

5.0 Environmental Impacts of Postulated Accidents

Environmental issues associated with postulated accidents were 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 included 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 were 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 characteristics.
- (2) Single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the impacts (except for collective offsite radiological impacts from the fuel cycle and from high-level waste and spent fuel disposal).
- (3) Mitigation of adverse impacts associated with the issue has been considered in the analysis, and it has been determined that additional plant-specific mitigation measures are not likely to be sufficiently beneficial to warrant implementation.

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 describes the environmental impacts from postulated accidents that might occur during the license renewal term.

5.1 Postulated Plant Accidents

Two classes of accidents are evaluated in the GEIS. These are design-basis accidents (DBAs) and severe accidents, as discussed below.

(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 Addendum 1.

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Design-Basis Accidents.

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2
3 In order to receive NRC approval to operate a nuclear power facility, an applicant must submit a
4 safety analysis report (SAR) as part of its application. The SAR presents the design criteria
5 and design information for the proposed reactor and comprehensive data on the proposed site.
6 The SAR also discusses various hypothetical accident situations and the safety features that
7 are provided to prevent and mitigate accidents. The NRC staff reviews the application to
8 determine whether the plant design meets the Commission's regulations and requirements and
9 includes, in part, the nuclear plant design and its anticipated response to an accident.
10

11 DBAs are those accidents that both the licensee and the NRC staff evaluate to ensure that the
12 plant can withstand normal and abnormal transients, and a broad spectrum of postulated
13 accidents without undue hazard to the health and safety of the public. A number of these
14 postulated accidents are not expected to occur during the life of the plant, but are evaluated to
15 establish the design basis for the preventive and mitigative safety systems of the facility. The
16 acceptance criteria for DBAs are described in 10 CFR Part 50 and 10 CFR Part 100. The
17 environmental impacts of DBAs are evaluated during the initial license process, and the ability
18 of the plant to withstand these accidents is demonstrated to be acceptable before issuance of
19 the operating license (OL). The results of these evaluations are found in license documentation
20 such as the staff's safety evaluation report (SER), the Final Environmental Statement (FES),
21 and Section 5.1 of this SEIS as well as the licensee's Final Safety Analysis Report (FSAR).
22 The licensee is required to maintain the acceptable design and performance criteria throughout
23 the life of the plant including any extended-life operation. The consequences for these events
24 are evaluated for the hypothetical maximum exposed individual; as such, changes in the plant
25 environment will not affect these evaluations. Because of the requirements that continuous
26 acceptability of the consequences and aging management programs be in effect for license
27 renewal, the environmental impacts as calculated for DBAs should not differ significantly from
28 initial licensing assessments over the life of the plant, including the license renewal period.
29 Accordingly, the design of the plant relative to DBAs during the extended period is considered
30 to remain acceptable and the environmental impacts of those accidents were not examined
31 further in the GEIS.
32

33 The Commission has determined that the environmental impacts of DBAs are of SMALL
34 significance for all plants because the plants were designed to successfully withstand these
35 accidents. Therefore, for the purposes of license renewal, design-basis events are designated
36 as a Category 1 issue in 10 CFR Part 51, Subpart A, Appendix B, Table B-1. The early
37 resolution of the DBAs make them a part of the current licensing basis of the plant; the current
38 licensing basis of the plant is to be maintained by the licensee under its current license and,
39 therefore, under the provisions of 10 CFR 54.30, is not subject to review under license renewal.
40 This issue, applicable to Turkey Point Units 3 and 4, is listed in Table 5-1. Florida Power and

Table 5-1. Category 1 Issue Applicable to Postulated Accidents During the Renewal Term

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section
POSTULATED ACCIDENTS	
Design-basis accidents (DBAs)	5.3.2; 5.5.1

Light (FPL) stated in its Environmental Report (ER; FPL 2000) that it is not aware of any new and significant information associated with the renewal of the Turkey Point Units 3 and 4 OLS. The staff has not identified any significant new information during its independent review of the FPL ER (FPL 2000), the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts related to this issue beyond those discussed in the GEIS.

Severe Accidents.

Severe nuclear accidents are those that are more severe than DBAs because they could result in substantial damage to the reactor core, whether or not there are serious offsite consequences. The GEIS assessed the impacts of severe accidents during the license renewal period, using the results of existing analyses and site-specific information to conservatively predict the environmental impacts of severe accidents for each plant during the renewal period.

Severe accidents initiated by external phenomena such as tornadoes, floods, earthquakes, fires, and sabotage have not traditionally been discussed in quantitative terms in FESs and were not specifically considered for the Turkey Point site in the GEIS (NRC 1996). However, the GEIS did evaluate existing impact assessments performed by NRC and by the industry at 44 nuclear plants in the United States and concluded that the risk from sabotage and beyond design basis earthquakes at existing nuclear power plants is small and, additionally, that the risks from other external events are adequately addressed by a generic consideration of internally initiated severe accidents.

Based on information in the GEIS, the Commission found that

The probability weighted consequences of atmospheric releases, fallout onto open bodies of water, releases to groundwater, and societal and economic impacts from severe accidents are small for all plants. However, alternatives to mitigate severe accidents must be considered for all plants that have not considered such alternatives.

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1 The Commission has designated severe accidents as a Category 2 issue in 10 CFR Part 51,
2 Subpart A, Appendix B, Table B-1. This issue, applicable to Turkey Point Units 3 and 4, is
3 listed in Table 5-2.

4
5 The staff has not identified any significant new information with regard to the consequences
6 from severe accidents during its independent review of the FPL ER (FPL 2000), the staff's site
7 visit, the scoping process, or its evaluation of other available information. Therefore, the staff
8 concludes that there are no impacts of severe accidents beyond those discussed in the GEIS.
9 However, in accordance with 10 CFR 51.53(c)(3)(ii)(L), the staff has reviewed severe accident
10 mitigation alternatives (SAMAs) for Turkey Point Units 3 and 4. The results of its review are
11 discussed in Section 5.2.

12
13 **Table 5-2.** Category 2 Issue Applicable to Postulated Accidents During the Renewal Term
14

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Sections	10 CFR 51.53(c)(3)(ii) Subparagraph	SEIS Section
POSTULATED ACCIDENTS			
Severe Accidents	5.3.3; 5.3.3.2; 5.3.3.3; 5.3.3.4; 5.3.3.5; 5.4; 5.5.2	L	5.2

5.2 Severe Accident Mitigation Alternatives

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20
21
22 Title 10 of the Code of Federal Regulations, Part 51.53(c)(3)(ii)(L), requires that license renewal
23 applicants consider alternatives to mitigate severe accidents if the staff has not previously
24 considered SAMAs for the applicant's plant in an environmental impact statement or related
25 supplement or in an environmental assessment. The purpose of this consideration is to ensure
26 that plant design changes with the potential for improving severe accident safety performance
27 are identified and evaluated. SAMAs have not been previously considered for Turkey Point
28 Units 3 and 4; therefore, the following sections address those alternatives.

5.2.1 Introduction

29
30
31
32 FPL submitted an assessment of SAMAs for Turkey Point Units 3 and 4 as part of the
33 Environmental Report (ER) (FPL 2000). The assessment was based on the Turkey Point
34 Probabilistic Safety Assessment (PSA) for total accident frequency (core damage frequency
35 [CDF] and containment release frequency), and a supplemental analysis of offsite conse-
36 quences and economic impacts for risk determination. While identifying and evaluating

1 potential SAMAs, FPL took into consideration the insights and recommendations from several
2 SAMA analyses for other plants, other U.S. Nuclear Regulatory Commission (NRC) and
3 industry documents discussing potential plant improvements, and documented insights
4 provided by the plant staff. FPL considered 167 SAMAs and concluded that there are no
5 SAMAs that are cost-beneficial associated with license renewal.
6

7 Based on a review of the SAMA assessment, the NRC issued a request for additional informa-
8 tion (RAI) to FPL by letter dated January 31, 2001 (NRC 2001a). Key questions concerned the
9 base case risk and its constituents, Probabilistic Safety Assessment (PSA) model and changes,
10 external events and their limited inclusion in SAMAs, and potential design enhancements and
11 their disposition. FPL submitted additional information by letter dated March 30, 2001 (FPL
12 2001). These responses addressed the staff's concerns and reaffirmed the conclusions of the
13 study.
14

15 An assessment of SAMAs for Turkey Point Units 3 and 4 is presented below.
16

17 **5.2.2 Estimate of Risk for Turkey Point Units 3 and 4**

18

19 FPL's estimates of offsite risk at Turkey Point Units 3 and 4 are summarized below. The
20 summary is followed by an evaluation of FPL's risk estimates.
21

22 **5.2.2.1 FPL's Risk Estimates**

23

24 Two distinct analyses are combined to form the basis for the risk estimates used in the SAMA
25 analysis: (1) the Turkey Point PSA model which is an updated version of the individual plant
26 examination (IPE), and (2) a supplemental analysis of offsite consequences and economic
27 impacts for risk determination developed specifically for SAMA analyses. The Turkey Point
28 PSA is considered to be a living plant risk model, incorporating new information on equipment
29 performance, plant configuration changes, and refinements in PSA modeling techniques. It
30 contains a Level 1 analysis to determine the CDF from internally-initiated events and a Level 2
31 analysis to determine containment performance during severe accidents. The baseline CDF for
32 the purpose of SAMA evaluation is $1.62 \times 10^{-5}/\text{yr}$. A breakdown of the CDF is provided in
33 Table 5-3. As shown in this table, transient initiators contribute about 39 percent, while loss-of-
34 coolant accidents (LOCAs) contribute about 60 percent of the total internal events CDF. It is
35 seen in Table 5-3 that containment bypass events (i.e., steam generator tube rupture [SGTR]
36 and interfacing systems loss-of-coolant accident [ISLOCA]) make a minimal contribution to
37 internal events CDF for Turkey Point, and the frequency associated with the largest release
38 (i.e., ISLOCA) for Turkey Point is estimated to be about 6×10^{-8} per reactor year (ry). The
39 station blackout (SBO) contribution to the transients is not explicitly provided in the submittal;
40 however, the plant damage states for which both sprays and fan coolers have failed (mostly

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1 due to loss of power) is about 4.49×10^{-8} /ry. Anticipated transient without scram (ATWS)
2 contributors are not explicitly provided in the submittal; however, based on the top 20 cutsets,
3 ATWS contributes, at least, 1×10^{-6} /ry.
4

5 **Table 5-3. Turkey Point Core Damage Frequency (CDF)**
6

7	Initiating Event	Frequency (per reactor year)
8	Transients	6.3×10^{-6}
9	Loss-of-coolant accident (LOCA)	9.8×10^{-6}
10	Steam generator tube rupture (SGTR)	1.7×10^{-8}
11	Interfacing system LOCA	6.2×10^{-8}
12	Total CDF from internal events	1.6×10^{-5}

13
14 The offsite consequences and economic impact analyses use the MELCOR Accident Conse-
15 quence Code System 2 (MACCS2) code, Version 1.12, to determine the offsite risk impacts on
16 the surrounding environment and the public. Inputs for this analysis include plant/site-specific
17 values for core radionuclide inventory, source term and release fractions, meteorological data,
18 projected population distribution, emergency response evacuation modeling, and economic
19 data. The magnitude of the onsite impacts (in terms of clean-up and decontamination costs and
20 occupational dose) is based on information provided in NUREG/BR-0184 (NRC 1997a).
21

22 FPL estimates the risk to the population within 80 km (50 mi) of the Turkey Point site, from
23 internal initiators, to be 10.9 person-rem/yr. Table 5-4 shows the contributions to population
24 dose by containment release mode. Late containment failure accounts for the majority of the
25 population dose. This is primarily due to the dominance of the late containment failure
26 frequency (i.e., about 9.05×10^{-6} /ry), which is about 56 percent of the total internal events CDF
27 of 1.62×10^{-5} /ry, or 99 percent of the total release frequency of 9.14×10^{-6} /ry. (Note that about
28 44 percent of the core melt accidents at Turkey Point do not result in containment failure and
29 the release of radioactivity.) The contribution of early containment failure, including
30 containment bypass scenarios, is very small (about 0.5 percent of total internal events CDF or
31 about 1 percent of total release frequency).
32

Table 5-4. Risk Profile

Containment Release Mode	Contribution to Population Dose (%)
Containment intact	0
Late containment failure	97.2
Early containment failure	0.1
Containment bypass	2.7

In response to an RAI, FPL (FPL 2001) explains that the dominant late containment failure sequences are due to the conservative assumptions made in the IPE/PSA with respect to exceeding the equipment qualification (EQ) limit for a short period of time causing the failure of the containment heat removal systems (CHRSs). PDSs with successful containment spray but with hypothesized late containment failures are the result of non-condensable gas generation due to protracted core-concrete-interactions. Basemat melt-through (BMT) contributes about 25 percent (under dry and wet cavity conditions), and loss of containment integrity due to hydrogen burn contributes about 25 percent. FPL indicated (FPL 2001) that if the conservative assumptions (i.e., EQ-induced failure of CHRS and BMT, considering Severe Accident Management Guidelines [SAMGs]) were to be removed from the Level 2 analysis, the late containment failure contribution would be expected to drop from approximately 56 percent to 25 percent (due to hydrogen burn causing late containment failure).

5.2.2.2 Review of FPL’s Risk Estimates

FPL’s determination of offsite risk impacts at Turkey Point Units 3 and 4 is based on the Turkey Point PSA and a separate MACCS2 analysis. This review considered the following major elements:

- the Level 1 and 2 risk models
- the modifications to the PSA model
- the MACCS2 analyses performed to translate fission product release frequencies from the Level 2 PSA model into offsite consequence measures.

Each of these analyses was reviewed to determine the acceptability of FPL’s risk estimates for the SAMA analysis, as summarized below.

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1 The staff's review of the Turkey Point IPE is described in a staff report dated October 15, 1992
2 (NRC 1992). In that review, the staff evaluated the methodology, models, data, and assump-
3 tions used to estimate the CDF and characterize containment performance and fission product
4 releases. The staff concluded that FPL's analysis met the intent of Generic Letter 88-20 (NRC
5 1988); that is, the IPE was of adequate quality to be used to look for design or operational
6 vulnerabilities. Although the staff reviewed certain aspects of the IPE in more detail than
7 others, it primarily focused on the licensee's ability to examine Turkey Point for severe accident
8 vulnerabilities and not specifically on the detailed findings or quantification estimates. Overall,
9 the staff believed that the Turkey Point IPE was of adequate quality to be used as a tool in
10 searching for areas with high potential for risk reduction and to assess such risk reductions,
11 especially when the risk models are used in conjunction with insights, such as those from risk
12 importance, sensitivity, and uncertainty analyses. It is important to note that significant changes
13 have been made to the Turkey Point risk model since the original IPE was completed and
14 reviewed by the NRC staff. These include both modifications to the models and changes due to
15 plant modification, as discussed below.

16
17 A comparison of CDF profiles between the original IPE and the current PSA indicates that the
18 estimate of the CDF for internal events has been reduced from 3.7×10^{-4} /ry to about
19 1.62×10^{-5} /ry (over a factor of 20 reduction). The lower values in the current PSA are attributed
20 to plant and modeling improvements that have been implemented in Turkey Point since the
21 IPE, as discussed below.

22
23 The original model documented in the 1991 Turkey Point IPE submittal had a CDF of
24 3.7×10^{-4} /ry. To address NRC comments, the model was revised and submitted to the NRC in
25 1992. The Turkey Point PSA model was updated in 1993, 1995, and 1997 to incorporate plant
26 and modeling changes. The CDF for the 1997 update was 6.12×10^{-5} /ry. Plant upgrades incor-
27 porated in the 1997 revised model included modifications to the service water system, standby
28 steam generator feedwater pump (from motor-driven to diesel driven) and instrument air system
29 upgrade. Major modeling changes included time-dependent recovery of offsite power, more
30 consistent recovery actions (use of rule-based recovery), and data updates. In 1999, the 1997
31 Turkey Point PSA model was modified to account for several plant features that have significant
32 impact on the benefit calculations, but were not included in the plant risk model. The modified
33 baseline CDF is 1.62×10^{-5} /ry. This CDF was used to evaluate SAMAs related to component
34 cooling water (CCW) performance, reactor coolant pump (RCP) seal LOCA, secondary heat
35 removal, and equipment ventilation, and takes credit for the following features:

- 36
37 • cross-tie of the Unit 3 and Unit 4 CCW systems reducing the loss of CCW initiator
38 frequency and allowing recovery post-accident
- 39
40 • alternate feedwater sources for the steam generators, including cross-tie via the opposite
41 unit main feedwater and condensate

- 1
- 2 • revised dependency on reactor auxiliary building (RAB) ventilation to reflect that only RHR
- 3 pumps require RAB fans
- 4
- 5 • revised common cause start and run failure beta factors for high head safety injection
- 6 (HHSI) pumps based on INEL-94/0064, Volume 6, and
- 7
- 8 • revised likelihood for RCP seal LOCA upon loss of seal cooling (partially due to the new O-
- 9 ring for the RCPs).
- 10

11 The present CDF value of $1.62 \times 10^{-5}/\text{ry}$ is lower than most of the original IPE values estimated
12 for other pressurized water reactors (PWRs) with large dry containment. Although many of
13 these have similarly been reduced due to modeling and hardware changes since submitting
14 their IPEs. Figure 11.6 of NUREG-1560 (NRC 1997b) shows that the IPE-based total internal
15 events CDF for Westinghouse 3-loop plants ranges from 6×10^{-5} to $4 \times 10^{-4}/\text{ry}$.

16
17 As noted in Table 5-3, the core damage frequencies for SGTR and ISLOCA were very low. In
18 an RAI (NRC 2001) the staff requested an explanation of why these values were so low, when
19 compared both with the original IPE values for Turkey Point, Units 3 and 4 and with corre-
20 sponding values for similar plants. According to the FPL response (FPL 2001), the CDF
21 reduction for SGTR was primarily based on crediting the redundant and diverse secondary heat
22 removal mechanisms. The SGTR Emergency Operating Procedure (EOP) provides detailed
23 guidance on bringing the reactor to stable conditions. Additional SAMGs supplement the EOP,
24 which in combination with the additional and diverse means for decay heat removal, make the CDF
25 for SGTR low. The frequency of an ISLOCA initiating event was calculated to be $6.2 \times 10^{-6}/\text{ry}$. It
26 was estimated that the probability of failing to prevent the ISLOCA sequence from proceeding to
27 core damage was 0.01 (given that 6 hours is available to use the other unit HHSI), resulting in an
28 ISLOCA CDF of $6.2 \times 10^{-8}/\text{ry}$. This improvement was based on taking credit for proceduralized
29 operator actions and the shared HHSI system if available. The staff recognizes (NRC 1977c) that,
30 in general, the contributions to total core damage frequency from either SGTRs or ISLOCAs
31 are relatively small for Westinghouse 3-loop PWRs. Further, the staff concludes, based on the
32 points raised by FPL above, that the contributions from these initiators to core damage and risk
33 for Turkey Point Units 3 and 4 are low, relative to other contributors.

34
35 FPL submitted an IPE of external events (IPEEE) by letter dated June 24, 1994 (FPL 1994).
36 FPL did not identify any fundamental weaknesses or vulnerabilities to severe accident risk with
37 regard to the external events related to seismic, fire, high winds, floods, transportation and
38 nearby facility accidents, and other external hazards. In a Technical Evaluation Report, the
39 NRC's contractor concluded that the IPEEE met the intent of Supplement 4 to Generic Letter
40 88-20 (ERI 1998). However, FPL used margins-type methodologies rather than PSA for

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1 addressing external events. Therefore, FPL chose to capture the potential risk benefits
2 associated with external events by doubling the calculated benefits for a given SAMA. In the
3 responses to the RAIs, FPL states that the CDF contribution from external events reported in
4 the IPEEE submittal (tornado, transportation and nearby facilities and others) is estimated to be
5 less than $7.0 \times 10^{-7}/\text{ry}$. FPL further argues that the PSA model used for the SAMA would make
6 the risk contribution from these external events even lower due to a smaller seal LOCA
7 probability (partially due to new seal O-rings for the RCPs) and the capability to cross-tie CCW
8 from the opposite unit that was not credited in the Turkey Point IPEEE submittal. Even though
9 the FPL approach in doubling of core damage frequency to account for the calculated benefits
10 for external events would provide a numerically reasonable estimate of the potential impact of
11 external events, this approach fails to capture the benefits that could result from specific
12 SAMAs that would be aimed at particular external events. Nevertheless, since the staff
13 believes the search for external events vulnerabilities as part of the Turkey Point IPEEE did not
14 identify any risk contributors that would benefit from potential SAMAs, the staff considers the
15 present FPL approach to be adequate.

16
17 The Turkey Point Level 2 IPE submittal (FPL 1991) that was reviewed by NRC in 1992 has
18 been modified recently to account for changes in the Plant Damage State (PDS) frequencies,
19 resulting from the Level 1 PSA modifications discussed earlier in this section, and changes
20 brought about by additional research since the original Level 2 IPE was completed. This
21 research includes the NRC studies on resolution of the direct containment heating (DCH) issue
22 for Westinghouse PWRs (NRC 1996b), the steam explosions-induced containment failure issue
23 (FPL 2001; NRC 1989) and other issues related to high pressure scenarios (i.e., induced SGTR
24 and vessel thrust forces). The revision in the Level 2 PSA model as a result of the aforemen-
25 tioned changes, results in low probabilities of early containment failure modes and insignificant
26 contributions to the overall risk. The staff concludes that the use of the FPL Level 2 model
27 provides a sufficiently detailed characterization of containment response to support a license
28 renewal SAMA analysis.

29
30 The process used by FPL to extend the containment performance (Level 2) portion of the PSA
31 to an assessment of offsite consequences (Level 3 PSA) was reviewed. This included consid-
32 eration of the source terms used to characterize fission product releases for each of 47 contain-
33 ment release modes and consideration of the major inputs and assumptions used in the offsite
34 consequence analyses. FPL used the severe accident source terms presented in the Turkey
35 Point Units 3 and 4 IPE for each of 47 containment release modes. The source terms were
36 incorporated as input to the NRC-developed MACCS2 code. For radionuclides not reported in
37 the IPE, fraction values were set to zero.

38
39 The release input parameters used in the Level 3 quantification as required for MACCS2 calcu-
40 lations were defined for Turkey Point. In general, it is assumed that the time (after accident

1 initiation) when the accident reaches general emergency conditions, or when personnel can
2 reliably predict that general emergency conditions will be attained, is about 4.9, 3, 2, and
3 10 hours, for late containment failure, early containment failure, ISLOCA, and SGTR scenarios,
4 respectively. Early releases (including bypass sequences) are assumed to be more energetic
5 as compared with other releases. All releases are assumed to be elevated (i.e., at a height of
6 30 meters), and the assumed release time varies from about 4.9 hours (after scram) for early
7 releases, to 24 hours for late releases. These assumptions are, for the most part, consistent
8 with those of other studies, including NUREG-1150 (NRC 1990). Sensitivity calculations were
9 also performed to assess the impact of releases due to inclusion of radionuclides not consid-
10 ered as part of the original IPE source term calculations (i.e., ruthenium, lanthanum, cerium,
11 and barium). These sensitivity analyses (FPL 2001) showed an increase in the benefits
12 (increase in risk-reduction potential) of about \$3000 (from \$801,500 to \$804,500) when these
13 radionuclides were added to the analysis with release fractions of 1.0×10^{-3} for key release
14 modes. Thus, the impact is small.

15
16 The MACCS2 input used site-specific meteorological data processed from hourly measurements
17 for one full year (1998). This data was collected at the site meteorological tower.

18
19 The staff (NRC 2001) requested information on the impact of the Turkey Point Units 3 and 4
20 power uprate and 18-month cycle burn-up on the radiological activity used in the risk analysis.
21 In response, FPL (FPL 2001) stated that a comparison of the major core inventory reported in
22 the MACCS2 end-of-cycle inventory for a 3412 MW(t) plant with the plant-specific estimates for
23 the Turkey Point Units 3 and 4 power uprate conditions, shows an increase of less than 25
24 percent in the estimated baseline risk. On this basis, the staff concludes that this increase
25 would need to be accounted for among the SAMA candidates that are not eliminated by
26 qualitative screening.

27
28 The population distribution used as input to the MACCS2 analysis is based on 1990 census
29 data. Population growth within a 80-km (50-mi) radius of the site was projected out to 2025 by
30 using the computer program SECPOP90 (NRC 1997c). Projections were benchmarked with
31 1998 county-wide population estimates.

32
33 Evacuation modeling is based on a site-specific evacuation plan developed by FPL. It is
34 assumed that the people within the evacuation zone (extending out to 16 km [10 mi] from the
35 plant) would move at an average speed of approximately 12 m/s with a delayed start time of
36 5,130 seconds. It is assumed that people beyond the 10-mile radius would continue their normal
37 work activities unless the 50 and 25 rem whole-body effective dose equivalent in one week limits
38 are predicted to be exceeded. In these cases, relocation is assumed to occur after half a day
39 and one day, respectively. A sensitivity analysis was performed that assumes that only 95
40 percent of the people within the evacuation zone would participate in the evacuation. The

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1 remaining five percent are assumed to go about their normal activities. This assumption is
2 conservative relative to the NUREG-1150 study (NRC 1990), which assumes evacuation of
3 99.5 percent of the population within the emergency planning zone. It was further assumed in
4 this sensitivity analysis that the evacuation speed was 1.0 m/s and that the evacuation delay
5 time is 2 hours. The result is less than a 1-percent change in population dose and evacuation
6 costs. Accordingly, the evacuation assumptions and analysis are deemed reasonable and
7 acceptable for the purposes of SAMA evaluation.
8

9 Much of the site-specific economic data was provided by SECPOP90 (NRC 1997c) and used in
10 the MACCS2 analyses. SECPOP90 contains a database extracted from U.S. Bureau of Census
11 CD-ROMs (1990 census data), the 1992 Census of Agriculture CD-ROM Series 1B, the 1994
12 U.S. Census County and City Data Book CD-ROM, the 1993 and 1994 Statistical Abstract of the
13 United States. These regional economic values were updated to 1997 using the Consumer
14 Price Index and other data from the U.S. Bureau of the Census and the Department of
15 Agriculture. Although some of the economic parameter values were based on values quoted in
16 NUREG-1150 (NRC 1990), some were revised with more recent and/or site-specific data.
17

18 Even though the SAMA analyses did not explicitly include the impact of uncertainties associated
19 with severe accident risk at Turkey Point, nevertheless, in response to RAIs, FPL provided the
20 results of the most recent PSA model for Turkey Point (NRC 2001) that demonstrate the
21 uncertainties in the calculated CDF range from about 27 percent of the mean internal events
22 CDF at the 5th percentile to about 2.5 times the mean internal events CDF at the 95th percentile
23 (i.e., an order of magnitude spread in the calculated internal events CDF). The SAMA baseline
24 CDF of $1.62 \times 10^{-5}/\text{ry}$ corresponds to the 88th percentile of the latest CDF distribution (FPL 2001).
25 In response to RAIs, FPL indicated that other factors that offset the higher CDF associated with
26 higher failure rates, as reflected by the upper bounds of uncertainties, include modeling uncer-
27 tainties and the cost estimates. In the response to an RAI on uncertainties, FPL argued that
28 additional credit for severe accident management guidance "could have been taken to reduce
29 the likelihood of containment failure and fission product release. Plant specific implementation
30 of SAMA candidates may be complicated by space limitations, outage cost, regulatory
31 requirements, seismic, fire and other considerations. These factors overestimate the benefit or
32 underestimate the cost. It is concluded that the effect of considering these uncertainties
33 associated with the SAMA cost-benefit estimate would, in effect, offset the uncertainties
34 associated with the CDF estimates, thus making the conclusions robust. No SAMA candidates
35 are considered cost-beneficial even when a higher-confidence CDF is used." (FPL 2001)
36

37 Consistent with NUREG/BR-0184, sensitivity studies performed using a 3-percent discount rate
38 (versus the 7-percent rate used in the baseline analysis) show an increase in the benefits of
39 potential SAMAs; however, this does not alter the ER conclusions on the unfavorable cost-
40 benefit ratios for the considered severe accident management alternatives.
41

1 The staff concludes that overall the methodology used by FPL to estimate the CDF and offsite
 2 consequences for Turkey Point provides an acceptable basis from which to proceed with an
 3 assessment of the risk reduction potential for candidate SAMAs. Further, the risk results that
 4 were calculated for Turkey Point are consistent with risk results for other nuclear power plants,
 5 when adjusted for differences in population, weather, and the magnitude and frequency of
 6 radiological releases. Accordingly, the staff bases its assessment of offsite risk on the CDF and
 7 offsite doses reported by FPL.

8
 9 **5.2.3 Potential Design Improvements**

10
 11 The process for identifying potential plant improvements, an evaluation of that process, and the
 12 improvements evaluated in detail by FPL are discussed in this section.

13
 14 **5.2.3.1 Process for Identifying Potential Design Improvements**

15
 16 FPL's process for identifying potential plant improvements consisted of the following three
 17 elements:

- 18
- 19 • a review of the Turkey Point IPE submittal and the updated PSA
- 20
- 21 • reviews of SAMA analyses submitted in support of original licensing and license renewal
- 22 activities for other operating nuclear power plants and advanced light water reactor plants
- 23
- 24 • reviews of other NRC and industry documentation discussing potential plant improvements.
- 25

26 FPL's initial list of 167 candidate improvements was extracted from the process and is reported
 27 in Table F.2-1 in Appendix F of the ER (FPL 2000).

28
 29 FPL performed a qualitative screening on the initial list of 167 SAMAs using the following criteria:

- 30
- 31 • The SAMA is not applicable to Turkey Point, either because the enhancement is only for
- 32 boiling water reactors, the Westinghouse AP600 design, or pressurized water reactor ice
- 33 condenser containments, or it is a plant-specific enhancement that does not apply at Turkey
- 34 Point (Screening Criterion A), or
- 35
- 36 • The SAMA has already been implemented at Turkey Point (or the design meets the intent of
- 37 the SAMA, as determined by plant review of each SAMA) (Screening Criterion B).
- 38

39 Based on the qualitative screening, 91 SAMAs were eliminated, leaving 76 subject to the final
 40 screening and evaluation process. Of the 91 SAMAs eliminated, 64 were eliminated because

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1 they had already been implemented at Turkey Point (or the design met the intent of the SAMA).
2 The 76 remaining SAMAs are listed in Table F.2-2 of Appendix F of the ER (FPL 2000). The
3 final screening process involves identifying and eliminating those SAMAs whose cost exceeded
4 twice their benefit.
5

6 **5.2.3.2 Staff Evaluation**

7

8 FPL's efforts to identify potential SAMAs focused primarily on areas associated with internal
9 initiating events. (This is reasonable, since external events only contribute a small amount to the
10 total CDF.) The list of 76 SAMAs generally addressed the accident categories that are dominant
11 CDF contributors (transients and small break LOCAs) or issues that tend to have a large impact
12 on a number of accident sequences at Turkey Point Units 3 and 4. The preliminary review of
13 FPL's SAMA identification process raised some concerns that plant-specific risk contributors
14 were not adequately assessed. The staff requested (NRC 2001) additional plant-specific risk
15 information (dominant minimal cutsets) to determine if any significant SAMAs might have been
16 overlooked. Further, the staff requested specific information about the final SAMA candidates
17 including the 16 SAMAs that were based on the Turkey Point plant-specific risk profile as
18 modeled in the current PSA. Based on the initial submittal and the responses to the RAIs, it is
19 the staff's opinion that FPL made a reasonable effort to search for potential SAMA candidates,
20 using the knowledge and experience of its Probabilistic Risk Assessment (PRA) personnel;
21 reviewing insights from the IPE, IPEEE, and other plant-specific studies; and reviewing plant
22 improvements in previous SAMA analyses. The potential SAMA candidates included a balance
23 of both hardware and procedural alternatives.
24

25 It is important to note that as a follow-up to IPE/IPEEE process, FPL has identified five potential
26 enhancements to the plant's accident management capability, that were subsequently
27 implemented, and were considered in more detail in the updated PSA as described below (FPL
28 2001):
29

- 30 • Replenishment of Refueling Water Storage Tank (RWST): This enhancement has been
31 proceduralized in the Turkey Point EOP for loss of emergency coolant recirculation. In
32 addition, the units can also share the high head safety injection systems, meeting the intent
33 of RWST replenishment to prolong the injection for LOCAs by pending steps allowing use of
34 the postulated non-accident unit's RWST inventory.
35
- 36 • Primary System Depressurization: Procedures exist to use the sprays, auxiliary spray or
37 PORVs in the pressurizer to depressurize the Reactor Coolant System (RCS), under high
38 pressure accident conditions. For beyond design basis severe accidents, a Severe Accident
39 Guideline (SAG) has been developed that provides guidance for RCS depressurization to
40 prevent high RCS pressure at a postulated vessel breach.
41
42
43

- 1 • AC Power Recovery: The importance of AC power recovery has been highlighted in the
2 Turkey Point operator training. Hurricane procedures also emphasize the importance of
3 verifying the performance of diesel generators (DGs). A more detailed time-dependent
4 recovery analysis varying the mission time and the time to recover offsite power also allows
5 more realistic quantification of the risk as related to the loss of offsite power and SBO
6 scenarios.
- 7
- 8 • Cross-connection of Component Cooling Water (CCW): This enhancement has been
9 implemented at Turkey Point by providing specific steps in the applicable Off-Normal
10 Operating Procedure to cross-connect the CCW between the two units. This action is also
11 highlighted during operator training at Turkey Point.
- 12
- 13 • Manual Actuation of Containment Spray (Cavity Flooding): This enhancement has already
14 been implemented at Turkey Point. A SAG has been developed in order to provide guidance
15 for injecting water to the containment from a variety of sources including containment spray.
16

17 These enhancements were not included in the SAMA candidate identification process for Turkey
18 Point Units 3 and 4 (FPL 2001) because they had been implemented at the facility.
19

20 The staff notes that the set of SAMAs submitted is not all inclusive, since additional, possibly
21 even less expensive, design alternatives can always be postulated. However, the staff
22 concludes that the benefits of any additional modifications are unlikely to exceed the benefits of
23 the modifications evaluated and that the alternative improvements would not likely cost less than
24 the least expensive alternatives evaluated, when the subsidiary costs associated with
25 maintenance, procedures, and training are considered.
26

27 The staff concludes that FPL used a systematic and comprehensive process for identifying
28 potential plant improvements for Turkey Point Units 3 and 4.
29

30 **5.2.4 Risk Reduction Potential of Design Improvements**

31

32 FPL evaluated each of the 76 SAMAs remaining after the screening using a bounding technique.
33 Each SAMA was assumed to completely eliminate all sequences that the specific enhancement
34 was intended to address. Table 5-5 lists these bounding analyses, the respective assumptions,
35 and the applicable SAMAs. Since there is not an external events PSA model for Turkey Point
36 Units 3 and 4, FPL doubled the maximum benefit (based on the internal risk) to account for any
37 unmodelled risk reduction that could also occur in external events. If the implementation costs
38 were greater than two times the benefit, then the SAMA was screened

Table 5-5. SAMA Cost-Benefit Screening Analysis

Analysis Case and Description	SAMA	Total Benefit (Bounding)	Estimated Cost	Screening Conclusion
SAMAs Requiring Hardware Modifications that Exceed 2 x MAB				
Qualitative Assessment	33, 34, 35, 38, 39, 46, 53, 87, 115, 167	<\$802K (MAB)	>2 x Benefit	Screened out
SAMAs Requiring Plant Hardware Modifications				
SEALCSF Eliminate all contribution from RCP seal LOCAs	7, 8, 9, 10, 11, 12, 13, 15, 16, 165	<\$31K	>2 x Benefit	Screened out
No LOG (see Note 1) Eliminate all loss of grid events	47, 71, 75, 76 Comment: Industry estimates for 71 are \$10M, and for 75 are \$1M/mile	<\$49K	>2 x Benefit	Screened out
SGCRVLP2 Eliminate all contribution from containment spray failure	31, 32, 48	<\$177K	>2 x Benefit	Screened out
CI-OK Eliminate all contribution from early containment failure	88, 96, 157, 161	<\$17K	>2 x Benefit	Screened out
SGFCSF Eliminate secondary decay heat removal failures	No SAMA identification numbers for this case			
HHDDPCSF Added two diesel-driven HHSI pumps (one for each unit)	117, 118, 124, 126,	<\$131K	>2 x Benefit	Screened out

Table 5-5. (contd)

Analysis Case and Description	SAMA	Total Benefit (Bounding)	Estimated Cost	Screening Conclusion
NO-ISLOCA (see Note 2) Eliminate all contribution from ISLOCA	89, 90, 91, 92, 95, 96, 159, 160, 161 Comment: SAMAs 96 and 161 are also considered by base case CI-OK	<\$17K	>2 x Benefit	Screened out
SAMAs Requiring Procedure Modifications				
RABCSF Eliminate all contribution from failure of RAB ventilation	25	<\$15.3K	>2 x Benefit	Screened out
NO-SGTR (Note 1) Eliminate all contribution from SGTR	79, 80, 81, 82, 83, 84, 85	<\$1K	>2 x Benefit	Screened out
EDG5 Installation of another DG	57 Comment: Industry estimates installation of DG to be \$431K - \$25M	<\$72K	>2 x Benefit	Screened out
OPERCSE Further increased operator training for critical human interactions	121	<\$67K	>2 x Benefit	Screened out
OperCSI Provide capability to auto realign from injection mode to recirc mode	131	<\$56K	~\$450K	Screened out
SAMAs Utilizing PRA (CDF or RRW (see Note 3)) as Argument for Elimination				
CDF <5E-07 or RRW = 1	59, 67, 97, 98, 99, 144, 148, 151, 156	~\$0	>2 x Benefit	Screened out
RRW = 1.001, 1.005	135, 140	<\$4.1K	>2 x Benefit	Screened out

Table 5-5. (contd)

Analysis Case and Description	SAMA	Total Benefit (Bounding)	Estimated Cost	Screening Conclusion
RRW = 1.008, 1.009	111, 123	<\$8.1K	>2 x Benefit	Screened out
RRW = 1.016	134	<\$13K	>2 x Benefit	Screened out
CDF contribution of <0.5%	152	<\$4.1K	>2 x Benefit	Screened out
CDF contribution of <2%	129, 149	<\$16.4K	>2 x Benefit	Screened out
CDF contribution of <2.5%	155	<\$20.1K	>2 x Benefit	Screened out
CDF contribution of ~5%	146	<\$41K	>2 x Benefit	Screened out
CDF contribution of 8.5%	101	<\$68.2K	~\$580K	Screened out

Note 1: Requires both plant hardware and procedure modifications.

