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DRAFT REGULATORY GUIDE

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PREPARATION OF ENVIRONMENTAL REPORTS FOR NUCLEAR POWER PLANT LICENSE RENEWAL APPLICATIONS

A. INTRODUCTION

This guidance document provides general procedures for the preparation of environmental reports (ER), which are submitted as part of an application for the renewal of a nuclear power plant operating license in accordance with Title 10, Part 54, "Requirements for Renewal of Operating Licenses for Nuclear Power Plants," of the *Code of Federal Regulations* (10 CFR Part 54). This regulatory guide amends Supplement 1 to Regulatory Guide 4.2, "Preparation of Supplemental Environmental Reports for Applications to Renew Nuclear Power Plant Operating Licenses," issued September 2000. Use of this regulatory guide will help to ensure the completeness of the information provided in the ER, assist staff of the U.S. Nuclear Regulatory Commission (NRC) and others in locating pertinent information, and facilitate the environmental review process. However, the NRC does not require conformance with the procedures, which are provided for guidance only.

This regulatory guide explains how the NRC's environmental protection regulations for the renewal of nuclear power plant operating licenses are met (see 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions"). Regulations at 10 CFR Part 51 implement Section 102(2) of the National Environmental Policy Act (NEPA). The agency published the license renewal provisions of 10 CFR Part 51 in the *Federal Register* on December 18, 1996 (Volume 61, page 66537 (61 FR 66537)), which became effective on January 17, 1997. The NRC's intention in developing the rule was to improve the efficiency of the environmental review process for the renewal of nuclear power plant operating licenses. These provisions support the analyses conducted for and reported in NUREG-1437, Revision 1, "*Generic Environmental Impact Statement for License Renewal of Nuclear Plants*," issued July 2009 (GEIS).

This regulatory guide is being issued in draft form to involve the public in the early stages of the development of a regulatory position in this area. It has not received final staff review or approval and does not represent an official NRC final staff position.

Public comments are being solicited on this draft guide (including any implementation schedule) and its associated regulatory analysis or value/impact statement. Comments should be accompanied by appropriate supporting data. Written comments may be submitted to the Rulemaking and Directives Branch, Office of Administration, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; e-mailed to nrcrep.resource@nrc.gov; submitted through the NRC's interactive rulemaking Web page at http://www.nrc.gov; or faxed to (301) 492-3446. Copies of comments received may be examined at the NRC's Public Document Room, 11555 Rockville Pike, Rockville, MD. Comments will be most helpful if received by October 14, 2009.

Electronic copies of this draft regulatory guide are available through the NRC's interactive rulemaking Web page (see above); the NRC's public Web site under Draft Regulatory Guides in the Regulatory Guides document collection of the NRC's Electronic Reading Room at http://www.nrc.gov/reading-rm/doc-collections/; and the NRC's Agencywide Documents Access and Management System (ADAMS) at http://www.nrc.gov/reading-rm/adams.html, under Accession No. ML091620409.

The NRC amended the original rule on September 3, 1999 (64 FR 48496), to address the environmental impacts from the transportation of uranium fuel and reactor waste to and from a single nuclear power plant. NUREG-1437, Volume 1, Addendum 1, "*Generic Environmental Impact Statement for License Renewal of Nuclear Plants: Main Report Section 6.3—'Transportation,' Table 9.1, 'Summary of Findings on NEPA Issues for License Renewal of Nuclear Power Plants,' Final Report,"* issued August 1999, provides the analysis supporting the amendment. The amendment also addressed local traffic impacts from the continued operation of a nuclear power plant during the license renewal term. The 1996 GEIS noted this requirement, which was inadvertently omitted from the 1996 rule at the time of its publication. The NRC may amend the rule in the future. Applicants should become familiar with the content of the GEIS as the ER is developed.

The revised GEIS evaluates 78 environmental issues and analyses determined that 58 of these issues are adequately addressed for all applicable nuclear plants. The GEIS identifies these issues as Category 1 issues, and the NRC will not require additional analysis in a plant-specific review unless new and significant plant-specific information requires consideration. Of the remaining 19 issues, 18 are Category 2 issues, which require plant-specific analyses. One issue (the effects of electromagnetic fields) is not categorized, and the NRC staff addresses this issue in plant-specific supplements to the GEIS.

The NRC issues regulatory guides to describe to the public methods that the staff considers acceptable for use in implementing specific parts of the agency's regulations, to explain techniques that the staff uses in evaluating specific problems or postulated accidents, and to provide guidance to applicants. Regulatory guides are not substitutes for regulations and compliance with them is not required.

This regulatory guide contains information collection requirements covered by 10 CFR Part 51 that the Office of Management and Budget (OMB) approved under OMB control number 3150-0021. The NRC may neither conduct nor sponsor, and a person is not required to respond to, an information collection request or requirement unless the requesting document displays a currently valid OMB control number.

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Environmental Review Process

After receiving an applicant's ER, the NRC staff performs an acceptance review to determine whether the information in the ER is sufficiently complete to begin the NEPA review process. After reviewing the information and analyses in the ER, the NRC staff prepares a supplemental environmental impact statement (SEIS). NUREG-1555, Supplement 1, Revision 1, "Standard Review Plans for Environmental Reviews for Nuclear Power Plants: Operating License Renewal," issued July 2009, guides the NRC staff's environmental review and preparation of the SEIS. In the SEIS, the NRC analyzes the environmental impacts of the proposed action (the renewal of the operating license of a nuclear power plant) and the alternatives to renewing the operating license. The SEIS presents the staff's recommendations regarding the renewal of the operating license of a nuclear power plant. The NRC's record of decision (ROD) considers these recommendations, along with the findings from the safety review (10 CFR Part 54).

The NRC's NEPA review process consists of the following actions required by 10 CFR Part 51:

- Publish a notice of intent to prepare an SEIS in the *Federal Register* (see 10 CFR 51.27, "Notice of Intent," and 10 CFR 51.95(c)) and send copies of the notice to appropriate Federal, State, and local agencies; affected American Indian tribes; State, regional, and metropolitan clearinghouses; and any interested persons upon request. The notice should explain the scoping process, state the locations of copies of the ER available for public inspection, and invite public participation in the scoping process.

- Conduct scoping (see 10 CFR 51.28, "Scoping—Participants," and 10 CFR 51.29, "Scoping—Environmental Impact Statement and Supplement to Environmental Impact Statement"). The scoping process includes identifying and inviting appropriate agencies, groups, and persons to participate in the process. With respect to license renewal, scoping focuses on allowing other parties to raise environmental issues that they believe are significant and yet are not addressed or not adequately addressed in the ER. Parties may raise issues at the public scoping meeting, which the NRC staff routinely holds in the vicinity of the plant, and in written comments. The scoping process also routinely includes a staff site visit to the plant and communication with local, regional, and State officials and representatives of interested or knowledgeable organizations. As a result of scoping, the staff may request additional information from the applicant.

- Prepare a draft SEIS (see 10 CFR 51.70, "Draft Environmental Impact Statement—General," and 10 CFR 51.95(c)). In developing the draft SEIS, the NRC staff will independently evaluate the information provided by the applicant and others, as well as information identified by the staff.

- Distribute the draft SEIS for comment (see 10 CFR 51.73, "Request for Comments on Draft Environmental Impact Statement"). The NRC will publish a notice of the availability of the SEIS in the *Federal Register* and will distribute copies of the draft SEIS to the U.S Environmental Protection Agency (EPA); other appropriate Federal agencies; affected American Indian tribes; appropriate State, regional, and local agencies; organizations and individuals who have expressed interest in the review; and any other parties requesting a copy.

- Prepare a final SEIS (see 10 CFR 51.95(c)). In developing the final SEIS, the NRC staff will consider comments received on the draft, prepare responses, and modify the SEIS as warranted. The staff will determine whether such comments identify new and significant

information that was neither considered in the GEIS nor addressed in the applicant's ER. After considering the environmental impacts associated with license renewal and with the alternatives to license renewal, the staff will determine whether or not the adverse environmental impacts of license renewal are so great that preserving the option of license renewal for energy planning decision makers would be unreasonable. The NRC will publish a notice of the availability of the final SEIS in the *Federal Register*.

- Hold a hearing on the license renewal application if the Commission or the designated licensing board determines that it is in the public interest or if a request for hearing and petition to intervene are granted. In accordance with 10 CFR 2.105(a)(10), the agency will issue a notice of opportunity for hearing as soon as practicable after the application has been docketed. Any person whose interest may be affected by the action may request a hearing. (See also 10 CFR 51.104, "NRC Proceeding Using Public Hearings; Consideration of Environmental Impact Statement.")

- Provide a ROD (see 10 CFR 51.103, "Record of Decision—General"). The ROD will discuss the alternatives considered in the SEIS, the measures taken to minimize environmental harm, and any license conditions adopted in connection with mitigation measures. In making a final decision on license renewal, the NRC will determine whether or not the adverse environmental impacts of license renewal are so great that preserving the option of license renewal for energy planning decision makers would be unreasonable. The NRC publishes the Commission's final decision on the application in the *Federal Register*.

General Guidance to Applicants

Use of Regulatory Guides

The NRC issues regulatory guides to describe to the public methods acceptable to the staff for implementing specific parts of the agency's regulations, to explain techniques used by the staff to evaluate specific problems, and to provide guidance to applicants. Regulatory guides are not substitutes for regulations, and compliance with them is not required.

Environmental Reports—General Guidance

An ER should contain sufficient information to support analyses and findings. While other documents (e.g., the original ER or safety analysis report may be referenced, the ER should summarize information used in the analyses. In preparing the ER, the applicant should be guided by the general requirements set out in 10 CFR 51.45, "Environmental Report," and 10 CFR 51.55, "Environmental Report—Standard Design Certification," in addition to the provisions of 10 CFR 51.53(c) specific to operating license renewal.

Treatment of Category 1 Issues

According to 10 CFR 51.53(c)(3)(i), "The environmental report for the operating license renewal stage is not required to contain analyses of the environmental impacts of the license renewal issues identified as Category 1 issues in Appendix B to Subpart A of this part." The ER should, however, describe the environmental resources pertinent to those Category 1 issues that apply to the plant and identify the Category 1 issues that do not apply to the plant. The ER incorporates by reference the findings in the GEIS for applicable Category 1 issues.

New and Significant Information

According to 10 CFR 51.53(c)(3)(iv), "The environmental report must contain any new and significant information regarding the environmental impacts of license renewal of which the applicant is aware." New and significant information is (1) information that identifies a significant environmental issue that was not considered in the GEIS and, consequently, not codified in Appendix B, "Environmental Effect of Renewing the Operating License of a Nuclear Power Plant," to Subpart A, "National Environmental Policy Act—Regulations Implementing Section 102(2)," of 10 CFR Part 51, or (2) information not considered in the analyses summarized in the GEIS leading to an impact finding different from that codified in 10 CFR Part 51. An applicant should state in the ER whether it is aware of any new and significant information and highlight any actions taken to identify new information and evaluate its significance. This information will assist the staff in fulfilling its responsibilities under 10 CFR 51.70(b), which in part states, "The NRC staff will independently evaluate and be responsible for the reliability of all information used in the draft environmental impact statement." Other parties, as well as the NRC, may also identify new and significant information in the scoping and public comment process. Chapter 5 of this regulatory guide provides guidance on actions that an applicant may take to identify and evaluate the significance of new information.

Impact Findings

The applicant should discuss the impacts of the environmental issues that require analyses in proportion to their significance. In assessing the significance of environmental impacts, the applicant should conform to the following general definitions of significance level used in the GEIS and codified in Appendix B to Subpart A of 10 CFR Part 51:

- SMALL—For the issue, environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource. For the purposes of assessing radiological impacts, the Commission considers impacts that do not exceed permissible levels in the Commission's regulations to be small.

- MODERATE—For the issue, environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource.

- LARGE—For the issue, environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

Mitigation of Adverse Effects

When adverse environmental effects are identified, 10 CFR 51.45(c) requires consideration of alternatives available for reducing or avoiding adverse effects. The applicant should identify any ongoing mitigation and should discuss the potential for additional mitigation. Applicants should consider mitigation alternatives in proportion to the significance of the impact. The Council on Environmental Quality (CEQ) in its regulations at 40 CFR 1508.20, "Mitigation," identifies five types of mitigative actions:

1. avoiding the impact altogether by not taking a certain action or parts of an action

2. minimizing impacts by limiting the degree or magnitude of the action and its implementation

3. rectifying the impact by repairing, rehabilitating, or restoring the affected environment

4. reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action

5. compensating for the impact by replacing or providing substitute resources or environments

The NRC uses these categories of mitigative actions in accordance with 10 CFR 51.14(b).

The applicant should identify all relevant, reasonable mitigation measures that could reduce or avoid adverse effects, even if they are outside the jurisdiction of the NRC.

Cumulative, Direct, and Indirect Impacts

Environmental impacts, or effects, include direct effects, indirect effects, and cumulative effects. The assessment of environmental issues should consider each type of effect, which should be discussed in proportion to the significance of the impact attributed to license renewal. (See Impact Findings above.) The CEQ regulations at 40 CFR Part 1508, "Terminology and Index," define the three types of effects. In particular, 40 CFR 1508.7, "Cumulative Impact," provides the following definition:

> *Cumulative impact* is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

In addition 40 CFR 1508.8 defines direct and indirect effects as follows:

> "Effects" include:
> (a) Direct effects, which are caused by the action and occur at the same time and place.
> (b) Indirect effects, which are caused by the action and are later in time or further removed in distance, but are still reasonably foreseeable.

The NRC uses these definitions in accordance with 10 CFR 51.14(b).

B. STANDARD FORM AND CONTENT OF ENVIRONMENTAL REPORTS

Chapter 1 Purpose of and Need for Action

This chapter of the ER should briefly describe the purpose of and need for the proposed action. The applicant's ER should include the following statement:

> The purpose and need for the proposed action (i.e., renewal of a commercial nuclear power plant operating license) is to provide the option to continue plant operations beyond the current operating license term.
>
> The purpose and need for the proposed action have no role in the energy planning decisions of State regulators and utility officials as to whether a particular nuclear power plant should continue to operate. From the perspective of the licensee and the State regulatory authority, the purpose of renewing an operating license is to maintain the availability of the nuclear plant to meet system energy requirements beyond the term of the plant's current license.

Chapter 2 Proposed Action and Description of Alternatives

This chapter of the ER should briefly describe the proposed action, general plant description, and alternatives to the proposed action. The applicant should also provide a description of any proposed refurbishment activities, programs and activities for managing the effects of aging, and employment estimates during the license renewal term.

2.1 The Proposed Action

The proposed action is renewal of the operating license and continued operation of the plant during the renewal term, including all associated activities. In addition to continuing operation and maintenance activities, associated activities may include refurbishment to allow for extended plant operation and changes to surveillance, as well as online monitoring, inspections, testing, trending, and recordkeeping (SMITTR). The applicant may undertake refurbishment and SMITTR activities as a result of the 10 CFR Part 54 aging management review or for other reasons, such as opportunities for improved economic operation and maintenance during the term of the renewed license. This chapter of the ER should identify those activities associated with license renewal that can affect the environment. The level of detail provided should be sufficient to support the analyses called for in Chapter 4 of this regulatory guide. For reference, Chapter 2 of the GEIS discusses possible activities associated with license renewal.

> As described in 10 CFR 51.53(c)(2), the ER must contain the following:
>
> [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 of this chapter. This report must describe in detail the affected environment around the plant, the modifications directly affecting the environment or any plant effluents, and any planned refurbishment activities. In addition, the applicant shall discuss in this report the environmental impacts of alternatives and any other matters discussed in § 51.45.

2.2 General Plant Information

The ER should briefly describe the major features of the nuclear plant and the operation and maintenance practices directly related to plant operations under license renewal. Information presented in this section should describe the following:

Reactor and Containment Systems

The ER should briefly describe the plant, including the reactor, reactor core power, fuel, percent uranium-235 enrichment, irradiation level, refueling cycle, containment system, design net electrical output, and the vendor of the nuclear steam supply system.

