

United States Nuclear Regulatory Commission Official Hearing Exhibit	
In the Matter of:	Entergy Nuclear Operations, Inc. (Indian Point Nuclear Generating Units 2 and 3)
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PROPOSED RULES

NUCLEAR REGULATORY COMMISSION

10 CFR Part 51

RIN 3150-AD94

Environmental Review for Renewal of Operating Licenses

Tuesday, September 17, 1991

*47016 AGENCY: Nuclear Regulatory Commission.

ACTION: Proposed rule.

SUMMARY: The Nuclear Regulatory Commission (NRC) is proposing to amend its regulations to establish new requirements for environmental review of applications to renew operating licenses for nuclear power plants. The proposed amendments would define the number and scope of environmental impacts that would need to be addressed as part of a license renewal application. Concurrent with the proposed amendments, the NRC is publishing for comment (1) a draft generic environmental impact statement, (2) a draft regulatory guide, (3) a draft environmental standard review plan, and (4) a draft regulatory analysis, which supplement the proposed amendments. A workshop on the proposed amendments and the draft generic environmental impact statement will be held during the comment period.

DATES: Comment period expires December 16, 1991. Comments received after this date will be considered if it is practical to do so, but the Commission is able to assure consideration only of comments received on or before this date. Notification of intent to attend the workshop, concurrent session preferences, and desire to participate as a panelist during a specific session should be received by the staff no later than October 4, 1991. Comments on the proposed agenda received by the staff by October 4, 1991, will be considered in developing the final workshop agenda. A final agenda and detailed information on each session will be available after October 18, 1991. This information will be mailed to all individuals and organizations who notify the NRC of their intent to attend and to others who request it. The workshop will be held on November 4 and 5, 1991.

ADDRESSES: Send comments to: The Secretary of the Commission, U.S. Nuclear Regulatory Commission, Washington, DC 20555, Attention: Docketing and Services Branch, or hand deliver comments to the Office of the Secretary, One White Flint North, 11555 Rockville Pike, Rockville, Maryland between 7:30 a.m. and 4:15 p.m. on Federal workdays. Copies of comments received may be examined at the NRC Public Document Room, 2120 L Street NW., (Lower Level), Washington, DC between the hours of 7:45 a.m. and 4:15 p.m. on Federal workdays. The workshop will be held at the Rosslyn Westpark Hotel, 1900 North Fort Myer Drive, Arlington, Virginia 22209. Send notification of intent to attend and desire to participate as a panelist during a specific session to Donald Cleary, Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission, Washington, DC 20555.

FOR FURTHER INFORMATION CONTACT: Donald Cleary, Division of Safety Issues Resolution, Office of Nuclear Regulatory Research, U.S. Nuclear Regulatory Commission, Washington, DC 20555, telephone (301) 492-3936.

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I. Introduction

The Commission is proposing to amend 10 CFR part 51 to improve the efficiency of the process of environmental review when an applicant seeks to renew an operating license for up to an additional 20 years. To prepare for possible license renewal applications, the Commission considered the merits of relying on the existing framework for environmental review in part 51 rather than revising part 51. In reaching its decision to revise part 51, the Commission considered the following factors: (1) License renewal will involve nuclear power plants for which the environmental impacts of operation are well understood as a result of data evaluated from operating experience to date; (2) activities and requirements associated with license renewal are anticipated to be within this range of operating experience, thus environmental impacts can reasonably be predicted; and (3) changes in the environment around nuclear power plants are generally gradual and predict-

able with respect to characteristics important to environmental impact analyses.

The Commission has conducted a study of the potential environmental impacts of license renewal. The objective of the study was to (1) identify all the potential impacts to the environmental and other National Environmental Policy Act (NEPA) issues associated with plant license renewal, (2) determine which of these environmental impacts and other NEPA issues could be evaluated generically for all plants, and (3) determine the significance of these issues that could be generically evaluated. The analyses and results of this study are presented in the draft Generic Environmental Impact Statement (GEIS) (NUREG-1437), which is being published for comment concurrently with this proposed rule. The staff concludes in the GEIS that only a limited number of the total potential impacts cannot be evaluated generically. Those impacts that cannot be evaluated generically will have to be evaluated for each plant before its license is renewed. However, the environmental impacts that can be generically evaluated will not have to be evaluated for each plant.

The GEIS provides the basis for this rulemaking. To develop the GEIS, the NRC staff followed the recommended procedures of the Council on Environmental Quality (CEQ), including scoping activities such as consulting the CEQ and other Federal agencies, a *47017 public workshop held on November 12-14, 1989 (54 FR 41980; October 13, 1989), and publication of a Notice of Intent to prepare the GEIS (55 FR 29967; July 23, 1990).

The proposed rule addresses the potential environmental impacts that are generically evaluated for all plants in the GEIS and codifies the findings in the GEIS. In addition, those potential impacts that are not generically evaluated in the GEIS are identified in the proposed rule to be evaluated on a plant-specific basis. By assessing and codifying certain potential environmental impacts on a generic basis, no need exists to address these impacts for each future license renewal. The proposed amendments should result in considerable savings to the NRC, the nuclear utility industry, and the nuclear utility ratepayers, while ensuring that the environmental impacts of license renewal are evaluated, as required by the NEPA.

The basic information and the supporting analysis of environmental impacts that serve as the basis of this proposed rulemaking are presented in the draft GEIS, NUREG-1437. The draft GEIS and these proposed amendments to 10 CFR part 51 also provide the basis for developing a license renewal draft supplement to Regulatory Guide 4.2, "Preparation of Environmental Reports for Nuclear Power Stations," which provides guidance on the format and content of the environmental report to be submitted as part of the license renewal application. Additionally, the staff also prepared a draft Environmental Standard Review Plan (NUREG-1429) to provide guidance to the staff on the scope of the review necessary to implement the proposed amendments to part 51.

II. Background

A. License Renewal—10 CFR Part 54

A significant number of the operating licenses for the existing nuclear power plants are due to expire in the early part of the 21st century. The NRC anticipates that a number of licensees will submit applications to renew an operating license 10 to 20 years before the license expires. The first of these applications is expected in the near future. The NRC has issued a proposed rule, 10CFR Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants" (55 FR 29043; July 17, 1990), that would establish the requirements that an applicant must meet, the information that must be submitted to the NRC for review so that the agency can determine whether these requirements have in fact been met, and the application procedures. The proposed part 54 permits the renewal of an operating license for up to an additional 20-year increment beyond the expiration of its current license (initial licensee authorize 40 years of operation). The part 54 rule could be applied to multiple renewals of an operating license for various increments. However, the part 51 amendments apply to one renewal of the initial license for up to 20 years beyond the expiration of the initial license.

License renewal for each plant will be based on the current licensing basis (i.e., the original licensing basis for the plant as amended during the initial license term) and changes, as necessary, to address the effects of age-related degradation on systems, structures, and components important to license renewal. To comply with 10 CFR part 54, the licensee shall assess and determine those activities and modifications that are necessary, at the time of license renewal and throughout the renewal term, to ensure continued safe operation of the plant. Each licensee shall identify and incorporate those activities necessary for managing aging into its licensing basis, thereby ensuring that acceptable margins of safety are preserved throughout the license renewal term. In addition, each applicant for a license renewal shall submit an environmental report that complies with the requirements of 10 CFR part 51, the NRC regulations governing environmental protection for domestic licensing.

B. Environmental Review

The scope of the NRC's National Environmental Policy Act (NEPA) review is found in 10 CFR part 51. To meet the provisions of 10 CFR 51.45, the applicant shall submit an environmental report (ER) that discusses (1) the impact of the proposed action on the environment, (2) any adverse environmental impacts that cannot be avoided, (3) alternatives to the proposed action, (4) the relationship between local short-term uses of the environment and maintenance and enhancement of long-term productivity, and (5) any irreversible or irretrievable commitments of resources. In addition, the licensee shall submit an analysis that considers and balances the environmental effects of the proposed action and the alternatives available for reducing or avoiding adverse environmental effects, as well as the benefits of the action. The NRC will independently review this material and publish the results.

Before issuing a construction permit (CP) or an operating license (OL) for a nuclear power plant, the NRC is required to assess the potential environmental impacts of the plant to ensure that the issuance of a permit or license is consistent with the NEPA and the NRC implementing regulations of the NEPA in 10 CFR part 51. For those plants licensed subsequent to the enactment of the NEPA, baseline quantitative studies and monitoring programs were often developed for comparison with data gathered from later programs if adverse effects of construction or operation were reasonably inferred from information obtained during the gathering of preconstruction or operational baseline phases. These studies were part of the applicant's environmental report and were reviewed in the staff's final environmental statement (FES) for the specific plant. These studies and programs were restricted to the impact assessment of important resources and important species described in the staff's guidance documents such as Regulatory Guide 4.2, and Environmental Standard Review Plans (NUREG-0555). The staff's final assessments of these programs were normally summarized in each plant-specific FES. On the basis of these reviews, appropriate environmental parameters would have been proposed for monitoring or for special studies.

Although two operating nuclear power plants were licensed before the NEPA was enacted and do not have FESs, the GEIS did consider and envelop these plants. Accordingly, the Commission believes that no reason exists to treat these two plants differently in the environmental review for each plant's license renewal.

Additionally, nonradiological discharges of pollutants to receiving waters from operating nuclear power plants that are licensed by the NRC are subject to limitations or monitoring under the Federal Water Pollution Control Act (FWPCA), administered by the U.S. Environmental Protection Agency (EPA) or designated State agencies. The resultant reporting requirements of a National Pollutant Discharge Elimination System (NPDES) permit are relied upon by the EPA and designated State agencies to provide data on potential problems. Permits are subject to review and approval every 5 years and may be modified by the permitting authority on the basis of an analysis of data generated from plant-specific NPDES monitoring programs.

The Commission considers that one of its responsibilities under the NEPA is to be cognizant of significant environmental impacts during the term of a plant's operations. For impacts *47018 involving degradation of the aquatic environment, the reporting requirements of an NPDES permit authorized by the FWPCA are generally relied upon to alert the NRC to potential problems. In addition, the Commission includes conditions in its licenses to protect the environment in accordance with 10 CFR 50.36(b). These conditions identify appropriate requirements for reporting and recording environmental data and for monitoring requirements to protect the nonaquatic environment under 10 CFR part 50, a license may also reference environmental protection plans, environmental technical specifications, and radiological technical specifications. Therefore, the environmental effect of current operating reactors is well known and the probable future effect if licenses are renewed can be predicted with some confidence. This practice is consistent with regulations promulgated by the CEQ that direct agencies to adopt monitoring and enforcement programs, where appropriate. As a result of the staff's environmental reviews, certain environmental conditions, including monitoring requirements, may be included in NRC licenses. Licensees submit the information from monitoring of these conditions to the NRC on a routine basis, and the Commission responds as appropriate.

C. Use of Generic Rulemaking

The Commission has previously endorsed the generic rulemaking process and recognized the advantages of generic rulemaking. In an interim policy statement on generic rulemaking to improve nuclear power plant licensing, these advantages were identified:

(a) enhance stability and predictability of the licensing process by providing regulatory criteria and requirements in discrete generic areas on matters which are significant in the review and approval of license applications; (b) enhance public understanding and confidence in the integrity of the licensing process by bringing out for public participation important generic issues which are of concern to the agency and the public; (c) enhance administrative efficiency in licensing by removing, in whole or in part, generic issues from staff review and adjudicatory resolution in individual licensing proceedings and/or by establishing the importance (or lack of importance) of various safety and environmental issues to the decision process; (d) assist the Commission in resolving complex methodology and policy issues involved in recurring issues in the review and approval of individual licensing applications; and (e) yield an overall savings in the utilization of resources in the licensing process by the utility industry, those of the public whose interest may be affected by the rulemaking, the NRC and other Federal, State, and local governments with an expected improvement in the quality of the decision process.[FN1]

FN1 Generic Rulemaking To Improve Nuclear Power Plant Licensing, Interim Policy Statement, 43 FR 58377; December 14, 1978.

The NRC has used this generic approach in several part 51 rulemakings. Table S-4 of § 51.52 that gives the environmental impacts of the transportation of radioactive waste and nuclear fuel is an example. Applicants meeting certain criteria can use the information in Table S-4 as the basis for their evaluation of the environmental impacts of the transportation of radioactive waste and spent fuel. They are not required to conduct their own analysis of these impacts. Other examples of past generic part 51 rulemakings are Table S-3 of § 51.51 that gives the environmental impacts of the nuclear fuel cycle and § 51.53 and § 51.95, that eliminate the requirement to consider need for power and alternative energy sources for nuclear reactors at the operating license stage (47 FR 12940, March 26, 1982). Therefore, this rule is consistent with the NRC policy.