Note 2: NO-ISLOCA SAMAs 89, 90, 91, 92, 95 require both plant hardware and procedure modifications

Note 3: RRW is the ratio of baseline risk to the risk calculated assuming complete elimination of the risk contribution addressed by the SAMA. Thus, a no-impact SAMA has a RRW of 1, and the relative impact of a SAMA is measured by RRW - 1.

from further consideration. The staff considers the use of a factor of two to implicitly account for the risk benefits associated with both internal and external events to be appropriate for the Turkey Point site.

The initial submittal (FPL 2000) did not give sufficient information regarding the actual risk reduction for the candidate SAMAs. For a given SAMA, all FPL provided was that the risk reduction was less than a given amount. Thus the staff could not determine how close the risk reduction was to the "less-than-value." The staff requested more specific information in the RAIs (NRC 2001). FPL responded (FPL 2001) with a summary of the key risk-reduction attributes for each of the cases (see Table 5-5), including the total benefit that would be achieved from implementing the SAMA.

The staff has reviewed FPL's bases for calculating the risk reduction for the various plant improvements and concludes that the rationale and assumptions for estimating risk reduction is reasonable and generally conservative (i.e., the estimated risk reduction is higher than what would actually be realized).

5.2.5 Cost Impacts of Candidate Design Improvements

FPL estimated the costs of implementing each SAMA through the application of engineering judgment, estimates from other licensees' submittals, and site-specific cost estimates. The cost estimates did not conservatively include the cost of replacement power during extended outages required to implement the modifications, nor did they include contingency costs associated with unforeseen implementation obstacles. Estimates based on modifications implemented or estimated in the past were presented in terms of dollar values at the time of implementation and were not adjusted to present-day dollars.

The minimum cost of making a procedural change (including training) was estimated at \$30,000. The minimum hardware modification package was assumed to be \$70,000. In response to the staff request for more specific cost information in the RAIs (NRC 2001), FPL (FPL 2001) provided a detailed cost breakdown for a digital feedwater control system (totaling \$580,000) as an example.

The cost estimate minimums that are implied in Table F.2-2 of Appendix F of the ER (FPL 2000) were compared to estimates developed elsewhere for similar improvements, including estimates developed as part of other licensees' analyses of SAMAs for operating reactors and advanced light-water reactors. The FPL estimates were found to be consistent and reasonable for the SAMAs under consideration.

5.2.6 Cost-Benefit Comparison

The cost-benefit comparison as evaluated by FPL and the staff evaluation of the cost-benefit analysis are described in the following sections.

5.2.6.1 FPL Evaluation

The methodology used by FPL was based primarily on NRC's guidance for performing cost-benefit analysis, i.e., NUREG/BR-0184, *Regulatory Analysis Technical Evaluation Handbook* (NRC 1997a). The guidance involves determining the net value for each SAMA according to the following formula:

$$\text{Net Value} = (\$APE + \$AOC + \$AOE + \$AOSC) - COE$$

where \$APE = present value of averted public exposure (\$)
\$AOC = present value of averted offsite property damage costs (\$)
\$AOE = present value of averted occupational exposure (\$)
\$AOSC = present value of averted onsite costs (\$)
COE = cost of enhancement (\$).

If the net value of a SAMA is negative, the cost of implementing the SAMA is larger than the benefit associated with the SAMA and it is not considered cost-beneficial. FPL's derivation of each of the associated costs is summarized below.

Averted Public Exposure (APE) Costs

The APE costs were calculated using the following formula:

$$\begin{aligned} \text{APE} &= \text{Annual reduction in public exposure } (\Delta \text{person-rem/ry}) \\ &\quad \times \text{monetary equivalent of unit dose } (\$2000 \text{ per person-rem}) \\ &\quad \times \text{present value conversion factor } (10.88, \text{ based on a 20-year period with a 7-percent} \\ &\quad \text{discount rate}). \end{aligned}$$

As stated in NUREG/BR-0184 (NRC 1997a), it is important to note that the monetary value of the public health risk after discounting does not represent the expected reduction in public health risk due to a single accident. Rather, it is the present value of a stream of potential losses extending over the remaining lifetime (in this case, the renewal period) of the facility. Thus, it reflects the expected annual loss due to a single accident, the possibility that such an accident could occur at any time over the renewal period, and the effect of discounting these potential future losses to present value.

For the purposes of the initial screening, FPL calculated an APE of \$234,207.

Averted Offsite Property Damage Costs (AOC)

The AOCs were calculated using the following formula:

$$\begin{aligned} \text{AOC} = & \text{Annual CDF reduction} \\ & \times \text{offsite economic costs associated with a severe accident (on a per-event basis)} \\ & \times \text{present value conversion factor.} \end{aligned}$$

FPL cited an annual offsite economic risk of \$22,850 based on the Level 3 risk analysis. This value, which corresponds to the frequency-weighted sum of the base offsite economic costs in Table F.1-5 of the ER (FPL 2000), appears to be higher than values for other sites and those presented in NUREG/BR-0184 (NRC 1997a). This higher value is primarily due to the relatively high population in the 80-km (50-mi) radius zone around the plant.

For the purposes of the initial screening, FPL calculated an AOC of \$245,932.

Averted Occupational Exposure (AOE) Costs

The AOE costs were calculated using the following formula:

$$\begin{aligned} \text{AOE} = & \text{Annual CDF reduction} \\ & \times \text{occupational exposure per core damage event} \\ & \times \text{monetary equivalent of unit dose} \\ & \times \text{present value conversion factor.} \end{aligned}$$

FPL derived the values for averted occupational exposure based on information provided in Section 5.7.3 of NUREG/BR-0184 (NRC 1997a). Best estimate values provided for immediate occupational dose (3300 person-rem) and long-term occupational dose (20,000 person-rem over a 10-year cleanup period) were used. The present value of these doses was calculated using the equations provided in NUREG/BR-0184 in conjunction with a monetary equivalent of unit dose of \$2000 per person-rem, a real discount rate of 7 percent, and a time period of 20 years to represent the license-renewal period.

For the purposes of the initial screening, FPL calculated an AOE of \$6,153.

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Averted Onsite Costs (AOSC)

The AOSCs include averted cleanup and decontamination costs, and averted power replacement costs. Repair and refurbishment costs are considered for recoverable accidents only and not for severe accidents. FPL derived the values for AOSC based on information provided in Section 5.7.6 of NUREG/BR-0184 (NRC 1997a).

Averted cleanup and decontamination costs (ACC) are calculated using the following formula:

$$\begin{aligned} \text{ACC} = & \text{Annual CDF reduction} \\ & \times \text{present value of cleanup costs per core damage event} \\ & \times \text{present value conversion factor.} \end{aligned}$$

The total cost of cleanup and decontamination subsequent to a severe accident is estimated in NUREG/BR-0184 (NRC 1997b) as $\$1.5 \times 10^9$ (undiscounted). This value was converted to present costs over a 10-year cleanup period and integrated over the term of the proposed license extension.

For the purposes of the initial screening, FPL calculated an ACC of \$188,082.

Averted power replacement costs RCP are calculated using the following formula:

$$\begin{aligned} \text{RCP} = & \text{Annual CDF reduction} \\ & \times \text{present value of replacement power for a single event} \\ & \times \text{factor to account for remaining service years for which replacement power is required} \\ & \times \text{reactor power scaling factor.} \end{aligned}$$

For the purposes of the initial screening, FPL calculated an RCP of \$127,818.

Thus, the total estimated present dollar value equivalent for severe accidents at Turkey Point Units 3 and 4 is about \$802,000.

FPL Results

Of the 76 SAMAs considered, 75 were eliminated because the estimated costs were expected to exceed twice the total benefit. The benefit was determined by assuming all risk for relevant internal events is eliminated. FPL doubled this value to bound additional benefits that might result for external events. The end result was that no SAMA candidates were found to be cost-beneficial.

FPL performed several sensitivity analyses to evaluate the impact of parameter choices on the analysis results. The sensitivity analyses included the calculation of candidate SAMA benefits using a 3-percent discount rate. There were no changes in the conclusions that resulted from the sensitivity assessments.

5.2.6.2 Staff Evaluation

The cost-benefit analysis performed by FPL was based primarily on NUREG/BR-0184 (NRC 1997a) and was executed appropriately. Although there could have been more attention given to evaluating actual costs, the staff believes that the candidates assessed have costs which are considerably higher than the associated benefits. One of the 76 candidates considered (a SAMA for hydrogen burn control) required additional analysis by the staff to demonstrate that the estimated costs would be expected to sufficiently exceed the estimated benefit so that it could be eliminated.

The staff specifically asked about the costs and benefits of using passive autocatalytic recombiners (PARs) for hydrogen control (NRC 2000). The motivation for this request was that PARs are being considered for hydrogen control at other nuclear power plants and that the FPL assessment for Turkey Point Units 3 and 4 indicates an opportunity to consider hydrogen burn mitigation since the conditional probability for containment failure from a hydrogen burn is large, about 25 percent given a core damage event. An effective system of PARs could reduce this percentage considerably. The potential risk-reduction benefit of PARs is estimated by the staff to be about \$120,000, considering internal events only. (Including external events and assuming the factor of two used by FPL (FPL 2000) to account for external events, this benefit value increases to \$240,000.) The value of \$120,000 was derived by subtracting from the value calculated by FPL for the total risk benefit of about \$800,000 (internal events) those contributions to the total risk benefit that would not be affected by the mitigation of core damage events, namely about \$320,000 (e.g., onsite economic costs), thus yielding \$480,000. About 25 percent of this value would be the benefit for the risk reduction from preventing containment failure from hydrogen burns, yielding \$120,000. Doubling that to account for external events yields about \$240,000 of benefit. (This benefit might be adjusted upward by up to 25 percent when considering the higher burnup of contemporary fuel cycles, and the resulting increased risk.) With the cost of a single PAR estimated at \$45,000, a more detailed assessment may be warranted.

The staff considered both the response to the RAI and NRC analysis of similar issues in addressing the costs and the contribution of PARs to risk reduction. Based on the FPL response to a RAI, it appears that the contribution to late containment failure is overly conservative because actions associated with the SAMGs and the likelihood of a wet cavity were

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not credited in the FPL analysis. FPL stated that although "the estimated cost of the autocatalytic recombiner seems attractive, when additional requirements such as design, qualification, installation, testing, maintenance, procedures and training are included, the cost is expected to be substantially higher." The staff agrees that the total cost, especially when considering multiple PAR units, would be substantially higher.

The staff has assessed and reviewed the role of hydrogen (and carbon monoxide) burns on late containment failures for other nuclear power plants with large-dry containments. Typically, hydrogen burns play a small role in late containment failure. As an example, the staff modeled the contribution of hydrogen combustion to containment failure for units with large dry containments as part of the NUREG-1150 study (NRC 1990). Table A.4-5 of NUREG/CR-4551 (NRC 1993) shows that the contribution of hydrogen combustion to late containment failure for the Zion plant is less than 0.1 percent.

When considering the realistic total costs of installation, training, and maintenance, it is the staff's opinion that the costs will be higher than the \$120,000 to \$240,000 range of the PAR benefit and considerably higher than the staff's estimate of PAR benefit for a typical PWR with a large, dry containment. Further the staff agrees with FPL that accounting for the wet cavity and accident mitigation actions in the SAMGs would reduce the probability of late containment failure and reduce the associated \$120,000 to \$240,000 range of risk-reduction benefits. This "accounting" would also bring Turkey Point Units 3 and 4 more in line with the results of other Level 2 PSAs for similar large-dry containment PWRs.

The staff concludes that PARs do not appear to be cost beneficial for Turkey Point Units 3 and 4. In addition, the installation of PARs do not relate to adequately managing the effects of aging during the period of extended operation. Therefore, it would not need to be implemented as part of license renewal pursuant to 10 CFR Part 54.

5.2.7 Conclusions

FPL compiled a list of 167 SAMA candidates using the SAMA analyses as submitted in support of licensing activities for other nuclear power plants, NRC and industry documents discussing potential plant improvements, and the plant-specific insights from the FPL IPE, IPEEE, and living PSA model. A qualitative screening removed SAMA candidates that (1) did not apply to Turkey Point Units 3 and 4 due to design differences, or (2) the SAMA had already been implemented at Turkey Point Units 3 and 4 (or the design meets the intent of the SAMA, as determined by plant review of each SAMA). A total of 64 SAMA candidates were eliminated since they had already been implemented at Turkey Point (or the design meets the intent of the SAMA, as determined by plant review of each SAMA) and 27 others were eliminated since they are not applicable to Turkey Point Units 3 and 4. Only 76 SAMA candidates remained after this screening process.

Using guidance in NUREG/BR-0184 (NRC 1997a), the FPL current PSA model and a Level 3 analysis developed specifically for SAMA evaluation, a maximum attainable benefit of about \$802,000 was calculated. The PSA results used in the FPL SAMA analysis were calculated using internal event results only. Because Turkey Point Units 3 and 4 do not have an external events PSA model to account for the potential impact of external events on the results of the SAMA evaluations, FPL doubled the benefits for the purposes of comparison to the costs.

The staff reviewed the FPL analysis and concluded that the methods used and the implementation of those methods were sound.

Based on its review of the FPL SAMA analyses, the staff concurs that none of the candidate SAMAs are cost beneficial. This is based on conservative treatment of costs and benefits. This conclusion is consistent with the low residual level of risk indicated in the Turkey Point Units 3 and 4 PSA and the fact that Turkey Point has already implemented many plant improvements identified from the IPE and IPEEE process.

5.3 References

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

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

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

U.S. Nuclear Regulatory Commission (NRC). 2001. Letter from U.S. NRC to T. F. Plunkett, Florida Power & Light Company. Subject: "Request for Additional Information Related to the Staff's Review of Severe Accident Mitigation Alternatives for Turkey Point Units 3 and 4 (TAC Nos. MA9440 and MA9944)." January 31, 2001.

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 were 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 included 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 were 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 characteristics.
- (2) A single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the impacts (except for collective offsite radiological impacts from the fuel cycle and from high-level waste [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 not likely 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 Turkey Point Units 3 and 4. 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 Impact of Transportation of Fuel and Waste to and from One Light-Water-Cooled Nuclear Power Reactor." The

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

Fuel Cycle

1 GEIS also addresses the impacts from radon-222 and technetium-99. There are no Category 2
2 issues for the uranium fuel cycle and solid waste management.
3

4 **6.1 The Uranium Fuel Cycle**

5
6 Category 1 issues in 10 CFR Part 51, Subpart A, Appendix B, Table B-1, that are applicable to
7 Turkey Point Units 3 and 4 from the uranium fuel cycle and solid waste management are listed
8 in Table 6-1.
9

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

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Section
URANIUM FUEL CYCLE AND WASTE MANAGEMENT	
15 Offsite radiological impacts (individual effects from other than 16 the disposal of spent fuel and high level waste [HLW])	6.1; 6.2.1; 6.2.2.1; 6.2.2.3; 6.2.3; 6.2.4; 6.6
17 Offsite radiological impacts (collective effects)	6.1; 6.2.2.1; 6.2.3; 6.2.4; 6.6
18 Offsite radiological impacts (spent fuel and HLW)	6.1; 6.2.2.1; 6.2.3; 6.2.4; 6.6
19 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
20 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
21 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

Table 6.1. (contd)

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	GEIS Sections
URANIUM FUEL CYCLE AND WASTE MANAGEMENT	
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
Nonradiological waste	6.1; 6.5; 6.5.1; 6.5.2; 6.5.3; 6.6
Transportation	6.1; 6.3.1; 6.3.2.3; 6.3.3; 6.3.4; 6.6, Addendum 1

Florida Power & Light Company (FPL) stated in its Environmental Report (ER; FPL 2000) that it is not aware of any new and significant information associated with the renewal of the Turkey Point Units 3 and 4 operating licenses. No new and significant information has been identified by the staff in the review process and in the staff's independent review. Therefore, the staff concludes that there are no impacts related to these issues beyond those discussed in the GEIS. For all of those issues, the staff concluded in the GEIS that the impacts are SMALL except for the collective offsite radiological impacts from the fuel cycle and from HLW and spent fuel disposal, as discussed below, and that plant-specific mitigation measures are not likely to be sufficiently beneficial to be warranted.

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

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

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

The staff has not identified any new and significant information during its independent review of the FPL ER (FPL 2000), the staff's site visit, the scoping process, or its evaluation

Fuel Cycle

1 of other available information. Therefore, the staff concludes that there are no offsite
2 radiological impacts of the uranium fuel cycle during the renewal term beyond those
3 discussed in the GEIS.

- 4
- 5 • Offsite radiological impacts (collective effects). In the GEIS, the staff concluded that
- 6

7 The 100-year environmental dose commitment to the U.S. population from the fuel
8 cycle, except for high level waste and spent fuel disposal, is calculated to be about
9 14,800 person rem [148 person Sv], or 12 cancer fatalities, for each additional 20-year
10 power reactor operating term. Much of this, especially the contribution of radon
11 releases from mines and tailing piles, consists of tiny doses summed over large
12 populations. This same dose calculation can theoretically be extended to include many
13 tiny doses over additional thousands of years as well as doses outside the United
14 States. The result of such a calculation would be thousands of cancer fatalities from the
15 fuel cycle, but this result assumes that even tiny doses have some statistical adverse
16 health effect that will not ever be mitigated (for example no cancer cure in the next
17 thousand years), and that these doses projection[s] over thousands of years are
18 meaningful. However, these assumptions are questionable. In particular, science
19 cannot rule out the possibility that there will be no cancer fatalities from these tiny
20 doses. For perspective, the doses are very small fractions of regulatory limits and even
21 smaller fractions of natural background exposure to the same populations...
22 Nevertheless, some judgement as to the regulatory NEPA [National Environmental
23 Policy Act] implication of these matters should be made, and it makes no sense to
24 repeat the same judgement in every case. The Commission concludes that these
25 impacts are acceptable in that these impacts would not be sufficiently large to require
26 the NEPA conclusion, for any plant, that the option of extended operation under
27 10 CFR 54 should be eliminated. Accordingly, while the Commission has not assigned
28 a single level of significance for the collective effects of the fuel cycle, this issue is
29 considered Category 1.

30

31 The staff has not identified any new and significant information during its independent
32 review of the FPL ER (FPL 2000), the staff's site visit, the scoping process, or its evaluation
33 of other available information. Therefore, the staff concludes that there are no offsite
34 radiological impacts (collective effects) from the uranium fuel cycle during the renewal term
35 beyond those discussed in the GEIS.

36

- 1 • Offsite radiological impacts (spent fuel and HLW disposal). Based on information in the
2 GEIS, the Commission found that
3

4 For the high level waste and spent fuel disposal component of the fuel cycle, there are
5 no current regulatory limits for offsite releases of radionuclides for the current candidate
6 repository site. However, if we assume that limits are developed along the lines of the
7 1995 National Academy of Sciences (NAS) report, "Technical Bases for Yucca Mountain
8 Standards," and that in accordance with the Commission's Waste Confidence Decision,
9 10 CFR 51.23, a repository can and likely will be developed at some site which will
10 comply with such limits, peak doses to virtually all individuals will be 100 millirem
11 [1 mSv] per year or less. However, while the Commission has reasonable confidence
12 that these assumptions will prove correct, there is considerable uncertainty since the
13 limits are yet to be developed, no repository application has been completed or
14 reviewed, and uncertainty is inherent in the models used to evaluate possible pathways
15 to the human environment. The NAS report indicated that 100 millirem [1 mSv] per year
16 should be considered as a starting point for limits for individual doses, but notes that
17 some measure of consensus exists among national and international bodies that the
18 limits should be a fraction of the 100 millirem [1 mSv] per year. The lifetime individual
19 risk from 100 millirem [1 mSv] annual dose limit is about 3×10^{-3} .
20

21 Estimating cumulative doses to populations over thousands of years is more problem-
22 atic. The likelihood and consequences of events that could seriously compromise the
23 integrity of a deep geologic repository were evaluated by the Department of Energy in
24 the "Final Environmental Impact Statement: Management of Commercially Generated
25 Radioactive Waste," October 1980 [DOE 1980]. The evaluation estimated the 70-year
26 whole-body dose commitment to the maximum individual and to the regional population
27 resulting from several modes of breaching a reference repository in the year of closure,
28 after 1,000 years, after 100,000 years, and after 100,000,000 years. Subsequently, the
29 NRC and other federal agencies have expended considerable effort to develop models
30 for the design and for the licensing of a high level waste repository, especially for the
31 candidate repository at Yucca Mountain. More meaningful estimates of doses to
32 population may be possible in the future as more is understood about the performance
33 of the proposed Yucca Mountain repository. Such estimates would involve very great
34 uncertainty, especially with respect to cumulative population doses over thousands of
35 years. The standard proposed by the NAS is a limit on maximum individual dose. The
36 relationship of potential new regulatory requirements, based on the NAS report, and
37 cumulative population impacts has not been determined, although the report articulates
38 the view that protection of individuals will adequately protect the population for a
39 repository at Yucca Mountain. However, EPA's generic repository standards in 40 CFR
40 Part 191 generally provide an indication of the order of magnitude of cumulative risk to

Fuel Cycle

1 population that could result from the licensing of a Yucca Mountain repository, assuming
2 the ultimate standards will be within the range of standards now under consideration.
3 The standards in 40 CFR Part 191 protect the population by imposing "containment
4 requirements" that limit the cumulative amount of radioactive material released over
5 10,000 years. Reporting performance standards that will be required by EPA are
6 expected to result in releases and associated health consequences in the range
7 between 10 and 100 premature cancer deaths with an upper limit of 1,000 premature
8 cancer deaths worldwide for a 100,000 metric tonne (MTHM) repository.
9

10 Nevertheless, despite all the uncertainty, some judgement as to the regulatory NEPA
11 implications of these matters should be made and it makes no sense to repeat the same
12 judgement in every case. Even taking the uncertainties into account, the Commission
13 concludes that these impacts are acceptable in that these impacts would not be
14 sufficiently large to require the NEPA conclusion, for any plant, that the option of
15 extended operation under 10 CFR Part 54 should be eliminated. Accordingly, while the
16 Commission has not assigned a single level of significance for the impacts of spent fuel
17 and high level waste disposal, this issue is considered Category 1.
18

19 The staff has not identified any new and significant information during its independent
20 review of the FPL ER (FPL 2000), the staff's site visit, the scoping process, or its evaluation
21 of other available information. Therefore, the staff concludes that there are no offsite
22 radiological impacts related to spent fuel and HLW disposal during the renewal term beyond
23 those discussed in the GEIS.
24

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

27
28 The nonradiological impacts of the uranium fuel cycle resulting from the renewal of an
29 operating license for any plant are found to be small.
30

31 The staff has not identified any new and significant information during its independent
32 review of the FPL ER (FPL 2000), the staff's site visit, the scoping process, or its evaluation
33 of other available information. Therefore, the staff concludes that there are no nonradiolo-
34 gical impacts of the uranium fuel cycle during the renewal term beyond those discussed in
35 the GEIS.
36

- 1 • Low-level waste storage and disposal. Based on information in the GEIS, the Commission
2 found that
3

4 The comprehensive regulatory controls that are in place and the low public doses being
5 achieved at reactors ensure that the radiological impacts to the environment will remain
6 small during the term of a renewed license. The maximum additional on-site land that
7 may be required for low-level waste storage during the term of a renewed license and
8 associated impacts will be small. Nonradiological impacts on air and water will be
9 negligible. The radiological and nonradiological environmental impacts of long-term
10 disposal of low-level waste from any individual plant at licensed sites are small. In
11 addition, the Commission concludes that there is reasonable assurance that sufficient
12 low-level waste disposal capacity will be made available when needed for facilities to be
13 decommissioned consistent with NRC decommissioning requirements.
14

15 The staff has not identified any new and significant information during its independent
16 review of the FPL ER (FPL 2000), the staff's site visit, the scoping process, or its evaluation
17 of other available information. Therefore, the staff concludes that there are no impacts of
18 low-level waste storage and disposal associated with the renewal term beyond those
19 discussed in the GEIS.
20

- 21 • Mixed waste storage and disposal. Based on information in the GEIS, the Commission
22 found that
23

24 The comprehensive regulatory controls and the facilities and procedures that are in
25 place ensure proper handling and storage, as well as negligible doses and exposure to
26 toxic materials for the public and the environment at all plants. License renewal will not
27 increase the small, continuing risk to human health and the environment posed by mixed
28 waste at all plants. The radiological and nonradiological environmental impacts of long-
29 term disposal of mixed waste from any individual plant at licensed sites are small. In
30 addition, the Commission concludes that there is reasonable assurance that sufficient
31 mixed waste disposal capacity will be made available when needed for facilities to be
32 decommissioned consistent with NRC decommissioning requirements.
33

34 The staff has not identified any new and significant information during its independent
35 review of the FPL ER (FPL 2000), the staff's site visit, the scoping process, or its evaluation
36 of other available information. Therefore, the staff concludes that there are no impacts of
37 mixed waste storage and disposal associated with the renewal term beyond those
38 discussed in the GEIS.
39

Fuel Cycle

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

2
3 The expected increase in the volume of spent fuel from an additional 20 years of
4 operation can be safely accommodated on site with small environmental effects through
5 dry or pool storage at all plants if a permanent repository or monitored retrievable
6 storage is not available.
7

8 The staff has not identified any new and significant information during its independent
9 review of the FPL ER (FPL 2000), the staff's site visit, the scoping process, or its evaluation
10 of other available information. Therefore, the staff concludes that there are no impacts of
11 onsite spent fuel associated with license renewal beyond those discussed in the GEIS.
12

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

14
15 No changes to generating systems are anticipated for license renewal. Facilities and
16 procedures are in place to ensure continued proper handling and disposal at all plants.
17

18 The staff has not identified any new and significant information during its independent
19 review of the FPL ER (FPL 2000), the staff's site visit, the scoping process, or its evaluation
20 of other available information. Therefore, the staff concludes that there are no
21 nonradiological waste impacts during the renewal term beyond those discussed in the GEIS
22

- 23 • Transportation. Based on information contained in the GEIS, the Commission found that

24
25 The impacts of transporting spent fuel enriched up to 5 percent uranium-235 with
26 average burnup for the peak rod to current levels approved by NRC up to 62,000 MWd/
27 MTU and the cumulative impacts of transporting high-level waste to a single repository,
28 such as Yucca Mountain, Nevada are found to be consistent with the impact values
29 contained in 10 CFR 51.52(c), Summary Table S-4—Environmental Impact of
30 Transportation of Fuel and Waste to and from One Light-Water-Cooled Nuclear Power
31 Reactor. If fuel enrichment or burnup conditions are not met, the applicant must submit
32 an assessment of the implications for the environmental impact values reported in
33 §51.52.
34

35 Turkey Point Units 3 and 4 meet the fuel-enrichment and burnup conditions set forth in
36 Addendum 1 to the GEIS. The staff has not identified any new and significant information
37 during its independent review of the FPL ER (FPL 2000), the staff's site visit, the scoping
38 process, or its evaluation of other available information. Therefore, the staff concludes that
39 there are no impacts of transportation associated with license renewal beyond those
40 discussed in the GEIS.

6.2 References

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

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

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

Florida Power & Light Company (FPL). 2000. *Applicant's Environmental Report – Operating License Renewal Stage Turkey Point Units 3 and 4*. Miami, Florida.

National Academy of Sciences (NAS). 1995. *Technical Bases for Yucca Mountain Standards*. Washington, D.C.

U.S. Department of Energy (DOE). 1980. *Final Environmental Impact Statement: Management of Commercially Generated Radioactive Waste*. DOE/EIS-0046F, Washington, D.C.

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

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

7.0 Environmental Impacts of Decommissioning

Environmental issues associated with decommissioning, which result from continued plant operation during the renewal term were 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 included 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 were 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 characteristics.
- (2) A single significance level (i.e., SMALL, MODERATE, or LARGE) has been assigned to the impacts (except for collective offsite radiological impacts from the fuel cycle and from high-level waste and spent fuel disposal).
- (3) Mitigation of adverse impacts associated with the issue has been considered in the analysis, and it has been determined that additional plant-specific mitigation measures are not likely to be sufficiently beneficial to warrant implementation.

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 Turkey Point Units 3 and 4.

Category 1 issues in Table B-1 of 10 CFR Part 51, Subpart A, Appendix B that are applicable to Turkey Point Units 3 and 4 decommissioning following the renewal term are listed in Table 7-1. Florida Power & Light Company (FPL) stated in its Environmental Report (ER; FPL 2000) that it is aware of no new and significant information regarding the environmental impacts of Turkey Point Units 3 and 4 license renewal. The staff has not identified any new and significant information during its independent review of the FPL ER (FPL 2000), the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes

(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.

Environmental Impacts of Decommissioning

1 that there are no impacts related to these issues beyond those discussed in the GEIS. For all
2 of these issues, the staff concluded in the GEIS that the impacts are SMALL, and plant-specific
3 mitigation measures are not likely to be sufficiently beneficial to be warranted.
4

5 **Table 7-1. Category 1 Issues Applicable to the Decommissioning of Turkey Point**
6 **Units 3 and 4 Following the Renewal Term**
7

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

8
9
10
11
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13
14
15
16
17
18
19 A brief description of the staff's review and the GEIS conclusions, as codified in Table B-1, for
20 each of the issues follows:
21

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

23
24 Doses to the public will be well below applicable regulatory standards regardless of
25 which decommissioning method is used. Occupational doses would increase no more
26 than 1 man-rem [0.01 person-Sv] caused by buildup of long-lived radionuclides during
27 the license renewal term.
28

29 The staff has not identified any new and significant information during its independent
30 review of the FPL ER (FPL 2000), the staff's site visit, the scoping process, or its evaluation
31 of other available information. Therefore, the staff concludes that there are no radiation
32 doses associated with decommissioning following license renewal beyond those discussed
33 in the GEIS.
34

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

36
37 Decommissioning at the end of a 20-year license renewal period would generate no
38 more solid wastes than at the end of the current license term. No increase in the
39 quantities of Class C or greater than Class C wastes would be expected.
40

1 The staff has not identified any new and significant information during its independent
2 review of the FPL ER (FPL 2000), the staff's site visit, the scoping process, or its evaluation
3 of other available information. Therefore, the staff concludes that there are no impacts of
4 solid waste associated with decommissioning following the license renewal term beyond
5 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 the end of
10 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 FPL ER (FPL 2000), the staff's site visit, the scoping process, or its evaluation
14 of other available information. Therefore, the staff concludes that there are no impacts of
15 license renewal on air quality during decommissioning beyond those discussed in the GEIS.
16

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

18
19 The potential for significant water quality impacts from erosion or spills is no greater
20 whether decommissioning occurs after a 20-year license renewal period or after the
21 original 40-year operation period, and measures are readily available to avoid such
22 impacts.
23

24 The staff has not identified any new and significant information during its independent
25 review of the FPL ER (FPL 2000), the staff's site visit, the scoping process, or its evaluation
26 of other available information. Therefore, the staff concludes that there are no impacts of
27 the license renewal term on water quality during decommissioning beyond those discussed
28 in the GEIS.
29

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

31
32 Decommissioning after either the initial operating period or after a 20-year license
33 renewal period is not expected to have any direct ecological impacts.
34

35 The staff has not identified any new and significant information during its independent
36 review of the FPL ER (FPL 2000), the staff's site visit, the scoping process, or its evaluation
37 of other available information. Although the nuclear plants would close, continued operation
38 of the cooling canal system will be needed to support the Turkey Point fossil plants.
39 Therefore, the staff concludes that there are no impacts of the license renewal term on
40 ecological resources during decommissioning beyond those discussed in the GEIS.

Environmental Impacts of Decommissioning

- Socioeconomic Impacts. Based on information in the GEIS, the Commission found that

Decommissioning would have some short-term socioeconomic impacts. The impacts would not be increased by delaying decommissioning until the end of a 20-year relicense period, but they might be decreased by population and economic growth.

The staff has not identified any new and significant information during its independent review of the FPL ER (FPL 2000), the staff's site visit, the scoping process, or its evaluation of other available information. Therefore, the staff concludes that there are no impacts of license renewal on the socioeconomic impacts of decommissioning beyond those discussed in the GEIS.

7.1 References

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

Florida Power & Light Company (FPL). 2000. *Applicant's Environmental Report – Operating License Renewal Stage Turkey Point Units 3 and 4*. Revision 1, Miami, Florida.

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

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

Alternatives

1 (1) demand-side management and energy conservation, (2) power purchased from other
2 electricity providers, (3) generating alternatives other than Turkey Point Units 3 and 4, or
3 (4) some combination of these options.
4

5 FPL will be required to comply with NRC decommissioning requirements whether or not the
6 OLs are renewed. If the Turkey Point Units 3 and 4 OLs are renewed, decommissioning
7 activities may be postponed for up to an additional 20 years. If the OLs are not renewed, FPL
8 would conduct decommissioning activities according to the requirements in 10 CFR 50.82. The
9 GEIS (NRC 1996; 1999) and the *Final Generic Environmental Impact Statement on*
10 *Decommissioning of Nuclear Facilities* (NRC 1988) provide descriptions of decommissioning
11 activities.
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 ensuing paragraphs. Impacts for all other impact categories would be SMALL as shown in
23 Table 9-1.
24

- 25 • Socioeconomic: When Turkey Point Units 3 and 4 cease operation, there will be a
26 decrease in employment and tax revenues associated with the closure. These impacts
27 would be concentrated in Miami-Dade County with lesser impacts in Broward and Monroe
28 counties. Most secondary employment impacts and impacts on population would also be
29 concentrated in Miami-Dade County and to a lesser extent in Broward and Monroe counties.
30 Approximately 85 percent of employees who work at Turkey Point Units 3 and 4 live in
31 Miami-Dade County, 7 percent live in Broward County, 7 percent live in Monroe County, and
32 the remainder live in other locations (FPL 2000a). The extent of impacts on Miami-Dade
33 County, particularly the southern portion of the county, will depend on the extent to which
34 economic and population growth projected for South Miami-Dade County materializes (see
35 Section 2.2.8.6).

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

Impact Category	Impact	Comment
Socioeconomic	SMALL to MODERATE	SMALL—if current growth projections for South Miami-Dade County materialize. MODERATE—decrease in employment, higher-paying jobs, and tax revenues assuming projected growth projections for South Miami-Dade County do not materialize.
Historic and Archaeological Resources	SMALL	Land occupied by Units 3 and 4 would likely be retained by FPL
Environmental Justice	SMALL to MODERATE	SMALL—if growth projections for South Miami-Dade County materialize. MODERATE—loss of employment opportunities if growth projections are not realized.

Most of the tax revenue losses resulting from closure of Turkey Point Units 3 and 4 would occur in Miami-Dade County. In 1998, FPL paid \$10.14 million in property taxes to Miami-Dade County for Turkey Point Units 3 and 4, or about 1.6 percent of all property taxes collected by the county. The no-action alternative would result in the loss of these taxes as well as the loss of plant payrolls 20 years earlier than if the OLs were renewed.

There would be some adverse impacts on housing values, the local economy in South Miami-Dade County, and employment if Turkey Point Units 3 and 4 were to cease operations. The local area is still in the process of recovering from the partial closure of the Homestead Air Force Base in 1994 and from the effects of Hurricane Andrew in 1992, both of which have had an adverse effect on employment opportunities and the local housing market.

FPL employees at Turkey Point Units 3 and 4 currently contribute time and money toward community involvement, including schools, churches, charities, and other civic activities. It is likely that with a reduced presence in the community following decommissioning, FPL's community involvement efforts in the region would be lessened.

Alternatives

1 If the growth forecasts for South Miami-Dade County materialize, the socioeconomic
2 consequences of nonrenewal of the OLs could be partially or entirely offset by the new jobs
3 created by such growth. What is not known are the types of jobs and pay scale of the
4 projected employment increase. If some of the new jobs are skilled, higher-paying jobs,
5 then the impacts of nonrenewal of the Turkey Point Units 3 and 4 OLs could be significantly
6 mitigated and the socioeconomic consequence of closure would be SMALL. If the jobs are
7 less skilled, and lower-paying jobs, then the impact of plant closure could be only partially
8 offset and the impacts would be MODERATE.
9

- 10 • Historic and Archaeological Resources: The potential for future adverse impacts to known
11 or unrecorded cultural resources at Turkey Point Units 3 and 4 following decommissioning
12 will depend on the future use of the site land. Following decommissioning, land occupied by
13 Units 3 and 4 would likely be retained by FPL. The system of cooling canals would continue
14 to be needed for operation of Turkey Point fossil-fuel Units 1 and 2. Eventual sale or
15 transfer of the land occupied by Units 3 and 4 could result in adverse impacts on these
16 resources if the land-use pattern changes dramatically. The impacts of this alternative on
17 historic and archaeological resources are considered SMALL.
18
- 19 • Environmental Justice for No-Action: Current operations at Turkey Point Units 3 and 4 have
20 no disproportionate impacts on the minority and low-income populations of the surrounding
21 counties, and no environmental pathways have been identified that would cause dispro-
22 proportionate impacts. Closure of Units 3 and 4 would result in decreased employment
23 opportunities and tax revenues in South Miami-Dade County with possible negative and
24 disproportionate impacts on minority or low-income populations. The extent of the impacts
25 would depend on the extent to which projected economic growth for South Miami-Dade
26 County materializes and the extent to which those impacted are able to commute from the
27 south part of the county to jobs elsewhere in the county. If projected growth is not fully
28 realized, then employment opportunities for minority and low-income populations could be
29 disproportionately impacted. Under this scenario, the environmental justice impacts are
30 considered SMALL to MODERATE. Alternatively, if projected growth does materialize, the
31 impacts of closure on minority and low-income populations would be mitigated, regardless
32 of whether the created jobs are low- or high-paying jobs. The environmental justice impacts
33 under this scenario are considered SMALL.
34

35 8.2 Alternative Energy Sources

36
37 This section discusses the environmental impacts associated with alternative sources of electric
38 power to replace the power generated by Turkey Point Units 3 and 4, assuming that the OLs for
39 Units 3 and 4 are not renewed. The following generation alternatives are considered in detail:
40

- 1 • coal-fired generation at the Turkey Point site and an alternate Florida site (Section 8.2.1)
- 2
- 3 • natural gas-fired generation at the Turkey Point site and an alternate Florida site
- 4 (Section 8.2.2)
- 5
- 6 • nuclear generation at the Turkey Point site and an alternate Florida site (Section 8.2.3)
- 7
- 8 • oil-fired generation at the Turkey Point site (Section 8.2.4).
- 9

10 The alternative of purchasing power from other sources to replace power generated at Turkey
 11 Point Units 3 and 4 is discussed in Section 8.2.5. Other power generation alternatives and
 12 conservation alternatives considered by the staff and found not to be reasonable replacements
 13 for Units 3 and 4 are discussed in Section 8.2.6. Section 8.2.7 discusses the environmental
 14 impacts of a combination of generation and conservation alternatives. The impacts associated
 15 with a combination of alternatives are estimated to be the same as or larger than the environ-
 16 mental consequences of renewal of the OLS for Turkey Point Units 3 and 4. The order of
 17 presentation of alternative energy sources in Section 8.2 does not imply which alternative would
 18 be most likely to occur or to have the least environmental impacts.