Cooling and Auxiliary Water Systems

The ER should describe the cooling and auxiliary water systems in the order that water flows through them, including approach, intake structure, trash racks, screens (including mesh sizes), screen wash, and fish return or collection systems and provide appropriate figures or maps to illustrate the system pathway. This description should include the rates of water withdrawal, the flow rates or volume of the water body from which cooling water is withdrawn, the location of water withdrawal, and intake velocity at the screens. The ER should also describe in detail any structural or operational measures, such as the schedule of traveling screen operation or planned outages, used to reduce impingement of fish and shellfish. This description should include a typical water balance or budget showing rates of water withdrawal, losses to evaporative cooling (for cooling towers), blowdown, effluent, and the like. The ER should also describe typical temperature changes as water passes through the system, as well as temperatures at the outfall, the size of the plume and mixing zone, and National Pollutant Discharge Elimination System (NPDES) or other permit conditions on temperature. The ER should include copies of such permits and supporting documentation in an appendix. This section should also describe chemical additions or other measures used to clean or maintain condensers and other components. The surface water and impingement and entrainment sections of the ER should refer to this section when appropriate to avoid unnecessary duplication of effort.

Radioactive Waste Management

Each nuclear power plant has a radioactive waste system to collect, treat, and dispose of the radioactive and potentially radioactive wastes that are byproducts of plant operations. Radioactive wastes are classified as liquid, gaseous, or solid.

To assist the NRC staff in its review, the ER should provide a brief plant-specific description of the major features of the liquid, gaseous, and solid radioactive waste management system. The information should include, at a minimum, a physical description of the systems and the types of treatment used (i.e., filtration, demineralizers, dewatering, and resin filtration for liquid wastes), a discussion concerning the use of an offsite waste processor, and details about the transportation and disposal of the waste and/or onsite storage facilities.

Nonradioactive Waste Management

Each nuclear power plant has a nonradioactive waste system to collect, treat, and dispose of the nonradioactive wastes that are byproducts of plant operations. The EPA, in accordance with the Resource

Conservation and Recovery Act, classifies certain nonradioactive wastes as hazardous, based on characteristics including ignitability, corrosivity, reactivity, or toxicity. State regulators may add wastes to the EPA list of hazardous wastes.

To assist the staff in its review, the ER should provide a brief plant-specific description of the major features of the nonradioactive waste storage and disposal management program. The information should include, at a minimum, details about the generation process, the types of waste, and the handling, storage, and disposal of the waste. The ER should also provide information on State permits or any special permits issued to the facility for generation, handling, storage, and disposal of nonradiological waste. This section should discuss any pollution prevention and waste minimization programs being used at the facility.

Maintenance, Inspection, and Refueling Activities

The ER should provide information regarding any maintenance, inspection, or refueling activities.

Power Transmission Systems

In the ER, the applicant should list and describe the in-scope transmission lines, including the length of the transmission lines or portions of lines; width of right-of-ways (ROWs); ROW maintenance plans, procedures, or protocols; and pesticides and herbicides used in ROWs, including information on how and when they are released. The ER should also describe the protocol for applying chemicals near streams and wetlands and any procedures in place to protect cultural resources. In addition, the ER should provide a map of all in-scope transmission lines and ROWs.

2.3 Refurbishment Activities

This section should describe facility refurbishments performed in support of license renewal. These descriptions should identify the major structures and components that will be replaced or modified. The section should identify where materials will be stored between their arrival on the site and installation in the plant, as well as between their removal from the plant and ultimate disposal. If refurbishment activities that directly or indirectly affect the environment will be required, the ER should describe the locations and nature of such activities. The ER should also describe any activities required to transport and/or deliver equipment, structures, or components (e.g., steam generators, vessel heads) related to refurbishment, such as dredging or bridge and road modifications. The ER should list applicable permits from Federal and State agencies. This section should identify the schedule for the refurbishment work and describe how it will be integrated with refueling and other maintenance activities. Applicants should ensure that the information in this section meets the information requirements of Chapter 4 of this regulatory guide.

2.4 Programs and Activities for Managing the Effects of Aging

This section should characterize any changes planned in the plant's operating practices, inspections, maintenance activities, systems, and administrative control procedures during the renewal term designed to manage the effects of aging. The ER should identify and discuss in detail any specific changes that may lead to environmental impacts.

2.5 Employment

The ER should provide the most current estimates of total permanent full-time onsite employment and refueling outage employment (i.e., the total number of full-time applicant and contractor employees). The ER should also provide information on the average duration of refueling outages (number of weeks) and their frequency (number of months).

The ER should provide projections of the incremental increase in onsite work force required for refurbishment activities associated with license renewal. The applicant should present the employment figures for refurbishment and refueling outages by the amount of time (days or months) and peak employment. This section should also include projections of any changes anticipated in the permanent work force during the license renewal term and identify modifications in the work force arising from changes in SMITTR activities. For refurbishment and for the renewal term, the applicant should estimate the number of temporary and permanent incremental workers migrating to the site and their dependents, including school-age children, and their anticipated residential distribution.

The applicant should estimate the indirect employment resulting from changes in the full-time and temporary work forces. This section should identify any employment multipliers that the applicant used and their source, with any additional information needed to verify the appropriateness of the multipliers. Using an estimate of average household size for the region, the applicant should estimate the change in total population associated with license renewal.

The applicant should also estimate the residential distribution of the total (direct and indirect) incremental permanent and temporary populations by county, city, or town. Absent better information, the applicant may assume that the residential pattern will be the same as that of the current permanent work force.

2.6 Alternatives to the Proposed Action

In deciding whether to approve the renewal of a license, the NRC will consider the environmental impacts of alternatives as well as those of the proposed action. The NRC considers environmental effects of license renewal according to 10 CFR 51.103(a)(5), which states the following:

> In making a final decision on a license renewal action pursuant to Part 54 of this chapter, the Commission shall determine whether or not the adverse environmental impacts of license renewal are so great that preserving the option of license renewal for energy planning decision makers would be unreasonable.

This section should briefly describe the process the applicant used to identify and select alternatives to the proposed action, which are evaluated in greater detail in Section 7.1 of this regulatory guide. Applicants should describe all of the alternatives considered and indicate which alternatives it evaluated in detail in Section 7.1.

While all applications should describe alternatives to license renewal, some applications will include a brief synopsis of any alternatives considered that would reduce or avoid adverse effects, as described in Section 7.2 of this regulatory guide.

Regarding alternatives, 10 CFR 51.45(b)(3) states, in part, the following:

> The discussion of alternatives shall be sufficiently complete to aid the Commission in developing and exploring, pursuant to section 102(2)(E) of NEPA, "appropriate

alternatives to the recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." To the extent practicable, the environmental impacts of the proposal and the alternatives should be presented in comparative form.

In addition, 10 CFR 51.53(c)(2) states the following:

[T]he applicant shall discuss in this report the environmental impacts of alternatives and any other matters described in § 51.45. The report is not required to include discussion of need for power or economic costs and economic benefits of the proposed action or of alternatives to the proposed action except insofar as such costs and benefits are either essential for a determination regarding the inclusion of an alternative in the range of alternatives considered or relevant to mitigation. The environmental report need not discuss other issues not related to the environmental effects of the proposed action and the alternatives.

Furthermore, 10 CFR 51.53(c)(3)(iii) states the following:

The report must contain a consideration of alternatives for reducing adverse impacts, as required by § 51.45(c), for all Category 2 license renewal issues in Appendix B to subpart A of this part. No such consideration is required for Category 1 issues in Appendix B to subpart A of this part.

Section 5 of Appendix A, "Format for Presentation of Material in Environmental Impact Statements," to Subpart A of 10 CFR Part 51 includes requirements for the treatment of alternatives in an environmental impact statement. These requirements are consistent with the CEQ regulations implementing NEPA (40 CFR 1502.14, "Alternatives Including the Proposed Action").

Chapter 3 Affected Environment

This chapter identifies information necessary for the NRC staff reviewers to describe the plant's environmental setting. This chapter of the ER should include the following information about the affected environment to assist the staff in its review of potential environmental impacts during the license renewal period:

- Describe the plant site location including State, county, latitude and longitude, and Universal Transverse Mercator coordinates, township, range, and sections.

- Include a map of the site showing site boundaries; exclusion area; site structures and facilities; major land uses (with land use classification consistent with the U.S. Geological Survey (USGS) categories); the construction zone for refurbishment, if any; sites for any other planned buildings and structures (both temporary and permanent); and transportation routes adjacent to the site.

- Provide maps of the site vicinity within a 6-mile (10-kilometer) radius and of the region within a 50-mile (80-kilometer) radius of the site showing county and local municipality boundaries, place names, residential areas, airports, industrial and commercial facilities, roads and highways, railroads, American Indian and/or Bureau of Indian Affairs lands held in trust for American Indians, and Indian tribes' lands, and military reservations.

- Identify and describe known and reasonably foreseeable Federal and non-Federal projects and other actions in the vicinity of the site that may contribute to the cumulative environmental impacts of license renewal and extended plant operation. List all Federal facilities, including national parks, national forests, national wildlife areas, American Indian and/or Bureau of Indian Affairs lands held in trust for American Indians, and Indian tribes' lands and distances within 50 miles (80 kilometers) of the plant site.

3.1 Land Use and Visual Resources

Land Use

The ER should provide information, including area and percentage by land use category, about the undeveloped portions of land within the plant site boundary and/or property. Onsite land use can be divided into four basic categories comprising (1) the amount of developable unused open portions of the site including fields and forest uplands, (2) the amount of nondevelopable wetlands and open water bodies (i.e., streams, ponds, and river), (3) the amount of developed portions of the plant site, including facilities, structures, parking areas, and visitor and recreation areas, and (4) the amount of onsite land that has been disturbed at some time during the construction and operation of the plant. The ER should also provide a map of the site vicinity within a 6-mile (10-kilometer) radius of the plant showing major land uses (with land use classifications consistent with the USGS categories). The ER should include information on local county comprehensive land use and development plans concerning land use and zoning that are relevant to population and housing growth and control and changes in land use patterns.

Visual Resources

The ER should describe the nuclear plant's visual setting in the environment, including the identity and height of the tallest visible structures and direction and distances from which these plant structures are visible. The ER should also describe the visual impacts (if they occur) of transmission lines connecting to the nearest substation grid.

3.2 Air Quality

The 1990 amendments to the Clean Air Act (Title 42 U.S.C. 7401, et seq.) include a provision that no Federal agency may support any activity that does not conform to a State Implementation Plan (SIP) designed to achieve the National Ambient Air Quality Standards (NAAQS).[1] On November 30, 1993, the EPA issued a final rule, effective January 31, 1994,[2] implementing the new statutory requirements for this provision (58 FR 63214). The EPA is currently revising the final rule, which is scheduled to be published in December 2008. The final rule requires that Federal agencies prepare a written conformity analysis and determination for proposed actions in NAAQS nonattainment or

[1] Section 176(c) of the Clean Air Act defines conformity as conformity to the purpose of the SIP to eliminate or reduce the severity and number of violations of the NAAQS and achieve expeditious attainment of such standards, and that such activities will not (1) cause or contribute to any new violation of any standard in any area, (2) increase the frequency or severity of any existing violation of any standard in any area, or (3) delay timely attainment of any standard or any required interim emission reductions or other milestones in any area.

[2] Subpart W, "Determining Conformity of General Federal Action to State and Federal Implementation Plans," in 40 CFR Part 51, "Requirements for Preparation, Adoption, and Submittal of Implementation Plans," includes the regulatory requirements.

maintenance areas for which the total of the action's direct and indirect emissions of criteria pollutants and their precursors would exceed the threshold emission levels of 40 CFR 51.853(b).[3,4,5]

The ER should provide information, including a description of local and regional air quality, based on published climatological summaries from nearby representative sites with long periods of records, including list of nonattainment and/or maintenance areas. The ER should also describe the onsite meteorological monitoring program and meteorological data monitoring system, the onsite stationary emission sources and applicable permits, and the assessment of cooling tower particulate emissions (if applicable). Additionally, the ER should include a map of the region within a 50-mile (80-kilometer) radius of the site of nonattainment and maintenance areas defined under the Clean Air Act, as amended, and a list of mandatory Class I Federal areas within the same radius.

3.3 Noise

The ER should provide information about current or past noise studies and analyses conducted at or near the nuclear plant site. In particular, the ER should identify the loudest noise-generating facilities and activities and indicate their distance to the nearest site boundary.

3.4 Geology and Soils

Geology

The ER should describe, in general, the site geologic setting, including brief definitions of the rock types present, formation names, thicknesses, and general engineering properties. The ER should briefly discuss seismicity, including the seismic history of the site, and identify the safe-shutdown earthquake, along with the largest historic regional earthquake.

Soils

The ER should describe, in general, the soils at the plant site, including unconsolidated material which may be naturally occurring or consist of fill. Using engineering terminology, soils are also referred to as overburden (i.e., the unconsolidated material overlying bedrock). The ER should describe the soils, along with their relationship to the site geology (e.g., identify whether fill material was brought in from

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[3] Criteria pollutant or standard means any pollutant for which there is established a NAAQS at 40 CFR Part 50, "National Primary and Secondary Ambient Air Quality Standards." In addition, 40 CFR 51.852, "Definitions," describes the precursors of a criteria pollutant.

[4] An area is designated "nonattainment" for a criteria pollutant if it does not meet the NAAQS for the pollutant. A maintenance area has been redesignated by a State from nonattainment to attainment; the State must submit to EPA a plan for maintaining NAAQS as a revision to its SIP.

Direct emissions are those emissions caused by or initiated by the Federal action that occur at the same time and place as the action. Indirect emissions are those caused by the Federal action that occur later in time or are located away from the action itself. Only those direct and indirect emissions that are reasonably foreseeable and that the Federal agency can practicably control need be considered. It must also be possible to locate and quantify direct and indirect emissions at the time a conformity determination is made. The Federal agency is not obligated to account for possible emissions that might result from the Federal action but cannot be specifically identified, quantified, or located.

[5] Note that the final rule issued by EPA implementing the new statutory requirements for this provision (58 FR 63214) only requires that Federal agencies prepare a written conformity analysis and determination for proposed actions in NAAQS nonattainment or maintenance areas. However, proposed actions near nonattainment or maintenance areas may also cause or contribute to nonattainment. Therefore, 10 CFR 51.53(c)(3)(ii)(F) states that the ER should address this issue for facilities located either in or near a nonattainment or maintenance area, and EPA has indicated that in the future it may revise the rule similarly. This approach reflects the reality that emissions continue beyond geographical boundaries and is consistent with environmental impact assessments prepared in accordance with NEPA.

off site or if onsite excavation material was used). The ER should identify the erosion potential of site soils and describe best management practices to control erosion and runoff associated with continued plant operations and refurbishment activities. This section should also identify prime farmland soils on or in the vicinity of the plant site.

3.5 Hydrology

Surface Water

The ER should describe the surface water resources at or near the site, as well as the river and stream flow, lake and reservoir volume, water level measurements, intake and discharge (outfall) specifications and operating parameters, and onsite ponds or other impoundment descriptions. The ER should also include local, State, and Federal permit information for enforcement of water use, NPDES-regulated discharges, and storm water runoff controls. The discussion of surface water resources should include surface water quality and both ambient conditions and monitoring results from site studies.

Groundwater

The ER should describe the site's groundwater hydrology and identify the hydrostratigraphic units underlying the site. This discussion should link the previously described site geology with groundwater conditions. The ER should identify the number and location of onsite water supply wells and monitoring wells on an accompanying map. The ER should also describe a dewatering system, if appropriate, and include it on a site map, if practicable.