III. Proposed Action

A. Proposed Amendments

The proposed amendments to 10 CFR part 51 would establish new requirements for environmental review of an application to renew a license for a single plant. These amendments would require the applicant to address only those environmental issues that require a plant-specific assessment as part of an application for each plant. Applicants for all plants will have to assess environmental impacts on threatened and endangered species and impacts on local transportation during periods of refurbishment activities related to license renewal. These refurbishment activities are those activities that are planned for and performed on a nuclear power plant to prepare the plant for operation during the period the license is being renewed. These activities include equipment replacements, overhauls, maintenance, inspection, and testing. For other issues, all applicants either will have to demonstrate that their plants fall within defined bounds of plants for which a generic conclusion about an issue can be reached, or, if an issue does not fall within these bounds, assess that issue. Also, as part of its ER, an applicant will have to include an analysis of whether or not the findings of the assessment of each issue overturns the favorable cost-benefit balance for license renewal found in proposed appendix B to 10 CFR part 51.

The proposed amendments codify the conclusions of the GEIS for those issues for which a generic conclusion can be reached. The proposed appendix B, which summarizes the Commission's findings on the scope and magnitude of environmental and other effects of renewing the operating license of each nuclear power plant, is added to 10 CFR part 51. In the proposed appendix, the Commission also states its finding that the "renewal of any operating license for up to 20 years will have accrued benefits that outweigh the economic, environmental, and social costs of license renewal * * *."

In addition, the proposed amendments eliminate the requirement that the NRC staff must prepare a supplemental environmental impact statement (EIS) for every license renewal application; instead, the amendments permit the staff to prepare an environmental assessment (EA) if certain conditions are met. The basis for this proposed change is the GEIS finding that only a limited number of potential impacts need to be addressed to renew a license for each plant.

The Commission believes that, in many instances, this limited set of potential environmental issues will be found to have impacts that are nonexistent or small and, therefore, could be analyzed in an EA that results in a finding of no significant impact (FONSI). If no significant impacts are found in the EA, the NRC will issue a FONSI. If a FONSI cannot be made, the environmental review process would require developing a draft EIS for public comment and a final supplemental EIS. The supplemental EIS would evaluate the environmental impacts identified in the EA and their effect on the overall cost-benefit balance. The NRC will issue a supplemental EIS if any of the issues addressed are determined to have impacts that are negative and either moderate or large, as the terms are defined in proposed Appendix B of Subpart A of Part 51. Impacts that otherwise might be considered moderate could be mitigated to small by commitments made in a license renewal application.

The proposed amendments would define those environmental issues that need to be addressed in an application to renew a license for a single plant. The Commission wishes to emphasize the importance of the public commenting at this time on environmental reviews in the GEIS and the findings in the proposed rule. After the final rule is published, comment on environmental impacts of a licensing renewal action for a plant will be limited to those impacts *47019 that the rule requires to have a plant-specific evaluation.

However, the adoption of the proposed amendments would not preclude reopening environmental issues if significant new information becomes available. A petition to amend 10 CFR part 51 will be acted upon if new information warrants a reopening of issues. The Commission plans to periodically review the GEIS findings contained in appendix B to part 51 and its supporting documentation.

Environmental Impacts To Be Reviewed To Renew a License for Each Plant

The Commission concludes that the adverse environmental impacts of license renewal are minor compared to the benefits to be gained from continued operation for up to an additional 20 years beyond the initial license period. However, the proposed amendments require that each applicant address in its ER those environmental issues for which no generic conclusion can be reached.

The NRC staff, in its GEIS, divided its conclusions about environmental impacts into three categories and further drew a conclusion about the significance of each impact.

The NRC drew one of the following three conclusions about each impact:

Category 1. The NRC reached a conclusion about this impact that applies to all affected plants.

Category 2. The NRC reached a conclusion about this impact that applies to all affected plants that are within certain bounds.

Category 3. The NRC reached a conclusion about this impact that the licensee shall evaluate this impact for each plant for which it applies to renew a license.

The NRC then determined whether the significance of an impact about which it had drawn one of these three conclusions is "small," "moderate," or "large."

- A small impact is so minor that it warrants neither detailed investigation nor consideration of mitigative actions when the impact is negative.

- A moderate impact is usually evident and usually warrants consideration of mitigation alternatives when the impact is negative.

- A large impact involves either a severe penalty or a major benefit and mitigation alternatives are always considered when an impact is negative.

The following includes 2 Category 3 issues and combines 22 Category 2 issues into 10 issues. The issues which must be addressed are as follows:

(1) The applicant must submit an assessment of potential impacts on threatened or endangered species.

(2) Aquatic impacts of entrainment, impingement, and heat shock are potential problems at plants with once-through or cooling-pond heat dissipation systems. However, plant operations and effluents that have the potential to cause these impacts are under the regulatory authority of EPA or State authorities. The permit process authorized by the FWPCA is an adequate mechanism for control and mitigation of these potential aquatic impacts. If an applicant to renew a license has appropriate EPA or State permits, further NRC review of these potential impacts is not warranted. Therefore, the proposed rule requires an applicant to provide the NRC with certification that it holds FWPCA permits, or if State regulation applies, current State permits. If the applicant does not so certify, it must assess these aquatic impacts.

(3) Potential aquatic impacts from any refurbishment activities would be minor or insignificant if best management practices are used to control soil erosion or spills. The proposed rule requires applicants to submit evidence of a construction impact control program.

(4) For plants located at inland sites and using cooling ponds, the applicant must assess groundwater quality impacts.

- (5) For plants using Ranney wells or pumping 100 or more gallons per minute and having wells in the cone of depression, the applicant must assess groundwater-use conflicts.
- (6) For potential terrestrial impacts, the NRC staff, in the GEIS, concluded that the only potential impact that need be evaluated to renew a license for each plant was any potential impact on important plant and animal habitats. These could include wetlands, wildlife concentration areas, and certain plant life environments. The proposed rule requires applicants to assess any potential impacts on such plant and animal habitats if construction activities generated by refurbishment or extended operation could affect these resources.
- (7) The proposed amendments required any license renewal applicant, whose site does not have access to a low-level radioactive waste disposal facility, to assess environmental impacts of low-level waste management.
- (8) Each applicant must verify that adequate provisions have been taken to ensure that transmission line electric shock effects are not a health hazard. The applicant may rely on National Electric Safety Codes for this assessment.
- (9) An applicant with a plant at a site in a low-population area, as defined by numerical criteria on population and distance from sizable cities or in areas where growth control measures are in effect, must assess housing impacts.
- (10) For socioeconomic impacts, all applicants must assess potential transportation impacts during refurbishment.
- (11) Applicants with plants using cooling ponds, lakes, or canals, or discharging cooling water to small rivers must address effects of microbiological organisms on human health.
- (12) Applicants who exceed threshold criteria for cost of refurbishment, operating and maintenance, and fuel costs must submit a cost analysis to demonstrate the cost advantages of license renewal over the most reasonable replacement alternative. Applicants must also assess for certain plants the geothermal alternative.

B. Generic Environmental Impact Statement

The GEIS establishes the bounds and significance of potential environmental impacts at all 118 light-water nuclear power reactors currently licensed to operate or expected to be licensed to operate in the United States (113 nuclear power plants were licensed to operate as of June 30, 1992, plus Bellefonte Units 1 and 2, Comanche Peak Unit 2, and Watts Bar Units 1 and 2). For the GEIS, the NRC staff assessed all environmental issues that may be of concern to the NRC in its reviews of applications to renew operating licenses at these 118 nuclear power plants. The scope of these issues reflects the potential effects of plant refurbishment activities associated with license renewal, an additional 20 years of plant operation, and possible change in the plant environmental setting. For this analysis, all of the environmental issues identified were combined into 104 issues. For each type of environmental impact, the staff attempts to establish generic findings encompassing as many nuclear power plants as possible. Plant- and site-specific information is used in developing these generic findings. In conjunction with the proposed rule change, this GEIS also provides an applicant seeking to renew an operating license information and analyses that it may reference in the application. Further guidance on the format, content, and analysis standards for environmental documentation in their application is provided in draft Regulatory Guide 4.2, Supplement 1.

***47020** The analytical approach to assessing environmental impacts in this GEIS involves four stages:

- (1) Characterize each issue on the basis of information from past plant construction and current operating experience to establish a baseline.

- (2) Assess the extent to which activities and requirements associated with license renewal may differ from the baseline.
- (3) Assess potential relevant changes in the environment and estimate trends for the technology and economics of alternative energy sources.
- (4) Combine these separate analyses to fully characterize the nature and magnitude of impacts and other issues that will result from the refurbishments necessary for license renewal and the potential environmental impacts of operating plants for 20 years beyond their current 40-year licensing limit.

The upper bound scenario of refurbishment activities and plant operation that may be brought about by license renewal is described in detail in appendix B to the GEIS. All plants are considered enveloped by appendix B to the GEIS. The range of environmental issues considered in the GEIS was identified from past studies of nuclear power plant construction and operation (principally EISs), consultations with Federal and State regulatory agencies, and input from the nuclear utility industry and the general public.

The analyses in the GEIS drew on an extensive body of published materials from government, industry, academia, and other sources about operation and maintenance of nuclear power plants and their effects on the environment. Additional plant-specific information not otherwise available was collected by the Nuclear Utilities Management and Resources Council (NUMARC) and made available to Oak Ridge National Laboratory (ORNL) for use in the report. This information is available in the NRC Public Document Room. A team of environmental specialists from ORNL interviewed Federal, State, and local regulatory officials, as well as persons from business and other private organizations in the vicinity of nuclear power plants, as part of the effort to establish the scope for the GEIS.

The objectives of the GEIS are to (1) provide an understanding of the types and severity of environmental impacts that may occur as a result of renewing operating licenses for nuclear power plants, (2) identify and assess those impacts expected to be generic to license renewal, and (3) define the issues that need to be addressed by the NRC and the applicants in plant-specific license renewal proceedings.

The broad topical areas covered are surface-water quality, aquatic ecology, groundwater, terrestrial ecology, human health, socioeconomics, postulated accidents, waste management, decommissioning, need for generating capacity, and alternatives to license renewal.

In the GEIS, the NRC staff identified and evaluated the significance of the environmental impact of each of 104 environmental issues associated with the renewal of individual plant licenses. For 80 issues, the staff reached a generic conclusion that the potential environmental impacts are acceptable. For 22 issues, this conclusion could be reached for some subset of all nuclear power plants that were within bounds defined in the GEIS. For 2 issues, the staff concluded that no generic conclusion on impacts could be reached.

The Commission is proposing to limit the scope of environmental review for each plant license renewal to only those impacts for which no generic conclusion could be reached (i.e., Categories 2 and 3). All applicants will be required to provide appropriate information and analyses in their license renewal applications for all Category 2 and 3 impacts identified in the GEIS.

An evaluation of the impacts that have been assessed on a generic basis is summarized in a proposed new appendix B to part 51.

The NRC's NEPA review procedures in part 51 require "a preliminary analysis which considers and balances the envir-

onmental and other effects of the proposed action and the alternatives available for reducing or avoiding adverse environmental and other effects, as well as the environmental, economic, technical, and other benefits of the proposed action” (§ 51.71(d)). This analysis is found in chapter 10 of the GEIS. Table 10.1, “Summary of Conclusions on NEPA Issues” in the GEIS is included in these proposed amendments as proposed Table B.1 of appendix B of subpart A of part 51. The table lists each environmental issue addressed in the GEIS, states the conclusions, and includes an assessment of the benefit or cost involved. The major benefit is the electric energy that would be produced by a plant whose license is renewed. The major economic costs are those for refurbishing and for operating and maintaining a plant during the renewal term of up to 20 years. For those adverse environmental impacts that can be assessed generically (Category 1 and, for a subset of plants, Category 2), the adverse impact is identified as small. For environmental impacts for which generic conclusions can be reached, Table B-1 shows that no adverse environmental impacts exist that would offset the benefits of license renewal.