19
 20 Each year the Energy Information Administration (EIA), a component of the U.S. Department of
 21 Energy (DOE), issues an Annual Energy Outlook. The *Annual Energy Outlook 2001*, was
 22 issued in December 2000 (DOE/EIA 2000a). In the *Annual Energy Outlook 2001*, EIA projects
 23 that combined-cycle or combustion turbine technology fueled by natural gas is likely to account
 24 for approximately 92 percent of new electric generating capacity between the years 2000 and
 25 2020 (DOE/EIA 2000a). Both technologies are designed primarily to supply peak and inter-
 26 mediate capacity, but combined-cycle technology can also be used to meet baseload^(a) require-
 27 ments. Coal-fired plants are projected by EIA to account for approximately 6 percent of new
 28 capacity during this period. Coal-fired plants are generally used to meet baseload require-
 29 ments. Renewable energy sources, primarily wind, biomass gasification, and municipal solid
 30 waste units, are projected by EIA to account for the remaining 2 percent of capacity additions.
 31 EIA's projections are based on the assumption that providers of new generating capacity will
 32 seek to minimize cost while meeting applicable environmental requirements. Combined-cycle
 33 plants are projected by EIA to have the lowest generation cost in 2005 and 2020, followed by
 34 coal-fired plants and then wind generation (DOE/EIA 2000a).

(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.

Alternatives

1 EIA projects that oil-fired plants will account for very little of new generation capacity in the
2 United States during the 2000 to 2020 time period because of higher fuel costs and lower
3 efficiencies (DOE/EIA 2000a). Nevertheless, an oil-fired generating alternative at the Turkey
4 Point site for replacement of power generated by Turkey Point Units 3 and 4 is considered in
5 Section 8.2.4, principally because co-located Turkey Points Units 1 and 2 are oil-fired
6 generation plants and infrastructure to support the oil-fired generation option is already in place
7 at the Turkey Point site.
8

9 EIA also projects that new nuclear power plants will not account for any new generation
10 capacity in the United States during the 2000 to 2020 time period because natural gas and
11 coal-fired plants are projected to be more economical (DOE/EIA 2000a). In spite of this
12 projection, a new nuclear plant alternative for replacement of power generated by Turkey Point
13 Units 3 and 4 is considered in Section 8.2.3. Since 1997, the NRC has certified three new
14 standard designs for nuclear power plants under the procedures in 10 CFR 52 Subpart B.
15 These designs are the U.S. Advanced Boiling Water Reactor (10 CFR 52, Appendix A), the
16 System 80+ Design (40 CFR 52, Appendix B), and the AP600 Design (10 CFR 52,
17 Appendix C). The submission to the NRC of these three applications for certification indicates
18 continuing interest in the possibility of licensing new nuclear power plants. NRC has recently
19 established a Future Licensing Project Organization to prepare for and manage future reactor
20 and site licensing applications (NRC 2001).
21

22 Turkey Point Units 3 and 4 have a combined net summer rating of 1386 megawatts electric
23 (MW[e]). For the coal, natural gas, and oil-fired alternatives, FPL's Environmental Report (ER;
24 FPL 2000a) assumes three standard 400-MW(e) units^(a) as potential replacements for Units 3
25 and 4. This approach is followed in this draft SEIS, although it results in some environmental
26 impacts that are roughly 13 percent lower than if full replacement capacity were constructed.
27 FPL's reasoning is that although customized unit sizes can be built, use of standardized sizes is
28 more economical. Moreover, using four 400-MW(e) units for the analysis would overestimate
29 environmental impacts and tend to make the fossil alternatives less attractive.
30

31 FPL identified three preferred and three additional potential sites in Florida, all with existing FPL
32 generating units, for possible future generation additions in its *Ten Year Power Plant Site Plan*
33 prepared for the Florida Public Service Commission (FPL 2000b). The three preferred sites
34 are: (1) a site 6 km (4 mi) east of Tice in Lee County, (2) property within the city limits of
35 Debary in Volusia County, and (3) a site 11 km (7 mi) northwest of Indiantown in Martin County.
36 The Martin County site is the closest preferred site to Turkey Point. The three additional

(a) The gas-fired units would have a rating of 416 gross MW and 400 net MW. The coal-fired units would have a rating of 424 gross MW and 400 net MW. The difference between "gross" and "net" is the electricity consumed onsite.

1 potential sites are: (1) a site in Brevard County near the city of Port St. Johns, (2) a site in Palm
 2 Beach County within the city limits of Riviera Beach, and (3) a site in Broward County at Port
 3 Everglades within the city limits of Fort Lauderdale. The potential site in Broward County is the
 4 closest of the designated preferred and potential sites to the Turkey Point site. This draft SEIS
 5 has been prepared taking account of these preferred and potential sites, but not being limited to
 6 these particular sites.

7
 8 **8.2.1 Coal-Fired Generation**
 9

10 The coal-fired alternative is analyzed for both the Turkey Point site and an alternate site in
 11 Florida, such as one of the preferred or potential sites identified by FPL in its *Ten Year Power*
 12 *Plant Site Plan* (FPL 2000b). Construction of three 400-MW(e) units is assumed as discussed
 13 in Section 8.2. Construction at an alternate site would necessitate the construction of a new
 14 500-kV transmission line to connect to existing lines to transmit power to FPL's customers in
 15 the Miami area. The FPL ER assumes that the new line would be approximately 96 km (60 mi)
 16 long (FPL 2000a).

17
 18 The coal-fired plant would consume approximately 3.6 million metric ton (MT) (4.0 million tons)
 19 per year of pulverized bituminous coal with an ash content of approximately 8.2 percent (FPL
 20 2000a). The ER assumes a heat rate^(a) of 2.8 joules (J) of fuel /J of electricity (9600 Btu/kWh)
 21 and a capacity factor^(b) of 0.9 (FPL 2000a). After combustion, 99.9 percent of the ash would be
 22 collected and disposed of at the plant site. In addition, approximately 300,000 MT (329,000
 23 tons) of scrubber sludge would be disposed of at the plant site based on annual calcium
 24 hydroxide usage of approximately 169,000 MT (186,000 tons). Calcium hydroxide^(c) is used in
 25 the scrubbing process for control of sulfur dioxide (SO₂) emissions.

(a) Heat rate is a measure of generating plant thermal efficiency. The value given is in both metric and English units. It is more commonly 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.

(b) 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.

(c) Calcium hydroxide is prepared by reacting lime with water, a process called slaking. Calcium hydroxide is also known as hydrated lime or slaked lime. Calcium oxide (lime) is prepared by heating calcium carbonate (i.e., limestone) in a lime kiln to about 500°C to 600°C, which decomposes the limestone into the oxide and carbon dioxide.

Alternatives

1 The FPL ER assumes that coal and calcium hydroxide would be delivered by barge to the
2 existing Turkey Point receiving dock. This dock is currently used for oil deliveries for Turkey
3 Point Units 1 and 2. Any barge delivery would require the barges and accompanying vessels to
4 pass through Biscayne National Park and the dredged channel that serves the dock. Such
5 delivery would have an adverse aesthetic impact on park visitors. The park ecology would also
6 be negatively impacted by routine transport and potentially impacted significantly if an accident
7 occurred during transport.
8

9 An alternative means of delivery would be by rail. The Florida East Coast Railroad and CSX
10 Transportation Inc. have tracks that serve the Miami area (Florida Department of Transportation
11 2001). Tracks of the Florida East Coast Railroad are approximately 14 km (9 mi) northwest of
12 the Turkey Point site (NRC 1996). Construction of a rail spur to the Turkey Point site could
13 occur in sensitive Everglades wetland areas and have negative ecological impacts both from
14 construction and operation. Rail delivery would be the most likely option for delivering coal to
15 an alternate inland Florida site for the coal plant. Barge delivery is potentially feasible for a
16 coastal site.
17

18 For the rail delivery option, coal would likely be delivered by rail trains of approximately 115 cars
19 each. Each open-top rail car holds about 90 MT (100 tons) of coal. Additional rail cars would
20 be needed for lime delivery. In all, approximately 340 trains per year, would deliver the coal
21 and lime for the three units. An average of roughly 13 train trips per week on the rail spur
22 would be needed, because for each full train delivery there would be an empty return train.
23

24 A coal slurry pipeline is another potential alternative for delivering coal. However, such a
25 pipeline would need to cover a great distance to reach a suitable coal-mining area or the coal
26 would need to be transported by alternative means (e.g., rail) to a site closer to the Turkey
27 Point site for introduction into the pipeline. The coal slurry pipeline alternative for delivering
28 coal is not considered a feasible alternative because of the length of the pipeline that would be
29 needed and is not further evaluated in this draft SEIS.
30

31 Unless otherwise indicated, the assumptions and numerical values used in Section 8.2.1 are
32 from the FPL ER (FPL 2000a). The staff reviewed this information and compared it to environ-
33 mental impact information in the GEIS. Although the OL renewal period is only 20 years, the
34 impact of operating the coal-fired alternative for 40 years is considered (as a reasonable
35 projection of the operating life of a natural coal-fired plant).
36

37 **8.2.1.1 Closed-Cycle Cooling System**

38

39 A coal-fired plant located at the Turkey Point site would use the existing canal system as a
40 source of cooling. An alternate site could use either a closed-cycle or a once-through cooling

1 system. FPL did not analyze an alternate site for a coal-fired plant in its ER, but assumed
 2 that an alternative natural gas-fired plant at a central Florida location would use a closed-cycle
 3 cooling system using mechanical draft cooling towers (FPL 2000a).
 4

5 The overall impacts of the coal-fired generating system are discussed in the following sections
 6 and summarized in Table 8-2. The extent of impacts at an alternate Florida site will depend on
 7 the location of the particular site selected.
 8

9 • **Land Use**

10
 11 The existing facilities and infrastructure at the Turkey Point site would be used to the extent
 12 practicable, limiting the amount of new construction that would be required. Specifically, it is
 13 assumed that the coal-fired replacement plant alternative would use the cooling canal
 14 system, switchyard, offices, and transmission line right-of-way. Much of the land that would
 15 be used has been previously disturbed.
 16

17 The coal-fired generation alternative would necessitate converting roughly an additional
 18 360 ha (900 ac) of the Turkey Point site to industrial use for the plant, coal storage, and ash
 19 and scrubber sludge disposal. Additional land-use changes would occur offsite in an
 20 undetermined coal-mining area to supply coal for the plant. The GEIS estimated that
 21 approximately 8900 ha (22,000 ac) would be affected for mining the coal and disposing of
 22 the waste to support a coal plant during its operational life. Partially offsetting this offsite
 23 land use would be the elimination of the need for uranium mining to supply fuel for Units 3
 24 and 4. The GEIS estimated that approximately 400 ha (1000 ac) would be affected for
 25 mining the uranium and processing it during the operating life of a nuclear power plant.
 26

27 If coal is delivered by rail, an additional approximately 70 ha (160 ac) would be needed for a
 28 rail spur.
 29

30 The waste would be disposed of onsite, accounting for approximately 138 ha (340 ac) of
 31 land area over the 40-year plant life.
 32

33 The impact of a coal-fired generating unit on land use at the existing Turkey Point site is
 34 best characterized as MODERATE. The impact would definitely be greater than the OL
 35 renewal alternative.
 36

37 Construction of the coal-fired generation alternative at an alternate Florida site could impact
 38 up to 700 ha (1700 ac) (NRC 1996). An additional 1000 ha (2500 ac) would be needed for
 39 a transmission line to connect to existing lines to transmit power to FPL customers in the
 40 Miami area. Up to 70 ha (160 ac) could also be needed for a rail spur for coal and lime

Alternatives

Table 8-2. Summary of Environmental Impacts of Coal-Fired Generation at Turkey Point Site and an Alternate Florida Site Using Closed-Cycle Cooling

		Turkey Point Site		Alternate Florida Site	
Impact Category	Impact	Comments	Impact	Comments	
Land Use	MODERATE	Uses approximately 570 ha (1400 ac) for plant, waste disposal, and rail spur; additional offsite land impacts for coal and limestone mining.	MODERATE to LARGE	Uses approximately 1770 ha (4300 ac), for plant, offices, parking, transmission line, and rail spur; additional land impacts for coal and limestone mining.	
Ecology	MODERATE to LARGE	Uses undeveloped areas at current Turkey Point site, plus rail corridor or barge channel. Barge traffic in Biscayne Bay would adversely affect the marine ecosystem.	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 cooling canal 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 <ul style="list-style-type: none"> • 11,200 MT/yr (12,300 tons/yr) Nitrogen oxides <ul style="list-style-type: none"> • 7000 MT/yr (7800 tons/yr) Particulates <ul style="list-style-type: none"> • 150 MT/yr (165 tons/yr) of total suspended particulates • 34 MT/yr (38 tons/yr) of PM₁₀ 	MODERATE	Potentially same impacts as the Turkey Point site, although pollution-control standards may vary.	

Table 8-2. (contd)

		Turkey Point Site		Alternate Florida Site	
Impact Category	Impact	Comments	Impact	Comments	
Air Quality (contd)		Carbon monoxide • 900 MT/yr (1000 tons/yr) Small amounts of mercury and other hazardous air pollutants and naturally occurring radioactive materials – mainly uranium and thorium			
Waste	MODERATE	Total waste volume would be approximately 600,000 MT/yr (660,000 tons/yr) of ash and scrubber sludge requiring approximately 138 ha (340 ac) for disposal during the 40-year life of the plant.	MODERATE	Same impacts as Turkey Point 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 the Turkey Point site.	
Socioeconomics	SMALL to LARGE	During construction, impacts would be MODERATE. Up to 2500 workers during the peak period of the 5-year construction period, followed by reduction from current Turkey Point Units 3 and 4 work force of 960 to 250; tax base preserved. Impacts during operation would be SMALL. Transportation impacts associated with construction workers could be MODERATE to LARGE.	SMALL to LARGE	Construction impacts depend on location, but could be LARGE if plant is located in an area that is more rural than the Turkey Point site. Miami-Dade County would experience loss of tax base and employment, potentially offset by projected economic growth. Transportation impacts associated with construction workers could be MODERATE to LARGE.	

Alternatives

Table 8-2. (contd)

		Turkey Point Site		Alternate Florida Site	
	Impact Category	Impact	Comments	Impact	Comments
6	Socioeconomics		For rail transportation of coal and lime, the impact is considered MODERATE to LARGE. For barge transportation, the impact is considered SMALL.		For rail transportation of coal and lime, the impact is considered MODERATE to LARGE. For barge transportation, the impact is considered SMALL.
7	(contd)				
8	Aesthetics	LARGE	LARGE aesthetic impact due to impact of plant units and stacks on environmentally sensitive Biscayne National Park. Barge transportation of coal and lime would have a MODERATE aesthetic impact. Noise impact would be MODERATE given the environmental sensitivity of Biscayne National Park.	MODERATE to LARGE	Greatest impact is from the new transmission line that would be needed.
9					
10	Historic and Archeological Resources	SMALL	Some construction would affect previously developed parts of Turkey Point site; cultural resource inventory should minimize any impacts on undeveloped lands.	SMALL	Alternate location would necessitate cultural resource studies
11					
12					
13					
14	Environmental Justice	SMALL to 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 710 operating jobs could reduce employment prospects for minority and low-income populations. Impacts could be offset by projected economic growth and the ability of affected workers to commute to other jobs.	SMALL to MODERATE	Impacts will vary depending on population distribution and makeup at the site.
15					

1 delivery, assuming that the alternate site location is within 16 km (10 mi) from the nearest
 2 railway connection. Depending particularly on transmission line and rail line routing, this
 3 alternative would result in MODERATE to LARGE land-use impacts.
 4

5 • **Ecology**
 6

7 Locating a coal-fired plant at the Turkey Point site would alter ecological resources because
 8 of the need to convert roughly 360 ha (900 ac) of land to industrial use (plant, coal storage,
 9 ash and scrubber sludge disposal). However, some of this land would have been previously
 10 disturbed.
 11

12 Ecological impacts associated with transporting coal and lime to the Turkey Point site would
 13 be significant. The rail option would involve constructing a rail spur with a minimum length
 14 of 14 km (9 mi). Construction of at least a portion of the spur through ecologically sensitive
 15 wetlands would likely be needed. The barge delivery option would have negative ecological
 16 implications for waters included within Biscayne National Park. Written scoping comments
 17 submitted by the National Park Service (included in Appendix A) state that barges delivering
 18 oil for Turkey Point Units 1 and 2 have run aground within Biscayne National Park
 19 numerous times. The comments state that each trip adversely impacts water quality by
 20 churning up the bottom of Biscayne Bay and creating a turbidity plume that lasts long after
 21 the barge has passed. Turbidity limits the photosynthesis of the phytoplanktonic and
 22 seagrass communities that are essential for a healthy marine ecosystem. The comments
 23 also point out that the thrust from the tugboat may disrupt seagrass recovery by ripping it
 24 from the bottom along with other attached vegetation.
 25

26 Siting a coal-fired plant at Turkey Point would have a MODERATE to LARGE ecological
 27 impact that would be greater than renewal of the Unit 3 and 4 OLS.
 28

29 At an alternate site, the coal-fired generation alternative would introduce construction
 30 impacts and new incremental operational impacts. Even assuming siting at a previously
 31 disturbed area, the impacts would alter the ecology. Impacts could include wildlife habitat
 32 loss, reduced productivity, habitat fragmentation, and a local reduction in biological diversity.
 33 Use of cooling makeup water from a nearby surface water body could have adverse aquatic
 34 resource impacts. Construction and maintenance of the transmission line would have
 35 ecological impacts. Overall, the ecological impacts at an alternate site would be
 36 MODERATE to LARGE.
 37
 38
 39
 40

Alternatives

• **Water Use and Quality**

The coal-fired generation alternative at the Turkey Point site is assumed to use the existing cooling canal system, which would minimize incremental water-use and quality impacts. Surface-water impacts are expected to remain SMALL; the impacts would be sufficiently minor that they would not noticeably alter any important attribute of the resource.

It is assumed that a coal-fired plant located at Turkey Point would obtain potable, process, and fire-protection water from the Miami-Dade County public water system similarly to the current practice for Turkey Point Units 3 and 4 (see Section 2.2.2).

Alternate sites would likely use a closed-cycle cooling system with cooling towers. For alternate sites, the impact on the surface water would depend on the volume of water needed for makeup water, the discharge volume, and the characteristics of the receiving body of water. Intake from and discharge to any surface body of water would be regulated by the State of Florida. The impacts would be SMALL to MODERATE.

No groundwater is currently used for operation of Turkey Point Units 3 and 4. It is unlikely that groundwater would be used for an alternative coal-fired plant sited at Turkey Point site. Use of groundwater for a coal-fired plant sited at an alternate site is a possibility. Any groundwater withdrawal would require a permit from the local permitting authority.

• **Air Quality**

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

A new coal-fired generating plant located in southern Florida would likely need a prevention of significant deterioration (PSD) permit and an operating permit under the Clean Air Act. The plant would need to comply with the new source performance standards for such plants set forth in 40 CFR 60 Subpart Da. The standards establish limits for particulate matter and opacity (40 CFR 60.42a), SO₂ (40 CFR 60.43a), and NO_x (40 CFR 60.44a).

Section 169A of the Clean Air Act (42 USC 7491) establishes a national goal of preventing future and remedying existing impairment of visibility in mandatory Class I Federal areas when impairment results from man-made air pollution. Everglades National Park is a Class I area where visibility is an important value (40 CFR 81.407). Any new fossil power plant in southern Florida has the potential to affect visibility in the Everglades National Park.

1 The U.S. Environmental Protection Agency (EPA) has various regulatory requirements for
 2 visibility protection in 40 CFR 51 Subpart P, including a specific requirement for review of
 3 any new major stationary source in an area designated as attainment or unclassified under
 4 the Clean Air Act. All of south-central Florida is classified as attainment or unclassified for
 5 criteria pollutants, except that Broward and Miami-Dade counties are maintenance areas for
 6 ozone (40 CFR 81.310). EPA issued a new regional haze rule in 1999 (64 FR 35714; July
 7 1,1999 [EPA 1999]). The rule specifies that for each mandatory Class I Federal area
 8 located within a State, the State must establish goals that provide for reasonable progress
 9 towards achieving natural visibility conditions. The reasonable progress goals must provide
 10 for an improvement in visibility for the most-impaired days over the period of the implemen-
 11 tation plan and ensure no degradation in visibility for the least-impaired days over the same
 12 period [40 CFR 51.308(d)(1)].

13
 14 Impacts for particular pollutants are as follows:

15
 16 Sulfur oxides emissions. FPL states in its ER that an alternative coal-fired plant located at
 17 the Turkey Point site would use spray-drying technology (dry scrubber) for flue gas
 18 desulfurization rather than a wet scrubber (FPL 2000a). Lime/limestone would be used for
 19 the flue gas desulfurization (FPL 2000a). FPL notes that the saline groundwater at the
 20 Turkey Point site would be incompatible with the chemistry of a flue gas desulfurization
 21 scrubbing process and the higher corrosivity of the saline groundwater would increase the
 22 construction, operation, and maintenance costs.

23
 24 A new coal-fired power plant would be subject to the requirements in Title IV of the Clean
 25 Air Act. Title IV was enacted to reduce emissions of SO₂ and NO_x, the two principal
 26 precursors of acid rain, by restricting emissions of these pollutants from power plants.
 27 Title IV caps aggregate annual power plant SO₂ emissions and imposes controls on SO₂
 28 emissions through a system of marketable allowances. EPA issues one allowance for each
 29 ton of SO₂ that a unit is allowed to emit. New units do not receive allowances, but are
 30 required to have allowances to cover their SO₂ emissions. Owners of new units must
 31 therefore acquire allowances from owners of other power plants by purchase or reduce SO₂
 32 emissions at other power plants they own. Allowances can be banked for use in future
 33 years. Thus, a new coal-fired power plant would not add to net regional SO₂ emissions,
 34 although it might do so locally. Regardless, SO₂ emissions would be greater for the coal
 35 alternative than the OL renewal alternative.

36
 37 FPL estimates that by using the best available control technology for SO_x emissions, the
 38 total annual stack emissions would be approximately 11,200 MT (12,300 tons) of SO_x (FPL
 39 2000a).

Alternatives

1 Nitrogen oxides emissions. Section 407 of the Clean Air Act establishes technology-based
2 emission limitations for NO_x emissions. The market-based allowance system used for SO₂
3 emissions is not used for NO_x emissions. A new coal-fired power plant would be subject to
4 the new source performance standards for such plants at 40 CFR 60.44a(d)(1). This
5 regulation, issued on September 16, 1998 (63 FR 49453 [EPA 1998]), limits the discharge
6 of any gases that contain nitrogen oxides (expressed as NO₂) in excess of 200 ng/J of
7 gross energy output (1.6 lb/MWh), based on a 30-day rolling average.
8

9 FPL estimates that using the best available control technology, the total annual NO_x
10 emissions for a new coal-fired power plant would be approximately 7000 MT (7800 tons).
11 This level of NO_x emissions would be greater than the OL renewal alternative.
12

13 Particulate emissions. FPL estimates that the total annual stack emissions would include
14 150 MT (165 tons) of filterable total suspended particulates and 34 MT (38 tons) of
15 particulate matter having an aerodynamic diameter less than or equal to 10 μm (PM₁₀)
16 (40 CFR 50.6). Fabric filters or electrostatic precipitators would be used for control. In
17 addition, coal-handling equipment would introduce fugitive particulate emissions. Particu-
18 late emissions would be greater under the coal alternative than the OL renewal alternative.
19

20 During the construction of a coal-fired plant, fugitive dust would be generated. In addition,
21 exhaust emissions would come from vehicles and motorized equipment used during the
22 construction process.
23

24 Carbon monoxide emissions. FPL estimates that the total carbon monoxide emissions
25 would be approximately 900 MT (1000 tons) per year. This level of emissions is greater
26 than the OL renewal alternative.
27

28 Hazardous air pollutants including mercury. In December 2000, EPA issued regulatory
29 findings on emissions of hazardous air pollutants from electric utility steam generating units
30 (EPA 2000). EPA determined that coal- and oil-fired electric utility steam-generating units
31 are significant emitters of hazardous air pollutants. Coal-fired power plants were found by
32 EPA to emit arsenic, beryllium, cadmium, chromium, dioxins, hydrogen chloride, hydrogen
33 fluoride, lead, manganese, and mercury (EPA 2000). EPA concluded that mercury is the
34 hazardous air pollutant of greatest concern. EPA found that (1) there is a link between coal
35 consumption and mercury emissions; (2) electric utility steam-generating units are the
36 largest domestic source of mercury emissions; and (3) certain segments of the U.S. popu-
37 lation (e.g., the developing fetus and subsistence fish-eating populations) are believed to be
38 at potential risk of adverse health effects due to mercury exposures resulting from
39 consumption of contaminated fish (EPA 2000). Accordingly, EPA added coal- and oil-fired
40 electric utility steam-generating units to the list of source categories under Section 112(c) of

1 the Clean Air Act for which emission standards for hazardous air pollutants will be issued
 2 (EPA 2000).

3
 4 Uranium and thorium. Coal contains uranium and thorium. Uranium concentrations are
 5 generally in the range of 1 to 10 parts per million. Thorium concentrations are generally
 6 about 2.5 times greater than uranium concentrations (Gabbard 1993). One estimate is that
 7 a typical coal-fired plant released roughly 4.7 MT (5.2 tons) of uranium and 11.6 MT
 8 (12.8 tons) of thorium in 1982 (Gabbard 1993). The population dose equivalent from the
 9 uranium and thorium releases and daughter products produced by the decay of these
 10 isotopes has been calculated to be significantly higher than that from nuclear power plants
 11 (Gabbard 1993).

12
 13 Summary. The GEIS analysis did not quantify emissions from coal-fired power plants, but
 14 implied that air impacts would be substantial. The GEIS also mentioned global warming
 15 from unregulated carbon dioxide emissions and acid rain from SO_x and NO_x emissions as
 16 potential impacts. Adverse human health effects from coal combustion such as cancer and
 17 emphysema have been associated with the products of coal combustion. The appropriate
 18 characterization of air impacts from coal-fired generation would be MODERATE. The
 19 impacts would be clearly noticeable, but would not destabilize air quality.

20
 21 Siting a coal-fired generation plant at a site other than Turkey Point would not significantly
 22 change air-quality impacts, although it could result in installing more or less stringent
 23 pollution-control equipment to meet applicable local requirements. Therefore, the impacts
 24 would be MODERATE.

25
 26 • **Waste**

27
 28 Coal combustion generates waste in the form of ash, and equipment for controlling air
 29 pollution generates additional ash and scrubber sludge. Three 400-MW(e) coal-fired plants
 30 would generate approximately 600,000 MT (660,000 tons) of this waste annually for
 31 40 years. The waste would be disposed of onsite, accounting for approximately 138 ha
 32 (340 ac) of land area over the 40-year plant life. Waste impacts to groundwater and surface
 33 water could extend beyond the operating life of the plant if leachate and runoff from the
 34 waste storage area occurs. Disposal of the waste could noticeably affect land use and
 35 groundwater quality, but with appropriate management and monitoring, it would not
 36 destabilize any resources. After closure of the waste site and revegetation, the land could
 37 be available for other uses. For these reasons, the appropriate characterization of impacts
 38 from waste generated from burning coal is MODERATE; the impacts would be clearly
 39 noticeable, but would not destabilize any important resource.

Alternatives

1 Construction-related debris would be generated during construction activities.

2
3 Siting the facility at a site other than Turkey Point would not alter waste generation,
4 although other sites might have more constraints on disposal locations. Therefore, the
5 impacts would be MODERATE.

6 7 • **Human Health**

8
9 Coal-fired power generation introduces worker risks from fuel and limestone mining, and
10 worker and public risks from fuel and lime/limestone transportation and inhalation of stack-
11 emissions. Emission impacts can be widespread and health risks difficult to quantify. The
12 coal alternative also introduces the risk of coal-pile fires and attendant inhalation risks.

13
14 The GEIS analysis noted that there could be human health impacts (cancer and emphy-
15 sema) from inhalation of toxins and particulates, but did not identify the significance of these
16 impacts. In addition, the discharges of uranium and thorium from coal-fired plants can
17 potentially produce radiological doses in excess of those arising from nuclear power plant
18 operations (Gabbard 1993).

19
20 Regulatory agencies, including EPA and State agencies, set air emission standards and
21 requirements based on human health impacts. These agencies also impose site-specific
22 emission limits as needed to protect human health. As discussed above, EPA has recently
23 concluded that certain segments of the U.S. population (e.g., the developing fetus and
24 subsistence fish-eating populations) are believed to be at potential risk of adverse health
25 effects due to mercury exposures from sources such as coal-fired power plants. However,
26 in the absence of more quantitative data, human health impacts from radiological doses and
27 inhaling toxins and particulates generated by burning coal are characterized as SMALL.

28 29 • **Socioeconomics**

30
31 Construction of the coal-fired alternative would take approximately 5 years. It is assumed
32 that construction would take place while Turkey Point Units 3 and 4 continue operation and
33 would be completed by the time Units 3 and 4 permanently cease operations. The work
34 force would be expected to vary between 1200 and 2500 workers during the 5-year
35 construction period (NRC 1996; 1999). These workers would be in addition to the approxi-
36 mately 960 workers employed at Units 3 and 4. During construction, the surrounding
37 communities would experience demands on housing and public services that could have
38 MODERATE impacts. These impacts would be tempered by construction workers
39 commuting to the site from other parts of Miami-Dade County or from other counties. After
40 construction, the communities would be impacted by the loss of the construction jobs,

1 although this loss would be possibly offset by other growth currently being projected for
 2 South Miami-Dade County.

3
 4 If the coal-fired replacement plant were constructed at the Turkey Point site and Units 3 and
 5 4 were decommissioned, there would be a loss of approximately 710 permanent high-
 6 paying jobs (960 for two nuclear units down to 250 for the coal-fired plant), with a
 7 commensurate reduction in demand on socioeconomic resources and contribution to the
 8 regional economy. However, as discussed previously, projected economic growth in South
 9 Miami-Dade County could temper or offset the projected loss of jobs from the closure of
 10 Units 3 and 4. The coal-fired plants would provide a new tax base to offset the loss of tax
 11 base associated with decommissioning of the nuclear units. For all of these reasons, the
 12 appropriate characterization of nontransportation socioeconomic impacts for a coal-fired
 13 plant constructed at the Turkey Point site would be SMALL to MODERATE; the
 14 socioeconomic impacts would be noticeable, but would be unlikely to destabilize the area.

15
 16 During the 5-year construction period of replacement coal-fired units, up to 2500 construc-
 17 tion workers would be working at the site in addition to the 960 workers at Units 3 and 4.
 18 The addition of these workers could place significant traffic loads on existing highways,
 19 particularly those leading to the Turkey Point site from Florida City. Such impacts would be
 20 MODERATE to LARGE.

21
 22 For transportation related to commuting of plant operating personnel, the impacts are
 23 considered SMALL. The maximum number of plant operating personnel would be
 24 approximately 250. The current Turkey Point Units 3 and 4 work force is approximately
 25 960. Therefore, traffic impacts associated with plant personnel commuting to a coal-fired
 26 plant would be expected to be SMALL compared to the current impacts from Turkey Point
 27 Units 3 and 4 operations.

28
 29 For rail transportation related to coal and lime delivery to the Turkey Point site, the impacts
 30 are considered MODERATE to LARGE. Approximately 340 trains per year would be
 31 needed to deliver the coal and lime for the three coal-fired units. A total of 13 train trips is
 32 expected per week, or nearly 2 trips per day, because for each full train delivery there would
 33 be an empty train. On several days per week, there could be three trains per day using the
 34 rail spur to the Turkey Point site. Barge delivery of coal and lime would have SMALL
 35 socioeconomic impacts.

36
 37 Construction of a replacement coal-fired power plant at an alternate Florida site would
 38 relocate some socioeconomic impacts, but would not eliminate them. The communities
 39 around Turkey Point would still experience the impact of Turkey Point Units 3 and 4
 40 operational job loss (although potentially tempered by projected economic growth), and the

Alternatives

1 communities around the new site would have to absorb the impacts of a large, temporary
2 work force (up to 2500 workers at the peak of construction) and a permanent work force of
3 approximately 250 workers. The GEIS indicated that socioeconomic impacts at a rural site
4 would be larger than at an urban site, because more of the peak construction work force
5 would need to move to the area to work. The Turkey Point site is within commuting
6 distance of the Miami metropolitan area and is therefore not considered a rural site.
7 Alternate sites in Florida would need to be analyzed on a case-by-case basis. Socio-
8 economic impacts at a rural site could be LARGE. Transportation-related impacts
9 associated with commuting construction workers at an alternate Florida site are site
10 dependent, but could be MODERATE to LARGE. Transportation impacts related to
11 commuting of plant operating personnel would also be site dependent, but can be
12 characterized as SMALL to MODERATE.

13
14 At an alternate Florida site, coal and lime would likely be delivered by rail, although barge
15 delivery is feasible for a coastal location. Transportation impacts would depend upon the
16 site location. Socioeconomic impacts associated with rail transportation would likely be
17 MODERATE to LARGE. Barge delivery of coal and lime would likely have SMALL
18 socioeconomic impacts.

• Aesthetics

19
20
21
22 If sited at Turkey Point, the three coal-fired power plant units could be as much as 60 m
23 (200 ft) tall and be visible in daylight hours over many miles. The three exhaust stacks
24 would be somewhere in the range of 120 to 185 m (400 to 600 ft) high. Given the low
25 elevation at the site and of the surrounding land, the stacks would be highly visible in
26 daylight hours for distances up to 16 km (10 mi). The units and associated stacks would
27 also be visible at night because of outside lighting. The National Park Service states in its
28 scoping comments that the Turkey Point Plant can be seen at night as far east as the park's
29 barrier islands, which are 11 km (7 mi) offshore. Visual impacts of a new coal-fired plant
30 could be mitigated by landscaping and color selection for buildings that is consistent with
31 the environment. Visual impact at night could be mitigated by reduced use of lighting and
32 appropriate use of shielding.

33
34 The aesthetic impact of the replacement coal-fired units on visitors to Biscayne National
35 Park would be significant. Given the environmental sensitivity of the park and the
36 associated expectations of visitors to national parks, the addition of the coal-fired units and
37 the associated exhaust stacks would likely have a LARGE aesthetic impact.

38
39 If coal and lime for a new coal-fired plant were delivered by barge to the Turkey Point site,
40 the tugboat and barges would pass through Biscayne National Park. Given the environ-

1 mental sensitivity of the park and the associated expectations of visitors to national parks,
2 there would likely be a MODERATE aesthetic impact on visitors to the park associated with
3 such traffic. During construction of the plant, it is also possible that equipment would be
4 delivered by barge and thereby pass through the park.
5

6 Coal-fired generation would introduce mechanical sources of noise that would be audible
7 offsite, especially within Biscayne National Park. Sources contributing to total noise
8 produced by plant operation are classified as continuous or intermittent. Continuous
9 sources include the mechanical equipment associated with normal plant operations.
10 Intermittent sources include the equipment related to coal handling, solid-waste disposal,
11 transportation related to coal and lime delivery, use of outside loudspeakers, and the
12 commuting of plant employees. The incremental noise impacts of a coal-fired plant
13 compared to existing Turkey Point Units 3 and 4 operations are considered to be
14 MODERATE. Impacts would be most significant for visitors to Biscayne National Park.
15

16 Noise impacts associated with rail delivery of coal and lime to a plant at Turkey Point would
17 be most significant for residents living in the vicinity of the facility and along the rail route.
18 Although noise from passing trains significantly raises noise levels near the rail corridor, the
19 short duration of the noise reduces the impact. Nevertheless, given the frequency of train
20 transport and the many residents likely to be within hearing distance of the rail route, the
21 impacts of noise on residents in the vicinity of the facility and the rail line is considered
22 MODERATE.
23

24 Noise associated with barge transportation of coal and lime would be audible to visitors to
25 Biscayne National Park. Given the environmental sensitivity of the park and the associated
26 expectations of visitors to national parks, there would likely be a MODERATE noise impact
27 on visitors to the park associated with such traffic.
28

29 At an alternate Florida site, there would be an aesthetic impact from the buildings, exhaust
30 stacks, cooling towers, and the plume associated with the cooling towers. There would be a
31 significant aesthetic impact associated with construction of a new 96-km (60-mi) trans-
32 mission line to connect to other lines to enable delivery of electricity to the Miami area.
33 Noise and light from the plant would be detectable offsite. Aesthetic impacts at the plant
34 site would be mitigated if the plant were located in an industrial area adjacent to other power
35 plants. Overall the aesthetic impacts associated with locating at an alternate site can be
36 categorized as MODERATE to LARGE. The greatest contributor to this categorization is
37 the aesthetic impact of the new transmission line.
38
39
40

Alternatives

1 • **Historic and Archaeological Resources**

2
3 At the Turkey Point site or an alternate site, a cultural resource inventory would be likely be
4 needed for any onsite property that has not been previously surveyed. Other lands, if any,
5 that are acquired to support the plant would also likely need an inventory of field cultural
6 resources, identification and recording of extant historic and archaeological resources, and
7 possible mitigation of adverse effects from subsequent ground-disturbing actions related to
8 physical expansion of the plant site.
9

10 Prior to construction at the Turkey Point site or an alternate Florida site, studies would likely
11 be needed to identify, evaluate, and address mitigation of the potential impacts of new plant
12 construction on cultural resources. The studies would likely be needed for all areas of
13 potential disturbance at the proposed plant site and along associated corridors where new
14 construction would occur (e.g., roads, transmission corridors, rail lines, or other rights-of-
15 way). Historic and archaeological resource impacts can generally be effectively managed
16 and as such are considered SMALL.
17

18 • **Environmental Justice**

19
20 No environmental pathways or locations have been identified that would result in
21 disproportionately high and adverse environmental impacts on minority and low-income
22 populations if a replacement coal-fired plant were built at the Turkey Point site. Some
23 impacts on housing availability and prices during construction might occur, and this could
24 disproportionately affect the minority and low-income populations. Closure of Turkey Point
25 Units 3 and 4 would result in a decrease in employment of approximately 710 operating
26 employees, possibly offset by projected growth in the South Miami-Dade County area.
27 Following construction, it is possible that the ability of local government to maintain social
28 services could be reduced at the same time as diminished economic conditions reduce
29 employment prospects for minority or low-income populations. Overall, impacts would be
30 SMALL to MODERATE, and would depend on the extent to which projected economic
31 growth is realized and the ability of minority or low-income populations to commute to other
32 jobs outside the South Miami-Dade County area.
33

34 Impacts at other sites would depend upon the site chosen and the nearby population
35 distribution, but are likely to also be SMALL to MODERATE.
36
37
38
39
40

8.2.1.2 Once-Through Cooling System

This section discusses the environmental impacts of constructing a coal-fired generation system at an alternate Florida location site using once-through cooling. The impacts (SMALL, MODERATE, or LARGE) of this option are the same as the impacts for a coal-fired plant using the closed-cycle system. However, there are minor environmental differences between the closed-cycle and once-through cooling systems. Table 8.3 summarizes the incremental differences.