3.6 Ecology

This section identifies information necessary for an NRC staff reviewer to describe the ecological resources potentially affected by current and future nuclear plant operations. Ecological resources include members and attributes of aquatic, terrestrial, riparian, and wetland plant and animal communities. Wetlands and riparian habitats are the interface between aquatic and terrestrial habitats and as defined by EPA in 1993 as follows:

> [Wetlands are] those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.
>
> [Riparian areas are] vegetated ecosystems along a water body through which energy, materials, and water pass. Riparian areas characteristically have a high water table and are subject to periodic flooding and influence from the adjacent water body. These systems encompass wetlands, uplands, or some combination of these two land forms; they do not in all cases have all of the characteristics necessary for them to be classified as wetlands.

The NRC generally includes wetland and riparian habitats with terrestrial ecology.

The following information on ecological resources should be included in this section of the ER:

Region

The ER should describe the ecoregion, ecosystems, and habitats surrounding the site; the geomorphic, or physiographic, province; characteristic vegetation and animal species, including climax vegetation and typical succession in the area of the site; the ecological province of the ocean if the plant is located near an ocean or estuary; and the watershed and names and locations of source and receiving water bodies for the plant's cooling system.

Site and Vicinity

The ER should describe the local environment of the site, including soil types; water and sediment quality; vegetation and animal communities; physiographic habitats such as upland forest, swamps, marshes, wetlands, rivers, streams, and the like; and significant water bodies that intersect or parallel transmission lines. The ER should also include topographic maps and descriptions, as appropriate.

Potentially Affected Water Bodies

The ER should describe the location of the site, in river miles, if appropriate, with respect to the principal nearby water bodies that it affects. The ER should also describe the source and receiving water bodies in terms of their relationship to the watershed; size; shoreline; bathymetry; tidal and net flows, including seasonal or occasional variations; substrata; and sediment and water quality. This section should include the location of the main channel, dams, and flood control and describe uses of the water body other than as cooling water.

History

The ER should provide a short description of the ecological environment before European settlement and the transition of the environment on the site from before plant construction to the present. This description should include major changes or modifications to the land and/or water bodies over the projected life of the plant. Typically, the ER should describe channelization, navigation, pollution, habitat degradation or fragmentation, urbanization, development, and pond or reservoir creation. This description should also include pollution control or other programs designed for environmental improvement. The ER should briefly describe major wildlife living around site in the past and which species remain today. If appropriate, the ER should refer to cultural resources when possible to avoid repeating information.

Places and Entities of Special Interest

The ER should provide the occurrence, location, and description of communities and habitats of special interest in the vicinity of plant, such as wetlands, natural heritage areas and other areas of public or scientific interest, or other areas that may be particularly sensitive or susceptible either directly or indirectly to the effects of continued plant operations and refurbishment.

Aquatic Communities

The ER should briefly describe the aquatic communities based on available information (e.g., present and past studies, Federal and State sources). This description should focus on a subset of representative and important species, such as those with the following characteristics—potential or reported susceptibility to impingement and entrainment; dominance, commonness, or rarity in numbers or biomass; importance to the structure and function of the ecosystem, such as keystone species, important

trophic links, potential for trophic cascade, or habitat formers or modifiers; indicators of water quality or "ecosystem health"; important recreational or commercial fishing and shell fishing; fish consumption advisories; and ecosystem services.

Terrestrial Communities

The ER should describe the terrestrial communities briefly using available information (e.g., present and past studies, Federal and State sources) and include representative species of plants, mammals, birds, reptiles, amphibians, and insects. This description should note any endemic species, sensitive or indicator species, or keystone species. The ER should also describe bird species that nest within the area, migratory species, known migratory bird rookeries, and, if applicable, the location of the site in relation to any nearby flyways. Additionally, the ER should describe the types of vegetative communities found on and in the vicinity of the site, especially any delineated wetlands or potential wetland habitat. This section should summarize any available botanical surveys conducted on or in the vicinity of the site.

Invasive Species

The ER should provide occurrences of invasive species in the vicinity of the plant and document any management activities undertaken by the plant to control such species.

Procedures and Protocols

The ER should describe wildlife management plans and best management practices (if applicable), including pesticides and herbicides used and ground-disturbing activities performed routinely to maintain the site. The ER should include such plans and practices.

Maps

The ER should include a topographic map containing site and in-scope transmission line right of ways (ROWs); stream crossings; rivers; other bodies of water; wetlands; designated Federal, State, and local parks and natural areas; significant natural heritage areas; and known locations or historic sightings of migratory bird rookeries and other significant information.

Studies and Monitoring

The ER should briefly summarize any studies or monitoring programs on or in the vicinity of the site and include the location, dates, objective, methods, and results applicable to this license renewal application. The ER should also identify any data or data summaries that might be available for NRC review.

Threatened, Endangered, and Protected Species and Essential Fish Habitat

This chapter of the ER should include information on federally or State-listed threatened and endangered species and essential fish habitat (EFH), as well as any species that are protected under other legislations, including the Marine Mammal Protection Act, the Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act, as outlined below:

- Endangered Species Act. The Endangered Species Act of 1973, as amended (16 USC 1531 et seq.) was enacted to protect threatened and endangered species and the ecosystems on which they depend. In accordance with Section 7 of the Endangered Species Act, Federal agencies must

review actions they undertake or support (such as issuing permits and licenses) to determine whether they may jeopardize the continued existence of any endangered species or their habitats. If such review reveals the potential to adversely affect listed or candidate species, the Federal agency must consult with the U.S. Fish and Wildlife Service or the National Marine Fisheries Service (NMFS) (collectively, the Services), as appropriate. The Services implement the interagency cooperation provisions of Section 7 at 50 CFR Part 402, "Interagency Cooperation—Endangered Species Act of 1973, As Amended."[6]

The applicant should determine if federally listed threatened, endangered, or candidate species, critical habitat, and/or State-listed species and habitat have the potential to occur on the site or in the vicinity of the site, including the area within the applicant's in-scope transmission line ROWs. For such species, the ER should provide sufficient information on historical occurrences, population size and trends, critical habitat, and potential habitat to aid the NRC in its biological assessment. The ER should discuss any license renewal activities and modifications to plant operation that may affect such species and habitats.

- Essential Fish Habitat. The 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1801 et seq.) set forth, among other things, a new mandate for Federal action agencies to identify and protect important marine and anadromous fish habitat. Under the Act, the Fishery Councils, assisted by NMFS, must delineate EFH in fishery management plans (FMPs) or FMP amendments for all managed species. The Act defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity," and the Act's EFH provisions seek to maintain sustainable fisheries by protecting habitat required by the fish. The regulations also direct the Councils to consider a second, more limited habitat designation within EFH for each species, known as the habitat area of particular concern, which indicate habitats that are rare, particularly susceptible to human-induced degradation, especially ecologically important, or located in an environmentally stressed area.

  Federal action agencies such as the NRC that fund, permit, or carry out activities that may adversely affect EFH are required to consult with NMFS regarding the potential adverse effects of their actions on EFH, where an adverse effect is defined as "any impact which reduces quality and/or quantity of EFH...[and] may include direct (e.g. contamination or physical disruption), indirect (e.g., loss of prey, reduction in species' fecundity), site-specific or habitat wide impacts, including individual, cumulative, or synergistic consequences of actions." If a project may have an adverse effect on EFH, NMFS is required to develop EFH conservation recommendations for the project.

  If license renewal has the potential to affect any EFH, the NRC will prepare an EFH assessment that will describe how any such habitat might be affected, as part of the environmental review process. The ER should include sufficient information to aid the NRC in its EFH assessment. For such species, the ER should provide information similar to that provided for protected species, which should include historical occurrences, population size and trends, important trophic links, identified EFH habitat, and potential or reported susceptibility to impingement and entrainment. The ER should discuss any license renewal activities and modifications to plant operation that may affect such species and habitats.

[6] An explanation of the structure and implementation of the Endangered Species Act is found in Ray Vaughan, *Endangered Species Act Handbook*, Government Institutes, Inc., Rockville, Maryland, 1994.

- Other Acts. Several federal laws, including the Marine Mammal Protection Act, the Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act, also mandate the protection of certain species. Protected species that have the potential to occur on or in the vicinity of the site or associated transmission line ROWs should be discussed in the ER.

3.7 Historic and Cultural Resources

The applicant should use Section 106 of the National Historic Preservation Act of 1966 (NHPA) as a guide for providing historic and cultural resource information about the nuclear plant site. The ER should include information detailed below to assist the staff in its review of the potential impacts to historic and cultural resources during the license renewal period.

The ER should identify any activities associated with continued operations and refurbishment activities that could affect onsite or offsite historic properties.[7] Such activities include ground-disturbing activity, increases in traffic, and audio and visual intrusions. The ER should identify the area of potential effect on a site map.

Historic and Cultural Information

The ER should summarize the land use history for the plant site and surrounding area in order to identify historic and cultural resources on the plant site, including a Plat map or other similar historical maps. Plat and other historic maps show ownership, acreage, property boundaries, and the location of existing or former historic structures. The ER should provide photos of the plant site before construction, preconstruction (showing land clearing), construction, and post-construction of the current facility. The ER should also summarize the cultural history of the area (including the plant site), from the beginning of human settlement to the 20th century.

The ER should identify historic and cultural resources that are present on the site (especially within the area of potential affect). The ER should summarize previous investigations and the types of resources that have been located within the area of potential affect. The ER should also indicate any activities that have taken place on the site to determine the historic and cultural resources present. In addition, this section should indicate whether a records review for historic structures and cultural resources was conducted.

If the plant site has not been surveyed for historic and cultural resources, then the applicant should conduct reconnaissance or pedestrian surveys. The applicant should initiate informal consultation and conduct investigations to assist in identifying onsite historic and cultural resources with a contractor approved by the State Historic Preservation Officer (SHPO) who meets the Secretary of Interior's standards. In consultation with the SHPO and appropriate American Indian tribes, the applicant should evaluate the significance of the historic and cultural resources and assess any effects the plant may have on them. Additionally, the applicant should identify, evaluate, and describe protection measures for historic and cultural resources through consultation with SHPO. The ER should include a summary of this information, as well as copies of correspondence with the SHPO, tribes, or members of the public the applicant used to assess historic and cultural resources within the area of potential effect.

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[7] As defined in 36 CFR 800.16(l)(1), "Historic property means any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register. This term includes, for the purposes of these regulations, artifacts, records, and remains that are related to and located within such properties. The term 'eligible for inclusion in the National Register' includes both properties formally determined as such by the Secretary of the Interior and all other properties that meet National Register listing criteria." National Register criteria for listing are found in 36 CFR Part 60, "National Register of Historic Places."

Procedures/Integrated Cultural Resources Management Plans

If significant resources are located within the area of potential affect, the applicant should establish procedures or implement an integrated cultural resources management plan to protect the historic and cultural resources identified on the site.

3.8 Socioeconomics

The ER should include the following information to assist the staff in its review of the potential socioeconomic impacts during the license renewal period:

- Based on information provided in Section 2.5 provide current employee residential distribution information in a table showing the number of applicant employees by county and community. Also identify where outage employees stay during refueling and maintenance outages. Identify the likely commuter routes for the workers and traffic conditions on those roads.

- Describe public and private recreational facilities and tourist attractions located in the vicinity of the nuclear plant, including present and projected percentage of utilization.

- Discuss and provide a table showing the distribution of property tax payments and other forms of agreed-to payments, including payments-in-lieu-of-taxes to local jurisdictions (e.g., county, municipality, townships, villages, and school districts) for the past 5 years and the associated total revenues or property tax revenue for each jurisdiction and school district.

- Discuss any adjustments to these payments caused by reassessments and other actions (including legal actions) that resulted in notable increases and decreases in payments to local jurisdictions.

3.9 Human Health

The ER should include the following information to assist the staff in its review of the potential human health impacts during the license renewal period:

Microbiological Hazards

The applicant should consult the State agency responsible for environmental health regarding the potential existence and concentration of *Naegleria fowleri* in the receiving waters for plant cooling water discharge. The ER should document the results of this consultation.

The ER should include copies of correspondence with the responsible agency indicating concurrence with the applicant's risk assessment and proposed mitigation strategy, if one is required.

The ER should include information of any known upstream heat load contributors to the river and their locations relative to the plant.

The ER should also include information regarding any known local, State, and/or Federal regulations that would govern monitoring requirements and the possible modification of discharge permit limits, if thermophilic microbiological organisms are a concern at the plant's discharge.

Electric Shock Hazards

The applicant should determine whether any sites or areas do not meet current National Electric Safety Code (NESC) clearance standards. In addition, the ER should identify any changes in the operation of transmission lines or maintenance of transmission line ROWs. The ER should also include maps, photographs, or drawings indicating the locations of all sites that do not meet the NESC clearance standards.

3.10 Environmental Justice

To assist the staff in its review of potential human health impacts that could occur during the license renewal period, the ER should describe the general demographic composition of minority and low-income populations and communities (by race and ethnicity) residing in the immediate vicinity of the plant that could be affected by ongoing and future plant operations and license renewal activities. The geographic scale should be commensurate with the potential impact area and include a sample of the surrounding population to facilitate the evaluation of the communities, neighborhoods, and areas that may be disproportionately impacted. This discussion should cover all areas with an actual or potential for reasonably foreseeable physical, social, cultural, and health impacts. The ER should also include migrant workers as well as full-time residents and provide geographic information about the location of these populations and communities.

Chapter 4 Environmental Consequences of the Proposed Action and Mitigating Actions

General Guidance

The revised GEIS evaluates 78 environmental issues. Analyses determined that 58 of these issues, identified as Category 1 issues in the GEIS, are adequately addressed for all applicable nuclear plants. Thus, a plant-specific review will not require additional analysis unless new and significant plant-specific information that could change the conclusions in the GEIS should be considered (see Table B-1 in Appendix B to Subpart A of 10 CFR Part 51). Chapter 5 of this regulatory guide discusses ways in which to identify new and significant information. The applicant may adopt the findings for the codified Category 1 issues if no new and significant information exists.

Of the remaining 19 environmental issues, 18 are Category 2 issues, which require plant-specific analyses. The following sections discuss information that the applicant should include in the ER to assist the NRC staff in evaluating the impacts of these 18 Category 2 issues. One issue (the effects of electromagnetic fields) is not categorized, and the NRC staff addresses this issue separately in plant-specific supplements to the GEIS. The presentation of the Category 2 issues in this section follows the format of Table B-1 in Appendix B to Subpart A of 10 CFR Part 51. This discussion also references the specific requirements stated in 10 CFR 51.53(c)(3)(ii). The steps for reviewing each Category 2 issue include (1) determine whether the issue is applicable to the plant using the criteria given in 10 CFR 51.53(c)(3)(ii), (2) if the issue is not applicable, provide a short statement on the rationale, and (3) if the issue is applicable, provide the information and analysis specified in the appropriate section below. The information and analysis should be sufficient to determine the size and extent of the impacts associated with the issue and the significance of the impacts as defined in the Impacts Findings section located in the General Guidance to Applicants section of this regulatory guide.

The applicant should analyze direct, indirect, and cumulative effects. The cumulative or indirect effects of the action may be of moderate or large significance even when the direct effect is of small significance. The General Guidance to Applicants section of this regulatory guide defines these effects.

The applicant should consider mitigation measures to reduce or avoid adverse effects for each Category 2 issue. The applicant should identify and discuss possible mitigation measures in proportion to the significance of the impact. If no mitigation measure is identified, the applicant should provide the basis of that determination. If mitigation measures are identified, the applicant should describe the benefits and costs of each measure. The General Guidance to Applicants section of this regulatory guide defines mitigation measures.

The ER should include map information as appropriate for issues addressed in Chapter 4. This section should also present any new and significant information in sufficient detail and depth to support an impact analysis. Text, tables, and graphic information should support the analysis of impacts presented in Chapter 4 of the ER.

4.1 Land Use and Visual Resources

The GEIS reviews the impacts to land use and visual resources and considers them to be generic, or Category 1, issues. The ER should discuss any new and significant information, if appropriate; otherwise, impacts to these resources do not need further assessment.

4.2 Air Quality

The GEIS reviews the following Category 2 issue, which requires a plant-specific analysis.