The other NEPA review requirements in 10 CFR part 51 that have been codified in Table B-1 are a review of short- and long-term benefits and productivity and irreversible commitments of resources. The principal short-term benefit from continued operation of nuclear plants is the production of electrical energy from an existing capital asset.

The Commission finds that the resource commitments involved in license renewal do not differ from resource commitments required during the initial operating license term. However, additional nuclear fuel will be used, and small amounts of materials will be used for plant refurbishment. A minor amount of additional land would be used.

Summary of Issues Analyzed in the GEIS

The following describes those environmental issues that were examined for the GEIS, and summarizes the conclusions by major topical area.

1. Surface Water Quality

For the GEIS, the NRC staff examined water quality, water-use conflicts, altered salinity gradients, altered current patterns, temperature effects on sediment transport, altered thermal stratification, scouring caused by discharged cooling water, eutrophication, discharge of chlorine or other biocides or chemical contaminants, and discharge of sanitary wastes.

Aquatic impacts from plant refurbishment activities to support license renewal could occur at any type of plant if erosion or spills occur. In the GEIS, the staff concluded that “best management practices” need to be used during refurbishment to prevent adverse impacts. Site-specific mitigation measures can be implemented during refurbishment to prevent or minimize construction-related aquatic impacts from erosion or spills. These impacts are normally of limited duration and affect only a portion of the aquatic environment. Potential impacts on threatened or endangered species cannot be assessed generically and will require plant-specific analysis.

2. Aquatic Ecology

For the GEIS, the staff examined impingement and entrainment, heat shock, cold shock, thermal plume barriers to migration, premature emergence of aquatic insects, *47021 stimulation of nuisance organisms, gas supersaturation, low dissolved oxygen in the discharge, accumulation of contaminants in sediment or biota, and losses from predators, parasites, and disease.

For nuclear power plants using once-through cooling systems, the operational experience of existing plants indicates that many early concerns about aquatic resources have not materialized. Neither the published literature nor the responses of

regulatory and resource agencies have revealed potential concerns about such early issues as phytoplankton and zooplankton entrainment and premature emergence of aquatic insects in thermal discharges. Although significant localized effects of these stresses have occasionally been demonstrated, the populations' rapid regeneration and biological compensatory mechanisms are sufficient to preclude long-term or far-field impacts.

However, some issues involving aquatic resources warranted further monitoring, and in some cases, mitigative measures to define and correct adverse impacts. The entrainment and impingement of fish and the discharge of large volumes of heated effluents into small or warm ambient waters were a source of concern at some nuclear power plants. These issues were examined and resolved through the mechanisms of NPDES permits and associated FWPCA 316(a) and (b) determinations and were either found to be acceptable or actions were implemented to mitigate the problems. For a few plants, the NPDES process has not been completed and the issues relating impingement, entrainment, and thermal discharges have not all been resolved. For these plants, issues relating to intake and discharge effects on fish and shellfish may be unresolved.

Resource agencies are expending major efforts to restore anadromous fish runs, particularly salmon and American shad, through water quality improvements, stocking, and removal of migration barriers. As a result, a number of the agencies have expressed concerns about future impingement and entrainment impacts at plants that operate on certain rivers. These concerns are routinely addressed during the NPDES permit renewal process. Nuclear power plants with once-through cooling systems that currently discharge cooling water near the upper temperature limits of their NPDES permits may find complying with those requirements increasingly difficult if climates change and ambient water temperatures warm in the coming decades. Under these conditions, such plants may need to modify their operations during the warmest months or rely more on helper cooling towers to prevent adverse thermal impacts. Continuing to consult resource agencies and permitting agencies and to promptly resolve NPDES permit issues are expected to ensure that future changes in the environment do not lead to unacceptable impacts on aquatic ecology.

3. Groundwater Use and Quality

For the GEIS, the NRC staff examined groundwater use and quality; groundwater-use conflicts, including use of Ranney wells; and groundwater quality degradation and concluded that ground-water use conflicts and quality degradation may be a problem at certain plants. Groundwater quality at some river sites may be degraded by induced infiltration of poor-quality river water into an aquifer that supplies large quantities of plant cooling water.

Sites with closed-cycle cooling ponds may degrade groundwater quality. For those plants located inland, the quality of groundwater in the vicinity of ponds must be shown to remain within the State regulatory agency's defined-use category.

4. Terrestrial Ecology

For the GEIS, the NRC staff examined refurbishment impacts, cooling tower impacts on crops and native plants, bird collisions with cooling towers and transmission lines, cooling-pond impacts, power line right-of-way management, electromagnetic field effects, and effects on floodplains and wetlands, threatened or endangered species, air quality, and land use.

Refurbishment activities would disturb only small areas of land and should result in no significant loss of terrestrial habitats. Air quality impacts from refurbishment are not expected to lead to significant environmental impact. Salt draft from cooling towers at nuclear plants has not been shown to threaten agricultural crops, orchards, or other cultivated vegetation. Cooling tower operation has not been reported to reduce crops yields except in situations where crops were experimentally placed next to cooling towers. No significant adverse impacts of transmission lines and their maintenance was

identified. Potential refurbishment impacts that will require an analysis for each plant would be those that may occur if one or more important terrestrial resources (wetlands, endangered species) would be affected.

5. Public Health

For the GEIS, the NRC staff examined radiation exposures to the public, occupational radiation exposures from refurbishment and extended operation, acute and chronic health effects of the electromagnetic fields of transmission lines, microbiological organisms associated with the cooling system known as the ultimate heat sink and noise.

For the GEIS, the staff assessed public health impacts from refurbishment activities and extended operation. Occupational exposure and doses to the public are expected to remain well within regulatory limits. The 9 plants using cooling ponds, lakes, or canals and the 14 plants discharging to small rivers have the potential to influence thermophilic organisms. Health questions related to public use of affected waters need to be addressed by utilities for each plant license renewal. The potential for electrical shock-induced currents from transmission lines should be reviewed with respect to the National Electric Safety Code (NESC) recommendations. Biological and physical studies of 60-Hz electromagnetic fields have not demonstrated consistent evidence linking harmful effects with field exposures.

6. Socioeconomics

For the GEIS, the staff assessed impacts in the following socioeconomic areas: housing, taxes, public services (excluding transportation), transportation, offsite land use, economic structure, and historic and aesthetic resources. They examined impacts from refurbishment activities as well as extended operation of nuclear power plants and reached generic conclusions for taxes, public services, excluding transportation, offsite land use, transportation impacts during continued operation, economic structure, and historic and aesthetic resources. These impacts may be either positive (taxes, employment, income) or negative, but small, and thus need not be addressed for each plant.

Housing impacts during refurbishment could be negative and potentially significant (moderate or large impact) for plants located in areas categorized as "low" population or as those that have growth control measures to limit housing development. In particular circumstances, transportation impacts during refurbishment could also be negative and significant. As a result, only housing and transportation issues need to be evaluated for each plant.

*47022 7. Uranium Fuel Cycle

For the GEIS, the NRC staff assessed the impacts of the uranium fuel cycle, which is based on the values given in 10 CFR 51.51 Table S-3, and analyzed the radiological impact from radon-222 and technetium-99. Categories of natural resource use that were analyzed include land use, water consumption and thermal effluents, radioactive releases, burial of transuranic and high- and low-level wastes, and radiation doses from transportation and occupational exposures. Radiological and nonradiological impacts were found to be small.

8. Waste Management

For the GEIS, the NRC staff examined the potential environmental impacts from the generation of various types of wastes during refurbishment and extended operation for an additional 20 years. More specifically, the staff examined nonradiological waste, mixed waste, low-level radiological waste storage and disposal, spent fuel storage and disposal, and transportation.

In the GEIS, the staff concluded that license renewal would have only minor impacts on mixed waste and nonradiological waste management activities. For low-level radioactive waste, onsite storage was judged to be adequate as suitable

land is available at all plants for interim storage of additional waste from refurbishment and extended plant operation if disposal sites continue to accept waste in normal increments. The conclusions regarding low-level radioactive waste disposal hinge on the timely implementation of present plans for siting regional compact and individual State disposal sites. If circumstances change and the GEIS assumptions are no longer valid, these impacts would need to be addressed for each plant.

The greater volume of spent fuel resulting from up to 20 years of operation beyond the 40-year license can be safely accommodated onsite through dry or pool storage at all plants. The staff concluded that radioactive waste transportation impacts were small and bounded by the values in 10 CFR 51.52, Table S-4.

9. Postulated Accidents

For Chapter 5 of the GEIS, the NRC staff evaluated the environmental impacts of postulated accidents for the license renewal period. This evaluation included severe accidents as well as design-basis accidents. For design-basis accidents, all plants have had a previous evaluation of their environmental impacts. In addition, the licensees will be required to maintain acceptable design and performance criteria throughout the plant license renewal period. The calculated releases from design-basis accidents would not be expected to change. Therefore, the NRC staff concluded that the design of the plants associated with impacts from design-basis accidents remains acceptable. Severe accident environmental impacts were not evaluated in the past for all plants. However, since 1981, all plant FESs have included an analysis of severe accidents. In addition, in the past 10 years, extensive work has taken place on severe accident analysis and safety issue resolution. Therefore, the severe accident analyses done previously in support of FESs (a total of 27 FESs contain analyses of severe accidents) plus the results of other severe accident analyses done in the past were utilized and extrapolated to predict the severe accident environmental impacts for all plants at the midpoint of their license renewal period. For this assessment, the staff evaluated the environmental impacts of releases of radioactive materials to the atmosphere and groundwater as well as fallout over land and water. In addition, they evaluated the economic consequences of such accidents and the need to evaluate severe accident mitigation design alternatives (SAMDA).

In the GEIS, the staff concluded that the environmental impacts of severe accidents during the license renewal period represent a low risk to the population and environment. Although the offsite consequences are potentially large, they are of low likelihood. Because of the low likelihood, the staff concluded that these impacts need not be considered further for each plant license renewal application. In addition to the low risk, Commission policy is to consider SAMDA only at the initial construction stage (during which plant design features may be more easily incorporated). Accordingly, SAMDA evaluations at the license renewal stage are not necessary.

10. Decommissioning

For the GEIS, the staff examined radiation doses, waste management, air quality, water quality, ecological resources, economic impacts, and socioeconomic impacts.

The physical requirements and attendant effects of decommissioning nuclear power plants after a 20-year license renewal period are not expected to be different from those of decommissioning at the end of the current 40-year license period. Decommissioning after a 20-year license renewal period would increase the occupational dose by about 0.5 person-rem and the public dose by a negligible amount. License renewal would not increase the quantity or classification of low-level radioactive waste generated by decommissioning to any appreciable extent. Air and water quality and ecological impacts of decommissioning would not change as a result of license renewal.

Considerable uncertainty exists about the cost of decommissioning. While license renewal would not be expected to

change the ultimate cost of decommissioning, it would reduce the present value of the cost. The socioeconomic effects of decommissioning will depend on the magnitude of the decommissioning effort, the size of the community, and other economic activities at the time. However, the NRC does not expect that the impacts would be increased by decommissioning at the end of a 20-year license renewal period rather than at the end of the current license term. Because the NRC can reach a generic conclusion on the acceptability of the incremental impacts of decommissioning for all plants, impacts on decommissioning need not be evaluated for each plant license renewal application.

11. Need for Generating Capacity

Projections of the demand for electric power from 1991 to 2030 in each of the 11 Department of Energy regions indicate that a need will exist for the generating capacity represented by license renewal of plants in all 11 regions. The projection included demands for both individual and utility service areas, which showed that the generating capacity of each nuclear power plant would be needed to meet the nation's electric power demand.

12. Alternatives to License Renewal

In chapter 8 of the GEIS, the staff established the need for the electric-generating capacity represented by the renewal of operating licenses. Chapter 9 of the GEIS addresses how the demand for this generating capacity could be filled by alternatives to license renewal and weighed the alternatives against that of license renewal.