Table 8-3. Summary of Environmental Impacts of Coal-Fired Generation at an Alternate Florida Site with Once-Through Cooling System

Impact Category	Change in Impacts from Closed-Cycle Cooling System
Land Use	Impacts may be less (e.g., through elimination of cooling towers) or greater (e.g., if a reservoir is required).
Ecology	Impact would depend on ecology at the site. Possible impacts associated with entrainment of fish and shellfish in early life stages, impingement of fish and shellfish, and heat shock.
Surface Water Use and Quality	Increased water withdrawal leading to possible water-use conflicts; thermal load higher than with closed-cycle cooling
Groundwater Use and Quality	No change
Air Quality	No change
Waste	No change
Human Health	No change
Socioeconomics	No change
Aesthetics	Elimination of cooling towers
Historic and Archaeological Resources	No change
Environmental Justice	No change

Alternatives

1 **8.2.2 Natural Gas-Fired Generation**

2
3 FPL concluded in its ER that the Turkey Point site would not be a reasonable site for location of
4 a natural gas-fired generating unit. The basis for this determination was the consideration that
5 such a plant would likely necessitate the construction of approximately 240 km (150 mi) of
6 pipeline through ecologically sensitive Everglades habitat. FPL suggested in its ER that a site
7 near the center of the State would be a more suitable location (FPL 2000a). Nevertheless, the
8 environmental impacts of the natural gas-fired alternative are examined in this section for both
9 the Turkey Point site and an alternate Florida site. For the Turkey Point site, it is assumed that
10 the plant would use the existing cooling canal system.

11
12 The Turkey Point site is currently served by a 61-cm (24-in) diameter natural gas pipeline.
13 However, gas availability has been a problem, and Turkey Point Units 1 and 2 are principally
14 fired with oil, with gas as a backup when available.

15
16 If a new natural gas-fired plant were built in southern Florida to replace Turkey Point Units 3
17 and 4, a new 500-kV transmission line would need to be constructed to connect to existing lines
18 to transmit power to FPL's customers in the Miami area. The FPL ER assumes that the new
19 line would be approximately 96 km (60 mi) long (FPL 2000a). Location of a new gas-fired
20 generating plant anywhere in southern Florida could also necessitate the construction or
21 upgrade of a natural gas pipeline from the plant to a supply point where a firm supply of gas
22 would be available. The FPL ER assumes that Mobile Bay, Alabama, would be the closest
23 supply point. Additionally, the ER assumes that such a pipeline, to the center of the State,
24 would be approximately 800 km (500 mi) long and be located adjacent to existing highways.
25 For delivery to the Turkey Point site, the pipeline originating in Mobile would either need to be
26 extended to the Turkey Point site or be tied in to the existing gas pipeline serving the Turkey
27 Point site. For the natural gas-fired alternative at the Turkey Point site, it is assumed that
28 construction of a new pipeline to the Turkey Point site would be needed and that the distance
29 would be approximately 10 percent longer than construction to the center of Florida. Another
30 potential source of natural gas is liquefied natural gas (LNG) imported to the Elba Island facility
31 in Georgia. The Elba Island facility is expected to be reactivated in 2003 (DOE/EIA 2000a).
32 LNG imported to the Elba Island facility would need to be vaporized and transported to a Florida
33 location via pipeline.

34
35 It is assumed that a replacement natural gas-fired plant would use combined-cycle technology
36 (FPL 2000a). In the combined-cycle unit, hot combustion gases in a combustion turbine rotate
37 the turbine to generate electricity. Waste combustion heat from the combustion turbine is
38 routed through a heat-recovery boiler to make steam to generate additional electricity.
39
40

1 The following additional assumptions are made for the natural gas-fired plants (FPL 2000a):

- 2
- 3 • three 400-MW units, each consisting of two 150-MW combustion turbines and a 100-MW
- 4 heat recovery boiler
- 5 • natural gas with an average heating value of 37 MJ/m³ (1000 Btu/ft³) as the primary fuel
- 6 • use of low-sulfur No. 2 fuel oil as backup fuel
- 7 • heat rate of 2 J fuel/J electricity (6,800 Btu/kWh)
- 8 • capacity factor of 0.9.
- 9

10 Unless otherwise indicated, the assumptions and numerical values used in Section 8.2.2 are
 11 from the FPL ER (FPL 2000a). The staff reviewed this information and compared it to environ-
 12 mental impact information in the GEIS. Although the OL renewal period is only 20 years, the
 13 impact of operating the natural gas-fired alternative for 40 years is considered (as a reasonable
 14 projection of the operating life of a natural gas-fired plant).

15

16 **8.2.2.1 Closed-Cycle Cooling System**

17

18 The overall impacts of the natural gas-generating system are discussed in the following
 19 sections and summarized in Table 8-4. The extent of impacts at an alternate Florida site will
 20 depend on the location of the particular site selected.

21

22 • **Land Use**

23

24 For siting at Turkey Point, existing facilities and infrastructure would be used to the extent
 25 practicable, limiting the amount of new construction that would be required. Specifically, it is
 26 assumed that the natural gas-fired replacement plant alternative would use the cooling
 27 canal system, switchyard, offices, and transmission line right-of-way. Much of the land that
 28 would be used has been previously disturbed. At Turkey Point it is assumed that
 29 approximately 14 ha (35 ac) would be needed for the plant and associated infrastructure.
 30 There would be an additional impact of up to approximately 4050 ha (10,000 ac) for
 31 construction and/or upgrade of a gas pipeline.

32

33 For construction at an alternate site, it is assumed that 20 ha (50 ac) would be needed for
 34 the plant and associated infrastructure (NRC 1996). In addition, approximately 1000 ha
 35 (2500 ac) would be impacted for construction of a transmission line, assuming a 96-km (60-
 36 mi) line. Approximately 3640 ha (9000 ac) could potentially be disturbed during construction
 37 and/or upgrade of an underground pipeline. Additional land would be required for natural
 38 gas wells and collection stations. Partially offsetting these offsite land requirements would
 39 be the elimination of the need for uranium mining to supply fuel for Units 3 and 4. The
 40 GEIS (NRC 1996;1999) estimated that approximately 400 ha (1000 ac) would be affected

Alternatives

1 for mining the uranium and processing it during the operating life of a nuclear power plant.
 2 Overall, land-use impacts would be MODERATE to LARGE.
 3

4 **Table 8-4.** Summary of Environmental Impacts of Natural Gas-Fired Generation at
 5 Turkey Point Site and an Alternate Florida Site Using Closed-Cycle Cooling
 6

		Turkey Point Site		Alternate Florida Site	
Impact Category	Impact	Comments	Impact	Comments	
10 Land Use	MODERATE to LARGE	14 ha (35 ac) for powerblock, offices, roads, and parking areas. Additional impact of up to approximately 4050 ha (10,000 ac) for construction and/or upgrade of an underground gas pipeline.	MODERATE to LARGE	20 ha (50 ac) for powerblock, offices, roads, and parking areas. Approximately 1000 ha (2500 ac) for transmission line. Additional impact of up to 3600 ha (9000 ac) for construction and/or upgrade of an underground gas pipeline.	
11 Ecology	MODERATE to LARGE	Uses undeveloped areas at current Turkey Point site, plus gas pipeline through sensitive Everglades habitat.	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. Likely plant sites already have power generation facilities.	
13 Water Use and Quality	SMALL	Uses existing cooling canal system	SMALL to MODERATE	Impact depends on volume of water withdrawal and discharge and characteristics of surface water body.	
16 Air Quality	MODERATE	Sulfur oxides • 13.6 MT/yr (15 tons/yr) Nitrogen oxides • 200 MT/yr (221 tons/yr) Carbon monoxide • 191 MT/yr (211 tons/yr) PM ₁₀ particulates • 439 MT/yr (484 tons/yr) Some hazardous air pollutants	MODERATE	Same emissions as Turkey Point site	
18 Waste	SMALL	Small amount of ash produced	SMALL	Same waste produced as if produced at the Turkey Point site	

Table 8-4. (contd)

		Turkey Point Site		Alternate Florida Site	
Impact Category	Impact	Comments	Impact	Comments	
Human Health	SMALL	Impacts considered to be minor.	SMALL	Impacts considered to be minor	
Socioeconomics	SMALL to 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 Turkey Point Units 3 and 4 work force of 960 to 150; tax base preserved. Impacts during operation would be SMALL. Transportation impacts associated with construction workers would be MODERATE.	SMALL to MODERATE	During construction, impacts would be MODERATE. Up to 1200 additional workers during the peak of the 3-year construction period. Miami-Dade County would experience loss of tax base and employment, potentially offset by projected economic growth. 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 Biscayne National Park.	MODERATE to LARGE	Greatest impact would be from the new transmission line that would be needed.	
Historic and Archeological Resources	SMALL	Any potential impacts can likely be effectively managed.	SMALL	Same as Turkey Point; any potential impacts can likely be effectively managed.	
Environmental Justice	SMALL to 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 810 operating jobs at Turkey Point Plant could reduce employment prospects for minority and low-income populations. Impacts could be offset by projected economic growth and the ability of affected workers to commute to other jobs.	SMALL to MODERATE	Impacts vary depending on population distribution and makeup at site.	

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18

Alternatives

1 • Ecology

2
3 At the Turkey Point site, there would be ecological impacts to land use for siting of the gas-
4 fired plant. There would also be substantial ecological impacts associated with bringing a
5 new underground gas pipeline to the Turkey Point site, especially since the pipeline would
6 likely have to be routed through sensitive Everglades habitat. Ecological impacts at an
7 alternate site would depend on the nature of the land converted for the plant and trans-
8 mission line. If a natural gas-fired plant were located at an alternate Florida site there is a
9 reasonable likelihood that the plant would be located adjacent to an existing power plant on
10 previously disturbed land, which would tend to mitigate impacts. Construction of the
11 transmission line and construction and/or upgrading of the gas pipeline to serve the plant
12 would be expected to have temporary ecological impacts. Ecological impacts to the plant
13 site and utility easements could include impacts on threatened or endangered species,
14 wildlife habitat loss and reduced productivity, habitat fragmentation, and a local reduction in
15 biological diversity. At an alternate site, the cooling makeup water intake and discharge
16 could have aquatic resource impacts. Overall, the ecological impacts are considered
17 MODERATE to LARGE.

18 • Water Use and Quality

19
20
21 Each of the gas-fired units would include a heat-recovery boiler from which steam would
22 turn an electric generator. Steam would be condensed and circulated back to the boiler for
23 reuse. A natural gas-fired plant sited at Turkey Point is assumed to use the existing cooling
24 canal system. No groundwater is currently used for operation of Turkey Point Units 3 and 4.
25 It is unlikely that groundwater would be used for an alternative natural gas-fired plant sited
26 at Turkey Point. Water-use and quality impacts at Turkey Point would be SMALL.

27
28 A natural gas-fired plant at an alternate Florida site is assumed to use a closed-cycle
29 cooling system with mechanical draft cooling towers. It is assumed that surface water
30 would be used for cooling makeup water and discharge. Intake and discharge would
31 involve relatively small quantities of water compared to the coal alternative. Intake from and
32 discharge to any surface body of water would be regulated by the State of Florida.

33
34 Water-quality impacts from sedimentation during construction was characterized in the
35 GEIS as SMALL. The GEIS also noted that operational water quality impacts would be
36 similar to, or less than, those from other generating technologies.

37
38 Use of groundwater for a natural gas-fired plant sited at an alternate site is a possibility.
39 Any groundwater withdrawal would require a permit from the local permitting authority.
40 Impacts on surface water would depend on the volume and other characteristics of the

1 source water budget. Overall, water-use and quality impacts at an alternate Florida site are
 2 considered SMALL to MODERATE.

3
 4 • **Air Quality**

5
 6 Natural gas is a relatively clean-burning fuel. The gas-fired alternative would release similar
 7 types of emissions, but in lesser quantities than the coal-fired alternative.

8
 9 A new gas-fired generating plant located in south-central Florida would likely need a PSD
 10 permit and an operating permit under the Clean Air Act. A new combined-cycle natural gas
 11 power plant would also be subject to the new source performance standards for such units
 12 at 40 CFR 60, Subparts Da and GG. These regulations establish emission limits for
 13 particulates, opacity, SO₂, and NO_x.

14
 15 Section 169A of the Clean Air Act (42 USC 7491) establishes a national goal of preventing
 16 future and remedying existing impairment of visibility in mandatory Class I Federal areas
 17 when impairment results from man-made air pollution. Everglades National Park is a
 18 Class I area where visibility is an important value (40 CFR 81.407). Any new fossil power
 19 plant in southern Florida has the potential to affect visibility in Everglades National Park.
 20 EPA has various regulatory requirements for visibility protection in 40 CFR 51, Subpart P,
 21 including a specific requirement for review of any new major stationary source in an area
 22 designated attainment or unclassified under the Clean Air Act. EPA issued a new regional
 23 haze rule in 1999 (64 FR 35714; July 1, 1999 [EPA 1999]). The rule specifies that for each
 24 mandatory Class I Federal area located within a State, the State must establish goals that
 25 provide for reasonable progress towards achieving natural visibility conditions. The
 26 reasonable progress goals must provide for an improvement in visibility for the most
 27 impaired days over the period of the implementation plan and ensure no degradation in
 28 visibility for the least-impaired days over the same period [40 CFR 51.308(d)(1)].

29
 30 FPL projects the following emissions for the natural gas-fired alternative (FPL 2000a):

- 31
 32 Sulfur oxides - 13.6 MT/yr (15 tons/yr)
 33 Nitrogen oxides - 200 MT/yr (221 tons/yr)
 34 Carbon monoxide - 191 MT/yr (211 tons/yr)
 35 PM₁₀ particulates - 439 MT/yr (484 tons/yr)
 36

37 A natural gas-fired plant would also have unregulated carbon dioxide emissions that could
 38 contribute to global warming.
 39

Alternatives

1 In December 2000, EPA issued regulatory findings on emissions of hazardous air pollutants
2 from electric utility steam-generating units (EPA 2000). Natural gas-fired power plants were
3 found by EPA to emit arsenic, formaldehyde, and nickel (EPA 2000). Unlike coal and oil-
4 fired plants, EPA did not determine that regulation of emissions of hazardous air pollutants
5 from natural gas-fired power plants should be regulated under Section 112 of the Clean Air
6 Act.

7
8 Construction activities would result in temporary fugitive dust. Exhaust emissions would
9 also come from vehicles and motorized equipment used during the construction process.

10
11 The preceding emissions would likely be the same at Turkey Point or at an alternate Florida
12 site. Impacts from the above emissions would be clearly noticeable, but would not be
13 sufficient to destabilize air resources as a whole. The overall air-quality impact for a new
14 natural gas-generating plant sited at Turkey Point or at an alternate Florida site is
15 considered MODERATE.

16 17 • Waste

18
19 There will be small amounts of solid-waste products (i.e., ash) from burning natural gas fuel.
20 The GEIS concluded that waste generation from gas-fired technology would be minimal.
21 Gas firing results in very few combustion by-products because of the clean nature of the
22 fuel. Waste generation at a gas-fired plant would be largely limited to typical office wastes.
23 Waste-generation impacts would be so minor that they would not noticeably alter any
24 important resource attribute. Construction-related debris would be generated during
25 construction activities. Overall, the waste impacts would be SMALL for a natural gas-fired
26 plant sited at Turkey Point or at an alternate Florida site.

27 28 • Human Health

29
30 Table 8-2 of the GEIS identifies cancer and emphysema as potential health risks from gas-
31 fired plants. The risk may be attributable to NO_x emissions that contribute to ozone
32 formation, which in turn contribute to health risks. NO_x emissions from the plant would be
33 regulated by the Florida Department of Environmental Protection (FDEP). Human health
34 effects would not be detectable or would be sufficiently minor that they would neither
35 destabilize nor noticeably alter any important attribute of the resource. Overall, the impacts
36 on human health of the natural gas-fired alternative sited at Turkey Point or at an alternate
37 Florida site are considered SMALL.

1 • **Socioeconomics**

2
3 A 3-year construction period is assumed. Peak employment would be approximately
4 1200 workers (NRC 1996; 1999). It is assumed that construction would take place while
5 Units 3 and 4 continue operation and would be completed by the time they permanently
6 cease operations. During construction, the communities surrounding the Turkey Point site
7 would experience demands on housing and public services that could have MODERATE
8 impacts. These impacts would be tempered by construction workers commuting to the site
9 from other parts of Miami-Dade County or from other counties. After construction, the
10 communities would be impacted by the loss of jobs. The current Turkey Point Units 3 and 4
11 work force (960 workers) would decline through a decommissioning period to a minimal
12 maintenance size. The gas-fired plant would introduce a replacement tax base at Turkey
13 Point or an alternate Florida site and approximately 150 new permanent jobs. For siting at
14 an alternate Florida site, impacts in South Miami-Dade County resulting from decommis-
15 sioning of Units 3 and 4 may be offset by economic growth projected to occur in the county.
16

17 The GEIS (NRC 1996; 1999) concluded that socioeconomic impacts from constructing a
18 natural gas-fired plant would not be very noticeable and that the small operational work
19 force would have the lowest socioeconomic impacts of any nonrenewable technology.
20 Compared to the coal-fired and nuclear alternatives, the smaller size of the construction
21 work force, the shorter construction time frame, and the smaller size of the operations work
22 force would mitigate socioeconomic impacts. For these reasons, gas-fired generation
23 socioeconomic impacts associated with construction and operation of a natural gas-fired
24 power plant would be SMALL to MODERATE for siting at Turkey Point or at an alternate
25 Florida site. Depending on other growth in the area, socioeconomic effects could be
26 noticed, but they would not destabilize any important socioeconomic attribute.
27

28 Transportation impacts associated with construction and operating personnel commuting to
29 the plant site would depend on the population density and transportation infrastructure in the
30 vicinity of the site. The impacts can be classified as MODERATE for siting at Turkey Point
31 or at an alternate Florida site.
32

33 Overall, socioeconomic impacts resulting from construction of a natural gas-fired plant at
34 Turkey Point or an alternate Florida site and from decommissioning of Turkey Point Units 3
35 and 4 would be SMALL to MODERATE.
36

37 • **Aesthetics**

38
39 The turbine buildings (approximately 30 m [100 ft] tall) and exhaust stacks (approximately
40 38 m [125 ft] tall) would be visible during daylight hours from offsite. The gas pipeline

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1 compressors would also be visible. Noise and light from the plant would be detectable
2 offsite. No travel through Biscayne National Park would be needed to support plant
3 operations. During construction, some plant equipment might be delivered by barge and
4 thereby pass through the park. At the Turkey Point site, these impacts would result in a
5 MODERATE aesthetic impact given the environmental sensitivity of Biscayne National Park
6 and the expectations of visitors to national parks.
7

8 At an alternate Florida site, the buildings, cooling towers, cooling tower plumes, and the
9 associated transmission line and gas pipeline compressors would be visible offsite. The
10 visual impact of a new 96-km (60-mi) transmission line would be especially significant.
11 Aesthetic impacts would be mitigated if the plant were located in an industrial area adjacent
12 to other power plants. Overall, the aesthetic impacts associated with an alternate Florida
13 site are categorized as MODERATE to LARGE. The greatest contributor to this categoriza-
14 tion is the aesthetic impact of the new transmission line.
15

16 • **Historic and Archaeological**

17
18 At both Turkey Point and an alternate Florida site, a cultural resource inventory would likely
19 be needed for any onsite property that has not been previously surveyed. Other lands, if
20 any, that are acquired to support the plant would also likely need an inventory of field
21 cultural resources, identification and recording of extant historic and archaeological
22 resources, and possible mitigation of adverse effects from subsequent ground-disturbing
23 actions related to physical expansion of the plant site.
24

25 Prior to construction at Turkey Point or an alternate Florida site, studies would likely be
26 needed to identify, evaluate, and address mitigation of the potential impacts of new plant
27 construction on cultural resources. The studies would likely be needed for all areas of
28 potential disturbance at the proposed plant site and along associated corridors where new
29 construction would occur (e.g., roads, transmission and pipeline corridors, or other rights-of-
30 way). Impacts to cultural resources can be effectively managed under current laws and
31 regulations and kept SMALL.
32

33 • **Environmental Justice**

34
35 No environmental pathways or locations have been identified that would result in dispro-
36 proportionately high and adverse environmental impacts on minority and low-income
37 populations if a replacement natural gas-fired plant were built at the Turkey Point site.
38 Some impacts on housing availability and prices during construction might occur, and this
39 could disproportionately affect minority and low-income populations. Closure of Turkey
40 Point Units 3 and 4 would result in a decrease in employment of approximately 810 oper-
41 ating employees, possibly offset by general growth in the South Miami-Dade County area.

1 Following construction, it is possible that the ability of local government to maintain social
 2 services could be reduced at the same time as diminished economic conditions reduce
 3 employment prospects for minority or low-income populations. Overall, impacts are
 4 expected to be SMALL to MODERATE. Projected economic growth in South Miami-Dade
 5 County and the ability of minority and low-income populations to commute to other jobs
 6 outside the South Miami-Dade County area could mitigate any adverse effects.
 7

8 Impacts at an alternate Florida site would depend upon the site chosen and the nearby
 9 population distribution, but are likely to also be SMALL to MODERATE.
 10

11 **8.2.2.2 Once-Through Cooling System**
 12

13 This section discusses the environmental impacts of constructing a natural gas-fired generation
 14 system at an alternate Florida location using once-through cooling. The impacts (SMALL,
 15 MODERATE, or LARGE) of this option are the same as the impacts for a natural gas-fired plant
 16 using the closed-cycle system. However, there are minor environmental differences between
 17 the closed-cycle and once-through cooling systems. Table 8.5 summarizes the incremental
 18 differences.
 19

20 **Table 8-5. Summary of Environmental Impacts of Natural Gas-Fired Generation at an**
 21 **Alternate Florida Site with Once-Through Cooling**
 22

Impact Category	Change in Impacts from Closed-Cycle Cooling System
Land Use	Impacts may be less (e.g., through elimination of cooling towers) or greater (e.g., if a reservoir is required).
Ecology	Impact would depend on ecology at the site. Potential impacts associated with entrainment of fish and shellfish in early life stages, impingement of fish and shellfish, and heat shock.
Surface Water Use and Quality	Increased water withdrawal leading to possible water-use conflicts, thermal load higher than with closed-cycle cooling
Groundwater Use and Quality	No change
Air Quality	No change
Waste	No change

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Table 8-5. (contd)

Impact Category	Change in Impacts from Closed-Cycle Cooling System
Human Health	No change
Socioeconomics	No change
Aesthetics	Elimination of cooling towers
Historic and Archaeological Resources	No change
Environmental Justice	No change

8.2.3 Nuclear Power Generation

Since 1997 the NRC has certified three new standard designs for nuclear power plants under the procedures at 10 CFR 52, Subpart B. These designs are the 1300-MW U.S. Advanced Boiling Water Reactor (10 CFR 52, Appendix A), the 1300- MW System 80+ Design (10 CFR 52, Appendix B), and the 600 MW AP600 Design (10 CFR 52, Appendix C). All of these plants are light-water reactors. Although no applications for a construction permit or a combined license based on these certified designs have been submitted to NRC, the submission of the design certification applications indicates continuing interest in the possibility of licensing new nuclear power plants. In addition, recent escalation in prices of natural gas and electricity have made new nuclear power plant construction more attractive from a cost standpoint. Consequently, construction of a new nuclear power plant at the Turkey Point site using the existing cooling canal system and at an alternate Florida site using both closed- and open-cycle cooling are considered in this section. It is assumed that the new nuclear plant would have a 40-year lifetime. Consideration of a new nuclear generating plant to replace Units 3 and 4 was not included in the FPL ER.

NRC has summarized environmental data associated with the uranium fuel cycle in Table S-3 of 10 CFR 51.51. The impacts shown in Table S-3 are representative of the impacts that would be associated with a replacement nuclear power plant built to one of the certified designs, sited at Turkey Point or an alternate Florida site. The impacts shown in Table S-3 are for a 1000-MW(e) reactor and would need to be adjusted to reflect replacement of Units 3 and 4, which have a capacity of 1386 MW(e). The environmental impacts associated with transporting fuel and waste to and from a light-water cooled nuclear power reactor are summarized in Table S-4 of 10 CFR 51.52. The summary of NRC's findings on National Environmental Policy Act (NEPA) issues for license renewal of nuclear power plants in Table B-1 of 10 CFR 51 Subpart A, Appendix B, is also relevant for consideration of environmental impacts associated with the operation of a replacement nuclear power plant. Additional environmental impact

1 information for a replacement nuclear power plant using closed-cycle cooling is presented in
 2 Section 8.2.3.1 and using open-cycle cooling in Section 8.2.3.2.

3
 4 **8.2.3.1 Closed-Cycle Cooling System**

5
 6 The overall impacts of the nuclear generating system are discussed in the following sections.
 7 The impacts are summarized in Table 8-6. The extent of impacts at an alternate Florida site will
 8 depend on the location of the particular site selected.

9
 10 • **Land Use**

11
 12 The existing facilities and infrastructure at the Turkey Point site would be used to the extent
 13 practicable, limiting the amount of new construction that would be required. A replacement
 14 nuclear power plant at the Turkey Point site would alter approximately 200 to 400 ha (500 to
 15 1000 ac) of land to industrial use. Specifically, it is assumed that a replacement nuclear
 16 power plant would use the existing cooling canal system, switchyard, offices, and
 17 transmission line right-of-way. Much of the land that would be used has been previously
 18 disturbed.

19
 20 There would be no net change in land needed for uranium mining because land needed for
 21 the new nuclear plant would offset land needed to supply uranium for fuel for Units 3 and 4.

22
 23 The impact of a replacement nuclear generating plant on land use at the existing Turkey
 24 Point site is best characterized as MODERATE. The impact would be greater than the OL
 25 renewal alternative.

26
 27 Land-use impacts at an alternate Florida site would be similar to siting at Turkey Point
 28 except for the land needed for a transmission line to connect to existing lines to transmit
 29 power to FPL's customers in the Miami area. Assuming a 96-km (60-mi) transmission line,
 30 an additional 1000 ha (2500 ac) would be needed. In addition, it may be necessary to
 31 construct a rail spur to an alternate site to bring in equipment during construction.
 32 Depending particularly on transmission line routing, siting a new nuclear plant at an
 33 alternate Florida site would result in MODERATE to LARGE land-use impacts.

34
 35 • **Ecology**

36
 37 Locating a replacement nuclear power plant at the Turkey Point site would alter ecological
 38 resources because of the need to convert roughly 200 to 400 ha (500 to 1000 ac) of land to
 39 industrial use. Some of this land, however, would have been previously disturbed.

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Table 8-6. Summary of Environmental Impacts of New Nuclear Power Generation at the Turkey Point Site and an Alternate Florida Site Using Closed-Cycle Cooling

	Turkey Point Site			Alternate Florida Site	
Impact Category	Impact	Comments	Impact	Comments	
Land Use	MODERATE	Requires approximately 200 to 400 ha (500 to 1000 ac) for the plant and 400 ha (1000 ac) for uranium mining	MODERATE to LARGE	Same as Turkey Point site plus land for transmission line (1000 ha [2500 ac] assuming a 96 km [60 mi] line)	
Ecology	MODERATE	Uses undeveloped areas at current Turkey Point site	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 cooling canal 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	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 Turkey Point site	
Waste	SMALL	Waste impacts for an operating nuclear power plant are set out in 10 CFR 51, Appendix B, Table B-1. Debris would be generated and removed during construction.	SMALL	Same impacts as Turkey Point site	
Human Health	SMALL	Human health impacts for an operating nuclear power plant are set out in 10 CFR 51, Appendix B, Table B-1.	SMALL	Same impacts as Turkey Point site	

Table 8-6. (contd)

		Turkey Point Site		Alternate Florida Site	
Impact Category	Impact	Comments	Impact	Comments	
Socioeconomics	SMALL to LARGE	During construction, impacts would be MODERATE. Up to 2500 workers during peak period of the 6-year construction period. Operating work force assumed to be similar to Units 3 and 4; tax base preserved. Impacts during operation would be SMALL. Transportation impacts associated with construction workers could be MODERATE to LARGE. Transportation impacts of commuting plant personnel would be SMALL.	SMALL to LARGE	Construction impacts depend on location. Impacts at a rural location could be LARGE. Miami-Dade County would experience loss of tax base and employment, possibly offset by economic growth. Transportation impacts of construction workers could be MODERATE to LARGE. Transportation impacts of commuting plant personnel could 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. There would be no travel across Biscayne National Park.	MODERATE to LARGE	Greatest impact is from the new transmission line that would be 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.	SMALL to MODERATE	Impacts will vary depending on population distribution and makeup at the site. Impacts to minority and low-income residents of South Miami-Dade County associated with closure of Turkey Point Units 3 and 4 could be significant, but could also be mitigated by projected economic growth for the are	

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1 Siting at Turkey Point would have a MODERATE ecological impact that would be greater
2 than renewal of the Unit 3 and 4 OLS.
3

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

12 • **Water Use and Quality**

13
14 The replacement nuclear plant alternative at the Turkey Point site is assumed to use the
15 existing cooling canal system, which would minimize incremental water-use and quality
16 impacts. Surface-water impacts are expected to remain SMALL; the impacts would be
17 sufficiently minor that they would not noticeably alter any important attribute of the resource.
18

19 It is assumed that a new nuclear power plant located at Turkey Point would obtain potable,
20 process, and fire-protection water from the Miami-Dade County public water system
21 similarly to the current practice for Turkey Point Units 3 and 4 (see Section 2.2.2).
22

23 Cooling towers would likely be used at alternate sites. For alternate sites, the impact on the
24 surface water would depend on the volume of water needed for makeup water, the
25 discharge volume, and the characteristics of the receiving body of water. Intake from and
26 discharge to any surface body of water would be regulated by the State of Florida. The
27 impacts would be SMALL to MODERATE.
28

29 No groundwater is currently used for operation of Turkey Point Units 3 and 4. It is unlikely
30 that groundwater would be used for an alternative nuclear power plant sited at Turkey Point.
31 Use of groundwater for a nuclear power plant sited at an alternate site is a possibility. Any
32 groundwater withdrawal would require a permit from the local permitting authority.
33

34 • **Air Quality**

35
36 Construction of a new nuclear plant sited at Turkey Point or an alternate site would result in
37 fugitive emissions during the construction process. Exhaust emissions would also come
38 from vehicles and motorized equipment used during the construction process. An operating
39 nuclear plant would have minor air emissions associated with diesel generators. Emissions

1 would be regulated by the FDEP. Overall, emissions and associated impacts are consid-
 2 ered SMALL.

3
 4 • **Waste**

5
 6 The waste impacts associated with operation of a nuclear power plant are set out in
 7 Table B-1 of 10 CFR 51, Subpart A, Appendix B. Construction-related debris would be
 8 generated during construction activities and removed to an appropriate disposal site.
 9 Overall, waste impacts are considered SMALL.

10
 11 Siting the replacement nuclear power plant at a site other than Turkey Point would not alter
 12 waste generation. Therefore, the impacts would be SMALL.

13
 14 • **Human Health**

15
 16 Human health impacts for an operating nuclear power plant are set out in 10 CFR 51
 17 Subpart A, Appendix B, Table B-1. Overall, human health impacts are considered SMALL.

18
 19 Siting the replacement nuclear power plant at a site other than Turkey Point would not alter
 20 human health impacts. Therefore, the impacts would be SMALL.

21
 22 • **Socioeconomics**

23
 24 The construction period and the peak work force associated with new nuclear power plant
 25 construction are currently unquantified (NRC 1996). In the absence of quantified data, a
 26 construction period of 6 years and a peak work force of 2500 is assumed. It is assumed
 27 that construction would take place while the existing nuclear units continue operation and
 28 would be completed by the time Turkey Point Units 3 and 4 permanently cease operations.
 29 During construction, the communities surrounding the Turkey Point site would experience
 30 demands on housing and public services that could have MODERATE impacts. These
 31 impacts would be tempered by construction workers commuting to the site from other parts
 32 of Miami-Dade County or from other counties. After construction, the communities would be
 33 impacted by the loss of the construction jobs, although this loss would be possibly offset by
 34 other growth currently being projected for South Miami-Dade County.

35
 36 The replacement nuclear unit(s) are assumed to have an operating work force comparable
 37 to the 960 workers currently working at Turkey Point Units 3 and 4. The replacement
 38 nuclear unit(s) would provide a new tax base to offset the loss of tax base associated with
 39 decommissioning of Turkey Point Units 3 and 4. For all of these reasons, the appropriate
 40 characterization of nontransportation socioeconomic impacts for replacement nuclear units

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1 constructed at Turkey Point would be SMALL to MODERATE; the socioeconomic impacts
2 would be noticeable, but would be unlikely to destabilize the area.
3

4 During the 6-year construction period, up to 2500 construction workers would be working at
5 the Turkey Point site in addition to the 960 workers at Units 3 and 4. The addition of the
6 construction workers could place significant traffic loads on existing highways, particularly
7 those leading to the Turkey Point site from Florida City. Such impacts would be
8 MODERATE to LARGE. Transportation impacts related to commuting of plant operating
9 personnel would be similar to current impacts associated with operation of Units 3 and 4
10 and are considered SMALL.
11

12 Construction of a replacement nuclear power plant at an alternate Florida site would
13 relocate some socioeconomic impacts, but would not eliminate them. The communities
14 around the Turkey Point site would still experience the impact of Turkey Point Units 3 and 4
15 operational job loss (although potentially tempered by projected economic growth), and the
16 communities around the new site would have to absorb the impacts of a large, temporary
17 work force (up to 2500 workers at the peak of construction) and a permanent work force of
18 approximately 960 workers. The GEIS (NRC 1996; 1999) indicated that socioeconomic
19 impacts at a rural site would be larger than at an urban site because more of the peak
20 construction work force would need to move to the area to work. The Turkey Point site is
21 within commuting distance of the Miami metropolitan area and is therefore not considered a
22 rural site. Alternate sites in Florida would need to be analyzed on a case-by-case basis.
23 Socioeconomic impacts at a rural site could be LARGE. Transportation-related impacts
24 associated with commuting workers at an alternate Florida site are site dependent, but
25 could be MODERATE to LARGE. Transportation impacts related to commuting of plant
26 operating personnel would also be site dependent, but can be characterized as SMALL to
27 MODERATE.
28

29 • Aesthetics

30
31 The containment buildings for a replacement nuclear power plant sited at Turkey Point and
32 other associated buildings would likely be visible in daylight hours over many miles. The
33 replacement nuclear units would also likely be visible at night because of outside lighting.
34 The National Park Service states in its scoping comments (see Appendix E) that the Turkey
35 Point Plant can be seen at night as far east as the park's barrier islands, which are 11 km
36 (7 mi) offshore. Visual impacts could be mitigated by landscaping and selecting a color for
37 buildings that is consistent with the environment. Visual impact at night could be mitigated
38 by reduced use of lighting and appropriate use of shielding. No exhaust stacks would be
39 needed. No cooling towers would be needed assuming use of the existing cooling canal
40 system.

1 A replacement nuclear plant sited at Turkey Point would be visible from Biscayne National
 2 Park. However, the visual impact can be kept SMALL. No travel through the park would be
 3 needed to support plant operations. During construction, some plant equipment might be
 4 delivered by barge and thereby pass through the park.

5
 6 Noise from operation of a replacement nuclear power plant would potentially be audible by
 7 visitors to Biscayne National Park in calm wind conditions or when the wind is blowing in the
 8 direction of the park. Mitigation measures, such as reduced or no use of outside loud-
 9 speakers, can be employed to reduce noise level and keep the impact SMALL.

10
 11 At an alternate Florida site, there would be an aesthetic impact from the buildings, cooling
 12 towers, and the plume associated with the cooling towers. There would also be a significant
 13 aesthetic impact associated with construction of a new 96-km (60-mi) transmission line to
 14 connect to other lines to enable delivery of electricity to the Miami area. Noise and light
 15 from the plant would be detectable offsite. The impact of noise and light would be mitigated
 16 if the plant is located in an industrial area adjacent to other power plants. Overall the
 17 aesthetic impacts associated with locating at an alternative site can be categorized as
 18 MODERATE to LARGE. The greatest contributor to this categorization is the aesthetic
 19 impact of the new transmission line.

20
 21 • **Historic and Archaeological Resources**

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

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

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• Environmental Justice

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 a replacement nuclear plant were built at the Turkey Point site. Some impacts on housing availability and prices during construction might occur, and this could disproportionately affect the minority and low-income populations. After completion of construction, it is possible that the ability of the local government to maintain social services could be reduced at the same time as diminished economic conditions reduce employment prospects for the minority and low-income populations. Overall, impacts are expected to be SMALL. Projected economic growth in South Miami-Dade County and the ability of minority and low-income populations to commute to other jobs outside the South Miami-Dade County area could mitigate any adverse effects.

Impacts at other sites would depend upon the site chosen and the nearby population distribution, but are likely to be SMALL to MODERATE. Impacts to minority and low income residents of South Miami-Dade County associated with closure of Turkey Point Units 3 and 4 could be significant, but could also be mitigated by projected economic growth for the area.

8.2.3.2 Once-Through Cooling System

This section discusses the environmental impacts of constructing a nuclear power plant at an alternate Florida location site using once-through cooling. The impacts (SMALL, MODERATE, or LARGE) of this option are the same as the impacts for a nuclear power plant using the closed-cycle system. However, there are minor environmental differences between the closed-cycle and once-through cooling systems. Table 8.7 summarizes the incremental differences.

