U.S.NRC

UNITED STATES NUCLEAR REGULATORY COMMISSION

*Protecting People and the Environment*

# COMBINED LICENSE AND EARLY SITE PERMIT
# COL/ESP-ISG-026

## Environmental Issues Associated with New Reactors

## Interim Staff Guidance

## August 2014

*(Final)*

ML14092A402 – August 2014

**Interim Staff Guidance on Environmental Issues**
**Associated with New Reactors**
**COL/ESP-ISG-026**

## Issuance Status

Final

## Purpose

The purpose of this Interim Staff Guidance (ISG) is to clarify the U.S. Nuclear Regulatory Commission (NRC) guidance and application of NUREG-1555, "Standard Review Plans for Environmental Reviews for Nuclear Power Plants," (NRC 2000) regarding the assessment of construction impacts, greenhouse gas and climate change, socioeconomics, environmental justice, need for power, alternatives, cumulative impacts, and cultural/historical resources as part of the preparation of Environmental Impact Statements (EIS) for early site permit (ESP) and combined license (COL) applications.

## Background

The existing NRC environmental guidance to the staff, is NUREG-1555, "Standard Review Plans for Environmental Reviews for Nuclear Power Plants: Environmental Standard Review Plan" (NRC 2000), including the 2007 draft revisions to selected sections of NUREG-1555. While preparing the environmental impact statements (EISs) for the first group of COL applications, the NRC staff identified a number of issues that necessitated changes to staff guidance. As a result, the Director of the Division of Site and Environmental Reviews issued a memorandum dated March 4, 2011, to the staff providing guidance on how to analyze these issues in the EISs (Agencywide Documents Access and Management System (ADAMS) Accession No. ML110380369 (NRC 2011). The staff is incorporating this guidance into an ISG until NUREG-1555 is updated. Among other things, the guidance addresses implications of changes to the NRC's definition of "construction" in Title 10 of the *Code of Federal Regulations* (10 CFR) 50.10, "License Required; Limited Work Authorization,") referred to in this guidance as the limited work authorization (LWA) rule.

## Issue Discussion

This guidance is intended to assist staff in conducting environmental reviews associated with ESP and COL applications. This ISG complements existing NRC guidance, NUREG-1555 including the 2007 draft revisions. Use of this guidance will assist the staff in addressing certain aspects of the environmental reviews for ESP and COL applications that: (1) have evolved since the last update to NUREG-1555, (2) were identified during ESP and COL reviews as needing updating, or (3) involve the U.S. Army Corps of Engineers (Corps or USACE) as a cooperating agency.

## Rationale

The purpose of this document is to provide updated guidance to the staff on the assessment of construction impacts, greenhouse gases and climate change, socioeconomics, environmental justice, need for power, alternatives, cumulative impact assessments, and historic and cultural resource issues. Detailed guidance is provided within attachments to this ISG. This guidance

ensures that the analyses and review procedures are appropriately standardized and that these issues are addressed consistently and adequately in the resulting EISs.

**Staff Guidance**

This guidance will be used on an interim basis until NUREG-1555 is updated. This guidance may be revised and updated as needed to clarify the content or incorporate modifications approved by NRC management. Through this document, the NRC staff provides interim guidance to address:

- construction and preconstruction impacts
- mitigation
- greenhouse gases and climate change
- socioeconomics and environmental justice
- need for power
- historic and cultural resources
- cumulative impacts
- alternatives

Below is the background information for construction and preconstruction impacts resulting from changes to the LWA rule.

