

6.0 Environmental Impacts of the Uranium Fuel Cycle and Solid Waste Management

Environmental issues associated with the uranium fuel cycle and solid waste management are discussed in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2 (NRC 1996; 1999.)^(a) The GEIS includes a determination of whether the analysis of the environmental issue could be applied to all plants and whether additional mitigation measures would be warranted. Issues are then assigned a Category 1 or a Category 2 designation. As set forth in the GEIS, Category 1 issues are those that meet all of the following criteria:

- (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 characteristic.
- (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 [HLW] 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 likely not to be sufficiently beneficial to warrant implementation.

For issues that meet the three Category 1 criteria, no additional plant-specific analysis is required unless new and significant information is identified.

Category 2 issues are those that do not meet one or more of the criteria for Category 1, and, therefore, additional plant-specific review of these issues is required.

This chapter addresses the issues that are related to the uranium fuel cycle and solid waste management during the license renewal term that are listed in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B, and are applicable to Surry Power Station, Units 1 and 2. The generic potential impacts of the radiological and nonradiological environmental impacts of the uranium fuel cycle and transportation of nuclear fuel and wastes are described in detail in the GEIS, based, in part, on the generic impacts provided in 10 CFR 51.51(b), Table S-3, "Table of Uranium Fuel Cycle Environmental Data," and in 10 CFR 51.52(c), Table S-4, "Environmental

(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 Impact of Transportation of Fuel and Waste to and from One Light-Water-Cooled Nuclear
2 Power Reactor.” The GEIS also addresses the impacts from radon-222 and technetium-99.
3 There are no Category 2 issues for the uranium fuel cycle and solid waste management.
4

6.1 The Uranium Fuel Cycle

5
6
7 Category 1 issues in 10 CFR Part 51, Subpart A, Appendix B, Table B-1, that are applicable to
8 Surry Power Station, Units 1 and 2 from the uranium fuel cycle and solid waste management
9 are listed in Table 6-1.
10

11 **Table 6-1.** Category 1 Issues Applicable to the Uranium Fuel Cycle and Solid Waste
12 Management During the Renewal Term
13

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section
URANIUM FUEL CYCLE AND WASTE MANAGEMENT	
16 Offsite radiological impacts (individual effects from other than the 17 disposal of spent fuel and HLW)	6.1; 6.2.1; 6.2.2.1; 6.2.2.3; 6.2.3; 6.2.4; 6.6
18 Offsite radiological impacts (collective effects)	6.1; 6.2.2.1; 6.2.3; 6.2.4; 6.6
19 Offsite radiological impacts (spent fuel and HLW)	6.1; 6.2.2.1; 6.2.3; 6.2.4; 6.6
20 Nonradiological impacts of the uranium fuel cycle	6.1; 6.2.2.6; 6.2.2.7; 6.2.2.8; 6.2.2.9; 6.2.3; 6.2.4; 6.6
21 Low-level waste storage and disposal	6.1; 6.2.2.2; 6.4.2; 6.4.3; 6.4.3.1; 6.4.3.2; 6.4.3.3; 6.4.4; 6.4.4.1; 6.4.4.2; 6.4.4.3; 6.4.4.4; 6.4.4.5; 6.4.4.5.1; 6.4.4.5.2; 6.4.4.5.3; 6.4.4.5.4; 6.4.4.6; 6.6
22 Mixed waste storage and disposal	6.4.5.1; 6.4.5.2; 6.4.5.3; 6.4.5.4; 6.4.5.5; 6.4.5.6; 6.4.5.6.1; 6.4.5.6.2; 6.4.5.6.3; 6.4.5.6.4; 6.6
23 Onsite spent fuel	6.1; 6.4.6; 6.4.6.1; 6.4.6.2; 6.4.6.3; 6.4.6.4; 6.4.6.5; 6.4.6.6; 6.4.6.7; 6.6
24 Nonradiological waste	6.1; 6.5; 6.5.1; 6.5.2; 6.5.3; 6.6
25 Transportation	6.1; 6.3.1; 6.3.2.3; 6.3.3; 6.3.4; 6.6, Addendum 1

1 The Virginia Electric and Power Company (VEPCo) stated in its Environmental Report (ER;
2 VEPCo 2001) that it is not aware of any new and significant information associated with the
3 renewal of the Surry Power Station, Units 1 and 2 operating licenses. No significant new
4 information has been identified by the staff in the review process and in the staff's independent
5 review. Therefore, the staff concludes that there are no impacts related to these issues beyond
6 those discussed in the GEIS. For all of those issues, the staff concluded in the GEIS that the
7 impacts are SMALL except for the collective offsite radiological impacts from the fuel cycle and
8 from HLW and spent fuel disposal, as discussed below, and that plant-specific mitigation
9 measures are not likely to be sufficiently beneficial to be warranted.

10
11 A brief description of the staff review and the GEIS conclusions, as codified in Table B-1,
12 10 CFR 51, for each of these issues follows:

- 13
14 • Offsite radiological impacts (individual effects from other than the disposal of spent fuel
15 and HLW). Based on information in the GEIS, the Commission found that

16
17 Offsite impacts of the uranium fuel cycle have been considered by the
18 Commission in Table S-3 of this part [10 CFR 51.51(b)]. Based on information in
19 the GEIS, impacts on individuals from radioactive gaseous and liquid releases
20 including radon-222 and technetium-99 are small.

21
22 The staff has not identified any new and significant information during its independent
23 review of the VEPCo ER (VEPCo 2001), the staff's site visit, the scoping process, or its
24 evaluation of other available information. Therefore, the staff concludes that there are no
25 offsite radiological impacts (individual effects from other than the disposal of spent fuel and
26 HLW) of the uranium fuel cycle during the renewal term beyond those discussed in the
27 GEIS.

- 28
29 • Offsite radiological impacts (collective effects). Based on information in the GEIS, the
30 Commission found that

31
32 The 100 year environmental dose commitment to the U.S. population from the
33 fuel cycle, high level waste and spent fuel disposal excepted, is calculated to be
34 about 14,800 person rem [148 person Sv], or 12 cancer fatalities, for each
35 additional 20-year power reactor operating term. Much of this, especially the
36 contribution of radon releases from mines and tailing piles, consists of tiny doses
37 summed over large populations. This same dose calculation can theoretically be
38 extended to include many tiny doses over additional thousands of years as well
39 as doses outside the U.S. The result of such a calculation would be thousands
40 of cancer fatalities from the fuel cycle, but this result assumes that even tiny
41 doses have some statistical adverse health effect, which will not ever be

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1 mitigated (for example no cancer cure in the next thousand years), and that
2 these doses projected over thousands of years are meaningful. However, these
3 assumptions are questionable. In particular, science cannot rule out the
4 possibility that there will be no cancer fatalities from these tiny doses. For
5 perspective, the doses are very small fractions of regulatory limits and even
6 smaller fractions of natural background exposure to the same populations.
7

8 Nevertheless, despite all the uncertainty, some judgement as to the regulatory
9 NEPA [National Environmental Policy Act] implications of these matters should
10 be made and it makes no sense to repeat the same judgement in every case.
11 Even taking the uncertainties into account, the Commission concludes that these
12 impacts are acceptable in that these impacts would not be sufficiently large to
13 require the NEPA conclusion, for any plant, that the option of extended operation
14 under 10 CFR Part 54 should be eliminated. Accordingly, while the Commission
15 has not assigned a single level of significance for the collective effects of the fuel
16 cycle, this issue is considered Category 1.
17

18 The staff has not identified any new and significant information during its independent
19 review of the VEPCo ER (VEPCo 2001), the staff's site visit, the scoping process, or its
20 evaluation of other available information. Therefore, the staff concludes that there are no
21 offsite radiological impacts (collective effects) from the uranium fuel cycle during the
22 renewal term beyond those discussed in the GEIS.
23

- 24 • Offsite radiological impacts (spent fuel and HLW disposal). Based on information in the
25 GEIS, the Commission found that
26

27 For the high level waste and spent fuel disposal component of the fuel cycle,
28 there are no current regulatory limits for offsite releases of radionuclides for the
29 current candidate repository site. However, if we assume that limits are
30 developed along the lines of the 1995 National Academy of Sciences (NAS)
31 report, "Technical Bases for Yucca Mountain Standards," and that in accordance
32 with the Commission's Waste Confidence Decision, 10 CFR 51.23, a repository
33 can and likely will be developed at some site which will comply with such limits,
34 peak doses to virtually all individuals will be 100 millirem [1 mSv] per year or
35 less. However, while the Commission has reasonable confidence that these
36 assumptions will prove correct, there is considerable uncertainty since the limits
37 are yet to be developed, no repository application has been completed or
38 reviewed, and uncertainty is inherent in the models used to evaluate possible
39 pathways to the human environment. The NAS report indicated that 100 millirem
40 [1 mSv] per year should be considered as a starting point for limits for individual

1 doses, but notes that some measure of consensus exists among national and
2 international bodies that the limits should be a fraction of the 100 millirem [1
3 mSv] per year. The lifetime individual risk from 100 millirem [1 mSv] annual dose
4 limit is about 3×10^{-3} .

5
6 Estimating cumulative doses to populations over thousands of years is more
7 problematic. The likelihood and consequences of events that could seriously
8 compromise the integrity of a deep geologic repository were evaluated by the
9 Department of Energy in the "Final Environmental Impact Statement:
10 Management of Commercially Generated Radioactive Waste," October 1980
11 [DOE 1980]. The evaluation estimated the 70-year whole-body dose
12 commitment to the maximum individual and to the regional population resulting
13 from several modes of breaching a reference repository in the year of closure,
14 after 1,000 years, after 100,000 years, and after 100,000,000 years.
15 Subsequently, the NRC and other federal agencies have expended considerable
16 effort to develop models for the design and for the licensing of a high level waste
17 repository, especially for the candidate repository at Yucca Mountain. More
18 meaningful estimates of doses to population may be possible in the future as
19 more is understood about the performance of the proposed Yucca Mountain
20 repository. Such estimates would involve very great uncertainty, especially with
21 respect to cumulative population doses over thousands of years. The standard
22 proposed by the NAS is a limit on maximum individual dose. The relationship of
23 potential new regulatory requirements, based on the NAS report, and cumulative
24 population impacts has not been determined, although the report articulates the
25 view that protection of individuals will adequately protect the population for a
26 repository at Yucca Mountain. However, EPA's [the Environmental Protection
27 Agency's] generic repository standards in 40 CFR part 191 generally provide an
28 indication of the order of magnitude of cumulative risk to population that could
29 result from the licensing of a Yucca Mountain repository, assuming the ultimate
30 standards will be within the range of standards now under consideration. The
31 standards in 40 CFR part 191 protect the population by imposing "containment
32 requirements" that limit the cumulative amount of radioactive material released
33 over 10,000 years. Reporting performance standards that will be required by
34 EPA are expected to result in releases and associated health consequences in
35 the range between 10 and 100 premature cancer deaths with an upper limit of
36 1,000 premature cancer deaths world-wide for a 100,000 metric tonne (MTHM)
37 repository.

38
39 Nevertheless, despite all the uncertainty, some judgement as to the regulatory NEPA
40 implications of these matters should be made and it makes no sense to repeat the same
41 judgement in every case. Even taking the uncertainties into account, the Commission

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1 concludes that these impacts are acceptable in that these impacts would not be
2 sufficiently large to require the NEPA conclusion, for any plant, that the option of
3 extended operation under 10 CFR part 54 should be eliminated. Accordingly, while the
4 Commission has not assigned a single level of significance for the impacts of spent fuel
5 and high level waste disposal, this issue is considered Category 1.
6

7 Since the GEIS was originally issued in 1996, EPA published radiation protection standards
8 for Yucca Mountain, Nevada, at 40 CFR Part 197, "Public Health and Environmental
9 Radiation Protection Standards for Yucca Mountain, Nevada," on June 13, 2001 (66 FR
10 32132). The Energy Policy Act of 1992 directs the NRC to adopt these standards into its
11 regulations for reviewing and licensing the repository. NRC published its regulations at 10
12 CFR Part 63, "Disposal of High-Level Radioactive Wastes in Geologic Repository at Yucca
13 Mountain, Nevada," on November 2, 2001 (66 FR 55792). These standards include the
14 following: (1) a 0.15 mSv/yr (15 mrem/yr) dose limit for members of the public during the
15 storage period prior to repository closure, (2) a 0.15 mSv/yr (15 mrem/yr) dose limit for the
16 reasonably maximally exposed individual from the undisturbed repository for 10,000 years
17 following disposal, (3) a 0.15 mSv/yr (15 mrem/yr) dose limit for the reasonably maximally
18 exposed individual as a result of a human intrusion at or before 10,000 years after disposal,
19 and (4) a ground-water protection standard that states that for 10,000 years of undisturbed
20 performance after disposal, radioactivity in a representative volume of groundwater will not
21 exceed (a) 0.2 Bq/L (5 pCi/L) for radium-226 and radium-228, (b) 0.56 Bq/L (15 pCi/L) for
22 gross alpha activity, and (c) 0.04 mSv/yr (4 mrem/yr) to the whole body or any organ (from
23 combined beta- and photon-emitting radionuclides, assuming consumption of 2 Lpd of the
24 affected water).
25

26 On February 15, 2002, subsequent to the receipt of a recommendation by the Secretary,
27 Department of Energy, the President recommended the Yucca Mountain site for the
28 development of a repository for the geologic disposal of spent nuclear fuel and HLW.
29

30 This change in regulatory status does not cause the staff to change its position with respect
31 to the impact of spent fuel and HLW disposal. The staff still considers the Category 1
32 classification in the GEIS (NRC 1996, 1999) appropriate.
33

34 The staff has not identified any new and significant information during its independent
35 review of the VEPCo ER (VEPCo 2001), the staff's site visit, the scoping process, or its
36 evaluation of other available information. Therefore, the staff concludes that there are no
37 offsite radiological impacts related to spent fuel and HLW disposal during the renewal term
38 beyond those discussed in the GEIS.
39

- 1 • Nonradiological impacts of the uranium fuel cycle. Based on information in the GEIS,
2 the Commission found that

3
4 The nonradiological impacts of the uranium fuel cycle resulting from the renewal
5 of an operating license for any plant are found to be small.
6

7 The staff has not identified any new and significant information during its independent
8 review of the VEPCo ER (VEPCo 2001), the staff's site visit, the scoping process, or its
9 evaluation of other available information. Therefore, the staff concludes that there are no
10 nonradiological impacts of the uranium fuel cycle during the renewal term beyond those
11 discussed in the GEIS.
12

- 13 • Low-level waste storage and disposal. Based on information in the GEIS, the
14 Commission found that

15
16 The comprehensive regulatory controls that are in place and the low public
17 doses being achieved at reactors ensure that the radiological impacts to the
18 environment will remain small during the term of a renewed license. The
19 maximum additional on-site land that may be required for low-level waste
20 storage during the term of a renewed license and associated impacts will be
21 small. Nonradiological impacts on air and water will be negligible. The
22 radiological and nonradiological environmental impacts of long-term disposal of
23 low-level waste from any individual plant at licensed sites are small. In addition,
24 the Commission concludes that there is reasonable assurance that sufficient low-
25 level waste disposal capacity will be made available when needed for facilities to
26 be decommissioned consistent with NRC decommissioning requirements.
27

28 The staff has not identified any new and significant information during its independent
29 review of the VEPCo ER (VEPCo 2001), the staff's site visit, the scoping process, or its
30 evaluation of other available information. Therefore, the staff concludes that there are no
31 impacts of low-level waste storage and disposal associated with the renewal term beyond
32 those discussed in the GEIS.
33

- 34 • Mixed waste storage and disposal. Based on information in the GEIS, the Commission
35 found that

36
37 The comprehensive regulatory controls and the facilities and procedures that are
38 in place ensure proper handling and storage, as well as negligible doses and
39 exposure to toxic materials for the public and the environment at all plants.
40 License renewal will not increase the small, continuing risk to human health and
41 the environment posed by mixed waste at all plants. The radiological and

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1 nonradiological environmental impacts of long-term disposal of mixed waste from
2 any individual plant at licensed sites are small. In addition, the Commission
3 concludes that there is reasonable assurance that sufficient mixed waste
4 disposal capacity will be made available when needed for facilities to be
5 decommissioned consistent with NRC decommissioning requirements.
6

7 The staff has not identified any new and significant information during its independent
8 review of the VEPCo ER (VEPCo 2001), the staff's site visit, the scoping process, or its
9 evaluation of other available information. Therefore, the staff concludes that there are no
10 impacts of mixed waste storage and disposal associated with the renewal term beyond
11 those discussed in the GEIS.
12

- 13 • Onsite spent fuel. Based on information in the GEIS, the Commission found that

14
15 The expected increase in the volume of spent fuel from an additional 20 years of
16 operation can be safely accommodated on site with small environmental effects
17 through dry or pool storage at all plants if a permanent repository or monitored
18 retrievable storage is not available.
19

20 The staff has not identified any new and significant information during its independent
21 review of the VEPCo ER (VEPCo 2001), the staff's site visit, the scoping process, or its
22 evaluation of other available information. Therefore, the staff concludes that there are no
23 impacts of onsite spent fuel associated with license renewal beyond those discussed in the
24 GEIS.
25

- 26 • Nonradiological waste. Based on information in the GEIS, the Commission found that

27
28 No changes to generating systems are anticipated for license renewal. Facilities
29 and procedures are in place to ensure continued proper handling and disposal at
30 all plants.
31

32 The staff has not identified any new and significant information during its independent
33 review of the VEPCo ER (VEPCo 2001), the staff's site visit, the scoping process, or its
34 evaluation of other available information. Therefore, the staff concludes that there are no
35 nonradiological waste impacts during the renewal term beyond those discussed in the
36 GEIS.
37

- 1 • Transportation. Based on information contained in the GEIS, the Commission found
2 that
3

4 The impacts of transporting spent fuel enriched up to 5 percent uranium-235 with
5 average burnup for the peak rod to current levels approved by NRC up to
6 62,000 MWd/MTU and the cumulative impacts of transporting high-level waste to
7 a single repository, such as Yucca Mountain, Nevada are found to be consistent
8 with the impact values contained in 10 CFR 51.52(c), Summary Table S-4—
9 Environmental Impact of Transportation of Fuel and Waste to and from One
10 Light-Water-Cooled Nuclear Power Reactor. If fuel enrichment or burnup
11 conditions are not met, the applicant must submit an assessment of the
12 implications for the environmental impact values reported in § 51.52.
13

14 Surry Power Station, Units 1 and 2, meet the fuel-enrichment and burnup conditions set
15 forth in Addendum 1 to the GEIS. The staff has not identified any new and significant
16 information during its independent review of the VEPCo ER (VEPCo 2001), the staff's site
17 visit, the scoping process, or its evaluation of other available information. Therefore, the
18 staff concludes that there are no impacts of transportation associated with license renewal
19 beyond those discussed in the GEIS.
20

21 6.2 References

22
23 10 CFR 51. Code of Federal Regulations, Title 10, *Energy*, Part 51, "Environmental Protection
24 Regulations for Domestic Licensing and Related Regulatory Functions."

25
26 10 CFR 54. Code of Federal Regulations, Title 10, *Energy*, Part 54, "Requirements for
27 Renewal of Operating Licenses for Nuclear Power Plants."

28
29 10 CFR 63. Code of Federal Regulations, Title 10, *Energy*, Part 63, "Disposal of High-Level
30 Radioactive Wastes in a Geologic Repository at Yucca Mountain, Nevada."

31
32 40 CFR 191. Code of Federal Regulations, Title 40, *Protection of Environment*, Part 191,
33 "Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear
34 Fuel, High-Level and Transuranic Radioactive Waste."

35
36 40 CFR 197. Code of Federal Regulations, Title 40, *Protection of Environment*, Part 197,
37 "Public Health and Environmental Radiation Protection Standards for Yucca Mountain,
38 Nevada."

39
40 Energy Policy Act of 1992. 42 USC 10101, et seq.

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- 1 National Academy of Sciences (NAS). 1995. *Technical Bases for Yucca Mountain Standards*.
2 Washington, D.C.
- 3
- 4 National Environmental Policy Act (NEPA) of 1969, as amended. 42 USC 4321, et seq.
- 5
- 6 U.S. Department of Energy (DOE). 1980. *Final Environmental Impact Statement:*
7 *Management of Commercially Generated Radioactive Waste*. DOE/EIS-0046F, DOE,
8 Washington, D.C.
- 9
- 10 U.S. Nuclear Regulatory Commission (NRC). 1996. *Generic Environmental Impact Statement*
11 *for License Renewal of Nuclear Plants*. NUREG-1437, Volumes 1 and 2, NRC,
12 Washington, D.C.
- 13
- 14 U.S. Nuclear Regulatory Commission (NRC). 1999. *Generic Environmental Impact Statement*
15 *for License Renewal of Nuclear Plants, Main Report*, “Section 6.3 – Transportation, Table 9.1,
16 ‘Summary of findings on NEPA issues for license renewal of nuclear power plants, Final
17 Report.’” NUREG-1437, Volume 1, Addendum 1, NRC, Washington, D.C.
- 18
- 19 Virginia Electric and Power Company (VEPCo). 2001. *Application for License Renewal for*
20 *Surry Power Station, Units 1 and 2*, “Appendix E, Environmental Report - Operating License
21 Renewal Stage.” Richmond, Virginia.

7.0 Environmental Impacts of Decommissioning

Environmental issues associated with decommissioning, which result from continued plant operation during the renewal terms are discussed in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2 (NRC 1996; 1999).^(a) The GEIS includes a determination of whether the analysis of the environmental issue could be applied to all plants and whether additional mitigation measures would be warranted. Issues are then assigned a Category 1 or a Category 2 designation. As set forth in the GEIS, Category 1 issues are those that meet all of the following criteria:

- (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 characteristic.
- (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 likely not to be sufficiently beneficial to warrant implementation.

For issues that meet the three Category 1 criteria, no additional plant-specific analysis is required unless new and significant information is identified.

Category 2 issues are those that do not meet one or more of the criteria for Category 1, and therefore, additional plant-specific review of these issues is required. There are no Category 2 issues related to decommissioning Surry Power Station, Units 1 and 2.

Category 1 issues in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B that are applicable to Surry Power Station, Units 1 and 2, decommissioning following the renewal term are listed in Table 7-1. The Virginia Electric and Power Company (VEPCo) stated in its Environmental Report (ER; VEPCo 2001) that it is aware of no new and significant information regarding the environmental impacts of Surry Power Station, Units 1 and 2, license renewal. The staff has not identified any significant new information during its independent review of the VEPCo ER (VEPCo 2001), the staff's site visit, the scoping process, or its evaluation of other available information.

(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.

Table 7-1. Category 1 Issues Applicable to the Decommissioning of Surry Power Station Following the Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section
DECOMMISSIONING	
Radiation Doses	7.3.1; 7.4
Waste Management	7.3.2; 7.4
Air Quality	7.3.3; 7.4
Water Quality	7.3.4; 7.4
Ecological Resources	7.3.5; 7.4
Socioeconomic Impacts	7.3.7; 7.4

Therefore, the staff concludes that there are no impacts related to these issues beyond those discussed in the GEIS. For all of these issues, the staff concluded in the GEIS that the impacts are SMALL, and plant-specific mitigation measures are not likely to be sufficiently beneficial to be warranted.

A brief description of the staff's review and the GEIS conclusions, as codified in Table B-1, for each of the issues follows:

- Radiation doses. Based on information in the GEIS, the Commission found that

Doses to the public will be well below applicable regulatory standards regardless of which decommissioning method is used. Occupational doses would increase no more than 1 man-rem [0.01 person-Sv] caused by buildup of long-lived radionuclides during the license renewal term.

The staff has not identified any new and significant information during its independent review of the VEPCo ER (VEPCo 2001), the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no radiation doses associated with decommissioning following license renewal beyond those discussed in the GEIS.

- Waste management. Based on information in the GEIS, the Commission found that

Decommissioning at the end of a 20-year license renewal period would generate no more solid wastes than at the end of the current license term. No increase in the quantities of Class C or greater than Class C wastes would be expected.

1 The staff has not identified any new and significant information during its independent
2 review of the VEPCo ER (VEPCo 2001), the staff's site visit, the scoping process, or its
3 evaluation of other available information. Therefore, the staff concludes that there are no
4 impacts of solid waste associated with decommissioning following the license renewal term
5 beyond those discussed in the GEIS.
6

- 7 • Air quality. Based on information in the GEIS, the Commission found that

8
9 Air quality impacts of decommissioning are expected to be negligible either at
10 the end of the current operating term or at the end of the license renewal term.
11

12 The staff has not identified any new and significant information during its independent
13 review of the VEPCo ER (VEPCo 2001), the staff's site visit, the scoping process, or its
14 evaluation of other available information. Therefore, the staff concludes that there are no
15 impacts of license renewal on air quality during decommissioning beyond those discussed
16 in the GEIS.
17

- 18 • Water quality. Based on information in the GEIS, the Commission found that

19
20 The potential for significant water quality impacts from erosion or spills is no
21 greater whether decommissioning occurs after a 20-year license renewal period
22 or after the original 40-year operation period, and measures are readily available
23 to avoid such impacts.
24

25 The staff has not identified any new and significant information during its independent
26 review of the VEPCo ER (VEPCo 2001), the staff's site visit, the scoping process, or its
27 evaluation of other available information. Therefore, the staff concludes that there are no
28 impacts of the license renewal term on water quality during decommissioning beyond those
29 discussed in the GEIS.
30

- 31 • Ecological resources. Based on information in the GEIS, the Commission found that

32
33 Decommissioning after either the initial operating period or after a 20-year
34 license renewal period is not expected to have any direct ecological impacts.
35

36 The staff has not identified any new and significant information during its independent
37 review of the VEPCo ER (VEPCo 2001), the staff's site visit, the scoping process, or its
38 evaluation of other available information. Therefore, the staff concludes that there are no
39 impacts of the license renewal term on ecological resources during decommissioning
40 beyond those discussed in the GEIS.
41

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- 1 • Socioeconomic Impacts. Based on information in the GEIS, the Commission found that
2
3 Decommissioning would have some short-term socioeconomic impacts. The
4 impacts would not be increased by delaying decommissioning until the end of a
5 20-year relicense period, but they might be decreased by population and
6 economic growth.

7
8 The staff has not identified any new and significant information during its independent
9 review of the VEPCo ER (VEPCo 2001), the staff's site visit, the scoping process, or its
10 evaluation of other available information. Therefore, the staff concludes that there are no
11 impacts of license renewal on the socioeconomic impacts of decommissioning beyond
12 those discussed in the GEIS.
13

14 7.1 References

15
16 10 CFR 51. Code of Federal Regulations, Title 10, *Energy*, Part 51, "Environmental Protection
17 Regulations for Domestic Licensing and Related Regulatory Functions."

18
19 U.S. Nuclear Regulatory Commission (NRC). 1996. *Generic Environmental Impact Statement*
20 *for License Renewal of Nuclear Plants*. NUREG-1437, Volumes 1 and 2, Washington, D.C.

21
22 U.S. Nuclear Regulatory Commission (NRC). 1999. *Generic Environmental Impact Statement*
23 *for License Renewal of Nuclear Plants, Main Report*, "Section 6.3 – Transportation, Table 9.1,
24 Summary of findings on NEPA issues for license renewal of nuclear power plants, Final
25 Report." NUREG-1437, Volume 1, Addendum 1, Washington, D.C.