In the GEIS, the staff concluded that new fossil-fuel and nuclear power plants are reasonable alternatives for replacing of retired nuclear capacity because they are proven commercial power-generating technologies, they can provide the baseload capacity currently generated by large nuclear units, and they are available nationwide. However, on balance, none of these alternatives *47023 offer significant environmental advantages over license renewal. In fact, license renewal of existing nuclear generating capacity would delay or eliminate the environmental impacts associated with constructing replacement power plants. The principal issues associated with operation of new fossil plants are emissions of pollutants. This includes SOX, NOX, and COX which contribute to the degradation of air quality, including acid rain and decreased visibility, and increase the potential for global warming and climate change. Although license renewal is expected to be more advantageous than new fossil or new nuclear plants from a cost perspective in most situations, a decision to seek license renewal is a prerogative of individual utilities. For the GEIS, the staff evaluated several studies and developed an independent estimate. Each study focused on comparing the costs of license renewal and new coal-generated capacity. From this comparison, the staff concluded that license renewal offers significant savings under a diverse set of conditions over new coal-generated capacity. However, differences in operating parameters and performance of nuclear plants would affect the actual cost savings for each plant.

With respect to renewable energy sources, the staff finds that wind, sun, water, and biomass are not preferred near-term alternatives to license renewal because of technological limitations (nonbaseload power sources), availability, and economics. The potential exists for small-scale regional application of geothermal energy to replace a small fraction of current nuclear baseload capacity.

Therefore, in the GEIS, the staff concludes, for the nation as a whole, license renewal is preferable to replacing the generating capacity with a new facility. Because some uncertainty is associated with the economic costs of license renewal caused by the plant-specific nature of the refurbishment required, a limited data submittal including analysis of cost of refurbishment, should accompany each license renewal application. If these data meet the threshold criterion, no analysis of alternatives need accompanying the license application. If the submittal shows that license renewal cannot meet the threshold criterion, the applicant should submit an analysis of the most reasonable alternative. In addition, licensees for plants in California, Oregon, Washington, or Arizona should submit a cost comparison of license renewal to geothermal

energy.

C. Regulatory Guidance To Support the 10 CFR Part 51 Revisions

To ensure proper implementation of the revised sections of 10 CFR part 51, the NRC is issuing a draft regulatory guide and a draft environmental standard review plan for license renewal. Both documents are being published concurrently with these proposed amendments. The draft guide, identified as Draft Supplement 1 to Regulatory Guide 4.2, establishes a uniform format and content acceptable to the staff for structuring and presenting the environmental information to be compiled and submitted by an applicant to renew an operating license. More specifically, this draft regulatory guide describes the content of environmental information to be included in a license renewal application, including the criteria to address appropriate Category 2 issues as specified in the proposed amendments to 10 CFR part 51.

Draft "Environmental Standard Review Plan for License Renewal" (ESRP-LR) NUREG-1429 provides guidance for the NRC staff when performing a 10 CFR part 51 environmental review of an application to renew an operating license. The plan parallels Regulatory Guide 4.2, Supplement 1. The primary purpose of the ESRP-LR is to ensure that these reviews are focused on those environmental concerns associated with license renewal as described in 10 CFR part 51. Specifically, it provides guidance to the NRC staff about environmental issues that should be reviewed and provides acceptance criteria to help the reviewer evaluate the information submitted as part of the license renewal application. It is also the intent of this plan to make information about the regulatory process available and to improve communication between the NRC, interested members of the public, and the nuclear power industry, thereby increasing understanding of the review process.

D. Public Comments on Advance Notice of Proposed Rulemaking

On July 23, 1990, the NRC published in the Federal Register an advance notice of proposed rulemaking (ANPR) (55 FR 29964) and a companion notice of intent to prepare a generic environmental impact statement (55 FR 29967). Advice and recommendations on the proposed rulemaking were invited from all interested persons. Comments were requested on nine specific questions. Comments were received from 29 groups and individuals. Two private individuals were opposed to the rulemaking. Of five citizens groups; one supported, three supported with qualifications, and one opposed the rulemaking. Of the two State agencies responding, one supported the rulemaking and one supported it with qualifications. Three Federal agencies supported the rulemaking with qualifications. All 16 NRC nuclear power plant licensees commenting on the ANPR supported the rulemaking. The one industry group that submitted comments supported the rulemaking. A summary of comments on each question and the staff response are as follows:

Question No. 1. Is a generic environmental impact statement or an environmental assessment required by the NEPA to support this proposed rulemaking or can the rulemaking be supported by a technical study

Comments: Strong support for a generic environmental survey (GES) rather than a full GEIS to provide the technical basis for the rulemaking was expressed by the NUMARC, nuclear utilities, the U.S. Department of Energy, and Americans for Nuclear Energy, Inc. The EPA and the State of Wisconsin Public Service Commission (WPSC) support development of a comprehensive GEIS. Other comments offered no specific opinion on a GEIS versus a generic environmental survey. Supporters of the generic environmental survey approach stated that it is legally acceptable and would be less costly and less subject to delays. Supporters of a comprehensive GEIS believed that it is a feasible approach and a prudent one.

NRC Response: The NRC believes that while the GES provides an alternative approach to rulemaking, the GEIS approach is preferable and has been used to develop the proposed rule. The purpose of this rulemaking is to resolve as

many National Environmental Policy Act (NEPA) issues as possible before beginning plant-by-plant license renewal reviews. Although the NRC recognized the possibility that not all NEPA issues would be fully resolvable in the GEIS, the NRC did not wish to make a priori judgments about which issues could be resolved generically and which could not. Also, even though some issues may not be fully resolved generically, the analyses performed for the GEIS have helped sharpen and focus the issues that must be addressed in specific license renewal reviews. To these ends the NEPA procedures specified in 10 CFR part 51 and followed in developing the GEIS do have the advantage of resulting in a comprehensive GEIS and rule that have been extensively reviewed by multiple outside, interested parties and therefore, *47024 will be stronger in focusing and limiting environmental discussion during license renewal.

In addition, a GES need not follow NEPA-mandated public comment requirements. It is envisioned as a scientific document, whose contents are similar in some ways to a GEIS, but it is published in final form without public comment. However, a GES need discuss neither alternatives to license renewal nor the cost-benefit balance of the major federal action (license renewal) under discussion. Therefore, use of a GES as support for limiting environmental discussion a license renewal hearings would weaken this rulemaking endeavor because of the lack of public participation in commenting on this cornerstone document and lack of compliance with the full-disclosure provision of NEPA.

Question No. 2. What alternative forms of codifying the findings of the generic environmental impact statement should be considered

Comments: This question was not specifically addressed by most commenters. The NUMARC recommended that the findings of the GEIS be codified by classifying potential environmental impacts of license renewal into four categories that it described.

NRC Response: The NRC believes that the categories used in the GEIS and the results of the evaluation in chapter 10 of the GEIS permit codification of findings that is at least as adequate as would result from the NUMARC recommendation. The approach taken in the proposed rulemaking to codify the results of the GEIS is a mix of the four approaches identified in the ANPR.

Question No. 3. What activities associated with license renewal will lead to environmental impacts

Comments: Several respondents addressed this question in general terms. NUMARC stated: "In general, most of the activities associated with license renewal that may have environmental impacts are the same activities considered in environmental evaluations for the initial licenses." Activities associated with license renewal are more fully discussed in a document that NUMARC submitted with its comments. The document is "Study of Generic Environmental Issues Related to License Renewal," dated May 9, 1989. A State agency identified a number of replacement activities that would result in generating low-level radioactive waste and radiation doses to workers engaged in these activities.

NRC Response: In May 1989, NUMARC submitted a study to the NRC in the context of the rulemaking on 10 CFR Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants." Information on plant modification and operation activities associated with license renewal in this document was reviewed and considered in preparing the GEIS. Activities associated with license renewal that were identified by the State agency are addressed in the GEIS in chapter 2 and appendix B.

Question No. 4. What topical areas should be covered in the generic environmental impact statements Should the proposed outline be supplemented or restructured

Comments: Respondents to this question identified priority topics that should be covered in the GEIS and commented on

the completeness of the scope of these topics. Those addressing the scope of such topics generally were satisfied with the list in the ANPR. Most concerns were with the balance of the treatment of topics within the outline. NUMARC, supported by member utilities, believed that some topics such as plant modifications associated with license renewal and decommissioning are unduly emphasized by being given major section status. A number of respondents discussed topical areas already identified in the ANPR about which they were particularly concerned. Several topics not identified in the ANPR were identified as concerns by one or more respondents. Concern was expressed that the pool of trained nuclear engineers is diminishing. Thus, operators may be less well qualified in the future. A respondent stated that each type of reactor should be treated separately. A Federal agency stated that the GEIS could assess the utilities' efforts to comply with the Public Utilities Regulatory Policy Act (PURPA) for financial assistance to private cogeneration facilities and that it could also assess the utilities' efforts to comply with State and local conservation efforts.

The WPSC raised the following four points not explicitly covered in the ANPR:

- (1) Regarding the need for generating capacity, whether the NRC should defer to the relevant State agency's determination of need for generating capacity;
- (2) Whether an accident that has the potential for leading to a demand by the public that all reactors be shut down could jeopardize the supply of electricity;
- (3) Whether plant management history will be considered in a license renewal decision; and
- (4) Whether embrittlement of the reactor pressure vessel may result in shutting plants down for susceptibility to pressurized thermal shock soon after extending the license.

NRC Response: The NRC believes that the scope of the GEIS accommodates most of the issues of concern raised in the comments. However some issues raised are beyond the scope of the GEIS. The NRC will ensure the qualification of operators in the future through NRC regulations, especially 10 CFR Part 55, "Operator's Licenses". The NRC has not explicitly assessed compliance with PURPA and State and local conservation efforts on a utility-by-utility basis and it does not believe it is necessary to do so. Conservation and cogeneration projections are already incorporated in forecasts of need for generating capacity.

Regarding WPSC's comment that the NRC should defer to the determination of need that relevant State agencies made, the NRC encourages State agencies to review analyses in the GEIS for consistency with their own analyses and to comment on any significant disagreements between them. Regarding the concern about a possible public demand to shut down all reactors after a severe accident at one, the NRC assumes in the GEIS that the programs described in Chapter 5 of the GEIS will maintain a low probability of a severe accident and that a shutdown of all reactors is speculative. Management history is not an issue that is addressed in the GEIS or the proposed rule. Although management action will be continually monitored through the operating life of any plant, it will not be a major topic evaluated to renew a license. The NRC will consider the embrittlement status of the reactor pressure vessel for a license renewal, and its status may indeed limit the term or bar the issuance of a renewed license.

Question No. 5. For each topical area, what are the specific environmental issues that should be addressed

Comments: NUMARC was the only respondent who specifically addressed this question. Several other respondents did identify specific topics and environmental issues that concerned them. These other responses are addressed under Question No. 4. NUMARC referred the NRC to the detailed areas treated in the NUMARC report titled "Study of Generic Environmental Issues Related to License Renewal," dated May 9, 1989, and submitted to the NRC in May 1989.

NRC Response: The NUMARC report has been reviewed and was considered in developing the scope and analyses of the GEIS.

***47025** Question No. 6. For each topical area and each specific issue, what information and data are required to perform generic analyses Where do the information and data exist

Comments: NUMARC referred to its study submitted to the NRC titled, "Study of Generic Environmental Issues Related to License Renewal," and point out that the study contains relevant information and an extensive list of data sources. The EPA offered to provide information about the effect of electromagnetic frequency radiation and global climate change. The WPSC stated that information about the need for power, the amount of conservation that is technically and economically possible, and load management exists at each utility and at the corresponding State utility commission.

NRC Response: All information in the NUMARC study was reviewed and was used as appropriate in developing the GEIS. The NRC considered the EPA's information and guidance on effects of electromagnetic frequency radiation and global climate change. In the GEIS, the NRC took a regional generic approach about the need for power, conservation, and load management. The NRC believes this is an adequate analysis to establish the need for generating capacity for each plant but is requesting comment on its analysis.

Question No. 7. For each topical area and each specific issue, what criteria should be used to judge the significance of the environmental impact

Comments: This question was specifically addressed by NUMARC and Yankee Atomic Electric Company. NUMARC provided the more detailed response, and it was consistent with the Yankee Atomic response. NUMARC made a number of general observations about the significance criteria embodied in the NRC practice in the environmental and associated safety areas and in the CEQ guidelines. They provided examples of significant criteria for endangered species, impacts to aquatic biota, and radiological impacts.

NRC Response: These comments generally support the approach to determine the significance of environmental issues employed in the GEIS.