In 1974, the NRC created the LWA rule (10 CFR 50.10), which allowed for site preparation, excavation, and certain other onsite activities to proceed before a construction permit was issued, but only after NRC review and approval in the form of an LWA. On October 9, 2007, the NRC issued revisions to its rules related to LWAs in *Federal Register* notice, 72 FR 57416 (NRC 2007b). The NRC clarified that it does not have authority to require an NRC license for activities unless they have a reasonable nexus to radiological health and safety or common defense and security. The revised rule clarified which activities are defined as "construction" because they have such a nexus and therefore fall within the NRC's regulatory authority; the rule also defined activities that are not considered construction. In discussing the environmental impacts of the proposed action, activities defined by the LWA rule not to be construction are also referred to in this guidance as "preconstruction" activities, because they may occur in the absence of an NRC license and are not part of the NRC's licensing action. Therefore, preconstruction activities are not considered direct impacts of the NRC's Federal action. This change has implications for how impacts are described within the NRC's EISs, even when the application does not involve a request for an LWA. This ISG provides guidance on how EISs are to address construction and preconstruction issues consistent with the LWA rule. Construction and preconstruction issues will be addressed in EISs, as they have been in recent EISs, in a manner consistent with the revised LWA rule.

On February 23, 2009, "Interim Staff Guidance on the Definition of Construction and on Limited Work Authorizations," was issued in the *Federal Register* (74 FR 8124) and is available at ADAMS Accession No. ML082970729 (NRC 2009a). The February 23, 2009 ISG provides guidance on the definition of construction, including the delineation of preconstruction activities and the identification of those activities requiring NRC approval. This ISG also provides guidance on the information applicants should provide on impacts from preconstruction activities and cumulative impacts.

The NRC staff expects USACE will be a cooperating agency on the majority of EISs because it is likely to also have a permitting action for the proposed nuclear plant under Section 404 of the Clean Water Act and/or Section 10 of the Rivers and Harbors Act of 1899. In addition, if a proposal could modify a federal project, USACE approval may be required under Section 14 of the Rivers and Harbors Act of 1899 (33 USC 408 – commonly referred to as "Section 408").

The NRC and the USACE will cooperate on the EISs in accordance with the updated Memorandum of Understanding (MOU) between the NRC and the USACE (NRC 2008) (ADAMS Accession No. ML082540354). The NRC and the Corps established the cooperative agreement because both agencies have concluded it is the most effective and efficient use of Federal resources to develop one EIS that provides the environmental information and analysis needed by both agencies to comply with the National Environmental Policy Act (NEPA) and related laws to make their regulatory decisions. The Corps indicated that it considers all impacts of preconstruction and construction activities as direct impacts from its Federal action. Therefore, when the Corps is a cooperating agency, impacts from preconstruction are discussed in EIS Chapter 4 to satisfy the needs of the Corps and are also addressed in the cumulative impacts analysis in Chapter 7.

**Mitigation**

The reviewer will address mitigation of impacts. The guidance on mitigation applies to EIS Chapters 4 and 5. In Chapters 7 and 9, mitigation of impacts at alternative sites will follow the same approach as in Chapters 4 and 5.

*Mitigation*: The EIS should be written to be clear when mitigation measures are or are not reasonably foreseeable. A mitigation measure can be considered reasonably foreseeable if, for example, it is 1) required by the NRC as a license condition (e.g., a requirement imposed pursuant to 10 CFR 50.54(aa)), 2) required or likely to be required by another regulatory agency (e.g., USACE), or 3) mitigation that the applicant has stated to the NRC (e.g., in the Environmental Report) that it would perform. Where mitigation measures would be required by a license condition, that should be clearly stated in the EIS.

Where applicable, the NRC staff should specify what Federal, state, or local laws require the mitigation measures, or if there is (or is expected to be) a Federal, state, or local permit that requires the particular measures. The NRC staff should clearly explain the requirements that are being imposed by the regulatory agency with authority over the resource and state how the staff relied on the mitigation to determine the impact level by discussing how the mitigation will be accomplished and whether it is expected to lower the impact level. For example, for a project where a wetlands mitigation plan is required by a state permit issued to the applicant and/or by state laws and regulations, the NRC staff should consider this information in the EIS.