26
27 Virginia Electric and Power Company (VEPCo). 2001. *Application for License Renewal for*
28 *Surry Power Station, Units 1 and 2*, "Appendix E, Environmental Report - Operating License
29 Renewal Stage." Richmond, Virginia.

8.0 Environmental Impacts of Alternatives to Operating License Renewal

This chapter examines the potential environmental impacts associated with denying the renewal of the operating licenses (OLs) (i.e., the no-action alternative); the potential environmental impacts from electric generating sources other than Surry Power Station, Units 1 and 2; the possibility of purchasing electric power from other sources to replace power generated by Units 1 and 2 and the associated environmental impacts; the potential environmental impacts from a combination of generation and conservation measures; and other generation alternatives that were deemed unsuitable for replacement of power generated by Units 1 and 2. The environmental impacts are evaluated using the U.S. Nuclear Regulatory Commission's (NRC's) three-level standard of significance—SMALL, MODERATE, or LARGE, as developed using the Council on Environmental Quality guidelines and set forth in a footnote 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.

The impact categories evaluated in this chapter are the same as those used in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2 (NRC 1996; 1999)^(a), with the additional impact categories of environmental justice and transportation.

8.1 No-Action Alternative

NRC's regulations implementing the National Environmental Policy Act (NEPA) specify that the no-action alternative be discussed in an NRC environmental impact statement (EIS, see 10 CFR Part 51, Subpart A, Appendix A[4]). For license renewal, the no-action alternative refers to a scenario in which the NRC would not renew the OLs for Surry Units 1 and 2, and the Virginia Electric and Power Company (VEPCo) would then decommission Units 1 and 2, when

(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.

Alternatives

1 plant operations cease. Replacement of Units 1 and 2 electricity generation capacity would be
2 met by (1) demand-side management and energy conservation, (2) power purchased from
3 other electricity providers, (3) generating alternatives other than Units 1 and 2, or (4) some
4 combination of these options.

5
6 VEPCo will be required to comply with NRC decommissioning requirements whether or not the
7 OLs are renewed. If the Units 1 and 2 OLs are renewed, decommissioning activities may be
8 postponed for up to an additional 20 years. If the OLs are not renewed, VEPCo would conduct
9 decommissioning activities according to the requirements in 10 CFR 50.82. The GEIS (NRC
10 1996) and the *Final Generic Environmental Impact Statement on Decommissioning of Nuclear*
11 *Facilities* (NRC 1988) provide descriptions of decommissioning activities.^(a)

12
13 The environmental impacts associated with decommissioning under the no-action alternative
14 would be bounded by the discussion of impacts in Chapter 7 of the GEIS, Chapter 7 of this draft
15 Supplemental Environmental Impact Statement (SEIS), and the *Final Generic Environmental*
16 *Impact Statement on Decommissioning of Nuclear Facilities* (NRC 1988). The impacts of
17 decommissioning after 60 years of operation are not expected to be significantly different from
18 those occurring after 40 years of operation.

19
20 The environmental impacts for the socioeconomic, historic and archaeological resources, and
21 environmental justice impact categories are summarized in Table 8-1 and discussed in the
22 following paragraphs.

23
24 **Table 8-1.** Summary of Environmental Impacts of the No-Action Alternative

25

26 Impact Category	Impact	Comment
27 Socioeconomic	LARGE	Decrease in employment, higher-paying jobs, and tax revenues
28 29 Historic and 30 Archaeological 31 Resources	SMALL to MODERATE	Land occupied by Units 1 and 2 would likely be retained by VEPCo
32 33 Environmental Justice	MODERATE to LARGE	Loss of employment opportunities and social programs

34

(a) The NRC staff is currently updating the GEIS on decommissioning nuclear facilities. A draft for comment was issued on November 9, 2001 (66 FR 56721).

- 1 • Socioeconomic: When Surry Units 1 and 2 cease operation, there will be a decrease in
2 employment and tax revenues associated with the closure. Employment (primary and
3 secondary) impacts would be concentrated in Surry, James City, and Isle of Wight
4 Counties and the City of Newport News. Approximately 60 percent of the employees
5 who work at Surry Units 1 and 2 live in Surry, James City, and Isle of Wight Counties or
6 the City of Newport News. The remainder live in other nearby locations (VEPCo 2001).

7
8 Most of the tax revenue losses resulting from closure of Surry Units 1 and 2 would occur in
9 Surry County. In 2001, VEPCo paid \$10.9 million in property taxes to Surry County for the
10 nuclear and fossil generation units at the Surry Power Station, or about 70 percent of all
11 property taxes collected by the county (VEPCo 2001). The majority of the \$10.9 million was
12 attributable to Surry Units 1 and 2. The no-action alternative would result in the loss of the
13 taxes attributable to Surry Units 1 and 2, as well as the loss of plant payrolls 20 years earlier
14 than if the OLs were renewed. Loss of the property tax revenue would have a significant
15 negative impact on the ability of Surry County to provide public services such as schools
16 and road maintenance. There would also be an adverse impact on housing values and the
17 local economy in Surry County and surrounding areas if Surry Units 1 and 2 were to cease
18 operations.

19
20 VEPCo employees working at Surry Units 1 and 2 currently contribute time and money
21 toward community involvement, including schools, churches, charities, and other civic
22 activities. It is likely that with a reduced presence in the community following
23 decommissioning, community involvement efforts by VEPCo and its employees in the
24 region would be less.

- 25
26 • Historic and Archaeological Resources: The potential for future adverse impacts to
27 known or unrecorded cultural resources at the Surry Power Station following
28 decommissioning of Units 1 and 2 will depend on the future use of the land occupied by
29 the two units. Following decommissioning, land occupied by Units 1 and 2 would likely
30 be retained by VEPCo for other corporate purposes. Eventual sale or transfer of the
31 land occupied by Units 1 and 2, however, could result in adverse impacts to cultural
32 resources if the land-use pattern changes dramatically. Notwithstanding this possibility,
33 the impacts of this alternative on historic and archaeological resources are considered
34 SMALL to MODERATE.

- 35
36 • Environmental Justice for No-Action: Current operations at Surry Units 1 and 2 have no
37 disproportionate impacts on the minority and low-income populations of Surry and
38 surrounding counties, and no environmental pathways have been identified that would
39 cause disproportionate impacts. Closure of Units 1 and 2 would result in decreased
40 employment opportunities and tax revenues in Surry County and surrounding counties

Alternatives

1 with possible negative and disproportionate impacts on minority or low-income
2 populations. Because the Surry Power Station is located in a relatively rural area, the
3 environmental justice impacts under the no-action alternative are considered
4 MODERATE to LARGE.

5
6 Impacts for all other impact categories would be SMALL, as shown in Table 9-1.
7

8.2 Alternative Energy Sources

8
9
10 This section discusses the environmental impacts associated with alternative sources of electric
11 power to replace the power generated by Surry Units 1 and 2, assuming that the OLS for
12 Units 1 and 2 are not renewed. The order of presentation of alternative energy sources in
13 Section 8.2 does not imply which alternative would be most likely to occur or to have the least
14 environmental impacts. The following generation alternatives are considered in detail:

- 15
- 16 • coal-fired generation at the Surry Power Station site and at an alternate greenfield^(a) site
17 (Section 8.2.1)
- 18
- 19 • natural-gas-fired generation at the Surry Power Station site and at an alternate
20 greenfield site (Section 8.2.2)
- 21
- 22 • nuclear generation at the Surry Power Station site and at an alternate greenfield site
23 (Section 8.2.3).
- 24

25 The alternative of purchasing power from other sources to replace power generated at Surry
26 Units 1 and 2 is discussed in Section 8.2.4. Other power generation alternatives and conserva-
27 tion alternatives considered by the staff and found not to be reasonable replacements for
28 Units 1 and 2 are discussed in Section 8.2.5. Section 8.2.6 discusses the environmental
29 impacts of a combination of generation and conservation alternatives.

30
31 Each year, the Energy Information Administration (EIA), a component of the U.S. Department of
32 Energy (DOE), issues an Annual Energy Outlook. In the *Annual Energy Outlook 2002* issued in
33 December 2001 (DOE/EIA 2001a), EIA projects that combined-cycle or combustion turbine
34 technology fueled by natural gas is likely to account for approximately 88 percent of new
35 electric generating capacity between the years 2000 and 2020. Both technologies are designed
36 primarily to supply peak and intermediate capacity, but combined-cycle technology can also be

(a) A greenfield site is assumed to be an undeveloped site with no previous construction.

1 used to meet baseload^(a) requirements. Coal-fired plants are projected by EIA to account for
2 approximately 9 percent of new capacity during this period. Coal-fired plants are generally
3 used to meet baseload requirements. Renewable energy sources, primarily wind, geothermal,
4 and municipal solid waste units, are projected by EIA to account for the remaining 3 percent of
5 capacity additions. EIA's projections are based on the assumption that providers of new
6 generating capacity will seek to minimize cost while meeting applicable environmental
7 requirements. Combined-cycle plants are projected by EIA to have the lowest generation cost
8 in 2005 and 2020, followed by coal-fired plants and then wind generation (DOE/EIA 2001a).

9
10 EIA projects that oil-fired plants will account for very little of new generation capacity in the U.S.
11 during the 2000 to 2020 time period because of higher fuel costs and lower efficiencies
12 (DOE/EIA 2001a).

13
14 EIA also projects that new nuclear power plants will not account for any new generation
15 capacity in the U.S. during the 2000 to 2020 time period because natural gas and coal-fired
16 plants are projected to be more economical (DOE/EIA 2001a). In spite of this projection, a new
17 nuclear plant alternative for replacing power generated by Surry Units 1 and 2 is considered in
18 Section 8.2.3. Since 1997, the NRC has certified three new standard designs for nuclear power
19 plants under the procedures in 10 CFR Part 52, Subpart B: the U.S. Advanced Boiling Water
20 Reactor (10 CFR Part 52, Appendix A), the System 80+ Design (10 CFR Part 52, Appendix B),
21 and the AP600 Design (10 CFR Part 52, Appendix C). The submission to the NRC of these
22 three applications for certification indicates continuing interest in the possibility of licensing new
23 nuclear power plants. NRC has recently established a New Reactor Licensing Program
24 Organization to prepare for and manage future reactor and site licensing applications
25 (NRC 2001).

26
27 Surry Units 1 and 2 have a combined average net capacity of 1602 megawatts electric (MW[e]).
28 For the coal and natural gas alternatives, VEPCo's Environmental Report (ER) assumes three
29 standard 508-MW(e) units^(b) as potential replacements for Units 1 and 2 (VEPCo 2001). The
30 staff used this assumption in their evaluation, although it results in some environmental impacts
31 that are roughly 5 percent lower than if full replacement capacity were constructed. VEPCo's
32 reasoning is that although customized unit sizes can be built, use of standardized sizes is more

(a) A baseload plant normally operates to supply all or part of the minimum continuous load of a system and consequently produces electricity at an essentially constant rate. Nuclear power plants are commonly used for baseload generation, i.e., these units generally run near full load.

(b) Each of the coal-fired units would have a rating of 538 gross MW and 508 net MW. Each of the gas-fired units would have a rating of 528 gross MW and 508 net MW. The difference between "gross" and "net" is the electricity consumed onsite.

Alternatives

1 economical. Moreover, using four 508-MW(e) units for the analysis would overestimate
2 environmental impacts and tend to make the fossil alternatives less attractive.

3 4 **8.2.1 Coal-Fired Generation**

5
6 The coal-fired alternative is analyzed for both the Surry Power Station site and an alternate
7 greenfield site. As discussed in Section 8.2, the staff assumed construction of three
8 508-MW(e) units.

9
10 The VEPCo ER assumes that coal and lime or limestone for a coal-fired plant sited at the Surry
11 Power Station would be delivered by barge to the existing receiving dock (VEPCo 2001).
12 Lime^(a) (or limestone) is used in the scrubbing process for control of sulfur dioxide (SO₂)
13 emissions. Rail delivery would be the most likely option for delivering coal and lime/ limestone
14 to an alternate inland site for the coal-fired plant. Barge delivery of coal and lime/ limestone is
15 potentially feasible for a coastal site. A coal slurry pipeline is also a technically feasible delivery
16 option; however, the associated cost and environmental impacts make a slurry pipeline an
17 unlikely transportation alternative. Construction at an alternate site could necessitate the
18 construction of a new transmission line to connect to existing lines and a rail spur to the
19 plant site.

20
21 The coal-fired plant would consume approximately 4.4 million MT (4.9 million tons) per year of
22 pulverized bituminous coal with an ash content by weight of approximately 10.7 percent
23 (VEPCo 2001). The ER assumes a heat rate^(b) of 3 J fuel/J electricity (10,200 Btu/kWh) and a
24 capacity factor^(c) of 0.85 (VEPCo 2001). After combustion, 99.9 percent of the ash
25 (approximately 474,000 MT/yr [522,000 tons/yr]) would be collected and disposed of at the plant
26 site. In addition, approximately 221,000 MT/yr (244,000 tons/yr) of scrubber sludge would be
27 disposed of at the plant site based on annual lime usage of approximately 76,000 MT
28 (84,000 tons) (VEPCo 2001).

29
30 Unless otherwise indicated, the assumptions and numerical values used in Section 8.2.1 are
31 from the VEPCo ER (VEPCo 2001). The staff reviewed this information and compared it to

(a) In a typical wet scrubber, lime (calcium hydroxide) or limestone (calcium carbonate) is injected as a slurry into the hot effluent combustion gases to remove entrained sulfur dioxide. The lime-based scrubbing solution reacts with sulfur dioxide to form calcium sulfite, which precipitates out and is removed in sludge form.

(b) Heat rate is a measure of generating-station thermal efficiency. In English units, it is generally expressed in British thermal units (Btu) per net kilowatt-hour (kWh). It is computed by dividing the total Btu content of fuel burned for electric generation by the resulting net kWh generation.

(c) The capacity factor is the ratio of electricity generated, for the period of time considered, to the energy that could have been generated at continuous full-power operation during the same period.

1 environmental impact information in the GEIS. Although the OL renewal period is only
2 20 years, the impact of operating the coal-fired alternative for 40 years is considered (as a
3 reasonable projection of the operating life of a coal-fired plant).
4

5 **8.2.1.1 Once-Through Cooling System**

6

7 For purposes of this SEIS, the staff assumed that a coal-fired plant located at the Surry Power
8 Station would use the existing once-through system as a source of cooling. An alternate
9 greenfield site could use either a closed-cycle or a once-through cooling system.
10

11 The overall impacts of the coal-fired generating system are discussed in the following sections
12 and summarized in Table 8-2. The extent of impacts at an alternate site would depend on the
13 location of the particular site selected.
14

- 15 • **Land Use**

16

17 The existing facilities and infrastructure at the Surry Power Station site would be used to the
18 extent practicable, limiting the amount of new construction that would be required.
19 Specifically, the staff assumed that the coal-fired replacement plant alternative would use
20 the existing once-through cooling system, switchyard, offices, and transmission line rights-
21 of-way. Some additional land beyond the current Surry Power Station site boundary may be
22 needed to construct a new coal-fired plant while the existing nuclear Units 1 and 2 continue
23 to operate.
24

25 The coal-fired generation alternative would necessitate converting most of the unused land
26 at the Surry Power Station to industrial use for the plant, coal storage, and landfill disposal
27 of ash, spent selective catalytic reduction catalyst (used for control of nitrogen oxide emis-
28 sions), and scrubber sludge. VEPCo estimates that ash and scrubber waste disposal over
29 a 40-year plant life would require approximately 172 ha (425 ac) (VEPCo 2001). Additional
30 land-use changes would occur offsite in an undetermined coal-mining area to supply coal
31 for the plant. The GEIS estimated that approximately 8900 ha (22,000 ac) would be
32 affected for mining the coal and disposing of the waste to support a 1000-MW(e) coal plant
33 during its operational life (NRC 1996). A replacement coal-fired plant for Surry Units 1 and
34 2 would be 1524 MW(e) and would affect proportionately more land. Partially offsetting this
35 offsite land use would be the elimination of the need for uranium mining to supply fuel for
36 Surry Units 1 and 2. The GEIS states that approximately 400 ha (1000 ac) would be
37 affected for mining the uranium and processing it during the operating life of a 1000-MW(e)
38 nuclear power plant (NRC 1996).

Alternatives

Table 8-2. Summary of Environmental Impacts of Coal-Fired Generation at Surry Power Station and an Alternate Greenfield Site Using Once-Through Cooling

		Surry Power Station Site		Alternate Greenfield Site	
Impact Category	Impact	Comments	Impact	Comments	
Land Use	MODERATE	Uses most of unused portion of Surry Power Station site for plant, infrastructure, and waste disposal. Additional offsite land may also be needed. Additional offsite land impacts for coal and limestone mining.	MODERATE to LARGE	Uses up to 700 ha (1700 ac) for plant and infrastructure; additional land impacts for coal and limestone mining; possible impacts for transmission line and rail spur.	
Ecology	MODERATE to LARGE	Uses undeveloped areas at Surry Power Station plus some offsite land. Potential habitat loss and fragmentation and reduced productivity and biological diversity.	MODERATE to LARGE	Impact depends on location and ecology of the site, surface-water body used for intake and discharge, and transmission line route; potential habitat loss and fragmentation; reduced productivity and biological diversity.	
Water Use and Quality	SMALL	Uses existing once-through cooling system	SMALL to MODERATE	Impact will depend on the volume of water withdrawn and discharged and the characteristics of the surface-water body.	
Air Quality	MODERATE	Sulfur oxides • 4126 MT/yr (4548 tons/yr) Nitrogen oxides • 1075 MT/yr (1185 tons/yr) Particulates • 237 MT/yr (261 tons/yr) of total suspended particulates which would include 54 MT/yr (60 tons/yr) of PM ₁₀ Carbon monoxide • 1108 MT/yr (1221 tons/yr) Small amounts of mercury and other hazardous air pollutants and naturally occurring radioactive materials – mainly uranium and thorium	MODERATE	Potentially same impacts as the Surry Power Station site, although pollution control standards may vary.	

Table 8-2. (contd)

	Surry Power Station Site			Alternate Greenfield Site	
Impact Category	Impact	Comments	Impact	Comments	
Waste	MODERATE	Total waste volume would be approximately 700,000 MT/yr (770,000 tons/yr) of ash, spent catalyst, and scrubber sludge requiring approximately 172 ha (425 ac) for disposal during the 40-year life of the plant.	MODERATE	Same impacts as Surry Power Station site; waste disposal constraints may vary.	
Human Health	SMALL	Impacts are uncertain, but considered SMALL in the absence of more quantitative data.	SMALL	Same impact as Surry Power Station site.	
Socioeconomics	SMALL to LARGE	<p>During construction, impacts would be MODERATE to LARGE. Up to 2500 workers during the peak of the 5-year construction period, followed by reduction from current Surry Units 1 and 2 workforce of 990 to 200. Tax base preserved. Impacts during operation would be SMALL.</p> <p>Transportation impacts associated with construction workers could be MODERATE to LARGE. For barge transportation of coal and lime/limestone, the impact is considered SMALL.</p>	SMALL to LARGE	<p>Construction impacts depend on location, but could be LARGE if plant is located in a rural area. Surry County would experience loss of Units 1 and 2 tax base and employment with potentially LARGE impacts. Impacts during operation would be SMALL.</p> <p>Transportation impacts associated with construction workers could be MODERATE to LARGE. For rail transportation of coal and lime/limestone, the impact is considered MODERATE to LARGE. For barge transportation, the impact is considered SMALL.</p>	

Alternatives

Table 8-2. (contd)

Surry Power Station Site			Alternate Greenfield Site	
Impact Category	Impact	Comments	Impact	Comments
Aesthetics	MODERATE to LARGE	<p>MODERATE to LARGE aesthetic impact. Exhaust stacks will be visible from the Hog Island Wildlife Management Area, the James River, Chippokes Plantation State Park, and Colonial National Historical Park.</p> <p>Barge transportation of coal and lime/limestone would have a SMALL aesthetic impact.</p> <p>Noise impact would be SMALL to MODERATE.</p>	MODERATE to LARGE	<p>Impact would depend on the site selected and the surrounding land features. If needed, a new transmission line or rail spur would add to the aesthetic impact.</p> <p>Rail transportation of coal and lime/limestone would have a MODERATE aesthetic impact. Barge transportation of coal and lime/limestone would have a SMALL aesthetic impact.</p> <p>Noise impact would be SMALL to MODERATE.</p>
Historic and Archeological Resources	SMALL	Some construction would affect previously developed parts of Surry Power Station site; cultural resource inventory should minimize any impacts on undeveloped lands.	SMALL	Alternate location would necessitate cultural resource studies.
Environmental Justice	MODERATE	Impacts on minority and low-income communities should be similar to those experienced by the population as a whole. Some impacts on housing may occur during construction; loss of 790 operating jobs at Surry Power Station could reduce employment prospects for minority and low-income populations.	MODERATE to LARGE	Impacts at alternate site vary depending on population distribution and makeup at site. Surry County would lose significant revenue, which could have MODERATE to LARGE impacts on minority and low-income populations.

The impact of a coal-fired generating unit on land use at the Surry Power Station site is best characterized as MODERATE. The impact would definitely be greater than the OL renewal alternative.

1 In the GEIS, NRC staff estimated that a 1000-MW(e) coal-fired plant would require
 2 approximately 700 ha (1700 ac) (NRC 1996). It is likely that this acreage would be sufficient
 3 for a 1524-MW(e) coal-fired generation alternative at an alternate greenfield site. Additional
 4 land could be needed for a transmission line and for a rail spur to the plant site. Depending
 5 particularly on transmission line and rail line routing requirements, this alternative would
 6 result in MODERATE to LARGE land-use impacts.

7
 8 • **Ecology**

9
 10 Locating a coal-fired plant at the Surry Power Station site would alter ecological resources
 11 because of the need to convert most of the currently unused land at the Station to industrial
 12 use for the plant, coal storage, and ash and scrubber sludge disposal. However, some of
 13 this land would have been previously disturbed.

14
 15 Siting a coal-fired plant at the Surry Power Station would have a MODERATE to LARGE
 16 ecological impact that would be greater than renewal of the Units 1 and 2 OLS.

17
 18 At an alternate site, the coal-fired generation alternative would introduce construction
 19 impacts and new incremental operational impacts. Even assuming siting at a previously
 20 disturbed area, the impacts would alter the ecology. Impacts could include wildlife habitat
 21 loss, reduced productivity, habitat fragmentation, and a local reduction in biological diversity.
 22 Use of cooling makeup water from a nearby surface-water body could have adverse aquatic
 23 resource impacts. If needed, construction and maintenance of a transmission line and a rail
 24 spur would have ecological impacts. Overall, the ecological impacts at an alternate site
 25 would be MODERATE to LARGE.

26
 27 • **Water Use and Quality**

28
 29 The coal-fired generation alternative at the Surry Power Station site is assumed to use the
 30 existing once-through cooling system, which would minimize incremental water use and
 31 quality impacts. Surface-water impacts are expected to remain SMALL; the impacts would
 32 be sufficiently minor that they would not noticeably alter any important attribute of the
 33 resource.

34
 35 The staff assumed that a coal-fired plant located at the Surry Power Station would obtain
 36 potable, process, and fire-protection water from the series of groundwater wells that
 37 currently supply Units 1 and 2 (see Section 2.2.2). Use of groundwater for a coal-fired plant
 38 at an alternate site is a possibility. Groundwater withdrawal at an alternate site would likely
 39 require a permit.

Alternatives

1 Some erosion and sedimentation would likely occur during construction (NRC 1996).

2
3 For a coal-fired plant located at an alternate site, the impact on the surface water would
4 depend on the discharge volume and the characteristics of the receiving body of water.
5 Intake from and discharge to any surface body of water would be regulated by the
6 Commonwealth of Virginia or another state. The impacts would be SMALL to MODERATE.

7 8 • **Air Quality**

9
10 The air-quality impacts of coal-fired generation vary considerably from those of nuclear
11 generation due to emissions of sulfur oxides (SO_x), nitrogen oxides (NO_x), particulates,
12 carbon monoxide, hazardous air pollutants such as mercury, and naturally occurring
13 radioactive materials.

14
15 Surry County is in the State Capital Intrastate Air Quality Control Region (40 CFR 81.145).
16 Surry County is in compliance with the national ambient air quality standards for particulate
17 matter, carbon monoxide, nitrogen dioxide, lead, sulfur dioxide (SO₂), and ozone
18 (40 CFR 81.347).

19
20 A new coal-fired generating plant located at the Surry Power Station would likely need a
21 prevention of significant deterioration (PSD) permit and an operating permit under the Clean
22 Air Act. The plant would need to comply with the performance standards for new plants set
23 forth in 40 CFR Part 60, Subpart D(a). The standards establish limits for particulate matter
24 and opacity (40 CFR 60.42[a]), SO₂ (40 CFR 60.43[a]), and NO_x (40 CFR 60.44[a]).

25
26 The U.S. Environmental Protection Agency (EPA) has various regulatory requirements for
27 visibility protection in 40 CFR Part 51, Subpart P, including a specific requirement for review
28 of any new major stationary source in an area designated as attainment or unclassified
29 under the Clean Air Act. Surry County is classified as attainment or unclassified for criteria
30 pollutants.^(a)

31
32 Section 169A of the Clean Air Act (42 USC 7401) establishes a national goal of preventing
33 future and remedying existing impairment of visibility in mandatory Class I Federal areas
34 when impairment results from man-made air pollution. EPA issued a new regional haze rule
35 in 1999 (64 FR 35714; July 1, 1999 [EPA 1999]). The rule specifies that for each mandatory
36 Class I Federal area located within a state, the state must establish goals that provide for

(a) Existing criteria pollutants under the Clean Air Act are ozone, carbon monoxide, particulates, sulfur dioxide, lead, and nitrogen oxide. Emission standards for criteria pollutants are set out in 40 CFR Part 50.

1 reasonable progress towards achieving natural visibility conditions. The reasonable
2 progress goals must provide for an improvement in visibility for the most-impaired days over
3 the period of the implementation plan and ensure no degradation in visibility for the least
4 impaired days over the same period (40 CFR 51.308[d][1]). If a coal-fired plant were
5 located close to a mandatory Class I area, additional air pollution control requirements could
6 be imposed. However, the closest mandatory Class I Federal areas to Surry Power Station
7 are the Swanquarter Wilderness in eastern North Carolina located approximately 200 km
8 (125 mi) southeast of Surry Power Station, Shenandoah National Park located
9 approximately 225 km (140 mi) northwest of Surry Power Station, and the James River
10 Face Wilderness located approximately 240 km (150 mi) west of Surry Power Station.

11
12 In 1998, EPA issued a rule requiring 22 eastern states, including Virginia, to revise their
13 state implementation plans to reduce nitrogen-oxide emissions (63 FR 49442, EPA 1998).
14 Nitrogen-oxide emissions contribute to violations of the national ambient air quality standard
15 for ozone. The total amount of nitrogen oxides that can be emitted by each of the 22 states
16 in the year 2007 ozone season (May 1 - September 30) is set out at 40 CFR 51.121(e). For
17 Virginia, the amount is 163,470 MT (180,195 tons). Any new coal-fired plant sited in
18 Virginia would be subject to this limitation.

19
20 Impacts for particular pollutants are as follows:

21
22 Sulfur oxides emissions. VEPCo states in its ER that an alternative coal-fired plant located
23 at the Surry Power Station site would use wet scrubber technology utilizing lime/limestone
24 for flue gas desulfurization (VEPCo 2001).

