

9.0 Summary and Conclusions

1 By letter dated August 6, 2002, South Carolina Electric and Gas Company (SCE&G) submitted
2 an application to the U.S. Nuclear Regulatory Commission (NRC) to renew the operating
3 license (OL) for the Virgil C. Summer Nuclear Station (V.C. Summer) for an additional 20-year
4 period (SCE&G 2002a). If the OL is renewed, State regulatory agencies and SCE&G will
5 ultimately decide whether the plant will continue to operate based on factors such as the need
6 for power or other matters within the State's jurisdiction or the purview of the owners. If the OL
7 is not renewed, then the plant must be shut down at or before the expiration of the current OL,
8 which expires on August 6, 2022.

9
10 Section 102 of the National Environmental Policy Act of 1969 (NEPA) (42 USC 4321) directs
11 that an environmental impact statement (EIS) is required for major Federal actions that
12 significantly affect the quality of the human environment. The NRC has implemented Section
13 102 of NEPA in 10 CFR Part 51. Part 51 identifies licensing and regulatory actions that require
14 an EIS. In 10 CFR 51.20(b)(2), the Commission requires preparation of an EIS or a
15 supplement to an EIS for renewal of a reactor OL; 10 CFR 51.95(c) states that the EIS
16 prepared at the OL renewal stage will be a supplement to the *Generic Environmental Impact
17 Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2
18 (NRC 1996; 1999).^(a)

19
20 Upon acceptance of the SCE&G application, the NRC began the environmental review process
21 described in 10 CFR Part 51 by publishing a notice of intent to prepare an EIS and conduct
22 scoping in the *Federal Register* (67 FR 65612 [NRC 2002]) on October 25, 2002. The staff
23 visited the V.C. Summer site in December 2002 and held public scoping meetings on
24 December 11, 2002, in Jenkinsville, South Carolina (NRC 2002). The staff reviewed the
25 SCE&G Environmental Report (SCE&G 2002b) and compared it to the GEIS, consulted with
26 other agencies, and conducted an independent review of the issues following the guidance set
27 forth in NUREG-1555, Supplement 1, the *Standard Review Plans for Environmental Reviews
28 for Nuclear Power Plants, Supplement 1: Operating License Renewal* (NRC 2000). The staff
29 also considered the public comments received during the scoping process for preparation of
30 this draft supplemental environmental impact statement (SEIS) for V.C. Summer. The public
31 comments received during the scoping process that were considered to be within the scope of
32 the environmental review are provided in Appendix A, Part 1, of this SEIS.

33
34 The staff will hold two public meetings in Jenkinsville, South Carolina, in August 2003, to
35 describe the preliminary results of the NRC environmental review and to answer questions to

(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 provide members of the public with information to assist them in formulating their comments.
2 When the comment period ends, the staff will consider and disposition all of the comments
3 received. These comments will be addressed in Appendix A, Part 2, of the final SEIS.
4

5 This draft SEIS includes the NRC staff's preliminary analysis that considers and weighs the
6 environmental effects of the proposed action, the environmental impacts of alternatives to the
7 proposed action, and mitigation measures available for reducing or avoiding adverse effects.
8 It also includes the staff's preliminary recommendation regarding the proposed action.
9

10 The NRC has adopted the following statement of purpose and need for license renewal from
11 the GEIS:
12

13 The purpose and need for the proposed action (renewal of an operating license) is to
14 provide an option that allows for power generation capability beyond the term of a
15 current nuclear power plant operating license to meet future system generating needs,
16 as such needs may be determined by State, utility, and, where authorized, Federal
17 (other than NRC) decisionmakers.
18

19 The goal of the staff's environmental review, as defined in 10 CFR 51.95(c)(4) and the GEIS, is
20 to determine
21

22 ... whether or not the adverse environmental impacts of license renewal are so great
23 that preserving the option of license renewal for energy planning decisionmakers would
24 be unreasonable.
25

26 Both the statement of purpose and need and the evaluation criterion implicitly acknowledge that
27 there are factors, in addition to license renewal, that will ultimately determine whether an
28 existing nuclear power plant continues to operate beyond the period of the current OL.
29

30 NRC regulations [10 CFR 51.95(c)(2)] contain the following statement regarding the content of
31 SEISs prepared at the license renewal stage:
32

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

1 within the scope of the generic determination in § 51.23(a) and in accordance with §
2 51.23(b).^(a)

3
4 The GEIS contains the results of a systematic evaluation of the consequences of renewing an
5 OL and operating a nuclear power plant for an additional 20 years. It evaluates
6 92 environmental issues using the NRC's three-level standard of significance—SMALL,
7 MODERATE, or LARGE—developed using the Council on Environmental Quality guidelines.
8 The following definitions of the three significance levels are set forth in the footnotes to
9 Table B-1 of 10 CFR Part 51, Subpart A, Appendix B:

10
11 SMALL - Environmental effects are not detectable or are so minor that they will neither
12 destabilize nor noticeably alter any important attribute of the resource.