Impacts to Air Quality (Nonattainment and Maintenance Areas)

Table B-1 in Appendix B to Subpart A of 10 CFR Part 51 states the following:

> Air quality impacts of continued operations and refurbishment activities associated with the license renewal term are expected to be small. However, emissions during these activities could be a cause for concern at locations in or near air quality nonattainment or maintenance areas. The significance of the impact cannot be determined without considering the compliance status of each site and the activities that could occur. These impacts would be short-lived and cease after projects were completed.
>
> Specifically, 10 CFR 51.53(c)(3)(ii)(F) requires the following:
>
> If the applicant's plant is located in or near a nonattainment or maintenance area, an assessment of vehicle exhaust emissions anticipated at the time of peak refurbishment work force must be provided in accordance with the Clean Air Act as amended.

The threshold emission levels serve as a screening value to determine whether a conformity analysis should be performed for a proposed action. The threshold emission levels range from 10 to 100 tons (9 to 91 metric tons) per year. The EPA considers it extremely unlikely that emissions below the threshold emission levels would affect a nonattainment or maintenance area. If the threshold emission levels are not exceeded, a conformity analysis is not required unless the total direct and indirect

emissions[8] are 10 percent or more of a nonattainment or maintenance area's total emissions for that pollutant. Under this latter scenario, the action is defined as a "regionally significant action" and requires a conformity analysis.

Information and Analysis Content

The applicant should consult with the appropriate EPA regional office and the State air quality regulatory agency. Discussions with staff at EPA regional offices indicate that some flexibility may exist in the rigor of the analysis that would be acceptable, depending on the particular site, the extent of refurbishment, the pollutants in nonattainment, the severity of the nonattainment, and the State regulatory agency. The ER should document such consultations.

In support of NRC's responsibility to consider the conformity of its actions with SIPs, the applicant should provide the following information in accordance with the 12 steps identified below:

1. If there will be no refurbishment or if refurbishment involves no additional workers, no further analysis is required.

2. Identify the positions of nonattainment and maintenance areas relative to the plant. If there are no nonattainment and maintenance areas within 50 miles (80 kilometers) of the plant, the ER should indicate this, and no further analysis is required.

3 Identify the pollutant or pollutants for which the area is in nonattainment or maintenance, as well as the severity of nonattainment.

4. Determine the meteorological conditions typically associated with poor air quality in each nonattainment and maintenance area.

5. Compare the meteorological conditions associated with poor air quality with regional climatology.

6. Estimate onsite and offsite vehicle emissions resulting from refurbishment activities that contribute to the pollutants identified in step 3[9], and identify the approximate locations of the emissions during the peak employment period. This estimate may be based on the applicant's estimate of vehicle miles associated with commuting refurbishment workers, other activities directly associated with refurbishment, and emission factors available in the current mobile source models approved by the EPA Office of Transportation and Air Quality.[10]

7. Determine whether the emissions related to license renewal activities have a reasonable likelihood of adversely affecting air quality in the nonattainment or maintenance area. Climatological considerations, simple atmospheric dispersion models, and conservative assumptions are appropriate for this screening analysis. For each nonattainment and maintenance area determined to have a reasonable likelihood of being adversely affected, continue the analysis in step 8. No further analysis is required for those areas that were not determined to be adversely affected.

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8 The "total direct and indirect emissions" includes emissions of criteria pollutants and emissions of precursors of criteria pollutants (see 40 CFR 51.852).

9 A good reference for this information is "AP-42: Compilation of Air Pollutant Emission Factors" (historical and current information) which can be found at http://www.epa.gov/otaq/ap42.htm.

10 Information on the most current EPA modeling tools for calculating vehicle emissions may be obtained at http://www.epa.gov/otaq/models.htm.

8. Compare the total emissions calculated in step 6 with the appropriate threshold emission levels of 40 CFR 51.853(b). If the threshold emission levels are exceeded, proceed to step 11. If not, continue the analysis at step 9.

9. Determine the nonattainment or maintenance area's total emissions of pollutants identified in step 3. These determinations need only be sufficiently accurate to support evaluation of the regional significance of emission levels below the threshold emission levels of 40 CFR 51.853(b). Potential sources of this information include EPA regional offices, State and local air quality agencies, and final environmental impact statements. If an existing estimate of the area's total emissions is not found, estimate the emissions from readily available information, such as population, traffic counts, and published emission rates, using reasonable assumptions. Identify the information and the assumptions.

10. Compare the total emissions from refurbishment estimated in step 6 with the area's total emissions estimated in step 9. In accordance with 40 CFR 51.853(i), if the total emissions from refurbishment are 10 percent or more of the area's total emissions, proceed to step 11. If not, the emissions are not regionally significant, and no further analysis is required.

11. For those pollutants identified in steps 8–10, use air dispersion modeling to estimate pollutant concentrations in the ambient air. Using these concentrations, evaluate the extent to which refurbishment-related emissions would cause or increase the frequency of the threshold emission levels being exceeded during the refurbishment.[11] If analyses based on peak employment period emissions indicate a potential for the annual air quality limits to be exceeded, the applicant may take into account that the refurbishment period is less than 1 year and that peak employment levels will not occur during the entire refurbishment period.

12. If refurbishment-related emissions would cause or contribute to the threshold emission levels being exceeded, identify and analyze the extent to which mitigation measures could minimize adverse impacts on air quality. Explain the extent to which mitigation measures directed at air quality could be coordinated with the mitigation of transportation impacts.

If the nuclear plant utilizes a cooling tower and is located in a State that regulates particulate emissions from cooling towers, the applicant should conduct an appropriate assessment of such emissions and report the results in its ER.

4.3 Noise

The GEIS reviews impacts to noise resources, which are considered generic, or Category 1, issues. The ER should discuss any new and significant information; otherwise, impacts to this resource do not need further assessment.

4.4 Geology and Soils

The GEIS reviews impacts to geology and soils resources, which are considered generic, or Category 1, issues. The ER should discuss any new and significant information; otherwise, impacts to this resource do not need further assessment.

[11] Conditions on air quality models used for conformity analysis are provided in 40 CFR 51.859(c).

4.5 Hydrology

The GEIS reviews the following Category 2 issues, which require a plant-specific analysis:

Surface Water Use Conflicts (Plants with Cooling Ponds or Cooling Towers Using Makeup Water from a River with Low Flow)

This section applies to nuclear power plants with cooling ponds or cooling towers using makeup water from a river with low flow (less than 3.15×10^{12} cubic feet per year (ft^3/yr) (9×10^{10} cubic meters per year (m^3/yr)).

Table B-1 states, "Impacts could be of small or moderate significance, depending on makeup water requirements, water availability, and competing water demands."

Specifically, 10 CFR 51.53(c)(3)(ii)(A) requires, in part, the following:

> If the applicant's plant utilizes cooling towers or cooling ponds and withdraws make-up water from a river whose annual flow rate is less than 3.15×10^{12} ft^3/year (9×10^{10} m^3/year), an assessment of the impact of the proposed action on water availability and competing water demands,…must be provided.

Section 4.5.1.1 of the GEIS discusses surface water use conflicts.

No additional surface water conflict information is needed for plants using once-through cooling systems or not specifically using cooling towers or cooling ponds, or if the plant takes its makeup water for the cooling towers or cooling ponds from a river with an annual flow greater than 3.15×10^{12} ft^3/yr (9×10^{10} m^3/yr). The ER should explain the method used to determine the annual river flow, and that no further information is needed with reference to these issues. If the plant does not meet the above conditions, the applicant should provide the information and analysis described below.

Information and Analysis Content

If the plant obtains its water from a river with low flow as defined above and uses cooling towers or cooling ponds, the ER should include the following information:

- Provide estimates of the quantities and timing of cooling water withdrawals and discharges. Estimate current consumptive water use and future consumptive water use during the license renewal period. Provide water level, flow, and stream gauge data so that water balance calculations can be verified.

- Compare the consumptive water used by the heat-dissipation system to flows in the source water body (i.e., the river from which water is withdrawn for cooling tower or cooling pond makeup water). Base this comparison on records of the initial license period. Project and compare consumptive use and stream flows during the license renewal period.

- Estimate the quantities of other ongoing water withdrawals and consumptive water uses in the portion of the water body affected by the plant and indicate whether these withdrawals or uses are expected to change during the license renewal period.

- Describe mitigation measures (e.g., limiting withdrawals during droughts) that have been used to reduce the adverse impacts on river flow of consumptive water use and the mitigation measures that are expected to be used during the license renewal period. Briefly explain the rationale for rejecting measures that were considered but not implemented.

Groundwater Use Conflicts (Plants with Closed-Cycle Cooling Systems That Withdraw Makeup Water from a River)

This section applies to plants using cooling towers that withdraw makeup water from a river.

Table B-1 states the following:

Water use conflicts could result from water withdrawals from rivers during low-flow conditions, which may affect aquifer recharge. The significance of impacts would depend on makeup water requirements, water availability, and competing water demands.

Specifically, 10 CFR 51.53(c)(3)(ii)(A) requires, in part, the following:

If the applicant's plant utilizes cooling towers…and withdraws make-up water from a river whose annual flow rate is less than 3.15×10^{12} ft^3/year (9×10^{10} m^3/year)…. The applicant shall also provide an assessment of the impacts of the withdrawal of water from the river on alluvial aquifers during low flow.

Section 4.5.1.2 of the GEIS discusses this issue.

Information and Analysis Content

If the plant withdraws cooling tower makeup water from a river, the applicant should provide the following information and analyses to enable the NRC staff to assess the groundwater use conflicts during operation:

- Provide a description of alluvial aquifers near the site that could be affected by surface water withdrawal, including approximate areal extent, thickness, porosities, and hydraulic conductivities of aquifer strata.

- Describe existing and known future offsite and onsite wells, including average flow rate, peak flow rate, water use, and completion depth.

- Include maps of steady-state piezometric surface estimated with onsite and offsite wells at peak pumping rates, average pumping rates, and no pumping. These maps should indicate the location of all wells, and each offsite well should be annotated with the drawdown of the piezometric surface attributable to both the onsite and offsite wells.

- Describe existing and known future water rights (including Tribal water rights).

- Describe any wetlands in the vicinity that might be affected by a lowered water table.

- Evaluate the significance of present and future effects of onsite withdrawal on offsite wells. Additionally, describe any potential mitigation measures and state whether they will be implemented.

Groundwater Use Conflicts (Plants That Withdraw More Than 100 Gallons per Minute, Including Ranney Wells)

This section applies to plants using more than an annual average of 100 gallons per minute (gpm) (6 liters per second (L/s)) of groundwater. Only one plant in the United States, Grand Gulf Nuclear Station in Mississippi, uses Ranney (collector) wells. The Grand Gulf wells intercept most of their production from infiltration of Mississippi River water through the bottom of the river bed and have little or no impact on surrounding groundwater users and should not be considered further in ERs for other sites.

Table B-1 states that, "Plants that withdraw more than 100 gpm could cause groundwater use conflicts with nearby groundwater users."

Specifically, 10 CFR 51.53(c)(3)(ii)(C) requires, in part, the following:

> If the applicant's plant…pumps more than 100 gallons (total onsite) of groundwater per minute, an assessment of the impact of the proposed action on groundwater must be provided.

Section 4.5.1.2 of the GEIS discusses this issue. This section provides guidance to the applicant to assist in identifying and assessing the environmental impacts of groundwater withdrawal and use during the license renewal period. If the applicant can provide withdrawal records or other evidence that the plant does not pump more than an annual average of 100 gpm (6 L/s) of groundwater, the ER should note this fact, and no additional information need be provided.

Information and Analysis Content

If the plant pumps more than an annual average of 100 gpm (6 L/s), the applicant should provide the following information and analyses to enable the NRC staff to assess the magnitude and significance of potential groundwater use conflicts during operation:

- Describe all groundwater aquifers potentially impacted by operation of onsite wells, including approximate areal extent, thickness, porosities, and hydraulic conductivities of aquifer strata. Discuss significant uncertainties, anisotropies, and inhomogeneities.

- Describe existing and known future offsite and onsite wells, including average flow rate, peak flow rate, water use, and completion depth.

- Include maps of steady-state piezometric surfaces estimated with onsite and offsite wells at peak pumpage, average pumpage, and no pumpage. These maps should indicate the location of all wells and should annotate each offsite well with the drawdown of the piezometric surface attributable to both the onsite and offsite wells. Describe the methods of analysis, including assumptions used.

- Describe existing and known future water rights (including Tribal water rights).

- Describe any wetlands in the vicinity that might be impacted by a lowered water table.

- Evaluate the significance of present and future effects of onsite withdrawal on offsite wells. Additionally, describe any potential mitigation measures and state whether they will be implemented.

Groundwater Quality Degradation (Plants with Cooling Ponds at Inland Sites)

This section applies to plants at inland sites with cooling ponds.

Table B-1 states the following:

> Sites with closed-cycle cooling ponds could degrade groundwater quality. For plants located inland, the quality of the groundwater in the vicinity of the ponds could be affected. The significance of the impact would depend on cooling pond water quality, site hydrogeologic conditions (including the interaction of surface water and groundwater), and the location, depth, and pump rate of water wells.

Specifically, 10 CFR 51.53(c)(3)(ii)(D) requires the following:

> If the applicant's plant is located at an inland site and utilizes cooling ponds, an assessment of the impact of the proposed action on groundwater quality must be provided.

Section 4.5.1.2 of the GEIS also discusses this issue.

If the plant does not use cooling ponds or if the cooling ponds are adjacent to salt marshes, the ER should note this fact, and no further information need be provided.

Information and Analysis Content

If the plant uses cooling ponds and is not adjacent to salt marshes, the applicant should provide the following information and analyses to enable the NRC staff to assess the presence and magnitude of groundwater quality degradation during operation:

- Describe cooling pond characteristics (e.g., liners or impermeable materials used, impermeable soils) that would retard or prevent infiltration into local aquifers.

- Identify the types and concentrations of impurities in the cooling pond water and chemistry of soils along pathways to local aquifers to determine whether cooling pond water can contaminate the groundwater.

- Describe water quality and other characteristics of local aquifers that could be affected by infiltration of cooling pond water.

- Provide Federal, State, and local groundwater quality requirements with emphasis on any changes to these requirements that have occurred during the plant's initial license term and any anticipated changes to those requirements during the license renewal term.

- Identify and characterize offsite groundwater users who could be affected by the degradation of aquifers. Include locations and elevations of offsite wells, pumping rates, screened intervals, depth to water, and an estimate of the groundwater needs of local users.

- Describe possible mitigation measures, if they are warranted, and whether they will be implemented.

Groundwater and Soil Contamination

This section applies to plants that may have soil or groundwater contamination due to industrial practices involving the use of solvents, hydrocarbons, heavy metals, or other chemicals. Onsite sources may include lined or unlined lagoons, pipe and valve leakages, fuel spills, or other inadvertent incidents.

Table B-1 states the following:

> Industrial practices involving the use of solvents, hydrocarbons, heavy metals, or other chemicals and unlined wastewater lagoons have the potential to contaminate site groundwater, soil, and subsoil. Contamination is subject to State- and Environmental Protection Agency (EPA)-regulated cleanup and monitoring programs.

Specifically, 10 CFR 51.53(c)(3)(ii)(O) requires the following:

> If the applicant's plant conducts industrial practices involving the use of solvents, hydrocarbons, heavy metals, or other chemicals and has unlined wastewater lagoons, the applicant shall assess the potential for contamination of site groundwater, soil, and subsoil. The applicant shall provide an assessment of dissolved chemical and suspended sediment discharge to the plant's wastewater lagoons in addition to National Pollutant Discharge Elimination System (NPDES) compliance data collected for submittal to the U.S. Environmental Protection Agency (EPA) or designated State agency. A summary of existing reports describing site groundwater and soil contamination should also be included.

Section 4.5.1.2 of the GEIS discusses this issue.

It is possible that, for a given plant, no spills or incidents have occurred. In that case, reporting of soil and groundwater contamination in the ER would not be necessary.