Table 8-7. Summary of Environmental Impacts of a New Nuclear Power Plant Sited at an Alternate Florida Site with Once-Through Cooling

Impact Category	Change in Impacts from Closed-Cycle Cooling System
Land Use	Impacts may be less (e.g., through elimination of cooling towers) or greater (e.g., if a reservoir is required).

Table 8-7. (contd)

Impact Category	Change in Impacts from Closed-Cycle Cooling System
Ecology	Impacts would depend on ecology at the site. Possible impacts associated with entrainment of fish and shellfish in early life stages, impingement of fish and shellfish, and heat shock.
Surface Water Use and Quality	Increased water withdrawal leading to possible water-use conflicts, thermal load higher than with closed-cycle cooling
Groundwater Use and Quality	No change
Air Quality	No change
Groundwater Use and Quality	No change
Air Quality	No change
Waste	No change
Human Health	No change
Socioeconomics	No change
Aesthetics	Elimination of cooling towers
Historic and Archaeological Resources	No change
Environmental Justice	No change

8.2.4 Oil-Fired Generation

EIA projects that oil-fired plants will account for very little of the new generation capacity in the United States during the 2000 to 2020 time period because of higher fuel costs and lower efficiencies (DOE/EIA 2000a). Nevertheless, an oil-fired generating alternative at the Turkey Point site for replacement of power generated by Turkey Point Units 3 and 4 is considered in

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1 this section principally because co-located Turkey Point Units 1 and 2 are oil-fired generation
2 plants and the infrastructure to support the oil-fired generation option is already in place at the
3 Turkey Point site. It is assumed that an oil-fired plant sited at Turkey Point would use the
4 existing cooling canal system. Oil-fired generation at an alternate Florida site is not considered
5 in this draft SEIS because of the EIA projection that little, if any, new oil-fired generation
6 capacity will be constructed in the 2000 to 2020 time period.
7

8 Unit 1 at Turkey Point began commercial operation in 1967 and has a net summer capability of
9 410 MW. Unit 2 began commercial operation in 1968 and has a net summer capability of
10 400 MW (DOE/EIA 2000b, Table 20). Both units are fueled by Number 6 fuel oil as the primary
11 fuel with natural gas as the alternate fuel.
12

13 The following additional assumptions are made for the oil-fired plants (FPL 2000a):
14

- 15 • three 400-MW tangentially fired units
- 16 • use of Number 6 fuel oil
- 17 • heat rate of 2.9 J fuel/J electricity (9800 Btu/kWh)
- 18 • capacity factor of 0.9.
19

20 Unless otherwise indicated, the assumptions and numerical values used in Section 8.2.4 are
21 from the FPL ER (FPL 2000a). The staff reviewed this information and compared it to environ-
22 mental impact information in the GEIS. Although the OL renewal period is only 20 years, the
23 impact of operating the oil-fired alternative for 40 years is considered (as a reasonable
24 projection of the operating life of a oil-fired plant).
25

26 The overall environmental impacts of the oil-fired generating system are discussed in the
27 following sections and summarized in Table 8-8.
28

- 29 • **Land Use**
30

31 The existing facilities and infrastructure at the Turkey Point site would be used to the extent
32 practicable, limiting the amount of new construction that would be required. Specifically, it is
33 assumed that the oil-fired alternatives would use the cooling canal system, switchyard,
34 offices, and transmission line right-of-way. Much of the land that would be used has been
35 previously disturbed.
36

37 The oil-fired generation alternative would necessitate converting roughly an additional 50 ha
38 (120 ac) of the Turkey Point site to industrial use for the plant and associated facilities
39 including oil storage tanks. Additional land-use changes would occur offsite in an undeter-
40 mined area to supply oil for the plant. The GEIS estimated that approximately 650 ha

1 (1600 ac) would be affected for oil wells and support facilities to support an oil-fired plant
 2 during its operational life (NRC 1996). Partially offsetting this offsite land use would be the
 3 elimination of the need for uranium mining to supply fuel for Units 3 and 4. The GEIS (NRC
 4 1996; 1999) estimated that approximately 400 ha (1000 ac) would be affected for mining the
 5 uranium and processing it during the operating life of a nuclear power plant.
 6

7 Approximately 225,000 MT (250,000 tons) of oil-combustion by-products per year (ash and
 8 scrubber sludge) would be disposed of onsite, requiring approximately 52 ha (130 ac) for a
 9 by-product disposal area for the 40-year expected life of the plant.^(a) Facilities would be
 10 constructed to control and treat leachate from ash and scrubber sludge disposal areas. It is
 11 assumed that oil-fired generation structures and facilities, including oil storage and ash and
 12 scrubber sludge disposal areas, would all be located within the current Turkey Point site
 13 boundary.
 14

15 The impact of an oil-fired generating unit on land use at the Turkey Point site is best
 16 characterized as SMALL to MODERATE. The impact would be greater than the OL renewal
 17 alternative.
 18

19 • **Ecology**
 20

21 Locating an alternate energy source at the existing Turkey Point site would alter ecological
 22 resources because of the need to convert roughly 102 ha (250 ac) of land to industrial use
 23 (plant, oil storage, waste storage, ash and scrubber sludge disposal). Some of this land,
 24 however, would have been previously disturbed.
 25

26 Ecological impacts associated with transporting oil and lime to the Turkey Point site would
 27 be significant. If rail is used, a rail spur with a minimum length of 14 km (9 mi) would need
 28 to be constructed. Construction of at least a portion of the spur through ecologically
 29 sensitive wetlands would likely be needed. The barge delivery option would have negative
 30 ecological implications for waters included within Biscayne National Park. Written scoping
 31 comments submitted by the National Park Service (included in Appendix A) state that
 32 barges currently bringing oil for Turkey Point Units 1 and 2 have run aground within
 33 Biscayne National Park numerous times. The comments state that each trip adversely
 34 impacts water quality by churning up the bottom of Biscayne Bay and creating a turbidity
 35 plume that lasts long after the barge has passed. Turbidity limits the photosynthesis of the
 36 phytoplanktonic and seagrass communities that are essential for a healthy marine
 37

(a) Only half of the land area needed for by-product disposal is directly attributable to the alternative of renewing the Turkey Point Units 3 and 4 OLs for 20 years.

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Table 8-8. Summary of Environmental Impacts Associated with New Oil-Fired Generation Plants at Turkey Point Site Assuming Use of Existing Cooling Canal System

Impact Category	Impact	Comments
Land Use	SMALL to MODERATE	102 ha (250 ac) for powerblock, oil storage, waste storage, offices, roads, and parking areas. Additional land impacts for oil wells and support facilities.
Ecology	MODERATE to LARGE	Uses undeveloped areas at current Turkey Point site plus barge channel. Impacts to Biscayne National Park from barge transport of oil could be significant.
Water Use and Quality	SMALL	Uses existing cooling canal system
Air Quality	MODERATE	Sulfur oxides - 6930 MT/yr (7640 tons/yr) Nitrogen oxides - 2980 MT/yr (3290 tons/yr) Total suspended particulates - 50 MT/yr (55 tons/yr) PM ₁₀ particulates - 32 MT/yr (35 tons/yr) Carbon monoxide - 1430 MT/yr (1580 tons/yr) Some hazardous air pollutants including mercury
Waste	MODERATE	Approximately 225,000 MT/yr (250,000 tons/yr) of ash and scrubber sludge requiring approximately 52 ha (130 ac) for disposal
Human Health	SMALL	Impacts are uncertain, but considered SMALL in the absence of more quantitative data.
Socioeconomics	MODERATE	During construction, impacts would be MODERATE. Up to 1700 additional workers during the peak of the 3- to 4-year construction period, followed by reduction from current Turkey Point Units 3 and 4 work force of 960 to approximately 200. Tax base preserved. Impacts during operation would be SMALL. Transportation impacts associated with construction workers would be MODERATE.
Aesthetics	MODERATE to LARGE	MODERATE to LARGE impact from the plant and stacks to Biscayne National Park visitors. Barge transportation of oil and lime would have a MODERATE impact. Noise impact of the plant and related transportation would be MODERATE given the environmental sensitivity of Biscayne National Park.
Historic and Archaeological Resources	SMALL	Any potential impacts can likely be effectively managed.
Environmental Justice	SMALL to 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 760 operating jobs could reduce employment prospects for minority and low-income populations. Impacts could be offset by projected economic growth and the ability of affected workers to commute to other jobs.

ecosystem. The comments also point out that the thrust from the tugboat may disrupt seagrass recovery by ripping it from the bottom, along with other attached vegetation.

Siting at the existing Turkey Point site would have a MODERATE to LARGE ecological impact that would be greater than renewal of the Unit 3 and 4 OLs.

• Water Use and Quality

The oil-fired generation alternative at the Turkey Point site is assumed to use the existing cooling canal system, which would minimize incremental water-use and quality impacts. Surface-water impacts are expected to remain SMALL; the impacts would be sufficiently minor that they would not noticeably alter any important attribute of the resource.

It is assumed that an oil-fired plant located at Turkey Point would obtain potable, process, and fire protection water from the Miami-Dade County public water system similarly to the current practice for Turkey Point Units 3 and 4 (see Section 2.2.2).

No groundwater is currently used for operation of Turkey Point Units 3 and 4. It is unlikely that groundwater would be used for an alternative oil-fired plant sited at Turkey Point.

• Air Quality

The air-quality impacts of oil-fired generation vary considerably from those of nuclear power due to emissions of SO_x, NO_x, particulates, carbon monoxide, and hazardous air pollutants such as mercury.

A new oil-fired generating plant located in south Florida would likely need a PSD permit and an operating permit under the Clean Air Act. The plant would need to comply with the new source performance standards for such plants set forth in 40 CFR 60, Subpart Da. The standards establish limits for particulate matter and opacity (40 CFR 60.42a), SO₂ (40 CFR 60.43a), and NO_x (40 CFR 60.44a).

Section 169A of the Clean Air Act (42 USC 7491) establishes a national goal of preventing future and remedying existing impairment of visibility in mandatory Class I Federal areas when impairment results from man-made air pollution. Everglades National Park is a Class I area where visibility is an important value (40 CFR 81.407). Any new fossil power plant in southern Florida has the potential to affect visibility in Everglades National Park. EPA has various regulatory requirements for visibility protection in 40 CFR 51, Subpart P, including a specific requirement for review of any new major stationary source in an area designated as attainment or unclassified under the Clean Air Act. EPA issued a new

Alternatives

1 regional haze rule in 1999 (64 FR 35714; July 1, 1999 [EPA 1999]). The rule specifies that
2 for each mandatory Class I Federal area located within a State, the State must establish
3 goals that provide for reasonable progress towards achieving natural visibility conditions.
4 The reasonable progress goals must provide for an improvement in visibility for the most-
5 impaired days over the period of the implementation plan and ensure no degradation in
6 visibility for the least-impaired days over the same period [40 CFR 51.308(d)(1)].
7

8 Impacts for particular pollutants are as follows:
9

10 Sulfur oxides emissions. FPL states in its ER that an alternative coal-fired plant located at
11 the Turkey Point site would use spray-drying technology (dry scrubber) for flue-gas
12 desulfurization rather than a wet scrubber (FPL 2000a). The dry scrubber technology is
13 also assumed for a new oil-fired plant. Lime/limestone would be used for the flue-gas
14 desulfurization (FPL 2000a). FPL notes that the saline groundwater at the Turkey Point site
15 would be incompatible with the chemistry of a flue-gas desulfurization scrubbing process
16 and the higher corrosivity of the saline groundwater would increase the construction,
17 operation, and maintenance costs.
18

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

32 FPL estimates that by using the best available control technology for SO_x emissions, the
33 total annual stack emissions from an alternate oil-fired replacement plant would be
34 approximately 6930 MT (7640 tons) of SO_x (FPL 2000a).
35

36 Nitrogen oxides emissions. Section 407 of the Clean Air Act establishes technology-based
37 emission limitations for NO_x emissions. The market-based allowance system used for SO₂
38 emissions is not used for NO_x emissions. A new oil-fired power plant would be subject to
39 the new source performance standards for such plants at 40 CFR 60.44a(d)(1). This
40 regulation, issued on September 16, 1998 (63 FR 49453 [EPA 1998]), limits the discharge

1 of any gases that contain nitrogen oxides (expressed as NO₂) in excess of 200 ng/J of
2 gross energy output (1.6 lb/MWh), based on a 30-day rolling average.

3
4 FPL estimates that using the best available control technology, the total annual NO_x
5 emissions for a new oil-fired power plant would be approximately 2980 MT (3290 tons).
6 This level of NO_x emissions would be greater than the OL renewal alternative.

7
8 Particulate emissions. FPL estimates that the total annual stack emissions would include
9 50 MT (55 tons) of filterable total suspended particulates and 32 MT (35 tons) of PM₁₀
10 particulate matter. Fabric filters would be used for control (FPL 2000a). Particulate
11 emissions would be greater under the oil alternative than the OL renewal alternative.

12
13 Carbon monoxide emissions. FPL estimates that the total carbon monoxide emissions
14 would be approximately 1430 MT (1580 tons) per year. This level of emissions is greater
15 than the OL renewal alternative.

16
17 Hazardous Air Pollutants including Mercury. In December 2000, EPA issued regulatory
18 findings on emissions of hazardous air pollutants from electric utility steam-generating units
19 (EPA 2000). EPA determined that coal- and oil-fired electric utility steam-generating units
20 are significant emitters of hazardous air pollutants. Oil-fired power plants were found by
21 EPA to emit arsenic, beryllium, cadmium, chromium, dioxins, hydrogen chloride, lead,
22 manganese, mercury, and nickel (EPA 2000). EPA concluded that mercury is the
23 hazardous air pollutant of greatest concern. EPA found that (1) electric utility steam-
24 generating units are the largest domestic source of mercury emissions; and (2) certain
25 segments of the U.S. population (e.g., the developing fetus and subsistence fish-eating
26 populations) are believed to be at potential risk of adverse health effects due to mercury
27 exposures resulting from consumption of contaminated fish (EPA 2000). Accordingly, EPA
28 added coal- and oil-fired electric utility steam-generating units to the list of source
29 categories under Section 112(c) of the Clean Air Act for which emission standards for
30 hazardous air pollutants will be issued (EPA 2000).

31
32 Fugitive dust would be generated during construction activities. Exhaust emissions would
33 also come from vehicles and motorized equipment used during the construction process.

34
35 Summary. The GEIS analysis did not quantify emissions from oil-fired power plants, but
36 implied that air impacts would be substantial and mentioned global warming from unregu-
37 lated carbon dioxide emissions and acid rain from SO_x and NO_x emissions as potential
38 impacts. Adverse human health effects, such as cancer and emphysema, have been
39 associated with the products of fossil fuel combustion. The appropriate characterization of

Alternatives

1 air impacts from oil-fired generation would be MODERATE. The impacts would be clearly
2 noticeable, but would not destabilize air quality.
3

4 • Waste

5
6 Oil combustion generates waste in the form of ash, and equipment for controlling air
7 pollution generates additional ash and scrubber sludge. Three 400-MW(e) oil-fired plants
8 would generate approximately 225,000 MT (250,000 tons) of this waste annually for
9 40 years. The waste would be disposed of onsite, accounting for approximately 52 ha
10 (130 ac) of land area during the 40 year life of the plant. Waste impacts to groundwater
11 and surface water could extend beyond the operating life of the plant if leachate and runoff
12 from the waste storage area occurs. Disposal of the waste could noticeably affect land use
13 and groundwater quality, but with appropriate management and monitoring, it would not
14 destabilize any resources. After closure of the waste site and revegetation, the land could
15 be available for other uses.
16

17 Construction of the plant would result in construction-related debris.
18

19 The appropriate characterization of impacts from waste generated from the oil-fired
20 generation alternative is MODERATE; the impacts would be clearly noticeable, but would
21 not destabilize any important resource.
22

23 • Human Health

24
25 Oil-fired power generation introduces worker risks from oil-drilling activities and limestone
26 mining, and worker and public risks from oil and lime/limestone transportation and inhalation
27 of stack emissions. Emission impacts can be widespread and health risks difficult to
28 quantify. The GEIS analysis noted that there could be human health impacts (cancer and
29 emphysema) from inhalation of toxins and particulates, but did not identify the significance
30 of these impacts.
31

32 Regulatory agencies, including EPA and State agencies, focus on air emissions and have
33 revised regulatory requirements based on human health impacts. Such agencies also
34 impose site-specific emission limits as needed to protect human health. As discussed in the
35 air quality section above, EPA has recently concluded that certain segments of the U.S.
36 population (e.g., the developing fetus and subsistence fish-eating populations) are believed
37 to be at potential risk of adverse health effects due to mercury exposures from coal- and oil-
38 fired power plants. However, in the absence of more quantitative data, human health
39 impacts from radiological doses and inhaling toxins and particulates generated by an oil-
40 fired power plant are characterized as SMALL.

1 • **Socioeconomics**

2
 3 Construction of the oil-fired alternative plant would take approximately 3 to 4 years. It is
 4 assumed that construction would take place while Units 3 and 4 continue operation and
 5 would be completed by the time Units 3 and 4 permanently cease operations. There would
 6 be a peak construction work force of approximately 1700 workers (NRC 1996). These
 7 workers would be in addition to the approximately 960 workers employed at Units 3 and 4.
 8 During construction, the communities surrounding the Turkey Point site would experience
 9 demands on housing and public services that could have MODERATE impacts. These
 10 impacts would be tempered by construction workers commuting to the site from other parts
 11 of Miami-Dade County or from other counties. After construction, the communities would be
 12 impacted by the loss of the construction jobs, although this loss would be possibly offset by
 13 other growth currently being projected for South Miami-Dade County.

14
 15 The GEIS (NRC 1996; 1999) indicated that socioeconomic impacts at a rural site would be
 16 larger than at an urban site because more of the peak construction work force would need
 17 to move to the area to work. The Turkey Point site is within commuting distance of the
 18 Miami metropolitan area and is therefore not considered a rural site.

19
 20 When the oil-fired replacement plant is constructed and Units 3 and 4 are decommissioned,
 21 there will be a loss of approximately 760 permanent high-paying jobs (960 for the two
 22 nuclear units down to 200 for the oil-fired plant), with a commensurate reduction in demand
 23 on socioeconomic resources and contribution to the regional economy. However, as
 24 discussed previously, projected economic growth in South Miami-Dade County could
 25 temper or offset the projected loss of jobs from the closure of Units 3 and 4. The oil-fired
 26 plant would provide a new tax base to offset the loss of tax base associated with decommis-
 27 sioning of the nuclear units. For all of these reasons, the appropriate characterization of
 28 socioeconomic impacts for an oil-fired plant would be SMALL to MODERATE; the socioeco-
 29 nomic impacts would be noticeable, but would be unlikely to destabilize the area.

30
 31 Rail delivery of lime and possibly of oil could have MODERATE socioeconomic impacts.
 32 Barge delivery of oil and lime would have SMALL socioeconomic impacts.

33
 34 For transportation related to commuting of plant operating personnel, the impacts are
 35 considered SMALL. The maximum number of plant operating personnel for the oil-fired
 36 plant would be approximately 200. The current Turkey Point Units 3 and 4 work force is
 37 approximately 960. Therefore, traffic impacts associated with commuting plant personnel
 38 would be expected to be SMALL compared to the current impacts from Turkey Point Units 3
 39 and 4 operations.

Alternatives

1 During the 3- to 4-year construction period of replacement oil-fired units, up to an additional
2 1700 construction workers would be working at the site in addition to the 960 workers at
3 Units 3 and 4. The addition of these workers could place significant traffic loads on existing
4 highways, particularly those leading to the Turkey Point site from Florida City. Such impacts
5 would be MODERATE.
6

7 • Aesthetics

8

9 Given the low elevation at the Turkey Point site and of the surrounding land and the rela-
10 tively low ground cover, the oil-fired power plant units and the associated exhaust stacks
11 would be highly visible for distances up to 16 km (10 mi). The aesthetic impact on visitors
12 to Biscayne National Park would be particularly significant, although mitigated somewhat by
13 the existing aesthetic impact associated with Turkey Point Units 1 and 2. Given the environ-
14 mental sensitivity of the park and the associated expectations of visitors to national parks,
15 the addition of the oil-fired units and the associated exhaust stacks would likely have a
16 MODERATE to LARGE aesthetic impact.
17

18 If oil and lime are delivered by barge to the Turkey Point site, the tugboat and barges would
19 pass through Biscayne National Park. Given the environmental sensitivity of the park and
20 the associated expectations of visitors to national parks, there would likely be a
21 MODERATE aesthetic impact on visitors to the park associated with such traffic. During
22 construction of the plant, it is also possible that equipment would be delivered by barge and
23 thereby pass through the park.
24

25 Oil-fired generation would introduce mechanical sources of noise that would be audible
26 offsite, especially within Biscayne National Park. Sources contributing to total noise
27 produced by plant operation are classified as continuous or intermittent. Continuous
28 sources include the mechanical equipment associated with normal plant operations.
29 Intermittent sources include the equipment related to solid-waste disposal, transportation
30 (rail or barge) related to oil and lime delivery, use of loudspeakers, and the commuting of
31 plant employees. Given the environmental sensitivity of the park and the associated
32 expectations of visitors to national parks, the incremental noise impacts of an oil-fired plant
33 compared to existing Turkey Point Units 3 and 4 operations are considered to be
34 MODERATE. Impacts would be most significant for visitors to Biscayne National Park.
35

36 Noise impacts associated with rail delivery of lime and possibly oil would be most significant
37 for residents living in the vicinity of the facility and along the rail route. Although noise from
38 passing trains significantly raises noise levels near the rail corridor, the short duration of the
39 noise reduces the impact. Nevertheless, the impacts of noise on residents in the vicinity of
40 the facility and the rail line is considered MODERATE.

1 • **Historic and Archaeological Resources**

2
3 A cultural resource inventory would likely need to be conducted for any onsite property that
4 has not been previously surveyed. Other lands, if any, that are acquired to support the
5 plant would also likely need an inventory of field cultural resources, identification and
6 recording of extant historic and archaeological resources, and possible mitigation of
7 adverse effects from subsequent ground-disturbing actions related to physical expansion of
8 the plant site.

9
10 Prior to construction, studies would likely be needed to identify, evaluate, and address
11 mitigation of the potential impacts of new plant construction on cultural resources. The
12 studies would likely be needed for all areas of potential disturbance at the proposed plant
13 site and along associated corridors where new construction would occur (e.g., roads,
14 transmission corridors, rail lines, or other rights-of-way). Historic and archaeological
15 resource impacts can generally be effectively managed and as such are considered
16 SMALL.

17
18 • **Environmental Justice**

19
20 No environmental pathways or locations have been identified that would result in dispro-
21 proportionately high and adverse environmental impacts on minority and low-income popula-
22 tions if a replacement oil-fired plant were built at the Turkey Point site. Some impacts on
23 housing availability and prices during construction might occur, and this could dispropor-
24 tionately affect the minority and low-income populations. Closure of Turkey Point Units 3
25 and 4 would result in a decrease in employment of approximately 760 operating employees,
26 possibly offset by projected economic growth in the South Miami-Dade County area.
27 Following construction, it is possible that the ability of the local government to maintain
28 social services could be reduced at the same time as diminished economic conditions
29 reduce employment prospects for the minority or low-income populations. Overall, impacts
30 are likely to be SMALL to MODERATE, and would depend on the extent to which projected
31 economic growth is realized and the ability of minority and low-income populations to
32 commute to other jobs outside the South Miami-Dade County area.

33
34 **8.2.5 Purchased Electrical Power**

35
36 If available, purchased power from other sources could potentially obviate the need to renew
37 the Turkey Point Units 3 and 4 OLs. It is unlikely, however, that sufficient baseload, firm power
38 supply would be available to replace the Units 3 and 4 capacity.

Alternatives

1 Purchased power accounted for approximately 14 percent of FPL power sales in 1998 (FPL
2 2000a). FPL has a contract to purchase up to 931 MW, with a minimum of 380 MW, of coal-
3 fired generation from the Southern Company. In addition, FPL has contracts with the
4 Jacksonville Electric Authority for the purchase of 388 MW of coal-fired generation from the
5 St. John's Power Park Units 1 and 2 (FPL 2000b). FPL also has contracts with
6 10 cogeneration/small power production facilities to purchase firm capacity and energy (FPL
7 2000b). FPL purchases as-available (nonfirm) energy from other cogeneration and small
8 power-production facilities. FPL does not foresee any substantial new capacity additions from
9 co-generation facilities in the nonutility generation sector (FPL 2000a). All of the preceding
10 power sources are being used to meet current and projected customer demand and are not
11 available to replace power generated by Turkey Point Units 3 and 4.
12

13 Florida's peninsula limits interconnection alternatives for obtaining power purchased from out-
14 of-State sources. The location of the Turkey Point Units 3 and 4 load center (Miami) at the
15 southern end of the peninsula further constrains import possibilities. The existing power
16 transmission infrastructure currently lacks the capacity to import power in sufficient quantity to
17 replace a major generation source such as Turkey Point Units 3 and 4 located at the southern
18 end of the FPL system. To replace Turkey Point Units 3 and 4 capacity with imported power,
19 FPL would need to construct additional transmission facilities from the Florida State line to the
20 Miami area, a distance of approximately 560 km (350 mi). Additional transmission facilities may
21 need to be constructed in other states to transmit the power to Florida (FPL 2000a).
22

23 Imported power from Canada or Mexico is unlikely to be available for replacement of Turkey
24 Point Units 3 and 4 capacity. In Canada, 56 percent of the country's electricity capacity is
25 derived from hydropower. However, there are few plans to expand large-scale hydroelectric
26 facilities, although several small- to mid-sized hydroelectric projects are still being pursued
27 (DOE/EIA 2000c). Canada is reevaluating the safety of its nuclear power industry. In late 1997
28 and early 1998, Hydro Ontario shut down seven of its older nuclear power plants, or 17 percent
29 (4,300 MW) of its operating capacity. It is uncertain whether the plants will be brought back on
30 line sometime after 2000 as was intended. If the plants are prematurely retired, Canada's
31 future dependence on nuclear power would be reduced. In addition, the loss of capacity could
32 lead to a temporary reversal of electricity trade flows between the United States and Canada
33 (DOE/EIA 2000c). EIA projects that total gross U.S. imports of electricity from Canada and
34 Mexico will gradually increase from 46.5 billion kWh in year 2000 to 68.7 billion kWh in year
35 2005 and then gradually decrease to 28.6 billion kWh in year 2020 (DOE/EIA 2000a).
36 Consequently, it is unlikely that electricity imported from Canada or Mexico would be able to
37 replace the Turkey Point Units 3 and 4 capacity.
38

39 If power to replace Turkey Point Units 3 and 4 capacity were to be purchased from sources
40 within the United States or a foreign country, the generating technology would be one of those

1 described in this draft SEIS and in the GEIS (probably coal, natural gas, or nuclear). The
2 description of the environmental impacts of other technologies in Chapter 8 of the GEIS is
3 representative of the purchased electrical power alternative to renewal of the Turkey Point Units
4 3 and 4 OLS. Thus, the environmental impacts of imported power would still occur but would be
5 located elsewhere within the region, nation, or another country.
6

7 **8.2.6 Other Alternatives**

8

9 Other generation technologies considered by NRC are discussed in the following paragraphs.
10

11 **8.2.6.1 Wind Power**

12
13 The State of Florida is in a wind power Class 1 region (average wind speeds at 10-m (30 ft)
14 elevation of 0 to 4.4 m/s [9.8 mph]). Class 1 has the lowest potential for wind energy
15 generation (DOE 2001a). Wind turbines are economical in wind power Classes 4 through 7
16 (average wind speeds of 5.6 to 9.4 m/s [12.5 to 21.1 mph] [DOE 2001a]). Consequently, the
17 staff concludes that locating a wind-energy facility on or near the Turkey Point site would not be
18 economically feasible given the current state of wind energy generation technology.
19

20 **8.2.6.2 Solar Power**

21
22 Solar power technologies, photovoltaic and thermal, cannot currently compete with conventional
23 fossil-fueled technologies in grid-connected applications due to higher capital costs per kilowatt
24 of capacity. The average capacity factor of photovoltaic cells is about 25 percent, and the
25 capacity factor for solar thermal systems is about 25 percent to 40 percent. Energy storage
26 requirements limit the use of solar-energy systems as baseload electricity supply.
27

28 There are substantial impacts to natural resources (wildlife habitat, land-use, and aesthetic
29 impacts) from construction of solar-generating facilities. According to the GEIS, land require-
30 ments are high—14,000 ha (35,000 ac) per 1000 MW(e) for photovoltaic and approximately
31 5700 ha (14,000 ac) per 1000 MW(e) for solar thermal systems. Neither type of solar electric
32 system would fit at the Turkey Point site, and both would have large environmental impacts at a
33 greenfield site.
34

35 The Turkey Point site receives approximately 4 to 5 kWh of solar radiation per square meter
36 per day, compared to 6 to 8 kWh of solar radiation per square meter per day in areas of the
37 western United States, such as California, which are most promising for solar technologies
38 (DOE/EIA 2000d). Because of the natural resource impacts (land and ecological), the area's
39 relatively low rate of solar radiation, and high cost, solar power is not deemed a feasible
40 baseload alternative to renewal of the Turkey Point Units 3 and 4 OLS. Some solar power may

Alternatives

1 substitute for electric power in rooftop and building applications. Implementation of non-rooftop
2 solar generation on a scale large enough to replace Turkey Point Units 3 and 4 would likely
3 result in LARGE environmental impacts.
4

5 **8.2.6.3 Hydropower**

6
7 Florida has an estimated 43 MW of undeveloped hydroelectric resources (INEEL 1998). This
8 amount is far less than needed to replace the 1386 MW(e) capacity of Turkey Point Units 3 and
9 4. As Section 8.3.4 of the GEIS points out, hydropower's percentage of U.S. generating
10 capacity is expected to decline because hydroelectric facilities have become difficult to site as a
11 result of public concern about flooding, destruction of natural habitat, and alteration of natural
12 river courses. Based on estimates in the GEIS, land requirements for hydroelectric power are
13 approximately 400,000 ha (1 million ac) per 1000 MW(e). Replacement of Turkey Point Units 3
14 and 4 generating capacity would require flooding more than this amount of land. Due to the
15 relatively low amount of undeveloped hydropower resource in Florida and the large land-use
16 and related environmental and ecological resource impacts associated with siting hydroelectric
17 facilities large enough to replace Turkey Point Units 3 and 4, the staff concludes that local
18 hydropower is not a feasible alternative to Turkey Point Units 3 and 4 OL renewal on its own.
19 Any attempts to site hydroelectric facilities large enough to replace Turkey Point Units 3 and 4
20 would result in LARGE environmental impacts.
21

22 **8.2.6.4 Geothermal Energy**

23
24 Geothermal energy has an average capacity factor of 90 percent and can be used for baseload
25 power where available. However, geothermal technology is not widely used as baseload
26 generation due to the limited geographical availability of the resource and immature status of
27 the technology (NRC 1996). As illustrated by Figure 8.4 in the GEIS, geothermal plants are
28 most likely to be sited in the western continental United States, Alaska, and Hawaii where
29 hydrothermal reservoirs are prevalent. There is no feasible eastern location for geothermal
30 capacity to serve as an alternative to Turkey Point Units 3 and 4. The staff concludes that
31 geothermal energy is not a feasible alternative to renewal of the Turkey Point Units 3 and 4
32 OLs.
33

34 **8.2.6.5 Wood Waste**

35
36 A wood-burning facility can provide baseload power and operate with an average annual
37 capacity factor of around 70 to 80 percent and with 20 to 25 percent efficiency (NRC 1996,
38 Section 8.3.6). The fuels required are variable and site-specific. A significant barrier to the use
39 of wood waste to generate electricity is the high delivered-fuel cost and high construction cost
40 per MW of generating capacity. The larger wood-waste power plants are only 40 to 50 MW(e)

1 in size. Estimates in the GEIS suggest that the overall level of construction impact per MW of
2 installed capacity should be approximately the same as that for a coal-fired plant, although
3 facilities using wood waste for fuel would be built at smaller scales. Like coal-fired plants,
4 wood-waste plants require large areas for fuel storage and processing and involve the same
5 type of combustion equipment.
6

7 Due to uncertainties associated with obtaining sufficient wood and wood waste to fuel a base-
8 load generating facility, ecological impacts of large-scale timber cutting (e.g., soil erosion and
9 loss of wildlife habitat), and high inefficiency, the staff has determined that wood waste is not a
10 feasible alternative to renewing the Turkey Point Units 3 and 4 OLS.
11

12 **8.2.6.6 Municipal Solid Waste**

13
14 The initial capital costs for municipal solid-waste plants are greater than for comparable steam-
15 turbine technology at wood-waste facilities (Section 8.2.6.5). This is due to the need for
16 specialized waste-separation and -handling equipment for municipal solid waste. The decision
17 to burn municipal waste to generate energy is usually driven by the need for an alternative to
18 landfills rather than by energy considerations. The use of landfills as a waste disposal option is
19 likely to increase in the near term; however, it is unlikely that many landfills will begin converting
20 waste to energy because of unfavorable economics, particularly with electricity prices declining
21 in real terms. EIA projects that between 1999 and 2020, the average price of electricity in real
22 1999 dollars will decline by an average of 0.5 percent per year as result of competition among
23 electricity suppliers (DOE/EIA 2000a). Therefore, municipal solid waste would not be a feasible
24 alternative to renewal of the Turkey Point Units 3 and 4 OLS, particularly at the scale required.
25

26 **8.2.6.7 Other Biomass-Derived Fuels**

27
28 In addition to wood and municipal solid-waste fuels, there are several other concepts for fueling
29 electric generators, including burning crops, converting crops to a liquid fuel such as ethanol,
30 and gasifying crops (including wood waste). The GEIS points out that none of these tech-
31 nologies has progressed to the point of being competitive on a large scale or of being reliable
32 enough to replace a baseload plant such as Turkey Point Units 3 and 4. For these reasons,
33 such fuels do not offer a feasible alternative to renewal of the Turkey Point Units 3 and 4 OLS.
34

35 **8.2.6.8 Fuel Cells**

36
37 Fuel cells work without combustion and its environmental side effects. Power is produced
38 electrochemically by passing a hydrogen-rich fuel over an anode and air over a cathode and
39 separating the two by an electrolyte. The only by-products are heat, water, and carbon dioxide.
40 Hydrogen fuel can come from a variety of hydrocarbon resources by subjecting them to steam

Alternatives

1 under pressure. Phosphoric acid fuel cells are generally considered first-generation tech-
2 nology. Higher-temperature second-generation fuel cells achieve higher fuel-to-electricity and
3 thermal efficiencies. The higher temperatures contribute to improved efficiencies and give the
4 second-generation fuel cells the capability to generate steam for cogeneration and combined-
5 cycle operations. DOE projects that by 2003, two second-generation fuel cell technologies
6 using molten carbonate and solid oxide technology, respectively, will be commercially available
7 in sizes up to 2 MW at a cost of \$1000 to \$1500 per kW of installed capacity (DOE 2001b). For
8 comparison, the installed capacity cost for a natural gas-fired combined-cycle plant is on the
9 order of \$500 to \$600 per kW (NWPPC 2000). As market acceptance and manufacturing
10 capacity increase, natural-gas-fueled fuel cell plants in the 50- to 100-MW range are projected
11 to become available (DOE 2001b). At the present time, fuel cells are not economically or tech-
12 nologically competitive with other alternatives for baseload electricity generation. Fuels cells
13 are, consequently, not a feasible alternative to renewal of the Turkey Point Units 3 and 4 OLS.
14

15 **8.2.6.9 Delayed Retirement**

16
17 FPL has no current plans to retire any existing generating units. For this reason, delayed
18 retirement of other FPL generating units would not be a feasible alternative to renewal of the
19 Turkey Point Units 3 and 4 OLS.
20

21 **8.2.6.10 Utility-Sponsored Conservation**

22
23 FPL has developed residential, commercial, and industrial programs to reduce both peak
24 demands and daily energy consumption. These programs are commonly referred to as
25 demand-side management (DSM). FPL's DSM programs through 1999 have resulted in a
26 cumulative summer peak reduction of approximately 2800 MW at the generator (FPL 2000b).
27 FPL's additional incremental summer peak reduction goals attributable to DSM programs are
28 200 MW for 2001 increasing to 765 MW by 2009 (FPL 2000b). These goals have been
29 approved by the Florida Public Service Commission (FPL 2000b).
30

31 FPL's current DSM program includes the following components (FPL 2000b):
32

- 33 • Residential Conservation Service – This is an energy audit program designed to assist
34 residential customers in understanding how to make their homes more energy-efficient
35 through the installation of conservation measures and practices.
36
- 37 • Residential Building Envelope – This program encourages the installation of energy-efficient
38 ceiling insulation in residential dwellings that use whole-house electric air conditioning.
39

- 1 • Duct System Testing and Repair – This program encourages demand and energy
2 conservation through the identification of air leaks in whole-house air conditioning duct
3 systems and the repair of those leaks by qualified contractors.
4
- 5 • Residential Air Conditioning – This program is designed to encourage customers to
6 purchase higher-efficiency central cooling and heating equipment.
7
- 8 • Residential Load Management (On Call) – This program offers load control of major
9 appliances and household equipment to residential customers.
10
- 11 • BuildSmart – This program is designed to encourage the design and construction of energy-
12 efficient homes that cost-effectively reduce FPL’s coincident peak load and energy
13 consumption.
14
- 15 • Business Energy Evaluation – This program is designed to encourage energy efficiency in
16 both new and existing commercial and industrial facilities by identifying DSM opportunities
17 and providing recommendations to the customer.
18
- 19 • Commercial/Industrial Heating, Ventilating, and Air Conditioning – This program is designed
20 to encourage the use of high-efficiency heating, ventilating, and air conditioning systems in
21 commercial and industrial facilities. These systems include air- and water-cooled chillers,
22 thermal energy storage, window and wall units, and duct repair measures.
23
- 24 • Commercial/Industrial Lighting – This program is designed to encourage the installation of
25 energy-efficient lighting measures in commercial and industrial facilities.
26
- 27 • Off-Peak Battery Charging – This program is designed to shift the demand of commercial
28 and industrial customers’ battery-charging applications from on-peak to off-peak time
29 periods.
30
- 31 • Business Custom Incentive – This program is designed to encourage commercial and
32 industrial customers to implement unique energy conservation measures or projects not
33 covered by other FPL programs.
34
- 35 • Commercial/Industrial Load Control – This program is designed to reduce peak demand by
36 controlling customer loads of 200 kW or greater during periods of extreme demand or
37 capacity shortages.
38

Alternatives

- 1 • Commercial/Industrial Building Envelope – This program is designed to encourage the
2 installation of energy-efficient building envelope measures such as window treatments and
3 roof/ceiling insulation.
4
- 5 • Business on Call – This program is designed to offer load control of central air conditioning
6 units to small nondemand billed commercial and industrial customers.
7

8 FPL's DSM program also includes a variety of research and development activities (FPL
9 2000b).

10
11 Historic and projected reduction in generation needs as a result of DSM programs have been
12 credited in the FPL *Ten Year Power Plant Site Plan 2000-2009* (FPL 2000b) to meet part of
13 FPL's projected customer demand. Because these DSM savings are part of the long-range
14 plan for meeting projected demand, they are not available offsets for Turkey Point Units 3 and
15 4. Therefore, the conservation option is not considered a reasonable replacement for the OL
16 renewal alternative.
17

18 **8.2.7 Combination of Alternatives**

19
20 Even though individual alternatives to Turkey Point Units 3 and 4 might not be sufficient on their
21 own to replace Turkey Point Units 3 and 4 capacity due to the small size of the resource or lack
22 of cost-effective opportunities, it is conceivable that a combination of alternatives might be cost-
23 effective.
24

25 As discussed in Section 8.2, Turkey Point Units 3 and 4 have a combined net summer rating of
26 1386 MW(e). For the coal-, natural gas-, and oil-fired alternatives, the FPL ER assumes three
27 standard 400-MW(e) units as potential replacements for Units 3 and 4. This approach is
28 followed in this draft SEIS, although it results in some environmental impacts that are somewhat
29 lower than if full replacement capacity were constructed. One possible approach for gaining the
30 additional 186 MW(e) would be to operate oil-fired Units 1 and 2 at Turkey Point at a higher
31 capacity factor than the current factor of approximately 0.5.
32

33 Another possible combination is that additional cost-effective conservation opportunities
34 combined with limited small-scale solar power could be combined with a smaller central power
35 station to replace the Turkey Point Units 3 and 4 capacity. Such an alternative could potentially
36 have fewer environmental impacts than the central plant by itself. The environmental impacts
37 associated with the additional generating option(s), such as solar power, would need to be
38 added to the impacts associated with the central plant technology. For example, solar thermal
39 systems potentially have significant wildlife habitat, land-use, and aesthetic impacts.
40

1 Table 8-9 contains a summary of the environmental impacts of one assumed combination of
 2 alternatives consisting of 800 MW(e) of combined cycle natural gas-fired generation using
 3 closed-cycle cooling, an additional 186 MW(e) from Turkey Point Units 1 and 2 gained by
 4 operating at a higher capacity factor, and 400 MW(e) gained from additional DSM measures.
 5 The impacts are based on the gas-fired generation impact assumptions discussed in
 6 Section 8.2.2, adjusted for the reduced generating capacity. While the DSM measures would
 7 have few environmental impacts, operation of the new gas-fired plant and increased operation
 8

9 **Table 8-9. Summary of Environmental Impacts of 800 MW(e) of Natural Gas-Fired Generation,**
 10 **186 MW(e) from Turkey Point Units 1 and 2, and 400 MW(e) from Demand-Side**
 11 **Management Measures**

Turkey Point Site			Alternate Florida Site	
Impact Category	Impact	Comments	Impact	Comments
16 Land Use	MODERATE to LARGE	9 ha (23 ac) for powerblock, offices, roads, and parking areas. Additional impact of up to approximately 4050 ha (10,000 ac) for construction and/or upgrade of an underground gas pipeline.	MODERATE to LARGE	23 ha (34 ac) for powerblock, offices, roads, and parking areas. Approximately 1000 ha (2500 ac) for transmission line. Additional impact of up to 3600 ha (9000 ac) for construction and/or upgrade of an underground gas pipeline.
17 Ecology	MODERATE to LARGE	Uses undeveloped areas at current Turkey Point site, plus gas pipeline through sensitive Everglades habitat.	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. Likely plant sites already have power generation facilities.
19 Water Use and Quality	SMALL	Uses existing cooling canal system	SMALL to MODERATE	Impact depends on volume of water withdrawal and discharge and characteristics of surface water body.