If the applicant committed to mitigation measures in the environmental report or other documents submitted to the NRC under oath or affirmation, that may be sufficient for the NRC staff to rely on that mitigation to determine impact levels, provided the NRC staff documents in the EIS why it concludes that the mitigation is reasonably foreseeable. For example, if the applicant states that it plans to use construction best management practices (BMPs) that are not required by a license condition or another state or federal permit, then the staff should rely on this mitigation if it can document that these BMPs are standard industry construction practices. BMPs can also be relied on if they are integral parts of the project. Documentation may take the form of asking the applicant to provide additional information to help determine if these practices

are reasonably foreseeable. NRC staff should ask, for example, whether these same practices been used by the applicant on other large construction projects.

If mitigation would result in a change in impact level for one or more resource areas, it is particularly important that the staff document the basis for concluding that this mitigation is reasonably foreseeable. NEPA instructs agencies to discuss environmental issues in accordance with their significance. So if a mitigation measure is particularly important to an impact determination, it may be appropriate to ask more specific requests for additional information of an applicant to obtain more details on the proposed mitigation plan. If the available information does not clearly demonstrate whether the mitigation measure is reasonably foreseeable and the non-implementation of that mitigation would result in a change in an impact level, then the staff should provide two impact levels; one with and one without mitigation (Example: The impact from traffic would be MODERATE without the traffic mitigation and SMALL with the mitigation). Because NEPA allows agencies to account for uncertainty, it may be appropriate to discuss why there is uncertainty in a particular analysis or state which impact is more likely to occur. If the non-implementation of mitigation would not alter the impact level, then the staff should provide the impact level without the mitigation and state that the mitigation, if enacted, would further reduce/minimize impacts (Example: The impact from traffic would be SMALL without mitigation, but implementation of a traffic management plan would further reduce impacts within the SMALL category).

**EIS Chapter-Specific Guidance**

The following guidance is premised on the assumption that the Corps will be acting as a cooperating agency on preparation of future EISs. Under the terms of the MOU, when the Corps is acting as a cooperating agency, "[t]he NRC will be responsible for drafting sections and requesting additional information to the extent that the NRC believes the analysis is needed and would normally be required by the NRC if the Corps were not involved. If the Corps believes that additional analysis is needed, but the NRC does not agree that such analysis would be required under the regulatory procedures of the NRC, such analysis will be the responsibility of the Corps." General guidance for addressing construction or preconstruction if the USACE is a cooperating agency is summarized below. Detailed guidance on specific topics (greenhouse gases and climate change, socioeconomics and environmental justice, need for power, historic and cultural resources, cumulative impacts, and alternatives) is included in the attachments.

<u>Chapter 1: Introduction</u>

Chapter 1 describes the proposed action, the process used to develop the EIS, the purpose and need for the project, and the status of compliance with permits required for the project. Because the USACE is typically a cooperating agency for the EISs, some adjustments are necessary to include information related to the role of the USACE in the review. In addition, the NRC staff introduces in this chapter the issue of preconstruction activities. This chapter should:

- Describe the NRC and the USACE application review.
- Explain the cooperating agency agreement between the NRC and USACE.
- Describe the proposed Federal action for both the NRC and USACE.
- Describe the purpose and need for both the NRC and USACE.

- Explain preconstruction activities.

- Briefly describe the alternatives, including USACE Section 404(b)(1) alternatives, to the proposed action that will be discussed in more detail in Chapter 9 or in a separate appendix.

Purpose and Need Statement

The purpose and need statement is the foundation of the environmental analysis on which the rest of the EIS is built. The purpose and need statement is developed by the NRC staff, and is informed by the applicant's objectives,[1] as stated in Chapter 1 of the applicant's environmental report. In accordance with the 2008 MOU, NRC should coordinate closely with USACE when determining purpose and need, giving full consideration to USACE's views. USACE must evaluate alternatives not only under NEPA but also in accordance with the Clean Water Act's Section 404(b)(1) guidelines.

