producing a reactor core rated thermal power of 3,579 megawatts (MW(t)). The nominal gross electrical capacity is 1,284 megawatts-electric (MWe). The current operating license for Callaway, Unit 1 (NPF-30) expires on October 18, 2024.

The NRC accepted Ameren's application and began the environmental review process on February 24, 2012. 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 license for Callaway 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 March 14, 2012, the NRC held two public meetings in Fulton, Missouri, 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 April 11, 2012.

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), in accordance with 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.

Ameren submitted its license renewal application and environmental report under NRC's 1996 rule governing license renewal environmental reviews (61 FR 28467, as amended)¹, as codified in NRC's environmental protection regulation, 10 CFR Part 51. The 1996 GEIS² and Addendum 1³ 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 Callaway, the NRC staff initiated its environmental review in accordance with the 1996 rule and GEIS. Neither Ameren 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 Ameren'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)⁴ revising 10 CFR Part 51, including the list of NEPA issues and findings in Table B-1. A revised GEIS⁵, 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 (non-cooling 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 Callaway license renewal.

¹61 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.

²U.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.

³U.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.

⁴78 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.

⁵U.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 Callaway license renewal application on February 12, 2014 (ADAMS Accession No. ML14041A373). 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 March 19, 2014, the NRC conducted two public meetings at the Fulton City Hall in Fulton, Missouri, 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 FSEIS.

The NRC issued the final plant-specific SEIS in support of the Callaway license renewal application in October 2014 (ADAMS Accession No. ML14289A140). In the FSEIS, the NRC staff concluded that the adverse environmental impacts of license renewal for Callaway 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 Callaway license renewal application. This ROD incorporates by reference materials contained in the FSEIS, in accordance with 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 report (SER) (ADAMS Accession No. ML14232A380). By letter dated October 14, 2014, the Advisory Committee of Reactor Safeguards (ACRS) notified the Commission of the ACRS's recommendation to approve the application for renewal of Callaway's operating license (ADAMS Accession No. ML14279A289).

This ROD and the FSEIS document the NRC's decision for the environmental review that the adverse environmental impacts of license renewal for Callaway 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, Ameren will be able to continue operating Callaway, Unit 1, for an additional 20 years beyond the expiration of the operating license, 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 Ameren 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 a renewed license for Callaway, which will allow the plant to operate for 20 years beyond its current license expiration date. 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 Callaway operating license expires. The current operating license for Callaway reactor will expire on October 18, 2024, and reasonable alternatives must be available (constructed, permitted, and connected to the grid) by the time the current Callaway license expires 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, Callaway does not have a sufficient amount of land available for all of the replacement power alternatives because Callaway 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 also evaluated the impacts of locating replacement power facilities at other sites in the alternative analysis. 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. This review includes

updated information from sources such as the Energy Information Administration (EIA), other organizations within the U.S. Department of Energy (DOE), the EPA, industry sources and publications, and information submitted by Union Electric Company in its Environmental Report (ER), specifically the Ameren Integrated Resource Plan. In compiling the list of reasonable alternatives analyzed in the SEIS, the staff reviewed regional policies and focused the evaluation on replacement power technologies already in commercial operation, or well under development, in the state and region.

The NRC staff initially considered a number of additional alternatives for analysis as alternatives to the license renewal of Callaway; 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 Callaway license expires, rendering these alternatives not feasible and commercially viable. The no action alternative (i.e., not renewing the Callaway operating license) 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 Callaway site and at some other unspecified alternate location.

Alternatives considered, but dismissed, were:

- Oil-Fired Generation
- Wind
- Solar
- Hydropower
- Small Modular Reactor
- Biomass Energy
- Fuel Cells
- Delayed Retirement
- Demand-Side Management
- Purchased Power
- Non-Powered Dams

Each alternative eliminated from detailed study and the basis for its removal is provided in Section 8.5 of the FSEIS.