Alternatives

Table 8-9. (contd)

		Turkey Point Site		Alternate Florida Site	
Impact Category	Impact	Comments	Impact	Comments	
Air Quality	MODERATE	<p><u>Natural Gas-Fired Units</u></p> <p>Sulfur oxides</p> <ul style="list-style-type: none"> • 9 MT/yr (10 tons/yr) <p>Nitrogen oxides</p> <ul style="list-style-type: none"> • 134 MT/yr (148 tons/yr) <p>Carbon monoxide</p> <ul style="list-style-type: none"> • 128 MT/yr (141 tons/yr) <p>PM₁₀ particulates</p> <ul style="list-style-type: none"> • 294 MT/yr (324 tons/yr) <p>Some hazardous air pollutants</p> <p><u>Turkey Point Units 1 and 2</u></p> <p>Incremental emissions of sulfur oxides, nitrogen oxides, carbon monoxide, particulates, and hazardous air pollutants</p>	MODERATE	Same as siting at Turkey Point	
Waste	SMALL to MODERATE	Small amount of ash produced from gas-fired plant; roughly 6000 MT/yr (6700 tons/yr) as ash for increased operation of Units 1 and 2 requiring roughly 1 ha (3 ac) for disposal during a 40 yr plant life.	SMALL	Small amount of ash produced from gas-fired plant; roughly 6000 MT/yr (6700 tons/yr) as ash for increased operation of Units 1 and 2 requiring roughly 1 ha (3 ac) for disposal during a 40 yr plant life.	
Human Health	SMALL	Impacts considered to be minor.	SMALL	Impacts considered to be minor.	
Socioeconomics	SMALL to MODERATE	<p>During construction, impacts would be MODERATE. Up to 1000 additional workers during the peak of the 3-year construction period, followed by reduction from current Turkey Point Units 3 and 4 work force of 960 to 100; tax base preserved. Impacts during operation would be SMALL.</p> <p>Transportation impacts associated with construction workers would be MODERATE.</p>	SMALL to MODERATE	<p>Construction impacts depend on location, but could be significant if location is in a more rural area than Turkey Point. Miami-Dade County would experience loss of tax base and employment, potentially offset by projected economic growth.</p> <p>Transportation impacts associated with construction workers would be MODERATE.</p>	

Table 8-9. (contd)

		Turkey Point Site		Alternate Florida Site	
Impact Category	Impact	Comments	Impact	Comments	
Aesthetics	MODERATE	MODERATE aesthetic impacts due to impacts of plant units and stacks on environmentally sensitive Biscayne National Park.	MODERATE to LARGE	Greatest impact is from the new transmission line that would be 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 to 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 860 operating jobs at Turkey Point could reduce employment prospects for minority and low-income populations. Impacts could be offset by projected economic growth and the ability of affected workers to commute to other jobs.	SMALL to MODERATE	Impacts vary depending on population distribution and makeup at site.	

of Units 1 and 2 would result in increased emissions and environmental impacts. Increased emissions from operation of Units 1 and 2 are noteworthy because these units, which began operation in the late 1960s, are not required to meet the "Standards of Performance for Electric Utility Steam Generating Units for which Construction is Commenced after September 18, 1978" in 40 CFR 60 Subpart Da. These standards establish limits for particulate matter and opacity (40 CFR 60.42a), SO₂ (40 CFR 60.43a), and NO_x (40 CFR 60.44a). The staff concludes that it is very unlikely that the environmental impacts of any reasonable combination of generating and conservation options could be reduced to the level of impacts associated with renewal of the Turkey Point Units 3 and 4 OLS.

8.3 Summary of Alternatives Considered

The environmental impacts of the proposed action, license renewal, are SMALL for all impact categories (except collective offsite radiological impacts from the fuel cycle and from HLW and spent fuel disposal, for which a single significance level was not assigned). The alternative actions, i.e., no-action alternative (discussed in Section 8.1), new generation alternatives (from

Alternatives

1 coal, natural gas, nuclear, and oil discussed in Sections 8.2.1 through 8.2.4, respectively,
2 purchased electrical power (discussed in Section 8.2.5), alternative technologies (discussed in
3 Section 8.2.6), and the combination of alternatives (discussed in Section 8.2.7) were
4 considered.

5
6 The no-action alternative would require the replacement of electrical generating capacity by
7 (1) demand-side management and energy conservation, (2) power purchased from other
8 electricity providers, (3) generating alternatives other than Turkey Point Units 3 and 4, or (4)
9 some combination of these options and would result in the decommissioning of Turkey Point
10 Units 3 and 4. For each of the new generation alternatives (coal, natural gas, nuclear, and oil),
11 the environmental impacts would not be less than the impacts of license renewal. For example,
12 the land-disturbance impacts resulting from construction of any new facility would be greater
13 than the impacts of continued operation of Turkey Point Units 3 and 4. The impacts of
14 purchased electrical power (imported power) would still occur, but would occur elsewhere.
15 Alternative technologies are not considered feasible at this time and it is very unlikely that the
16 environmental impacts of any reasonable combination of generation and conservation options
17 could be reduced to the level of impacts associated with renewal of Turkey Point Units 3 and 4.
18

19 The staff concludes that the alternative actions, including the no-action alternative, may have
20 environmental effects in at least some impact categories that reach MODERATE or LARGE
21 significance.
22

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27
28 10 CFR 51. Code of Federal Regulations, Title 10, *Energy*, Part 51, "Environmental Protection
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30
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33
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36
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39

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 3

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Alternatives

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9.0 Summary and Conclusions

1 By letter dated September 8, 2000, the Florida Power & Light Company (FPL) submitted an
2 application to the U.S. Nuclear Regulatory Commission (NRC) to renew the operating licenses
3 (OLs) for Turkey Point Units 3 and 4 for an additional 20-year period (FPL 2000a). If the OLs
4 are renewed, State regulatory agencies and FPL will ultimately decide whether the plant will
5 continue to operate based on factors such as the need for power or other matters within the
6 State's jurisdiction or the purview of the owners. If the OLs are not renewed, then the plant
7 must be shut down at or before the expiration of the current OLs, which expire on July 19, 2012,
8 for Unit 3, and April 10, 2013, for Unit 4.

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

17
18 Upon acceptance of the FPL application, the NRC began the environmental review process
19 described in 10 CFR Part 51 by publishing a notice of intent to prepare an EIS and conduct
20 scoping (65 FR 63636 [NRC 2000a]). The staff visited the Turkey Point site in December 2000,
21 and held public scoping meetings on December 6, 2000, in Homestead, Florida (NRC 2001).
22 The staff reviewed the FPL Environmental Report (ER; FPL 2000b) and compared it to the
23 GEIS, consulted with other agencies, and conducted an independent review of the issues
24 following the guidance set forth in NUREG-1555, Supplement 1, the *Standard Review Plans for*
25 *Environmental Reviews for Nuclear Power Plants, Supplement 1: Operating License Renewal*
26 (NRC 2000b). The staff also considered the public comments received during the scoping
27 process for preparation of this draft Supplemental Environmental Impact Statement (SEIS) for
28 Turkey Point Units 3 and 4. The public comments received during the scoping process that
29 were considered to be within the scope of the environmental review are provided in Appendix A,
30 Part 1, of this SEIS.

31
32 The staff will hold two public meetings in Homestead, Florida in July 2001, to describe the
33 preliminary results of the NRC environmental review and to answer questions to provide
34 members of the public with information to assist them in formulating their comments. When the
35 comment period ends, the staff will consider and disposition all of the comments received.
36 These comments will be addressed in Appendix A, Part 2, of the final SEIS.

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

5
6 The NRC has adopted the following statement of purpose and need for license renewal from
7 the GEIS:

8
9 The purpose and need for the proposed action (renewal of an operating license) is to
10 provide an option that allows for power generation capability beyond the term of a
11 current nuclear power plant operating license to meet future system generating needs,
12 as such needs may be determined by State, utility, and, where authorized, Federal
13 (other than NRC) decisionmakers.

14
15 The goal of the staff's environmental review, as defined in 10 CFR 51.95(c)(4) and the GEIS, is
16 to determine

17
18 ... whether or not the adverse environmental impacts of license renewal are so great
19 that preserving the option of license renewal for energy planning decisionmakers would
20 be unreasonable.

21
22 Both the statement of purpose and need and the evaluation criterion implicitly acknowledge that
23 there are factors, in addition to license renewal, that will ultimately determine whether an
24 existing nuclear power plant continues to operate beyond the period of the current OLs.

25
26 NRC regulations [10 CFR 51.95(c)(2)] contain the following statement regarding the content of
27 SEISs prepared at the license renewal stage:

28
29 The supplemental environmental impact statement for license renewal is not required to
30 include discussion of need for power or the economic costs and economic benefits of the
31 proposed action or of alternatives to the proposed action except insofar as such benefits
32 and costs are either essential for a determination regarding the inclusion of an alternative in
33 the range of alternatives considered or relevant to mitigation. In addition, the supplemental
34 environmental impact statement prepared at the license renewal stage need not discuss
35 other issues not related to the environmental effects of the proposed action and the
36 alternatives, or any aspect of the storage of spent fuel for the facility within the scope of the
37 generic determination in § 51.23(a) and in accordance with § 51.23(b).^(a)

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

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

7
8 **SMALL:** Environmental effects are not detectable or are so minor that they will neither
9 destabilize nor noticeably alter any important attribute of the resource.

10
11 **MODERATE:** Environmental effects are sufficient to alter noticeably, but not to
12 destabilize, important attributes of the resource.

13
14 **LARGE:** Environmental effects are clearly noticeable and are sufficient to destabilize
15 important attributes of the resource.

16
17 For 69 of the 92 issues considered in the GEIS, the analysis in the GEIS shows the following:
18

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

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

36 Of the 23 issues that do not meet the criteria set forth above, 21 are classified as Category 2
37 issues requiring analysis in a plant-specific supplement to the GEIS. The remaining two issues,
38 environmental justice and chronic effects of electromagnetic fields, were not categorized.

Summary and Conclusions

1 Environmental justice was not evaluated on a generic basis and must also be addressed in a
2 plant-specific supplement to the GEIS. Information on the chronic effects of electromagnetic
3 fields was not conclusive at the time the GEIS was prepared.
4

5 This draft SEIS documents the staff's evaluation of all 92 environmental issues considered in
6 the GEIS. The staff considered the environmental impacts associated with alternatives to
7 license renewal and compared the environmental impacts of license renewal and the alterna-
8 tives. The alternatives to license renewal that were considered include the no-action alternative
9 (not renewing the OLs for Turkey Point Units 3 and 4) and alternative methods of power
10 generation. These alternatives are evaluated assuming that the replacement power generation
11 plant is located at either the Turkey Point site or some other unspecified location in south-
12 central Florida.
13

14 **9.1 Environmental Impacts of the Proposed Action —** 15 **License Renewal**

16
17 FPL and the staff have established independent processes for identifying and evaluating the
18 significance of any new information on the environmental impacts of license renewal. Neither
19 FPL nor the staff has identified information that is both new and significant related to Category
20 1 issues that would call into question the conclusions in the GEIS. Similarly, neither the
21 scoping process, FPL, nor the staff has identified any new issue applicable to Turkey Point
22 Units 3 and 4 that has a significant environmental impact. Therefore, the staff relies upon the
23 conclusions of the GEIS for all Category 1 issues that are applicable to Turkey Point Units 3
24 and 4.
25

26 FPL's license renewal application presents an analysis of the Category 2 issues plus
27 environmental justice and chronic effects from electromagnetic fields. The staff has reviewed
28 the FPL analysis for each issue and has conducted an independent review of each issue. Five
29 Category 2 issues are not applicable because they are related to plant design features or site
30 characteristics not found at Turkey Point. Four Category 2 issues are not discussed in this draft
31 SEIS because they are specifically related to refurbishment. FPL (FPL 2000b) has stated that
32 its evaluation of structures and components, as required by 10 CFR 54.21, did not identify any
33 major plant refurbishment activities or modifications as necessary to support the continued
34 operation of Turkey Point Units 3 and 4 for the license renewal period. In addition, any
35 replacement of components or additional inspection activities are within the bounds of normal
36 plant component replacement and, therefore, are not expected to affect the environment
37 outside of the bounds of the plant operations evaluated in the *Final Environmental Statement*
38 *Related to Operation of Turkey Point Plant* (AEC 1972).
39

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

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

19
20 The following sections discuss unavoidable adverse impacts, irreversible or irretrievable
21 commitments of resources, and the relationship between local short-term use of the
22 environment and long-term productivity.

23 24 **9.1.1 Unavoidable Adverse Impacts**

25
26 An environmental review conducted at the license renewal stage differs from the review
27 conducted in support of a construction permit because the plant is in existence at the license
28 renewal stage and has operated for a number of years. As a result, adverse impacts
29 associated with the initial construction have been avoided, have been mitigated, or have
30 already occurred. The environmental impacts to be evaluated for license renewal are those
31 associated with refurbishment and continued operation during the renewal term.

32
33 The adverse impacts of continued operation identified are considered to be of SMALL
34 significance, and none warrants implementation of additional mitigation measures. The
35 adverse impacts of likely alternatives if Turkey Point Units 3 and 4 cease operation at or before
36 the expiration of the current OLS will not be smaller than those associated with continued
37 operation of these units, and they may be greater for some impact categories in some
38 locations.

39

Summary and Conclusions

9.1.2 Irreversible or Irretrievable Resource Commitments

The commitment of resources related to construction and operation of the Turkey Point Units 3 and 4 during its current license period was made when the plant was built. The resource commitments to be considered in this draft SEIS are associated with continued operation of the plant for an additional 20 years. These resources include materials and equipment required for plant maintenance and operation, the nuclear fuel used by the reactors, and ultimately, permanent offsite storage space for the spent fuel assemblies.

The most significant resource commitments related to operation during the renewal term are the fuel and the permanent storage space. Turkey Point Units 3 and 4 replace approximately one third of the fuel assemblies in each of the two units during every refueling outage, which occurs on an 18-month cycle.

The likely power generation alternatives if Turkey Point Units 3 and 4 cease operation on or before the expiration of the current OLS will require a commitment of resources for construction of the replacement plants as well as for fuel to run the plants.

9.1.3 Short-Term Use Versus Long-Term Productivity

An initial balance between short-term use and long-term productivity of the environment at the Turkey Point site was set when the plants were approved and construction began. That balance is now well established. Renewal of the OLS for Turkey Point Units 3 and 4 and continued operation of the plants will not alter the existing balance, but may postpone the availability of the site for other uses. Denial of the application to renew the OLS will lead to shutdown of the plants and will alter the balance in a manner that depends on subsequent uses of the site. For example, the environmental consequences of turning the Turkey Point site into a park or an industrial facility are quite different.

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

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

1 The significance of the environmental impacts from the proposed action (approval of the
2 application for renewal of the OLS), the no-action alternative (denial of the application),
3 alternatives involving nuclear or coal-, gas-, or oil-fired generation of power at the Turkey Point
4 site and an unspecified "greenfield site," and a combination of alternatives are compared in
5 Table 9-1. Continued use of a closed-cycle cooling system for Turkey Point Units 3 and 4 is
6 assumed for Table 9-1.

7
8 Substitution of once-through cooling for the recirculating cooling system in the evaluation of the
9 nuclear and gas- and coal-fired generation alternatives would result in somewhat greater
10 environmental impacts in some impact categories.

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 FPL (FPL 2000b), (3) consultation with Federal, State, and local agencies, (4) the staff's own
23 independent review, and (5) the staff's consideration of public comments received during the
24 scoping process, the preliminary recommendation of the staff is that the Commission determine
25 that the adverse environmental impacts of license renewal for Turkey Point Units 3 and 4 are
26 not so great that preserving the option of license renewal for energy planning decisionmakers
27 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."

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

Impact Category	Proposed Action	No-Action Alternative	Coal-Fired Generation		Natural Gas-Fired Generation		New Nuclear Generation		Oil-Fired Generation
	License Renewal	Denial of Renewal	Turkey Point Site	Alternate Site in Florida	Turkey Point Site	Alternate Site in Florida	Turkey Point Site	Alternate Site in Florida	Turkey Point Site
Land Use	SMALL	SMALL	MODERATE	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE	MODERATE	MODERATE to LARGE	SMALL to MODERATE
Ecology	SMALL	SMALL	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE	MODERATE to LARGE	MODERATE	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
Air Quality	SMALL	SMALL	MODERATE	MODERATE	MODERATE	MODERATE	SMALL	SMALL	MODERATE
Waste	SMALL	SMALL	MODERATE	MODERATE	SMALL	SMALL	SMALL	SMALL	MODERATE
Human Health	SMALL ^(a)	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
Socioeconomics	SMALL	SMALL to MODERATE	SMALL to LARGE	SMALL to LARGE	SMALL to MODERATE	SMALL to MODERATE	SMALL to LARGE	SMALL to LARGE	MODERATE
Transportation	SMALL	SMALL	SMALL	SMALL to MODERATE	SMALL	SMALL	SMALL	SMALL	SMALL
Aesthetics	SMALL	SMALL	LARGE	MODERATE to LARGE	MODERATE	MODERATE to LARGE	SMALL	MODERATE to LARGE	MODERATE to LARGE
Historic and Archaeological Resources	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL	SMALL
Environmental Justice	SMALL	SMALL TO MODERATE	SMALL TO MODERATE	MODERATE to LARGE	SMALL to MODERATE	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL to MODERATE

(a) Except for collective offsite radiological impacts from the fuel cycle and from HLW and spent-fuel disposal, for which a significance level was not assigned. See Chapter 6 for details.

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- 1 Florida Power & Light Company (FPL). 2000a. *Application for Renewed Operating Licenses,*
2 *Turkey Point Units 3 and 4.* Miami, Florida.
- 3
- 4 Florida Power & Light Company (FPL). 2000b. *Applicant's Environmental Report - Operating*
5 *License Renewal Stage Turkey Point Units 3 and 4.* Miami, Florida.
- 6
- 7 National Environmental Policy Act of 1969 (NEPA). 42 USC 4321, et seq.
- 8
- 9 U.S. Atomic Energy Commission (AEC). 1972. *Final Environmental Statement Related to*
10 *Operation of Turkey Point Plant Florida Power & Light Company, Dockets No. 50-250 and*
11 *50-251.* Washington, D.C.
- 12
- 13 U.S. Nuclear Regulatory Commission (NRC). 1996. *Generic Environmental Impact Statement*
14 *for License Renewal of Nuclear Plants.* NUREG-1437, Volumes 1 and 2, Washington, D.C.
- 15
- 16 U.S. Nuclear Regulatory Commission (NRC). 1999. *Generic Environmental Impact Statement*
17 *for License Renewal of Nuclear Plants: Main Report, "Section 6.3—Transportation, Table 9.1*
18 *Summary of findings on NEPA issues for license renewal of nuclear power plants, Final*
19 *Report."* NUREG-1437, Volume 1, Addendum 1, Washington, D.C.
- 20
- 21 U.S. Nuclear Regulatory Commission. 2000a. "Notice of Intent To Prepare an Environmental
22 Impact Statement and Conduct Scoping Process." *Federal Register.* Vol. 65, No. 206, pp.
23 63636-63637. Washington, D.C.
- 24
- 25 U.S. Nuclear Regulatory Commission (NRC). 2000b. "Standard Review Plans for Environ-
26 mental Reviews for Nuclear Power Plants, Supplement 1: Operating License Renewal."
27 NUREG-1555, Supplement 1, Washington, D.C.
- 28
- 29 U.S. Nuclear Regulatory Commission (NRC). 2001. *Environmental Impact Statement Scoping*
30 *Process: Summary Report - Turkey Point Units 3 & 4, Homestead, Florida.* Washington, D.C.

Appendix A

Comments Received on the Environmental Review

Appendix A

Comments Received on the Environmental Review

Part I - Comments Received During Scoping

On October 24, 2000, the U.S. Nuclear Regulatory Commission (NRC) published a Notice of Intent in the Federal Register (65 FR 63636), 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 Turkey Point operating licenses and to conduct scoping. The plant-specific supplement to the GEIS will be 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 December 22, 2000. The scoping process included two public scoping meetings, which were held at the Harris Field Complex – Homestead YMCA in Homestead, Florida on December 6, 2000. 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. Forty-five attendees provided either oral or written statements that were recorded and transcribed by a certified court reporter. The corrected meeting transcripts are available as an attachment to the January 10, 2001, Scoping Meeting Summary and supplement dated January 30, 2001. In addition to the comments provided during the public meetings, five comment letters and three e-mail messages were received by the NRC in response to the Notice of Intent.

At the conclusion of the scoping period, the NRC staff and its contractor reviewed the transcripts and all written material received, and identified individual comments. All comments and suggestions received orally during the scoping meetings or in writing were considered. Each set of comments from a given commenter was given a unique identifier (Commenter ID number), allowing each set of comments from a commenter to be traced back to the transcript, letter, or e-mail in which the comments were submitted. Several commenters submitted comments through multiple sources (e.g., afternoon and evening scoping meetings).

Table A.1 identifies the individuals who provided comments and the Commenter ID number associated with each person's set(s) of comments. The individuals are listed in the order in which they spoke at the public meeting, and in alphabetical order for the comments received by letter or e-mail.

Appendix A

1 Comments were consolidated and categorized according to the topic within the proposed
2 supplement to the GEIS or according to the general topic if the topic was outside of the scope
3 of the GEIS. Comments with similar specific objectives were combined to capture the common
4 essential issues that had been raised by the source comments. Once comments were grouped
5 according to subject area, the staff and contractor determined the appropriate action for each
6 comment. The staff made a determination on each comment that it was one of the following:
7

- 8 • a comment that was actually a question and introduces no new information
9
- 10 • a comment that was either related to support or opposition of license renewal in general
11 (or specifically Turkey Point) or that makes a general statement about the license
12 renewal process. It may make only a general statement regarding Category 1 and/or
13 Category 2 issues. In addition, it provides no new information and does not pertain to
14 10 CFR Part 54
15
- 16 • a comment about a Category 1 issue that
17 - provided new information that required evaluation during the review, or
18 - provided no new information
19
- 20 • a comment about a Category 2 issue that
21 - provided information that required evaluation during the review, or
22 - provided no such information
23
- 24 • a comment that raised an environmental issue that was not addressed in the GEIS
25
- 26 • a comment regarding alternatives to the proposed action
27
- 28 • a comment regarding related Federal projects
29
- 30 • a comment outside the scope of license renewal (not related to 10 CFR Parts 51 or 54),
31 which includes
32 - a comment regarding the need for power
33 - a comment on safety issues pertaining to 10 CFR Part 54.

1 **Table A.1.** Individuals Providing Comments During Scoping Comment Period
 2

3	Commenter			Comment
4	ID	Commenter	Affiliation (If Stated)	Source
5	01	Dr. Roy Phillips	Miami-Dade Community College	Scoping Meeting
6	02	Curtis Ivey	City of Homestead	Scoping Meeting
7	03	Mark Oncavage		Scoping Meeting
8	04	Bob Hovey	Turkey Point Nuclear Plant	Scoping Meeting
9	05	Liz Thompson	FPL - Turkey Point Nuclear Plant	Scoping Meeting
10	06	Dennis Moss	Miami-Dade County	Scoping Meeting
11	07	Chuck Wallace		Scoping Meeting
12	08	Chuck Lanza	Dade County Emergency Management	Scoping Meeting
13	09	Steve Shiver	City of Homestead	Scoping Meeting
14	10	Robert Epling	Community Bank of Florida	Scoping Meeting
15	11	Joette Lorion		Scoping Meeting
16	12	Joe Wasilewski	Natural Selections	Scoping Meeting
17	13	Ginny O'Shaben	Audubon of Florida	Scoping Meeting
18	14	Angie Howard	Nuclear Energy Institute	Scoping Meeting
19	15	Reverend Ted Greer	Goulds Coalition of Ministers/ Lay Peoples	Scoping Meeting
20	16	Dick Bauer	TIP Bank of the Keys	Scoping Meeting
21	17	David Balch	United Way of Miami-Dade	Scoping Meeting
22	18	Jerry Brown	Florida International University	Scoping Meeting
23	19	Ruben Rothschild	Scout Leader and FPL	Scoping Meeting
24	20	William Weaver		Scoping Meeting
25	21	William Comber	Homestead Air Reserve Station	Scoping Meeting
26	22	Mario Signorello	Homestead Challenge	Scoping Meeting
27	23	Joe Brennan	International Brotherhood of Electrical Workers (IBEW), Local 359	Scoping Meeting
28	24	Debra Vase	Florida Power and Light	Scoping Meeting
29	25	Charles Munz	Redland Company	Scoping Meeting
30	26	Thomas Cullen	Monroe County Emergency Management	Scoping Meeting
31	27	Linda Canzanelli	Biscayne National Park - National Park Service	Email comments
32	28	Joette Lorion		Email comments
33	29	Mark Oncavage		Email comments
34	30	Bo Bollinger	Homestead Hospital	Scoping Meeting
35	31	George DeFazio	The Earth's Cure Informer	Scoping Meeting
36	32	David Balch	United Way of Miami-Dade	Scoping Meeting
37	33	Irene Toner	Monroe County Department of Emergency Management	Scoping Meeting

Appendix A

Table A-1. (contd)

Commenter		Comment Source	
ID	Commenter	Affiliation (If Stated)	Source
34	Paige Latterner	Keys Gate Development	Scoping Meeting
35	Tim Williams		Scoping Meeting
36	Ruben Rothschild	Scout Leader and FPL	Scoping Meeting
37	Len Anthony	Condominium Association Naranja Lakes Condo #5	Scoping Meeting
38	Mike Pedrianes	IBEW Local 359	Scoping Meeting
39	Mike Richardson	First National Bank of Homestead	Scoping Meeting
40	Allen Bennett	Mutineer Restaurant	Letter
41	Eric S. Johnson	Community Bank of Florida	Letter
42	Robert L. Epling	Community Bank of Florida	Letter
43	Board of Directors	Greater Homestead/Florida City Chamber of Commerce	Letter
44	Betty Thomas	Dade County Public School	Scoping Meeting
45	Captain Bowe	Homestead Police Department	Scoping Meeting
46	William Comber	Homestead Air Reserve Station	Scoping Meeting
47	Steve Garrison	Florida Nurserymen and Growers Association	Scoping Meeting
48	Walter L. Campbell	First Baptist Church of Florida City	Scoping Meeting
49	Mary Finlan	Greater Homestead/Florida City Chamber of Commerce	Scoping Meeting
50	Katy Olesen		Scoping Meeting
51	Buddy Howamitz	IBEW Local 349	Scoping Meeting
52	Hayden Blaylock	Blaylock Oil Company	Scoping Meeting
53	Alex Penelas	Miami-Dade County	Scoping Meeting
54	Liz Thompson	FPL - Turkey Point Nuclear Plant	Scoping Meeting
55	Bob Hovey	Turkey Point Nuclear Plant	Scoping Meeting
56	Angie Howard	Nuclear Energy Institute	Scoping Meeting
57	Joette Lorion		Letter

While developing this plant-specific supplement to the GEIS, the staff and its contractor considered all of the relevant issues raised during the scoping process. Table A-1 identifies the individuals who provided comments that were applicable to the environmental review. The individuals are listed in the order in which they spoke or provided written comments at the meetings. To maintain consistency with the scoping summary, we have retained the same unique identifier that was used for that person in the report. The accession number is provided for the written comments to facilitate access to the document through the Public Electronic Reading Room (ADAMS) <http://www.nrc.gov/NRC/ADAMS/index.html>

1 Accession Nos.:

- 2 1. ML010880454 - Letter & mailing list
- 3 2. ML010880464 - Environmental Impact Statement Scoping Process Summary Report
- 4 3. ML010880478 - Package

5
6 Comments were then consolidated and categorized according to the topic within the proposed
7 supplement to the GEIS, or according to the general topic if the topic was outside the scope of
8 the GEIS.

9
10 Each comment that was applicable to this environmental review is summarized in this section.
11 This information was extracted from the Turkey Point Scoping Summary Report, dated
12 March 29, 2001, and is being provided in this report for the convenience of those interested in
13 the scoping comments applicable to this environmental review. The comments that were
14 determined to be general or outside the scope of the environmental review for Turkey Point are
15 not included in this report. More detail regarding the disposition of general or nonapplicable
16 comments can be found in the Turkey Point Scoping Summary Report. Commenters whose
17 comments are not discussed in this section will find the disposition of their concerns addressed
18 in that report.

19
20 The following pages summarize the comments and suggestions received as part of the scoping
21 process, and discuss their disposition. Parenthetical numbers after each comment refer to the
22 Commenter ID number and the comment number. Comments can be tracked to the
23 commenter and the source document through the ID number listed in Table A.1. Comments
24 are grouped by category. The categories are as follows:

- 25
- 26 1. Comments Concerning Category 1 Groundwater-Use and Quality Issues
- 27 2. Comments Concerning Category 1 Socioeconomic Issues
- 28 3. Comments Concerning Category 1 Air-Quality Issues
- 29 4. Comments Concerning Category 1 Land-Use Issues
- 30 5. Comments Concerning Category 1 Human Health Issues
- 31 6. Comments Concerning Category 1 Terrestrial Resource Issues
- 32 7. Comments Concerning Category 1 Postulated Accident Issues
- 33 8. Comments Concerning Category 1 Uranium Fuel Cycle and Waste Management Issues
- 34 9. Comments Concerning Category 2 Aquatic Ecology and Threatened and Endangered
35 Species Issues
- 36 10 Comments Concerning Category 2 Socioeconomic Issues
- 37 11. Comments Concerning Environmental Justice
- 38 12. Comments Concerning Related Federal Projects
- 39 13. Comments Concerning Alternative Energy Sources
- 40

Appendix A

1 14. Comments Concerning Safety Issues Within the Scope of License Renewal

2 15. Questions: Water Quality and Postulated Accidents

3 4 **Comments**

5 6 **1. Comments Concerning Category 1 Groundwater Use and Quality Issues**

7
8 As stated in 10 CFR Part 51, Table B-1, Category 1 water quality issues include:

- 9
10 • Groundwater use conflicts (potable and service water; plants that use <100 gpm)
- 11
12 • Groundwater quality degradation (Ranney wells)
- 13
14 • Groundwater quality degradation (saltwater intrusion)
- 15
16 • Groundwater quality degradation (cooling ponds in salt marshes).