For example, in recent EISs for large light-water reactors, the NRC's purpose and need has been described in terms of a specific quantity of baseload electricity within an identified service area within a defined time period. This purpose and need statement is the basis for the need for power analysis and for establishing a reasonable set of alternatives to the proposed action. The need for power analysis demonstrates that there is a need for the quantity and type of power in the service area and in the time frame specified. The alternatives analysis considers both alternative energy sources consistent with the type of power identified, and alternatives sites that meet the purpose and need. Energy alternatives that do not meet the purpose and need statement are not considered reasonable alternatives and are not analyzed in detail. For the alternative sites analysis, it must be practicable for the plant to supply its power to the service area identified in the purpose and need. The benefit-cost analysis evaluates the benefit of generating the quantity of baseload power for which there is a demonstrated need against the environmental cost of building and operating the plant. The purpose and need statement cannot be so narrowly drawn as to foreclose all reasonable alternatives.

The NRC's purpose and need in the EIS should be informed by the applicant's objectives, which can be different from the above example. For example, an applicant could include other project purposes in addition to supplying baseload power, such as meeting greenhouse gas emission goals, enhancing energy diversity, or a meeting State energy policy.

Chapter 2: Affected Environment

Chapter 2 describes the site and environs. This description informs the analysis in Chapters 4 and 5 and serves as the "baseline" of the cumulative impacts evaluation in Chapter 7. The following clarifications address the focus of the information for Chapter 2, and the role of the USACE.

[1] 40 CFR 1502.13, "Purpose and Need," defines purpose and need as follows: "The statement shall briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action." It is NRC policy to voluntarily take into account, subject to certain conditions, of the regulations of Council on Environmental Quality (CEQ) implementing NEPA.

- Focus the scope of Chapter 2 on the resource areas that are expected to be most affected by the proposed action or alternatives. Similarly, focus the level of detail for elements in Chapter 2 commensurate with the impact levels presented in Chapters 4 and 5. For example, for a LARGE[2] impact to a resource area related to construction or operation in Chapters 4 or 5, the appropriate baseline information in Chapter 2 needs to be well defined.

- The NRC reviewer should coordinate with the Corps to ensure that information is included in Chapter 2 that the Corps needs regarding their regulated activities including wetlands, streams and rivers that may be affected by the project or the associated transmission lines.

Chapter 3: Site Layout and Plant Description

Chapter 3 will provide a general characterization of the activities for the principal systems, structures, and components (SSCs) to provide the requisite background for the assessment of environmental impacts.

- The characterization of the activities for the SSCs will include descriptive information, a discussion of construction and preconstruction activities, and a discussion of the operational performance of the SSCs. The purpose of the discussion of the SSCs in Chapter 3 along with a description of the affected environment in Chapter 2 is to provide information for the assessment of impacts in Chapters 4 and 5.

Chapter 4: Construction Impacts at the Proposed Site

Chapter 4 describes and evaluates the environmental impacts related to the construction of the proposed project, using the information from Chapters 2 and 3. Changes to Chapter 4 result from updated guidance on greenhouse gases and climate change, historic and cultural resources, environmental justice, and the change in the definition of NRC authorized construction. In addition, changes were made to address the difference in treatment of construction and preconstruction impacts between the NRC and USACE, as discussed in the bullets below.

- Chapter 4 will include a discussion of the MOU with the Corps, if applicable, including its purpose and why the two agencies agreed to update the MOU to include the cooperating agency approach.

- Include a discussion of how and why the EIS addresses the impacts of preconstruction activities in Chapter 4. The discussion should explain how each agency establishes the scope and structure of its NEPA review from its enabling legislation.

- Provide discussions in the appropriate areas about activities for which the applicant expects to need a Corps permit (e.g., dredging, filling, installing culverts, modifying a Federal project etc.).