13
14 MODERATE - Environmental effects are sufficient to alter noticeably, but not to
15 destabilize, important attributes of the resource.

16
17 LARGE - Environmental effects are clearly noticeable and are sufficient to destabilize
18 important attributes of the resource.

19
20 For 69 of the 92 issues considered in the GEIS, the staff analysis in the GEIS shows the
21 following:

- 22
23 (1) The environmental impacts associated with the issue have been determined to apply either
24 to all plants or, for some issues, to plants having a specific type of cooling system or other
25 specified plant or site characteristic.
- 26
27 (2) A single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the
28 impacts (except for collective off site radiological impacts from the fuel cycle and from high-
29 level waste [HLW] and spent fuel disposal).
- 30
31 (3) Mitigation of adverse impacts associated with the issue has been considered in the analysis,
32 and it has been determined that additional plant-specific mitigation measures are likely not
33 to be sufficiently beneficial to warrant implementation.
- 34

(a) The title of 10 CFR 51.23 is "Temporary storage of spent fuel after cessation of reactor operations—generic determination of no significant environmental impact."

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

5
6 Of the 23 issues that do not meet the criteria set forth above, 21 are classified as Category 2
7 issues requiring analysis in a plant-specific supplement to the GEIS. The remaining two issues,
8 environmental justice and chronic effects of electromagnetic fields, were not categorized.
9 Environmental justice was not evaluated on a generic basis and must also be addressed in a
10 plant-specific supplement to the GEIS. Information on the chronic effects of electromagnetic
11 fields was not conclusive at the time the GEIS was prepared.

12
13 This draft SEIS documents the staff's consideration of all 92 environmental issues identified in
14 the GEIS. The staff considered the environmental impacts associated with alternatives to
15 license renewal and compared the environmental impacts of license renewal and the alterna-
16 tives. The alternatives to license renewal that were considered include the no-action alternative
17 (not renewing the OL for V.C. Summer) and alternative methods of power generation. These
18 alternatives were evaluated assuming that the replacement power generation plant is located at
19 either the V.C. Summer site or some other unspecified greenfield location.

21 **9.1 Environmental Impacts of the Proposed Action—** 22 **License Renewal**

23
24 SCE&G and the staff have established independent processes for identifying and evaluating the
25 significance of any new information on the environmental impacts of license renewal. Neither
26 SCE&G nor the staff has identified information that is both new and significant related to
27 Category 1 issues that would call into question the conclusions in the GEIS. Similarly, neither
28 the scoping process, SCE&G, nor the staff has identified any new issue applicable to
29 V.C. Summer that has a significant environmental impact. Therefore, the staff relies upon the
30 conclusions of the GEIS for all Category 1 issues that are applicable to V.C. Summer.

31
32 SCE&G's license renewal application presents an analysis of the Category 2 issues that are
33 applicable to V.C. Summer, plus environmental justice and chronic effects from electromagnetic
34 fields. The staff has reviewed the SCE&G analysis for each issue and has conducted an
35 independent review of each issue. Three Category 2 issues are not applicable because they
36 are related to plant design features or site characteristics not found at V.C. Summer. Four
37 Category 2 issues are not discussed in this draft SEIS because they are specifically related to
38 refurbishment. SCE&G (SCE&G 2002b) has stated that its evaluation of structures and
39 components, as required by 10 CFR 54.21, did not identify any major plant refurbishment

1 activities or modifications as necessary to support the continued operation of V.C. Summer, for
2 the license renewal period. In addition, any replacement of components or additional inspection
3 activities are within the bounds of normal plant component replacement and, therefore, are not
4 expected to affect the environment outside of the bounds of the plant operations evaluated in
5 the *Final Environmental Statement Related to the Virgil C. Summer Nuclear Station Unit 1*
6 (AEC 1973).