Information and Analysis Content

If a plant has current or historical information regarding groundwater and soil contamination due to industrial practices, the ER should include the following information:

- Provide a list of leaks, spills, or accidental releases including their nature, location, date, and amount spilled. Include the regulatory agency overseeing the incident and whether or not a noncompliance or notice of violation was issued. Also include a site map depicting the locations of the listed incidents.

- Describe the cleanup or other mitigation completed for each of the listed source terms.

- Provide a copy of the current NPDES permit issued under the Clean Water Act in an appendix to the ER.

Radionuclides Released to Groundwater

Table B-1 states the following:

> Underground system leaks of process water have been discovered in recent years at several plants. Groundwater protection and monitoring programs have been established at all operating nuclear power plants.

Specifically, 10 CFR 51.53(c)(3)(ii)(Q) requires the following:

> If the applicant's plant has had known inadvertent releases of radioactive liquid into the groundwater, the applicant shall assess the radiological impact from the release(s). The applicant shall provide a radiological assessment in accordance with § 20.1501 which contains information on the source of the release, its location within the plant site, the known or estimated information on the involved radionuclides, quantities, forms, concentrations, and the projected impact to the environment (i.e., projected transport path and concentrations) during the license renewal term. A summary of existing reports describing the event(s) of any inadvertent releases to the groundwater shall also be included.

Section 4.5.1.2 of the GEIS discusses this issue.

Information and Analysis Content

Each nuclear power plant has committed to follow the guidance developed by the Nuclear Energy Institute (NEI) contained in NEI 07-07, "Industry Ground Water Protection Initiative—Final Guidance Document." The purpose of the initiative is to improve nuclear industry programs for preventing, detecting, and responding to inadvertent releases of radioactive materials that may result in low but detectable levels of plant-related materials in groundwater. Because each nuclear power plant has developed a site-specific groundwater protection program, the staff must review the details for each plant's program.

For those plants that have groundwater monitoring systems composed of wells, the ER should contain the following information:

- Provide a site map at sufficient scale to show the location of all monitoring wells and water supply wells.
- Include a table depicting well construction information, such as well depth, diameter, screened interval, and construction material.
- Include a table showing depths to water and water-level elevations.
- Provide a groundwater flow direction map for each aquifer or hydrostratigraphic unit beneath the site.
- Develop a table and accompanying map showing the distribution of radionuclide concentrations across the site (e.g., tritium concentrations in picocuries per liter.) A series of maps may be necessary to depict the concentration at depth.

For those plants that rely on a system other than a groundwater monitoring system composed of wells, the ER should describe the program used for preventing, detecting, and responding to inadvertent releases of radioactive materials into the groundwater.

4.6 Ecology

General Approach for Information and Analysis Content for All Ecological Issues

The ER should provide sufficient information to put any effects of plant operation in perspective in terms of stability of populations and other such properties of ecosystem structure and function and alteration in ecosystem services. Ecosystem services refers to a wide range of conditions and processes through which natural ecosystems, and the species that are part of them, help sustain and fulfill human life.

For all ecological issues, the same general approach can identify the environmental consequences of license renewal and its alternatives. This approach, consisting of the steps detailed below, generally follows the EPA framework for ecological risk assessment:

1. Identify the Relevant Sources of Information

While Chapter 3 should generally describe the environment, this section should identify the specific information and sources used for assessing impact and include the following:

Studies and monitoring programs. Briefly summarize any studies or monitoring programs that provide site-specific data and explain environmental impacts. Include the location, dates, objectives, biological entities or attributes chosen for study, methods, and results applicable to this license renewal application, as well as any data or data summaries that might be available for NRC review. If data are older than 5 years old, explain why the studies would or would not be relevant for assessing the effects of present and projected future plant operation over the term of license renewal. For example, demonstrate that both the potentially affected resources and the effect of the plant on them have remained and can be expected to remain unchanged over the term of license renewal.

Communications with regulatory agencies. Document any communications with regulatory agencies (e.g., EPA or other water quality permitting agencies) and resource agencies (e.g., NMFS, U.S. Fish and Wildlife Service, State fish and wildlife agencies) relevant to assessing impact and not documented elsewhere in the ER. If relevant communications are documented elsewhere, refer the reader to the appropriate sections.

Other sources. Provide in-text citations to sources of data and information used to assess impact and provide a list of literature cited.

2. Identify Those Resources to be Analyzed for the Issue

While Chapter 3 should contain an overview of biological resources, this section should identify the specific resources or their attributes used for assessing impact. Because biological systems are complicated, only a subset of resources can be addressed as described below:

Identify potentially affected resource entities. Describe the potentially affected resources in terms of representative species, functional group of species (e.g., insectivores), communities, an ecosystem (e.g., oak-hickory forest), a specific valued habitat (e.g., wet meadows), a unique

place, or other entity of concern. Additional guidance on identifying important species to be evaluated can be found in "U.S. Fish and Wildlife Service Mitigation Policy; Notice of Final Policy."[12] Contact Federal, State, and regional government agencies with jurisdiction over biological resources to assist with the identification of important species and habitats.

Identify attributes of those resources potentially at risk. If potentially adverse effects on a species, habitat, or other resource are identified, assess the resource with respect to local, regional, and national social, economic, and ecological value.

3. Show the Relationships Between Plant Operation and the Resource Attributes

To be considered an indicator of impact, a causal link must exist between attributes of a resource and plant operation. Lack of change in a resource attribute may not indicate lack of an adverse effect if plant operations have no link to resource levels.

If any adverse impacts are identified, describe mitigation measures that have been used to reduce the adverse impacts during the initial license period or that are expected to be used during the license renewal period and their expected effects. Briefly explain the rationale for not implementing any measures that were considered but rejected.

The GEIS reviews the following Category 2 issues, which require a plant-specific analysis:

Water Use Conflicts on Terrestrial Resources

This section applies to plants with cooling ponds or cooling towers using makeup water from a river with low flow (less than 3.15×10^{12} ft^3/yr (9×10^{10} m^3/yr).

Table B-1 notes that the impacts of surface water use on terrestrial resources are anticipated to be small or moderate. The table also notes that "impacts on terrestrial resources in riparian communities affected by water use conflicts could be of moderate significance in some situations."

Specifically, 10 CFR 51.53(c)(3)(ii)(A) requires, in part, the following:

> If the applicant's plant utilizes cooling towers or cooling ponds and withdraws makeup water from a river whose annual flow rate is less than 3.15×10^{12} ft^3/year (9×10^{10} m^3/year), an assessment of the impact of the proposed action on the flow of the river, and related impacts on instream (aquatic) and riparian (terrestrial) ecological communities must be provided.

Section 4.6.1.1 of the GEIS discusses surface water use conflicts on terrestrial resources.

[12] The January 23, 1981, *Federal Register* notice (46 FR 7644) establishes final policy guidance for U.S. Fish and Wildlife Service personnel involved in making recommendations to protect or conserve fish and wildlife resources. Guidance is provided on the definition and identification of "evaluation species," evaluation of direct and indirect effects of a project on the evaluation species, the levels of mitigation, and the various methods for accomplishing mitigation when adverse effects are identified. On pages 7662 and 7663, the notice discusses the types of species that should be considered. In this regulatory guide, the terms "important species" and "evaluation species" are used interchangeably.

No additional surface water conflict information is needed for (1) plants using once-through cooling systems, (2) plants that do not specifically use cooling towers or cooling ponds, or (3) plants drawing makeup water for the cooling towers or cooling ponds from a river with an annual flow greater than 3.15×10^{12} ft^3/yr (9×10^{10} m^3/yr).

Information and Analysis Content

The ER should follow the general approach for information and analysis content for all ecology issues as described at the beginning of this section.

Impacts of Continued Plant Operations on Terrestrial Ecosystems

Table B-1 states the following:

> Continued operations, refurbishment, and maintenance activities are expected to keep terrestrial communities in their current condition. Application of best management practices would reduce the potential for impacts. The magnitude of impacts would depend on the nature of the activity, the status of the resources that could be affected, and the effectiveness of mitigation.
>
> Specifically, 10 CFR 51.53 (c)(3)(ii)(E) requires, in part, "All license renewal applicants shall assess the impact of refurbishment and other license-renewal-related construction activities on important plant and animal habitats."

The applicant should describe any activities associated with license renewal and continued operations, maintenance, and refurbishment that will disturb terrestrial habitat. If no area will be disturbed, the ER should note that fact and no further discussion of the issue is needed. Chapter 4 of the ER should describe areas that will be disturbed with respect to (1) the amount of land to be disturbed, (2) ecological characteristics of the habitat, (3) species of plants and animals found in the area, and (4) the extent to which the habitat is unusual. Note that the information and analysis for this issue overlaps the information and analysis for assessing impacts on threatened and endangered species.

Information and Analysis Content

The ER should follow the general approach for information and analysis content for all ecology issues as described at the beginning of this section. In addition, if a license renewal activity will disturb any plant or wildlife habitat, the ER should describe any land that will be disturbed during transport and delivery of equipment, structures, or components; material laydown areas; or construction associated with refurbishment. If any temporary or permanent structures will be built, the ER should provide a map of the site that includes the proposed location of these structures. If any road or bridge modifications will occur as a result of transport, the ER should describe the potential effects on the terrestrial environment.

Impingement and Entrainment of Aquatic Organisms (Plants with Once-Through Cooling Systems or Cooling Ponds)

This section applies to plants with once-through and cooling pond heat dissipation systems.

Table B-1 notes the following:

> The impacts of impingement and entrainment are small at many plants but may be moderate or even large at a few plants with once-through and cooling-pond cooling systems, depending on cooling system withdrawal rates and volumes and the aquatic resources at the site.

Specifically, 10 CFR 51.53(c)(3)(ii)(B) requires, in part, the following:

> If the applicant's plant utilizes once-through cooling or cooling pond heat dissipation systems, the applicant shall provide a copy of current Clean Water Act 316(b) determinations…or equivalent State permits and supporting documentation. If the applicant can not provide these documents, it shall assess the impact of the proposed action on fish and shellfish resources resulting from heat shock and impingement and entrainment.

Section 4.6.1.2 of the GEIS discusses this issue.

If the plant does not use a once-through cooling or closed-cycle cooling pond heat dissipation system, the ER should note this fact, and no additional information need be provided.

If the plant uses a once-through or closed-cycle cooling pond heat dissipation system and the applicant holds a current Clean Water Act Section 316(b) determination, the applicant should provide the NRC with copies of the determination, supporting documentation, and relevant correspondence with the water quality permitting agency (EPA or permitting State agency). Additionally, the ER should describe any potential mitigation measures and state whether they will be implemented.

If (1) the plant utilizes a once-through or cooling pond heat dissipation system and (2) the applicant does not possess a current Clean Water Act Section 316(b) determination, the ER must consider issues of impingement and entrainment of fish and shellfish. Information that should be provided to the NRC for review and analysis of the impingement and entrainment issue is outlined below.

Information and Analysis Content

The ER should follow the general approach for information and analysis content for all ecology issues as described at the beginning of this section. Specific guidance for this issue follows:

- Document any communications with regulatory agencies (e.g., EPA or other water quality permitting agencies) and resource agencies (e.g., NMFS, U.S. Fish and Wildlife Service, State fish and wildlife agencies) regarding the issues of impingement and entrainment. Provide a copy of any Clean Water Act Section 316(b) determination. If a determination has not been made that the "location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact," discuss the outstanding issues.

- Briefly summarize any impingement or entrainment studies or monitoring programs and include the location, dates, objective, methods, and results applicable to this license renewal application, as well as any data or data summaries that might be available for NRC review. Provide estimates of the species and numbers of fish and shellfish impinged and entrained on a daily, monthly, and annual basis. Provide site-specific estimates of the mortality of impinged fish and shellfish.

- Estimate the number of fish and shellfish lost to the water body because of impingement and entrainment. Provide full documentation of analytical or modeling techniques used to assess entrainment and impingement losses. Describe these losses in terms of the commercial, recreational, and ecosystem services they would have provided.

If aquatic resources have been monitored in the field, provide an analysis of temporal and geographical trends in the data that might indicate whether fish and shellfish populations have increased, decreased, or remained stable during the initial period of operation. Show any relationships between patterns of impingement and entrainment at the plant and trends in the potentially affected populations. Because entrainment, impingement, and thermal impacts all affect field populations simultaneously, provide a single discussion of the effects of these stressors on trends in field data rather than discussing these three stressors individually, if possible.

Thermal Impacts on Aquatic Organisms (Plants with Once-Through Cooling or Cooling Ponds)

This section applies to plants with once-through and cooling pond heat dissipation systems.

Table B-1 notes the following:

> Most of the effects associated with thermal discharges are localized and are not expected to affect overall stability of populations or resources. The magnitude of impacts, however, would depend on site-specific thermal plume characteristics and the nature of aquatic resources in the area.

Specifically, 10 CFR 51.53(c)(3)(ii)(B) requires, in part, the following:

> If the applicant's plant utilizes once-through cooling or cooling pond heat dissipation systems, the applicant shall provide a copy of 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 and supporting documentation. If the applicant can not provide these documents, it shall assess the impact of the proposed action on fish and shellfish resources resulting from heat shock….

Section 4.6.1.2 of the GEIS discusses this issue.

If the plant does not use a once-through cooling or closed-cycle cooling pond heat dissipation system, the ER should note this fact, and no additional information need be provided.

If the plant uses a once-through or closed-cycle cooling pond heat dissipation system and the applicant holds a current NPDES permit that demonstrates that the plant meets State water temperature standards, or a current Clean Water Act Section 316(a) determination, the applicant should provide copies of the determination, NPDES permit, supporting documentation, and relevant correspondence with the water quality permitting agency (EPA or permitting State agency) to the NRC. Additionally, the applicant should describe any potential mitigation measures and state whether they will be implemented.

If (1) the plant uses a once-through or cooling pond heat dissipation system and (2) the applicant does not possess a current NPDES permit that demonstrates that the plant meets State water temperature standards or does not possess a current Clean Water Act Section 316(a) determination, the ER must consider issues of thermal impacts. Information that should be provided for review and analysis of the thermal impacts issue is outlined below.

Information and Analysis Content

The ER should follow the general approach for information and analysis content for all ecology issues as described at the beginning of this section. Specific guidance for this issue follows:

- Document any communications with regulatory agencies (e.g., EPA or other water quality permitting agencies) and resource agencies (e.g., NMFS, U.S. Fish and Wildlife Service, State fish and wildlife agencies) regarding the issue of thermal impacts. Provide copies of any NPDES permits and Clean Water Act Section 316(a) determinations. If a current NPDES permit relative to thermal discharges and/or a current Section 316(a) variance from State water temperature standards do not exist, discuss the outstanding issues.

- Briefly summarize any plant-specific thermal effluent studies, monitoring programs, or thermal effects or mortality studies and include locations, dates, objectives, methods, and results applicable to this license renewal application, as well as any data or data summaries available for NRC review. Estimate the number, by taxa, of fish and shellfish affected by and susceptible to the thermal effluent on a daily, monthly, and annual basis. Provide areal or volumetric estimates of thermally affected fish and shellfish habitat. Provide full documentation of analytical or modeling techniques used to assess effects. Describe these effects in terms of the commercial, recreational, and ecosystem services they would have provided.

- If aquatic resources have been monitored, provide an analysis of temporal and geographic trends in the data that might indicate whether fish and shellfish populations have increased, decreased, or remained stable during the initial period of operation. Detail any relationships between patterns of thermal effects and trends in potentially affected populations. Because entrainment, impingement, and thermal impacts affect field populations simultaneously, provide, if possible, a single discussion of the effects of these stressors on trends in field data rather than discussing these three stressors individually.

Water Use Conflicts on Aquatic Resources

This section applies to plants with cooling ponds or cooling towers using makeup water from a river with low flow (less than 3.15×10^{12} ft^3/year (9×10^{10} m^3/year).

Table B-1 notes the impacts of surface water use on aquatic resources are anticipated to be small or moderate. The table also notes that "impacts on aquatic resources in instream communities affected by water use conflicts could be of moderate significance in some situations."