[2] SMALL, MODERATE, and LARGE impact levels are defined in 10 CFR 51, "Environmental Protection Regulations for Domestic Licensing and Regulated Regulatory Functions," Subpart A, "National Environmental Policy Act—Regulations Implementing Section 102(2), Appendix B, "Environmental Effect of Renewing the Operating License of a Nuclear Power Plant," Table B-1.

- In the discussion for each resource area (land use, hydrology, etc.), text should be added to Chapter 4 that describes the basis and conclusion regarding the combined impact level of construction and preconstruction activities (the conclusions are drawn by the review team, which includes NRC and Corps personnel. It also specified that:

    - For any resource area where the combined impact level is SMALL, no further breakdown of impacts between construction and preconstruction is needed, and the NRC staff will conclude the impact from NRC-authorized construction activities is SMALL.

    - For any resource area where the conclusion of the combined impact is greater than SMALL, a statement indicating the impact level for the NRC-authorized construction activities and the basis for the NRC staff's conclusion must be presented.

In general, more detail regarding the analysis, bases, and conclusions should be provided for those activities where the overall impact is greater than SMALL. However, all impacts need to have sufficient basis to support the determination. For resource areas where the impact category level is greater than SMALL, the impact (including supporting analysis, bases, and conclusions) resulting from NRC-authorized construction activities will be discussed separately. For example, if the overall effects of preconstruction and construction on a particular resource area are MODERATE, then the NRC also will assess and draw a conclusion regarding the effects solely from NRC-defined construction activities on the particular resource area. When the overall impact category level is SMALL, then the discussion regarding the NRC-related construction impacts may be relatively brief and no further detailed discussion is necessary. A summary table at the end of Chapter 4 will be used to characterize construction and preconstruction impacts.

Chapter 5: Operational Impacts at the Proposed Site

Chapter 5 describes and evaluates the environmental impacts related to the operation of the proposed project, using the information from Chapters 2 and 3. Changes to Chapter 5 are the result of more detailed guidance on greenhouse gases and climate change, historic and cultural resources, and environmental justice. Reference the attachments for more details on the specific issues.

Chapter 6: Fuel Cycle, Transportation, and Decommissioning

Chapter 6 describes and evaluates the environmental impacts related to the fuel cycle, transportation of radioactive materials, and the decommissioning of the proposed project. While this ISG provides guidance as to the analysis of impacts associated with greenhouse gases, it does not otherwise provide guidance with respect to the EIS analysis of impacts from the fuel cycle or decommissioning. Reference Attachment 1 for more details on greenhouse gas analysis.

Chapter 7: Cumulative Impacts

Chapter 7 describes and evaluates the impacts of the project when combined with the impacts of other past, present, and reasonably foreseeable projects that impact the same resources. The staff has developed guidance for cumulative impact review for Chapter 7 of the EIS in Attachment 4 of this ISG. Reference Attachment 4 for more details on cumulative impacts.

Chapter 8: Need for Power

Chapter 8 describes and evaluates the need for the power that would be provided by the proposed project. The staff has developed guidance for need for power reviews for Chapter 8 of the EIS in Attachment 5 of this ISG. Reference Attachment 5 for more details on need for power analysis.

Chapter 9: Environmental Impact of Alternatives

Chapter 9 describes and evaluates alternatives to the proposed project. The staff has developed guidance for alternative reviews for Chapter 9 of the EIS in Attachment 6. Reference Attachment 6 for more details on alternatives analysis.

Chapter 10: Conclusion and Recommendation

Chapter 10 summarizes the conclusions set forth in the EIS and states the staff's recommendations concerning the proposed action. Discussions of unavoidable adverse impacts, costs, and benefits will be developed in terms of preconstruction and construction activities.

**Guidance for Specific Issues**

Greenhouse Gases and Climate Change

The staff has updated guidance for addressing greenhouse gas (GHG) and climate change impacts for new reactor EISs in Attachment 1 of this ISG. The Commission, in CLI-09-21 (NRC 2009b) (ADAMS Accession No. ML093070690), provided guidance to the staff regarding consideration of carbon dioxide and other greenhouse gases in its environmental reviews for major licensing actions under NEPA.