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

21
22 Mitigation measures were considered for each Category 2 issue. Current measures to mitigate
23 the environmental impacts of plant operation were found to be adequate, and no additional
24 mitigation measures were deemed sufficiently beneficial to be warranted.

25
26 The following sections discuss unavoidable adverse impacts, irreversible or irretrievable
27 commitments of resources, and the relationship between local short-term use of the
28 environment and long-term productivity.

30 **9.1.1 Unavoidable Adverse Impacts**

31
32 An environmental review conducted at the license renewal stage differs from the review
33 conducted in support of a construction permit because the plant is in existence at the license
34 renewal stage and has operated for a number of years. As a result, adverse impacts
35 associated with the initial construction have been avoided, have been mitigated, or have
36 already occurred. The environmental impacts to be evaluated for license renewal are those
37 associated with refurbishment and continued operation during the renewal term.

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1 The adverse impacts of continued operation identified are considered to be of SMALL
2 significance, and none warrant implementation of additional mitigation measures. The adverse
3 impacts of likely alternatives if V.C. Summer ceases operation at or before the expiration of the
4 current OL will not be smaller than those associated with continued operation of this unit and
5 they may be greater for some impact categories in some locations.
6

7 **9.1.2 Irreversible or Irretrievable Resource Commitments**

8
9 The commitment of resources related to construction and operation of V.C. Summer during the
10 current license period was made when the plant was built. The resource commitments to be
11 considered in this draft SEIS are associated with continued operation of the plant for an
12 additional 20 years. These resources include materials and equipment required for plant
13 maintenance and operation, the nuclear fuel used by the reactors, and ultimately, permanent
14 offsite storage space for the spent fuel assemblies.
15

16 The most significant resource commitments related to operation during the renewal term are
17 the fuel and the permanent storage space. V.C. Summer replaces approximately one-third of
18 the fuel assemblies in each of the two units during every refueling outage, which occurs on an
19 18-month cycle.
20

21 The likely power generation alternatives if V.C. Summer ceases operation on or before the
22 expiration of the current OL will require a commitment of resources for construction of the
23 replacement plants as well as for fuel to run the plants.
24

25 **9.1.3 Short-Term Use Versus Long-Term Productivity**

26
27 An initial balance between short-term use and long-term productivity of the environment at the
28 V.C. Summer site was set when the plant was approved and construction began. That balance
29 is now well established. Renewal of the OL for V.C. Summer and continued operation of the
30 plant will not alter the existing balance, but may postpone the availability of the site for other
31 uses. Denial of the application to renew the OL will lead to shutdown of the plant and will alter
32 the balance in a manner that depends on subsequent uses of the site. For example, the
33 environmental consequences of turning the V.C. Summer site into a park or an industrial facility
34 are quite different.
35

9.2 Relative Significance of the Environmental Impacts of License Renewal and Alternatives

The proposed action is renewal of the OL for V.C. Summer. Chapter 2 describes the site, power plant, and interactions of the plant with the environment. As noted in Chapter 3, no refurbishment and no refurbishment impacts are expected at V.C. Summer. Chapters 4 through 7 discuss environmental issues associated with renewal of the OL. Environmental issues associated with the no-action alternative and alternatives involving power generation and use reduction are discussed in Chapter 8.

The significance of the environmental impacts from the proposed action (approval of the application for renewal of the OL), the no-action alternative (denial of the application), alternatives involving nuclear or coal- or gas-fired generation of power at the V.C. Summer site and an unspecified "greenfield site," and a combination of alternatives are compared in Table 9-1. Continued use of a once-through cooling system for V.C. Summer is assumed for the V.C. Summer site alternatives.

Table 9-1 shows that the significance of the environmental effects of the proposed action are SMALL for all impact categories (except for collective offsite radiological impacts from the fuel cycle and from high-level waste and spent fuel disposal, for which a single significance level was not assigned [see Chapter 6]). The alternative actions, including the no-action alternative, may have environmental effects in at least some impact categories that reach MODERATE or LARGE significance.

9.3 Staff Conclusions and Recommendations

Based on (1) the analysis and findings in the GEIS (NRC 1996; 1999), (2) the Environmental Report submitted by SCE&G (SCE&G 2002b), (3) consultation with Federal, State, and local agencies, (4) the staff's own independent review, and (5) the staff's consideration of public comments received during the scoping process, the preliminary recommendation of the staff is that the Commission determine that the adverse environmental impacts of license renewal for V.C. Summer are not so great that preserving the option of license renewal for energy planning decisionmakers would be unreasonable.