Specifically, 10 CFR 51.53(c)(3)(ii)(A) requires, in part, the following:

> If the applicant's plant utilizes cooling towers or cooling ponds and withdraws makeup water from a river whose annual flow rate is less than 3.15×10^{12} ft^3/year (9×10^{10} m^3/year), an assessment of the impact of the proposed action on the flow of the river and related impacts on in-stream and riparian ecological communities must be provided.

Section 4.6.1.2 of the GEIS discusses surface water use conflicts on aquatic resources.

No additional surface water conflict information is needed for (1) plants using once-through cooling systems, (2) plants not specifically using cooling towers or cooling ponds, or (3) plants drawing makeup water for the cooling towers or cooling ponds from a river with an annual flow greater than 3.15×10^{12} ft^3/year (9×10^{10} m^3/year).

Information and Analysis Content

The ER should follow the general approach for information and analysis content for all ecology issues as described at the beginning of this section.

Threatened, Endangered, and Protected Species and Essential Fish Habitat

Table B-1 states the following:

> The magnitude of impacts on threatened, endangered, and protected species and essential fish habitat would depend on the occurrence of listed species and habitats and the effects of power plant systems on them. Consultation with appropriate agencies would be needed to determine whether special status species or habitats are present and whether they would be adversely affected by activities associated with license renewal.

Specifically, 10 CFR 51.53(c)(3)(ii)(E) requires, in part, the following:

> Additionally, the applicant shall assess the impact of the proposed action on threatened or endangered species in accordance with Federal laws protecting wildlife, including but not limited to the Endangered Species Act, and essential fish habitat in accordance with the Magnuson-Stevens Fishery Conservation and Management Act.

Section 4.6.1.3 of the GEIS discusses this issue. Two Federal acts govern the protection of species and their habitat—the Endangered Species Act and, specific to aquatic species, the Magnuson-Stevens Act, which are both described in detail in Chapter 3.6. Information needs specific to each act are outlined below:

Endangered Species Act

The applicant should determine whether the site and vicinity are within the range of listed species, and if they are, assess the extent to which license renewal, continued plant operation, and associated refurbishment activities are likely to jeopardize the continued existence of those listed species or result in the destruction or adverse modification of critical habitat. If in compiling information and assessing the effects of license renewal on threatened and endangered species a need arises to consult with either the U.S. Fish and Wildlife Service or NMFS, the applicant should notify the NRC so that the NRC staff can coordinate the communications.

Information and Analysis Content for the Endangered Species Act

In addition to the general information and analysis content for all ecology issues, the ER should include the species listed for protection and their critical or potential habitats among the biological entities to be analyzed for each ecological issue. Specifically, the ER should refer to any adverse impacts on listed and candidate threatened or endangered species or critical habitat found in the review of biologically related topics outlined in this regulatory guide, such as aquatic or instream ecological communities, riparian ecological communities, entrainment and impingement of fish and shellfish, thermal effects from the heated effluent, surface water conflicts, or impacts of refurbishment and continued operation on terrestrial resources. The ER should also describe any studies or monitoring programs that might provide relevant information about species listed for protection and their critical or potential habitats if the site is in the range of such species or their habitats. The ER should reference any letters and communications with Federal, State, or local agencies regarding species and their critical habitat listed for protection and include copies of the communications in an appendix.

Magnuson-Stevens Fisheries Conservation and Management Act and Essential Fish Habitat

If license renewal might affect any EFH, the NRC staff will prepare as part of the application review process an EFH assessment that will describe how any such habitat might be affected. The applicant should provide sufficient information to aid the NRC staff in the development of the EFH assessment.

Information and Analysis Content for Essential Fish Habitat

In addition to the general information and analysis content for all ecology issues, the ER should include the following:

- Reference any EFH that may be found in water bodies that may be affected by plant operation. Reference any license renewal activities and modifications to plant operation that may adversely affect EFH. Reference letters and communications with NMFS, and any resulting NMFS memoranda, and include any letters in the appendix to the ER.

- Describe the EFH, if any, which might be affected by plant operation. Include the EFH and the species for which it is designated among the biological entities to be analyzed for each aquatic issue. EFH regulations define "'waters' to include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; 'substrate' to include sediment, hard bottom, structures underlying the waters, and associated biological communities; 'necessary' to mean the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and 'spawning, breeding, feeding, or growth to maturity' to cover a species' full life cycle."

Other Acts

If license renewal might affect any species protected under Federal law, including the Marine Mammal Protection Act, the Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act, the applicant should provide sufficient information to aid the NRC staff in the development of an assessment of the impacts on those species.

Information and Analysis Content for Other Acts

In addition to the general information and analysis content for all ecology issues, the ER should include the following:

- Reference any protected species that may be found on or in the vicinity of the site or associated transmission line ROWs that may be affected by plant operation.

- Describe the protected species, if any, which might be affected by plant operation. Include those species among the biological entities to be analyzed for each terrestrial or aquatic issue, as appropriate.

4.7 Historic and Cultural Resources

The GEIS reviews the following Category 2 issues, which requires a plant-specific analysis.

Impacts to Historic and Cultural Resources

Table B-1 states the following:

> Continued operations and refurbishment associated with the license renewal term are expected to have no more than small impacts on historic and cultural resources located onsite and in the transmission line ROW because most impacts could be mitigated by avoiding those resources. The National Historic Preservation Act (NHPA) requires the Federal agency to consult with the State Historic Preservation Officer (SHPO) and appropriate Native American Tribes to determine the potential impacts and mitigation. See § 51.14(a).

Specifically, 10 CFR 51.53(c)(ii)(K) requires that, "All applicants shall assess whether any historic properties will be affected by the proposed project."

Section 4.7 of the GEIS discusses this issue.

The NRC's Office of Nuclear Reactor Regulation (NRR) is guided in its consideration of impacts to historic and cultural resources by Section 5.2.5., "NRR Responsibilities under the National Historic Preservation Act," to NRR Office Instruction, LIC-203, Revision 2, "Procedural Guidance for Preparing Environmental Assessments and Considering Environmental Issues," dated February 17, 2009. Section 106 of the NHPA of 1966, as amended (16 U.S.C. 470-470w-6), requires that Federal agencies take into account the effects of the agency's undertaking (including issuance of a license) on properties included in or eligible for the National Register of Historic Places and, prior to approval of an undertaking, to afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on the undertaking. The NHPA defines "undertakings" as any project or activity that is funded or under the direct jurisdiction of a Federal agency, or any project or activity that requires a Federal permit, license, or approval. The Advisory Council's regulations at 36 CFR Part 800, "Protection of Historic Properties," defines the provision for meeting Section 106 requirements. The following guidance instructs the applicant as to the information and analysis that is required for the NRC to comply with Section 106 requirements in a manner that minimizes the potential need to consult with the Advisory Council, which could delay review of the application. The applicant should also consider the effects on properties that are not eligible for the

National Register of Historic Places but, nevertheless, are likely to be considered by the SHPO or local historians to have local historic value and to contribute substantially to an area's sense of historic character.[13]

Information and Analysis Content

The ER should include the following information:

- Identify any activities associated with continued operations and refurbishment that could affect onsite or offsite historic properties. Such activities would include ground-disturbing activity, increases in traffic, and audio and visual intrusions.

- On a copy of the site map or, if appropriate, the site vicinity map included in Chapter 2, identify the areas of potential effects if historic properties are found.

- Describe all historic properties. Properties can be identified by referring to 36 CFR Part 60, "National Register of Historic Places"; consulting the SHPO, local preservation officials, and nearby American Indian Tribal officials; and conducting field surveys.

- If historic properties are found in or near areas of potential effects, assess those effects. Use the criteria for assessment of adverse effects given in 36 CFR 800.5, "Assessment of Adverse Effects." Applicants should involve the SHPO and local historic preservation officials in the assessment. The assessment should lead to one of three conclusions:

  - No effect—the undertaking will not affect historic properties.
  - No adverse effect—the undertaking will affect one or more historic properties, but the effect will not be harmful.
  - Adverse effect—the undertaking will harm one or more historic properties.

- If an adverse effect will occur, identify, in consultation with the SHPO, the NRC, and other interested parties, mitigation measures to reduce the impacts from continued operations or refurbishment activities.

4.8 Socioeconomics

Impacts to socioeconomic resources are considered generic, or Category 1, issues. The ER should discuss any new and significant information; otherwise, impacts to this resource do not need further assessment.

[13] This criterion is a NEPA consideration, not related to NHPA requirements.

4.9 Human Health

The GEIS reviews the following Category 2 issues, which require a plant-specific analysis:

Microbiological Hazards to the Public

With regard to the public health effects of microbiological (thermophilic) organisms, Table B-1 states the following:

> These organisms are not expected to be a problem at most operating plants except possibly at plants using cooling ponds, lakes, or canals that discharge to rivers. Impacts would depend on site-specific characteristics.
>
> Specifically, 10 CFR 51.53(c)(3)(ii)(G) requires the following:
>
> If the applicant's plant uses a cooling pond, lake, or canal or discharges into a river having an annual average flow rate of less than 3.15×10^{12} ft^3/yr (9×10^{10} m^3/yr), an assessment of the impact of the proposed action on public health from thermophilic organisms in the affected water must be provided.

Nuclear plants that use cooling ponds, lakes, or canals, or discharges into rivers with low flows (i.e., plants that have an annual average flow rate of less than 3.15×10^{12} ft^3/yr (9×10^{10} m^3/yr)) have a potential to enhance the concentration of thermophilic microorganisms. These include the enteric pathogens *Salmonella* sp. and *Shigella* sp., as well as *Pseudomonas aeruginosa*, thermophilic fungi, *Legionella* sp. in unusually high concentrations, and the free-living amoebae of the genera *Naegleria* and *Acanthomoeba*. Of greatest concern is *Naegleria* (*N.*) sp., four species of which have been isolated. To date, only one species, *N. fowleri*, has been determined to be pathogenic in humans.

Information and Analysis Content

If the applicant can show that the nuclear plant does not use cooling ponds, lakes, or canals, or discharges into rivers with low flows, the ER should note this fact. No further information or analysis need be provided. If the plant does use cooling ponds, lakes, canals, or rivers to receive its thermal discharge, the ER should include the following:

- If the State advises that tests should be conducted for concentration of *N. fowleri* in the receiving waters, perform the tests when the facility has been operating at a power level typical of the level anticipated during the license renewal period for at least 1 month to ensure a steady-state population during the sampling. Collect samples at locations of potential public use.

- Assess the data collected to determine the magnitude of potential impacts of *N. fowleri* on public health during the license renewal term.

- Describe proposed mitigation measures to minimize the exposure to members of the public and the rationale for not implementing any measures that were considered but rejected.

Electric Shock Hazards

Table B-1 states the following:

> Electrical shock potential is of small significance for transmission lines that are operated in adherence with the National Electrical Safety Code (NESC). Without a review of each nuclear plant transmission line conformance with NESC criteria, it is not possible to determine the significance of the electrical shock potential.

Specifically, 10 CFR 51.53(c)(3)(ii)(H) requires the following:

> If the applicant's transmission lines that were constructed for the specific purpose of connecting the plant to the transmission system do not meet the recommendations of the National Electrical Safety Code for preventing electric shock from induced currents, an assessment of the impact of the proposed action on the potential shock hazard from the transmission lines must be provided.

Section 4.8.1.1 of the GEIS discusses this issue, which concerns transmission lines built to connect the power plant with the existing transmission system. This issue is reviewed as part of the construction permit. Most transmission lines were designed to be in compliance with the NESC recommendations for electric shock hazard.[14] However, unless the utility has had an active program of transmission line management aimed at reviewing changes in land use in the ROW and the operating characteristics of the transmission line, as well as ensuring compliance with changes in the NESC, the line may not meet current NESC recommendations.

Information and Analysis Content

If the transmission lines that were built to connect the plant to the transmission system meet current NESC clearance standards, the ER should demonstrate that fact. The demonstration should take one of two forms, either (1) a calculation which demonstrates adherence to the NESC standard and a description of an ongoing program of power line ROW supervision and management aimed at ensuring that current electrical shock provisions of the NESC are met, or (2) a transmission line survey that develops the following information:

- For those sites where transmission line characteristics, clearances, and human uses of the transmission corridor may not meet current NESC standards, describe measures that could be taken to meet the standards, the measures the applicant plans or proposes to undertake, and whether those measures will meet the standards. Consider basic electrical design parameters, including transmission design voltage or voltages, line capacity, conductor type and configuration, spacing between phases, minimum conductor clearances to ground, maximum predicted electrical field strength(s) at 1 meter above ground, the predicted electrical field strength at the edge of the ROW in kilovolts per meter, and the design bases for these values.

- For any sites that will not meet the NESC clearance standards, explain in detail the rationale for concluding that the standards are not appropriate to the situation or the rationale for not making modifications to meet the standards.

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[14] The National Electric Safety Code®, 1997 Edition, Institute of Electrical and Electronics Engineers, Inc., New York, 1996. Section 23 deals with clearances. Section 232 deals specifically with clearances between above-ground conductors and human activities, equipment, and structures.

4.10 Environmental Justice

The GEIS reviews the following Category 2 issue, which requires a plant-specific analysis:

Minority and Low-Income Populations

Table B-1 states that, "Impacts to minority and low-income populations and subsistence consumption will be addressed in plant-specific reviews."

Specifically, 10 CFR 51.53(c)(3)(ii)(N) requires the following:

> Applicants shall provide information on the general demographic composition of minority and low-income populations and communities (by race and ethnicity) residing in the immediate vicinity of the plant that could be affected by ongoing and future plant operations and license renewal activities.

On February 11, 1994, the President signed Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," which directs all Federal agencies to consider environmental justice in their programs, policies, and activities. The Executive Order describes environmental justice as "identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." The 1996 GEIS did not consider environmental justice because guidance on how to conduct environmental justice reviews had not been promulgated.

On December 10, 1997, the CEQ issued, "Environmental Justice: Guidance under the National Environmental Policy Act.". CEQ developed this guidance to "…further assist Federal agencies with their National Environmental Policy Act (NEPA) procedures." As an independent agency, the CEQ guidance is not binding on the NRC; however, the NRC considers CEQ guidance on environmental justice in its NEPA review process.

CEQ provides the following information on disproportionately high and adverse human health and environmental effects in its December 10, 1997, guidance:

> **Disproportionately High and Adverse Human Health Effects—**Adverse health effects are measured in risks and rates that could result in latent cancer fatalities, as well as other fatal or nonfatal adverse impacts on human health. Adverse health effects may include bodily impairment, infirmity, illness, or death. Disproportionately high and adverse human health effects occur when the risk or rate of exposure to an environmental hazard for a minority or low-income population is significant (as defined by NEPA) and appreciably exceeds the risk or exposure rate for the general population or for another appropriate comparison group.
>
> **Disproportionately High and Adverse Environmental Effects—**A disproportionately high environmental impact that is significant (as defined by NEPA) refers to an impact or risk of an impact on the natural or physical environment in a low-income or minority community that appreciably exceeds the environmental impact on the larger community. Such effects may include ecological, cultural, human health, economic, or social impacts. An adverse environmental impact is an impact that is determined to be both harmful and significant (as defined by NEPA). In assessing cultural and aesthetic environmental impacts, impacts that uniquely affect geographically dislocated or dispersed minority or low-income populations or American Indian tribes are considered.

On August 24, 2004, the Commission issued its Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions (69 FR 52040), which states, "The Commission is committed to the general goals set forth in E.O. 12898, and strives to meet those goals as part of its NEPA review process." This policy statement further states that the "NRC's goal is to identify and adequately weigh or mitigate effects, on low-income and minority communities by assessing impacts peculiar to those communities…EJ is a tool, within the normal NEPA context, to identify communities that might otherwise be overlooked and identify impacts due to their uniqueness as part of the NRC's NEPA review process." The following guidance is consistent with this policy statement.