17
18 **Comment:** The Supplemental EIS should investigate ways to reserve some of the adverse
19 impacts to mainland and near shore habitats under the proposed action and all alternatives.
20 Specifically, the area south and southwest of the plant contains the 100+ miles of cooling
21 canals that have altered the natural environment by maintaining a hypersaline area of influence
22 that in turn impedes natural groundwater flow from the upland side of the canals into the Bay.
23 Rehydrating the hypersaline marshes with fresh water is one example of potential mitigation to
24 be considered during the analysis. (27-14)

25
26 **Response:** *The comment is noted. The groundwater flow in the vicinity of Turkey Point is*
27 *controlled by precipitation and tidal action. Any exchange of water between the cooling canals*
28 *and the groundwater would not alter the groundwater flow significantly, but may alter sheet*
29 *runoff. This is a Category 1 issue that was considered in the GEIS. The comment provides no*
30 *new information. Therefore, the issue will not be evaluated further.*

31 32 **2. Comments Concerning Category 1 Socioeconomic Issues**

33
34 As stated in 10 CFR Part 51, Table B-1, Category 1 socioeconomic issues include:

- 35
36 • Public services: public safety, social services, and tourism and recreation
- 37
38 • Public services, education (license renewal term)
- 39
40 • Aesthetics impacts (refurbishment)

- 1 • Aesthetics impacts (license renewal)
2
3 • Aesthetics impacts of transmission lines (license renewal term).
4

5 **Comment:** The Supplemental EIS should investigate ways to minimize the facility's current
6 intrusions to "old Florida's" natural landscape and scenic vistas. A mitigation option to consider
7 under the proposed action and all alternatives may include repainting the structures in natural
8 tones that mirror the surrounding landscape, and consequently make them less obtrusive to the
9 natural setting. (27-11)

10
11 **Response:** *The comment is noted. The comment suggests that mitigation measures be*
12 *introduced to repaint the structures to make them less obtrusive. Aesthetic impacts were*
13 *evaluated in the GEIS and determined to be a Category 1 issue. Aesthetic impacts of Units 1*
14 *and 2 (the fossil units) are outside the scope of the SEIS for Turkey Point. However, the*
15 *information regarding the impact of Turkey Point structures on the natural landscape and scenic*
16 *vistas will be discussed in Chapter 4 of the SEIS. Evaluation of the impacts of potential*
17 *alternatives to license renewal at Turkey Point will be provided in Chapter 8 of the SEIS.*
18

19 **Comment:** The Service is interested in working with FPL to minimize the excessive lighting of
20 the Plant from dusk to dawn. This is a fragile resource critical to wildlife that is sought after by
21 many visitors and residents. (27-12)
22

23 **Comment:** The Supplemental EIS should include mitigation options for the night sky under the
24 proposed action and all alternatives. (27-13)
25

26 **Response:** *The comments are noted. The comments suggest that mitigation measures be*
27 *introduced to reduce the impact of Turkey Point lighting on the night sky. Aesthetic impacts of*
28 *Units 1 and 2 (the fossil units) are outside the scope of the SEIS for Turkey Point. However,*
29 *the information regarding the proximity of the national park to Turkey Point Units 3 and 4, and*
30 *resulting impacts on the natural landscape of the park will be discussed in Section 4 of the*
31 *SEIS.*
32

33 **Comment:** Noise monitoring conducted by a noise consultant for the National Park Service
34 identified the natural ambient sound levels in the southwestern portion of the park to be at or
35 below 30 decibels. The operation of the Turkey Point Plant may result in intrusive industrial
36 noise that may impede Biscayne National Park's efforts to preserve and/or restore the park's
37 natural ambient sound levels. (27-3)
38
39

Appendix A

1 **Comment:** The supplemental EIS should include the natural soundscape of the park as part of
2 the "affected environment" when identifying impacts and any potential mitigation for such
3 impacts. (27-4)
4

5 **Response:** *The comments are noted. The comments refer to potential noise impacts from*
6 *operation of the Turkey Point facility. The noise generated by operations associated with*
7 *Turkey Point Units 1 and 2 (the fossil units) are not within the scope of the SEIS. The noise*
8 *associated with Units 3 and 4 during the relicensing term will be considered in Section 4 of the*
9 *SEIS.*
10

11 **Comment:** There is a concern that there will be a socioeconomic impact if you go along a path
12 where you re-license a plant that will later shut down earlier than people think. (11-20)
13

14 **Response:** *The comment is noted. Socioeconomic issues will be addressed in Section 4.2 of*
15 *the SEIS. Decommissioning socioeconomic impacts, designated as a Category 1 issue, will be*
16 *addressed in Section 7 of the SEIS.*
17

18 **3. Comments Concerning Category 1 Air Quality Issues**

19 As stated in 10 CFR Part 51, Table B-1, Category 1 air quality issues include:
20
21

- 22 • Air quality effects of transmission lines.
23

24 **Comment:** Turkey Point will keep air quality high with no emissions. (5-5 and 54-5)
25

26 **Comment:** Nuclear electricity is produced without producing any greenhouse gases or other
27 air pollutants. (14-3 and 56-3)
28

29 **Response:** *The comments are noted. Air quality impacts from plant operations were*
30 *evaluated in the GEIS and found to be minimal. These emission are regulated through permits*
31 *issued by the U.S. Environmental Protection Agency and the States. Air quality effects of*
32 *transmission lines is a Category 1 issue as evaluated in the GEIS. The comments provide no*
33 *new information and, therefore, will not be evaluated further.*
34

35 **Comment:** The National Park Service is concerned about the continued introduction of
36 anthropogenic air pollutants and particulate matter into an area of special concern. (27-5)
37
38

1 **Comment:** The Supplemental EIS should identify the cumulative effect associated with
2 projected population growth and continued and increasing emissions under the proposed action
3 and all alternatives. Mitigation measures, including air scrubbers and other similar technolo-
4 gies, should be fully evaluated and implemented. (27-6)
5

6 **Response:** *The comments are noted. Air quality impacts from plant operations were*
7 *evaluated in the GEIS and found to be minimal. These emission are regulated through permits*
8 *issued by the U.S. Environmental Protection Agency and the States. Air quality effects of*
9 *transmission lines is a Category 1 issue as evaluated in the GEIS. Emissions at Turkey Point*
10 *are largely associated with Units 1 and 2 (the fossil units), which are not under NRC regulation.*
11 *Emissions associated with Units 3 and 4 (the nuclear units) are governed by Permit*
12 *Number 0250003-002-AV issued by the State of Florida Department of Environmental Protec-*
13 *tion. Impacts of emissions from fossil-fueled alternative forms of generation will be discussed in*
14 *Section 8 of the SEIS. The comments provide no new information and, therefore, will not be*
15 *evaluated further.*
16

17 **4. Comments Concerning Category 1 Land Use Issues**

18
19 As stated in 10 CFR Part 51, Table B-1, Category 1 land use issues include:
20

- 21 • Onsite land use during license renewal term and refurbishment
- 22
- 23 • Power line rights-of-way.
- 24

25 **Comment:** FPL owns, maintains, and uses some 20 thousand acres to sustain both the plant
26 and the status quo of the environment for the sustenance of the flora, fauna and land. (37-5)
27

28 **Response:** *The comment is noted. Onsite land use during the renewal period is a Category 1*
29 *issue as evaluated in the GEIS. Applicable site descriptive information, such as the amount of*
30 *acreage for the plant, will be included in Section 2 of the SEIS.*
31

32 **5. Comments Concerning Category 1 Human Health Issues**

33
34 As stated in 10 CFR Part 51, Table B-1, Category 1 human health issues include:
35

- 36 • Radiation exposure to the public during refurbishment
- 37
- 38 • Occupational radiation exposure during refurbishment
- 39
- 40 • Microbiological organisms (occupational health)

Appendix A

- 1 • Noise
- 2
- 3 • Radiation exposures to public (license renewal term)
- 4
- 5 • Occupational radiation exposures (license renewal term).
- 6

7 **Comment:** There is a need to look at the cumulative impacts of any radiation that may be
8 building up in the cooling canals outside in Biscayne National Park, say cesium-137 and
9 strontium-90. Asks to test shellfish from Biscayne Bay for occurrence of strontium-90. (11-13)

10
11 **Comment:** Emissions from nuclear plants, even if within regulatory limits, may be adversely
12 affecting public health. (18-3)

13
14 **Response:** *The comments are noted. To the extent that these comments question the*
15 *radiological protection afforded by NRC regulations, radiation doses to the public during the*
16 *license renewal term are a Category 1 issue as evaluated in the GEIS. The evaluation of health*
17 *effects of radiation, both natural and man-made, is an ongoing activity involving public, private,*
18 *and international institutions. The assessment of health effects upon which the GEIS analysis*
19 *is based was founded on the consensus of these sources. No changes in that consensus have*
20 *occurred since the GEIS was completed. Further, the staff is not aware of any new information*
21 *or studies that call into question the conclusions in the GEIS. Therefore, the comments will not*
22 *be evaluated further.*

23
24 **Comment:** NRC needs to remove the generic approach because there are issues with coastal
25 reactors about how radiation accumulates in the environment. (11-12)

26
27 **Comment:** Radiological releases from the steam generation system, if they are impacting
28 humans, must also be impacting the plants and wildlife of the area. (18-4)

29
30 **Comment:** The NRC should address the impacts that radioactive emissions from the plant
31 during routine operations have had and may continue to have in the future on wildlife and the
32 human environment. (28-5 and 57-8)

33
34 **Comment:** Under NEPA, the licensee must assess any current impact that radiation may be
35 having on the environment surrounding the plant in order to assess the cumulative impact that
36 may result from extending the operating license. (28-15)

37
38 **Comment:** NRC must analyze the impact of the potential increase in radiation that Turkey
39 Point is having on the cooling canals and the aquatic and human environment surrounding the
40 plant. (57-16)

1 **Response:** *The comments are noted. Radiation exposures to the public during the license*
2 *renewal term is a Category 1 issue that was evaluated in the GEIS. NRC considers public*
3 *protection from radiological doses also to be protective of terrestrial and aquatic organisms.*
4 *Public doses from Turkey Point emissions were specifically evaluated in Section 4.6 of the*
5 *GEIS, using data from monitored emissions and ambient monitoring. The comments do not*
6 *detail specific issues associated with coastal reactors, provide no new information, and,*
7 *therefore, will not be evaluated further.*

8
9 **Comment:** The Tooth Fairy Project, by the Radiation and Public Health Project, states that
10 researchers had found that strontium-90 radiation levels in baby teeth of Miami-Dade County
11 children are twice as high as in other areas of the country. This increase is found within a 50
12 mile radius of Turkey Point Nuclear Power Plant. (13-1)

13
14 **Comment:** NRC should sponsor Federal funds to test for strontium-90 in baby teeth. (13-2)

15
16 **Comment:** The EIS should include a mandate to assess health effects of radioactive
17 emissions and strontium-90 in baby teeth. (13-3)

18
19 **Comment:** Strontium-90 concentrations in baby teeth have not changed since the 50's, and
20 the concentrations in Dade County were higher than the other areas studied. Strontium-90 is
21 considered an indicator of other radionuclides released from steam-generated degradation of
22 reactor systems. (18-2)

23
24 **Response:** *The comment is noted. Radiation exposures to the public during the license*
25 *renewal term is a Category 1 issue and was evaluated in the GEIS. Although the referenced*
26 *report was not available at the time that the GEIS was written, the comment does not represent*
27 *new information with regard to the Category 1 issue as evaluated in the GEIS because the*
28 *study does not identify a significant departure from what was specifically documented in the*
29 *GEIS with regard to public dose. Therefore, the comment will not be evaluated further.*

30
31 **Comment:** There is new evidence of a link between strontium-90 and other radioisotopes in
32 the environment and increases in breast, prostate, and childhood cancer rates. A study
33 published by the Radiation and Public Health Project in 1996 identified a higher breast cancer
34 mortality rate for 1985-1989 in women living within 100 miles of a nuclear reactor relative to a
35 base period in the 50's. Turkey Point's rate was 26% higher during the 80's, vs. a U.S. average
36 of 1% increase. In areas where nuclear plants have shut down, rates of childhood cancers, low
37 birth rates and infant mortality rates have all improved. All this suggests that low dose rates
38 over protracted intervals are a significant factor in the current cancer epidemic and other
39 illnesses. (18-1)

40

Appendix A

1 **Response:** *The comment is noted. Radiological exposures to the public during the license*
2 *renewal term is a Category 1 issue that was evaluated in the GEIS. Doses to members of the*
3 *public from Turkey Point emissions were specifically evaluated in Section 4.6 of the GEIS,*
4 *using data from monitored emissions and ambient monitoring, and were found to be well within*
5 *regulatory limits. The staff has reviewed the 1996 study and concludes that it provides no new*
6 *evidence that links strontium-90 with increases in breast cancer, prostate cancer, or childhood*
7 *cancer rates. The American Cancer Society recognizes that "public concern about*
8 *environmental cancer risks often focuses on risks for which no carcinogenicity has been proven*
9 *or on situations where known carcinogen exposures are at such low levels that risks are*
10 *negligible. Ionizing radiation emissions from nuclear facilities are closely controlled and involve*
11 *negligible levels of exposure for communities near such plants." The comment provides no new*
12 *information and, therefore, will not be evaluated further.*

13
14 **Comment:** NRC needs to look at the epidemiological studies about the health of the
15 surrounding population around Turkey Point in terms of cancer. (11-14)

16
17 **Comment:** NRC and FPL should conduct an epidemiological study, a biological study of
18 strontium-90 in teeth, and a medical study to see if radiation released from Turkey Point is
19 contributing to cancer in the community. (18-5)

20
21 **Comment:** High incidence rates of cancer in the Dade county area may well be due to the high
22 incidence of old persons and people moving from areas of the country with health problems.
23 Strontium-90 may come from weapons-grade nuclear weapons materials and not nuclear
24 power plants. (26-3)

25
26 **Comment:** Long Island has one of the highest rates of breast cancer. Gaseous radioactive
27 tritium had been released from the stack at the reactor for 40 years. So look into what is going
28 on at Turkey Point. (31-1)

29
30 **Response:** *The comments are noted. Radiation exposures to the public during the license*
31 *renewal term is a Category 1 issue as evaluated in the GEIS. At the request of Congress, the*
32 *National Cancer Institute (NCI) conducted a study in 1990, "Cancer in Populations Living Near*
33 *Nuclear Facilities," to look at cancer mortality rates around 52 nuclear power plants, including*
34 *Indian Point, nine Department of Energy facilities, and one former commercial fuel reprocessing*
35 *facility. The NCI study concluded "from the evidence available, this study has found no*
36 *suggestion that nuclear facilities may be linked causally with excess deaths from leukemia or*
37 *from other cancers in populations living nearby." Additionally, the American Cancer Society has*
38 *concluded that although reports about cancer case clusters in such communities have raised*

1 *public concern, studies show that clusters do not occur more often near nuclear plants than*
2 *they do by chance elsewhere in the population. The comments provide no new information,*
3 *therefore, the comment will not be evaluated further.*

4
5 **Comment:** The SEIS should also review groundwater/drinking water pathways and the unique
6 fact that the Biscayne Aquifer is an EPA designated sole source drinking water supply for
7 millions of people in South Florida. (28-8)

8
9 **Response:** *The comment is noted. The comment expresses concern regarding the levels of*
10 *protection afforded by NRC radiological emissions standards. Radiation exposures to the*
11 *public during the license renewal term is a Category 1 issue as evaluated in the GEIS. The*
12 *comment provides no new information and, therefore, will not be evaluated further.*

13 14 **6. Comments Concerning Category 1 Terrestrial Resource Issues**

15
16 As stated in 10 CFR Part 51, Table B-1, Category 1 terrestrial resource issues include:

- 17 • Cooling tower impacts on crops and ornamental vegetation
- 18 • Cooling tower impacts on native plants
- 19 • Bird collisions with cooling towers
- 20 • Cooling pond impacts on terrestrial resources
- 21 • Power line rights-of-way management (cutting and herbicide application)
- 22 • Bird collisions with power lines
- 23 • Impacts of electromagnetic fields on flora and fauna (plants, agricultural crops,
24 honeybees, wildlife, livestock)
- 25 • Flood plains and wetland on power line rights-of-way.

26
27
28
29
30 **Comment:** The National Park Service recommends that the Supplemental EIS consider
31 continued and expanded exotic plant eradication from FPL property for its benefits of removing
32 harmful seed sources. (27-8)

Appendix A

1 **Response:** *The comment is noted. Impacts on terrestrial resources resulting from continued*
2 *operation during the renewal period have been evaluated and were designated as a Category 1*
3 *issue in the GEIS. The comment provides no new information. This is an operations concern*
4 *that will be brought to the attention of FPL. The comment will not be evaluated further.*
5

6 **7. Comments Concerning Category 1 Postulated Accident Issues**

7
8 As stated in 10 CFR Part 51, Table B-1, Category 1 postulated accidents issues include:

- 9
10 • Design basis accidents.
11

12 **Comment:** Accidents may affect the Biscayne Aquifer, which is the drinking water source for
13 the Miami-Dade county area. (3-9)
14

15 **Response:** *The comment is noted. Design basis accidents are a Category 1 issue and were*
16 *evaluated in the GEIS. The comment provides no new information and, therefore, will not be*
17 *evaluated further.*
18

19 **Comment:** The licensee's projections for the rapidly growing South Florida population that will
20 occur during the extended license period increases risk and requires the licensee to conduct a
21 probabilistic risk assessment that analyzes emergency response capability to determine
22 whether they can meet the requirements of 10 CFR 50.54(a) in the event of an accident and the
23 requirements of 40 CFR Part 190 and the proposed 40 CFR Part 61 to protect the public from
24 potential high and lower level exposures and resultant health risk. Additionally, the
25 environmental impacts, including environmental pathways, that could result from of a severe
26 accident taking place at the Turkey Point plant, a Bay/Ocean plant, must be analyzed in a site-
27 specific SEIS. (28-13)
28

29 **Response:** *The comment is noted. Design basis accidents are a Category 1 issue as*
30 *evaluated in the GEIS. The GEIS analysis does not include the assumption that area*
31 *population would always remain static. Further, to the extent that the comment concerns*
32 *emergency planning, such issues were determined by the Commission to be outside of license*
33 *renewal. Finally, with the exception of a requirement to consider alternative mitigation*
34 *measures, the Commission has determined that severe accident issues are not within the*
35 *scope of license renewal. Therefore, this comment will not be evaluated further.*
36

37 **8. Comments Concerning Category 1 Uranium Fuel Cycle and Waste Management** 38 **Issues**

39
40 As stated in 10 CFR Part 51, Table B-1, Category 1 uranium fuel cycle and waste management

1 issues include:
2

- 3 • Offsite radiological impacts (individual effects from other than the disposal of spent fuel
4 and high level waste)
- 5
- 6 • Offsite radiological impacts (collective effects)
- 7
- 8 • Offsite radiological impacts (spent fuel and high level waste)
- 9
- 10 • Nonradiological impacts of the uranium fuel cycle
- 11
- 12 • Low level waste storage and disposal
- 13
- 14 • Mixed waste storage and disposal
- 15
- 16 • On-site spent fuel
- 17
- 18 • Nonradiological waste.
- 19

20 **Comment:** A spent fuel accident at Turkey Point could contaminate 224 square miles. Need
21 to have appropriate response capability, especially under hurricane situations. (11-3)
22

23 **Comment:** There is no place to put the high-level nuclear waste and right now there is nuclear
24 waste piling up at Turkey Point. This could create a problem in case of a nuclear-spent-fuel
25 accident and resultant land contamination. (11-15)
26

27 **Comment:** The NRC should look at effects of a hurricane hitting the spent fuel pool, especially
28 as the components in the pool age. (11-16)
29

30 **Comment:** There is a nuclear waste storage issue. There will be an increase in the amount of
31 nuclear waste we leave our children. NRC needs to test if there will be a potential increase in
32 the surrounding environment to ensure there will be no cumulative impact. (11-18).
33

34 **Comment:** The proposed action will result in twenty years of additional operation that will
35 increase the amount of high-level and low-level nuclear waste. Presently, FPL does not have
36 storage space for the additional high-level waste and appears to be uncertain as to disposal of
37 their low-level waste. The storage of these wastes on site for the extended period of operation
38 could increase the risk of an accidental release to the environment in that Turkey Point is
39 located in a hurricane zone rather than a geologically stable area. If it becomes necessary to
40 store these wastes on site because no permanent burial site has been implemented, the

Appendix A

1 storage of this spent fuel on site could also increase the risk and consequences of a spent fuel
2 pool accident depending on the storage method. The licensee should be required to
3 demonstrate that they can permanently and safely dispose of both their high level and low-level
4 nuclear waste off-site for the extended operation of the plant. Additionally, the NRC should
5 analyze the potential environmental impact of such a potential accident in a site-specific SEIS.
6 (28-14)
7

8 **Comment:** Relicensing will create more nuclear waste and radioactive byproducts that could
9 adversely impact the environment, especially as repositories close. (57-15)
10

11 **Response:** *The comments are noted. Uranium fuel cycle impacts are Category 1 issues as*
12 *evaluated in the GEIS. The comments provide no new information and, therefore, will not be*
13 *evaluated further.*
14

15 **9. Comments Concerning Category 2 Aquatic Ecology and Threatened and Endangered** 16 **Species Issues**

17
18 As stated in 10 CFR Part 51, Table B-1, Category 2 aquatic ecology and threatened and
19 endangered species issues are:
20

- 21 • Entrainment of fish and shellfish in early life stages
- 22
- 23 • Impingement of fish and shellfish
- 24
- 25 • Heat shock
- 26
- 27 • Threatened or endangered species.
- 28

29 **Comment:** It is estimated that approximately 70% of the increase in population of the
30 American Crocodile in South Florida is due to the preservation efforts of FPL in the cooling
31 canal system. (5-3 and 54-3)
32

33 **Comment:** Beneficial coexistence of Turkey Point and the environment. The plant site gave
34 some of the land to the National Park Service to help establish Biscayne National Park. Over
35 13,000 acres of that property is undeveloped, and is part of the Everglades Mitigation Bank.
36 FPL is restoring this to its natural state and maintaining the land for the protection and
37 preservation of the environment. (5-2 and 54-2)
38

39 **Comment:** They have worked with the county government to protect some of the
40 environmentally endangered lands in the community. (6-4)

1 **Comment:** The Turkey Point Plant is also environmentally sensitive. The 13,000 acres that
2 have been set aside for mitigation are evidence of the commitment to protect the environment.
3 (7-3)
4

5 **Comment:** We have one of the only crocodile natural habitats in this area, and that says a lot
6 about the dedication of the Turkey Point Plant and the employees to making sure the
7 environment can coexist with this facility. (9-3)
8

9 **Comment:** The cooling canal systems are a unique habitat and would not exist in this day and
10 age. It provides a home for the American crocodile. (12-1)
11

12 **Comment:** The lands associated with the Turkey Point Plant have the ability to benefit or harm
13 many of the critical species (threatened and endangered) of South Florida. (27-7)
14

15 **Comment:** The Supplement EIS should consider the impacts and benefits that have occurred
16 due to the alteration of the natural habitat from the Turkey Point cooling canals. The Park
17 recognizes the success of the cooling canals as artificial breeding grounds for the endangered
18 North American saltwater crocodile. (27-9)
19

20 **Comment:** The Park hopes to work more closely with FPL in the future with data exchange
21 regarding the North American saltwater crocodile, to include monitoring of tagged animals that
22 are observed in the park and research projects that could jointly benefit park resource
23 managers and FPL. (27-10)
24

25 **Comment:** The water cooling in the canals is not interconnected to the adjacent fragile
26 Biscayne Bay. The extensive both marshy and dry land provides much wildlife habitat for birds,
27 varmints and so forth. Part of the land even provides the community an open and sheltered
28 picnic area. (37-6)
29

30 **Comment:** Cooling pond system provides a warm ecosystem for wintering birds and wildlife,
31 and protects the American crocodile. (40-4)
32

33 **Comment:** The Turkey Point employees have developed a unique stewardship of the
34 environment in the region surrounding the plant by preserving the natural habitat surrounding
35 the plant, providing homes to many endangered species, including the American crocodile.
36 (53-2)

Appendix A

1 **Response:** *The comments are noted. The comments acknowledge the importance of the*
2 *manner in which FPL operates the site to the benefit of threatened and endangered species.*
3 *The appropriate descriptive information regarding the plant-specific ecology of the site will be*
4 *addressed in Section 2 of the SEIS.*

5
6 **Comment:** This process must comply with the Endangered Species Act. Within a 50 mile
7 radius at Turkey Point there are probably 60 endangered and threatened species because it is
8 a major ecosystem. (11-8)

9
10 **Comment:** Under the Endangered Species Act, the NRC must consult with the U.S. Fish and
11 Wildlife Service on how the proposed action could adversely impact threatened and
12 endangered species within at least a fifty mile radius of the Turkey Point plant prior to
13 conducting relicensing activities. (28-10)

14
15 **Comment:** NRC has not undertaken consultation with the Fish and Wildlife Service for the
16 proposed action. (57-10)

17
18 **Response:** *The comments are noted. Threatened and endangered species on the plant site*
19 *and transmission line rights-of-way will be addressed as a Category 2 issue in Section 4.6 of*
20 *the SEIS. The staff will conduct appropriate consultation under the Endangered Species Act.*

21
22 **Comment:** There are new and significant issues related to the presence of endangered and
23 threatened species in the parks and preserves surrounding the site. (57-6)

24
25 **Response:** *The comment is noted, however, the comment fails to identify the new and*
26 *significant issues related to the presence of threatened and endangered species. Threatened*
27 *and endangered species within the plant site and the transmission line rights-of-way will be*
28 *addressed as a Category 2 issue in Section 4.6 of the SEIS.*

29 30 **10. 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
 - 36 • Public services: public utilities
 - 37
 - 38 • Public services, education (refurbishment)
 - 39
 - 40 • Offsite land use (refurbishment)

- 1 • Offsite land use (license renewal term)
- 2
- 3 • Public services, transportation
- 4
- 5 • Historic and archaeological resources.
- 6

7 **Comment:** Turkey Point maintains a wetlands mitigation bank that is used by Homestead and
8 others to offset impacts to wetlands. Loss of the plant will affect the ability to develop. (2-5)

9
10 **Response:** *The comment is noted. It addresses a Category 2 issue regarding offsite land use*
11 *during the license renewal term, and will be evaluated in Section 4.4 of the SEIS.*

12
13 **Comment:** Turkey Point is the largest employer in Dade County. Loss would impact 800
14 employees, and affect the plant's property tax base of \$8 million. There will be a great deal of
15 ancillary job and facility loss if the license is not renewed. (2-2)

16
17 **Comment:** Keeping Turkey Point a part of this community is also important to the social and
18 economic well-being of our neighbors, with an estimated economic impact of over \$60 million
19 annually to the local economy, and by the participation of the Turkey Point employees in the
20 community. (5-7)

21
22 **Comment:** They are a major provider of jobs in the community. (6-2)

23
24 **Comment:** With over 800 employees, just about all our families are some how touched
25 through the connection with Turkey Point Plant. With \$50 billion in payroll multiplied throughout
26 our community, many of our businesses are able to stay afloat and flourish because of the
27 economic impact of this plant. (7-2)

28
29 **Comment:** We have employees that are there contributing \$8 million in real estate taxes, \$50
30 million a year in payroll to this community. (9-5)

31
32 **Comment:** Nuclear energy is a source of employment and economic activity that supports
33 families, regional businesses, local governments as they provide residents with essential
34 educational and social services. (14-5)

35
36 **Comment:** Turkey Point plays a vital role in the local economy. (15-2)

Appendix A

1 **Comment:** The 800 or so employees of the plant earn an average of over \$62,000 per year,
2 bringing in a payroll of over \$50 million per year, with another \$10 million in goods and services
3 purchased locally. This makes it possible for TIB to make loans to businesses and residents.
4 (16-1)
5

6 **Comment:** Turkey Point staff contribute financially to the community, giving over \$150,000 to
7 the United Way, and have a \$200,000 scholarship for Miami-Dade Community College. Turkey
8 Point staff do a lot of work in the community on a volunteer basis. (17-1)
9

10 **Comment:** The economic impact of Turkey Point exceeds the payroll, and may be as high as
11 \$150 to 200 million, because of the re-spending of the income in the local community. (22-2)
12

13 **Comment:** Turkey Point union members have donated over \$10,000 to the Miami Cancer and
14 Burn Center over the past 7 years. (23-2)
15

16 **Comment:** The paychecks at Turkey Point contribute to the Monroe County service-related
17 fields. (26-1)
18

19 **Comment:** The folks at Turkey Point are an essential component of this local economy. They
20 are the largest employer in deep South Dade. (30-1)
21

22 **Comment:** Turkey Point is the largest employer in South Dade. (32-1)
23

24 **Comment:** Turkey Point facility raised over \$150,000 for the United Way for this community
25 and participate heavily in civic activities. Turkey Point staff is highly involved in the community
26 and have created a \$200,000 fund for scholarships at Miami-Dade Community College. (32-2)
27

28 **Comment:** The economic impact of not renewing the license would be devastating to the local
29 community of South Dade and Keys Gate. (34-1)
30

31 **Comment:** Contributions from the Turkey Point staff to the United Way affect as many as 450
32 underprivileged people who are dependent upon their funding and contributions. (35-3)
33

34 **Comment:** FPL and its appropriation has another community interest in their direct dollar
35 donations to the local hospital. (37-7)
36

37 **Comment:** Turkey Point employs about 800 people. (38-1)
38

39 **Comment:** Plant employees use community services and provide income to the city and jobs
40 for residents. (40-2)

1 **Comment:** Turkey Point is the largest private employer in South Dade, with over
 2 800 employees and annual base salaries of over \$62,000. Economic impacts would be felt in
 3 payroll, property taxes, and support of area services. (41-1)
 4

5 **Comment:** Turkey Point Nuclear Plant is one of the largest employers in the region with over
 6 800 employees and its purchase of local services helps sustain the economy of south Miami-
 7 Dade County. (53-3)
 8

9 **Comment:** Keeping Turkey Point a part of this community is also important to the social and
 10 economic well-being of our neighbors. With an estimated economic impact of over \$60 million
 11 annually to the local economy, and by the participation of the Turkey Point employees in the
 12 community. (54-7)
 13

14 **Comment:** Nuclear energy is a source of employment and economic activity that supports
 15 families, regional businesses, local governments as they provide residents with essential
 16 educational and social services. (56-5)
 17

18 **Response:** *The comments are noted. Socioeconomic issues specific to the plant are*
 19 *Category 2 issues and will be addressed in Section 4.4 of the SEIS. The comments support*
 20 *license renewal at Turkey Point Units 3 and 4.*
 21

22 **11. Comments Concerning Environmental Justice**

23
 24 **Comment:** There is a need to look at the impact of re-licensing on Native Americans. The
 25 Miccosukee Tribe and Seminoles live within the 50 mile zone of Turkey Point. NRC needs to
 26 look at how the re-licensing may impact their culture and way of life. Their culture and whole
 27 way of life depends on the natural Everglades system and it not being contaminated. (11-21)
 28

29 **Comment:** NRC must evaluate environmental justice impacts on the Miccosukee and
 30 Seminole Indians. (28-6)
 31

32 **Response:** *The comments are noted. Environmental Justice is an issue specific to the plant*
 33 *and will be addressed in Section 4.4 of the SEIS. The Miccosukee and Seminole Indians have*
 34 *been offered the opportunity to participate in the scoping process and will be invited to*
 35 *comment on the draft SEIS.*
 36

37 **12. Comments Concerning Related Federal Projects**

38
 39 **Comment:** The NEPA analysis should involve the South Florida Ecosystem Restoration Task
 40 Force. (11-19)

Appendix A

1 **Comment:** NRC should ask the Fish and Wildlife Service, the Everglades National Park,
2 Biscayne National Park, the Environmental Protection Agency, and the Army Corps of
3 Engineers to become cooperating agencies on the site-specific EIS, and notify the South
4 Florida Ecosystem Restoration Task Force and their working group of the scope of the
5 proposed action. (57-11)
6

7 **Response:** *The comments are noted. Consultation with U.S. Fish and Wildlife under the*
8 *Endangered Species Act requirements will take place as part of the license renewal evaluation*
9 *process under NEPA. Other Federal agencies, as appropriate, have been contacted for*
10 *information. It is not appropriate for these agencies to be cooperating agencies under the*
11 *proposed action of license renewal, because these other agencies will not be issuing permits or*
12 *licenses related to the proposed license renewal action.*
13

14 **Comment:** There is significant new information at Turkey Point in terms of its significance to
15 this whole area - the whole South Florida area in the Everglades restoration effort. (11-6)
16

17 **Comment:** Under NEPA, the NRC must assess whether the proposed action conflicts with the
18 Federal investment in the Everglades Restoration plan. (28-16)
19

20 **Comment:** NRC should be aware of the Everglades Restoration Project and the Federal
21 government's commitment to the South Florida ecosystem. (57-3)
22

23 **Comment:** Relicensing may be incompatible with restoration of the Everglades and the South
24 Florida ecosystem. (57-17)
25

26 **Response:** *The comments are noted. However, the comments fail to explain how the*
27 *existence of an Everglades restoration effort is significant new information that would require*
28 *further assessment in the SEIS. The U.S. Army Corps of Engineers Everglades Restoration*
29 *Project will be invited to provide information as part of the NEPA analysis of this proposed*
30 *action. The Everglades Restoration Plan will be discussed in Section 2 of the SEIS.*
31

32 **Comment:** Government support for Everglades restoration, and the clearly defined Federal
33 interest in the protection of Biscayne National Park, Everglades National Park, the Big Cypress
34 National Preserve, and Miccosukee Indian Reservation, along with the endangered and
35 threatened species that inhabit these lands, changes the likely environmental harms by a
36 "considerable magnitude" and could significantly alter the costs and benefits of the proposed
37 project. (28-3)

1 **Comment:** There are new and significant issues related to the context of the plant, including
2 the Biscayne National Park, Everglades National Park, Big Cypress National Preserve,
3 Miccosukee Indian Reservation, and the Everglades Restoration Bill. (57-5)
4

5 **Response:** *The comments are noted. However, the comments fail to explain how the*
6 *existence of an Everglades restoration effort is significant and new information that would*
7 *require further assessment in the SEIS. The appropriate agencies will be contacted to provide*
8 *information on their perceptions of scoping issues and impacts as a routine fulfillment of*
9 *Federal responsibilities under NEPA. To the extent that these comments address offsite land*
10 *use, which is a Category 2 socioeconomic issue, offsite land use will be discussed in Section 2*
11 *and 4 of the SEIS.*
12

13. Comments Concerning Alternative Energy Sources

14

15 **Comment:** Nuclear is a good alternative to oil - keeps us from being dependent on foreign oil.
16 (1-1)
17

18 **Comment:** Without Turkey Point, a new plant would likely have to be built, and a means for
19 transporting the fuel to the plant would have to be constructed. This could mean constructing a
20 new gas pipeline to the site. Windmills would require over 200,00 acres. A solar park would
21 require over 50,000 acres, and both would be less reliable than Turkey Point. Turkey Point's
22 license renewal is the least impact alternative for providing electricity to the South Florida
23 community. (5-6 and 54-6)
24

25 **Comment:** It was calculated that propane gas is three times as expensive as electricity from
26 Turkey Point. (10-2)
27

28 **Comment:** Could convert Turkey Point to a natural gas plant. (11-1)
29

30 **Comment:** There is a need to do a fair analysis of alternatives so we will not wind up in Dade
31 County without sufficient power if the plant has to be derated or shut down in the future. (11-
32 10)
33

34 **Comment:** Renewal of a nuclear plant's license is far more economical than building any type
35 of new electrical facility. (14-6 and 56-6)
36

37 **Comment:** Current land use is for a nuclear plant, so there is no need to disturb new land for a
38 new power plant. (16-3)

Appendix A

1 **Comment:** The nuclear plant produces no soot or greenhouse gases, and has no adverse
2 effect on one of the most sensitive ecological areas in the country. A fossil plant could not do
3 this. (26-2)
4

5 **Comment:** The Service is very concerned about the detrimental impacts that will occur without
6 the power production from the nuclear units. As delivery is set today, this would result in a
7 dramatic increase in the numbers of FPL barge transports through Biscayne National Park's
8 sensitive marine ecosystem. Without nuclear energy production, reliance on burning fossil
9 fuels without using extensive mitigation methods will result in serious threats to the Park's air
10 quality. The Supplement should address these concerns during the alternatives analysis. (27-
11 16)
12

13 **Comment:** The Service is concerned about the alternatives to license renewal and that it will
14 result in the demand to develop new power plant facilities in deep South Dade, leading to land
15 use changes that prevent the ability to preserve and protect the Bay. These direct and
16 cumulative impacts related to a large-scale development of this character should be fully
17 identified within the Supplement EIS. (27-15)
18

19 **Comment:** An objective review of alternatives and their environmental risks could preclude the
20 need to conduct the expensive and time consuming relicensing process by substituting a more
21 environmentally friendly alternative for the operation of this aged nuclear power plant located in
22 one of the most environmentally sensitive areas in the world. (28-9)
23

24 **Comment:** Nuclear power is clean. The Tampa Tribune recently published an article on fossil
25 fuel emissions and the FDA is considering having warning labels on deepwater pelagic species
26 such as tuna, shark and swordfish due to fossil-fuel emissions. (30-2)
27

28 **Comment:** The alternative to Turkey Point is more power plants in the Keys with their
29 unavoidable impact on the fragile Keys environment. Other alternatives, such as the sun which
30 Monroe County has in abundance, are not ready to power all the air-conditioners, lights, and
31 countless no vacancy signs. (33-1)
32

33 **Comment:** Nuclear power is cleaner than other kinds of power. It provides the power they to
34 keep their agricultural business going. (35-2)
35

36 **Comment:** It makes sense to extend the license. If these plants were required to shut down,
37 new and possibly more expensive plants would have to be built in order to provide generation
38 capacity required for an ever increasing population in the area. (36-3)
39

1 **Comment:** Look at reasonable alternatives. Look at gas-fired generator, fossil-fuel generator,
2 need to be sure that the extension of the license gets us the best way of generating safe,
3 reliable electricity for the community. (39-2)
4

5 **Comment:** Nuclear generation is currently the least expensive method of providing electricity
6 to the area, and produces no pollutants to the air, unlike fossil fuels. (40-3)
7

8 **Comment:** NRC should evaluate a full study of alternatives, including those that are more
9 environmentally friendly. (57-9)
10

11 **Response:** *The comments are noted. Many of the comments support relicensing of Turkey*
12 *Point. Impacts from reasonable alternatives for the Turkey Point license renewal will be*
13 *evaluated in Section 8 of the SEIS.*
14

15 **Comment:** The delivery of fossil fuel occurs by barge from the port of Miami through Biscayne
16 Bay with over 300 trips each year hauling 12,000 barrels of bunker "C" fuel oil to the plant. The
17 barge has run aground numerous times, and each trip adversely impacts the water quality by
18 churning up the Bay bottom into the water column creating a turbidity plume that lasts long after
19 the barge has passed. The thrust from the barge's tugboat may disrupt sea grass recovery by
20 potentially ripping it from the bottom, as well as other vegetation. Turbidity is known to limit the
21 photosynthesis of both the phytoplanktonic and sea grass communities that are essential to a
22 healthy marine ecosystem. (27-1)
23

24 **Comment:** FPL should consider the possibility of extending the existing and under-utilized fuel
25 pipeline from the former Homestead Air Force Base to the Power Plant as an alternative. (27-2)
26

27 **Response:** *The comments are noted. The comments refer to fuel delivery to the fossil-*
28 *powered Units 1 and 2. Fuel delivery to the fossil powered units is not within the scope of 10*
29 *CFR Part 51 or 54, as fossil plants are not subject to NRC regulation. The analysis of*
30 *alternatives in Section 8 of the SEIS will include the possibility of replacing the nuclear plants by*
31 *alternative types of generation, including fossil plants. Section 8 will evaluate the impacts*
32 *associated with pipelines needed to support alternative forms of generation and the impacts of*
33 *barge delivery on the Biscayne Bay water quality and ecology.*

34 **14. Comments Concerning Safety Issues Within the Scope of License Renewal**

35

36 **Comment:** The issue of pressure-vessel integrity at Turkey Point and does this reactor have
37 the integrity it needs to have. This needs to be added to the NEPA process because its
38 important to safety and to economics. (11-9)
39

Appendix A

1 **Comment:** There is an issue with hurricanes and aging equipment that could increase the risk
2 probability and magnitude of a radiological accident. (11-11)
3

4 **Comment:** Need to be sure pressure vessels have the strength and the capacity to continue to
5 operate for another 20 years. (39-1)
6

7 **Comment:** The NRC should require that the licensee perform an analysis based on plant-
8 specific surveillance capsule test data, and plant-specific operating history, for both Turkey
9 Point Units 3 and 4, because the rate at which the beltline weld material deteriorates and/or
10 embrittles is plant specific. Such a plant-specific analysis is necessary to prove that an
11 acceptable margin of safety exists for the reactor vessels in both Turkey Point Units 3 and 4
12 that will enable them to meet the requirements of 10 CFR 50.61 and 10 CFR (c)(1)(ii) during the
13 period of extended operation, because the additional twenty years of operation will cause
14 increased neutron radiation damage to the reactor vessel welds that could further decrease the
15 margin of safety, thereby increasing the probability that a pressurized thermal shock event and
16 resultant meltdown could take place at Turkey Point Unit 3 or 4, either as a result of an internal
17 event or an external event, such as a hurricane, if fracture toughness is not maintained. In the
18 event that such an accident occurs in a hurricane in which emergency response capability is
19 curtailed or restricted, the consequences to the public could also be increased. (28-11)
20

21 **Comment:** The age-related degradation of multiple components could increase the chance
22 that several components in the reactor and/or spent fuel pool, could fail simultaneously during a
23 hurricane, thereby reducing the margin of safety of the plant and increasing the probability of an
24 age-related accident and resultant radiological emergency that would have an extremely
25 adverse impact on the human environment. The probability of a hurricane's (including a
26 beyond design basis hurricane's) impact on deteriorated plant structures and components and
27 its contribution to risk should be analyzed and discussed in quantitative terms by the licensee in
28 their application or environmental report to meet the requirements of 10 CFR 50.4(a)(1) and
29 also in a site-specific SEIS under NEPA. (28-12)
30

31 **Comment:** Operation of this aged and embrittled nuclear power plant beyond its original
32 license will cause more radioactive fission products to accumulate and could increase the
33 probability and consequences of a nuclear accident, threatening injury to herself, her family and
34 the ecosystem of South Florida. (57-1)
35

36 **Comment:** NRC should ensure that the licensee conduct Charpy tests of the pressure vessel
37 welds, because an embrittled pressure vessel would be subject to multiple failures of aging
38 components, including that induced by a hurricane. NRC should evaluate whether multiple-
39 component failure is more likely in an old facility. (57-12)
40

1 **Comment:** Hurricane and aging equipment could increase the risk, probability, and magnitude
2 of a radiological accident. (57-13)
3

4 **Response:** *The comments are noted. To the extent that these comments pertain to aging*
5 *within the scope of license renewal, these issues will be addressed during the parallel safety*
6 *analysis review performed under 10 CFR Part 54. Aging management issues are outside the*
7 *scope of 10 CFR Part 51 and will not be evaluated further in this SEIS. The ability to cope with*
8 *the effects of severe weather, such as hurricanes and tornados, is specifically addressed in the*
9 *deterministic review conducted prior to issuance of an operating license. This forms part of a*
10 *plant's licensing basis, which must be met at all times during the operating life of the plant.*
11 *Weather events more severe than the plant's design basis have been addressed by the*
12 *licensee in its individual plant examinations of internal and external events (IPE and IPEEE,*
13 *respectively). These plant-specific risk studies provide baseline estimates of risk from internal*
14 *and external events. In evaluating severe accident mitigation alternatives (SAMAs), a license*
15 *renewal applicant uses risk profiles to identify potential means of further reducing risk (through*
16 *design alternatives that enhance the ability to prevent or mitigate core damage). Section 5.2 of*
17 *the SEIS will contain the staff's evaluation of SAMAs.*
18

19 **15. Questions**

20

21 The following comments were presented in the form of questions during the scoping process.
22 The staff will take note of the questions to the extent that the questions apply to the issues
23 discussed in the SEIS. However, the questions did not provide new information and will not be
24 evaluated further.
25

26 Water Quality

27

28 **Comment:** The cooling canals are unlined, and the water enters Card Sound and Biscayne
29 Bay at 60 to 150 cubic feet per second. What levels of contaminants are migrating to the
30 Sound, and what is appearing in the inshore marine life of Biscayne Bay National Park? (3-1)
31

32 **Comment:** Will the discharge of contaminants to the cooling canals and ultimately to Card
33 Sound increase if Barnwell closes and the Southeast Regional Compact collapses? (3-2)
34

35 **Comment:** Do contaminants in the fish and shellfish of Card Sound and Biscayne Bay from
36 Turkey Point discharges pose an unacceptable health risk for consumers of those resources?
37 (3-3)
38

39 **Comment:** What are the actual levels of CO₂ production during the fuel fabrication process?
40 (3-6)

Appendix A

1 **Comment:** What isotopes at what concentrations are present in the water of Lake Warren?
2 (29-3)

3
4 **Comment:** What isotopes at what concentrations are present in the sediment of Lake Warren?
5 (29-4)

6
7 **Comment:** What volume of water containing radioactive waste, other than condenser cooling
8 water was discharged into Lake Warren in year 2000? (29-5)

9
10 **Comment:** What are the daily limits in volume and concentration for each chemical allowed for
11 discharge by the National Pollutant Discharge Elimination System permit? (29-6)

12
13 **Comment:** Have there been any requested discharges of toxic chemicals in year 2000? What
14 chemicals, what volume, what concentrations? (29-7)

15
16 **Comment:** What are the nonradioactive pollutants present in the water of Lake Warren? What
17 chemicals, what concentrations? (29-8)

18
19 **Comment:** What radioactive isotopes have been found in the bay waters outside the Turkey
20 Point plant in year 2000? (29-9)

21
22 **Comment:** What nonradioactive pollutants have been found in the bay waters outside the
23 Turkey Point plant in year 2000? (29-10)

24
25 **Response:** *The questions are noted. Radiological dose, offsite migration of radionuclides,*
26 *water quality, and uranium fuel cycle impacts are Category 1 issues that were evaluated in the*
27 *GEIS. Information from routine monitoring programs are available from the State of Florida*
28 *Department of Health. The requirements in the National Pollutant Discharge Elimination*
29 *System permit are set by the State of Florida and are not under the jurisdiction of the NRC.*
30 *The permit is included as part of the applicant's Environmental Report, and will be discussed in*
31 *Section 4 of the SEIS. Site description detail will be provided in Section 2.2 of the SEIS. The*
32 *questions provide no new information and, therefore, will not be evaluated further.*

33 34 Postulated Accidents

35
36 **Comment:** What safety impacts will result from the increased air traffic associated with the
37 proposed change in use of Homestead AFB? (3-7)

38
39 **Comment:** If Homestead AFB becomes a space port, what will be the impacts on Turkey Point
40 if a million pounds of liquid hydrogen stored in above-ground tanks near the plant ignite? (3-8)

1 **Response:** *The questions are noted. The impacts associated with postulated accidents*
2 *resulting from site hazards are evaluated under 10 CFR Part 50 as part of the licensing design*
3 *basis. In January 2001, the Department of Defense has announced that it will allow civilian*
4 *control and development of the former Homestead Air Force Base, provided no future airport is*
5 *located at that site. Should an airport be proposed near any nuclear power plant in the United*
6 *States, the hazard to continued operation of the plant would be evaluated. The questions*
7 *provide no new information and, therefore, will not be evaluated further.*

8

9 **Summary**

10
11 The preparations of the plant-specific supplement to the GEIS will take into account all the
12 relevant issues raised during the scoping process that are described above. Concerns related
13 to the environmental license renewal review of Turkey Point will be considered during the
14 development of the draft SEIS for Turkey Point Units 3 & 4. The draft SEIS will be available for
15 public comment. Interested Federal, State, and local government agencies; local organizations;
16 and members of the public will be given the opportunity to provide additional input to be
17 considered during the development of the final SEIS. Concerns identified that are outside the
18 scope of the staff's environmental review have been or will be forwarded to the appropriate
19 NRC program manager.