Table 9-1. Summary of Environmental Significance of License Renewal, the No-Action Alternative, and Alternative Methods of Generation Using Once-Through Cooling

Impact Category	Proposed Action– License Renewal	No-Action Alternative– Denial of Renewal	Coal-Fired Generation	Natural Gas-Fired Generation	New Nuclear Generation	Combination of Alternatives
			Greenfield Site ^(a)	Greenfield Site ^(a)	Greenfield Site ^(a)	Greenfield Site ^(a)
Land Use	SMALL	SMALL	SMALL to LARGE	SMALL to LARGE	MODERATE to LARGE	SMALL to LARGE
Ecology	SMALL	SMALL	SMALL to LARGE	SMALL to LARGE	MODERATE to LARGE	SMALL to LARGE
Water Use and Quality	SMALL	SMALL	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE
Air Quality	SMALL	SMALL	MODERATE	MODERATE	SMALL	MODERATE
Waste	SMALL	SMALL	MODERATE	SMALL	SMALL	SMALL
Human Health ^(b)	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
Socioeconomics	SMALL	SMALL to LARGE	SMALL to LARGE	SMALL to LARGE	SMALL to LARGE	SMALL to LARGE
Aesthetics	SMALL	SMALL	SMALL to LARGE	SMALL to LARGE	SMALL to LARGE	SMALL to LARGE
Historic and Archaeo- logical Resources	SMALL	SMALL	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE
Environmental Justice	SMALL	SMALL to MODERATE	SMALL to LARGE	SMALL to LARGE	SMALL to LARGE	SMALL to LARGE

(a) A greenfield site is assumed, for the purpose of bounding potential impacts, to be an undeveloped site with no previous construction.

(b) Excludes collective offsite radiological impacts from the fuel cycle and from high-level waste and spent fuel disposal, for which single significance levels were not assigned. See Chapter 6 for details.

1 **9.4 References**

1
2 10 CFR 51. Code of Federal Regulations, Title 10, *Energy*, Part 51, “Environmental Protection
3 Regulations for Domestic Licensing and Related Regulatory Functions.”

4
5 10 CFR 54. Code of Federal Regulations, Title 10, *Energy*, Part 54, “Requirements for
6 Renewal of Operating Licenses for Nuclear Power Plant.”

7
8 National Environmental Policy Act of 1969 (NEPA). 42 USC 4321, et seq.

9
10 South Carolina Electric and Gas Company (SCE&G). 2002a. License Renewal Application,
11 V.C. Summer Nuclear Station. Jenkinsville, South Carolina.

12
13 South Carolina Electric and Gas Company (SCE&G). 2002b. *Virgil C. Summer Nuclear Station*
14 *License Renewal Application*. “Appendix E, Environmental Report.” Docket Number 50/395;
15 License Number NPF-12. Jenkinsville, South Carolina.

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17 U.S. Atomic Energy Commission (AEC). 1973. *Final Environmental Statement Related to the*
18 *Virgil C. Summer Nuclear Station Unit 1, South Carolina Electric and Gas Company*. Docket
19 No. 50-935. Directorate of Licensing, Washington, D.C.

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21 U.S. Nuclear Regulatory Commission (NRC). 1996. *Generic Environmental Impact Statement*
22 *for License Renewal of Nuclear Plants*. NUREG-1437, Volumes 1 and 2, Washington, D.C.

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24 U.S. Nuclear Regulatory Commission (NRC). 1999. *Generic Environmental Impact Statement*
25 *for License Renewal of Nuclear Plants: Main Report*, “Section 6.3–Transportation, Table 9.1
26 Summary of findings on NEPA issues for license renewal of nuclear power plants, Final
27 Report.” NUREG-1437, Volume 1, Addendum 1, Washington, D.C.

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29 U.S. Nuclear Regulatory Commission (NRC). 2000. *Standard Review Plans for Environmental*
30 *Reviews for Nuclear Power Plants, Supplement 1: Operating License Renewal*.” NUREG-1555,
31 Supplement 1, Washington, D.C.

32
33 U.S. Nuclear Regulatory Commission. 2002. “Notice of Intent To Prepare an Environmental
34 Impact Statement and Conduct Scoping Process.” *Federal Register*, Vol. 67, No. 207, pp.
35 65612-65613. Washington, D.C.