25
26 A new coal-fired power plant would be subject to the requirements in Title IV of the Clean
27 Air Act. Title IV was enacted to reduce emissions of SO₂ and NO_x, the two principal
28 precursors of acid rain, by restricting emissions of these pollutants from power plants.
29 Title IV caps aggregate annual power plant SO₂ emissions and imposes controls on SO₂
30 emissions through a system of marketable allowances. EPA issues one allowance for each
31 ton of SO₂ that a unit is allowed to emit. New units do not receive allowances, but are
32 required to have allowances to cover their SO₂ emissions. Owners of new units must,
33 therefore, acquire allowances from owners of other power plants by purchase or reduce
34 SO₂ emissions at other power plants they own. Allowances can be banked for use in future
35 years. Thus, a new coal-fired power plant would not add to net regional SO₂ emissions,
36 although it might do so locally. Regardless, SO₂ emissions would be greater for the coal
37 alternative than the OL renewal alternative.

Alternatives

1 VEPCo estimates that by using the best technology to minimize SO_x emissions, the total
2 annual stack emissions would be approximately 4130 MT (4548 tons) of SO_x (VEPCo
3 2001).

4
5 Nitrogen oxides emissions. Section 407 of the Clean Air Act establishes technology-based
6 emission limitations for NO_x emissions. The market-based allowance system used for SO₂
7 emissions is not used for NO_x emissions. A new coal-fired power plant would be subject to
8 the new- source performance standards for such plants at 40 CFR 60.44(a)(d)(1). This
9 regulation, issued on September 16, 1998 (EPA 1998), limits the discharge of any gases
10 that contain nitrogen oxides (expressed as NO₂) in excess of 200 ng/J of gross energy
11 output (1.6 lb/MWh), based on a 30-day rolling average.

12
13 VEPCo estimates that by using NO_x burners with overfire air and selective catalytic
14 reduction, the total annual NO_x emissions for a new coal-fired power plant would be
15 approximately 1075 MT (1185 tons) (VEPCo 2001). This level of NO_x emissions would be
16 greater than the OL renewal alternative.

17
18 Particulates emissions. VEPCo estimates that the total annual stack emissions would
19 include 237 MT (261 tons) of filterable total suspended particulates (particulates that range
20 in size from less than 0.1 micrometer up to approximately 45 micrometers). The 237 MT
21 would include 54 MT (60 tons) of PM₁₀ (particulate matter having an aerodynamic diameter
22 less than or equal to 10 micrometers). Fabric filters or electrostatic precipitators would be
23 used for control. In addition, coal-handling equipment would introduce fugitive particulate
24 emissions. Particulate emissions would be greater under the coal alternative than the OL
25 renewal alternative.

26
27 During the construction of a coal-fired plant, fugitive dust would be generated. In addition,
28 exhaust emissions would come from vehicles and motorized equipment used during the
29 construction process.

30
31 Carbon monoxide emissions. VEPCo estimates that the total carbon monoxide emissions
32 would be approximately 1110 MT (1221 tons) per year (VEPCo 2001). This level of
33 emissions is greater than the OL renewal alternative.

34
35 Hazardous air pollutants emissions, including mercury. In December 2000, EPA issued
36 regulatory findings on emissions of hazardous air pollutants from electric utility steam
37 generating units (65 FR 79825, EPA 2000b). EPA determined that coal- and oil-fired
38 electric utility steam-generating units are significant emitters of hazardous air pollutants.
39 Coal-fired power plants were found by EPA to emit arsenic, beryllium, cadmium, chromium,
40 dioxins, hydrogen chloride, hydrogen fluoride, lead, manganese, and mercury (EPA 2000b).

1 EPA concluded that mercury is the hazardous air pollutant of greatest concern. EPA found
 2 that (1) there is a link between coal consumption and mercury emissions, (2) electric utility
 3 steam-generating units are the largest domestic source of mercury emissions, and
 4 (3) certain segments of the U.S. population (e.g., developing fetuses and the subsistence
 5 fish-eating populations) are believed to be at potential risk of adverse health effects due to
 6 mercury exposures resulting from consumption of contaminated fish (EPA 2000b).
 7 Accordingly, EPA added coal- and oil-fired electric utility steam-generating units to the list of
 8 source categories under Section 112(c) of the Clean Air Act for which emission standards
 9 for hazardous air pollutants will be issued (EPA 2000b).

10
 11 Uranium and thorium emissions. Coal contains uranium and thorium. Uranium
 12 concentrations are generally in the range of 1 to 10 parts per million. Thorium
 13 concentrations are generally about 2.5 times greater than uranium concentrations (Gabbard
 14 1993). One estimate is that a typical coal-fired plant released roughly 4.7 MT (5.2 tons) of
 15 uranium and 11.6 MT (12.8 tons) of thorium in 1982 (Gabbard 1993). The population dose
 16 equivalent from the uranium and thorium releases and daughter products produced by the
 17 decay of these isotopes has been calculated to be significantly higher than that from nuclear
 18 power plants (Gabbard 1993).

19
 20 A coal-fired plant would also have unregulated carbon-dioxide emissions that could
 21 contribute to global warming.

22
 23 Summary. The GEIS analysis did not quantify emissions from coal-fired power plants, but
 24 implied that air impacts would be substantial. The GEIS also mentioned global warming
 25 from unregulated carbon-dioxide emissions and acid rain from SO_x and NO_x emissions as
 26 potential impacts (NRC 1996). Adverse human health effects such as cancer and
 27 emphysema have been associated with the products of coal combustion. The appropriate
 28 characterization of air impacts from coal-fired generation would be MODERATE. The
 29 impacts would be clearly noticeable, but would not destabilize air quality.

30
 31 Siting a coal-fired generation plant at a site other than Surry Power Station would not
 32 significantly change air-quality impacts, although it could result in installing more or less
 33 stringent pollution-control equipment to meet applicable local requirements. Therefore, the
 34 impacts would be MODERATE.

35
 36 • **Waste**

37
 38 Coal combustion generates waste in the form of ash, and equipment for controlling air
 39 pollution generates spent selective catalytic reduction catalyst, additional ash, and scrubber
 40 sludge. Three 508-MW(e) coal-fired plants would generate approximately 695,000 MT

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1 (766,060 tons) of this waste annually. The waste would be disposed of onsite, accounting
2 for approximately 172 ha (425 ac) of land area over the 40-year plant life. Waste impacts to
3 groundwater and surface water could extend beyond the operating life of the plant if
4 leachate and runoff from the waste storage area occurs. Disposal of the waste could
5 noticeably affect land use and groundwater quality, but with appropriate management and
6 monitoring, it would not destabilize any resources. After closure of the waste site and
7 revegetation, the land could be available for other uses. Construction-related debris would
8 be generated during construction activities.

9
10 In May 2000, EPA issued a Notice of Regulatory Determination on Wastes from the
11 Combustion of Fossil Fuels (65 FR 32214, EPA 2000a). EPA concluded that some form of
12 national regulation is warranted to address coal combustion waste products because (1) the
13 composition of these wastes could present danger to human health and the environment
14 under certain conditions, (2) EPA has identified 11 documented cases of proven damage to
15 human health and the environment by improper management of these wastes in landfills
16 and surface impoundments, (3) present disposal practices are such that, in 1995, these
17 wastes were being managed in 40 to 70 percent of landfills and surface impoundments
18 without reasonable controls in place, particularly in the area of groundwater monitoring, and
19 (4) EPA identified gaps in state oversight of coal combustion wastes. Accordingly, EPA
20 announced its intention to issue regulations for disposal of coal combustion waste under
21 Subtitle D of the Resource Conservation and Recovery Act (RCRA).

22
23 For all of the preceding reasons, the appropriate characterization of impacts from waste
24 generated from burning coal is MODERATE; the impacts would be clearly noticeable, but
25 would not destabilize any important resource.

26
27 Siting the facility at a site other than the Surry Power Station would not alter waste
28 generation, although other sites might have more constraints on disposal locations.
29 Therefore, the impacts would be MODERATE.

30 31 • Human Health

32
33 Coal-fired power generation introduces worker risks from coal and limestone mining, worker
34 and public risks from coal and lime/limestone transportation, worker and public risks from
35 disposal of coal combustion wastes, and public risks from inhalation of stack emissions.
36 Emission impacts can be widespread and health risks difficult to quantify. The coal
37 alternative also introduces the risk of coal pile fires and attendant inhalation risks.

38
39 In the GEIS, the staff stated that there could be human health impacts (cancer and
40 emphysema) from inhalation of toxins and particulates from a coal-fired plant, but did not

1 identify the significance of these impacts (NRC 1996). In addition, the discharges of
2 uranium and thorium from coal-fired plants can potentially produce radiological doses in
3 excess of those arising from nuclear power plant operations (Gabbard 1993).
4

5 Regulatory agencies, including EPA and State agencies, set air-emission standards and
6 requirements based on human health impacts. These agencies also impose site-specific
7 emission limits as needed to protect human health. As discussed previously, EPA has
8 recently concluded that certain segments of the U.S. population (e.g., developing fetuses
9 and the subsistence fish-eating populations) are believed to be at potential risk of adverse
10 health effects due to mercury exposures from sources such as coal-fired power plants.
11 However, in the absence of more quantitative data, human health impacts from radiological
12 doses and inhaling toxins and particulates generated by burning coal are characterized as
13 SMALL.
14

15 • **Socioeconomics**
16

17 Construction of the coal-fired alternative would take approximately 5 years. The staff
18 assumed that construction would take place while Surry Units 1 and 2 continue operation
19 and would be completed by the time Units 1 and 2 permanently cease operations. The
20 workforce would be expected to vary between 1200 and 2500 workers during the 5-year
21 construction period (NRC 1996). These workers would be in addition to the approximately
22 990 workers employed at Units 1 and 2. During construction of the new coal-fired plant,
23 communities near the Surry Power Station would experience demands on housing and
24 public services that could have MODERATE to LARGE impacts. These impacts would be
25 tempered by construction workers commuting to the site from more distant cities such as
26 Hampton, Norfolk, Chesapeake, Portsmouth, and Virginia Beach. After construction, the
27 nearby communities would be impacted by the loss of the construction jobs. VEPCo
28 estimates that the completed coal plant would employ approximately 200 workers (VEPCo
29 2001).
30

31 If the coal-fired replacement plant were constructed at the Surry Power Station site and
32 Units 1 and 2 were decommissioned, there would be a loss of approximately 790 permanent
33 high-paying jobs (from 990 for the two nuclear units down to 200 for the coal-fired plant),
34 with a commensurate reduction in demand on socioeconomic resources and contribution to
35 the regional economy. The coal-fired plants would provide a new tax base to offset the loss
36 of tax base associated with decommissioning of the nuclear units. For all of these reasons,
37 the appropriate characterization of nontransportation socioeconomic impacts for an
38 operating coal-fired plant constructed at the Surry Power Station site would be MODERATE.
39 The socioeconomic impacts would be noticeable, but would be unlikely to destabilize the
40 area.

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1 During the 5-year construction period of replacement coal-fired units, up to 2500 construc-
2 tion workers would be working at the site in addition to the 990 workers at Units 1 and 2.
3 The addition of these workers could place significant traffic loads on existing highways near
4 the Surry Power Station. Such impacts would be MODERATE to LARGE.

5
6 For transportation related to commuting of plant-operating personnel, the impacts are
7 considered SMALL. The maximum number of plant-operating personnel would be
8 approximately 200. The current Surry Units 1 and 2 workforce is approximately 990.
9 Therefore, traffic impacts associated with plant personnel commuting to a coal-fired plant
10 would be expected to be SMALL compared to the current impacts from Unit 1 and 2
11 operations.

12
13 Barge delivery of coal and lime/limestone to the Surry Power Station would likely have
14 SMALL socioeconomic impacts.

15
16 Construction of a replacement coal-fired power plant at an alternate greenfield site would
17 relocate some socioeconomic impacts, but would not eliminate them. The communities
18 around Surry Power Station would experience the impact of Surry Units 1 and 2 operational
19 job loss and Surry County would lose a significant tax base. These losses would have
20 potentially LARGE socioeconomic impacts. Communities around the new site would have
21 to absorb the impacts of a large, temporary workforce (up to 2500 workers at the peak of
22 construction) and a permanent workforce of approximately 200 workers. In the GEIS, the
23 staff stated that socioeconomic impacts at a rural site would be larger than at an urban site
24 because more of the peak construction workforce would need to move to the area to work
25 (NRC 1996). Alternate sites would need to be analyzed on a case-by-case basis.
26 Socioeconomic impacts at a rural site could be LARGE. Transportation-related impacts
27 associated with commuting construction workers at an alternate site are site-dependent, but
28 could be MODERATE to LARGE. Transportation impacts related to commuting of plant-
29 operating personnel would also be site-dependent, but can be characterized as SMALL to
30 MODERATE.

31
32 At an alternate greenfield site, coal and lime/limestone would likely be delivered by rail,
33 although barge delivery is feasible for a coastal location. Transportation impacts would
34 depend upon the site location. For the rail delivery option, coal would likely be delivered by
35 rail trains of approximately 115 cars each. Each open-top rail car holds about 90 MT
36 (100 tons) of coal. Additional rail cars would be needed for lime/limestone delivery. In all,
37 approximately 440 trains per year would deliver the coal and lime/limestone for the three
38 units. An average of roughly 17 train trips per week on the rail spur would be needed
39 because for each full train delivery, there would be an empty return train. On several days
40 per week, there could be three trains per day using the rail spur to the alternate site.

1 Socioeconomic impacts associated with rail transportation, such as delays at rail crossings,
 2 would likely be MODERATE to LARGE. Barge delivery of coal and lime/limestone would
 3 likely have SMALL socioeconomic impacts.

4
 5 • **Aesthetics**

6
 7 The three coal-fired power plant units could be as much as 60 m (200 ft) tall and be visible
 8 in daylight hours over many miles. The three exhaust stacks would be as much as 185 m
 9 (600 ft) high (VEPCo 2001). Given the low elevation at the site and of the surrounding land,
 10 the stacks would likely be highly visible in daylight hours for distances up to 16 km (10 mi).
 11 The stacks would be visible from the Hog Island Wildlife Management Area, the James
 12 River, Chippokes Plantation State Park, and Colonial National Historical Park, particularly
 13 the historic Jamestown portion of the park. The plant units and associated stacks would
 14 also be visible at night because of outside lighting. Visual impacts of a new coal-fired plant
 15 could be mitigated by landscaping and color selection for buildings that is consistent with
 16 the environment. Visual impact at night could be mitigated by reduced use of lighting and
 17 appropriate use of shielding.

18
 19 The aesthetic impact of the replacement coal-fired units on visitors to the historic
 20 Jamestown portion of Colonial National Historical Park would be particularly significant.
 21 Given the environmental sensitivity of the park and the associated expectations of visitors to
 22 national parks, the addition of the coal-fired units and the associated exhaust stacks would
 23 likely have a MODERATE to LARGE aesthetic impact.

24
 25 Coal-fired generation would introduce mechanical sources of noise that would be audible
 26 offsite. Sources contributing to total noise produced by plant operation are classified as
 27 continuous or intermittent. Continuous sources include the mechanical equipment
 28 associated with normal plant operations. Intermittent sources include the equipment related
 29 to coal handling, solid-waste disposal, transportation related to coal and lime/limestone
 30 delivery, use of outside loudspeakers, and the commuting of plant employees. The
 31 incremental noise impacts of a coal-fired plant compared to existing Surry Units 1 and 2
 32 operations are considered to be SMALL to MODERATE given the rural location of the plant.

33
 34 Noise associated with barge transportation of coal and lime/limestone would be SMALL.

35
 36 At an alternate greenfield site, there would be an aesthetic impact from the buildings and
 37 exhaust stacks. There would be an aesthetic impact that could be LARGE if construction of
 38 a new transmission line and/or rail spur is needed. Noise impacts associated with rail
 39 delivery of coal and lime/limestone would be most significant for residents living in the
 40 vicinity of the facility and along the rail route. Although noise from passing trains

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1 significantly raises noise levels near the rail corridor, the short duration of the noise reduces
2 the impact. Nevertheless, given the frequency of train transport and the fact that many
3 people are likely to be within hearing distance of the rail route, the impact of noise on
4 residents in the vicinity of the facility and the rail line is considered MODERATE. Noise and
5 light from the plant would be detectable offsite. Aesthetic impacts at the plant site would be
6 mitigated if the plant were located in an industrial area adjacent to other power plants.
7 Overall, the aesthetic impacts associated with locating at an alternate site can be
8 categorized as MODERATE to LARGE.

9 10 • **Historic and Archaeological Resources**

11
12 At the Surry Power Station site or an alternate site, a cultural resource inventory would likely
13 be needed for any onsite property that has not been previously surveyed. Other lands, if
14 any, that are acquired to support the plant would also likely need an inventory of field
15 cultural resources, identification and recording of existing historic and archaeological
16 resources, and possible mitigation of adverse effects from subsequent ground-disturbing
17 actions related to physical expansion of the plant site.

18
19 Before construction at Surry Power Station or an alternate greenfield site, studies would
20 likely be needed to identify, evaluate, and address mitigation of the potential impacts of new
21 plant construction on cultural resources. The studies would likely be needed for all areas of
22 potential disturbance at the proposed plant site and along associated corridors where new
23 construction would occur (e.g., roads, transmission corridors, rail lines, or other rights-of-
24 way). Historic and archaeological resource impacts can generally be effectively managed
25 and as such are considered SMALL.

26 27 • **Environmental Justice**

28
29 No environmental pathways or locations have been identified that would result in dispro-
30 portionately high and adverse environmental impacts on minority and low-income populations if
31 a replacement coal-fired plant were built at the Surry Power Station site. Some impacts on
32 housing availability and prices during construction might occur, and this could dispro-
33 portionately affect minority and low-income populations. Closure of Surry Units 1 and 2 would
34 result in a decrease in employment of approximately 790 operating employees. Resulting
35 economic conditions could reduce employment prospects for minority or low-income
36 populations. Overall, impacts are expected to be MODERATE.

37
38 Impacts at other sites would depend upon the site chosen and the nearby population
39 distribution. If a replacement coal-fired plant were constructed at an alternate site, Surry
40 County would experience a significant loss of property tax revenue, which would affect the

1 County's ability to provide services and programs. Impacts to minority and low-income
2 populations in Surry County could be MODERATE to LARGE.

3 4 **8.2.1.2 Closed-Cycle Cooling System**

5
6 The environmental impacts of constructing a coal-fired generation system at an alternate
7 greenfield site using closed-cycle cooling with cooling towers are essentially the same as the
8 impacts for a coal-fired plant using the once-through system. However, there are some
9 environmental differences between the closed-cycle and once-through cooling systems.
10 Table 8-3 summarizes the incremental differences.

11 12 **8.2.2 Natural-Gas-Fired Generation**

13
14 The environmental impacts of the natural-gas-fired alternative are examined in this section for
15 both the Surry Power Station site and an alternate greenfield site. For the Surry Power Station
16 site, the staff assumed that the plant would use the existing once-through cooling system.

17
18 The Surry Power Station site is currently served by natural gas pipelines from Newport News
19 that pass under the James River (VEPCo 2001). The pipelines enter the VEPCo property near
20 the cooling water intake structure. VEPCo assumes that construction of replacement natural-
21 gas-fired units at the Surry Power Station site would require a new dedicated high-pressure 61-
22 cm (24-in.) diameter pipeline from Danville, Virginia (VEPCo 2001). Danville is approximately
23 238 km (148 mi) from the Surry Power Station. VEPCo also states in its ER that in the winter,
24 when demand for natural gas is high, it may become necessary for a replacement natural-gas-
25 fired plant to operate on fuel oil due to lack of gas supply (VEPCo 2001). Operation with oil
26 would result in more stack emissions.

27
28 If a new natural-gas-fired plant were built elsewhere to replace Surry Units 1 and 2, a new
29 transmission line could need to be constructed to connect to existing lines. In addition,
30 construction or upgrade of a natural gas pipeline from the plant to a supply point where a firm
31 supply of gas would be available could be needed. One potential source of natural gas is
32 liquefied natural gas (LNG) imported to either the Cove Point facility in Maryland or the Elba
33 Island facility in Georgia. Both facilities are expected to be reactivated in 2002 (DOE/EIA
34 2001a). LNG imported to either facility would need to be vaporized and transported to the plant
35 location via pipeline.

36
37 The staff assumed that a replacement natural-gas-fired plant would use combined-cycle
38 combustion turbines (VEPCo 2001). In a combined-cycle unit, hot combustion gases in a
39 combustion turbine rotate the turbine to generate electricity. Waste combustion heat from the

1 combustion turbine is routed through a heat-recovery boiler to make steam to generate
 2 additional electricity.

3
 4 The following additional assumptions are made for the natural-gas-fired plants (VEPCo 2001):

- 5
- 6 • three 508-MW(e) units, each consisting of two 168-MW combustion turbines and a 172-
 7 MW heat recovery boiler
- 8
- 9 • natural gas with an average heating value of 39 MJ/m³ (1059 Btu/ft³) as the primary fuel
- 10
- 11 • use of low-sulfur number 2 fuel oil as backup fuel
- 12
- 13 • heat rate of 2 J fuel/J electricity (6700 Btu/kWh)
- 14
- 15 • capacity factor of 0.85
- 16
- 17 • gas consumption of 2.11 billion m³/yr (74.7 billion ft³/yr).
- 18

19 Unless otherwise indicated, the assumptions and numerical values used in Section 8.2.2 are
 20 from the VEPCo ER. The staff reviewed this information and compared it to environmental
 21 impact information in the GEIS. Although the OL renewal period is only 20 years, the impact of
 22 operating the natural-gas-fired alternative for 40 years is considered (as a reasonable
 23 projection of the operating life of a natural-gas-fired plant).

24
 25 **8.2.2.1 Once-Through Cooling System**

26
 27 The overall impacts of the natural-gas-generating system are discussed in the following
 28 sections and summarized in Table 8-4. The extent of impacts at an alternate greenfield site will
 29 depend on the location of the particular site selected.

30
 31 • **Land Use**

32
 33 For siting at the Surry Power Station, existing facilities and infrastructure would be used to
 34 the extent practicable, limiting the amount of new construction that would be required.
 35 Specifically, the staff assumed that the natural-gas-fired replacement plant alternative would
 36 use the existing once-through cooling system, switchyard, offices, and transmission line
 37 rights-of-way. For Surry Power Station, the staff assumed that approximately 14 ha (35 ac)
 38 would be needed for the plant and associated infrastructure. There would be an additional
 39 land use impact of up to approximately 1200 ha (3000 ac) for construction of a natural gas
 40 pipeline adjacent to existing previously disturbed pipeline easements (VEPCo 2001).

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Table 8-4. Summary of Environmental Impacts of Natural-Gas-Fired Generation at Surry Power Station and an Alternate Greenfield Site Using Once-Through Cooling

Surry Power Station Site			Alternate Greenfield Site	
Impact Category	Impact	Comments	Impact	Comments
Land Use	MODERATE to LARGE	14 ha (35 ac) for powerblock, roads, and parking areas. Additional impact of up to approximately 1200 ha (3000 ac) for construction of an underground gas pipeline.	MODERATE to LARGE	45 ha (110 ac) for powerblock, offices, roads, switchyard, and parking areas. Additional land possibly impacted for transmission line and/or natural gas pipeline.
Ecology	MODERATE to LARGE	Uses undeveloped areas at Surry Power Station plus land for a new gas pipeline.	MODERATE to LARGE	Impact depends on location and ecology of the site, surface water body used for intake and discharge, and possible transmission and pipeline routes; potential habitat loss and fragmentation; reduced productivity and biological diversity.
Water Use and Quality	SMALL	Uses existing once-through cooling system.	SMALL to MODERATE	Impact depends on volume of water withdrawal and discharge and characteristics of surface water body.
Air Quality	MODERATE	Sulfur oxides • 122 MT/yr (134 tons/yr) Nitrogen oxides • 459 MT/yr (506 tons/yr) Carbon monoxide • 602 MT/yr (664 tons/yr) PM ₁₀ particulates • 180 MT/yr (198 tons/yr) Some hazardous air pollutants	MODERATE	Same emissions as Surry Power Station site.

Table 8-4. (contd)

Surry Power Station Site			Alternate Greenfield Site	
Impact Category	Impact	Comments	Impact	Comments
Waste	SMALL	Minimal amount of ash produced.	SMALL	Minimal amount of ash produced.
Human Health	SMALL	Impacts considered to be minor.	SMALL	Impacts considered to be minor.
Socioeconomics	MODERATE	<p>During construction, impacts would be MODERATE. Up to 1200 additional workers during the peak of the 3-year construction period, followed by reduction from current Surry Units 1 and 2 workforce of 990 to 150; tax base preserved. Impacts during operation would be SMALL.</p> <p>Transportation impacts associated with construction workers would be MODERATE.</p>	MODERATE to LARGE	<p>During construction, impacts would be MODERATE. Up to 1200 additional workers during the peak of the 3-year construction period. Surry County would experience loss of Units 1 and 2 tax base and employment associated with Units 1 and 2 with potentially LARGE associated impacts.</p> <p>Transportation impacts associated with construction workers would be MODERATE.</p>
Aesthetics	MODERATE	MODERATE aesthetic impact due to impact of plant units and stacks on environmentally sensitive Colonial National Historical Park.	SMALL to LARGE	SMALL to MODERATE impact from plant and stacks. Additional impact that could be LARGE if a new transmission line is needed.
Historic and Archeological Resources	SMALL	Any potential impacts can likely be effectively managed.	SMALL	Same as Surry Power Station site; any potential impacts can likely be effectively managed.

Table 8-4. (contd)

Surry Power Station Site			Alternate Greenfield Site	
Impact Category	Impact	Comments	Impact	Comments
Environmental Justice	MODERATE	Impacts on minority and low-income communities should be similar to those experienced by the population as a whole. Some impacts on housing may occur during construction; loss of 840 operating jobs at Surry Power Station could reduce employment prospects for minority and low-income populations.	MODERATE to LARGE	Impacts at alternate site vary depending on population distribution and makeup at site. Surry County would lose significant revenue, which could have MODERATE to LARGE impacts on minority and low-income populations.

For construction at an alternate greenfield site, the staff assumed that 45 ha (110 ac) would be needed for the plant and associated infrastructure (NRC 1996). Additional land could be impacted for construction of a transmission line and/or natural gas pipeline to serve the plant.

For any new natural-gas-fired plant, additional land would be required for natural gas wells and collection stations. In the GEIS the staff estimated that approximately 1500 ha (3600 ac) would be needed for a 1000-MW(e) plant (NRC 1996). A replacement gas-fired plant for Surry Units 1 and 2 would be 1524 MW(e) and would affect proportionately more land. Partially offsetting these offsite land requirements would be the elimination of the need for uranium mining to supply fuel for Units 1 and 2. The NRC staff states in the GEIS (NRC 1996) that approximately 400 ha (1000 ac) would be affected for mining the uranium and processing it during the operating life of a 1000-MW(e) nuclear power plant. Overall, land-use impacts at both the Surry Power Station and an alternate greenfield location would be MODERATE to LARGE.