Question No. 8. For each topical area and each specific issue, what is the potential for successful analysis

Comments: NUMARC addressed this question in detail. Commenting utilities supported the NUMARC response. Other responses ranged from a general statement that generic treatment is not feasible to a general statement that generic treatment is feasible. Several commenters each mentioned doubts about the possibility of generic treatment of at least some of the following: need for generating capacity, alternatives, climate change, impacts from refurbishment and continued operation, and severe accidents. NUMARC stated that "nearly all, if not all, of the impacts associated with license renewal have been found amenable to generic analysis." Using the four categories of generic conclusions (see Question No. 2), NUMARC presented conclusions on the categorization of various impacts from plant operation, plant modification, accidents, decommissioning, need for generating capacity, and alternative generating capacity.

NRC Response: The NRC considered the positions offered in comments on the potential of generic analysis for each topical area and each specific issue. The NRC findings are summarized in chapter 10 of the GEIS. The NRC believes that the approach taken in the GEIS resulted in generic conclusions that both encompass site- and region-specific considerations and consider forecasting uncertainties.

Question No. 9. What length of extended operating time can reasonably be addressed in the proposed rulemaking To

what extent is it possible to reach generic conclusions about the environmental impacts that would be applicable to plants having renewed operating licenses expiring in the year 2030, 2040, or 2050

Comments: Several commenters had doubts about the accuracy of long-term forecasts of need for generating capacity, alternative energy sources, climate change, and severe accidents. NUMARC specifically addressed this question and pointed out that environmental impact evaluations are performed for new plants for 40 to 50 years into the future, but that unlike new plants, applicants who will apply for plant license renewal have an operating history with accumulated monitoring data. NUMARC also stated that the NRC has the option of revising the GEIS at any future time if experience shows an impact that deviates significantly from its predicted value.

NRC Response: The NRC agrees with NUMARC's observations and believes the conclusions reached in the GEIS issue reflect careful consideration of future uncertainties.

IV. Questions

Public comment on conclusions about potential environmental impacts is being solicited as part of this rulemaking. The Commission will evaluate comments on this notice and the draft GEIS before publishing a final rule.

In addition to general comments on the proposed rulemaking, the Commission is especially interested in public responses to the following questions:

(1) Should the NRC staff have the flexibility, as provided in the proposed rule, to choose to prepare an environmental assessment instead of a supplemental environmental impact statement for each plant license to be renewed In answering this question, please consider whether it makes a difference if this proposed rulemaking is supported by a generic environmental survey rather than a full GEIS

(2) For presenting a full discussion of environmental impacts from postulated accidents as required by the NEPA:

(a) Is the exposure index (EI) method, as used in chapter 5 of the GEIS to predict potential environmental impacts of atmospheric releases of radioactive material from a severe accident, sufficient to present for consideration the potential impacts from severe accident of atmospheric releases for all plants for the license renewal period If not, what alternative analyses would be acceptable

(b) Is the method of analysis of radionuclide deposition from fallout over open bodies of water from severe accidents of atmospheric releases, as used in chapter 5 of the GEIS, sufficient to present for consideration the potential impacts of atmospheric fallout for all plants If not, what alternative analyses would be acceptable

(c) Is the method of analysis of releases to groundwater from severe accidents, as used in chapter 5 of the GEIS, sufficient to present for consideration the potential impacts of releases to groundwater for all plants If not, what alternative analyses would be acceptable

(3) It is reasonable to conclude that, based upon the calculated low risk to the environment from severe accidents and the June 13, 1980, Commission Policy Statement on accident considerations under the NEPA (45 FR 40101), SAMDAs need not be considered in individual license renewal applications If not, what alternative would be acceptable

(4) What significant environmental issues, if any, have not been evaluated in the GEIS

(5) Which evaluations presented, if any, are not sufficient for drawing generic conclusions

(6) What additional analyses can be done to further address the Category 2 and 3 items For example, what screening criteria could be applied to local transportation during *47026 refurbishment and to threatened and endangered species to change these issues from Category 3 to Category 2 Are the criteria for meeting the defined bounding conditions for each of the Category 2 items sufficiently clear

(7) The GEIS and this proposed action apply to all plants currently holding an OL or CP, except for Washington Nuclear Plant 1 and 3, Grand Gulf 2, and Perry 2. Should these plants be included in the scope of this action

V. Availability of Documents

The principal supporting documents of this supplementary information are as follows:

- (1) Draft Generic Environmental Impact Statement, NUREG-1437
- (2) Draft Regulatory Analysis: Proposed Part 51 Amendments, NUREG-1440
- (3) Draft Supplement to Regulatory Guide 4.2 (DG-4002)
- (4) Draft Environmental Standard Review Plan—License Renewal, NUREG-1429

A free single copy of each of these documents, to the extent of supply, may be requested by those who are considering commenting by writing to the U.S. Nuclear Regulatory Commission, Washington, DC 20555 (ATTN: Distribution and Mail Services Section). Copies of all documents cited in the supplementary information are available for inspection and/or for copying for a fee, in the NRC Public Document Room, 2120 L St. NW. (Lower Level), Washington, DC.

In addition, copies of NRC documents cited here may be purchased from the Superintendent of Documents, U.S. Government Printing Office, PO Box 37082, Washington, DC 20013-7082. Copies are also available for purchase from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.

VI. Workshop

A workshop is being scheduled during which experts with a diversity of perspectives can review the technical basis of the proposed amendments. Such interaction is expected to contribute information for the NRC to consider that may not otherwise have surfaced through written comments on the proposed amendments. In addition, the workshop may provide additional information that will assist those who comment in developing written comments.

The workshop is being designed to focus on the substantive technical findings of the GEIS codified in the proposed amendment. Workshop sessions will correspond to the major topical areas found in the GEIS and appendix B of subpart A of 10 CFR part 51. Workshop participants will be experts selected from industry, Federal and State agencies, and environmental organizations. Each workshop concurrent session will be limited to 15 participants and will be conducted in a panel format. Questions and statements from the audience will be taken if time permits.

Comments are invited on the following tentative agenda.

Day 1

7:45-8:30 Registration

8:30-8:45 Welcome

8:45-9:00 Workshop objectives, structure, ground rules

9:00-10:15 General Session—GEIS and proposed 10 CFR part 51 rulemaking overview

10:15-10:30 Break

10:30-11:45 General Session (cont.)

11:45-1:00 Lunch

1:00-3:00 Concurrent Sessions

A. Surface Water, Aquatic Ecology, Groundwater

B. Terrestrial Ecology, Land Use

C. Socioeconomics

3:00-3:15 Break

3:15-5:15 Concurrent Sessions

D. Decommissioning

E. Human Health

F. Need for Generating Capacity and Direct Economic Costs and Benefits

Day 2

8:30-10:15 Concurrent Sessions

G. Postulated Accidents

H. Solid Waste Management

I. Alternatives

10:15-10:30 Break

10:30-11:45 Concurrent Sessions G, H and I (cont.)

11:45-1:00 Lunch

1:00-2:00 General Session—NEPA Process

2:00-3:00 Summary and Conclusion of Sessions

VII. Submittal of Comments in an Electronic Format

Commenters are encouraged to submit, in addition to the original paper copy, a copy of their letter in an electronic

format on IBM PC DOS-compatible 3.5- or 5.25-inch, double-sided, double-density (DS/DD) diskettes. Data files should be provided in Wordperfect 5.1. ASCII code is also acceptable or, if formatted text is required, data files should be provided in IBM Revisable-Form Text Document Content Architecture (RFT/DCA) format.

VIII. Environmental Impact: Categorical Exclusion

The NRC has determined that this proposed regulation is the type of action described in categorical exclusion 10 CFR 51.22(c)(3). Therefore neither an environmental impact statement nor an environmental assessment has been prepared for this proposed regulation. This action is procedural in nature in that it pertains to the type of environmental information to be reviewed.

IX. Paperwork Reduction Act Statement

This proposed rule amends information collection requirements that are subject to the Paperwork Reduction Act of 1980 (44 U.S.C. 3501 et seq.). This rule has been submitted to the Office of Management and Budget for review and approval of the paperwork requirements. Public reporting burden for this collection of information is estimated to average about 3000 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Information and Records Management Branch (MNBB-7714), U.S. Nuclear Regulatory Commission, Washington, DC 20555 and to the Desk Officer Office of Information and Regulatory Affairs, NEOB-3019 (3150-0021), Office of Management and Budget, Washington, DC 20503.

X. Regulatory Analysis

The Commission has prepared a draft regulatory analysis on this proposed regulation. The analysis examines the costs and benefits of the alternatives considered by the Commission. The two alternatives considered were (a) retaining the existing part 51 review process for license renewal, which requires that all review be done on a plant-specific basis, and (b) amending part 51 to allow a portion of the environmental review to be conducted on a generic basis. The conclusions of the draft regulatory analysis show substantial cost savings of alternative (b) over alternative (a).

The draft analysis is available for inspection in the NRC Public Document Room, 2120 L Street, NW. (Lower Level), Washington, DC. Copies of the analysis are available as described in Section V of this proposed rule. The Commission requests public comment on the draft regulatory analysis. Comments on the draft analysis may be submitted to the NRC as indicated under the addresses' heading.

*47027 XI. Regulatory Flexibility Act Certification

As required by the Regulatory Flexibility Act of 1980, 5 U.S.C. 605(b), the Commission certifies that this proposed rule will not have a significant impact on a substantial number of small entities. The proposed rule states application procedures and environmental information to be submitted by nuclear power plant licensees to facilitate the NRC's obligations under the NEPA. Nuclear power plant licensees do not fall within the definition of small businesses as defined in section 3 of the Small Business Act, 15 U.S.C. 632, the Small Business Size Standards of the Small Business Administrator (13 CFR part 121), or the Commission's Size Standards (50 FR 50241; December 9, 1985).

XII. Backfit Analysis

The rulemaking does not constitute a "backfit" as defined in 10 CFR 50.109(a)(1) and a backfit analysis need not be pre-

pared. This rule addresses procedural requirements for considering the environmental effects of issuing a renewed operating license for a nuclear power plant. The Commission has not previously addressed these requirements either in rule-making or in guidance documents. Moreover, policy considerations weigh against considering part 51 and its amendments as a “backfit.” The primary impetus for the Backfit Rule was “regulatory stability,” namely, that once the Commission decides to issue a license, the terms and conditions for operating under that license would not be arbitrarily changed post hoc. Regulatory stability is not a relevant issue with respect to license renewal. This rule has only a prospective effect upon nuclear power plant licensees. No licensee currently holds a renewed nuclear power plant operating license and therefore, no valid expectations could be changed regarding the terms and conditions for holding a renewed operating license.

List of Subjects in 10 CFR Part 51

Administrative practice and procedure, Environmental impact statement, Nuclear materials, Nuclear power plants and reactors, Reporting and recordkeeping requirements.

For the reasons set out in the preamble and under the authority of the Atomic Energy Act of 1954, as amended; the Energy Reorganization Act of 1974, as amended; the National Environmental Policy Act of 1969, as amended; and 5 U.S.C. 553; the NRC is proposing to adopt the following amendments to 10 CFR part 51.

PART 51—ENVIRONMENTAL PROTECTION REGULATIONS FOR DOMESTIC LICENSING AND RELATED REGULATORY FUNCTIONS¹. The authority citation for part 51 continues to read as follows:

Authority: Sec. 161, 68 Stat. 948, as amended (42 U.S.C. 2201); secs. 201, as amended, 202, 88 Stat. 1242, as amended, 1244 (42 U.S.C. 5841, 5842). Subpart A also issued under National Environmental Policy Act of 1969, secs. 102, 104, 105, 83 Stat. 853-854, as amended (42 U.S.C. 4332, 4334, 4335); and Pub. L. 95-604, Title II, 92 Stat. 3033-3041. Sections 51.20, 51.30, 51.60, 51.61, 51.80, and 51.97 also issued under secs. 135, 141, Pub. L. 97-425, 96 Stat. 2232, 2241, and sec. 148, Pub. L. 100-203, 101 Stat. 1330-223 (42 U.S.C. 10155, 10161, 10168). Section 51.22 also issued under sec. 274, 73 Stat. 688, as amended by 92 Stat. 3036-3038 (42 U.S.C. 2021) and under Nuclear Waste Policy Act of 1982, sec. 121, 96 Stat. 2228 (42 U.S.C. 10141). Sections 51.43, 51.67, and 51.109 also under Nuclear Waste Policy Act of 1982, sec. 114(f), 96 Stat. 2216, as amended (42 U.S.C. 10134(f)).

10 CFR § 51.20

2. Section 51.20 is amended by revising paragraph (b)(2) to read as follows:

10 CFR § 51.20

§ 51.20 Criteria for and identification of licensing and regulatory actions requiring environmental impact statements.

