

Abstract

The U.S. Nuclear Regulatory Commission (NRC) considered the environmental impacts of renewing nuclear power plant operating licenses for a 20-year period in its *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2, and codified the results in 10 Code of Federal Regulations (CFR) Part 51. In the GEIS (and its Addendum 1), the staff identifies 92 environmental issues and reaches generic conclusions related to environmental impacts for 69 of these issues that apply to all plants or to plants with specific design or site characteristics. Additional plant-specific review is required for the remaining 23 issues. These plant-specific reviews are to be included in a supplement to the GEIS.

This draft supplemental environmental impact statement (SEIS) has been prepared in response to an application submitted to the NRC by the South Carolina Electric and Gas Company (SCE&G) to renew the operating license for the Virgil C. Summer Nuclear Station (V.C. Summer) for an additional 20 years under 10 CFR Part 54. This draft SEIS includes the NRC staff's analysis that considers and weighs the environmental impacts of the proposed action, the environmental impacts of alternatives to the proposed action, and mitigation measures available for reducing or avoiding adverse impacts. It also includes the staff's preliminary recommendation regarding the proposed action.

Regarding the 69 issues for which the GEIS reached generic conclusions, neither SCE&G nor the staff has identified information that is both new and significant for any issue that applies to V.C. Summer. The staff determined that information provided during the scoping process did not call into question the conclusions in the GEIS. Therefore, the staff concludes that the impacts of renewing the V.C. Summer operating license will not be greater than impacts identified for these issues in the GEIS. For each of these issues, the staff's conclusion in the GEIS is that the impact is of SMALL^(a) significance (except for collective offsite radiological impacts from the fuel cycle and high-level waste and spent fuel, which were not assigned a single significance level).

Regarding the remaining 23 issues, those that apply to V.C. Summer are addressed in this draft SEIS. For each applicable issue, the staff concludes that the significance of the potential environmental impacts of renewal of the operating license is SMALL. The staff also concludes that additional mitigation measures are not likely to be sufficiently beneficial as to be warranted. The staff determined that information provided during the scoping process did not identify any new issue that has a significant environmental impact.

(a) Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.

Abstract

1 The NRC staff's preliminary recommendation is that the Commission determine that the
2 adverse environmental impacts of license renewal for V.C. Summer are not so great that
3 preserving the option of license renewal for energy-planning decisionmakers would be
4 unreasonable. This recommendation is based on (1) the analysis and findings in the GEIS;
5 (2) the Environmental Report submitted by SCE&G; (3) consultation with Federal, State, and
6 local agencies; (4) the staff's own independent review; and (5) the staff's consideration of public
7 comments received during the scoping process.
8

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Executive Summary

By letter dated August 6, 2002, South Carolina Electric and Gas Company (SCE&G) submitted an application to the U.S. Nuclear Regulatory Commission (NRC) to renew the operating license (OL) for the Virgil C. Summer Nuclear Station (V.C. Summer) for an additional 20-year period. If the OL is renewed, State regulatory agencies and SCE&G will ultimately 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. If the OL is not renewed, then the plant must be shut down at or before the expiration date of the current OL, which is August 6, 2022.

Section 102 of the National Environmental Policy Act of 1969 (NEPA) (42 USC 4321) directs that an environmental impact statement (EIS) is required for major Federal actions that significantly affect the quality of the human environment. The NRC has implemented Section 102 of NEPA in 10 CFR Part 51. Part 51 identifies licensing and regulatory actions that require an EIS. In 10 CFR 51.20(b)(2), the Commission requires preparation of an EIS or a supplement to an EIS for renewal of a reactor OL; 10 CFR 51.95(c) states that the EIS prepared at the OL renewal stage will be a supplement to the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2.^(a)

Upon acceptance of the SCE&G application, the NRC began the environmental review process described in 10 CFR Part 51 by publishing a notice of intent to prepare an EIS and conduct scoping. The staff visited the V.C. Summer site in December 2002 and held public scoping meetings on December 11, 2002, in Jenkinsville, South Carolina. In the preparation of this draft supplemental environmental impact statement (SEIS) for V.C. Summer, the staff reviewed the V.C. Summer Environmental Report (ER) and compared it to the GEIS, consulted with other agencies, conducted an independent review of the issues following the guidance set forth in NUREG-1555, Supplement 1, the *Standard Review Plans for Environmental Reviews for Nuclear Power Plants, Supplement 1: Operating License Renewal*, and considered the public comments received during the scoping process. The public comments received during the scoping process that were considered to be within the scope of the environmental review are provided in Appendix A, Part 1, of this SEIS.