• **Ecology**

At the Surry Power Station site, there would be ecological land-related impacts for siting of the gas-fired plant. There would also be significant ecological impacts associated with bringing a new underground gas pipeline to the Surry Power Station site. Ecological impacts at an alternate site would depend on the nature of the land converted for the plant and the possible need for a new transmission line and/or gas pipeline. Construction of a transmission line and a gas pipeline to serve the plant would be expected to have temporary

1 ecological impacts. Ecological impacts to the plant site and utility easements could include
 2 impacts on threatened or endangered species, wildlife habitat loss and reduced productivity,
 3 habitat fragmentation, and a local reduction in biological diversity. At an alternate site, the
 4 cooling makeup water intake and discharge could have aquatic resource impacts. Overall,
 5 the ecological impacts are considered MODERATE to LARGE at either location.
 6

7 • **Water Use and Quality**
 8

9 Each of the natural-gas-fired units would include a heat-recovery boiler from which steam
 10 would turn an electric generator. Steam would be condensed and circulated back to the
 11 boiler for reuse. A natural-gas-fired plant sited at Surry Power Station is assumed to use
 12 the existing once-through cooling system.
 13

14 The staff assumed that a natural-gas-fired plant located at the Surry Power Station would
 15 obtain potable, process, and fire-protection water from the series of groundwater wells that
 16 currently supply Units 1 and 2 (see Section 2.2.2). It is possible that a natural-gas-fired
 17 plant sited at an alternate site could use groundwater. Groundwater withdrawal at an
 18 alternate site would likely require a permit. Groundwater withdrawal impacts are considered
 19 SMALL.
 20

21 For alternate sites, the impact on the surface water would depend on the discharge volume
 22 and the characteristics of the receiving body of water. Intake from and discharge to any
 23 surface body of water would be regulated by the State. A natural-gas-fired plant sited at an
 24 alternate site may use groundwater.
 25

26 Water-quality impacts from sedimentation during construction of a natural-gas-fired plant
 27 were characterized in the GEIS as SMALL (NRC 1996). The staff also noted in the GEIS
 28 that operational water quality impacts would be similar to, or less than, those from other
 29 generating technologies.
 30

31 Overall, water-use and quality impacts at an alternate site are considered SMALL
 32 to MODERATE.
 33

34 • **Air Quality**
 35

36 Natural gas is a relatively clean-burning fuel. The gas-fired alternative would release similar
 37 types of emissions, but in lesser quantities than the coal-fired alternative. Hence it would be
 38 subject to the same air quality regulations as a coal-fired plant.
 39

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1 VEPCo projects the following emissions for the natural-gas-fired alternative (VEPCo 2001):

2
3 Sulfur oxides - 122 MT/yr (134 tons/yr)
4 Nitrogen oxides - 459 MT/yr (506 tons/yr)
5 Carbon monoxide - 602 MT/yr (664 tons/yr)
6 PM₁₀ particulates - 180 MT/yr (198 tons/yr)
7

8 A natural-gas-fired plant would also have unregulated carbon dioxide emissions that could
9 contribute to global warming.

10
11 In December 2000, EPA issued regulatory findings on emissions of hazardous air pollutants
12 from electric utility steam-generating units. Natural-gas-fired power plants were found by
13 EPA to emit arsenic, formaldehyde, and nickel (EPA 2000b). Unlike coal- and oil-fired
14 plants, however, EPA did not determine that regulation of emissions of hazardous air
15 pollutants from natural-gas-fired power plants should be regulated under Section 112 of the
16 Clean Air Act.

17
18 Construction activities would result in temporary fugitive dust. Exhaust emissions would
19 also come from vehicles and motorized equipment used during the construction process.

20
21 The preceding emissions would likely be the same at the Surry Power Station or at an
22 alternate site. Impacts from the above emissions would be clearly noticeable, but would not
23 be sufficient to destabilize air resources as a whole. The overall air-quality impact for a new
24 natural-gas-generating plant sited at the Surry Power Station or at an alternate site is
25 considered MODERATE.

26 27 • Waste

28
29 There will be small amounts of solid-waste products (i.e., ash) from burning natural gas fuel.
30 In the GEIS, the staff concluded that waste generation from gas-fired technology would be
31 minimal (NRC 1996). Gas firing results in very few combustion by-products because of the
32 clean nature of the fuel. Waste generation at an operating gas-fired plant would be largely
33 limited to typical office wastes; impacts would be so minor that they would not noticeably
34 alter any important resource attribute. Construction-related debris would be generated
35 during construction activities. Overall, the waste impacts would be SMALL for a natural-
36 gas-fired plant sited at the Surry Power Station or at an alternate site.

37
38 In the winter, it may become necessary for a replacement baseload natural-gas-fired plant
39 to operate on fuel oil due to lack of gas supply. Number 2 fuel oil would be used.
40 Combustion of number 2 fuel oil does not produce any appreciable solid waste. Overall, the

1 waste impacts associated with fuel oil combustion at a combined cycle plant are expected to
 2 be SMALL.

3
 4 • **Human Health**

5
 6 In the GEIS, the staff identifies cancer and emphysema as potential health risks from gas-
 7 fired plants (NRC 1996). The risk may be attributable to NO_x emissions that contribute to
 8 ozone formation, which in turn contribute to health risks. For any gas-fired plant, NO_x
 9 emissions would be regulated. Human health effects are not expected to be detectable or
 10 sufficiently minor that they would neither destabilize nor noticeably alter any important
 11 attribute of the resource. Overall, the impacts on human health of the natural-gas-fired
 12 alternative sited at the Surry Power Station or at an alternate site are considered SMALL.

13
 14 • **Socioeconomics**

15
 16 Construction of a natural-gas-fired plant would take approximately 3 years. Peak
 17 employment could be up to 1200 workers (NRC 1996). The staff assumed that construction
 18 would take place while Units 1 and 2 continue operation and would be completed by the
 19 time they permanently cease operations. During construction, the communities surrounding
 20 the Surry Power Station site would experience demands on housing and public services that
 21 could have MODERATE impacts. These impacts would be tempered by construction
 22 workers commuting to the site from more distant cities such as Hampton, Norfolk,
 23 Chesapeake, Portsmouth, and Virginia Beach. After construction, the communities would
 24 be impacted by the loss of jobs. The current Units 1 and 2 workforce (990 workers) would
 25 decline through a decommissioning period to a minimal maintenance size. The new
 26 natural-gas-fired plant would replace the nuclear tax base at Surry Power Station or provide
 27 a new tax base at an alternate site and approximately 150 permanent jobs. Siting at an
 28 alternate site would result in the loss of the nuclear tax base and associated employment in
 29 Surry County with potentially LARGE socioeconomic impacts.

30
 31 In the GEIS (NRC 1996), the staff concluded that socioeconomic impacts from constructing
 32 a natural-gas-fired plant would not be very noticeable and that the small operational
 33 workforce would have the lowest socioeconomic impacts of any nonrenewable technology.
 34 Compared to the coal-fired and nuclear alternatives, the smaller size of the construction
 35 workforce, the shorter construction time frame, and the smaller size of the operations
 36 workforce would mitigate socioeconomic impacts.

37
 38 Transportation impacts associated with construction and operating personnel commuting to
 39 the plant site would depend on the population density and transportation infrastructure in the

Alternatives

1 vicinity of the site. The impacts can be classified as MODERATE for siting at Surry Power
2 Station or at an alternate site.

3
4 Overall, socioeconomic impacts resulting from construction of a natural-gas-fired plant at
5 Surry Power Station would be MODERATE. For construction at an alternate site,
6 socioeconomic impacts would be MODERATE to LARGE.

7
8 • **Aesthetics**

9
10 The turbine buildings and stacks (approximately 60 m [200 ft] tall) would be visible during
11 daylight hours from offsite. The gas-pipeline compressors would also be visible. Noise and
12 light from the plant would be detectable offsite. At the Surry Power Station site, these
13 impacts would result in a MODERATE aesthetic impact given the environmental sensitivity
14 of Colonial National Historical Park and the expectations of visitors to national parks.

15
16 At an alternate site, the buildings and stacks would be visible offsite. If a new transmission
17 line is needed, the aesthetic impact could be LARGE. Aesthetic impacts would be mitigated
18 if the plant were located in an industrial area adjacent to other power plants. Overall, the
19 aesthetic impacts associated with a replacement natural-gas-fired plant at an alternate site
20 are categorized as SMALL to LARGE with site-specific factors determining the final
21 categorization.

22
23 • **Historic and Archaeological**

24
25 At both Surry Power Station and an alternate site, a cultural resource inventory would likely
26 be needed for any onsite property that has not been previously surveyed. Other lands, if
27 any, that are acquired to support the plant would also likely need an inventory of field
28 cultural resources, identification and recording of existing historic and archaeological
29 resources, and possible mitigation of adverse effects from subsequent ground-disturbing
30 actions related to physical expansion of the plant site.

31
32 Before construction at Surry Power Station or an alternate site, studies would likely be
33 needed to identify, evaluate, and address mitigation of the potential impacts of new plant
34 construction on cultural resources. The studies would likely be needed for all areas of
35 potential disturbance at the proposed plant site and along associated corridors where new
36 construction would occur (e.g., roads, transmission and pipeline corridors, or other rights-
37 of-way). Impacts to cultural resources can be effectively managed under current laws and
38 regulations and kept SMALL.

39

1 • **Environmental Justice**

2
3 No environmental pathways or locations have been identified that would result in disproportionately high and adverse environmental impacts on minority and low-income populations if
4 a replacement natural-gas-fired plant were built at the Surry Power Station. Some impacts
5 on housing availability and prices during construction might occur, and this could disproportionately
6 affect minority and low-income populations. Closure of Surry Units 1 and 2 would
7 result in a decrease in employment of approximately 840 operating employees, possibly
8 offset by general growth in the immediate area. Resulting economic conditions could
9 reduce employment prospects for minority or low-income populations. Overall, impacts are
10 expected to be MODERATE.

11
12
13 Impacts at an alternate site would depend upon the site chosen and the nearby population
14 distribution. If a replacement natural-gas-fired plant were constructed at an alternate site,
15 Surry County would experience a significant loss of property tax revenue which would affect
16 the County's ability to provide services and programs. Impacts to minority and low-income
17 populations in Surry County could be MODERATE to LARGE.

18
19 **8.2.2.2 Closed-Cycle Cooling System**

20
21 The environmental impacts of constructing a natural-gas-fired generation system at an alternate
22 location using a closed-cycle cooling system with cooling towers are essentially the same as the
23 impacts for a natural-gas-fired plant using once-through cooling. However, there are some
24 environmental differences between the closed-cycle and once-through cooling systems.
25 Table 8-5 summarizes the incremental differences.

26
27 **8.2.3 Nuclear Power Generation**

28
29 Since 1997, the NRC has certified three new standard designs for nuclear power plants under
30 10 CFR Part 52, Subpart B. These designs are the U.S. Advanced Boiling Water Reactor
31 (10 CFR Part 52, Appendix A), the System 80+ Design (10 CFR Part 52, Appendix B), and the
32 AP600 Design (10 CFR Part 52, Appendix C). All of these plants are light-water reactors.
33 Although no applications for a construction permit or a combined license based on these
34 certified designs have been submitted to NRC, the submission of the design certification
35 applications indicates continuing interest in the possibility of licensing new nuclear power plants.
36 In addition, recent volatility in prices of natural gas and electricity have made new nuclear power
37 plant construction more attractive from a cost standpoint. Consequently, construction of a new
38 nuclear power plant at the Surry Power Station site using the existing once-through cooling
39 system and at an alternate greenfield site using both closed- and open-cycle cooling are

1 considered in this section. The staff assumed that the new nuclear plant would have a 40-year
2 lifetime.

3
4 NRC has summarized environmental data associated with the uranium fuel cycle in Table S-3
5 of 10 CFR 51.51. The impacts shown in Table S-3 are representative of the impacts that would
6 be associated with a replacement nuclear power plant built to one of the certified designs sited
7 at the Surry Power Station or an alternate site. The impacts shown in Table S-3 are for a
8 1000-MW(e) reactor and would need to be adjusted to reflect replacement of Units 1 and 2,
9 which have a capacity of 1602 MW(e). The environmental impacts associated with transporting
10 fuel and waste to and from a light-water-cooled nuclear power reactor are summarized in
11 Table S-4 of 10 CFR 51.52. The summary of NRC's findings on NEPA issues for license
12 renewal of nuclear power plants in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B, is also
13 relevant, although not directly applicable, for consideration of environmental impacts associated
14 with the operation of a replacement nuclear power plant. Additional environmental impact
15 information for a replacement nuclear power plant using once-through cooling is presented in
16 Section 8.2.3.1 and using closed-cycle cooling in Section 8.2.3.2.

17 18 **8.2.3.1 Once-Through Cooling System**

19
20 The overall impacts of the nuclear generating system are discussed in the following sections.
21 The impacts are summarized in Table 8-6. The extent of impacts at an alternate greenfield site
22 will depend on the location of the particular site selected.

23 24 • **Land Use**

25
26 The existing facilities and infrastructure at the Surry Power Station site would be used to the
27 extent practicable, limiting the amount of new construction that would be required.
28 Specifically, the staff assumed that a replacement nuclear power plant would use the existing
29 cooling system, switchyard, offices, and transmission line rights-of-way.

30
31 A replacement nuclear power plant at Surry Power Station would require approximately
32 200 ha (500 ac), some of which may be previously undeveloped land. There would be no
33 net change in land needed for uranium mining because land for the new nuclear plant would
34 offset land needed to supply uranium for fuel for Units 1 and 2.

35
36 The impact of a replacement nuclear generating plant on land use at the Surry Power Station
37 site is best characterized as MODERATE. The impact would be greater than the OL renewal
38 alternative.

Alternatives

1 **Table 8-6.** Summary of Environmental Impacts of New Nuclear Generation at Surry Power
 2 Station and an Alternate Greenfield Site Using Once-Through Cooling
 3

		Surry Power Station Site		Alternate Greenfield Site	
Impact Category	Impact	Comments	Impact	Comments	
6 Land Use	MODERATE	Requires approximately 200 ha (500 ac) for the plant	MODERATE to LARGE	Requires approximately 200-400 ha (500-1000 ac) for the plant. Possible additional land if a new transmission line is needed.	
7 Ecology	MODERATE	Uses undeveloped areas at current Surry Power Station site plus additional offsite land. Potential habitat loss and fragmentation and reduced productivity and biological diversity on offsite land.	MODERATE to LARGE	Impact depends on location and ecology of the site, surface-water body used for intake and discharge, and transmission line route; potential habitat loss and fragmentation; reduced productivity and biological diversity.	
9 Water Use and Quality	SMALL	Uses existing once-through cooling system	SMALL to MODERATE	Impact will depend on the volume of water withdrawn and discharged and the characteristics of the surface water body.	
12 Air Quality	SMALL	Fugitive emissions and emissions from vehicles and equipment during construction. Small amount of emissions from diesel generators and possibly other sources during operation.	SMALL	Same impacts as Surry Power Station site	
14 Waste	SMALL	Waste impacts for an operating nuclear power plant are set out in 10 CFR Part 51, Appendix B, Table B-1. Debris would be generated and removed during construction.	SMALL	Same impacts as Surry Power Station site	
16 Human Health	SMALL	Human health impacts for an operating nuclear power plant are set out in 10 CFR Part 51, Appendix B, Table B-1.	SMALL	Same impacts as Surry Power Station site	

Table 8-6. (contd)

		Surry Power Station Site		Alternate Greenfield Site	
Impact Category	Impact	Comments	Impact	Comments	
Socioeconomics	MODERATE to LARGE	During construction, impacts would be MODERATE to LARGE. Up to 2500 workers during the peak of the 6-year construction period. Operating workforce assumed to be similar to Units 1 & 2. Surry County tax base preserved.	MODERATE to LARGE	Construction impacts depend on location. Impacts at a rural location could be LARGE. Surry County would experience loss of a significant tax base and employment with potentially LARGE impacts.	
		Transportation impacts associated with commuting construction workers could be MODERATE to LARGE. Transportation impacts during operation would be SMALL.		Transportation impacts associated with commuting construction workers could be MODERATE to LARGE. Transportation impacts during operation would be SMALL to MODERATE.	
Aesthetics	SMALL	No exhaust stacks or cooling towers would be needed. Daytime visual impact could be mitigated by landscaping and appropriate color selection for buildings. Visual impact at night could be mitigated by reduced use of lighting and appropriate shielding. Noise impacts would be relatively small and could be mitigated.	SMALL to LARGE	Similar to impacts at Surry Power Station. Potentially a LARGE impact if a new transmission line is needed.	
Historic and Archeological Resources	SMALL	Any potential impacts can likely be effectively managed.	SMALL	Any potential impacts can likely be effectively managed.	
Environmental Justice	SMALL	Impacts on minority and low-income communities should be similar to those experienced by the population as a whole. Some impacts on housing may occur during construction.	MODERATE to LARGE	Impacts will vary depending on population distribution and makeup at the site. Impacts to minority and low-income residents of Surry County associated with closure of Surry Units 1 and 2 could be significant.	

Land-use requirements at an alternate site would be approximately 200-400 ha (500-1000 ac) plus the possible need for a new transmission line (NRC 1996). In addition, it may be necessary to construct a rail spur to an alternate site to bring in equipment during construction. Depending particularly on transmission line routing, siting a new nuclear plant at an alternate site could result in MODERATE to LARGE land-use impacts.

Alternatives

1 • **Ecology**

2
3 Locating a replacement nuclear power plant at the Surry Power Station site would alter
4 ecological resources because of the need to convert land to an industrial use. Some of this
5 land, however, would have been previously disturbed.

6
7 Siting at the Surry Power Station would have a MODERATE ecological impact that would be
8 greater than renewal of the Units 1 and 2 OLS.

9
10 At an alternate site, there would be construction impacts and new incremental operational
11 impacts. Even assuming siting at a previously disturbed area, the impacts would alter the
12 ecology. Impacts could include wildlife habitat loss, reduced productivity, habitat fragmen-
13 tation, and a local reduction in biological diversity. Use of cooling water from a nearby
14 surface water body could have adverse aquatic resource impacts. If needed, construction
15 and maintenance of the transmission line would have ecological impacts. Overall, the
16 ecological impacts at an alternate site would be MODERATE to LARGE.

17 18 • **Water Use and Quality**

19
20 The staff assumed that a replacement nuclear plant alternative at the Surry Power Station
21 would use the existing cooling system, which would minimize incremental water-use and
22 quality impacts. Surface-water impacts are expected to remain SMALL; the impacts would
23 be sufficiently minor that they would not noticeably alter any important attribute of the
24 resource.

25
26 The staff assumed that a new nuclear power plant located at the Surry Power Station would
27 obtain potable, process, and fire-protection water from onsite groundwater wells similarly to
28 the current practice for Units 1 and 2 (see Section 2.2.2). Some erosion and sedimentation
29 would likely occur during construction as a result of land clearing.

30
31 For alternate sites, the impact on the surface water would depend on the discharge volume
32 and the characteristics of the receiving body of water. Intake from and discharge to any
33 surface body of water would be regulated by the State. The impacts would be SMALL to
34 MODERATE.

35
36 A nuclear power plant sited at an alternate site may use groundwater. Groundwater
37 withdrawal at an alternate site would likely require a permit. Groundwater withdrawal
38 impacts would depend on availability and how the water is withdrawn, but overall are
39 considered SMALL.

40

1 • **Air Quality**

2
3 Construction of a new nuclear plant sited at the Surry Power Station or an alternate site
4 would result in fugitive emissions during the construction process. Exhaust emissions
5 would also come from vehicles and motorized equipment used during the construction
6 process. An operating nuclear plant would have minor air emissions associated with diesel
7 generators. These emissions would be regulated by the Virginia Department of
8 Environmental Quality or another state. Overall, emissions and associated impacts are
9 considered SMALL.

10
11 • **Waste**

12
13 The waste impacts associated with operation of a nuclear power plant are set out in
14 Table B-1 of 10 CFR Part 51, Subpart A, Appendix B. In addition to the impacts shown in
15 Table B-1, construction-related debris would be generated during construction activities and
16 removed to an appropriate disposal site. Overall, waste impacts are considered SMALL.

17
18 Siting the replacement nuclear power plant at a site other than the Surry Power Station
19 would not alter waste generation. Therefore, the impacts would be SMALL.

20
21 • **Human Health**

22
23 Human health impacts for an operating nuclear power plant are set out in 10 CFR Part 51,
24 Subpart A, Appendix B, Table B-1. Overall, human health impacts are considered SMALL.

25
26 Siting the replacement nuclear power plant at a site other than the Surry Power Station
27 would not alter human health impacts. Therefore, the impacts would be SMALL.

28
29 • **Socioeconomics**

30
31 The construction period and the peak workforce associated with construction of a new
32 nuclear power plant are currently unquantified (NRC 1996). In the absence of quantified
33 data, the staff assumed a construction period of 6 years and a peak workforce of 2500.
34 The staff assumed that construction would take place while existing Units 1 and 2 continue
35 operation and would be completed by the time Units 1 and 2 permanently cease operations.
36 During construction, the communities surrounding the Surry Power Station site would
37 experience demands on housing and public services that could have MODERATE to
38 LARGE impacts. These impacts would be tempered by construction workers commuting to
39 the site from more distant communities. After construction, the communities would be
40 impacted by the loss of the construction jobs.

Alternatives

1 The replacement nuclear units are assumed to have an operating workforce comparable to
2 the 990 workers currently working at Units 1 and 2. The replacement nuclear units would
3 provide a new tax base to offset the loss of tax base associated with decommissioning of
4 Units 1 and 2. The appropriate characterization of nontransportation socioeconomic
5 impacts for operating replacement nuclear units constructed at the Surry Power Station site
6 would be SMALL.

7
8 During the 6-year construction period, up to 2500 construction workers would be working at
9 the Surry Power Station site in addition to the 990 workers at Units 1 and 2. The addition of
10 the construction workers could place significant traffic loads on existing highways, particu-
11 larly those leading to the Surry Power Station site. Such impacts would be MODERATE to
12 LARGE. Transportation impacts related to commuting of plant operating personnel would
13 be similar to current impacts associated with operation of Units 1 and 2 and are considered
14 SMALL.

15
16 Construction of a replacement nuclear power plant at an alternate site would relocate some
17 socioeconomic impacts, but would not eliminate them. Surry County and surrounding
18 communities would experience the impact of Surry Units 1 and 2 operational job loss and
19 the loss of tax base with potentially LARGE impacts given Surry County's heavy
20 dependence on tax revenue from the Surry Power Station. The communities around the
21 new site would have to absorb the impacts of a large, temporary workforce (up to 2500
22 workers at the peak of construction) and a permanent workforce of approximately 880
23 workers. In the GEIS (NRC 1996), the staff noted that socioeconomic impacts at a rural site
24 would be larger than at an urban site because more of the peak construction workforce
25 would need to move to the area to work. The Surry Power Station site is within commuting
26 distance of a number of relatively large cities and, therefore, is not considered a rural site.
27 Alternate sites would need to be analyzed on a case-by-case basis. Socioeconomic
28 impacts at a rural site could be LARGE. Transportation-related impacts associated with
29 commuting construction workers at an alternate site are site-dependent, but could be
30 MODERATE to LARGE. Transportation impacts related to commuting of plant operating
31 personnel would also be site-dependent, but can be characterized as SMALL to
32 MODERATE.

33 34 • **Aesthetics**

35
36 The containment buildings for a replacement nuclear power plant sited at the Surry Power
37 Station and other associated buildings would likely be visible in daylight hours over many
38 miles. Visual impacts could be mitigated by landscaping and selecting a color for buildings
39 that is consistent with the environment. The visual impact could also be mitigated by below-
40 grade construction similar to Surry Units 1 and 2. Visual impact at night could be mitigated

1 by reduced use of lighting and appropriate use of shielding. No exhaust stacks would be
 2 needed. No cooling towers would be needed, assuming use of the existing once-through
 3 cooling system.

4
 5 Noise from operation of a replacement nuclear power plant would potentially be audible
 6 offsite in calm wind conditions or when the wind is blowing in the direction of the hearer.
 7 Mitigation measures, such as reduced or no use of outside loudspeakers, can be employed
 8 to reduce noise level and keep the impact SMALL.

9
 10 At an alternate site, there would be an aesthetic impact from the buildings. There would
 11 also be a significant aesthetic impact if a new transmission line were needed. Noise and
 12 light from the plant would be detectable offsite. The impact of noise and light would be
 13 mitigated if the plant is located in an industrial area adjacent to other power plants. Overall,
 14 the aesthetic impacts associated with locating at an alternative site can be categorized as
 15 SMALL; however, the impact could be LARGE if a new transmission line is needed to
 16 connect the plant to the power grid.

17
 18 • **Historic and Archaeological Resources**

19
 20 At both the Surry Power Station site and an alternate site, a cultural resource inventory
 21 would likely be needed for any onsite property that has not been previously surveyed. Other
 22 lands, if any, that are acquired to support the plant would also likely need an inventory of
 23 field cultural resources, identification and recording of existing historic and archaeological
 24 resources, and possible mitigation of adverse effects from subsequent ground-disturbing
 25 actions related to physical expansion of the plant site.

26
 27 Before construction at the Surry Power Station site or another site, studies would likely be
 28 needed to identify, evaluate, and address mitigation of the potential impacts of new plant
 29 construction on cultural resources. The studies would likely be needed for all areas of
 30 potential disturbance at the proposed plant site and along associated corridors where new
 31 construction would occur (e.g., roads, transmission corridors, rail lines, or other rights-of-
 32 way). Historic and archaeological resource impacts can generally be effectively managed
 33 and are considered SMALL.

34
 35 • **Environmental Justice**

36
 37 No environmental pathways or locations have been identified that would result in
 38 disproportionately high and adverse environmental impacts on minority and low-income
 39 populations if a replacement nuclear plant were built at the Surry Power Station site. Some
 40 impacts on housing availability and prices during construction might occur, and this could

Alternatives

1 disproportionately affect minority and low-income populations. After completion of
2 construction, it is possible that the ability of local governments to maintain social services
3 could be reduced at the same time as diminished economic conditions reduce employment
4 prospects for minority and low-income populations. Overall, however, impacts are expected
5 to be SMALL.

6
7 Impacts at an alternate site would depend upon the site chosen and the nearby population
8 distribution. If a replacement nuclear plant were constructed at an alternate site, Surry
9 County would experience a significant loss of property tax revenue, which would affect the
10 County's ability to provide services and programs. Impacts to minority and low-income
11 populations in Surry County could be MODERATE to LARGE.

12 13 **8.2.3.2 Closed-Cycle Cooling System**

14
15 The environmental impacts of constructing a nuclear power plant at an alternate greenfield site
16 using closed-cycle cooling with cooling towers are essentially the same as the impacts for a
17 nuclear power plant using a once-through system. However, there are minor environmental
18 differences between the closed-cycle and once-through cooling systems. Table 8-7
19 summarizes the incremental differences.

20 21 **8.2.4 Purchased Electrical Power**

22
23 If available, purchased power from other sources could potentially obviate the need to renew
24 the Surry Units 1 and 2 OLS. VEPCo currently has purchase agreements for 145 MW from the
25 Southeastern Power Administration and approximately 3500 MW of non-utility generation
26 (VEPCo 2001). Overall, Virginia is a net importer of electricity.

27
28 To replace Surry Units 1 and 2 capacity with imported power, VEPCo would need to construct a
29 new 500-kV transmission line, which VEPCo estimates would be approximately 160 km (100
30 mi) long (VEPCo 2001). Assuming a 0.09 km (300 ft) easement width, the transmission line
31 would impact approximately 15 km² (6 mi²).