The alternatives analyzed in detail include other methods of power generation and not renewing the Callaway operating license that includes the no-action alternative. Impacts of all alternatives considered in detail are summarized in Table 8-6 of the FSEIS. The feasible and commercially viable replacement power alternatives considered in-depth were:

- Natural Gas Combined-Cycle (NGCC)
- Supercritical Pulverized Coal (SCPC)
- New Nuclear
- Combination Generation of NGCC, Wind Power, and Energy Efficiency

ALTERNATIVE EVALUATION:

i. No Action Alternative

The No Action alternative refers to a scenario in which the NRC denies the renewed operating license for Callaway and the license expires at the end of the current license term, 2024. If the NRC denies the renewed operating license, the plant will shut down at or before the end of the current license. 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 Callaway, the no-action alternative would require the appropriate energy planning decision-makers (not NRC) to rely on an alternative to replace the capacity of Callaway, rely on energy conservation or power purchases to offset parts of the Callaway 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 Callaway 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 gas-turbine cycle combined with steam-turbine cycle for electricity generation. 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 Callaway. The NRC staff evaluated an alternative that consists of two units, 593 MW each. This alternative provides 1,186 MW of capacity, replacing the nominal gross capacity of 1,284 MW produced by Callaway (less 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, terrestrial ecology, and transportation would be greater depending on construction, site location, and land required for a new pipeline.

For SCPC (including ultra-SCPC), the FSEIS assumes that two equal-sized boiler (steam) turbine generator power-trains, operating independently and simultaneously, would likely be used to match the power output of Callaway. An SCPC power plant is similar to most existing coal-fired technologies, but it operates at higher pressures and temperatures (beyond the “critical point” of water). To complete this analysis, the NRC staff presumed that the power available would be equal to 1,186 MW. The staff notes that integrated gasification combined cycle (IGCC) technology also may be feasible and commercially available on a sufficient scale to replace Callaway by the time its current license expires. The IGCC plants use coal (or other solid or liquid feedstocks) to produce syngas, which burns in a combined-cycle plant similar to that used to burn natural gas. The IGCC plants have advantages that may become important if carbon dioxide capture and storage are technologically more feasible. However, because SCPC is a more-demonstrated and commercially available technology, staff considered it to be the most reasonable coal-fired generation alternative.

The FSEIS assumes that the SCPC plant would include the boiler and steam turbine building, two exhaust stacks, and coal storage and conveyance facilities. The FSEIS assumes natural-draft cooling towers would be required for operation of SCPC; however, it is possible

that if and when EPA reissues the final rule for cooling water intake systems at existing facilities, modifications would be necessary for a new generating unit.

Air emissions effects will be greater for SCPC due to increased greenhouse gas emissions during operation. Impacts to land use, aesthetic and noise, and terrestrial ecology would also be greater due to construction to accommodate 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 Callaway, 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 (or barge) deliveries of power plant components and material could cause additional traffic delays at railroad crossings.

For new nuclear, the FSEIS assumes an advanced light-water reactor such as the Advanced Passive 1000 (AP1000) model pressurized-water reactor, a reactor design for which the NRC has already issued a certification, with a gross output of 1,200 MW. The new nuclear alternative would rely on a closed-cycle cooling system, similar to the cooling system currently in place at Callaway. This would take advantage of existing infrastructure (e.g., cooling water intake system, transmission, roads, and technical and administrative support facilities). Impacts to land use and terrestrial resources could increase during construction of a new facility because of significant land requirements and construction. Aesthetics and noise, socioeconomics, and transportation impacts would increase due to the increase in workforce during construction and operation of the facility.

For combination generation of NGCC, wind power, and energy efficiency measures, the NRC staff determined that the feasibility of this alternative as a baseload power source depends on the availability, accessibility, and constancy of the wind resource within the region of interest. Therefore, the staff assumed the wind component of the combination alternative would be located in one or more areas of Missouri with the appropriate wind profile. The NGCC and energy efficiency combination would be supplemented by wind, when available.

The NRC staff assumed the NGCC component would represent 951 MW of the combination alternative's net capacity of 1,186 MW. The size, impacts, and appearance of a natural gas-fired facility would be similar to the full-scale NGCC alternative considered in the alternative analysis (all construction and operation effects would scale accordingly).