20

21 **Part II - Comments Received on the Draft SEIS**

22
23 (Reserved for comments received on the draft SEIS.)

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. Representatives from
5 Argonne National Laboratory, Lawrence Livermore National Laboratory, Energy Research
6 Incorporated, and the Information Systems Laboratory also participated in this review.

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Appendix B

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Name	Affiliation	Function or Expertise
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(a) Pacific Northwest National Laboratory is operated for the U.S. Department of Energy by Battelle Memorial Institute.		
(b) Argonne National Laboratory is operated for the U.S. Department of Energy by the University of Chicago.		
(c) Lawrence Livermore National Laboratory is operated for the U.S. Department of Energy by the University of California.		

Appendix C

Chronology of NRC Staff Environmental Review Correspondence Related to the Florida Power and Light Company Application for License Renewal of Turkey Point Units 3 and 4

Appendix C

Chronology of NRC Staff Environmental Review Correspondence Related to the Florida Power and Light Company Application for License Renewal of Turkey Point Units 3 and 4

This appendix contains a chronological listing of correspondence between the NRC and the Florida Power & Light Company (FPL) and other correspondence related to the NRC staff's environmental review, under 10 CFR Part 51, of FPL's application for renewal for Turkey Point, Units 3 and 4 operating licenses. All documents, with the exception of those containing proprietary information, have been placed in the Commission's Public Document Room, at One White Flint North, 11555 Rockville Pike (first floor), Rockville, Maryland, and are available electronically from the Public Electronic Reading Room found on the Internet at the following web address: <http://www.nrc.gov/NRC/ADAMS/index.html>. From this site, the public can gain access to the NRC's Agencywide Document Access and Management Systems (ADAMS), which provides text and image files of NRC's public documents in the Publicly Available Records (PARS) component of ADAMS.

- | | |
|--------------------|--|
| September 8, 2000 | Letter from Florida Power and Light Company (FPL) to NRC forwarding the application for renewal of operating licenses for Turkey Point Units 3 and 4, requesting extension of operating licenses for an additional 20 years |
| September 19, 2000 | Letter from NRC to FPL, "Receipt of the Turkey Point Units 3 and 4 License Renewal Application and Assignment of a Project Manager" |
| October 4, 2000 | Letter from NRC to FPL transmitting Determination of Acceptability and Sufficiency for Docketing, Proposed Review Schedule, and Opportunity for a Hearing Regarding an Application from Florida Power and Light Company for Renewal of the Operating Licenses for Turkey Point Units 3 and 4 |
| October 18, 2000 | Letter from NRC to FPL forwarding Federal Register Notice of Intent to Prepare and Environmental Impact Statement and Conduct Scoping in support of the review of the license renewal application |
| October 24, 2000 | Letter from NRC to Ms. Julie Rist, Homestead Branch Library, regarding Maintenance of Reference Material for Turkey Point License Renewal at the Homestead Branch Library |

Appendix C

November 15, 2000	Notice of Public Meeting to Discuss Environmental Scoping Process for the Turkey Point Units 3 and 4 License Renewal Application
December 21, 2000	Letter to James Billie, Seminole Indian Tribe, inviting participation in scoping process related to NRC's environmental review of the license renewal application for Turkey Point Units 3 and 4
December 21, 2000	Letter to Mr. Billy Cypress, Miccosukee Indian Tribe, inviting participation in scoping process related to NRC's environmental review of the license renewal application for Turkey Point Units 3 and 4
January 6, 2001	Summary of Site Audit to Support Review of License Renewal Application of Turkey Point
January 10, 2001	Note to Michael Lesar, Rules and Directives Branch, "Receipt of Comments Concerning the Scope of the Environmental Review of Turkey Point Units 3 and 4"
January 10, 2001	Summary of Scoping Meeting Held in Support of the Environmental Review for the Turkey Point Units 3 and 4 License Renewal Application
January 30, 2001	Supplement to the Summary of Scoping Meeting Held in Support of the Environmental Review for the Turkey Point Units 3 and 4 License Renewal Application
January 31, 2001	Letter to FPL from NRC, "Request for Additional Information Related to the Staff's Review of the License Renewal Environmental Report for Turkey Point Units 3 and 4"
January 31, 2001	Letter to FPL from NRC, "Request for Additional Information Related to the Staff's Review of Severe Accident Mitigation Alternatives for Turkey Point Units 3 and 4"
February 1, 2001	Letter from NRC to Ms. Terrie Bates, South Florida Water Management District, "U.S. Nuclear Regulatory Commission Review of the Turkey Point Units 3 and 4 License Renewal Application"
February 1, 2001	Letter from NRC to Col. James May, U.S. Army Corps of Engineers, "U.S. Nuclear Regulatory Commission Review of the Turkey Point Units 3 and 4 License Renewal Application"

February 13, 2001 E-mail from Ms. Terrie Bates, South Florida Water Management District, to NRC "U.S. Nuclear Regulatory Commission Review of the Turkey Point Units 3 and 4 License Renewal Application."

March 29, 2001 Environmental Scoping Summary Report Associated with the Staff's Review of the Application by Florida Power and Light Company for Renewal of the Operating Licenses for Turkey Point Units 3 and 4

March 30, 2001 Letter from FPL to NRC, "Response to Request for the Review of the Turkey Point Units 3 and 4 License Renewal Application."

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 Biscayne National Park, Miami-Dade County, Florida

6
7 Chamber of Commerce, Homestead, Florida

8
9 City of Florida City - Mayor, Florida City, Florida

10
11 City Manager, Homestead, Florida

12
13 Covenant Community Development, Florida City, Florida

14
15 Dade County Farm Bureau, Homestead Florida

16
17 Deputy Property Appraiser, Property Appraisal Office, Miami-Dade County

18
19 Economic Development Division, Miami-Dade County Office of Community and Economic
20 Development, Miami, Florida

21
22 Farm Share, Homestead, Florida

23
24 Florida Fish and Wildlife Conservation Commission, Vero Beach, Florida

25
26 Florida Natural Areas Inventory, Tallahassee, Florida

27
28 Florida State Historic Preservation Office, Tallahassee, Florida

29
30 Institute for Regional Conservation, Miami, Florida

31
32 Keyes Company Realtors, Homestead, Florida

33
34 Miccosukee Indian Tribe, Miami, Florida

35
36 Occupational License Office, Miami Dade County, Miami, Florida

37

Appendix D

- 1 Office of Commissioner Dennis C. Moss, Miami-Dade Board of County Commissioners, Miami,
2 Florida
- 3
- 4 Office of Community Services, Miami-Dade County, Miami, Florida
- 5
- 6 Planning and Zoning Department, Miami-Dade County, Miami, Florida
- 7
- 8 Salvation Army, Homestead, Florida
- 9
- 10 Seminole Indian Tribe, Hollywood, Florida
- 11
- 12 South Florida Water Management District, West Palm Beach, Florida
- 13
- 14 U.S. Army Corps of Engineers, Jacksonville, Florida
- 15
- 16 U.S. Fish & Wildlife Service, Vero Beach, Florida
- 17
- 18 Vision Council, Homestead, Florida

Appendix E

Florida Power and Light Company's Compliance Status and Consultation Correspondence

Appendix E

Florida Power and Light 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 Turkey Point Units 3 and 4 are shown in Table E-1.

3
4 Following Table E-1 are reproductions of correspondence prepared and sent during the
5 evaluation process of the application for renewal of the operating licenses for Turkey Point
6 Units 3 and 4.

Table E-1. Federal, State, Local, and Regional Licenses, Permits, Consultations, and Other Approvals for Current Turkey Point Units 3 and 4 Operation

Agency	Authority	Description	Number	Issue Date	Expiration Date	Remarks
U.S. District Court for the Southern District of Florida	Federal Clean Water Act	Final Judgment	Civil Action No. 70-328-CA	09/10/71	None	Controls any discharges from the closed cooling system into navigable waters of the U.S. The judgment is reproduced in Appendix C of AEC 1972.
NRC	10 CFR Part 50	Operating license, Turkey Point Unit 3	DPR-31	07/20/72	07/19/12	Authorizes operation of Unit 3
NRC	10 CFR Part 50	Operating license, Turkey Point Unit 4	DPR-41	04/11/73	04/10/13	Authorizes operation of Unit 4
FWS	Migratory Bird Treaty Act (16 USC 703-712)	Permit	PRT-697722		12/31/00 (renewal in progress)	The permit authorizes carcass salvage and injured bird transport.
FWS	Section 7 of the Endangered Species Act (16 USC 1536)	Consultation		Consultation initiated 09/07/99		Requires a Federal agency to consult with FWS regarding whether a proposed action will affect endangered or threatened species
NMFS	Section 7 of the Endangered Species Act (16 USC 1536)	Consultation	Letter F/SER3:BH from NMFS to FPL, 09/30/99			NMFS determined that license renewal is not likely to affect species protected by the Endangered Species Act and under the purview of NMFS
Florida Division of Historic Resources	Section 106 of the National Historic Preservation Act (16 USC 470f)	Consultation	Letter from Florida Division of Historic Resources to FPL, October 22, 1999			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. The Florida Division of Historic Resources determined that license renewal will have no effect on any sites listed or eligible for listing in the National Register.

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Appendix E

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Table E.1. (contd)

Agency	Authority	Description	Number	Issue Date	Expiration Date	Remarks
Florida Department of Community Affairs	Section 307 of the Coastal Zone Management Act [16 USC 1456(c)(3)(A)]	Consistency determination with the Florida Coastal Management Program	FL200008250606C	10/04/00	None	The Florida Department of Community Affairs determined that renewal of the Turkey Point Units 3 and 4 operating licenses would be consistent with the Florida Coastal Management Program.
South Florida Water Management District	Florida Statutes §120.54(5)	Agreement	4-FPL-22 8046/306		None	The Agreement covers interceptor ditch operation and groundwater monitoring.
FDEP	Florida Statutes §403.088, FDEP Rule 62-620, Florida Administrative Code	National Pollution Discharge Elimination System Permit	FL0001562	01/07/00	01/06/05	Permit for discharge of wastewater and once-through cooling water to the closed cycle recirculating cooling canal system. Section 1.E.15 of the permit states that the permit constitutes certification of compliance with §401 of the Federal Water Pollution Control Act (Clean Water Act).
FDEP	Florida Statutes §403.087	Wastewater treatment permit	FLA013612-002		01/25/01	Permit for the onsite sewage treatment facility
FDEP	Florida Statutes, chapter 376	Annual storage tank registration	Facility ID 8622249 Placard Number 110600		06/30/01	This authorization covers operation of seven above-ground storage tanks for petroleum products and one above-ground tank for sulfuric acid.
FDEP	Florida Statutes, chapter 376	Annual storage tank registration	Facility ID 8622251 Placard Number 110599		06/30/01	This authorization covers three above-ground and two underground petroleum storage tanks.
FDEP	Florida Statutes, chapter 403	Air emissions permit	0250003-002-AV		12/31/03	The permit authorizes emissions from nine diesel emergency generators, miscellaneous diesel engines, and miscellaneous emissions units and activities.

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Appendix E

Table E.1. (contd)

Agency	Authority	Description	Number	Issue Date	Expiration Date	Remarks
FDEP	Florida Statutes, chapter 403	Underground injection control permit	U013-277655		11/5/00 (renewal in progress)	The permit authorizes disposal of sanitary wastewater to wells.
FFWCC	Florida Administrative Code, chapter 39	Special purpose permit	WX01041		12/31/03	The permit authorizes live capturing of 1) crocodiles for marking and scientific data collection purposes, and 2) alligators and Eastern indigo snakes to avoid their harm in the performance of FPL activities.
FFWCC	Florida Administrative Code, chapter 39	Scientific collecting permit	W00278		07/30/03	The permit authorizes the salvaging of carcasses of protected wildlife.
DERM	Code of Miami-Dade County, chapter 24	Multiple source annual operating permit	MSP-00010-2000		9/30/01	The permit covers the boiler makeup water treatment system, fleet operations, two underground storage tanks, barge slip operations, and refrigerant use and recovery.
DERM	Code of Miami-Dade County, chapter 24	Domestic wastewater annual operating permit	DWO-00010 2000/2001		4/14/01	Sewage treatment facility
Miami-Dade County, Florida Fire Rescue Department		Burning permit	8201		3/7/01 (renewal in progress)	

- CFR = Code of Federal Regulations
- DERM = Miami-Dade County Department of Environmental Resources Management
- FWS = U.S. Fish and Wildlife Service
- NRC = U.S. Nuclear Regulatory Commission
- EPA = U.S. Environmental Protection Agency
- FDEP = Florida Department of Environmental Protection
- FFWCC = Florida Fish and Wildlife Conservation Commission
- NMFS = National Marine Fisheries Service
- USC = United States Code

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1 **From:** James Golden [jgolden@sfwmd.gov]
2 **Sent:** Tuesday, February 13, 2001 5:45 AM
3 **To:** TurkeyPointEIS@nrc.gov
4 **Cc:** Terrie Bates; Claudia Kugler
5 **Subject:** NRC Review of Turkey Point Units 3&4 License Renewal Application
6

7 This e-mail is in response to the February 1, 2001 letter from Cynthia A. Carpenter to Terrie
8 Bates of the South Florida Water Management District's (SFWMD's) Environmental Resource
9 Regulation Department concerning the above subject matter.
10

11 In August, 2000, the Florida State Clearinghouse requested comments from the SFWMD on
12 the license renewal application for this project for consistency with the Florida Coastal
13 Management Plan. In September, 2000, we advised the Florida State Clearinghouse that we
14 had no adverse comments on this proposal and that it was not inconsistent with our programs,
15 policies, and objectives.
16

17 Thank you for this opportunity to comment.
18

19 If you have any questions concerning the SFWMD's review of this proposal, please contact Jim
20 Golden, Senior Planner in the Environmental Resource Regulation Department, at
21 (561) 682-6862.



United States Department of the Interior

NATIONAL PARK SERVICE
Biscayne National Park
9700 S. W. 328th Street
Homestead, Florida 33033-5634

IN REPLY REFER TO:

N16

December 22, 2000

Mr. James Wilson, Chief, Rules and Directives Branch
Division of Administrative Services
Mailstop T-6 D59
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001

Dear Mr. Wilson:

The National Park Service (hereafter the "Service") appreciates the opportunity to provide scoping comments for the Supplement to the Generic Environmental Impact Statement (GEIS) on potential environmental impacts of license renewal and alternatives to license renewal for the Turkey Point Nuclear Plant, Units 3 and 4, in Homestead, Florida. The Service understands the Nuclear Regulatory Commission (NRC) is committed to the protection of human health and safety, environmental quality, national defense and security. The Service also understands the goal of the applicant, Florida Power and Light (FPL), is the renewal of their operating license to allow power generation capability twenty years beyond the term of the current license. We further understand that both the NRC and FPL want to ensure that this facility operates in a manner that protects the environment and supports the local and regional economy.

We recognize that some of the concerns raised below are not solely related to the operation of the nuclear units, but we are raising them because we feel that they should be considered during the relicensing review that is now underway. From our standpoint, we view the plant in its entirety and are compelled to comment holistically, as opposed to distinguishing between nuclear and fossil fuel aspects of the plant. We do so with the understanding that the two are really inseparable as far as the plant's very function and potential environmental impacts are concerned.

While the Service supports and appreciates the critical role Turkey Point Plant plays in the local community and economy as a large employer, philanthropist, and service provider, our intent here is to assist NRC during scoping to identify potential

environmental issues resulting from alternatives to be analyzed related to the current and future operation of the Turkey Point Plant. The Service recommends the full review of impacts and inclusion of all possible mitigation to help Biscayne National Park meet its mission of resource preservation and protection for present and future generations. The Service welcomes the opportunity to work with the NRC and FPL throughout the environmental review and analysis.

Introduction

Turkey Point Power Plant and property abuts Biscayne National Park (hereafter the "Park"). As FPL's closest neighbor, the Park is greatly concerned about the future of the facility and overall operations associated with running the plant. Biscayne National Park was set aside by Congress for the fundamental purpose stated in the National Park Service's Organic Act, "to conserve the scenery and the natural and the historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." The key management-related provision of the Organic Act is the nondegradation or no-impairment mandate for all park managers. The high standard of no-impairment helps ensure in perpetuity the health and integrity of the resources and values protected by the National Park System. The Service welcomes the opportunity to work with the NRC and FPL to investigate ways to help the Service achieve its mission as it relates to Biscayne National Park.

Scoping Issues and Concerns

The Service understands that the GEIS and its Supplement will analyze license renewal and non-renewal alternatives. The Service feels it is important to provide scoping comments for both the presumed "proposed action" of license renewal and alternatives that may be considered in place of nuclear power generation.

The Service understands under renewal, the nuclear units will continue operations much as they do today, including continued reliance on the fossil fuel units to meet gaps in nuclear production and demand. The Service realizes the extensive cooling canal system will continue to be a critical component of Plant operations. The high standards of safety and security at the Plant are assumed to continue and improve. The Service also understands that during the life of the license extension, the Plant may be required to increase the current levels of energy production to meet ever-growing demands. This increase in demand during the extension years may be met by an increase in energy production from the fossil fuel units of the Turkey Point Plant.

Without knowing the details of the potential non-renewal alternatives, the Service believes the GEIS and the Supplement will examine alternatives, which may include converting the Turkey Point Plant entirely to fossil fuel and or the possible construction of new fossil fuel facilities.

Overarching Scoping Issues - License Renewal and All Alternatives.

Biscayne Bay Natural Habitat

The Park's name is derived from Biscayne Bay and many consider the Bay the heart of the National Park. The Bay is a shallow estuarine identified as an Outstanding Florida Water Body. The Bay is also the focus of the Biscayne Bay Partnership Initiative, a multi-organizational group, that the Park and FPL are members of, dedicated to preserving this very fragile marine ecosystem in perpetuity. In a similar vein of cooperation, the Park is anxious to work with FPL to investigate alternative methods of fossil fuel delivery to the Power Plant. Currently, the delivery of fossil fuel occurs by barge from the port of Miami through Biscayne Bay with over 300 trips each year hauling 12,000 barrels of bunker "C" fuel oil to the Plant.

The barge has run aground numerous times, and each trip adversely impacts the water quality by churning up the Bay bottom into the water column creating a turbidity plume that lasts long after the barge has passed. The thrust from the barge's tugboat may disrupt seagrass recovery by potentially ripping it from the bottom, as well as any other attached vegetation. Turbidity is known to limit the photosynthesis of both the phytoplanktonic and seagrass communities that are essential for a healthy marine ecosystem. We realize that the fuel barge is under contract and not directly operated by FPL, but the barge is in the Park because of FPL. The continuation of this delivery method is strongly opposed by Biscayne National Park. We have asked FPL to consider the possibility of extending an existing and under-utilized fuel pipeline from the former Homestead Air Force Base to the Power Plant as an alternative. We recommend the same potential mitigation be considered under the proposed action and all alternatives within the Supplement. We especially recommend that other fuel delivery methods be explored because of the need to maintain this "anchor" in the Florida power grid long into the future.

Natural Soundscapes

An important part of the Service mission is to preserve and/or restore the natural soundscapes associated with units of the national park system. They are inherent components of "the scenery and the natural and historic objects and the wild life" protected by the National Park Service Organic Act. The natural ambient sound level of a park is the natural soundscape of that park. It is comprised of the natural sound conditions in a park that exist in the absence of any human-produced noises. This is the basis for determining the "affected environment" in National Environmental Policy Act documents and other environmental assessments related to human actions producing inappropriate or intrusive impacts on the park soundscape. Noise monitoring conducted by a noise consultant for the National Park Service identified the natural ambient sound levels in the southwestern portion of the park to be at or below 30 decibels.

The operation of Turkey Point Plant may result in intrusive industrial noise that may impede Biscayne National Park's efforts to preserve and/or restore the park's natural ambient sound levels in the park environments adjacent to the Power Plant. Service

directives mandate that park managers constructively work with those responsible for neighboring noise sources that impact parks to explore what can be done to better protect parks. With this in mind, the Service recognizes the vital missions of the Nuclear Regulatory Commission and Florida Power and Light and the potentially unavoidable by-product of noise as you achieve your mission. The Park is interested in gaining more information related to any potential existing and future impacts to the natural soundscape. We recommend the Supplement include the natural soundscape of the park as part of the "affected environment" when identifying impacts and any potential mitigation for such impacts. We acknowledge the complexities of mitigating noise intrusions from industrial facilities, therefore, we also recommend the Supplement consider long-term soundscape monitoring to help determine whether or if mitigation may be required in the future under the proposed action and all alternatives.

Air Resources

The Service is concerned about the continued introduction of anthropogenic air pollutants and particulate matter into an area of special concern. Although Biscayne National Park is designated a Class II Air Resource, the National Park Service Organic Act requires the Service protect (air) resources regardless of the air quality related values (AQRV) status. We recommend the Supplement identify the cumulative effect associated with projected population growth and continued and increasing emissions under the proposed action and all alternatives. We also recommend that maximum mitigation measures be implemented to prevent additional air pollutants. We also recommend that mitigation measures, including air scrubbers and other similar technologies be fully evaluated and implemented to the maximum extent possible to prevent particulate matter and other pollutants from being emitted into the air.

Native Plants, Animals, and Wildlife

Biscayne National Park helps provide refuge for many of the threatened and endangered species and other species of special concern of South Florida. The struggle to preserve and protect these rare and endangered species is complicated by many factors such as, continued proliferation of exotic plant species, alteration of natural habitat, loss of natural habitat, disruption of natural hydrology, disruption of predator/prey balance, loss of food source, over-harvest, and disturbance of breeding areas. The lands associated with the Turkey Point Plant have the ability to benefit or harm many of the critical species of South Florida.

We recommend the Supplement consider continued and expanded exotic plant eradication from FPL property for its benefits of removing harmful seed sources. We recommend the Supplement consider the impacts and benefits that have occurred due to the alteration of the natural habitat from the Turkey Point cooling canals. The Park recognizes the success of the cooling canals as artificial breeding grounds for the endangered North American saltwater crocodile. The park hopes to work more closely with FPL in the future with data exchange regarding the North American saltwater crocodile, to include monitoring of tagged animals that are observed in the park and research projects that could jointly benefit park resource managers and FPL.

The Park's Scenery (Scenic Features and Natural Landscapes)

As indicated in the Organic Act and the park's enabling legislation, scenic vistas and natural settings are directly identified as resources to be preserved and protected by park managers. Biscayne National Park's tropical setting is special due to its role in protecting some of the last remaining examples of "old Florida." The Power Plant's location, size, and industrial features alter "old Florida's" natural landscape and scenic vistas. While the Park realizes this alteration is largely unable to be mitigated, we are interested in the Supplement investigating ways to minimize the facility's current intrusions and that this issue is considered in any further development. A potential mitigation option to be considered under the proposed action and all alternatives may include repainting the structures in natural tones that mirror the surrounding landscape, and consequently are less obtrusive to the natural setting.

Natural Visibility (Night Skies)

One of the resources that park management is greatly concerned about is the Park's night sky. This is a fragile resource that is sought after by many visitors and residents and is critical to the health of wildlife. The Service is interested in working with FPL to minimize the excessive lighting of the Plant from dusk to dawn. We understand there are serious safety and security constraints that require sufficient lighting, yet the Park would want to see the installation of innovative shielding and other mitigation measures that would lessen the "glow" that can currently be seen as far east as the park's barrier islands (7 miles offshore). We recommend the Supplement include mitigation options for the night sky under the proposed action and all alternatives.

Mainland and Nearshore Habitat

The natural habitat north, south, and east of Turkey Point Nuclear Power Plant is protected within Biscayne National Park. This area is identified within park management plans as some of the most sensitive and critical resources of the park. The area south and southwest of the plant, just outside of the Park, contains the 100+ miles of cooling canals that have altered the natural environment by maintaining a hypersaline area of influence that in turn impedes natural groundwater flow from the upland side of the canals into the Bay. The downstream side of these canals contains dwarf mangroves and high salinity marshes, which are due to the lack of freshwater flow that once occurred in this area prior to the cooling canals creation. While the Park understands the cooling canals must remain as part of the Plant's operations and while we appreciate their function of avoiding the direct release of heated water into the Bay, the Park recommends the Supplement investigate ways to reverse some of the adverse impacts under the proposed action and all alternatives. Rehydrating the hypersaline marshes with fresh water is one example of potential mitigation to be considered during the analysis.

Scoping Issues - Non-Renewal Alternatives

The following issues include concerns over adoption of alternatives with reliance on fossil fuels for power production:

Loss of Important Environmentally Sensitive Lands, Open Space or Farmland

Biscayne Bay has been identified as requiring restoration from existing alterations and influences within its watershed that have reduced fresh water flow. The Service is

1 concerned that the alternatives to license renewal will result in the demand to develop new power plant facilities in deep South Dade, leading to land use changes that prevent the ability to preserve and protect the Bay. The direct and cumulative impacts related to a large-scale development of this character should be fully identified within the Supplement.

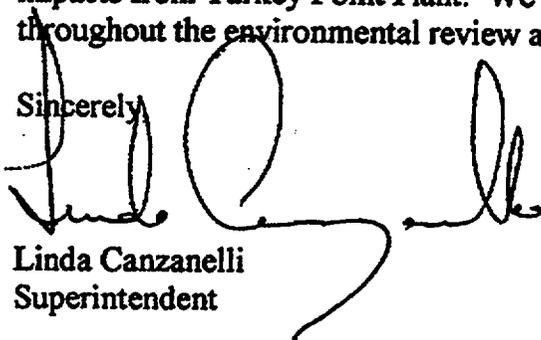
Reliance on Fossil Fuels for Power Production

As indicated in the overarching issues, the Service is very concerned about the detrimental impacts that will occur without the power production from the nuclear units. To meet the energy demands additional fossil fuel will be required. As delivery is set today, this would result in a dramatic increase in the numbers of FPL barge transports through Biscayne National Park's sensitive marine ecosystem. Without nuclear energy production, reliance on burning fossil fuels without using extensive mitigation methods will result in serious threats to the Park's air quality. The Supplement should address these concerns during the alternatives analysis.

Conclusion

Given the aforementioned issues, the National Park Service strongly recommends that the Supplement to the Generic EIS address concerns related to the future health and integrity of Biscayne National Park. Biscayne National Park will remain here long after the life of the nuclear facility is over. The National Park Service is interested in working with NRC and FPL to create new and productive partnerships to begin to mitigate current and future impacts from Turkey Point Plant. We look forward to assisting the NRC and FPL throughout the environmental review and analysis.

Sincerely,

A handwritten signature in black ink, appearing to read 'Linda Canzanelli', written over a large, faint circular stamp or watermark.

Linda Canzanelli
Superintendent

Appendix E

1 **E.1 References**

- 2
- 3 U.S. Atomic Energy Commission (AEC). 1972. *Final Environmental Statement Related to*
4 *Operation of Turkey Point Plant, Florida Power & Light Company.* Dockets No. 50-250 and
5 50-251, Washington, D.C.

Appendix F

GEIS Environmental Issues Not Applicable to Turkey Point Units 3 and 4

Appendix F

GEIS Environmental Issues Not Applicable to Turkey Point Units 3 and 4

The following table lists those environmental issues listed in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (GEIS) (NRC 1996; 1999)^(a) and 10 CFR Part 51, Subpart A, Appendix B, Table B-1, that are not applicable to Turkey Point Units 3 and 4 because of plant or site characteristics.

ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	Categor y	GEIS Sections	Comment
SURFACE WATER QUALITY, HYDROLOGY, AND USE (FOR ALL PLANTS)			
Altered current patterns at intake and discharge structures	1	4.2.1.2.1 4.3.2.2 4.4.2	Turkey Point Units 3 and 4 do not withdraw or discharge water to a open body of water
Altered salinity gradients	1	4.2.1.2.2 4.4.2.2	The Turkey Point Units 3 and 4 cooling system does not discharge to an estuary.
Altered thermal stratification of lakes	1	4.2.1.2.2 4.4.2.2	Turkey Point Units 3 and 4 do not discharge into a lake.
Temperature effects on sediment transport capacity	1	4.2.1.2.3 4.4.2.2	Turkey Point Units 3 and 4 do not discharge cooling water to an open body of water.
Water-use conflicts (plants with once-through cooling systems)	1	4.2.1.3	Turkey Point Units 3 and 4 do not use a once-through cooling system.

(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.

Appendix F

	ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	Categor y	GEIS Sections	Comment
1 2 3 4	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	The Turkey Point Units 3 and 4 cooling system does not use makeup water from a small river with low flow.
5	AQUATIC ECOLOGY (FOR ALL PLANTS)			
6 7	Thermal plume barrier to migrating fish	1	4.2.2.1.6 4.4.3	Turkey Point Units 3 and 4 do not discharge cooling water to a body of water accessible to migrating fish.
8	Distribution of aquatic organisms	1	4.2.2.1.6 4.4.3	Turkey Point Units 3 and 4 do not discharge cooling water to an open body of water.
9 10	Premature emergence of aquatic insects	1	4.2.2.1.7 4.4.3	Cooling system is hypersaline and without insects.
11	Stimulation of nuisance organisms	1	4.2.2.1.11 4.4.3	Cooling system is hypersaline and without organisms.
12	GROUNDWATER USE AND QUALITY			
13 14 15	Groundwater-use conflicts (potable and service water, and dewatering; plants that use >100 gpm)	2	4.8.1.1 4.8.2.1	Turkey Point Units 3 and 4 use <100 gpm of groundwater.
16 17 18	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 Turkey Point Units 3 and 4.
19 20	Groundwater-use conflicts (Ranney wells)	2	4.8.1.4	Turkey Point Units 3 and 4 do not have or use Ranney wells.

	ISSUE—10 CFR Part 51, Subpart A, Appendix B, Table B-1	Category	GEIS Sections	Comment
1 2	Groundwater quality degradation (Ranney wells)	1	4.8.2.2	Turkey Point Units 3 and 4 do not have or use Ranney wells.
3 4	Groundwater quality degradation (cooling ponds at inland sites)	2	4.8.3	Turkey Point Units 3 and 4 are not located at an inland site.
5	TERRESTRIAL RESOURCES			
6 7	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 Turkey Point Units 3 and 4.
8 9	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 Turkey Point Units 3 and 4.
10	Bird collisions with cooling towers	1	4.3.5.2	This issue is related to a heat-dissipation system that is not installed at Turkey Point Units 3 and 4.

11

12 **F.1 References**

13

14 10 CFR 51. Code of Federal Regulations, *Title 10, Energy*, Part 51, "Environmental Protection
15 Regulations for Domestic Licensing and Related Regulatory Functions."

16

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

19

NRC FORM 335 (2-89) NRCM 1102, 3201, 3202	U.S. NUCLEAR REGULATORY COMMISSION BIBLIOGRAPHIC DATA SHEET <i>(See instructions on the reverse)</i>	1. REPORT NUMBER <i>(Assigned by NRC. Add Vol., Supp., Rev., and Addendum Numbers, if any.)</i> NUREG-1437, Supplement 5				
2. TITLE AND SUBTITLE Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 5, Regarding Turkey Point Units 3 and 4 Draft Report For Comment		3. DATE REPORT PUBLISHED <table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">MONTH</td> <td style="width: 50%;">YEAR</td> </tr> <tr> <td style="text-align: center;">May</td> <td style="text-align: center;">2001</td> </tr> </table>	MONTH	YEAR	May	2001
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10. SUPPLEMENTARY NOTES Docket Numbers 50-250 and 50-251						
11. ABSTRACT <i>(200 words or less)</i> <p>This draft supplemental environmental impact statement (SEIS) has been prepared in response to an application submitted to the Nuclear Regulatory Commission (NRC) by Florida Power and Light Company (FPL) to renew the operating licenses for Turkey Point Units 3 and 4 for an additional 20 years under 10 CFR Part 54. The SEIS includes the staff's preliminary analysis that considers and weighs the the environmental effects of the proposed action, the environmental impacts of alternatives to the proposed action, and alternatives available for reducing or avoiding adverse impacts. It also includes the staff's preliminary recommendations regarding the proposed action.</p> <p>The staff's preliminary recommendation is that the Commission determine that the adverse environmental impacts of license renewal for Turkey Point Units 3 and 4 are not so great that preserving the option of license renewal for energy planning decisionmakers would be unreasonable. This preliminary recommendation is based on the analysis and findings in the Generic Environmental Impact Statement (NUREG-1437), the Environmental Reports submitted by FPL, consultation with other Federal and State agencies, the staff's own independent review, and the staff's consideration of public comments received during the scoping period for this review.</p>						
12. KEY WORDS/DESCRIPTORS <i>(List words or phrases that will assist researchers in locating the report.)</i> License Renewal National Environmental Policy Act NEPA Turkey Point Units 3 and 4 Supplement to the Generic Environmental Statement		13. AVAILABILITY STATEMENT unlimited 14. SECURITY CLASSIFICATION <i>(This Page)</i> unclassified <i>(This Report)</i> unclassified 15. NUMBER OF PAGES 16. PRICE				



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