32
33 Imported power from Canada or Mexico is unlikely to be available for replacement of Surry
34 Units 1 and 2 capacity. In Canada, 62 percent of the country's electricity capacity is derived
35 from renewable energy sources, principally hydropower (DOE/EIA 2001b). Canada has plans
36 to continue developing hydroelectric power, but the plans generally do not include large-scale
37 projects (DOE/EIA 2001b). Canada's nuclear generation is projected to increase by 1.7 percent
38 by 2020, but its share of power generation in Canada is projected to decrease from 14 percent
39 currently to 13 percent by 2020 (DOE/EIA 2001b). EIA projects that total gross U.S. imports of
40 electricity from Canada and Mexico will gradually increase from 47.9 billion kWh in year 2000 to

Table 8-7. Summary of Environmental Impacts of a New Nuclear Power Plant Sited at an Alternate Greenfield Site with Closed-Cycle Cooling

Impact Category	Change in Impacts from Once-Through Cooling System
Land Use	Required 10-12 additional ha (25-30 ac) for cooling towers and associated infrastructure.
Ecology	Impact would depend on ecology at the site. Additional impact to terrestrial ecology from cooling-tower drift. Reduced impact to aquatic ecology.
Surface Water Use and Quality	Discharge of cooling-tower blowdown containing dissolved solids. Discharge would be regulated by the State. Decreased water withdrawal and less thermal load on receiving body of water.
Groundwater Use and Quality	No change
Air Quality	No change
Waste	No change
Human Health	No change
Socioeconomics	No change
Aesthetics	Introduction of cooling towers and associated plume. Natural draft towers could be up to 158 m (520 ft). Mechanical draft towers could be up to 30 m (100 ft) high and also have an associated noise impact.
Historic and Archaeological Resources	No change
Environmental Justice	No change

Alternatives

1 66.1 billion kWh in year 2005, and then gradually decrease to 47.4 billion kWh in year 2020
2 (DOE/EIA 2001a). On balance, it is unlikely that electricity imported from Canada or Mexico
3 would be able to replace the Surry Units 1 and 2 capacity.
4

5 If power to replace Surry Units 1 and 2 capacity were to be purchased from sources within the
6 U.S. or a foreign country, the generating technology would likely be one of those described in
7 this SEIS and in the GEIS (probably coal, natural gas, or nuclear). The description of the
8 environmental impacts of other technologies in Chapter 8 of the GEIS is representative of the
9 purchased electrical power alternative to renewal of the Surry Units 1 and 2 OLs. Thus, the
10 environmental impacts of imported power would still occur, but would be located elsewhere
11 within the region, nation, or another country.
12

13 **8.2.5 Other Alternatives**

14
15 Other generation technologies are discussed in the following subsections.
16

17 **8.2.5.1 Oil-Fired Generation**

18
19 EIA projects that oil-fired plants will account for very little of the new generation capacity in the
20 United States during the 2000 to 2020 time period because of higher fuel costs and lower
21 efficiencies (DOE/EIA 2001a). Oil-fired operation is more expensive than nuclear or coal-fired
22 operation. In addition, future increases in oil prices are expected to make oil-fired generation
23 increasingly more expensive than coal-fired generation. The high cost of oil has prompted a
24 steady decline in its use for electricity generation. Also, construction and operation of an oil-
25 fired plant would have environmental impacts. For example, in Section 8.3.11 of the GEIS, the
26 staff estimated that construction of a 1000-MWe oil-fired plant would require about 50 ha
27 (120 ac) (NRC 1996). Additionally, operation of oil-fired plants would have environmental
28 impacts (including impacts on the aquatic environment and air) that would be similar to those
29 from a coal-fired plant.
30

31 **8.2.5.2 Wind Power**

32
33 Virginia is in a wind power Class 1 region (average wind speeds at 10-m (30-ft) elevation of 0 to
34 4.4 m/s [9.8 mph]). Class 1 has the lowest potential for wind energy generation (DOE 2001a).
35 Wind turbines are economical in wind power Classes 4 through 7 (average wind speeds of 5.6
36 to 9.4 m/s [12.5 to 21.1 mph] [DOE 2001a]). Consequently, the staff concludes that locating a
37 wind-energy facility on or near the Surry Power Station site would not be economically feasible
38 given the current state of wind energy generation technology.
39

8.2.5.3 Solar Power

Solar technologies use the sun's energy and light to provide heat and cooling, light, hot water, and electricity for homes, businesses, and industry. Solar power technologies (photovoltaic and thermal) cannot currently compete with conventional fossil-fueled technologies in grid-connected applications due to higher capital costs per kilowatt of capacity. The average capacity factor of photovoltaic cells is about 25 percent (NRC 1996), and the capacity factor for solar thermal systems is about 25 to 40 percent (NRC 1996). Energy storage requirements limit the use of solar-energy systems as baseload electricity supply.

There are substantial impacts to natural resources (wildlife habitat, land-use, and aesthetic impacts) from construction of solar-generating facilities. As stated in the GEIS, land requirements are high—14,000 ha (35,000 ac) per 1000 MW(e) for photovoltaic (NRC 1996) and approximately 6000 ha (14,000 ac) per 1000 MW(e) for solar thermal systems (NRC 1996). Neither type of solar electric system would fit at the Surry Power Station site, and both would have large environmental impacts at a greenfield site.

The Surry Power Station site receives approximately 4 kWh of direct normal solar radiation per square meter per day compared to 7 to 8 kWh of solar radiation per square meter per day in areas of the western U.S., such as California, which are most promising for solar technologies (DOE/EIA 2000a). Because of the natural resource impacts (land and ecological), the area's relatively low rate of solar radiation, and the high cost, solar power is not deemed a feasible baseload alternative to renewal of the Surry Units 1 and 2 OLs. Some onsite generated solar power, e.g., from rooftop photovoltaic applications, may substitute for electric power from the grid. Implementation of solar generation on a scale large enough to replace Surry Units 1 and 2 would likely result in LARGE environmental impacts.

8.2.5.4 Hydropower

Virginia has an estimated 617 MW of undeveloped hydroelectric resources (INEEL 1997). This amount is less than needed to replace the 1602 MW(e) capacity of Surry Units 1 and 2. As stated in Section 8.3.4 of the GEIS, hydropower's percentage of U.S. generating capacity is expected to decline because hydroelectric facilities have become difficult to site as a result of public concern about flooding, destruction of natural habitat, and alteration of natural river courses. In the GEIS, the staff estimated that land requirements for hydroelectric power are approximately 400,000 ha (1 million ac) per 1000 MW(e) (NRC 1996). Replacement of Surry Units 1 and 2 generating capacity would require flooding more than this amount of land. Due to the relatively low amount of undeveloped hydropower resource in Virginia and the large land-use and related environmental and ecological resource impacts associated with siting hydroelectric facilities large enough to replace Surry Units 1 and 2, the staff concludes that local

Alternatives

1 hydropower is not a feasible alternative to renewal of the Surry Units 1 and 2 OLS. Any
2 attempts to site hydroelectric facilities large enough to replace Surry Units 1 and 2 would result
3 in LARGE environmental impacts.

4 5 **8.2.5.5 Geothermal Energy**

6
7 Geothermal energy has an average capacity factor of 90 percent and can be used for baseload
8 power where available. However, geothermal technology is not widely used as baseload
9 generation due to the limited geographical availability of the resource and immature status of
10 the technology (NRC 1996). As illustrated by Figure 8-4 in the GEIS, geothermal plants are
11 most likely to be sited in the western continental U.S., Alaska, and Hawaii, where hydrothermal
12 reservoirs are prevalent. There is no feasible eastern location for geothermal capacity to serve
13 as an alternative to Surry Units 1 and 2. The staff concludes that geothermal energy is not a
14 feasible alternative to renewal of the Surry Units 1 and 2 OLS.

15 16 **8.2.5.6 Wood Waste**

17
18 A wood-burning facility can provide baseload power and operate with an average annual
19 capacity factor of around 70 to 80 percent and with 20 to 25 percent efficiency (NRC 1996).
20 The fuels required are variable and site-specific. A significant barrier to the use of wood waste
21 to generate electricity is the high delivered-fuel cost and high construction cost per MW of
22 generating capacity. The larger wood-waste power plants are only 40 to 50 MW(e) in size.
23 Estimates in the GEIS suggest that the overall level of construction impact per MW of installed
24 capacity should be approximately the same as that for a coal-fired plant, although facilities
25 using wood waste for fuel would be built at smaller scales (NRC 1996). Like coal-fired plants,
26 wood-waste plants require large areas for fuel storage and processing and involve the same
27 type of combustion equipment.

28
29 Due to uncertainties associated with obtaining sufficient wood and wood waste to fuel a base-
30 load generating facility, ecological impacts of large-scale timber cutting (e.g., soil erosion and
31 loss of wildlife habitat), and high inefficiency, the staff has determined that wood waste is not a
32 feasible alternative to renewing the Surry Units 1 and 2 OLS.

33 34 **8.2.5.7 Municipal Solid Waste**

35
36 Municipal waste combustors incinerate the waste and use the resultant heat to generate steam,
37 hot water, or electricity. The combustion process can reduce the volume of waste by up to
38 90 percent and the weight of the waste by up to 75 percent (EPA 2001). Municipal waste
39 combustors use three basic types of technologies: mass burn, modular, and refuse-derived
40 fuel (DOE/EIA 2001c). Mass-burning technologies are most commonly used in the U.S. This

1 group of technologies process raw municipal solid waste “as is,” with little or no sizing, shred-
2 ding, or separation before combustion. The initial capital costs for municipal solid-waste plants
3 are greater than for comparable steam-turbine technology at wood-waste facilities. This is due
4 to the need for specialized waste-separation and -handling equipment for municipal solid waste
5 (NRC 1996).

6
7 Growth in the municipal waste combustion industry slowed dramatically during the 1990s after
8 rapid growth during the 1980s. The slower growth was due to three primary factors: (1) the
9 Tax Reform Act of 1986, which made capital-intensive projects such as municipal waste
10 combustion facilities more expensive relative to less capital-intensive waste disposal
11 alternatives such as landfills; (2) the 1994 Supreme Court decision (*C&A Carbone v. Town of*
12 *Clarkstown*), which struck down local flow control ordinances that required waste to be
13 delivered to specific municipal waste combustion facilities rather than landfills that may have
14 had lower fees; and (3) increasingly stringent environmental regulations that increased the
15 capital cost necessary to construct and maintain municipal waste combustion facilities
16 (DOE/EIA 2001c).

17
18 Municipal solid waste combustors generate an ash residue that is buried in landfills. The ash
19 residue is composed of bottom ash and fly ash. Bottom ash refers to that portion of the
20 unburned waste that falls to the bottom of the grate or furnace. Fly ash represents the small
21 particles that rise from the furnace during the combustion process. Fly ash is generally
22 removed from flue-gases using fabric filters and/or scrubbers (DOE/EIA 2001c).

23
24 Currently, there are approximately 102 waste-to-energy plants operating in the U.S. These
25 plants generate approximately 2800 MW(e), or an average of approximately 28 MW(e) per
26 plant (Integrated Waste Services Association 2001). The staff concludes that generating
27 electricity from municipal solid waste would not be a feasible alternative to replace the
28 1602 MW(e) baseload capacity of Surry Units 1 and 2 and, consequently, would not be a
29 feasible alternative to renewal of the Surry Units 1 and 2 OLS.

30 31 **8.2.5.8 Other Biomass-Derived Fuels**

32
33 In addition to wood and municipal solid waste fuels, there are several other concepts for fueling
34 electric generators, including burning crops, converting crops to a liquid fuel such as ethanol,
35 and gasifying crops (including wood waste). In the GEIS, the staff stated that none of these
36 technologies has progressed to the point of being competitive on a large scale or of being
37 reliable enough to replace a baseload plant such as Surry Units 1 and 2 (NRC 1996). For these
38 reasons, such fuels do not offer a feasible alternative to renewal of the Surry Units 1 and 2 OLS.

39

1 **8.2.5.9 Fuel Cells**

2
3 Fuel cells work without combustion and its environmental side-effects. Power is produced
4 electrochemically by passing a hydrogen-rich fuel over an anode and air over a cathode and
5 separating the two by an electrolyte. The only by-products are heat, water, and carbon dioxide.
6 Hydrogen fuel can come from a variety of hydrocarbon resources by subjecting them to steam
7 under pressure. Phosphoric acid fuel cells are generally considered first-generation
8 technology. Higher-temperature second-generation fuel cells achieve higher fuel-to-electricity
9 and thermal efficiencies. The higher temperatures contribute to improved efficiencies and give
10 the second-generation fuel cells the capability to generate steam for cogeneration and
11 combined-cycle operations. DOE projects that by 2003, two second-generation fuel-cell
12 technologies using molten carbonate and solid oxide technology, respectively, will be
13 commercially available in sizes up to 2 MW at a cost of \$1000 to \$1500 per kW of installed
14 capacity (DOE 2001b). For comparison, the installed capacity cost for a natural-gas-fired
15 combined-cycle plant is on the order of \$500 to \$600 per kW (NWPPC 2000). As market
16 acceptance and manufacturing capacity increase, natural-gas-fueled fuel-cell plants in the 50-
17 to 100-MW range are projected to become available (DOE 2001b). At the present time,
18 however, fuel cells are not economically or technologically competitive with other alternatives
19 for baseload electricity generation. Fuel cells are, consequently, not a feasible alternative to
20 renewal of the Surry Units 1 and 2 OLS.

21
22 **8.2.5.10 Delayed Retirement**

23
24 The only VEPCo generating plants currently scheduled for retirement are Possum Point Units 1
25 and 2. These oil-fired units each have a nameplate generating capacity^(a) of 69 MW (DOE/EIA
26 2000b). The Possum Point facility is located about 25 miles south of Washington, D.C.
27 Delayed retirement of Possum Point Units 1 and 2 would not come close to replacing the 1602-
28 MW(e) capacity of Surry Units 1 and 2. For this reason, delayed retirement of VEPCo
29 generating units would not be a feasible alternative to renewal of the Surry Units 1 and 2 OLS.

30
31 **8.2.5.11 Utility-Sponsored Conservation**

32
33 VEPCo has developed residential, commercial, and industrial programs to reduce both peak
34 demands and daily energy consumption. These programs are commonly referred to as
35 demand-side management (DSM). VEPCo currently operates the following DSM programs:
36 Rate Schedule SG (standby generation), Rate Schedule CS (curtailable service), Rider J
37 (interruptible electric water heater service), and the Real Time Pricing Rate. VEPCo projects
38 that by the year 2007, its DSM programs will reduce peak power requirements in the summer

(a) The nameplate generating capacity is the full-load continuous rating of a generating unit.

1 and winter by 74 and 130 MW, respectively (VEPCo 2001). VEPCo also projects that energy
 2 requirements in 2007 will be reduced by 14 gigawatt hours, 94 percent of which would be from
 3 load-management programs (VEPCo 2001).

4
 5 Historic and projected reduction in generation needs as a result of DSM programs have been
 6 credited in VEPCo's planning to meet projected customer demand. Because these DSM
 7 savings are part of the long-range plan for meeting projected demand, they are not available
 8 offsets for Surry Units 1 and 2. Therefore, the conservation option is not considered a
 9 reasonable replacement for the OL renewal alternative.

10
 11 **8.2.6 Combination of Alternatives**

12
 13 Even though individual alternatives to Surry Units 1 and 2 might not be sufficient to replace
 14 Surry Units 1 and 2 capacity due to the small size of the resource or lack of cost-effective
 15 opportunities, it is conceivable that a combination of alternatives might be cost-effective.

16
 17 As discussed in Section 8.2, Surry Units 1 and 2 have a combined average net capacity of
 18 1602 MW(e). For the coal and natural gas alternatives, VEPCo assumed three standard
 19 508-MW(e) units as potential replacements for Surry Units 1 and 2 (VEPCo 2001). This
 20 approach is followed in this SEIS, although it results in some environmental impacts that are
 21 roughly 5 percent lower than if full replacement capacity were constructed.

22
 23 There are many possible combinations of alternatives. Table 8-8 contains a summary of the
 24 environmental impacts of an assumed combination of alternatives consisting of 1016 MW(e) of
 25 combined cycle natural-gas-fired generation at Surry Power Station using the existing once-
 26 through cooling system and at an alternate greenfield location using closed-cycle cooling,
 27 293 MW(e) purchased from other generators, and 293 MW(e) gained from additional DSM
 28 measures. The impacts associated with the combined cycle natural-gas-fired units are based
 29 on the gas-fired generation impact assumptions discussed in Section 8.2.2, adjusted for the
 30 reduced generating capacity. While the DSM measures would have few environmental
 31 impacts, operation of the new gas-fired plant would result in increased emissions and
 32 environmental impacts. The environmental impacts associated with power purchased from
 33 other generators would still occur, but would be located elsewhere within the region, nation, or
 34 another country, as discussed in Section 8.2.4. The environmental impacts associated with
 35 purchased power are not shown in Table 8-8. The staff concludes that it is very unlikely that
 36 the environmental impacts of any reasonable combination of generating and conservation
 37 options could be reduced to the level of impacts associated with renewal of the Surry Units 1
 38 and 2 OLs.

Alternatives

Table 8-8. Summary of Environmental Impacts for an Assumed Combination of Generating and Acquisition Alternatives

		Surry Power Station Site		Alternate Greenfield Site	
Impact Category	Impact	Comments	Impact	Comments	
Land Use	MODERATE to LARGE	9 ha (23 ac) for powerblock, offices, roads, and parking areas. Additional impact of up to approximately 1200 ha (3000 ac) for construction of an underground gas pipeline.	MODERATE to LARGE	30 ha (74 ac) for powerblock, offices, roads, and parking areas. Additional impact for construction of an underground natural gas pipeline and a transmission line.	
Ecology	MODERATE to LARGE	Uses undeveloped areas at Surry Power Station site plus land for a new gas pipeline.	MODERATE to LARGE	Impact depends on location and ecology of the site, surface-water body used for intake and discharge, and transmission and pipeline routes; potential habitat loss and fragmentation; reduced productivity and biological diversity impact to terrestrial ecology from cooling tower drift.	
Water Use and Quality	SMALL	Uses existing once-through cooling system	SMALL to MODERATE	Impact depends on volume of water withdrawal and discharge and characteristics of surface-water body. Discharge of cooling tower blowdown will have impacts.	
Air Quality	MODERATE	Sulfur oxides • 81 MT/yr (89 tons/yr) Nitrogen oxides • 306 MT/yr (337 tons/yr) Carbon monoxide • 402 MT/yr (443 tons/yr) PM ₁₀ particulates • 120 MT/yr (132 tons/yr) Some hazardous air pollutants	MODERATE	Same as siting at Surry Power Station	
Waste	SMALL	Small amount of ash produced	SMALL	Same as siting at Surry Power Station	
Human Health	SMALL	Impacts considered to be minor.	SMALL	Impacts considered to be minor.	

Table 8-8. (contd)

Surry Power Station Site			Alternate Greenfield Site	
Impact Category	Impact	Comments	Impact	Comments
Socioeconomics	MODERATE	During construction, impacts would be MODERATE. Up to 1200 additional workers during the peak of the 3-year construction period, followed by reduction from current Surry Units 1 and 2 workforce of 990 to approximately 100; tax base preserved. Impacts during operation would be SMALL.	MODERATE to LARGE	Construction impacts depend on location, but could be significant if location is in a rural area. Surry County would experience loss of tax base and employment with potentially LARGE impacts. Impacts during operation would be SMALL.
		Transportation impacts associated with construction workers would be MODERATE.		Transportation impacts associated with construction workers would be MODERATE.
Aesthetics	MODERATE	MODERATE aesthetic impact due to impact of plant units and stacks on environmentally sensitive Colonial National Historical Park.	SMALL to LARGE	MODERATE impact from plant and stacks. Additional impact could be LARGE if a new transmission line is needed.
Historic and Archeological Resources	SMALL	Any potential impacts can likely be effectively managed.	SMALL	Any potential impacts can likely be effectively managed.
Environmental Justice	MODERATE	Impacts on minority and low-income communities should be similar to those experienced by the population as a whole. Some impacts on housing may occur during construction; loss of approximately 890 operating jobs at Surry Power Station could reduce employment prospects for minority and low-income populations.	MODERATE to LARGE	Impacts vary depending on population distribution and makeup at site. Surry County would lose significant property tax revenue, which could have MODERATE to LARGE impacts on minority and low-income populations.

8.3 Summary of Alternatives Considered

The environmental impacts of the proposed action, renewal of the OLs for Surry Units 1 and 2, are SMALL for all impact categories (except 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). The following alternative actions were considered: no-action alternative (discussed in Section 8.1), new generation alternatives (from coal, natural gas, and nuclear discussed in Sections 8.2.1 through 8.2.3, respectively), purchased electrical power (discussed

Alternatives

1 in Section 8.2.4), alternative technologies (discussed in Section 8.2.5), and the combination of
2 alternatives (discussed in Section 8.2.6).

3
4 The no-action alternative would result in decommissioning Surry Units 1 and 2 and would
5 require replacing electrical generating capacity by (1) demand-side management and energy
6 conservation, (2) power purchased from other electricity providers, (3) generating alternatives
7 other than Surry Units 1 and 2, or (4) some combination of these options. For each of the new
8 generation alternatives (coal, natural gas, and nuclear), the environmental impacts would not be
9 less than the impacts of license renewal. For example, the land-disturbance impacts resulting
10 from construction of any new facility would be greater than the impacts of continued operation
11 of Surry Units 1 and 2. The impacts of purchased electrical power would still occur, but would
12 occur elsewhere. Alternative technologies are not considered feasible at this time, and it is very
13 unlikely that the environmental impacts of any reasonable combination of generation and
14 conservation options could be reduced to the level of impacts associated with renewal of the
15 OLs for Surry Units 1 and 2.

16
17 The staff concludes that the alternative actions, including the no-action alternative, may have
18 environmental effects in at least some impact categories that reach MODERATE or LARGE
19 significance.
20

21 8.4 References

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25
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27 Regulations for Domestic Licensing and Related Functions."

28
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30 Standard Design Certifications; and Combined Licenses for Nuclear Power Plants."

31
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34
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12
13

9.0 Summary and Conclusions

1 By letter dated May 29, 2001, the Virginia Electric and Power Company (VEPCo) submitted an
2 application to the U.S. Nuclear Regulatory Commission (NRC) to renew the operating licenses
3 (OLs) for Surry Power Station, Units 1 and 2, for an additional 20-year period (VEPCo 2001). If
4 the OLs are renewed, State regulatory agencies and VEPCo will ultimately decide whether the
5 plants will continue to operate based on factors such as the need for power or other matters
6 within the State's jurisdiction or the purview of the owners. If the OLs are not renewed, then the
7 plants must be shut down at or before the expiration of the current OLs, which expire on May
8 25, 2012, for Unit 1 and January 29, 2013, for Unit 2.

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

18
19 Upon acceptance of the VEPCo application, the NRC began the environmental review process
20 described in 10 CFR Part 51 for Surry Units 1 and 2 by publishing a notice of intent to prepare
21 an EIS and conduct scoping (66 FR 42897 [NRC 2001]) on August 15, 2001. The staff visited
22 the Surry Power Station in September 2001 and held public scoping meetings on September
23 19, 2001, in Surry County, Virginia. The staff reviewed the VEPCo Environmental Report for
24 Surry Units 1 and 2 (ER; VEPCo 2001) and compared it to the GEIS, consulted with other
25 agencies, and conducted an independent review of the issues following the guidance set forth
26 in NUREG-1555, Supplement 1, the *Standard Review Plans for Environmental Reviews for
27 Nuclear Power Plants, Supplement 1: Operating License Renewal* (NRC 2000). The staff also
28 considered the public comments received during the scoping process for preparation of this
29 draft Supplemental Environmental Impact Statement (SEIS) for Surry Power Station, Units 1
30 and 2. The public comments received during the scoping process that were considered to be
31 within the scope of the environmental review are provided in Appendix A, Part 1, of this SEIS.

32
33 The staff will hold two public meetings in Surry County, Virginia, in May 2002, to describe the
34 preliminary results of the NRC environmental review and to answer questions to provide
35 members of the public with information to assist them in formulating their comments. When the
36 comment period ends, the staff will consider and disposition all of the comments received.

(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.

Summary and Conclusions

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

2
3 This draft SEIS includes the NRC staff's preliminary analysis that considers and weighs the
4 environmental effects of the proposed action, the environmental impacts of alternatives to the
5 proposed action, and mitigation measures available for reducing or avoiding adverse effects. It
6 also includes the staff's preliminary recommendation regarding the proposed action.

7
8 The NRC has adopted the following statement of purpose and need for license renewal from
9 the GEIS:

10
11 The purpose and need for the proposed action (renewal of an operating license) is to
12 provide an option that allows for power generation capability beyond the term of a
13 current nuclear power plant operating license to meet future system generating needs,
14 as such needs may be determined by State, utility, and, where authorized, Federal
15 (other than NRC) decisionmakers.

16
17 The goal of the staff's environmental review, as defined in 10 CFR 51.95(c)(4) and the GEIS, is
18 to determine

19
20 ...whether or not the adverse environmental impacts of license renewal are so great that
21 preserving the option of license renewal for energy planning decisionmakers would be
22 unreasonable.

23
24 Both the statement of purpose and need and the evaluation criterion implicitly acknowledge that
25 there are factors, in addition to license renewal, that will ultimately determine whether an
26 existing nuclear power plant continues to operate beyond the period of the current OL.

27
28 NRC regulations [10 CFR 51.95(c)(2)] contain the following statement regarding the content of
29 SEISs prepared at the license renewal stage:

30
31 The supplemental environmental impact statement for license renewal is not required to
32 include discussion of need for power or the economic costs and economic benefits of
33 the proposed action or of alternatives to the proposed action except insofar as such
34 benefits and costs are either essential for a determination regarding the inclusion of an
35 alternative in the range of alternatives considered or relevant to mitigation. In addition,
36 the supplemental environmental impact statement prepared at the license renewal stage
37 need not discuss other issues not related to the environmental effects of the proposed
38 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 92 environmen-
6 tal issues using the NRC's three-level standard of significance—SMALL, MODERATE, or
7 LARGE—developed using the Council on Environmental Quality guidelines. The following
8 definitions of the three significance levels are set forth in a footnote to Table B-1 of 10 CFR
9 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 destabilize,
15 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 analysis in the GEIS shows the following:

- 21
22 (1) The environmental impacts associated with the issue have been determined to apply either
23 to all plants or, for some issues, to plants having a specific type of cooling system or other
24 specified plant or site characteristic.
- 25
26 (2) A single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the
27 impacts (except for collective offsite radiological impacts from the fuel cycle and from high
28 level waste [HLW] and spent fuel disposal).
- 29
30 (3) Mitigation of adverse impacts associated with the issue has been considered in the analysis,
31 and it has been determined that additional plant-specific mitigation measures are likely not
32 to be sufficiently beneficial to warrant implementation.

33
34 These 69 issues were identified in the GEIS as Category 1 issues. In the absence of new and
35 significant information, the staff relied on conclusions as amplified by supporting information in
36 the GEIS for issues designated Category 1 in Table B-1 of 10 CFR Part 51, Subpart A,
37 Appendix B.

(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."