* * * * *

(b) * * *

(2) Issuance of a full-power or design-capacity license to operate a nuclear power reactor pursuant to part 50 of this chapter, or issuance or renewal of a full-power or design-capacity license to operate a testing facility or a fuel reprocessing plant pursuant to part 50 of this chapter.

* * * * *

2A. Footnotes 3 through 8 in part 51 are redesignated as footnotes 5 through 10.

10 CFR § 51.53

3. Section 51.53 is revised to read as follows:

10 CFR § 51.53

§ 51.53 Supplement to environmental report.

(a) General. Any supplement to an environmental report prepared under the provisions of this section may incorporate by reference any information contained in a prior environmental report or supplement thereto that relates to the same production or utilization facility or any information contained in a final environmental document previously prepared by the NRC staff that relates to the same production or utilization facility. Documents that may be referenced include, but are not limited to, the final environmental impact statement; supplements to the final environmental impact statement, including supplements prepared at the license renewal stage; environmental assessments and records of decisions prepared in connection with the construction permit, the operating license, and any license amendment for that facility.

(b) Operating license stage. Each applicant for a license to operate a production or utilization facility covered by § 51.20 shall submit with its application the number of copies, as specified in § 51.55, of a separate document, entitled “Supplement to Applicant’s Environmental Report—Operating License Stage,” which will update “Applicant’s Environmental Report—Construction Permit Stage.” Unless otherwise required by the Commission, the applicant for an operating license for a nuclear power plant shall submit this report only in connection with the first licensing action authorizing full-power operation. In this report, the applicant shall discuss the same matters described in §§ 51.45, 51.51, and 51.52, but only to the extent that they differ from those discussed or reflect new information in addition to that discussed in the final environmental impact statement prepared by the Commission in connection with the construction permit. Unless otherwise required by the Commission, no discussion of need for power or alternative energy sources or alternative sites for the facility or of any aspect of the storage of spent fuel for the facility within the scope of the generic determination in § 51.23(a) and in accordance with § 51.23(b) is required in this report.

(c) Operating license renewal stage. (1) Each applicant for renewal of a license to operate a nuclear power plant under part 54 of this chapter shall submit with its application the number of copies, as specified in § 51.55, of a separate document, entitled “Supplement to Applicant’s Environmental Report—Operating License Renewal Stage.”

(2) The supplemental report must contain a description of the proposed action, including the applicant’s plans to modify the facility or its administrative control procedures as described in accordance with § 54.21(e) of this chapter. The report must describe in detail the modifications directly affecting the environment or affecting plant effluents that affect the environment.

(3) For those applicants seeking an initial renewal license and holding an operating license as of June 30, 1992, or *47028 who hold an operating license for Bellefonte Unit 1 or 2, Comanche Peak Unit 2, or Watts Bar Unit 1 or 2, the scope of issues to be addressed in the supplemental report will be limited to the following:

(i) Unless otherwise required by the Commission, no discussion of license renewal issues identified as Category 1 issues in appendix B of subpart A of this part is required in the supplemental report.

(ii) For those issues identified as Category 2 in appendix B of subpart A of this part, the supplemental report must contain a demonstration that:

(A) The nuclear power plant uses only cooling towers for primary condenser cooling or that the license renewal applicant holds current Clean Water Act 316(b) determinations and if necessary a 316(a) variance in accordance with 40 CFR part 125, or equivalent State permits. If no such demonstration can be made, an assessment of the impact of the individual nuclear power plant license renewal on fish and shellfish resources resulting from heat shock and impingement and entrainment must be provided.

(B) The nuclear power plant is not located at an inland site or does not have cooling ponds. If no such demonstration can be made, an assessment of the impact of the individual nuclear power plant license renewal on groundwater quality must be provided.

(C) The nuclear power plant does not use Ranney wells and either does not pump 100 or more gallons per minute of groundwater or does not have private wells located within the cones of depression of the nuclear power plant wells. If no such demonstration can be made, an assessment of the impact of the individual nuclear power plant license renewal on groundwater-use conflicts must be provided.

(D) Construction activities that are related to license renewal that involve additional onsite land use will not affect important plant and animal habitats. If no such demonstration can be made, an assessment of the impact of the individual plant license renewal on important plant and animal habitats must be provided.

(E) No major construction activities associated with the nuclear power plant license renewal will take place at the site. If no such demonstration can be made, a construction impact control program that will mitigate potential impacts on the aquatic environment from soil erosion or spills must be implemented and a description of this program must be provided.

(F) The nuclear power plant is in a medium or high population area[FN3] and not in an area where growth-control measures that limit housing development are in effect. If no such demonstration can be made, an assessment of the impact of the individual nuclear power plant license renewal on housing availability must be provided.

FN3 An area is considered to have a medium or high population if any of the following conditions is satisfied:

(a) The plant is within 20 miles of a city of 25,000;

(b) The plant is within 50 miles of a city of 100,000;

(c) The population of the area within 20 miles of the plant is 75,000 or more;

(d) The population of the area within 50 miles of the plant is 1,500,000 or more; or

(e) The population of the area within 20 miles of the plant is 50,000 or more and, within 50 miles of the plant, the population is 400,000 or more.

(G) The design of the transmission lines of the nuclear power plant meets the recommendations of the National Electric Safety Code for preventing electric shock from induced currents. If no such demonstration can be made, an assessment of the impact of the individual nuclear power plant license renewal on the potential electric shock hazard from the transmission lines of the plant must be provided.

(H) The nuclear power plant does not use a cooling pond, lake, or canal and does not discharge water to a small river. If no such demonstration can be made, an assessment of the impact of thermophilic organisms in the affected water on the health of recreational users must be provided.

(I) The nuclear power plant will have access to a low-level radioactive waste disposal facility through a low-level waste compact or an unaffiliated State. If no such demonstration can be made, a presentation of capability and plans for interim waste storage must be provided with an assessment of potential ecological habitat destruction caused by construction activities.

(J) The replacement of equivalent generating capacity by a coal-fired plant has no demonstrated cost advantage[FN4] over the individual nuclear power plant license renewal. If no such demonstration can be made, a justification for choosing the license renewal alternative must be provided. For nuclear power plants located in California, Oregon, Washington, or Arizona, applicants to renew a license must also provide an assessment of geothermal generating capacity as an alternative to license renewal in addition to the cost demonstration results.

FN4 In performing the cost demonstration, costs of refurbishment, construction, fuel, operation, and maintenance must be considered.

(iii) For those issues identified in Category 3 in appendix B of subpart A of this part, the supplemental report must contain an assessment about the following:

(A) The impact of renewing the license for the nuclear power plant on threatened or endangered species.

(B) The impact of renewing the license for the nuclear power plant on local transportation during periods of license-renewal-related refurbishment activities.

(4) The supplemental report must contain an analysis of whether the assessment required by paragraphs (c)(3)(ii)-(iii) of this section changes the findings documented in Table B-1 of appendix B of subpart A of this part that the renewal of any operating license for up to 20 years will have accrued benefits that outweigh the economic, environmental, and social costs of license renewal.

(d) Postoperating license stage. Each applicant for a license amendment authorizing the decommissioning of a production or utilization facility covered by § 51.20 and each applicant for a license or license amendment to store spent fuel at a nuclear power plant after expiration of the operating license for the nuclear power plant shall submit with its application the number of copies, as specified in § 51.55, of a separate document, entitled "Supplement to Applicant's Environmental Report—Post Operating License Stage," which will update "Supplement to Applicant's Environmental Report—Operating License Stage," and "Supplement to Applicant's Environmental Report—Operating License Renewal Stage," as appropriate, to reflect any new information or significant environmental change associated with the applicant's proposed decommissioning activities or with the applicant's proposed activities with respect to the planned storage of spent fuel. Unless otherwise required by the Commission, in accordance with the generic determination in § 51.23(a) and the provisions in § 51.23(b), the applicant shall only address the environmental impact of spent fuel storage for the term of the license applied for.

10 CFR § 51.55

4. In § 51.55, paragraph (a) is revised to read as follows:

10 CFR § 51.55

§ 51.55 Environmental report—number of copies; distribution.

(a) Each applicant for a license to construct and operate a production or utilization facility covered by paragraph (b)(1),

(b)(2), (b)(3) or (b)(4) of § 51.20, *47029 each applicant for renewal of an operating license for a nuclear power plant, each applicant for a license amendment authorizing the decommissioning of a production or utilization facility covered by § 51.20, and each applicant for a license or license amendment to store spent fuel at a nuclear power plant after expiration of the operating license for the nuclear power plant shall submit to the Director of the Office of Nuclear Reactor Regulation or the Director of the Office of Nuclear Material Safety and Safeguards, as appropriate, 41 copies of an environmental report or any supplement to an environmental report. The applicant shall retain an additional 109 copies of the environmental report or any supplement to the environmental report for distribution to parties and Boards in the NRC proceedings; Federal, State, and local officials; and any affected Indian tribes; in accordance with written instructions issued by the Director of the Office of Nuclear Reactor Regulation or the Director of the Office Nuclear Material Safety and Safeguards, as appropriate.

* * * * *

10 CFR § 51.95

5. Section 51.95 is revised to read as follows:

10 CFR § 51.95

§ 51.95 Supplement to final environmental impact statement; environmental assessment.

(a) General. Any supplement to a final environmental impact statement or any environmental assessment prepared under the provisions of this section may incorporate by reference any information contained in a final environmental document previously prepared by the NRC staff that relates to the same production or utilization facility. Documents that may be referenced include, but are not limited to, the final environmental impact statement; supplements to the final environmental impact statement, including supplements prepared at the operating license stage; environmental assessments and records of decisions prepared in connection with the construction permit, the operating license, and any license amendment for that facility. A supplement to a final environmental impact statement will include a request for comments as provided in § 51.73.

(b) Operating license stage. In connection with the issuance of an operating license for a production or utilization facility, the NRC staff will prepare a supplement to the final environmental impact statement on the construction permit for that facility, which will update the prior environmental review. The supplement will only cover matters that differ from or that reflect significant new information concerning matters discussed in the final environmental impact statement. Unless otherwise determined by the Commission, a supplement on the operation of a nuclear power plant will not include a discussion of need for power or alternative energy sources or alternative sites or of any aspect of the storage of spent fuel for the nuclear power plant within the scope of the generic determination in § 51.23(a) and in accordance with § 51.23(b), and will only be prepared in connection with the first licensing action authorizing full-power operation.

(c) Operating license renewal stage. In connection with the renewal of an operating license for a nuclear power plant under part 54 of this chapter, the NRC staff will prepare an environmental assessment or, if warranted, a supplemental environmental impact statement. Unless otherwise determined by the Commission, the environmental assessment or the supplemental environmental impact statement will address only the matters in § 51.53(c) of this part. A supplemental environmental impact statement is required if significant impacts are found in the environmental assessment.

(d) Postoperating license stage. In connection with the amendment of an operating license to authorize the decommissioning of a production or utilization facility covered by § 51.20 or with the issuance, amendment, or renewal of a license

to store spent fuel at a nuclear power plant after expiration of the operating license for the nuclear power plant, the NRC staff will prepare a supplemental environmental impact statement for the postoperating license stage or an environmental assessment, as appropriate, which will update the prior environmental review. Unless otherwise required by the Commission, in accordance with the generic determination in § 51.23(a) and the provisions of § 51.23(b), a supplemental environmental impact statement for the postoperating license stage or an environmental assessment, as appropriate, will address the environmental impacts of spent fuel storage only for the term of the license, license amendment, or license renewal applied for.

6. A new appendix B is added to subpart A, 10 CFR part 51 to read as follows:

Appendix B to Subpart A—Environmental Effect of Renewing the Operating License of a Nuclear Power Plant

The Commission has considered the environmental and other costs and benefits of alternatives to granting a renewed operating license for a nuclear power plant to a licensee who holds an operating license as of June 30, 1992, or who holds an operating license for Bellefonte Unit 1 or 2, Comanche Peak Unit 2, or Watts Bar Unit 1 or 2. The Commission has found that the renewal of any operating license for up to 20 years will have accrued benefits that outweigh the economic, environmental, and social costs of license renewal, subject to an evaluation of those issues identified as Category 2 (only for those nuclear power plants that are outside the envelope defined in each issue) and Category 3 in Table B-1. Table B-1 summarizes the Commission findings on the scope and magnitude of environmental and other effects of renewing the operating license for a nuclear power plant as required by section 102(2) of the National Environmental Policy Act of 1969, as amended. The Commission will periodically review the material in this appendix and update it if necessary.