The NRC's Office of Nuclear Reactor Regulation (NRR) is guided in its consideration of environmental justice by Appendix C, "Environmental Justice in NRR NEPA Documents," to NRR Office Instruction, LIC-203, Revision 2, "Procedural Guidance for Preparing Environmental Assessments and Considering Environmental Issues," dated February 17, 2009. The environmental justice review involves identifying minority and low-income populations in the vicinity of the plant that may be affected by license renewal, any concerns and potential environmental impacts that may affect these populations, including their geographic locations, the significance of such concerns and effects and whether they would be disproportionately high and adverse when compared to the general population, and if so, the mitigation measures available to reduce and/or eliminate these impacts, and the mitigation measures that will be implemented. The NRC will perform the environmental justice review to determine whether there would be disproportionately high and adverse human heath and environmental effects on minority and low-income populations and report the results of this review in the SEIS. The review will be based on information provided in the ER and developed during the scoping process.

Information and Analysis Content

The ER should include the following information to assist the staff in its environmental justice review:

- Based on information about minority and low-income populations and communities residing in the immediate vicinity of the plant site presented in Chapter 3 of this regulatory guide, identify potential impacts and any concerns these populations and communities may have about the continued operation of the nuclear plant. Also discuss the potential for disproportionately high and adverse human health and environmental impacts.

- Describe any observed subsistence consumption behavior patterns—specifically fish and wildlife consumption—by minority and low-income populations in the vicinity of the plant (see Section 4–4 of the Executive Order 12898). This subsistence consumption behavior could consist of hunting, fishing, and trapping of game animals and any other general food gathering activities (e.g., collecting nuts, berries, and other plant material) conducted by minority and low-income individuals in the vicinity of the plant.

- Provide any information about current or past wildlife sampling and testing of game animals such as deer, squirrel, turkey, pheasant, duck, and other game birds and animals that may have been conducted in the vicinity of plant. Wildlife sampling and testing may have been conducted before, during, and after plant construction and in the early days of plant operation, but was discontinued after determining that tissue samples consistently showed no significant or measurable radiological impact on the environment from plant operations. If this was indeed the case, then the ER should explain it.

- If it is determined that minority and/or low-income populations could be affected by plant operations and other associated license renewal activities, describe any mitigation measures that could be implemented.

4.11 Cumulative Impacts

Table B-1 states the following:

> Cumulative impacts of license renewal must be considered on a plant-specific basis. Impacts would depend on regional resource characteristics, the resource-specific impacts of license renewal, and the cumulative significance of other factors affecting the resource.

Specifically, 10 CFR 51.53(c)(3)(ii)(P) requires the following:

> Applicants shall provide information about past, present, and reasonably foreseeable future actions occurring in the vicinity of the nuclear plant that may result in a cumulative effect. For example, the applicant should include information about the construction and operation of other power plants and other industrial and commercial facilities in the vicinity of the nuclear plant.

Cumulative impact is a Category 2 issue and requires a plant-specific analysis. The CEQ defines cumulative impact in 40 CFR 1508.7. Cumulative impact analyses should consider new and continuing activities, such as license renewal, that are conducted, regulated, or approved by a Federal agency. The cumulative impacts analysis takes into account all actions, however minor, since impacts from individual minor actions may be significant when considered collectively over time. The goal of the analysis is to identify potentially significant impacts to improve decisions and move toward more sustainable development.

The analysis of cumulative impacts should focus on the resources that could be affected by the incremental impacts of continued plant operations. The CEQ discusses the assessment of cumulative effects in detail in its report entitled, "Considering Cumulative Effects under the National Environmental Policy Act." On the basis of the guidance provided in the CEQ report, a cumulative impact analysis in the ER should include the following:

- Consider the geographic scope (i.e., regions of influence). The regions of influence encompass the areas of effect and the distances at which impacts associated with license renewal may occur. Geographic boundaries may vary by the resource area being evaluated and the distances over which an impact may occur (e.g., the evaluation of impacts on air quality may have a greater regional extent than that of impacts on cultural resources).

- Consider the timeframe for the analysis. The timeframe incorporates the sum of the effects of renewal in combination with past, present, and future actions, since impacts may accumulate or develop over time. The reasonably foreseeable timeframe for future actions evaluated is 20 years (based on the typical license renewal term) from the time the license renewal is granted. Past and present actions include all actions up to and including the time of the license renewal application; future actions are those that are "reasonably foreseeable," that is, they are ongoing (and will continue into the future), are funded for future implementation, or are included in firm, near-term plans. Past and present actions are generally accounted for in the baseline assessment presented in the affected environment sections for each resource area (Chapter 3 of the ER). The direct and indirect impact analyses presented in Chapter 4 of the ER address the incremental impacts of

license renewal. These analyses are carried forward to the cumulative impact analysis, which expands the analysis to consider other past, present, and future actions. Table 4.12–1 of the GEIS lists examples of the types of other actions the analysis should consider.

- Consider the potential impacting factors of each past, present, or reasonably foreseeable future action or activity. Both the license renewal and other actions (related and nonrelated) will generate factors that could contribute to cumulative impacts. Discuss the impacts of activities associated with the proposed action (license renewal) for each resource area.

For some resource areas (e.g., water and aquatic resources), the contributions of ongoing actions within a region on cumulative impacts are regulated and monitored through a permitting process (e.g., NPDES) under State or Federal authority. In these cases, it may be assumed that cumulative impacts are managed as long as these actions (facilities) are in compliance with their respective permits. If, however, the analysis determines that a significant contribution to cumulative impacts would occur as a result of license renewal, the ER should identify measures to ensure that adverse impacts are avoided, minimized, or mitigated. Several recent environmental analyses for license renewal applications have found that overall cumulative impacts in the region of influence of the power plant were significant (e.g., the Oyster Creek plant in New Jersey and the Susquehanna plant in Pennsylvania).

4.12 Severe Accident Mitigation Alternatives

Table B-1 states the following:

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

Specifically, 10 CFR 51.53(c)(3)(ii)(L) requires the following:

> If the staff has not previously considered severe accident mitigation alternatives for the applicant's plant in an environmental impact statement or related supplement or in an environmental assessment, a consideration of alternatives to mitigate severe accidents must be provided.

Section 4.9.1.2 and Appendix G to the revised GEIS discuss severe accident mitigation alternatives.

The analyses performed for Chapter 4, "Environmental Consequences of Postulated Accidents," in the 1996 GEIS, represent adequate, plant-specific estimates of the environmental impacts of severe accidents. However, the Commission determined that a site-specific consideration of severe accident mitigation alternatives (SAMAs) will be required at the time of license renewal in a final environmental impact statement, final environmental assessment, or related supplement. The applicant should provide the relevant citation. If no such citations exist, the applicant should provide the information described below.

Information and Analysis Content

The identification of possible SAMAs and evaluation of their merits should use the information and analyses developed for the latest available version of the plant-specific probabilistic risk assessment, as well as insights from the individual plant examination for severe accident vulnerabilities and the plant-

specific individual plant examination of external events for severe accident vulnerabilities (e.g., earthquakes, fire, winds). In preparing the SAMA analyses, applicants may be guided by analyses performed for previous applications for renewal of operating licenses, as documented in supplements to the GEIS. In structuring the analysis, the applicant should consider the methodology presented in NUREG/BR-0184, "Regulatory Analysis Technical Evaluation Handbook," issued January 1997, and the guidance provided in NEI 05-01, Revision A, "Severe Accident Mitigation Alternatives (SAMA) Analysis Guidance Document," issued November 2005 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML060530203).

The ER should present the results of the following analytical steps and describe the methodology or analytical process used:

1. Based on the plant-specific risk study and supplementary analyses, identify and characterize the leading contributors to core damage frequency and offsite risk (i.e., population dose). The frequency of and contributors to core damage frequency and large release frequency are generally available from the plant-specific risk study. Development of offsite risk information may require additional site-specific analyses if the existing risk study does not include an assessment of offsite consequences.

2. From the external event analyses, provide estimates of the incremental contribution to core damage frequency and population dose from external events.

3. Identify practical physical plant modifications and plant procedural and administrative changes that can reduce severe accident dose consequence risk, considering both internal and external events. For each modification or change, estimate the approximate reduction in risk.

4. Estimate the value of the reduction in risk. Value is usually calculated for public health, occupational health, offsite property, and onsite property. Chapter 5 of NUREG/BR-0184 provides a detailed discussion of value calculation.

5. Estimate the approximate cost of each modification and procedural and administrative change found to reduce the dose consequence risk of severe accidents. Potential SAMAs that are not expected to be cost beneficial, even when uncertainties in the analysis are taken into consideration, may be screened out based on a bounding analysis.

6. Perform a more detailed value-impact analysis for the remaining SAMAs to identify any plant modifications and procedural changes that may be cost effective (see Chapter 5 of NUREG/BR-0184).

7. List plant modifications and procedural changes (if any) that have been or will be implemented to reduce the severe accident dose consequence risk or that will be further evaluated for possible implementation.

4.13 Uranium Fuel Cycle

Transportation of Radiological Waste

The transportation impacts of the uranium fuel cycle are expected to be small for all nuclear plants. The impacts of transporting materials to and from uranium fuel cycle facilities on workers, the public, and the environment are expected to be small. Transportation of radioactive materials is governed by regulatory limits and standards.

This is a Category 1 issue, and the impacts are small as long as the fuel used is not enriched beyond 5-percent uranium-235 and the average level of burnup for the peak rod does not exceed 62,000 megawatt-day per metric ton of uranium (MWd/MTU). As stated in 10 CFR 51.53(c)(3)(i), "The environmental report for the operating license renewal stage is not required to contain analyses of the environmental impacts of the license renewal issues identified as Category 1 issues in appendix B to subpart A of this part."

Table B-1 states that, "The impacts of transporting materials to and from uranium-fuel-cycle facilities on workers, the public, and the environment are expected to be small."

Section 4.12.1.1 of the revised GEIS and Volume 1, Addendum 1, "Generic Environmental Impact Statement for License Renewal of Nuclear Plants: Main Report Section 6.3—'Transportation,' Table 9.1, 'Summary of Findings on NEPA Issues for License Renewal of Nuclear Power Plants,' Final Report," discuss this issue.

Addendum 1 provides the technical basis for the final rule issued on September 3, 1999 (64 FR 48496,), that changed the transportation of fuel and waste from a Category 2 issue to a Category 1 issue. The staff is closely monitoring industry and NRC programs that would lead to fuel burnup higher than 62,000 MWd/MTU to modify the September 3, 1999, rule in a timely manner. Meanwhile, any potential applicant for license renewal seeking approval for burnup beyond 62,000 MWd/MTU should request early guidance from the NRC staff on how to handle this issue in the ER.

Chapter 5 Assessment of New and Significant Information

The General Guidance to Applicants section of this regulatory guide discusses the regulatory requirement to report new and significant information. For each Category 1 issue, the applicant must determine whether any "new and significant information" exists that would change the Category 1 conclusion in the GEIS. The applicant should also assess the environmental impacts for this issue in the ER, should this situation occur. It is important for the applicant to identify any new and significant information while preparing the ER. Applicants should describe the methods used to identify potential new and significant information. The following information should be summarized in this chapter of the ER:

- Describe the process for gathering and reviewing new and significant information for the ER. Explain how the process resulted in the identification of new and significant information for Category 1 issues and any other issues. The explanation should address (1) the process used to identify new information and (2) the process for determining the significance of any new information. The process for identifying new information could include the review of environmental monitoring reports, scientific literature, interviews with environmental and operations staff, discussions with licensees and other peer groups and industry organizations, consultations with experts knowledgeable about the local

environment, and consultations with other local Federal, State, Tribal, environmental, natural resource, permitting, and land use agencies. If the applicant determines that no new and significant information exists, the ER should include a statement of this determination in the ER.

- Describe new and significant information and any environmental impacts.

- For each impact, describe mitigation measures that were considered and those that could be implemented.

The ER need not include detailed supporting documentation about the discovery of new and significant information that would change Category 1 conclusions in the GEIS, but such information should be available for review by the NRC staff.

Chapter 6 Summary of License Renewal Impacts and Mitigating Actions

6.1 License Renewal Impacts

This section should summarize in tabular form the environmental impacts of continued plant operations during the license renewal term. The presentation of material should be organized by environmental resource area, such as the subject areas presented in 10 CFR Part 51, Table B-1.

6.2 Mitigation

This section should summarize in tabular form any mitigation measures considered for implementation in this ER.

6.3 Unavoidable Adverse Impacts

This section should summarize "any adverse environmental effects which cannot be avoided should the proposal be implemented," as required by 10 CFR 51.45(b)(2). Chapters 4 and 5 of the ER should identify unavoidable adverse effects, providing a level of detail commensurate with the significance of the effects.

6.4 Irreversible or Irretrievable Resource Commitments

This section should summarize "any irreversible or irretrievable commitments of resources which would be involved in the proposed action should it be implemented," as required by 10 CFR 51.45(b)(5). Irreversible or irretrievable commitments of resources include energy, materials, and resources committed and consumed during the license renewal term and additional waste materials generated by continued plant operations. The ER should briefly describe the magnitude and significance of the resource commitments. Discussions should be proportionate to the significance of the resource commitments.

6.5 Short-Term Use Versus Long-Term Productivity of the Environment

This section should summarize "the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity," as required by 10 CFR 51.45(b)(4). For operational impacts, "short-term" indicates the operating life of the plant, and "long-term" suggests the period after the licensed operating life ends and continuing for as long as the plant could have discernible impacts. The term "productivity" should be interpreted broadly to include

both the productivity of resources useful for human activity and the productivity and stability of ecological systems, even those that are not used directly by humankind.

Chapter 7 Alternatives to the Proposed Action

Regarding alternatives, 10 CFR 51.45(b)(3) states the following:

> The discussion of alternatives shall be sufficiently complete to aid the Commission in developing and exploring, pursuant to section 102(2)(E) of NEPA, "appropriate alternatives to the recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." To the extent practicable, the environmental impacts of the proposal and the alternatives should be presented in comparative form.

In addition, 10 CFR 51.53(c)(2) states the following:

> The applicant shall discuss in this report the environmental impacts of alternatives and any other matters described in § 51.45. The report is not required to include discussion of need for power or economic costs and economic benefits of the proposed action or of alternatives to the proposed action except insofar as such costs and benefits are either essential for a determination regarding the inclusion of an alternative in the range of alternatives considered or relevant to mitigation. The environmental report need not discuss other issues not related to the environmental effects of the proposed action and the alternatives.

Furthermore, 10 CFR 51.53(c)(3)(iii) states the following:

> The report must contain a consideration of alternatives for reducing adverse impacts, as required by 51.45(c), for all Category 2 license renewal issues in appendix B to subpart A of this part. No such consideration is required for Category 1 issues in appendix B to subpart A of this part.

Section 5 of Appendix A to Subpart A of 10 CFR Part 51 presents requirements for the treatment of alternatives in an environmental impact statement. These requirements are consistent with the CEQ regulations implementing NEPA (40 CFR 1502.14, "Alternatives Including the Proposed Action"), which require that an environmental impact statement do the following:[15]

- Rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated.
- Devote substantial treatment to each alternative considered in detail including the proposed action so that reviewers may evaluate their comparative merits.
- Include reasonable alternatives not within the jurisdiction of the lead agency.
- Include the alternative of no action.

[15] The CEQ publication entitled, "Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations," dated March 23, 1981, and amended April 25, 1986 (46 FR 18026 and 51 FR 15618, respectively), provides additional guidance on alternatives.

- Identify the agency's preferred alternative or alternatives, if one or more exists, in the draft statement and identify such alternative in the final statement unless another law prohibits the expression of such a preference.

- Include appropriate mitigation measures not already included in the proposed action or alternatives.

In deciding whether or not to approve license renewal, the NRC will consider the environmental impacts of alternatives as well as those of the proposed action. The NRC considers environmental effects of license renewal according to 10 CFR 51.103(a)(5), which states the following:

> In making a final decision on a license renewal action pursuant to Part 54 of this chapter, the Commission shall determine whether or not the adverse environmental impacts of license renewal are so great that preserving the option of license renewal for energy planning decision makers would be unreasonable.