Summary and Conclusions

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

7
8 This draft SEIS documents the staff's evaluation of all 92 environmental issues considered in
9 the GEIS. The staff considered the environmental impacts associated with alternatives to
10 license renewal and compared the environmental impacts of license renewal and the
11 alternatives. The alternatives to license renewal that were considered include the no-action
12 alternative (not renewing the OLS for Surry Power Station, Units 1 and 2) and alternative
13 methods of power generation. These alternatives were evaluated assuming that the
14 replacement power generation plant is located at either the Surry Power Station site or some
15 other unspecified location.
16

17 **9.1 Environmental Impacts of the Proposed Action—** 18 **License Renewal**

19
20 VEPCo and the staff have established independent processes for identifying and evaluating the
21 significance of any new information on the environmental impacts of license renewal. Neither
22 VEPCo nor the staff has identified information that is both new and significant related to
23 Category 1 issues that would call into question the conclusions in the GEIS. Similarly, neither
24 the scoping process, VEPCo, nor the staff has identified any new issue applicable to Surry
25 Power Station, Units 1 and 2, that has a significant environmental impact. Therefore, the staff
26 relies upon the conclusions of the GEIS for all Category 1 issues that are applicable to Surry
27 Power Station, Units 1 and 2.
28

29 VEPCo's license renewal application presents an analysis of the Category 2 issues that are
30 applicable to Surry Units 1 and 2. The staff has reviewed the VEPCo analysis for each issue
31 and has conducted an independent review of each issue. In addition, the staff has evaluated
32 the two uncategorized issues, environmental justice and chronic effects from electromagnetic
33 fields. Five Category 2 issues are not applicable because they are related to plant design
34 features or site characteristics not found at Surry Power Station. Four Category 2 issues are
35 not discussed in this draft SEIS because they are specifically related to refurbishment. VEPCo
36 (VEPCo 2001) has stated that its evaluation of structures and components, as required by
37 10 CFR 54.21, did not identify any major plant refurbishment activities or modifications as
38 necessary to support the continued operation of Surry Units 1 and 2 for the license renewal
39 period. In addition, any replacement of components or additional inspection activities are within

1 the bounds of normal plant component replacement and, therefore, are not expected to affect
2 the environment outside of the bounds of the plant operations evaluated in the *Final*
3 *Environmental Statement Related to Operation of Surry Power Station Unit 1* (AEC 1972a) and
4 *Final Environmental Statement Related to Operation of Surry Power Station Unit 2* (AEC
5 1972b).

6
7 Twelve Category 2 issues related to operational impacts and postulated accidents during the
8 renewal term, as well as environmental justice and chronic effects of electromagnetic fields, are
9 discussed in detail in this draft SEIS. Five of the Category 2 issues and environmental justice
10 apply to both refurbishment and to operation during the renewal term and are only discussed in
11 this draft SEIS in relation to operation during the renewal term. For all 12 Category 2 issues
12 and environmental justice, the staff concludes that the potential environmental effects are of
13 SMALL significance in the context of the standards set forth in the GEIS. In addition, the staff
14 determined that appropriate Federal health agencies have not reached a consensus on the
15 existence of chronic adverse effects from electromagnetic fields. Therefore, no further
16 evaluation of this issue is required. For severe accident mitigation alternatives (SAMAs), the
17 staff concludes that a reasonable, comprehensive effort was made to identify and evaluate
18 SAMAs. Based on its review of the SAMAs for Surry Power Station, Units 1 and 2, and the
19 plant improvements already made, the staff concludes that none of the candidate SAMAs are
20 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.

38
39 The adverse impacts of continued operation identified are considered to be of SMALL
40 significance, and none warrants implementation of additional mitigation measures. The

Summary and Conclusions

1 adverse impacts of likely alternatives if Surry Power Station, Units 1 and 2, cease operation at
2 or before the expiration of the current OLs will not be smaller than those associated with
3 continued operation of these units, and they may be greater for some impact categories in
4 some locations.

5 6 **9.1.2 Irreversible or Irretrievable Resource Commitments**

7
8 The commitment of resources related to construction and operation of Surry Power Station,
9 Units 1 and 2, during its current license period was made when the plant was built. The
10 resource commitments to be considered in this draft SEIS are associated with continued
11 operation of the plant for an additional 20 years. These resources include materials and
12 equipment required for plant maintenance and operation, the nuclear fuel used by the reactors,
13 and ultimately, permanent offsite storage space for the spent fuel assemblies.

14
15 The most significant resource commitments related to operation during the renewal term are
16 the fuel and the permanent storage space. Surry Power Station, Units 1 and 2, replaces
17 approximately one-third of the fuel assemblies in each of the two units during every refueling
18 outage, which occurs on an 18-month cycle.

19
20 If Surry Power Station, Units 1 and 2, cease operation on or before the expiration of the current
21 OLs, the likely power generation alternatives will require a commitment of resources for
22 construction of the replacement plants as well as for fuel to run the plants.

23 24 **9.1.3 Short-Term Use Versus Long-Term Productivity**

25
26 An initial balance between short-term use and long-term productivity of the environment at the
27 Surry Power Station site was set when the plants were approved and construction began. That
28 balance is now well established. Renewal of the OLs for Surry Power Station, Units 1 and 2,
29 and continued operation of the plants will not alter the existing balance, but may postpone the
30 availability of the site for other uses. Denial of the application to renew the OLs will lead to
31 shutdown of the plants and will alter the balance in a manner that depends on subsequent uses
32 of the site. For example, the environmental consequences of turning the Surry Power Station
33 site into a park or an industrial facility are quite different.

34 35 **9.2 Relative Significance of the Environmental Impacts of** 36 **License Renewal and Alternatives**

37
38 The proposed action is renewal of the OLs for Surry Power Station, Units 1 and 2. Chapter 2
39 describes the site, power plants, and interactions of the plant with the environment. As noted in

1 Chapter 3, no refurbishment and no refurbishment impacts are expected at Surry Power
 2 Station, Units 1 and 2. Chapters 4 through 7 discuss environmental issues associated with
 3 renewal of the OLs. Environmental issues associated with the no-action alternative and
 4 alternatives involving power generation and use reduction are discussed in Chapter 8.

5
 6 The significance of the environmental impacts from the proposed action (approval of the
 7 application for renewal of the OLs), the no-action alternative (denial of the application),
 8 alternatives involving nuclear, coal, or gas generation of power at the Surry Power Station,
 9 Units 1 and 2, an unspecified greenfield site, and a combination of alternatives are compared in
 10 Table 9-1.

11
 12 Table 9-1 shows that the significance of the environmental effects of the proposed action are
 13 SMALL for all impact categories (except for collective offsite radiological impacts from the fuel
 14 cycle and from HLW and spent fuel disposal, for which a single significance level was not
 15 assigned [see Chapter 6]). The alternative actions, including the no-action alternative, may
 16 have environmental effects in at least some impact categories that reach MODERATE or
 17 LARGE significance.

18 19 **9.3 Staff Conclusions and Recommendations**

20
 21 Based on (1) the analysis and findings in the GEIS (NRC 1996; 1999), (2) the ER submitted by
 22 VEPCo (VEPCo 2001), (3) consultation with Federal, State, and local agencies, (4) the staff's
 23 own independent review, and (5) the staff's consideration of public comments received during
 24 the scoping process, the preliminary recommendation of the staff is that the Commission
 25 determine that the adverse environmental impacts of license renewal for Surry Power Station,
 26 Units 1 and 2, are not so great that preserving the option of license renewal for energy planning
 27 decisionmakers would be unreasonable.

28 29 **9.4 References**

30
 31 10 CFR 51. Code of Federal Regulations, *Title 10, Energy*, Part 51, "Environmental Protection
 32 Regulations for Domestic Licensing and Related Regulatory Functions."

33
 34 10 CFR 54. Code of Federal Regulations, *Title 10, Energy*, Part 54, "Requirements for
 35 Renewal of Operating Licenses for Nuclear Power Plants."

36
 37 National Environmental Policy Act of 1969 (NEPA). 42 USC 4321, et seq.

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

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	
			Surry Power Station	Greenfield Site ^(a)	Surry Power Station	Greenfield Site ^(a)	Surry Power Station	Greenfield Site ^(a)	Surry Power Station	Greenfield Site ^(a)
Land Use	SMALL	SMALL	MODERATE	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE	MODERATE	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE
Ecology	SMALL	SMALL	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE	MODERATE	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE
Water Use and Quality	SMALL	SMALL	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL	SMALL to MODERATE
Air Quality	SMALL	SMALL	MODERATE	MODERATE	MODERATE	MODERATE	SMALL	SMALL	MODERATE	MODERATE
Waste	SMALL	SMALL	MODERATE	MODERATE	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
Human Health ^(b)	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
Socio-economics	SMALL	LARGE	SMALL to LARGE	SMALL to LARGE	MODERATE	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE
Aesthetics	SMALL	SMALL	MODERATE to LARGE	MODERATE to LARGE	MODERATE	SMALL to LARGE	SMALL	SMALL to LARGE	MODERATE	SMALL to LARGE
Historic and Archaeological Resources	SMALL	SMALL to MODERATE	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
Environmental Justice	SMALL	MODERATE to LARGE	MODERATE	MODERATE to LARGE	MODERATE	MODERATE to LARGE	SMALL	MODERATE to LARGE	MODERATE	MODERATE 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 HLW and spent-fuel disposal, for which single significance levels were not assigned. See Chapter 6 for details.

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1 U.S. Atomic Energy Commission (AEC). 1972a. *Final Environmental Statement Related to*
2 *Operation of Surry Power Station, Unit 1*. Docket No. 50-250, AEC, Washington, D.C.

3
4 U.S. Atomic Energy Commission (AEC). 1972b. *Final Environmental Statement Related to*
5 *Operation of Surry Power Station, Unit 2*. Docket No. 50-281, AEC, Washington, D.C.

6
7 U.S. Nuclear Regulatory Commission (NRC). 1996. *Generic Environmental Impact Statement*
8 *for License Renewal of Nuclear Plants*. NUREG-1437, Volumes 1 and 2, Washington, D.C.

9
10 U.S. Nuclear Regulatory Commission (NRC). 1999. *Generic Environmental Impact Statement*
11 *for License Renewal of Nuclear Plants: Main Report*, "Section 6.3–Transportation, Table 9.1
12 Summary of findings on NEPA issues for license renewal of nuclear power plants, Final
13 Report." NUREG-1437, Volume 1, Addendum 1, Washington, D.C.

14
15 U.S. Nuclear Regulatory Commission (NRC). 2000. *Standard Review Plans for Environmental*
16 *Reviews for Nuclear Power Plants, Supplement 1: Operating License Renewal*. NUREG-
17 1555, Supplement 1, Washington, D.C.

18
19 U.S. Nuclear Regulatory Commission (NRC). 2001. "Notice of Intent To Prepare an
20 Environmental Impact Statement and Conduct Scoping Process." *Federal Register*. Vol. 66,
21 FR 42897, August 15, 2001. Washington, D.C.

22
23 Virginia Electric and Power Company (VEPCo). 2001. *Application for License Renewal for*
24 *Surry Power Stations, Units 1 and 2, "Appendix E, Environmental Report -Operating License*
25 *Renewal Stage*." Richmond, Virginia.

Appendix A

Discussion of Comments Received on the Environmental Review

Appendix A

Discussion of Comments Received on the Environmental Review

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Part I - Comments Received During Scoping

On August 15, 2001, the U.S. Nuclear Regulatory Commission (NRC) published a Notice of Intent in the Federal Register (66 FR 42897), to notify the public of the staff's intent to prepare a plant-specific supplement to the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS), NUREG-1437, Volumes 1 and 2, to support the renewal application for the Surry Power Station operating licenses and to conduct scoping. The plant-specific supplement to the GEIS has been prepared in accordance with the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) guidelines, and 10 CFR Part 51. As outlined by NEPA, the NRC initiated the scoping process with the issuance of the Federal Register Notice. The NRC invited the applicant; Federal, State, and local government agencies; local organizations; and individuals to participate in the scoping process by providing oral comments at the scheduled public meetings and/or submitting written suggestions and comments no later than October 15, 2001.

The scoping process included two public scoping meetings, which were held at the Surry County Government Center in Surry County, Virginia, on September 19, 2001. Approximately 50 members of the public attended the meetings. Both sessions began with NRC staff members providing a brief overview of the license renewal process and the NEPA process. After the NRC's prepared statements, the meetings were open for public comments. Twenty (20) attendees provided either oral comments or written statements that were recorded and transcribed by a certified court reporter. The meeting transcripts are an attachment to the October 10, 2001, Scoping Meeting Summary.

The NRC received a letter dated November 15, 2001, from Mr. John P. Wolflin of the U.S. Fish and Wildlife Service (FWS) providing comments on the scope of the staff's environmental review. Because these comments arrived well after the scoping process had ended, they were not included in the scoping summary report. However, the staff did consider the comments from FWS in the preparation of this supplemental environmental impact statement (SEIS).

At the conclusion of the scoping period, the NRC staff and its contractors reviewed the transcripts to identify specific comments and issues. Each set of comments from an individual was given a unique identifier (Commenter ID), so that the comments could be traced back to the original transcript containing the comment. Specific comments were numbered sequentially within each comment set. Several commenters submitted more than one set of comments (e.g., they made statements in both the afternoon and evening scoping meetings). In these cases, there is a unique Commenter ID for each set of comments.

Appendix A

1 Table A-1 identifies the individuals who provided comments applicable to the environmental
 2 review and gives the Commenter ID associated with each set of comments. Individuals who
 3 spoke at the scoping meetings are listed in the order in which they spoke at the public meeting.
 4 To maintain consistency with the scoping summary report (Surry Power Station Scoping
 5 Summary Report, dated January 16, 2002), the unique identifier used in that report for each set
 6 of comments is retained in this report.

7
 8 **Table A-1.** Individuals Providing Comments During Scoping Comment Period

9

10	Commenters ID	Commenter	Affiliation (If Stated)	Comment Source
11	SurS-A	Bill Barlow	Virginia House of Delegates	Scoping Meeting
12	SurS-B	Henry Bradby	The Isle of Wight County Board of Supervisors	Scoping Meeting
13	SurS-C	Judy Lyttle	Surry County Board of Supervisors	Scoping Meeting
14	SurS-D	Doug Caskey	Isle of Wight County	Scoping Meeting
15	SurS-E	Tyrone Franklin	Surry County Government	Scoping Meeting
16	SurS-F	Constance Rhodes	Smithfield Isle of Wight	Scoping Meeting
17	SurS-G	Claude Reeson	Surry County Chamber of Commerce	Scoping Meeting
18	SurS-H	Wilton Bobo	Dominion	Scoping Meeting
19	SurS-I	Richard Blount	Dominion	Scoping Meeting
20	SurS-J	Bill Bolin	Dominion	Scoping Meeting
21	SurS-K	Mike Stevens		Scoping Meeting
22	SurS-L	Howard Daniels	Tri-County Interdenominational Ministers Conference	Scoping Meeting
23	SurS-M	Thomas Hardy	Surry County	Scoping Meeting
24	SurS-N	Ralph Anderson	Nuclear Energy Institute	Scoping Meeting
25	SurS-O	Ernest Blount	Surry County Board of Supervisors	Scoping Meeting
26	SurS-P	Terry Lewis	Surry County	Scoping Meeting
27	SurS-Q	Jim Dishner		Scoping Meeting
28	SurS-R	Richard Blount	Dominion	Scoping Meeting
29	SurS-S	Bill Bolin	Dominion	Scoping Meeting
30	SurS-T	Fred Quayle	Virginia Senate	Scoping Meeting
31	SurS-U	James Brown	Dominion	Scoping Meeting
32	SurS-V	Bill Subjack		Scoping Meeting

1 Specific comments were categorized and consolidated by topic. Comments with similar specific
2 objectives were combined to capture the common essential issues raised by the commenters.
3 The comments fall into one of several general groups. These groups include:

- 4
- 5 • Specific comments that address environmental issues within the purview of the
6 NRC environmental regulations related to license renewal. These comments
7 address Category 1 or Category 2 issues or issues that were not addressed in
8 the GEIS. They also address alternatives and related Federal actions.
9
- 10 • General comments (1) in support of, or opposed to, nuclear power or license
11 renewal or (2) on the license renewal process, the NRC's regulations, and the
12 regulatory process. These comments may or may not be specifically related to
13 the Surry Units 1 and 2 license renewal application.
14
- 15 • Questions that do not provide new information.
16
- 17 • Specific comments that address issues that do not fall within, or are specifically
18 excluded from, the purview of NRC environmental regulations. These comments
19 typically address issues such as the need for power, emergency preparedness,
20 current operational safety issues, and safety issues related to operation during
21 the renewal period.
22

23 Each comment applicable to this environmental review is summarized in this section. This
24 information, which was extracted from the Surry Power Station Scoping Summary Report, is
25 provided for the convenience of those interested in the scoping comments applicable to this
26 environmental review. The comments that are general or outside the scope of the
27 environmental review for Surry Units 1 and 2 are not included here. More detail regarding the
28 disposition of general or nonapplicable comments can be found in the Summary Report. The
29 ADAMS accession number for the Summary Report is ML020160586.
30

31 This accession number is provided to facilitate access to the document through the Public
32 Electronic Reading Room (ADAMS), <http://www.nrc.gov/reading-rm.html>.
33

34 The following pages summarize the comments and suggestions received as part of the scoping
35 process that are applicable to this environmental review, and discuss the disposition of the
36 comments and suggestions. The parenthetical alpha-numeric identifier after each comment
37 refers to the comment set (Commenter ID) and the comment number.
38

Appendix A

1 Comments in this section are grouped in the following categories:

- 2
- 3 1. Category 1 Socioeconomic Issues
- 4 2. Category 1 Decommissioning Issues
- 5 3. Category 2 Aquatic Ecology Issues
- 6 4. Category 2 Threatened and Endangered Species Issues
- 7 5. Category 2 Socioeconomic Issues
- 8 6. Category 2 Historical and Archaeological Resource Issues

9

10 **1. Comments Concerning Category 1 Socioeconomic Issues**

11 As stated in 10 CFR Part 51, Table B-1, Category 1 socioeconomic issues include:

- 12
- 13
- 14 • Public services: public safety, social services, and tourism and recreation
- 15 • Public services, education (license renewal term)
- 16 • Aesthetics impacts (refurbishment)
- 17 • Aesthetics impacts (license renewal term)
- 18 • Aesthetics impacts of transmission lines (license renewal term)

19

20 **Comment:** Dominion Power has proven to be a great corporate citizen and steward for the
21 environment. (SurS-E-2)

22

23 **Comment:** Dominion's commitment in Isle of Wight, in particular, has been demonstrated in a
24 big way through the United Way effort. (SurS-F-5)

25

26 **Comment:** Dominion assisted in 12 nonprofit agencies in Isle of Wight on a yearly basis,
27 enabling us to meet the needs of those less fortunate in our community. (SurS-F-6)

28

29 **Comment:** As well when a recent devastating hurricane hit southeastern Virginia, the Surry
30 employees joined forces with other Dominion employees, to provide canned foods and
31 household items for those who suffered the loss of homes and property. (SurS-F-7)

32

33 **Comment:** We (Surry) have strived to be a good corporate citizen. (SurS-I-13)

34

35 **Comment:** The employees have volunteered their time to build an amphitheater over at
36 Chippokes, to paint some buildings over there. (SurS-K-3)

37

38 **Comment:** We view the power station as a great corporate neighbor to the county. (SurS-Q-2)

39

1 **Comment:** Our volunteer programs and participation is key to Dominion's corporate
2 philosophy. And we continue this commitment to our communities in the future. (SurS-R-12)
3

4 **Response:** *The comments are noted. The comments are supportive of license renewal at*
5 *Surry Power Station, Units 1 and 2. Public services were evaluated in the GEIS and*
6 *determined to be a Category 1 issue. Information regarding the impact on social services is*
7 *discussed in Chapter 4 of the SEIS.*
8

9 **Comment:** The Surry plant has provided for a great number of educational purposes.
10 (SurS-C-2)
11

12 **Comment:** Revenues from Surry have helped the county to do many things to improve itself.
13 For instance we have probably one of the better education systems in the state of Virginia.
14 (SurS-P-3)
15

16 **Response:** *The comments are noted. The comments are supportive of license renewal at*
17 *Surry Power Station, Units 1 and 2. Public services were evaluated in the GEIS and*
18 *determined to be a Category 1 issue. Information regarding the impact on education is*
19 *discussed in Chapter 4 of the SEIS.*
20

21 **Comment:** The containment structures for Surry were constructed below grade so as to
22 reduce the visual impact to the historic James Town and Colonial Williamsburg sites.
23 (SurS-J-2)
24

25 **Comment:** Another example of the design feature was the fact that the containment structures
26 were constructed below grade so as to reduce the visual impact to the historic James Town and
27 Colonial Williamsburg. (SurS-S-1)
28

29 **Response:** *The comments are noted. The comments are supportive of license renewal at*
30 *Surry Power Station, Units 1 and 2. Aesthetic impacts were evaluated in the GEIS and*
31 *determined to be a Category 1 issue. Information regarding the impact of Surry Power Station*
32 *structures on the natural landscape and scenic vistas is discussed in Chapter 4 of the SEIS.*
33

34 **2. Comments Concerning Category 1 Decommissioning Issues**

35
36 As stated in 10 CFR Part 51, Table B-1, Category 1 decommissioning issues include:
37

- 38 • Radiation doses
- 39 • Waste management
- 40 • Air quality

Appendix A

- 1 • Water quality
- 2 • Ecological resources
- 3 • Socioeconomic impacts

4
5 **Comment:** If we close down that facility we recognize the fact that we would have to put into
6 place all types of security just to make certain that what remains in the county, the residue in
7 terms of radioactive material, would have to be guarded. (SurS-P-11)

8
9 **Comment:** Losing Surry in terms of being a tax asset to the county, but also we pick up the
10 liability in terms of having to provide the services that would be necessary to keep Surry county
11 secure in the event that the plant itself is closed. (SurS-P-12)

12
13 **Response:** *The comments are noted; however, the statements are not accurate. Once the*
14 *plant is permanently shut down, it will be decommissioned and the license will be terminated.*
15 *To date, all nuclear power plants that have been decommissioned and have had their license*
16 *terminated have had unrestricted access, which allows the site to be used for other activities*
17 *and does not require any additional security or monitoring. If fuel is maintained onsite in an*
18 *Independent Spent Fuel Storage Installation (ISFSI), a license for the ISFSI will be maintained*
19 *and any required security and monitoring would be provided by the licensee. Decommissioning*
20 *issues are Category 1 issues as evaluated in the GEIS. The comments provide no new*
21 *information; therefore, the comments will not be evaluated further.*

22
23 **3. Comments Concerning Category 2 Aquatic Ecology Issues**

24
25 As stated in 10 CFR Part 51, Table B-1, Category 2 aquatic ecology issues are:

- 26 • Entrainment of fish and shellfish in early life stages
- 27 • Impingement of fish and shellfish
- 28 • Heat shock

29
30
31 **Comment:** We designed Surry Power Station such that the water that is released from the
32 power station goes around Hog Island such to protect the oyster beds. (SurS-I-9)

33
34 **Comment:** We designed a structure, which takes in, as water comes in, removes fish from the
35 water, protects them, and puts them back. (SurS-I-10)

36
37 **Comment:** The discharge for the Surry station was placed upstream to prevent, or to protect
38 the oyster beds downstream. (SurS-J-1)

1 **Comment:** Surry has state-of-the-art withdraw screens, which are at the intake structure to
2 protect fish. (SurS-J-4)

3
4 **Comment:** In the mid to late '70s we conducted a study that led to the impacts of this waste
5 heat on the bottom of the James River. Basically we found no long-term deleterious effects.
6 And the Virginia State Water Control Board, which is now called the Department of
7 Environmental Quality, agreed with our findings. (SurS-J-8)

8
9 **Comment:** Water withdrawal issues were looked at, also. Water withdrawal represents the
10 water that I mentioned earlier, that is used for cooling. The Virginia Institute of Marine Sciences
11 studied the water withdrawal issue, and again demonstrated no long-term deleterious effects on
12 the James River ecosystem. And, again, the water board, now VEQ, concurred with our
13 findings. (SurS-J-9)

14
15 **Comment:** Our waterways, our water streams, Surry has safety in mind, you know, with our
16 fish and wildlife, even at the intake. And they have designed a special fish separating system
17 intake screen that separates, and where it goes into the James River as well. (SurS-O-8)

18
19 **Comment:** We designed Surry Power Station such that when the water that is released from
20 the power station, that it does not impact the oyster beds. The station was turned such that
21 water goes out, and by the time it gets to the oyster beds it is all cooled down again.
22 (SurS-R-8)

23
24 **Comment:** Surry has developed the structure such that when fish are coming in, the structure
25 picks up the fish, and puts them back into the river without being harmed. (SurS-R-9)

26
27 **Comment:** In the mid to late '70s Surry conducted a study that looked at the impacts of this
28 waste heat on the biology of the James River. Basically we found no long-term deleterious
29 effects. The Virginia State Water Control Board, which is now called the Department of
30 Environmental Quality, agreed with our findings. (SurS-S-6)

31
32 **Comment:** Water withdrawal issues were looked at, also. Water withdrawal represents the
33 water that I mentioned earlier, that is used for cooling. The Virginia Institute of Marine Sciences
34 studied the water withdrawal issue, and again they demonstrated no long-term deleterious
35 effects on the James River ecosystem, which the water board agreed with, also. (SurS-S-7)

36
37 **Response:** *The comments are noted. The comments relate to aquatic ecology and are*
38 *supportive of license renewal at Surry Power Station, Units 1 and 2. Aquatic ecology is*
39 *addressed in Chapter 4 of the SEIS.*

40

1 **4. Comments Concerning Category 2 Threatened and Endangered Species Issues**

2
3 As stated in 10 CFR Part 51, Table B-1, Category 2 threatened and endangered species issues
4 are:

- 5
6 • Threatened or endangered species.
7

8 **Comment:** Surry looked at such issues as waste heat, water withdrawal, and threatening of
9 endangered species. (SurS-J-7)

10
11 **Comment:** Our research showed no impact to any threatened and endangered species as a
12 result of operation of Surry and its associated transmission lines. In fact one of the most long-
13 lived and successful bald eagle nest in Chesapeake bay population is located on Surry Power
14 Station property. (SurS-J-10)

15
16 **Comment:** Some of the issues that we (Surry) looked at, at Surry, include such things as
17 waste heat, water withdrawal, and threatened and endangered species. (SurS-S-5)

18
19 **Comment:** The evaluation of threatened and endangered species was a little different, in that
20 we had to go to state and federal agencies to investigate possible impacts on listed species,
21 since species are continually being listed. The research showed no impact to any threatened
22 and/or endangered species as a result of the operation of the station, and its associated
23 transmission lines. In fact one of the most long-lived and successful bald eagle nest in
24 Chesapeake bay population is located on the station property. (SurS-S-9)

25
26 **Response:** *The comments are noted. The comments acknowledge the importance of the*
27 *manner in which Surry Power Station operates the site to the benefit of threatened and*
28 *endangered species. This issue is addressed in Chapter 4 of the SEIS.*
29

30 **5. Comments Concerning Category 2 Socioeconomic Issues**

31
32 As stated in 10 CFR Part 51, Table B-1, Category 2 socioeconomic issues are:

- 33
34 • Housing
35 • Public services, public utilities
36 • Public services, education (refurbishment)
37 • Offsite land use (refurbishment)
38 • Offsite land use (license renewal term)
39 • Public services, transportation
40

1 **Comment:** Surry provides a tremendous employment base. (SurS-D-8)

2
3 **Comment:** Surry has also been a model corporate citizen, and have helped many
4 organizations in the county, plus provided jobs and an enormous tax base. (SurS-G-2)

5
6 **Comment:** License Renewal will assure that the local economy will continue to reap the
7 benefits of the large number of employees at Surry Power Station. (SurS-I-2)