Table B-1. Summary of Findings on NEPA Issues for License Renewal of Nuclear Power Plants

Issue	Category[FN1]	Findings[FN2]
PART I. NEED FOR GENERATING CAPACITY		
Need for generating capacity via license renewal		1 LARGE BENEFIT. License renewal of an individual nuclear power plant will be needed to meet generating capacity requirements in the service area and to avoid constructing and operating new generating facilities which would otherwise be necessary to replace the retired nuclear plant.
PART II. IMPACTS OF ALTERNATIVES		
Advances of alternatives to license renewal		1 NO ADVANTAGE. License renewal of an individual nuclear power plant is found to be preferable to replacement of the generating capacity with a new facility to the year 2020. License renewal is found to be preferable, both environmentally and economically[FN3] to either new fossil-fuel or new nuclear capacity. Wind, solar photovoltaic cells, solar thermal

power, hydropower, and biomass are found to be not preferable to license renewal because of technological limitations, availability, and economics. Geothermal power could be competitive in areas where geothermal resources are readily available. These areas are in the states of California, Oregon, Washington, and Arizona.

PART III. BENEFITS/COST ASSESSMENT BENEFITS

Direct Economic

Generating capacity	1 LARGE BENEFIT. Will provide from 72 x 10 ^[FN3] to 1270 x 10 ^[FN3] net kW(e) reflecting the smallest to the largest plant.
Electric energy	1 LARGE BENEFIT. Will provide from 391 x 10 ^[FN6] to 6898 x 10 ^[FN6] kWh/yr reflecting the smallest to the largest plant.
Avoided costs	2 ^[FN3] SMALL TO LARGE BENEFIT. Compared to replacement of electric generating capacity with a new coal-fired plant, license renewal offers savings under a diverse set of conditions.

Indirect

Local taxes	1 SMALL BENEFIT. Tax revenues will increase due to capital improvements.
Refurbishment	
Local taxes	1 SMALL BENEFIT. The impact of tax revenues may vary from small to large depending on the total tax base of the taxing jurisdictions.
Renewal term	
Employment	1 SMALL BENEFIT. Impacts on regional employment will be small to moderate depending on the total employment base of the region, and will be short-lived.
Refurbishment	
Employment	1 SMALL BENEFIT. Impacts on regional employment will be small to large depending on the total employ-

	ment base of the region.
Renewal term	
COSTS	
Direct Economic[FN3]	
Refurbishment	2 MODERATE COST. Refurbishment costs will vary widely depending on specific plant requirements. In general, costs will be significantly lower relative to the capital cost of new coal-fired plants.
Fuel	2 SMALL COST. Fuel costs will be much lower than for a new coal-fired plant.
Operation and maintenance	2 LARGE COST. O&M costs will vary widely depending on specific plant performance but on the average they will be significantly more that for a new coal-fired plant.
Environmental and Socioeconomic	
Surface Water Quality, Hydrology, and Use	
(for all plants)	
Effects of refurbishment on surface-water quality	2 SMALL COST. Impacts are expected to be minor and insignificant during refurbishment if there are no major construction activities associated with the individual plant license renewal or if best management practices (BMPs) are employed to control soil erosion and spills; applicant must provide evidence of approved BMPs in license renewal application.
Effects of refurbishment on surface-water use	1 SMALL COST. Water use during refurbishment will not change or will be reduced during reactor outage.
Altered current patterns at intake and discharge structures	1 SMALL COST. Has not been found to be a problem at operating nuclear power plants and is not expected to be a problem during the license renewal term.
Altered salinity gradients	1 SMALL COST. Has not been found to be a problem at operating nuclear power plants and is not expected to be

	a problem during the license renewal term.
Altered thermal stratification of lakes	1 SMALL COST. Has not been found to be a problem at operating nuclear power plants and is not expected to be a problem during the license renewal term.
Temperature effects on sediment transport capacity	1 SMALL COST. Has not been found to be a problem at operating nuclear power plants and is not expected to be a problem during the license renewal term.
Scouring caused by discharged cooling water	1 SMALL COST. Has not been found to be a problem at operating nuclear power plants and is not expected to be a problem during the license renewal term.
Eutrophication	1 SMALL COST. Has not been found to be a problem at operating nuclear power plants and is not expected to be a problem during the license renewal term.
Discharge of chlorine or other biocides	1 SMALL COST. Effects are readily controlled through National Pollutant Discharge Elimination System (NPDES) permit and periodic modifications, if needed, and is not expected to be a problem during the license renewal term.
Discharge of sanitary wastes	1 SMALL COST. Effects are readily controlled through NPDES permit and periodic modifications, if needed, and is not expected to be a problem during the license renewal term.
Discharge of other chemical contaminants (e.g., metals)	1 SMALL COST. Has not been found to be a problem at operating nuclear power plants with cooling-tower-based heat dissipation systems. Has been satisfactorily mitigated at other plants. It is not expected to be a problem during the license renewal term.
Water-use conflicts	1 SMALL COST. Has not been found

to be a problem at operating nuclear power plants with once-through heat dissipation systems. The issue has been a concern at two nuclear power plants with cooling ponds and at two plants with cooling towers, but it will be resolved with appropriate state or regional regulatory agencies outside of NRC license renewal actions. It is not expected to be a problem during the license renewal term.

Aquatic Ecology
(for all plants)

Refurbishment	1 SMALL COST. During plant shut-down and refurbishment there will be negligible effects on aquatic biota due to a reduction of entrainment and impingement of organisms or reduced release of chemicals.
Accumulation of contaminants in sediments or biota	1 SMALL COST. Has been a concern at a single nuclear power plant with a cooling pond, but has been satisfactorily mitigated. Has not been found to be a problem at operating nuclear power plants with cooling towers or once-through cooling systems, or a cooling pond, except for one plant. It was successfully mitigated at that plant. It is not expected to be a problem during the license renewal term.
Entrainment of phytoplankton and zooplankton	1 SMALL COST. Has not been found to be a problem at operating nuclear power plants and is not expected to be a problem during the license renewal term.
Cold shock	1 SMALL COST. Has been satisfactorily mitigated at operating nuclear plants with once-through cooling systems and has not endangered fish populations. Has not been found to be a problem at operating nuclear power plants with cooling towers or cooling ponds. It is not expected to be a problem during the license renewal term.

Thermal plume barrier to migrating fish	1 SMALL COST. Has not been found to be a problem at operating nuclear power plants and is not expected to be a problem during the license renewal term.
Premature emergence of aquatic insects	1 SMALL COST. Has not been found to be a problem at operating nuclear power plants and is not expected to be a problem during the license renewal term.
Gas supersaturation (gas bubble disease)	1 SMALL COST. Previously a concern at a small number of operating nuclear power plants with once-through cooling systems, but has been satisfactorily mitigated. Has not been found to be a problem at operating nuclear power plants with cooling towers or cooling ponds. It is not expected to be a problem during the license renewal term.
Low dissolved oxygen in the discharge	1 SMALL COST. Has been a concern at one nuclear power plant with a once-through cooling system, but issue will be monitored in the NPDES permit renewal process. Has not been found to be a problem at operating nuclear power plants with cooling towers or cooling ponds. It is not expected to be a problem during the license renewal term.
Losses from predation, parasitism, and disease among organisms exposed to sublethal stresses	1 SMALL COST. Has not been found to be a problem at operating nuclear power plants and is not expected to be a problem during the license renewal term.
Stimulation of nuisance organisms (e.g., shipworms)	1 SMALL COST. Has been satisfactorily mitigated at the single nuclear power plant with a once-through cooling system where it was a problem. Has not been found to be a problem at operating nuclear power plants with cooling towers or cooling ponds. It is not expected to be a problem during the license renewal term.

Aquatic Ecology

(for plant with once-through heat dissipation systems)

Entrainment of fish and shellfish in early life stages	2 SMALL COST. Has not been found to be a problem at most operating plants and is not expected to be a problem during the license renewal term. Licensees of plants that do not have an approved Clean Water Act 316(b) determination or equivalent State permit at the time of license renewal application must evaluate the entrainment issue in the license renewal application.
Impingement of fish and shellfish	2 SMALL COST. Has not been found to be a problem at most operating plants and is not expected to be a problem during the license renewal term. Licensees, of plants that do not have an approved Clean Water Act 316(b) determination or equivalent State permit if required at the time of license renewal application must evaluate the impingement issue in the license renewal application.
Heat shock	2 SMALL COST. Has not been found to be a problem at most operating plants and is not expected to be a problem during the license renewal term. Licensees, of plants that do not have an approved Clean Water Act 316(b) determination or equivalent State permit, if required, at the time of license renewal application must evaluate the heat shock issue in the license renewal application.

Aquatic Ecology

(for plants with cooling-tower-based heat dissipation systems)

Entrainment of fish and shellfish in early life stages	1 SMALL COST. Has not been found to be a problem at operating nuclear power plants with this type of cooling system and is not expected to be a problem during the license renewal term.
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Impingement of fish and shellfish	1 SMALL COST. Has not been found to be a problem at operating nuclear power plants with this type of cooling system and is not expected to be a problem during the license renewal term.
Heat shock	1 SMALL COST. Has not been found to be a problem at operating nuclear power plants with this type of cooling system and is not expected to be a problem during the license renewal term.
<p>Aquatic Ecology (for plants with cooling pond heat dissipation systems)</p>	
Impingement of fish	2 SMALL COST. Has not been found to be a problem at most operating plants and is not expected to be a problem during the license renewal term. Licensees of plants that do not have an approved Clean Water Act 316(b) determination or equivalent State permit at the time of license renewal application must evaluate the impingement issue in the license renewal application.
Entrainment of fish in early life stages	2 SMALL COST. Has not been found to be a problem at most operating plants and is not expected to be a problem during the license renewal term. Licensees of plants that do not have an approved Clean Water Act 316(b) determination or equivalent State permit at the time of license renewal application must evaluate the entrainment issue in the license renewal application.
Heat shock	2 SMALL COST. Has not been found to be a problem at most operating plants and is not expected to be a problem during the license renewal term. Licensees of plants that do not have an approved Clean Water act 316(a) determination or equivalent State permit, if required at the time of

license renewal application must evaluate the heat shock issue in the license renewal application.

Groundwater Use and Quality, Impacts of Refurbishment

Groundwater-use and quality

1 SMALL COST. Extensive dewatering during the original construction on some sites will not be repeated during refurbishment on any sites. Any plants wastes produced during refurbishment will be handled in the same manner as in current operating practices and is not expected to be a problem during the license renewal term.

Groundwater Use and Quality, Impacts of Operation

Groundwater-use conflicts (potable and service water)

2 SMALL COST. Has not been found to be a problem at most operating plants and is not expected to be a problem during the license renewal term. Plants pumping 100 or more gpm and having private wells located within cones of depression of reactor wells are required to assess for use conflict during the license renewal term.

Groundwater-use conflicts (water pumped for dewatering)

2 SMALL COST. Has not been found to be a problem at most operating plants and is not expected to be a problem during the license renewal term. Plants pumping 100 or more gpm and having private wells located within cones of depression of plant wells are required to assess for use conflict during the license renewal term.

Groundwater-use conflicts (surface water used as makeup water—potentially affecting aquifer recharge)

1 SMALL COST. Water use conflicts are small and will be resolved as necessary through surface water regulatory mechanism outside of NRC license renewal process and is not expected to be a problem for any plant during the license renewal term.

Groundwater-use conflicts (Ranney wells)

2 SMALL COST. Ranney wells can result in potential groundwater de-

pression beyond site boundary. Impacts of large groundwater withdrawal for cooling tower makeup at nuclear power plants using Ranney wells must be evaluated at the time of application for license renewal.

Groundwater-quality degradation
(Ranney wells)

1 SMALL COST. Groundwater quality at river sites may be degraded by induced infiltration of poor-quality river water into an aquifer that supplies large quantities of reactor cooling water. However, the lower quality infiltrating water would not preclude the current uses of groundwater and is not expected to be a problem during the license renewal term.