The staff's guidance proposes that climate change will be addressed in the affected environment portion of the EIS (Chapter 2) within the discussion of climate. It will also be considered in other resource areas (air and water resources, ecological resources, and human health areas) as part of the cumulative impacts analysis in Chapter 7 for the proposed site and in Chapter 9 for the alternative sites. Carbon dioxide and other GHGs will be considered as direct, indirect, or cumulative impacts on air quality (along with criteria pollutants) in Chapters 4, 5, 6, 7 and 9.

Appendix A of Attachment 1 contains an analysis performed by the NRC staff to determine the GHG emissions in carbon dioxide ($CO_2$) equivalent from the uranium fuel cycle and decommissioning, as well as from construction and operation of the facility. Refinements were made to the construction and operation emission estimates presented in the 2011 guidance memo (NRC 2011) (ADAMS Accession No. ML110380369).

An applicant may choose to either submit a detailed analysis of the GHG emissions from its planned facility or reference the staff's analysis in Appendix A of Attachment 1. If the applicant submits a detailed analysis instead of referencing the staff's analysis, then the staff will review the applicant's analysis and compare it to the generic analysis in Appendix A of Attachment 1 and other applicable reports when making a determination of impacts in the EIS.

Socioeconomics and Environmental Justice

The staff has updated guidance for socioeconomic and environmental justice reviews in Attachment 2 of this ISG. LIC-203, Revision 3, "Procedural Guidance for Preparing Categorical Exclusions, Environmental Assessments, and Considering Environmental Issues" (NRC 2013), provides guidance for the staff to use decennial census data for demographic information because it disaggregated data down to the census block group level. With the latest decennial census, the U.S. Census Bureau stopped including survey estimates of poverty data. However, another data series, the American Community Survey (ACS), tracks census block group level data on a 5-year moving average, based on survey data. For poverty data, this is the only source for census block group data. Because of this change, the reviewers should use the ACS 5-year summary file estimates for all race, ethnicity and poverty data. However, the reviewer may deviate from the ACS data when there is a reasonable basis for the alternative data source. For example, if decennial census data is reasonably new, the reviewer may deem decennial census data for race and ethnicity to be a reasonable data source.

The staff has guidance in place (NUREG-1555 draft, Revision 1, July 2007, Sections 2.5.4, 4.4.3, and 5.8.3) regarding the assessment of potential disproportionately high and adverse impacts on minority and low-income populations within the 80-kilometer (50-mile) region. Attachment 2 of this ISG contains detailed guidance on performing the environmental justice review that updates the 2007 guidance. These guidance documents are supplemented by the staff's guidance in LIC-203, Revision 3, and the Commission's Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions (68 FR 62642) (NRC 2004). Based on statements in the Commission's Memorandum and Order approving the ESP for the North Anna ESP site in Louisa County, VA, (CLI-07-27) (NRC 2007a), the staff determined that the following clarification to the guidance in NUREG-1555 was needed. Chapter 2 (Affected Environment) will describe how the staff will identify and describe the current state of the communities and people within the 80-kilometer (50-mile) region. In Chapters 4, 5, and 7, the staff will describe how the staff should consider the minority and low-income communities identified in Chapter 2, along with the analytical processes for determining socioeconomic impacts to identify potential impact categories (public services, education, demographics), pathways (soil, air, water), or unique practices (e.g., subsistence fishing, religious ceremonies, etc.) that could lead to environmental justice impacts.

Historic and Cultural Resources

The staff has updated guidance for addressing historic and cultural resources for new reactor EISs in Attachment 3 of this ISG. When the NRC conducts the required National Historic Preservation Act (NHPA), Section 106 consultation through its process for complying with the NEPA, the EIS contains conclusions to address both statutes with respect to the impacts to historic and cultural resources at the proposed site. The guidance supplements NUREG-1555 with respect to (1) coordinating NHPA with the NEPA conclusion, (2) completing Section 106 consultation, (3) using reconnaissance-level information for alternative sites, (4) analyzing cumulative impacts for historic and cultural resources, and (5) protecting historic and cultural resource information.