The staff will hold two public meetings in Jenkinsville, South Carolina, in August 2003, to describe the preliminary results of the NRC environmental review and answer questions to provide members of the public with information to assist them in formulating comments on this SEIS. When the comment period ends, the staff will consider and disposition all of the

(a) The GEIS was originally issued in 1996. Addendum 1 to the GEIS was issued in 1999. Hereafter, all references to the "GEIS" include the GEIS and its Addendum 1.

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1 comments received. These comments will be addressed in Appendix A, Part 2, of the final
2 SEIS.

3
4 This draft SEIS includes the NRC staff's preliminary analysis that considers and weighs the
5 environmental effects of the proposed action, the environmental impacts of alternatives to the
6 proposed action, and mitigation measures for reducing or avoiding adverse effects. It also
7 includes the staff's preliminary recommendation regarding the proposed action.

8
9 The Commission has adopted the following statement of purpose and need for license renewal
10 from the GEIS:

11
12 The purpose and need for the proposed action (renewal of an operating license) is to
13 provide an option that allows for power generation capability beyond the term of a current
14 nuclear power plant operating license to meet future system generating needs, as such
15 needs may be determined by State, utility, and, where authorized, Federal (other than NRC)
16 decisionmakers.

17
18 The goal of the staff's environmental review, as defined in 10 CFR 51.95(c)(4) and the GEIS, is
19 to determine

20
21 ... whether or not the adverse environmental impacts of license renewal are so great that
22 preserving the option of license renewal for energy planning decisionmakers would be
23 unreasonable.

24
25 Both the statement of purpose and need and the evaluation criterion implicitly acknowledge that
26 there are factors, in addition to license renewal, that will ultimately determine whether an
27 existing nuclear power plant continues to operate beyond the period of the current OL.

28
29 NRC regulations [10 CFR 51.95(c)(2)] contain the following statement regarding the content of
30 SEISs prepared at the license renewal stage:

31
32 The supplemental environmental impact statement for license renewal is not required to
33 include discussion of need for power or the economic costs and economic benefits of the
34 proposed action or of alternatives to the proposed action except insofar as such benefits
35 and costs are either essential for a determination regarding the inclusion of an alternative in
36 the range of alternatives considered or relevant to mitigation. In addition, the supplemental
37 environmental impact statement prepared at the license renewal stage need not discuss
38 other issues not related to the environmental effects of the proposed action and the
39 alternatives, or any aspect of the storage of spent fuel for the facility within the scope of the
40 generic determination in § 51.23(a) ["Temporary storage of spent fuel after cessation of

reactor operation—generic determination of no significant environmental impact”] and in accordance with § 51.23(b).

The GEIS contains the results of a systematic evaluation of the consequences of renewing an OL and operating a nuclear power plant for an additional 20 years. It evaluates 92 environmental issues using the NRC’s three-level standard of significance—SMALL, MODERATE, or LARGE—developed using the Council on Environmental Quality guidelines. The following definitions of the three significance levels are set forth in footnotes to Table B-1 of 10 CFR Part 51, Subpart A, Appendix B:

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.

For 69 of the 92 issues considered in the GEIS, the analysis in the GEIS reached the following conclusions:

- (1) The environmental impacts associated with the issue have been determined to apply either to all plants or, for some issues, to plants having a specific type of cooling system or other specified plant or site characteristics.
- (2) A single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the impacts (except for collective offsite radiological impacts from the fuel cycle and from high-level waste and spent fuel disposal).
- (3) Mitigation of adverse impacts associated with the issue has been considered in the analysis, and it has been determined that additional plant-specific mitigation measures are not likely to be sufficiently beneficial to warrant implementation.

These 69 issues were identified in the GEIS as Category 1 issues. In the absence of new and significant information, the staff relied on conclusions as amplified by supporting information in the GEIS for issues designated as Category 1 in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B.

Executive Summary

Of the 23 issues that do not meet the criteria set forth above, 21 are classified as Category 2 issues requiring analysis in a plant-specific supplement to the GEIS. The remaining two issues, environmental justice and chronic effects of electromagnetic fields, were not categorized. Environmental justice was not evaluated on a generic basis and must be addressed in a plant-specific supplement to the GEIS. Information on the chronic effects of electromagnetic fields was not conclusive at the time the GEIS was prepared.