Groundwater-quality degradation
(saltwater intrusion)

1 SMALL COST. Nuclear power plants do not contribute significantly to saltwater intrusion.

Groundwater-quality degradation
(cooling ponds)

2 SMALL COST. Sites with closed-cycle cooling ponds may degrade groundwater quality. This is not an issue for those plants located in salt marshes. However, for those plants located inland, the quality of the groundwater in the vicinity of the ponds must be shown to be adequate to allow continuation of current uses.

Terrestrial Resources

Refurbishment impacts

2 SMALL COST. Insignificant impact if no loss of important plant and animal habitat occurs. If important plant and animal habitats are affected the potential impact will be assessed at the time of license renewal.

Cooling tower impacts on crops

1 SMALL COST. Salt drift, icing, fogging, or increased humidity associated with cooling tower operation have not been found to be a problem at operating nuclear power plants and is not expected to be a problem during the license renewal term.

Cooling tower impacts on native plants

1 SMALL COST. Salt drift, icing, fog-

	ging, or increased humidity associated with cooling tower operation have not been found to be a problem at operating nuclear power plants and is not expected to be a problem during the license renewal term.
Birds colliding with cooling towers	1 SMALL COST. Has not been found to be a problem at operating nuclear power plants and is not expected to be a problem during the license renewal term.
Cooling pond impacts on terrestrial resources	1 SMALL COST. No significant damage to vegetation has been observed as a result of fogging, icing, or increased relative humidity at nuclear reactor cooling ponds. The low levels of water contaminants in cooling ponds are not a threat to wildlife using the ponds. No significant impact is expected at any nuclear power plant during the license renewal term.
Power line right of way management (cutting and herbicide application)	1 SMALL COST. Periodic vegetation control causes cyclic changes in the density of wildlife populations dependent on the right-of-way, but long-term densities appear relatively stable. Numerous studies show neither significant positive nor negative effects of power line right-of-way on wildlife. No significant impact is expected at any nuclear power plant during the license renewal term.
Birds colliding with power lines	1 SMALL COST. Has not been found to be a problem at operating nuclear power plant and is not expected to be a problem during the license renewal term.
Impacts of electromagnetic fields (EMFs) on flora and fauna (plants, agricultural crops, honeybees, wildlife, livestock)	1 SMALL COST. No significant impacts of electromagnetic fields on terrestrial flora and fauna have been identified as is not expected to be a problem during the license renewal term.
Floodplains and wetland on power line	1 SMALL COST. Periodic vegetation

right of way	control is necessary in forested wetlands underneath power lines and can be achieved with minimal damage to the wetland. On rare occasions when heavy equipment may need to enter a wetland to repair a power line, impacts can be minimized through the use of standard practices. No significant impact is expected at any nuclear power plant during the license renewal term.
Threatened or Endangered Species (for all plants)	
Threatened or endangered species	3 Generally, reactor refurbishment and continued operation is not expected to adversely affect threatened or endangered species. However, consultation with appropriate agencies must occur to determine if, in fact, threatened or endangered species are present and if they will be adversely affected.
Air Quality	
Air quality	1 SMALL COST. Air quality impacts from reactor refurbishment associated with license renewal are expected to be small.
Land Use	
Onsite land use	1 SMALL COST. Projected on-site land use changes required during refurbishment and the renewal period would be a small fraction of any nuclear power plant site.
Human Health, Impacts of Refurbishment	
Radiation exposures to the public	1 SMALL COST. During refurbishment, the gaseous effluents would result in doses well below the natural background dose. Applicable regulatory dose limits to the public are not expected to be exceeded.
Occupational radiation exposures	1 SMALL COST. Average occupational doses from refurbishment are expected to be within the range of annual

	average doses experienced for pressurized-water reactors and boiling-water reactors. Upper-limit cancer and genetic risks from radiation exposure from the incremental doses from refurbishment are expected to be less than 1% of the natural cancer and genetic risks.
Human Health, Impacts of Operation During License Renewal	
Microbiological organisms (occupational health)	1 SMALL COST. Occupational health questions are expected to be resolved using industrial hygiene principles to minimize worker exposures.
Microbiological organisms (public health)	2 SMALL COST. Has not been found to be a problem at most operating plants and is not expected to be a problem during the license renewal term. At the time of license renewal of plants using cooling ponds, lakes, or canals and plants discharging to small rivers applicants will assess the impact of thermophilic organisms on the health of recreational users of affected water.
Noise	1 SMALL COST. Has not been found to be a problem at operating plants and is not expected to be a problem at any reactor during the license renewal term.
Electromagnetic fields, acute effects (electric shock)	2 SMALL COST. Has not been found to be problem at most operating plants and is not expected to be a problem during the license renewal term. If it cannot be found at the time of license renewal that the transmission lines of the plant meets the National Electric Safety Code recommendations regarding the prevention of shock from induced currents then an assessment of the potential electric shock hazard from the transmission lines of the plant must be provided.
Electromagnetic fields, chronic effects	1 SMALL COST. Biological and physical studies of 60-Hz electromagnetic

	fields have not found consistent evidence linking harmful effects with field exposures.
Radiation exposures to public	1 SMALL COST. Present radiation doses to the public are very small with respect to natural background radiation; and doses from refurbishment are expected to be similar in magnitudes.
Occupational radiation exposures	1 SMALL COST. Projected maximum occupational doses during the license renewal term are within the range of doses experienced and are considerably below the 5 rem exposure limit.
Socioeconomics	
Housing impacts of refurbishment	2 SMALL COST. Not expected to be a problem at any plant located in a medium or high population area and not in an area where growth control measures that limit housing development are in effect. Housing impacts of the workforce associated with refurbishment will be assessed at the time of license renewal for plants located in sparsely populated areas or in areas with growth control measures that limit housing development.
Housing impacts of license renewal term	2 SMALL COST. Not expected to be a problem at any plant located in a medium or high population area and not in an area where growth control measures that limit housing development are in effect. Housing impacts of the workforce associated with refueling/maintenance outages will be assessed at the time of license renewal for plants located in sparsely populated areas or in areas with growth control measures that limit housing development.
Public service impacts of refurbishment	1 SMALL COST. Refurbishment induced population growth will be small and will not strain local infrastructure at any plant.

Transportation impacts of refurbishment	3 Impacts are generally expected to be small, however, they must be assessed for each plant to consider the increase in traffic associated with the additional workers and the local road and traffic control conditions.
Public service (including transportation) impacts during license renewal term	1 SMALL COST. No significant impacts are expected during the license renewal term.
Offsite land-use impacts of refurbishment	1 SMALL COST. Impacts will not be significant at any plant because plant-induced population growth will have little effect on land use patterns.
Offsite land-use impacts of license renewal term	1 SMALL COST. Changes in land use would be associated with population and tax revenue changes resulting from license renewal of a plant. These changes are expected to be small for all plants.
Historic resources impacts of refurbishment	1 SMALL COST. No significant impacts are expected during refurbishment.
Historic resources impacts of license renewal term (transmission lines)	1 SMALL COST. No significant impacts are expected during the license renewal term.
Historic resources impacts of license renewal term (normal operations)	1 SMALL COST. No significant impacts are expected during the license renewal term.
Aesthetic impacts of refurbishment	1 SMALL COST. No significant impacts are expected during refurbishment.
Aesthetic impacts of license renewal term	1 SMALL COST. Impacts will be small to moderate depending on the visual intrusiveness of the plant on historic and aesthetic resources in the area.
Aesthetic impacts of license renewal term (transmission lines)	1 SMALL COST. No significant impacts are expected during the license renewal term.
Uranium Fuel Cycle	
Radiological and nonradiological Impacts	1 SMALL COST. Impacts on the U.S. population from radioactive gaseous and liquid releases including radon-222 and technetium-99 is small com-

	pared with the impacts of natural background radiation. Nonradiological impacts on the environment are small.
Environmental Impacts of Postulated Accidents	
Design-basis accidents	1 SMALL COST. Regulations require that consequences from design basis events remain acceptable for every plant.
Severe accidents (atmospheric releases)	1 SMALL COST. Risks from atmospheric releases is small.
Severe accidents (fallout onto open bodies of water)	1 SMALL COST. Risk from both the drinking water pathway and the aquatic food pathway are small and interdiction can further reduce both sufficiently for all plants.
Severe accidents (releases from groundwater)	1 SMALL COST. Interdiction and the low probability of base mat penetration yield a low risk to the public for all plants.
Severe accidents (economic consequences)	1 SMALL COST. Predicted costs due to postulated accidents range from \$2,000/reactor-year to \$374,000/reactor-year.
Severe accident mitigation design alternatives	1 SMALL COST. Low risk to the environment from severe accidents.
Solid Waste Management	
Nonradiological waste	1 SMALL COST. No changes to generating systems are anticipated for license renewal. Existing regulations will ensure proper handling and disposal at all plants.
Low-level radioactive waste storage	2 SMALL COST. Impacts will be small for plants having access to offsite disposal space. For those plants denied the use of off-site disposal space due to delayed compact plans, the potential for ecological habitat disturbance due to construction of on-site storage facilities must be evaluated.
Low-level radioactive waste disposal	2 SMALL COST. Off-site disposal facilities are planning to handle refurbishment and normal operations waste

streams for an additional 20 years. If implementation of plans is delayed, plants in affected compact regions or unaffiliated states must plan for extended interim storage for an indefinite period of time and evaluate the impacts of such storage.

Mixed waste	1 SMALL COST. License renewal will not increase the small, continuing risk to human health and the environment posed by mixed waste at all plants.
Spent fuel	1 SMALL COST. A 50% greater volume of spent fuel from an additional 20 years of operation can be safely accommodated on-site with small environmental effects through dry or pool storage at all plants if a permanent repository or monitored retrievable storage facility is not available.
Transportation	1 SMALL COST. Rail and truck transport corridors can safely accommodate increased shipments of radioactive wastes associated with license renewal. Shipments would result in impacts within the scope of the Table S.4 rule and therefore would result in acceptable impact
Decommissioning	
Radiation doses	1 SMALL COST. Doses to the public are small regardless of which decommissioning method is used. Occupational doses would increase no more than 1 man-rem due to buildup of long-lived radionuclides during the license renewal term.
Waste management	1 SMALL COST. Decommissioning at the end of a 20-year license renewal period would generate no more solid wastes than at the end of the current license term. No increase in the quantities of Class C or greater than Class C wastes would be expected.

Air quality	1 SMALL COST. Air quality impacts of decommissioning are expected to be negligible whether at the end of the current operating term or at the end of the license renewal term.
Water quality	1 SMALL COST. The potential for significant water quality impacts from erosion or spills is no greater if decommissioning occurs after a 20-year license renewal period or after the original 40-year operation period, and measures are readily available to avoid such impacts.
Ecological resources	1 SMALL COST. Decommissioning after either the initial operating period or after a 20 year license renewal period is not expected to have any direct ecological impacts.
Socioeconomic impacts	1 SMALL COST. 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.

FN1 The numerical entries in this column are based on the following category definitions: Category 1: A generic conclusion on the impact has been reached for all affected nuclear power plants. Category 2: A generic conclusion on the impact has been reached for affected nuclear power plants that fall within defined bounds. Category 3: A generic conclusion on the impact was not reached for any affected nuclear power plants.

FN2 The findings in this column apply to Category 1 issues and Category 2 issues if a plant falls within the bounds of the generic analysis. For Part I of this table, the entry in this column indicates the level of need. For Part II of this table, the entry in this column indicates the relative advantages of alternatives to license renewal. For Part III of this table, the entries in this column are benefits or costs, as indicated by the following headings: Small impacts are so minor that they warrant neither detailed investigation or consideration of mitigative actions when such impacts are negative. Moderate impacts are likely to be clearly evident and usually warrant consideration of mitigation alternatives when such impacts are negative. Large impacts involve either a severe penalty or a major benefit and mitigation alternatives are always considered when such impacts are negative.

FN3 The uncertainty associated with the economic cost of license renewal leads to the requirement that an applicant demonstrate for license renewal that no cost advantage exists for replacing the plant's equivalent generating capacity by a new coal-fired power plant. If

no such demonstration can be made, and applicant shall justify choosing the license renewal alternative. The justification will include an assessment comparing the cost of license renewal to the cost of reasonable alternative replacement generating capacity. Costs considered must include refurbishment and construction, fuel, and operation, and maintenance.

***47035** Dated at Rockville, Maryland, this 10th day of September, 1991.

For the Nuclear Regulatory Commission.

Samuel J. Chilk,

Secretary of the Commission.

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