8
9 **Comment:** Since 1966 130 million dollars has gone to Surry County. (SurS-I-3)

10
11 **Comment:** With regard to socioeconomic issues, we found contribution to the local
12 infrastructure. (SurS-J-11)

13
14 **Comment:** Surry provided 10.3 million dollars in taxes last year for a county of 6,000 people.
15 (SurS-K-1)

16
17 **Comment:** From a business point of view, I have a restaurant, a small inn. Surry helps us to
18 keep our employee level high through the year. (SurS-K-2)

19
20 **Comment:** We are impressed and proud of the fact that we receive a tax base here. And we
21 are, more so, pleased with the fact that you employ some of our citizens. (SurS-L-3)

22
23 **Comment:** Surry has a profound effect on your tax base. (SurS-N-4)

24
25 **Comment:** Surry Power Station provides significant tax revenue for Surry County.
26 (SurS-O-10)

27
28 **Comment:** Surry employment provides employment for 900 to 1,000 people at the power
29 station, which contributes to the local economics here in the community, and surrounding areas
30 throughout Virginia. (SurS-O-11)

31
32 **Comment:** Surry Power Station has been of great benefit to the county, in terms of the tax
33 revenues that are generated by the plant for Surry. (SurS-P-2)

34
35 **Comment:** Revenues from Surry have helped the county to do many things to improve itself.
36 For instance we have probably one of the better education systems in the state of Virginia.
37 (SurS-P-3)

38
39 **Comment:** Surry Power Station allows Surry County to be a net producer of jobs. (SurS-P-5)

40

Appendix A

1 **Comment:** The jobs that are available at Surry Power Station are high end, high paying jobs,
2 highly skilled, highly technical people are employed in those jobs. (SurS-P-6)

3
4 **Comment:** Surry will also ensure that our local economy will continue to reap the benefits of a
5 large employer in the area. (SurS-R-2)

6
7 **Comment:** Surry County will continue to receive the tax revenue from the station operation.
8 (SurS-R-3)

9
10 **Comment:** Surry Power Station will continue to have jobs well into this century. (SurS-R-4)

11
12 **Comment:** With regard to socioeconomic issues, we (Surry) found positive contribution to the
13 local infrastructure, much of which you've heard about tonight. (SurS-S-10)

14
15 **Comment:** For the time that, since 1966, the Surry Power Station has pumped 130 million
16 dollars into the economy of this county. It has provided jobs for 850 people, many of whom live
17 in this county. (SurS-T-2)

18
19 **Comment:** Without Dominion Power we won't get no businesses. We use that to show that
20 we have a low tax base, and we use that to show that we have power to give you. (SurS-U-3)

21
22 **Response:** *The comments are noted. The comments support license renewal at Surry Power*
23 *Station, Units 1 and 2. Socioeconomic issues specific to the plant are Category 2 issues and*
24 *are addressed in Chapter 4 of the SEIS.*

25 26 **6. Comments Concerning Category 2 Historical and Archaeological Resource Issues**

27
28 **Comment:** Because there would be no new construction activity at Surry, we are going to
29 continue to use the same facilities, the continued operation of the station means that there will
30 be, the impacts to the cultural resource will also be negligible. (SurS-J-12)

31
32 **Comment:** There will be no new construction activity at Surry of a major consequence, so
33 therefore the cultural resource impacts would be negligible. (SurS-S-11)

34
35 **Response:** *The comments are noted. The comments are supportive of license renewal at*
36 *Surry Power Station, Units 1 and 2. Historical and archaeological resources are addressed as*
37 *Category 2 issues. Potential impacts to historical and archaeological resources are addressed*
38 *in Chapter 4 of the SEIS.*

1 **Part II - Comments Received on the Draft SEIS**
2
3 (Reserved for comments received on the draft SEIS.)
4

Appendix B

Contributors to the Supplement

Appendix B

Contributors to the Supplement

1 The overall responsibility for the preparation of this supplement was assigned to the Office of
2 Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission (NRC). The statement was
3 prepared by members of the Office of Nuclear Reactor Regulation with assistance from other
4 NRC organizations and the Pacific Northwest National Laboratory, Lawrence Livermore
5 National Laboratory, and Los Alamos National Laboratory.
6

Name	Affiliation	Function or Expertise
NUCLEAR REGULATORY COMMISSION		
Andrew Kugler	Nuclear Reactor Regulation	Project Manager
John Tappert	Nuclear Reactor Regulation	Section Chief
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Barry Zalzman	Nuclear Reactor Regulation	Technical Monitor
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Michael Masnik	Nuclear Reactor Regulation	Aquatic Ecology
Robert Schaaf	Nuclear Reactor Regulation	Project Management
Robert Palla	Nuclear Reactor Regulation	Severe Accident Mitigation Alternatives
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Michael J. Scott		Socioeconomics
James R. Weber		Technical Editor
Trina Russell, Colleen Warnecke		Document Design

Appendix B

	Name	Affiliation	Function or Expertise
1	Lawrence Livermore National Laboratory^(b)		
2	Charles Hall	Socioeconomics	
3	Los Alamos National Laboratory^(c)		
4	W. Bruce Masse	Cultural Resources	
5	Energy Research, Inc.		
6	Mohsen Khatib-Rahbar	Severe Accident Mitigation Alternatives	
7	Michael Zavisca	Severe Accident Mitigation Alternatives	
8	Information Systems Laboratory		
9	Kim Green	Severe Accident Mitigation Alternatives	
10	Jim Meyer	Severe Accident Mitigation Alternatives	
11	(a) Pacific Northwest National Laboratory is operated for the U.S. Department of Energy by Battelle Memorial		
12	Institute.		
13	(b) Lawrence Livermore National Laboratory is operated for the U.S. Department of Energy by the University of		
14	California.		
15	(c) Los Alamos National Laboratory is operated for the U.S. Department of Energy by the University of		
16	California.		
17			
18			

Appendix C

Chronology of NRC Staff Environmental Review Correspondence Related to Virginia Electric and Power Company's Application for License Renewal of Surry Power Station, Units 1 and 2

Appendix C

Chronology of NRC Staff Environmental Review Correspondence Related to Virginia Electric and Power Company's Application for License Renewal of Surry Power Station, Units 1 and 2

1 This appendix contains a chronological listing of correspondence between the U.S. Nuclear
2 Regulatory Commission (NRC) and the Virginia Electric and Power Company (VEPCo) and
3 other correspondence related to the NRC staff's environmental review, under 10 CFR Part 51,
4 of VEPCo's application for renewal for the Surry Power Station, Units 1 and 2, operating
5 licenses. All documents, with the exception of those containing proprietary information, have
6 been placed in the Commission's Public Document Room, at One White Flint North, 11555
7 Rockville Pike (first floor), Rockville, Maryland, and are available electronically from the Public
8 Electronic Reading Room found on the Internet at the following web address:
9 <http://www.nrc.gov/reading-rm.html>. From this site, the public can gain access to the NRC's
10 Agencywide Document Access and Management System (ADAMS), which provides text and
11 image files of NRC's public documents in the Publicly Available Records (PARS) component of
12 ADAMS. The ADAMS accession numbers for each document are included below.

13
14 May 16, 2001 Letter from NRC to Mr. Alan Zoellner, Swern Library, concerning the
15 maintenance of reference material for the Surry license renewal
16 application (Accession No. ML011360033)
17
18 May 29, 2001 Letter from Mr. David A. Christian, Virginia Electric Power Company
19 (VEPCo) to the NRC, submitting the application for the renewal of the
20 operating licenses for the Surry and North Anna Power Stations,
21 Units 1 and 2 (Accession No. ML011500502)
22
23 August 8, 2001 Letter from NRC to Mr. David A. Christian, VEPCo, forwarding the Notice
24 of Intent to prepare an environmental impact statement and conduct
25 scoping process for license renewal for Surry Power Station, Units 1 and 2
26 (Accession No. ML012130132)
27
28 August 21, 2001 Notice of September 19, 2001, public meeting to discuss environmental
29 scoping process for the Surry Power Station, Units 1 and 2, license
30 renewal application (Accession No. ML012330263)
31
32 August 22, 2001 Letter from NRC to Ms. Reeva Tilley, Chairman, Virginia Council on
33 Indians, inviting scoping comments (Accession No. ML012360236)

Appendix C

1	October 10, 2001	Summary of September 19, 2001, public scoping meetings for the Surry Power Station, Units 1 and 2, license renewal application (Accession No. ML012830412)
2		
3		
4		
5	October 17, 2001	NRC letter to Mr. David A. Christian, VEPCo, "Request for Additional Information Related to the Staff's Review of Severe Accident Mitigation Alternatives for the Surry and North Anna Power Stations, Units 1 and 2" (Accession No. ML012910292)
6		
7		
8		
9		
10	November 15, 2001	Letter to NRC from John P. Wolflin, U.S. Fish and Wildlife Service, providing scoping comments on Surry Power Station license renewal (Accession No. ML013460237)
11		
12		
13		
14	December 10, 2001	Letter from Mr. David A. Christian, VEPCo, to NRC, responding to the October 17, 2001, request for additional information related to the staff's review of severe accident mitigation alternatives for the Surry and North Anna Power Stations, Units 1 and 2 license renewal (Accession No. ML013520484)
15		
16		
17		
18		
19		
20	December 26, 2001	Memo to file, socioeconomic and aquatic information provided by VEPCo (Accession No. MLO13610514)
21		
22		
23	January 3, 2002	NRC letter to Ms. Cara H. Metz, Virginia Department of Historic Resources, concerning the potential for license renewal at the Surry and North Anna Power Stations to affect historic resources (Accession No. ML020070569)
24		
25		
26		
27		
28	January 16, 2002	NRC letter to Mr. David A. Christian, VEPCo, "Issuance of Environmental Scoping Summary Report Associated with the Staff's Review of the Application by Dominion for Renewal of the Operating Licences for Surry Power Station, Units 1 and 2" (Accession No. ML020160586)
29		
30		
31		
32		
33	January 17, 2002	NRC note to file, information provided by VEPCo during the NRC site audits in relation to the license renewal applications for the Surry and North Anna Power Stations, Units 1 and 2 (Accession No. ML020180119)
34		
35		
36		
37	January 23, 2002	NRC note to file, information provided by VEPCo in relation to severe accident mitigation alternatives in its license renewal application for the Surry Power Station, Units 1 and 2 (Accession No. ML020250545)
38		
39		
40		

Appendix D

Organizations Contacted

Appendix D

Organizations Contacted

1 During the course of the staff's independent review of environmental impacts from operations
2 during the renewal term, the following Federal, State, regional, and local agencies were
3 contacted:

4
5 U.S. Fish and Wildlife Service, Annapolis, Maryland

6
7 Virginia Department of Historic Resources, Portsmouth, Virginia

8
9 Virginia Department of Environmental Quality

10
11 Virginia State Historic Preservation Office

12
13 Virginia Department of Transportation, Resident Engineer

14
15 Virginia Department of Taxation

16
17 Virginia Employment Commission

18
19 Groundwater Hydrologist, Virginia Department of Environmental Quality

20
21 County Administrator, Surry County

22
23 Community Development Director, Surry County Department of Planning, Surry, Virginia

24
25 Director, Social Services, Surry County

26
27 Planning Director, Surry County

28
29 Agricultural Extension, Surry County

30
31 Associate Superintendent, Surry County School District

32
33 Director, Surry County Parks and Recreation Department

34
35 Commissioner of Revenue, Surry County

36
37 Hope Alternatives (private social service agency in Surry County)

38
39 Isle of Wight Social Services Director

Appendix D

- 1 Superintendent, School District, Isle of Wight
- 2
- 3 Director, Public Utilities Department, Isle of Wight
- 4
- 5 Director, Isle of Wight Parks and Recreation
- 6
- 7 Director, Economic Development, Isle of Wight
- 8
- 9 Director, Smithfield and Isle of Wight Convention and Tourist Bureau
- 10
- 11 Town Manager, Town of Smithfield
- 12
- 13 Deputy Director, Hampton Roads Planning District Commission
- 14
- 15 Director, James City County Social Services
- 16
- 17 Director, James City Service Authority (Water Service)
- 18
- 19 Director, James City County Economic Development Department
- 20
- 21 Director, Newport News Waterworks
- 22

Appendix E

Virginia Electric and Power Company's Compliance Status and Consultation Correspondence

Appendix E

Virginia Electric and Power Company's Compliance Status and Consultation Correspondence

1 The list of licenses, permits, consultations, and other approvals obtained from Federal, State,
2 regional, and local authorities for Surry Units 1 and 2 are shown in Table E-1. Following
3 Table E-1 are reproductions of correspondence prepared and sent during the evaluation
4 process for the application for renewal of the operating licenses for Surry Units 1 and 2.
5
6
7

Table E-1. Federal, State, Local, and Regional Licenses, Permits, Consultations, and Other Approvals for Surry Power Station, Units 1 and 2

Agency	Authority	Description	Number	Issue Date	Expiration Date	Remarks
NRC	10 CFR Part 50	Operating license, Surry Unit 1	DPR-32	05/26/72	05/25/12	Authorizes operation of Unit 1
NRC	10 CFR Part 50	Operating license, Surry Unit 2	DPR-37	01/30/73	01/29/13	Authorizes operation of Unit 2
FWS	Migratory Bird Treaty Act (16 USC 703-712)	Permit	MB705136-0	01/01/01	12/31/01	The permit authorizes removal of up to 15 osprey nests causing safety hazards.
FWS	Section 7 of the Endangered Species Act (16 USC 1536)	Consultation	NA	Letter from NRC to FWS 01/24/02	NA	Requires a Federal agency to consult with FWS regarding whether a proposed action will affect endangered or threatened species. FWS determined that the renewal of the Surry OLs may affect the bald eagle.
NMFS	Section 7 of the Endangered Species Act (16 USC 1536)	Consultation	Letter 1514-05(A) from NMFS to VEPCo, 03/23/01	NA	NA	NMFS determined that renewal of the Surry OLs is not likely to affect species protected by the Endangered Species Act and under the purview of NMFS
U.S. Army Corps of Engineers	Section 404 of the Clean Water Act (33 USC 1344)	Authorization to use regional permit for discharge of dredged or fill material	97-RP-19, Project 99-V1336	08/27/99	08/12/03	Permit covers periodic dredging to maintain the intake channel in the James River

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E-2

April 2002

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Table E-1. (contd)

April 2002

E-3

Draft NUREG-1437, Supplement 6

Agency	Authority	Description	Number	Issue Date	Expiration Date	Remarks
DOT Research and Special Programs Administration	49 CFR Part 107, Subpart G	Registration	0531000020241	05/25/01	06/30/02	Registration covers hazardous materials shipments
VMRC	COV Title 28.2, Chapters 12 and 13	Permit	VMRC 92-1347	08/02/99	12/31/02	Maintenance dredging of the intake channel in the James River
VDHR	Section 106 of the National Historic Preservation Act (16 USC 470f)	Consultation	NA	Letter from NRC to VDHR 01/03/02	NA	The National Historic Preservation Act requires Federal agencies to take into account the effect of any undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places.
VDEQ	Section 307(c)(3)(A) of the Coastal Zone Management Act (16 USC 1456[c][3][A])	Consistency determination with the Virginia Coastal Management Program	NA	Letter from VDEQ to VEPCo (02/20/02)	NA	Certification that the Surry Power Station complies with the Virginia Coastal Program
VDEQ	9 VAC 25-610-40	Permit	GW0003900	08/01/99	08/01/09	Permit for withdrawal of groundwater for use as potable, process, and cooling water
VDEQ	33 USC 1342	Virginia pollutant discharge elimination system (NPDES) permit	VA0004090	11/02/01	11/01/06	The NPDES permit covers plant and stormwater discharges

Table E-1. (contd)

Agency	Authority	Description	Number	Issue Date	Expiration Date	Remarks
VDEQ	9 VAC 5-80-10	Air operating permit				An application for an air operating permit was submitted to VDEQ on 01/12/98 and revised on 04/07/98. Issuance of the permit is pending.
VDEQ	9 VAC 5-20-160	Registration	50336	NA	NA	Annual recertification of air emission sources
VDEQ	9 VAC 5-80-10	Permit		09/27/93	None	Air pollution permit covering installation and operation of the emergency blackout generator
Virginia Department of Health, Bureau of Water Supply Engineering	Waterworks regulations, section 3.14	Permit	3181800	03/07/78	None	Permit authorizes operation of a noncommunity waterworks

- CFR = Code of Federal Regulations
- COV = Code of Virginia
- DOT = U.S. Department of Transportation
- EPA = U.S. Environmental Protection Agency
- FWS = U.S. Fish and Wildlife Service
- NMFS = National Marine Fisheries Service
- NRC = U.S. Nuclear Regulatory Commission
- USC = United States Code
- VAC = Virginia Administrative Code
- VDEQ = Virginia Department of Environmental Quality
- VDHR = Virginia Division of Historic Resources
- VEPCo = Virginia Electric and Power Company
- VMRC = Virginia Marine Resources Commission

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E-4

Appendix E

April 2002

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January 3, 2002

Ms. Cara H. Metz, Director
Division of Resource Services and Review
Virginia Department of Historic Resources
2801 Kensington Avenue
Richmond, VA 23221

Dear Ms. Metz:

This letter responds to issues raised in your letter dated February 13, 2001, to Mr. William Corbin of Virginia Electric and Power Company (VEPCo), regarding the license renewal Environmental Reports for the Surry and North Anna Power Stations. Our response has benefitted from productive discussions between representatives of my staff and Dr. Ethel Eaton of your staff, including a meeting held at the Virginia Department of Historic Resources on September 21, 2001, for Surry.

In response to your original letter, VEPCo authorized cultural resource assessments of the Surry and North Anna sites. These assessments were conducted by the Louis Berger Group, Inc., and the completed reports were delivered to VEPCo in March 2001, with an addendum to the North Anna report delivered in October 2001. A copy of the Surry report was provided to the U.S. Nuclear Regulatory Commission (NRC) during our recent visit to the site in September 2001. Also during this September visit, Dr. Eaton and our consulting archaeologist, Dr. W. Bruce Masse of Los Alamos National Laboratory, had the opportunity to tour the grounds of the Surry Power Plant. Dr. Masse later reviewed the assessment report and pertinent archival records on file at the Virginia Department of Historic Resources. We received a copy of the North Anna report and its addendum following our visit to that site in October 2001.

The NRC is acutely aware of the richness of the history in and around Gravel Neck Peninsula, and the lower James River in general. We are also aware of the potential for significant intact historic and archaeological resources to be present in the undeveloped portions of the Surry and North Anna Power Stations. We have discussed this topic at considerable length with the station managers and with other appropriate representatives from VEPCo, and are confident they share our concern for these cultural resources. Station procedures provide for the protection of cultural resources during future site activities.

Dr. Eaton, our reviewers, and the cultural resources assessment reports are in agreement that there is little likelihood that intact cultural resources exist in the presently developed portions of the Surry and North Anna Power Stations.

Because there are current operating procedures that take into account the inadvertent discovery of historic and archaeological remains at both stations, and because the license renewal is not expected to result in major refurbishment nor the need to expand operations into the currently undeveloped portions of the stations, we believe that license renewal is unlikely to

Appendix E

1

C. Metz

- 2 -

affect cultural resources. We therefore also consider it unnecessary at this time to enter into a programmatic agreement pursuant to the license renewal. However, should conditions specific to either of the stations change, or should the NRC license renewal process change in general, we would be prepared to reconsider this decision.

Please let us know if you have any other questions or concerns about the license renewal process. We will send you copies of the completed draft Supplemental Environmental Impact Statements for both the Surry and North Anna Power Stations as soon as they become available for review. Also, if you do not yet have a copy of the Berger Group cultural resource assessment reports for the two stations and wish to obtain copies for your files, we would be happy to provide you with copies.

Sincerely,
Original Signed By: CIGrimes
Christopher I. Grimes, Program Director
License Renewal and Environmental Impacts
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket Nos. 50-280, 50-281, 50-338, and 50-339

Enclosure: As stated

cc w/end: see next page

DISTRIBUTION
Environmental r/f
DMatthews/FGillespie
JTappert
AKugler
RPrato
CGrimes
OGC
EHickey (PNNL)

Accession no.: ML020070569

*See previous concurrence

Document Name:G:\Rgeb\North Anna-Surry\Common Items\Historic Preservation\NRC Itr to VDHR.wpd

OFFICE	PM:RGEB	SC:RGEB	C:RGEB	PD:RLEP	OGC (NLO)
NAME	AKugler*	BZalcman*	CCarpenter*	CGrimes*	RWeisman*
DATE	12/13/01	12/13/01	12/14/01	01/04/02	01/03/02

OFFICIAL FILE COPY

1

January 24, 2002

Ms. Karen Mayne, Supervisor
Virginia Field Office
U.S. Fish and Wildlife Service
6669 Short Lane
Gloucester, Virginia 23061

SUBJECT: REQUEST FOR LIST OF PROTECTED SPECIES WITHIN THE AREA UNDER
EVALUATION FOR THE SURRY AND NORTH ANNA POWER STATIONS
LICENSE RENEWAL

Dear Ms. Mayne:

The Nuclear Regulatory Commission (NRC) is evaluating an application submitted by Virginia Electric and Power Company for the renewal of the operating licenses for its Surry and North Anna Power Stations, Units 1 and 2. The NRC is preparing station-specific supplements to its "Generic Environmental Impact Statement for License Renewal of Nuclear Plants" (NUREG-1437) for this proposed license renewal, for which we are required to evaluate potential impacts to threatened and endangered species.

The proposed action would include use and continued maintenance of existing facilities and transmission lines and would not result in new construction or disturbance. The Surry Power Station is located on the James River in Surry County, Virginia. The transmission line corridors for this station pass through portions of Surry, Isle of Wight, Prince George, and Charles City counties, and the corporate limits of the cities of Suffolk, Chesapeake, Newport News, and Hopewell, Virginia. In total, the corridors include about 5000 acres (170 miles in length).

The North Anna Power Station is located on the south side of Lake Anna in Louisa County, Virginia. The transmission line corridors for this station pass through portions of Louisa, Hanover, Goochland, Powhatan, Henrico, Chesterfield, Spotsylvania, Caroline, Orange, Culpeper, and Fauquier counties, Virginia. In total, the corridors include about 2900 acres (120 miles in length). In addition, Lake Anna, which is fed by the North Anna River and impounded by the North Anna Dam, is used as part of the cooling system for North Anna Power Station. Therefore, the lake and the Lower North Anna River are considered part of the aquatic environment of interest.

To support the environmental impact statement preparation process and to ensure compliance with Section 7 of the Endangered Species Act, the NRC requests a list of species and information on threatened, endangered, proposed, and candidate species and critical habitat that may be in the vicinity of the Surry and North Anna Power Stations and their associated transmission lines. We have enclosed figures showing the location of the stations and their associated transmission lines.

Also, we would like confirmation that the Chesapeake Bay Field Office will serve as the U.S. Fish and Wildlife Service's point of contact for Endangered Species Act compliance, including any Section 7 consultation that may be needed, for the Surry and North Anna Power Stations.

Appendix E

1

K. Mayne

- 2 -

If you have any comments or questions, please contact Andrew J. Kugler, Senior Project Manager, at (301) 415-2828.

Sincerely,
CIGrimes
Christopher I. Grimes, Program Director
License Renewal and Environmental Impacts
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Docket Nos. 50-280, 50-281, 50-338 and 50-339

Enclosure: As stated

cc: John P. Wolfiin, Supervisor
Chesapeake Bay Field Office
U.S. Fish and Wildlife Service
177 Admiral Cochrane Drive
Annapolis, Maryland 21401

cc: See next page

Accession nos.:

1. Cover letter: ML020250603
2. Enclosure: Figures Depicting the Location of the Surry and North Anna Power Stations and Their Associated Transmission Lines - ML020100388
3. Package: ML020250611

DISTRIBUTION:

DMatthews/FGillespie	GEEdison
CGrimes	SMonarque
JTappert	RPrato
AKugler	Environmental R/F
EHickey (PNNL)	

*See previous concurrence

DOCUMENT NAME: G:\RGEB\North Anna-Surry\Surry\Consult\Ltr to FWS-E&T spec.wpd

OFFICE	PM:RLEP	SC:RLEP	RLEP:DRIP
NAME	AKugler*	JTappert*	CGrimes*
DATE	01/22/02	01/22/02	01/24/02

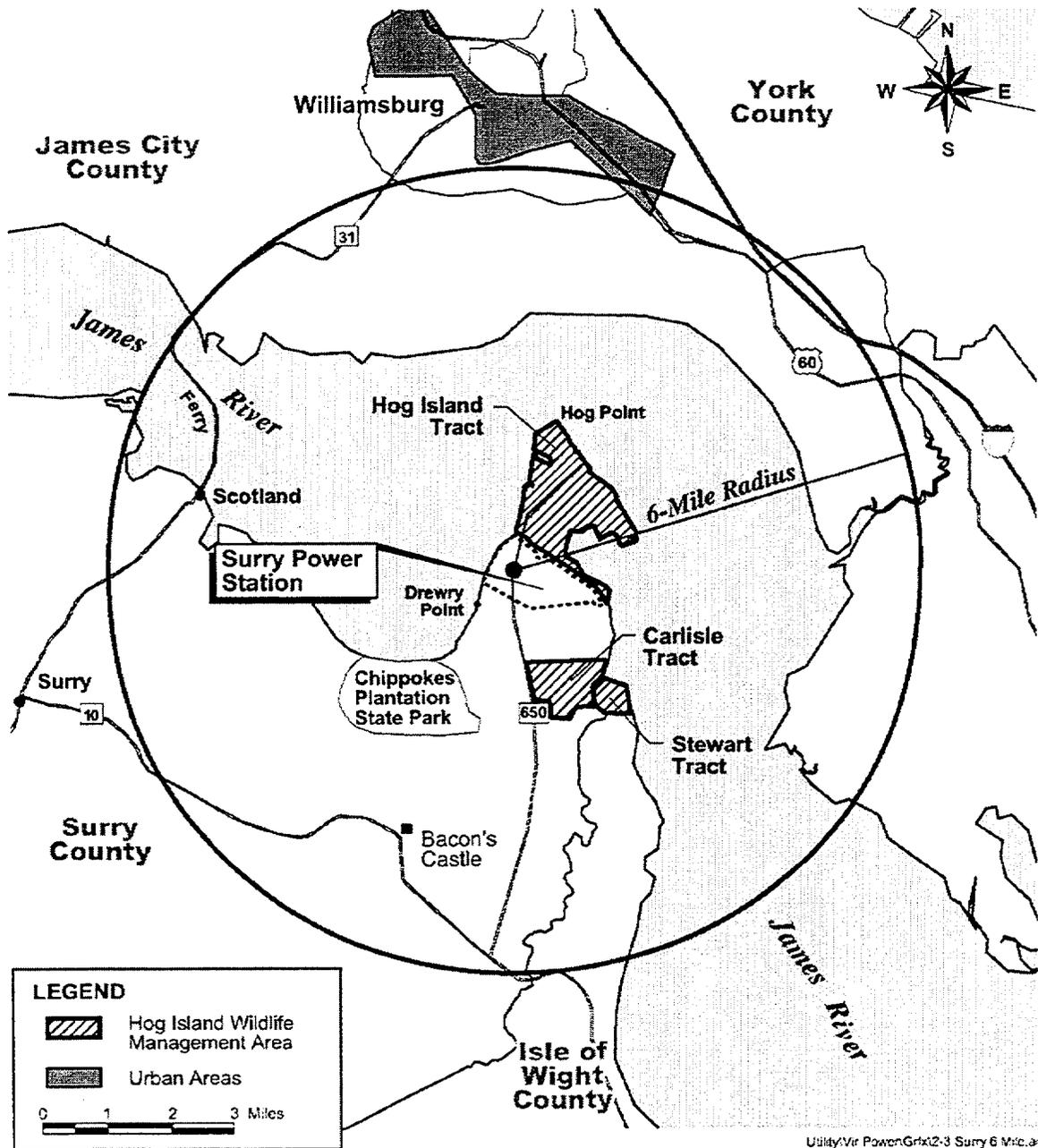
OFFICIAL RECORD COPY

**Enclosure: Figures Depicting the Locations of the
Surry and North Anna Power Stations and
Their Associated Transmission Lines**