Ameren's Integrated Resource Plan evaluated several scenarios of energy efficiency potential through 2030. For the 2025 time frame, Ameren's evaluation identified 331 MW of energy efficiency capacity in the business-as-usual case (baseline), and 846 MW in the realistically achievable case. The difference between these two scenarios is 515 MW. The NRC staff estimates that 25 percent of this energy efficiency potential, or about 130 MW, would reasonably offset baseload demand in 2024 and during the period of extended operation.

The wind component would also require interconnection to the transmission grid and a transmission line. The location of the grid interconnection would depend on the location of the wind facilities and available transmission capacity. The staff assumed the construction of 188 wind turbines of 1.6-MW each, for a total of 300 MW with a 35 percent capacity factor (or 105 MW). The construction and 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.

iii. Summary

In the October 2014 Callaway FSEIS, the NRC staff considered the environmental impacts associated with alternatives to license renewal, including other methods of power generation and not renewing the Callaway operating license (the no-action alternative). The Callaway FSEIS concluded that the continued operation of Callaway during the license renewal term would have SMALL environmental impacts in all areas. The Callaway FSEIS concluded that the environmental impacts of renewal of the operating license for Callaway 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 Callaway on or before its license expiration would have mostly SMALL impacts, although socioeconomic impacts would be SMALL to MODERATE.

A summary of the environmental impacts associated with the license renewal and alternatives, by resource areas, is provided in the below table.

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 Callaway 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 Callaway, 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, Ameren has a general license to store spent fuel in NRC approved dry storage casks in accordance with the requirements in 10 CFR Part 72, Subpart K. In the Callaway 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 Callaway is the environmentally-preferred alternative.

**Summary of Environmental Impacts of Proposed Action, Alternatives Evaluated in Detail,
and No-action Alternative**

Impact Area	Alternative					
	Callaway License Renewal (proposed action)	Natural-Gas-Fired Combined-Cycle (NGCC)	Super-critical Pulverized Coal (SCPC)	New Nuclear	Combination Generation	No-action Alternative
Air Quality	Small	Small to Moderate	Moderate	Small	Small to Moderate	Small
Surface Water	Small	Small	Small	Small	Small	Small
Groundwater	Small	Small	Small	Small	Small	Small
Aquatic Ecology	Small	Small	Small	Small	Small	Small
Terrestrial Ecology	Small	Small to Moderate	Moderate to Large	Small to Moderate	Small to Moderate	Small
Human Health	Small	Small	Small	Small	Small	Small
Land Use	Small	Small to Moderate	Small to Moderate	Small to Moderate	Small to Moderate	Small
Socioeconomics	Small	Small to Moderate	Small to Moderate	Small to Large	Small to Moderate	Small to Moderate
Transportation	Small	Small to Moderate	Small to Moderate	Small to Large	Small	Small
Aesthetics and Noise	Small	Small	Small to Moderate	Small to Moderate	Moderate to Large	Small
Historic and Archaeological Resources	Small	Small	Small	Small	Small to Large	Small
Waste Management	Small	Small	Moderate	Small	Small	Small

CONTINUED STORAGE OF SPENT NUCLEAR FUEL:

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 were deemed incorporated into the Callaway FSEIS for a license renewal application. The Continued Storage Rule⁶ and accompanying technical analyses were not finalized before the Callaway FSEIS was being prepared for publication. Therefore, the Callaway FSEIS further indicated that the NRC staff would address any impacts from the Continued Storage Rule in a Record of Decision or in a Supplement to the FSEIS, as appropriate.

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

As detailed in the NRC staff’s evaluation (ADAMS Accession No. ML14310A836), 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 Callaway FSEIS. By virtue of revised 10 CFR 51.23, the Callaway FSEIS incorporated 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 Callaway FSEIS that the adverse environmental impacts of license renewal for Callaway 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. ML14310A836), NUREG-2157 analyzes continued storage of spent fuel at-reactor and away-from-reactor sites during

⁶ For the purposes of this paper, the Staff will generally refer to the Continued Storage Rule unless it is specifically referencing an earlier version of the rule.