This draft SEIS documents the staff's evaluation of all 92 environmental issues identified in the GEIS. The staff considered the environmental impacts associated with alternatives to license renewal and compared the environmental impacts of license renewal and the alternatives. The alternatives to license renewal that were considered include the no-action alternative (not renewing the OL for V.C. Summer) and alternative methods of power generation. Based on projections made by the U.S. Department of Energy's Energy Information Administration, gas- and coal-fired generation appear to be the most likely power-generation alternatives if the power from V.C. Summer is replaced. These alternatives are evaluated assuming that the replacement power generation plant is located at either the V.C. Summer site or some other unspecified alternate location in South Carolina.

SCE&G and the staff have established independent processes for identifying and evaluating the significance of any new information on the environmental impacts of license renewal. Neither SCE&G nor the staff has identified information that is both new and significant related to Category 1 issues that would call into question the conclusions in the GEIS. Similarly, neither the scoping process nor the staff has identified any new issue applicable to V.C. Summer that has a significant environmental impact. Therefore, the staff relies upon the conclusions of the GEIS for all of the Category 1 issues that are applicable to V.C. Summer.

SCE&G's license renewal application presents an analysis of the Category 2 issues plus environmental justice and chronic effects from electromagnetic fields. The staff has reviewed the SCE&G analysis for each issue and has conducted an independent review of each issue. Three Category 2 issues are not applicable because they are related to plant design features or site characteristics not found at V.C. Summer. Four Category 2 issues are not discussed in this draft SEIS because they are specifically related to refurbishment. SCE&G has stated that its evaluation of structures and components, as required by 10 CFR 54.21, did not identify any major plant refurbishment activities or modifications as necessary to support the continued operation of V.C. Summer for the license renewal period. In addition, any replacement of components or additional inspection activities are within the bounds of normal plant component replacement and, therefore, are not expected to affect the environment outside of the bounds of the plant operations evaluated in the U.S. Atomic Energy Commission's 1981 *Final Environmental Statement Related to Operation of V.C. Summer Plant*.

1 Fifteen Category 2 issues related to operational impacts and postulated accidents during the
2 renewal term, as well as environmental justice and chronic effects of electromagnetic fields, are
3 discussed in detail in this draft SEIS. Four of the Category 2 issues and environmental justice
4 apply to both refurbishment and to operation during the renewal term and are only discussed in
5 this draft SEIS in relation to operation during the renewal term. For all 15 Category 2 issues
6 and environmental justice, the staff concludes that the potential environmental effects are of
7 SMALL significance in the context of the standards set forth in the GEIS. In addition, the staff
8 determined that appropriate Federal health agencies have not reached a consensus on the
9 existence of chronic adverse effects from electromagnetic fields. Therefore, no further
10 evaluation of this issue is required. For severe accident mitigation alternatives (SAMAs), the
11 staff concludes that a reasonable, comprehensive effort was made to identify and evaluate
12 SAMAs. Based on its review of the SAMAs for V.C. Summer, and the plant improvements
13 already made, the staff concludes that none of the candidate SAMAs are cost-beneficial.
14

15 Mitigation measures were considered for each Category 2 issue. Current measures to mitigate
16 the environmental impacts of plant operation were found to be adequate, and no additional
17 mitigation measures were deemed sufficiently beneficial to be warranted.
18

19 If the V.C. Summer OL is not renewed and the unit ceases operation on or before the expiration
20 of the current OL, then the adverse impacts of likely alternatives will not be smaller than those
21 associated with continued operation of V.C. Summer. The impacts may, in fact, be greater in
22 some areas.
23

24 The preliminary recommendation of the NRC staff is that the Commission determine that the
25 adverse environmental impacts of license renewal for V.C. Summer are not so great that
26 preserving the option of license renewal for energy planning decisionmakers would be
27 unreasonable. This recommendation is based on (1) the analysis and findings in the GEIS;
28 (2) the ER submitted by SCE&G; (3) consultation with other Federal, State, and local agencies;
29 (4) the staff's own independent review; and (5) the staff's consideration of public comments
30 received during the scoping process.
31
32