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2

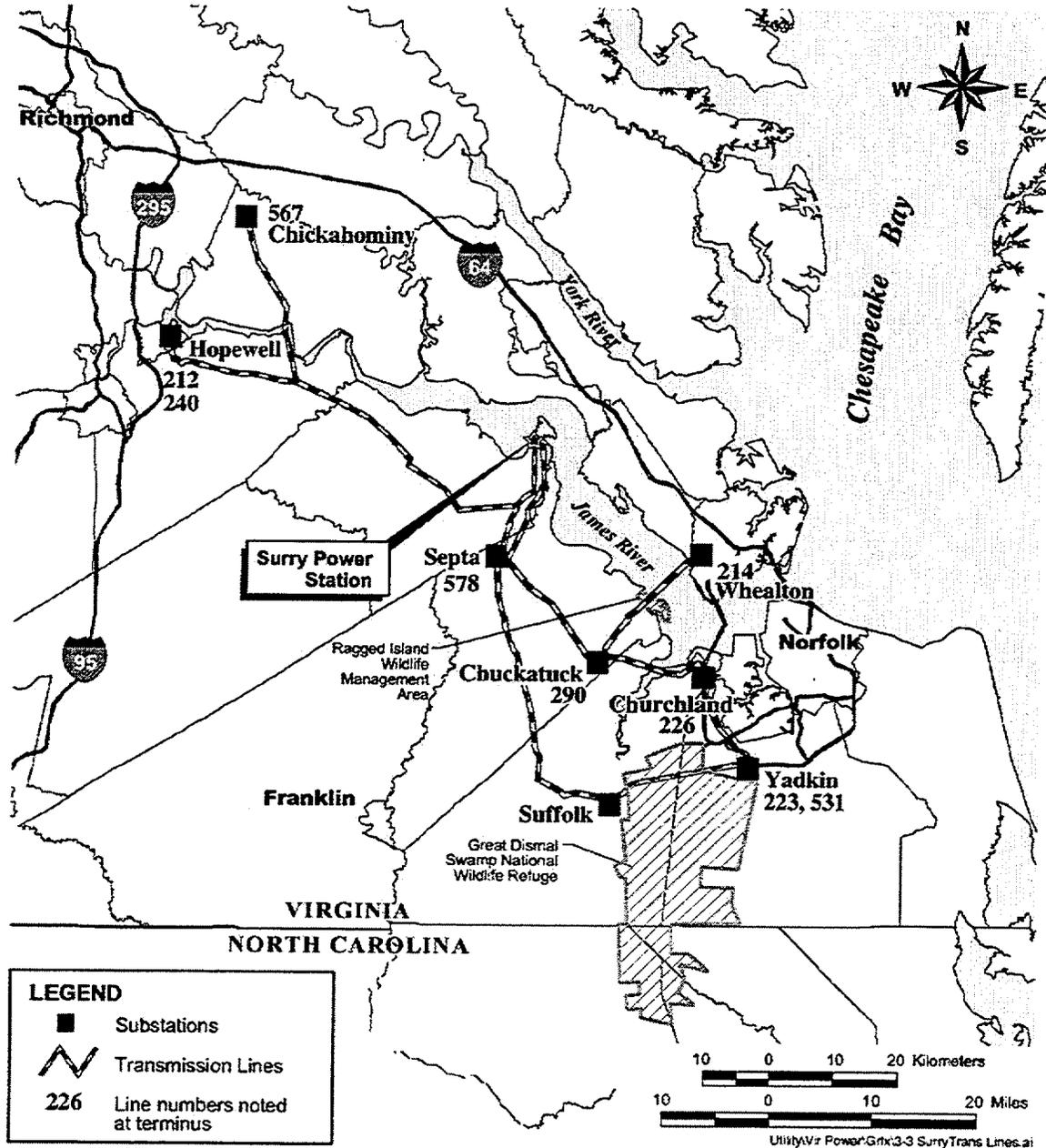
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Figure 2-3
Dominion - 6-Mile Surry Vicinity Map



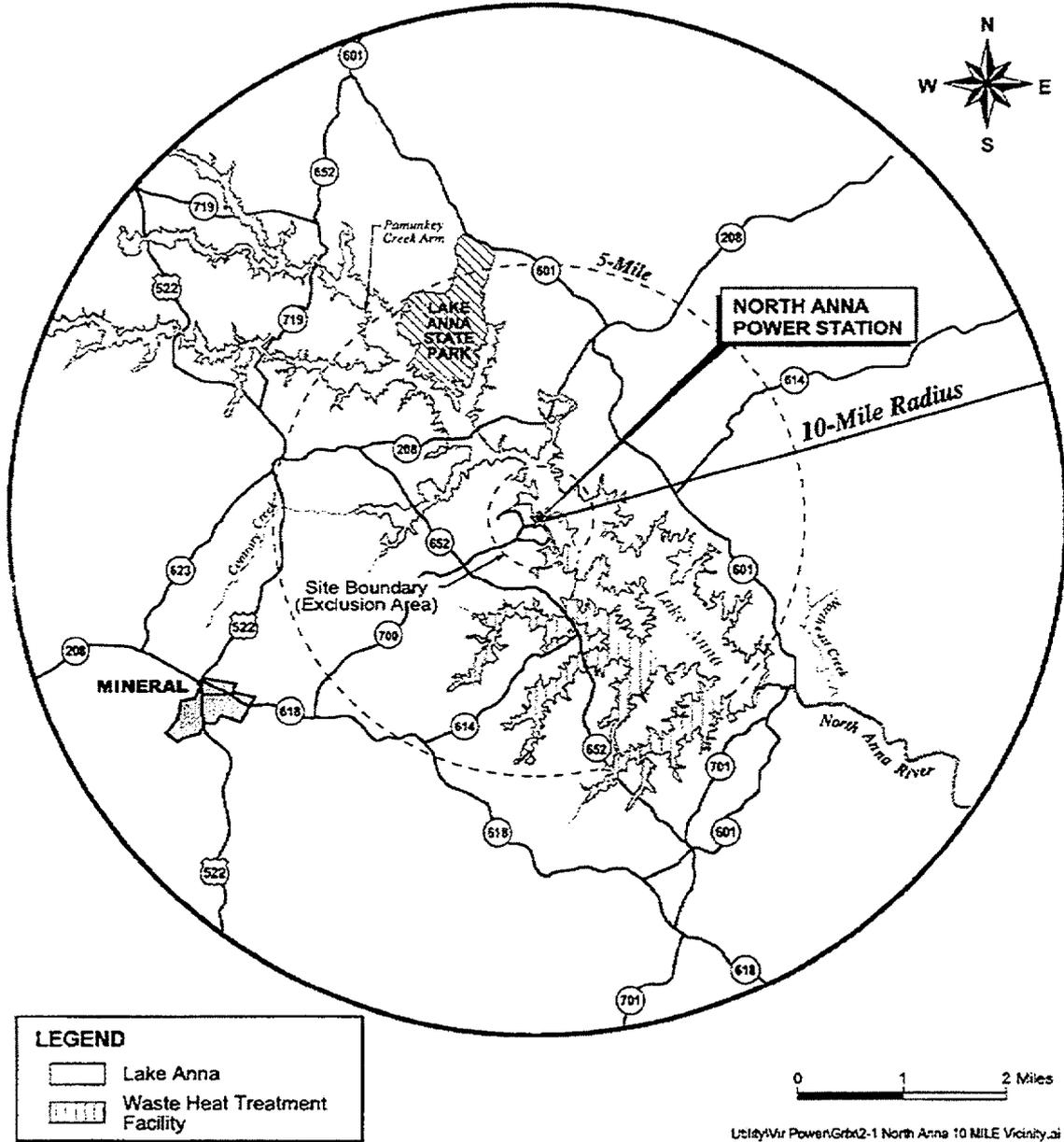
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4

**Figure 3-3
Transmission Corridors**



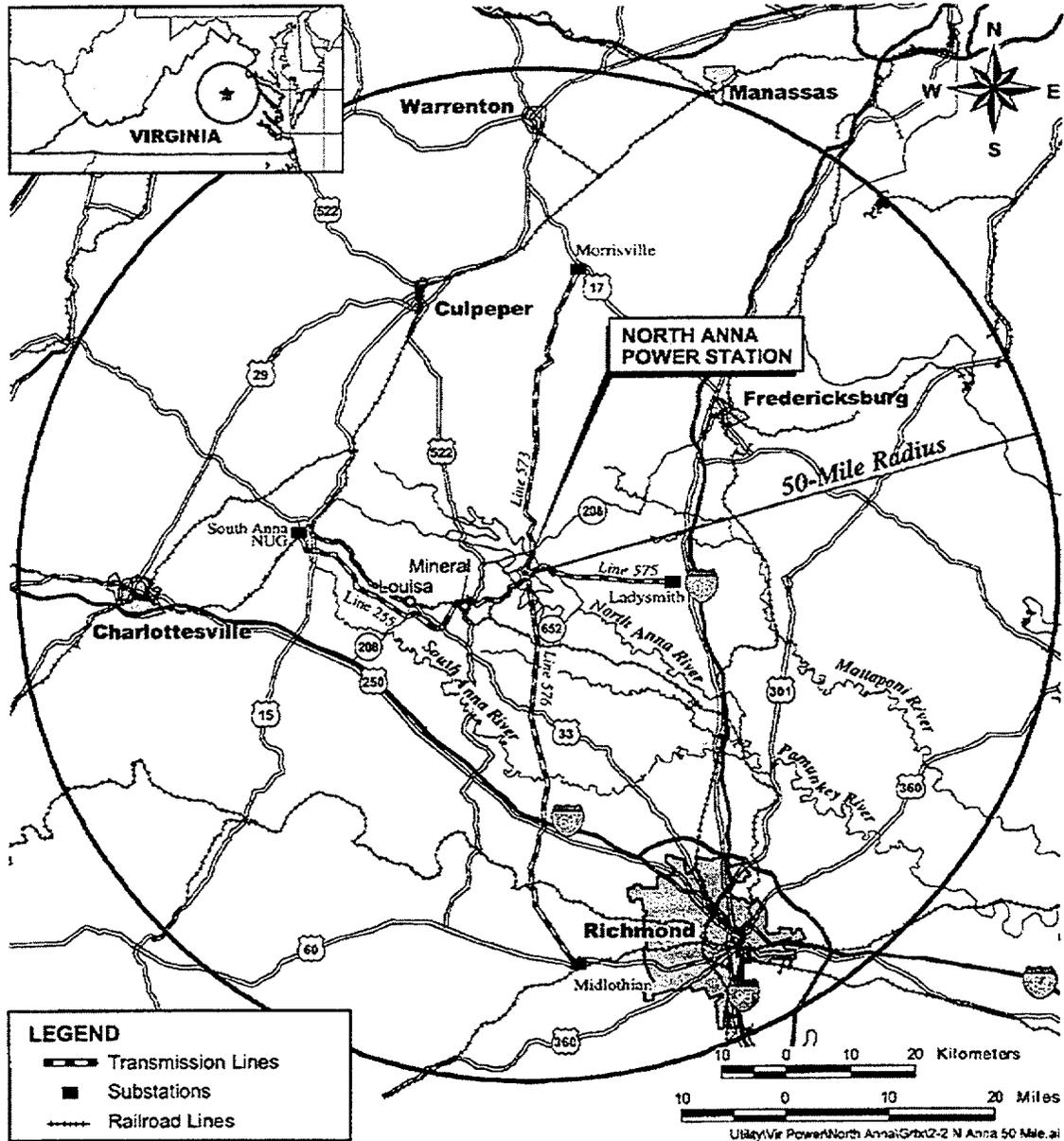
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Figure 2-1
Dominion - 10-Mile North Anna Vicinity Map



1
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Figure 2-2
Dominion - North Anna Power Station 50-Mile View





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February 21, 2002

J. W. White, Ph.D.
Manager, Water and Waste Programs
Dominion Virginia Power Company
5000 Dominion Boulevard
Glen Allen, Virginia 23060

RE: North Anna Power Station License Renewal: Application by Dominion Virginia Power Company to U.S. Nuclear Regulatory Commission for Renewed Operating License
Federal Consistency Certification under the Coastal Zone Management Act
DEQ-01-187F

Dear Dr. White:

This letter responds to your September 27, 2001 letter (and subsequent information received on October 30, 2001) requesting the Department of Environmental Quality's concurrence with the federal consistency certification for renewal of the Dominion Virginia Power Company's operating license for the North Anna Power station. The Department of Environmental Quality is responsible for coordinating Virginia's review of federal consistency certifications and responding to applicants for federal approval on behalf of the Commonwealth. The following agencies took part in this review:

Department of Environmental Quality
Department of Conservation
Department of Health
Marine Resources Commission
Chesapeake Bay Local Assistance Department

In addition, the Department of Game and Inland Fisheries, the Thomas Jefferson Planning District Commission, and Louisa County were invited to comment.

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Project Description

Dominion Virginia Power submitted information for this review in the form of two documents. One, submitted with the initial letter, is called "Appendix E, Environmental Report" (cited hereinafter as "Appendix E"). The other is entitled "Federal Consistency Certification for North Anna Power Station License Renewal" and is dated October 26, 2001 (cited hereinafter as "Certification").

Dominion Virginia Power owns and operates the North Anna Power Station, a nuclear electric generating station located on the southern shore of Lake Anna in Louisa County. As the Certification and the Environmental Report, Appendix E indicate, Louisa County is not included in Virginia's designated coastal management area. However, the proximity of the North Anna Power Station to Spotsylvania County, across the lake, and the presence of power lines in Spotsylvania and other counties within the coastal management area warrant consistency review because these facilities and their operation may have reasonably foreseeable effects upon coastal uses or resources (Certification, page 1; Appendix E, page E-2). See 15 CFR Part 930, subpart D, sections 930.50 and 930.54. The plant consists of two nuclear reactors and associated steam turbines that generate approximately 1,800 megawatts of electricity. The Unit 1 license is to expire on April 1, 2018, while the Unit 2 license will expire on August 21, 2020. Both licenses have terms of 20 years, and are to be renewed for new 20-year terms. (Appendix E, page E-3). The Company expects North Anna Power Station operations during the new license term to be a continuation of present operations (Appendix E, page E-2).

Federal Consistency Analysis

The Virginia Coastal Resources Management Program (VCP) is comprised of a network of programs administered by several agencies. In order to be consistent with the VCP, the applicant for federal licensing must obtain all the applicable permits and approvals listed under the Enforceable Programs of the VCP prior to commencing the project. Based on the commitments provided in the Consistency Certification that Dominion Virginia Power will obtain and comply with all approvals from agencies administering the applicable Enforceable Programs (Certification, page 1; Appendix E, page E-2) and the comments submitted by agencies administering the Enforceable Programs, the Department of Environmental Quality concurs with the finding that the license renewal and continued operation of the North Anna Power Station is consistent with Virginia's Coastal Resources Management Program.

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This discussion analyzes the continued operation of the project under the license renewal in light of the Enforceable Programs of the Virginia Coastal Management Program.

1. Subaqueous Lands Management. According to the Certification, the applicant has no plans for any activity under the license renewal that would require a permit from the Commission (page 12, Table 2, item b). The Marine Resources Commission indicates that there are no activities, present or prospective, at the North Anna Power Station that would require a Marine Resources Commission permit.

2. Coastal Lands Management. According to the Chesapeake Bay Local Assistance Department, the proposed license renewal is not subject to any requirements under the Chesapeake Bay Preservation Act because Louisa County is outside the geographic region subject to the Chesapeake Bay Preservation Act (*Virginia Code* sections 10.1-2100 *et seq.*). The Certification indicates that there is no new development applied for under the license renewal. Transmission lines are conditionally exempt from the Act.

3. Wetlands Management. According to the Certification, Dominion Virginia Power does not now conduct, and does not intend to conduct, any alteration of wetlands in the vicinity of the North Anna Power Station (page 12, Table 2, items c.1 and c.2). DEQ's Virginia Water Protection Program indicates that the license renewal will not result in any impacts to wetlands.

4. Point Source Water Pollution Control. DEQ's Virginia Water Protection Program indicates that the license renewal will not result in any impacts to surface waters. The Power Station is subject to an existing Virginia Pollutant Discharge Elimination System permit (No. VA 0052451) (Certification, page 15, Table E-1). According to DEQ's Northern Virginia Regional Office, the Power Station is in compliance with that permit.

5. Non-point Source Water Pollution Control. As with wetlands (item 3 above), the current operation of the North Anna Power Station does not involve any land-disturbing activity, and will not involve it in the future, according to the Certification (page 13, Table 2, item e.1). Accordingly, Virginia's non-point source water pollution control program, the Erosion and Sediment Control Plan requirement, does not apply to this project.

6. Air Pollution Control. According to DEQ's Northern Virginia Regional Office, the North Anna Power Station is in full compliance with its air permits.

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Accordingly, the project is consistent with the Air Pollution Control Program of the Virginia Coastal Resources Management Program.

7. Other Enforceable Programs. As the Certification indicates, the remaining Enforceable Programs of the Virginia Coastal Resources Management Program do not apply to the renewal of the NRC license for the North Anna Power Station. Specifically, the Fisheries Management Program, including the State Tributaries Regulatory Program, is not applicable to continued operation of the North Anna Power Station. Neither is the Dunes Management Program or the Shoreline Sanitation Program.

Environmental Impacts and Mitigation

1. Natural Heritage and Wildlife Resources. "Natural heritage resources" are defined as the habitat of rare, threatened, or endangered species of plants and animals, unique or exemplary natural communities, and significant geologic formations, according to the Department of Conservation and Recreation. That Department indicates that natural heritage resources have not been documented as present in the vicinity of the project. In addition, the Department of Conservation and Recreation represents the Department of Agriculture and Consumer Services in commenting on state-listed endangered plant and insect species that might be affected by a project. The continued operation of the North Anna Power Station will not affect protected plant or insect species.

The Department of Conservation and Recreation's Division of Natural Heritage (Christopher Ludwig, telephone 371-6206) should be contacted for an update if a significant amount of time passes before this information is used.

2. Recreation Resources. Continued operation of the North Anna Power Station will not adversely affect any existing or planned recreational facilities. Nor will it affect streams on the National Park Service Nationwide Inventory, Final List of Rivers or potential Virginia Scenic Rivers. The project will not affect any Virginia Byways.

3. Solid and Hazardous Waste Management. The DEQ's Waste Division, Office of Remedial Programs did a cursory review of its data files and found that the North Anna Power Station is listed as a small-quantity generator of hazardous waste, subject to the provisions of Title 40, Code of Federal Regulations, Part 262 (and related provisions in Parts 264, 265, and 268), which are adopted by reference in the Virginia Hazardous Waste Management Regulations. The most recent DEQ inspection of the North Anna Power Station took place in August 1999, according to the DEQ's Northern Virginia

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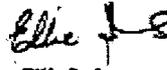
Regional Office; the inspection revealed that the Station was in compliance with all the requirements applicable to small-quantity generators.

4. Radiological Health Considerations. According to the Department of Health's Radiological Health Program, the Department of Health provides independent verification of this facility's environmental monitoring program for radiological releases. The Department of Health implemented its environmental monitoring program during the pre-operational stage of the facility; the program continues to the present day. There is no indication, in the published annual reports of the monitoring program, of any releases of radiation affecting the environment in the history of the program.

In addition, the applicant has been supportive of the efforts of state and local governments in maintaining an effective State Emergency Response Plan in case of radiological emergencies at the power plant. The Nuclear Regulatory Commission license includes a condition requiring certification of the Plan by the Federal Emergency Management Agency (FEMA); FEMA has certified the Plan.

Thank you for the opportunity to comment on this federal consistency certification.

Sincerely,



Ellis L. Irons
 Program Manager
 Office of Environmental Impact Review

Enclosures

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 Andy Kogler, U.S. NRC

TOTAL P.11

Appendix F

GEIS Environmental Issues Not Applicable to Surry Power Station, Units 1 and 2

Appendix F

GEIS Environmental Issues Not Applicable to Surry Power Station, Units 1 and 2

Table F-1 lists those environmental issues listed in the *Generic Environmental Impact Statement (GEIS) for License Renewal of Nuclear Plants* (NRC 1996; 1999)^(a) and 10 CFR Part 51, Subpart A, Appendix B, Table B-1, that are not applicable to Surry Units 1 and 2 because of plant or site characteristics.

Table F-1. GEIS Environmental Issues Not Applicable to Surry Power Station, Units 1 and 2

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	Category	GEIS Sections	Comment
SURFACE WATER QUALITY, HYDROLOGY, AND USE (FOR ALL PLANTS)			
Altered thermal stratification of lakes	1	4.2.1.2.2 4.4.2.2	Surry Units 1 and 2 do not discharge into a lake.
Water-use conflicts (plants with cooling ponds or cooling towers using makeup water from a small river with low flow)	2	4.3.2.1 4.4.2.1	Surry Units 1 and 2 cooling systems do not use makeup water from a small river with low flow.
GROUNDWATER USE AND QUALITY			
Groundwater-use conflicts (potable and service water, and dewatering; plants that use <100 gpm)	1	4.8.1.1 4.8.2.1	Surry Units 1 and 2 use >100 gpm of groundwater.
Groundwater-use conflicts (plants using cooling towers withdrawing makeup water from a small river)	2	4.8.1.3 4.4.2.1	This issue is related to heat-dissipation systems that are not installed at Surry Units 1 and 2.
Groundwater-use conflicts (Ranney wells)	2	4.8.1.4	Surry Units 1 and 2 do not have or use Ranney wells.
Groundwater quality degradation (Ranney wells)	1	4.8.2.2	Surry Units 1 and 2 do not have or use Ranney wells.
Groundwater quality degradation (cooling ponds at inland sites)	2	4.8.3	Surry Units 1 and 2 are not located at an inland site.

(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.

Table F-1. (contd)

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	Category	GEIS Sections	Comment
TERRESTRIAL RESOURCES			
Cooling tower impacts on crops and ornamental vegetation	1	4.3.4	This issue is related to a heat-dissipation system that is not installed at Surry Units 1 and 2.
Cooling tower impacts on native plants	1	4.3.5.1	This issue is related to a heat-dissipation system that is not installed at Surry Units 1 and 2.
Bird collisions with cooling towers	1	4.3.5.2	This issue is related to a heat-dissipation system that is not installed at Surry Units 1 and 2.
HUMAN HEALTH			
Microbiological organisms ^(a) (occupational health)	1	4.3.6	This issue is related to workers maintaining cooling towers, which Surry does not have.
Microbiological organisms, public health (plants using lakes or canals or cooling towers or cooling ponds that discharge to a small river)	2	4.3.6	Surry Units 1 and 2 do not use cooling lakes, towers, or ponds and do not discharge into a small river (the location of discharge into the James River is categorized as an estuary).
<p>(a) In its Environmental Report (VEPCo 2001), Virginia Electric and Power Company inadvertently stated that this issue was considered to apply to Surry. During discussions with the staff during the September site visit to Surry and the October site visit to North Anna, the staff established that this issue is not applicable to Surry.</p>			

F.1 References

10 CFR 51. Code of Federal Regulations, *Title 10, Energy*, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

1 U.S. Nuclear Regulatory Commission (NRC). 1996. *Generic Environmental Impact Statement*
2 *for License Renewal of Nuclear Plants*. NUREG-1437, Volumes 1 and 2, Washington, D.C.
3
4 U.S. Nuclear Regulatory Commission (NRC). 1999. *Generic Environmental Impact Statement*
5 *for License Renewal of Nuclear Plants: Main Report*, "Section 6.3 -Transportation, Table 9.1,
6 'Summary of findings on NEPA issues for license renewal of nuclear power plants, Final
7 Report'." NUREG-1437, Volume 1, Addendum 1, NRC, Washington, D.C.
8
9 Virginia Electric and Power Company (VEPCo). 2001. *Application for License Renewal for*
10 *Surry Power Station, Units 1 and 2*, "Appendix E, Environmental Report - Operating License
11 Renewal Stage." Richmond, Virginia.
12

BIBLIOGRAPHIC DATA SHEET

(See instructions on the reverse)

1. REPORT NUMBER
(Assigned by NRC, Add Vol., Supp., Rev.,
and Addendum Numbers, if any.)

NUREG-1437, Supplement 6

2. TITLE AND SUBTITLE

Generic Environmental Impact Statement for License Renewal of Nuclear Plants
Supplement 6
Regarding Surry Power Station, Units 1 and 2
Draft Report for Comment

3. DATE REPORT PUBLISHED

MONTH	YEAR
April	2002

4. FIN OR GRANT NUMBER

5. AUTHOR(S)

6. TYPE OF REPORT

Technical

7. PERIOD COVERED *(Inclusive Dates)*

8. PERFORMING ORGANIZATION - NAME AND ADDRESS *(If NRC, provide Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address; if contractor, provide name and mailing address.)*

Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

9. SPONSORING ORGANIZATION - NAME AND ADDRESS *(If NRC, type "Same as above"; if contractor, provide NRC Division, Office or Region, U.S. Nuclear Regulatory Commission, and mailing address.)*

Same as 8 above

10. SUPPLEMENTARY NOTES

Docket Numbers 50-280, 50-281

11. ABSTRACT *(200 words or less)*

This draft supplemental environmental impact statement (SEIS) has been prepared in response to an application submitted to the NRC on May 29, 2001, by the Virginia Electric and Power Company (VEPCo) to renew the operating licenses for Surry Power Station, Units 1 and 2, for an additional 20 years under 10 CFR Part 54. This SEIS includes the staff's analysis that considers and weighs the environmental effects of the proposed action, the environmental effects of alternatives to the proposed action, and alternatives available for reducing or avoiding adverse effects. It also includes the staff's preliminary recommendation regarding the proposed action.

The NRC staff's preliminary recommendation is that the Commission determine that the adverse environmental impacts of license renewal for Surry Power Station, Units 1 and 2, are not so great that preserving the option of license renewal for energy-planning decisionmakers would be unreasonable. This recommendation is based on (1) the analysis and findings in the GEIS; (2) the Environmental Report submitted by VEPCo; (3) consultation with Federal, State, and local agencies; (4) the staff's own independent review; and (5) the staff's consideration of public comments.

12. KEY WORDS/DESCRIPTORS *(List words or phrases that will assist researchers in locating the report.)*

Surry Power Station, Units 1 and 2
Surry
Supplement to the Generic Environmental Impact Statement
GEIS
National Environmental Policy Act
NEPA
License Renewal

13. AVAILABILITY STATEMENT

unlimited

14. SECURITY CLASSIFICATION

(This Page)

unclassified

(This Report)

unclassified

15. NUMBER OF PAGES

16. PRICE

**UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, DC 20555-0001**

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PENALTY FOR PRIVATE USE, \$300**