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 Callaway 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 Callaway 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 Callaway FSEIS that the adverse environmental impacts of license renewal for Callaway 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 Callaway would have SMALL environmental impacts in all resources areas. The NRC staff also conducted a severe accident mitigation alternatives (SAMA) review. As indicated in the SEIS, the NRC staff agrees with Ameren's identification of certain areas in which risk can be further reduced in a cost-beneficial manner. Given the potential for cost-beneficial risk reduction, the NRC staff agrees that further evaluation of these SAMA by Ameren is warranted, as a part of the Callaway long-range plan for further implementation consideration. Furthermore, the NRC staff concluded that none of the potentially cost-beneficial SAMA relate to adequately managing the effects of plant structure and component aging during the period of extended operation. Therefore, they need not be implemented as part of the license renewal, in accordance with 10 CFR Part 54, "Requirements for renewal of operating licenses for nuclear power plants."

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 by the NRC and discussed in the Callaway FSEIS. For radiological contaminants consideration, the NRC staff discussed Callaway's Radiological Environmental Monitoring

Program (REMP) in Section 4.9.2.2 of the Callaway FSEIS. REMPs at nuclear power plants were generically evaluated in the License Renewal GEIS as part of the Human Health issue listed in Table B-1 of 10 CFR Part 51 and classified as a Category 1 issue generic to all nuclear power plants. The GEIS contains a thorough discussion of the purpose, function, and description of the types of samples taken, the radiological analysis performed on those samples, and the results of the monitoring. The detailed analyses from the GEIS are incorporated by reference into the Callaway FSEIS.

CONSULTATIONS:

In conjunction with reviewing the license renewal application, the NRC staff submitted a biological assessment to the U.S. Fish and Wildlife Service (FWS) on the effects of Callaway's cooling water system operation on the endangered pallid sturgeon, thereby initiating an Endangered Species Act (ESA) section 7 consultation. The NRC staff's assessment found that young pallid sturgeon may occur in the Missouri River near Callaway and that some lethal takes of pallid sturgeon because of plant operation are probable over the period of license renewal and most likely inevitable. The NRC staff could not confirm such takes because Callaway has not monitored entrainment and impingement for endangered fish species for about three decades, and seasonal monitoring of entrainment and impingement would be necessary to quantify present and future levels of pallid sturgeon takes. The FWS agreed, found that NRC staff's biological assessment lacked sufficient information about impingement and entrainment of pallid sturgeon, and recommended that Callaway perform impingement and entrainment studies. During the consultation, the U.S. EPA finalized its regulations for cooling water intake structures (79 FR 48300), which allow EPA or its designated states to require impingement and entrainment monitoring in association with its NPDES habitat, (for example, the food base of endangered species). So, in association with its NPDES permit, Ameren agreed to conduct impingement and entrainment monitoring and Missouri River sampling for pallid sturgeon at Callaway and to provide the NRC staff with a report describing the results, with copies to the FWS, the Missouri Department of Natural Resources, and the Missouri Department of Conservation by March 31, 2017. Ameren followed up with a letter of formal commitment to that effect to the NRC on October 31, 2014 (ADAMS Accession No. ML14281A237). By letter dated November 21, 2014 (ADAMS Accession No. ML14328A006), FWS concurred with the NRC staff that Ameren's commitment meets the minimum information needs for the section 7 consultation. Based on the results of the impingement and entrainment sampling study, the NRC staff will take appropriate actions, such as further consultation with FWS.

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.

APPROVED BY:

/RA/

Christopher G. Miller, Director
Division of License Renewal
Office of Nuclear Reactor Regulation

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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.

APPROVED BY:

/RA/

Christopher G. Miller, Director
Division of License Renewal
Office of Nuclear Reactor Regulation

ADAMS Accession No. ML14302A238

*concurring via email

OFFICE	LA:RPB2:DLR*	BC:RPB2:DLR	BC:RERB:DLR
NAME	IBetts	BWittick	DWrona
DATE	11/06/14	11/25/14	1/7/15
OFFICE	BC:RPB1:DLR	OGC	D:DLR
NAME	YDiaz-Sanabria	AGhosh	CMiller
DATE	2/12/15	2/9/15	3/6/15

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