Abbreviations/Acronyms

1		
2		
3		
4	°	degree(s)
5		
6	μCi	microcurie(s)
7	μCi/mL	microcurie(s) per milliliter
8	μm	micrometer(s)
9		
10	AADT	annual average daily traffic (volume)
11	ac	acres
12	AD	Anno Domini
13	AEA	Atomic Energy Act of 1954
14	ALARA	as low as reasonably achievable
15	AQCR	Air Quality Control Region
16		
17	BC	before Christ
18	Bq/L	becquerel per liter
19	Bq/mL	becquerel per milliliter
20	Btu/ft ³	British thermal units per cubic foot
21	Btu/h	British thermal units per hour
22	Btu/kWh	British thermal units per kilowatt-hour
23		
24	C	Celsius
25	CFR	Code of Federal Regulations
26	cfs	cubic feet per second
27	Ci	curie(s)
28	cm	centimeter(s)
29	CWA	Clean Water Act
30		
31	DO	dissolved oxygen
32	DOE	U.S. Department of Energy
33	DSM	demand-side management
34		
35	EIA	Energy Information Administration (U.S. DOE)
36	EIS	environmental impact statement
37	ELF-EMF	extremely low frequency-electromagnetic field
38	EPA	U.S. Environmental Protection Agency
39	ER	Environmental Report
40		
41	F	Fahrenheit
42	FERC	Federal Energy Regulatory Commission
43	FPSF	Fairfield Pumped Storage Facility
44	FR	Federal Register
45	ft	foot/feet
46	ft ³	cubic feet

Abbreviations/Acronyms

1	FWPCA	Federal Water Pollution Control Act (also known as the Clean Water Act)
2		
3	gal	gallon(s)
4	gal/d	gallons per day
5	GEIS	<i>Generic Environmental Impact Statement for License Renewal of Nuclear Plants, NUREG 1437</i>
6		
7	gpm	gallons per minute
8	GWPS	gaseous waste processing system
9		
10		
11	ha	hectares
12	HEPA	high-efficiency particulate air (filter)
13	HLW	high-level waste
14	Hz	Hertz
15		
16	in	inch(es)
17	ISFSI	independent spent fuel storage installation
18		
19	J	joule(s)
20		
21	KkW	thousand kilowatts
22	km	kilometers
23	km ²	square kilometers
24	kPa	kilopascal
25	kV	kilovolts
26	kWh	kilowatt-hour
27		
28	L	liter(s)
29	lb/MWh	pounds per megawatt hour
30	L/d	liters per day
31	LLW	low-level waste
32	L/s	liters per second
33	LWPS	liquid waste processing systems
34		
35	m	meters
36	m/s	meters per second
37	m ³	cubic meters
38	m ³ /d	cubic meters per day
39	m ³ /s	cubic meters per second
40	m ³ /yr	cubic meters per year
41	mA	milliamperes
42	MGD	million gallons per day
43	mGy	milligray(s)
44	mi	mile(s)

Abbreviations/Acronyms

1	mi ²	square miles
2	mJ	millijoule(s)
3	mph	miles per hour
4	mrad	millirad(s)
5	mrem	millirem(s)
6	mSv	millisievert(s)
7	MT	metric ton(s)
8	MWd/MTU	megawatt-days per metric ton of uranium
9	MW(e)	megawatts electric
10	MWh	megawatt hour(s)
11	MW(t)	megawatts thermal
12		
13	NA	not applicable
14	NAS	National Academy of Sciences
15	NEPA	National Environmental Policy Act of 1969
16	NESC	National Electrical Safety Code
17	ng/J	nanogram(s) per joule
18	NHPA	National Historic Preservation Act of 1966
19	NIEHS	National Institute of Environmental Health Sciences
20	NMFS	National Marine Fisheries Service
21	NO _x	nitrogen oxides
22	NPDES	National Pollutant Discharge Elimination System
23	NRC	U.S. Nuclear Regulatory Commission
24	NRHP	National Register of Historic Places
25		
26	ODCM	Offsite Dose Calculation Manual
27	OL	operating license
28		
29	pCi/L	picocuries per liter
30	PM ₁₀	particulate matter, 10 microns or less in diameter
31	ppm	parts per million
32	psig	pounds per square inch gauge
33		
34	rem	roentgen equivalent man
35	REMP	radiological environmental monitoring program
36		
37	SAMA	severe accident mitigation alternative
38	SCANA	South Carolina Public Service Authority
39	SCDAH	South Carolina Department of Archives and History
40	SCDHEC	South Carolina Department of Health and Environmental Control
41	SCE&G	South Carolina Electric and Gas Company
42	SCDNR	South Carolina Department of Natural Resources
43	SEIS	supplemental environmental impact statement
44	SHPO	State Historic Preservation Officer

Abbreviations/Acronyms

1	SO ₂	sulfur dioxide
2	SO _x	sulfur oxides
3	Sv	seviert(s)
4		
5	TBq	tera becquerel(s)
6		
7	U.S.	United States
8	USC	United States Code
9		
10	V.C. Summer	Virgil C. Summer Nuclear Station
11		
12	yr	year
13		
14		