7.1 Energy Alternatives

Alternatives Considered

Each energy alternative should meet the purpose and need for the proposed action. The purpose and need adopted by the NRC, as stated in the GEIS and in Chapter 1 of this regulatory guide, are to meet future system generating needs. Alternatives that meet the stated purpose and need are (1) build new generating capacity (i.e., construct and operate a new fossil fuel or renewable energy power plant), (2) purchase power, or (3) reduce power requirements through demand reductions and conservation or energy efficiency measures.

In this section, applicants should describe the process used to identify and select alternatives to the proposed action. The ER should describe all of the energy alternatives considered and indicate which alternatives were evaluated in detail. The ER should explain in detail which alternatives were not considered and why. The ER should discuss the extent to which these alternatives have been considered by State, utility, or, where applicable, Federal authorities (e.g., public service commissions; environmental, natural resource, or energy agencies; or other groups vested with energy planning authority, depending on existing energy regulatory structures) and how such considerations relate to the applicant's evaluation. This discussion should include any existing State-level regulations that promote, enhance, prohibit, or challenge particular alternatives.

Environmental Impacts of Energy Alternatives

This section should describe the impacts of the energy alternatives identified for detailed consideration (i.e., fossil fuel and/or renewable energy power plant). The impacts should be described in sufficient detail and in similar format to the proposed action so that reviewers may compare the effects of the energy alternatives with the effects of continued plant operations. Impact analyses should consider land use and visual resources, air quality and noise, geology and soils, hydrology (surface water and groundwater), ecological resources, historic and cultural resources, socioeconomics, human health, environmental justice, and waste management and pollution prevention. The impacts analyses should include direct, indirect, and cumulative impacts. For each alternative, the analysis should identify and, to the extent possible, quantify, unavoidable adverse impacts, irreversible and irretrievable resource commitments, and tradeoffs between short-term use and long-term productivity of the environment. Each

alternative should be analyzed on a site-specific basis (whenever possible to locate an alternative at the existing plant site), or at least on a State- or region-specific basis, depending on the applicant's service area (when applicable) or the power market into which the applicant sells electricity. The applicant should analyze each impact in proportion to its significance. Chapter 4 of the GEIS includes the results of an analysis of the generic environmental impacts of several electricity generating technologies. The applicant may use these results to the extent that they are applicable. Any findings on impact levels for alternatives included in the GEIS are intended to be illustrative of likely impacts and must be revisited on a site- and plant-specific basis in the ER.

7.2 Alternatives for Reducing Adverse Impacts

Alternatives Considered

As noted in 10 CFR 51.53(c)(3)(iii), "The report must contain a consideration of alternatives for reducing adverse impacts, as required by § 51.45(c), for all Category 2 license renewal issues in Appendix B to Subpart A of this part." Applicants should describe the process it used to identify and select alternatives for reducing adverse impacts. Applicants should describe all of the alternatives considered and indicate which alternatives it evaluated in detail. Typical alternatives considered in this section include closed-cycle cooling or intake modification options for nuclear power plants that currently use once-through cooling.

Environmental Impacts of Alternatives for Reducing Adverse Impacts

This section should describe the impacts of the alternatives for reducing adverse effects identified for detailed consideration. The ER should describe the impacts in sufficient detail and in similar format to the proposed action so that reviewers may compare the effects of the alternatives with the effects of continued plant operations. Impact analyses should consider land use and visual resources, air quality and noise, geology and soils, hydrology (surface water and groundwater), ecological resources, historic and cultural resources, socioeconomics, human health, environmental justice, and waste management and pollution prevention. The impacts analyses should include direct, indirect, and cumulative impacts. For each alternative, the analysis should identify and, to the extent possible, quantify, unavoidable adverse impacts, irreversible and irretrievable resource commitments, and tradeoffs between short-term use and long-term productivity of the environment. The ER should analyze each alternative on a site-specific basis and in proportion to its significance.

7.3 No-Action Alternative

For license renewal, the no-action alternative is a scenario in which the NRC takes no action (not even docketing an application for review) and results in the applicant's operating license expiring at the end of the current licensing period. The applicant would still possess an operating license with its existing expiration date and could continue to operate the plant until the expiration of the license. At or before license expiration, the applicant could terminate plant operations and initiate decommissioning activities.

Decommissioning is not a consequence of the no-action alternative, because it would occur at some point in time at the end of the plant's operating life, whenever the applicant decides that the plant is no longer viable and terminates plant operations. Decommissioning may begin at the end of (or before the end of) the current operating license and may continue until well after the license expires.

As discussed in the 1996 GEIS (Section 8.4), decommissioning will make no difference in impact regardless of when decommissioning commences. The impacts of concern for the no-action alternative include the impacts from terminating plant operations rather than from decommissioning. The analysis should consider direct, indirect, and cumulative impacts. The level of effort expended on impact analyses of this alternative should be commensurate with the significance of the impacts. The ER may summarize and incorporate by reference material from the GEIS to the extent practicable.

Since the no-action alternative does not meet the purpose and need for the proposed action, it may require that the applicant or its customers take action to replace or compensate for lost power generation. The no-action alternative should consider the impacts of these actions. The applicant may incorporate by reference the impacts from analyses developed for the energy alternatives discussed in Section 7.1. The range of impacts for the no-action alternative should address the impacts associated with replacement power or other possible measures to address the loss of the plant's generating capacity.

Chapter 8 Comparison of Environmental Impact of License Renewal with the Alternatives

This section should present the impacts of the proposed action, reasonable alternatives to the proposed action, and the no-action alternative in comparative form in order to define the issues and provide a clear basis for the NRC to "determine whether or not the adverse environmental impacts of license renewal are so great that preserving the option of license renewal for energy planning decision makers would be unreasonable." The applicant may present this comparison in any of several formats. Often the comparison is presented in a tabular format such as Tables 2.4-1 through 2.4-5 in the GEIS. The comparison should emphasize the more significant impacts of each alternative.

Chapter 9 Status of Compliance

According to 10 CFR 51.45(d), an applicant must discuss the status of compliance with applicable environmental quality standards and requirements in the ER:

> The environmental report shall list all Federal permits, licenses, approvals and other entitlements which must be obtained in connection with the proposed action and shall describe the status of compliance with these requirements. The environmental report shall also include a discussion of the status of compliance with applicable environmental quality standards and requirements including, but not limited to, applicable zoning and land-use regulations, and thermal and other water pollution limitations or requirements which have been imposed by Federal, State, regional, and local agencies having responsibility for environmental protection.

Appendix F to Volume 2 of the GEIS presents a brief discussion of Federal and State laws, regulations, and other requirements that may be affected by the renewal and continued operation of NRC-licensed nuclear power plants. It also provides information about environmental laws and regulations applicable to license renewal that would be identified in Chapter 3, "Affected Environment" in Supplemental EISs. These include Federal and State laws, regulations, and other requirements designed to protect the environment, including land and water use, air quality, aquatic resources, terrestrial resources, radiological impacts, solid waste, chemical impacts, and socioeconomic conditions.

Applicable Federal and State laws and regulations include:

1. laws and regulations that could require the NRC or the applicant to undergo a *new* authorization or consultation process with Federal or State agencies outside the NRC or

2. laws and executive orders that could require the NRC or the applicant to *renew* authorizations currently granted or hold additional consultations with Federal or State agencies outside the NRC.

The appendix is provided as a general overview to assist the applicant in identifying environmental and natural resources laws that may affect the license renewal process. This is not intended as a complete and final list, and the applicant is reminded that a variety of additional local and regional requirements may exist for the specific plant site.

C. IMPLEMENTATION

The purpose of this section is to provide information to applicants and licensees regarding the NRC's plans for using this draft regulatory guide. The NRC does not intend or approve any imposition or backfit in connection with its issuance.

The NRC has issued this draft guide to encourage public participation in its development. The NRC will consider all public comments received in development of the final guidance document. In some cases, applicants or licensees may propose an alternative or use a previously established acceptable alternative method for complying with specified portions of the NRC's regulations. Otherwise, the methods described in this guide will be used in evaluating compliance with the applicable regulations for license applications, license amendment applications, and amendment requests.

REGULATORY ANALYSIS

The NRC did not prepare a separate regulatory analysis for this regulatory guide. The regulatory analysis for the proposed rule is located in ADAMS Accession No. ML083460087.

BIBLIOGRAPHY

U.S. Nuclear Regulatory Commission Documents [16]

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

U.S. Nuclear Regulatory Commission (NRC). 1999. Standard Review Plans For Environmental Reviews For Nuclear Power Plants. NUREG-1555, Supplement 1, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 1997. Regulatory Analysis Technical Evaluation Handbook. NUREG/BR-0184, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 2000. Preparation of Supplemental Environmental Reports for Applicants to Renew Nuclear Power Plant Operating Licenses. Regulatory Guide 4.2, Supplement 1, Washington, D.C.

U.S. Nuclear Regulatory Commission (NRC). 2009. Revision 2, "Procedural Guidance for Preparing Environmental Assessments and Considering Environmental Issues. NRR Office Instruction LIC-203, Washington, D.C.

Federal Regulations

10 CFR Part 2. Code of Federal Regulations, Title 10, Energy, Part 2, "Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders."

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

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

36 CFR Part 60. Code of Federal Regulations, Title 36, Parks, Forests, and Public Property, Part 60, "National Register of Historic Places."

36 CFR Part 800. Code of Federal Regulations, Title 36, Parks, Forests, and Public Property, Part 800, "Protection of Historic Properties."

40 CFR Part 50. Code of Federal Regulations, Title 40, Protection of Environment, Part 50, "National Primary and Secondary Ambient Air Quality Standards."

40 CFR Part 51. Code of Federal Regulations, Title 40, Protection of Environment, Part 51, "Requirements for Preparation, Adoption, and Submittal of Implementation Plans."

[16] Publicly available NRC published documents listed herein are available electronically through the Electronic Reading room on the NRC's public Web site at: http://www.nrc.gov/reading-rm/doc-collections/. Copies are also available for inspection or copying for a fee from the NRC's Public Document Room (PDR) at 11555 Rockville Pike, Rockville, MD; the mailing address is USNRC PDR, Washington, DC 20555; telephone 301-415-4737 or (800) 397-4209; fax (301) 415-3548; and e-mail PDR.Resource@nrc.gov.

40 CFR Part 1508. Code of Federal Regulations, Title 40, Protection of Environment, Part 1508, "Terminology and Index."

50 CFR Part 402. Code of Federal Regulations, Title 50, Wildlife and Fisheries, Part 402, "Interagency Cooperation – Endangered Species Act of 1973, as Amended."

Clean Water Act of 1977. Federal Water Pollution Control Act of 1977, 33 USC 1251, et seq.

Council on Environmental Quality (CEQ). 1997. "Considering Cumulative Effects under the National Environmental Policy Act." Office of the President, Washington, DC. Available at http://ceq.hss.doe.gov/nepa/ccenepa/ccenepa.htm. Accessed August 12, 2008.

Council on Environmental Quality (CEQ). 1997. "Environmental Justice: Guidance under the National Environmental Policy Act." Office of the President, Washington, DC. Available at http://ceq.hss.doe.gov/nepa/regs/ej/justice.pdf.

Daily, G.C., S. Alexander, P.R. Ehrlich, J. Lubchenco, P.A. Matson, H.A. Mooney, S. Postel, S.H. Schneider, D. Tilman, and G.M. Woodwell. 1997. "Ecosystem Services: Benefits Supplied to Human Societies by Natural Ecosystems." Issues in Ecology, 2:1–16.

Endangered Species Act of 1973. 7 USC 136 et seq.

Executive Order 12898. 1994. Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. 59 FR 7629. February 16.

Federal Water Pollution Control Amendments (Clean Water Act or CWA) of 1972. 33 USC 12 51 et seq.

Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). 1976. 16 USC 1801–1884.

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

National Historic Preservation Act of 1966, as amended (NHPA). 16 USC 470aa et seq.

Resource Conservation and Recovery Act (RCRA) of 1976. 42 USC 6901 et seq.

Federal Register Notices

46 FR 7644, U.S. Fish and Wildlife Service. Fish and Wildlife Service Mitigation Policy. January 23, 1981

46 FR 18026, Council on Environmental Quality. Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations. March 23, 1981. Amended 51 FR 15618, April 25, 1986.

58 FR 63214, Environmental Protection Agency. Final Rule for Determining Conformity of General Federal Actions to State or Federal Implementation Plans. November 30, 1993.

61 FR 28467, U.S. Nuclear Regulatory Commission. Environmental Review for Renewal of Nuclear Power Plant Operating Licenses; Final Rule. June 5, 1996.

61 FR 66537, U.S. Nuclear Regulatory Commission. Environmental Review for Renewal of Nuclear Power Plant Operating Licenses; Final Rule. December 18, 1996.

64 FR 48496, U.S. Nuclear Regulatory Commission. Changes to Requirements for Environmental Review for Renewal of Nuclear Power Plant Operating Licenses; Final Rule. September 3, 1999.

69 FR 52040, U.S. Nuclear Regulatory Commission. Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions; Final Policy Statement. August 24, 2004.

Other Documents [17]

Institute of Electrical and Electronic Engineers, Inc. (IEEE). 2007. National Electrical Safety Code. C2 2007, New York, New York.

Lowrance, R.R., S. McIntyre, and C. Lance. 1988. "Erosion and Deposition in a Field/Forest System Estimated Using Cesium-137 Activity." Journal of Soil and Water Conservation, 43(2):195–199. (Cited in EPA 1993.)

Mitsch, W.J., and J.G. Gosselink. 1986. Wetlands. Van Nostrand Reinhold Co., New York, NY. (Cited in EPA 1993.)

National Marine Fisheries Service (NMFS). 1998. "Essential Fish Habitat: New Marine Fish Habitat Conservation Mandate for Federal Agencies." EFH Federal Agency Primer. December 1998. Northeast Regional Office, Gloucester, Massachusetts. Available at: http://www.nero.noaa.gov/hcd/finprim.pdf. Accessed July 7, 2008.

National Research Council. 2004. "Valuing Ecosystem Services: Toward Better Environmental Decision-Making." The National Academies Press, Washington DC.

Nuclear Energy Institute (NEI). 2005. Severe Accident Mitigation Alternatives (SAMA) Analysis, Guidance Document. NEI 05-01, Revision A, Washington, D.C. November.

Nuclear Energy Institute (NEI). 2007. Industry Ground Water Protection Initiative – Final Guidance Document. NEI 07-07, Washington, D.C. August.

U.S. Environmental Protection Agency (EPA). 1993. "Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters." EPA 840-B-92-002. January 1993. Office of Wetlands, Oceans & Watersheds. Chapter 7, "Management Measures for Wetlands, Riparian Areas, and Vegetated Treatment Systems, 'Glossary'". Available at http://www.epa.gov/owow/nps/MMGI/ Accessed July 3, 2008.

U.S. Environmental Protection Agency (EPA). 1995. Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources, AP-42, Fifth Edition, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina, January.

[17] Copies of the non-NRC documents included in this bibliography may be obtained directly from the publishing organization.

U.S. Environmental Protection Agency (EPA). 1998. "Guidelines for Ecological Risk Assessment." EPA/630/R-95/002. Risk Assessment Forum, Washington, DC. Pages 35–36.

U.S. Environmental Protection Agency (EPA). 1999. Consideration of Cumulative Impacts in EPA Review of NEPA Documents. US EPA, Office of Federal Activities (2252A). EPA 315-R-99-002/May 1999.

U.S. Geological Survey (USGS). 1997. "USGS Land Use and Land Cover Data," USGS Earth Resources Observation Data Center, Sioux Falls, South Dakota. Available at: http://edcwww.cr.usgs.gov/glis/hyper/guide/1_250_lulc#lulc16.

Vaughan, R. 1994. Endangered Species Handbook. Government Institutes, Inc. Rockville, Maryland. 165 pages.