When fulfilling its NHPA obligations, the NRC views site preparation activities with no nexus to radiological health and safety or common defense and security as private actions that are not part of the NRC's Federal undertaking. However, those site preparation activities may be subject to NHPA review to the extent they are encompassed by the Federal undertaking of

another Federal Agency, such as the USACE. Certain site preparation activities may have other specific NHPA consequences.

The staff during pre-application interactions should inform the applicant that if it decides to commence site preparation activities, the applicant should be cognizant of the anticipatory demolition statutory provision in Section 110(k) of the NHPA (16 U.S.C. § 470h-2(k)) which states:

> Each Federal agency shall ensure that the agency will not grant a loan, loan guarantee, permit, license, or other assistance to an applicant who, with intent to avoid the requirements of section 106 of this Act, has intentionally significantly adversely affected a historic property to which the grant would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the agency, after consultation with the Council, determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant.

The staff during the acceptance review and throughout the review should inform management if it appears anticipatory demolition may have occurred and if necessary, consult with the Advisory Council on Historic Preservation (ACHP) to determine what action may be appropriate.

Cumulative Impacts

The staff has updated guidance for addressing cumulative impacts in Attachment 4 of this ISG. Chapter 7 will include a discussion explaining the assessment of cumulative impacts relying, in part, on input from earlier sections of the EIS. In the introduction to Chapter 7, a table will display past, present, and reasonably foreseeable projects that occur within the defined geographic area of interest within the established time period that would affect the same resources as the proposed plant. The final section of Chapter 7 should include a summary table of the cumulative impacts. This will be used in the comparison of the proposed site to the alternative sites in Chapter 9.

Need For Power

The staff has updated guidance for addressing need for power for new reactor EISs in Attachment 5 of this ISG. The Office of New Reactors has guidance in place (NUREG-1555, Sections 8.0-8.4) for the assessment of the need for power consistent with the objectives of an applicant's COL. The staff's need for power review was clarified further by a series of Commission statements and opinions, the most important of which is the Commission's Denial of Nuclear Energy Institute's Petition for Rulemaking regarding the need for power review, Docket No. PRM 52-2 (68 FR 55905) (NRC 2003). Because of these clarifications, the staff determined that clarification of the guidance was warranted. NUREG-1555 has significant guidance on how the staff will perform its own analysis if an independent, third party analysis is not available or if one does not meet the four criteria as defined in Attachment 5 of this ISG. The reviewer will perform an independent assessment of the need for power. A comparison of the staff's independent assessment with the applicant's conclusions in its ER will form the basis for the staff's Need for Power determination in the EIS.

The most notable changes for the need for power analysis are as follows:

- The ISG clarifies the ways by which an applicant can demonstrate the need for the full electricity capacity of the proposed project. It also clarifies the types of analyses and

documentation that are sufficient for the staff to rely upon the applicant's need for power determination.

Alternatives

The staff has updated guidance for the alternatives review in Chapter 9 of the EIS in Attachment 6. The most notable changes for alternatives are as follows:

- The comparison of energy alternatives and the impacts for the alternative sites will include the consideration of GHG emissions.

- Guidance is provided to develop additional detail regarding energy alternatives to support the comparison of alternatives.

- For alternative sites, the assessment will address cumulative impacts (including construction, pre-construction, operation at the site, and other projects as necessary for the cumulative impacts) in each resource area and a single impact level will be determined.

- Alternative transmission line routing is no longer evaluated because transmission lines are not NRC authorized construction. Transmission line routing for the primary site is analyzed in Chapter 7, Cumulative Impacts.

If the USACE is a cooperating agency on the EIS, it generally includes alternatives that will minimize the impacts to aquatic resources including wetlands, streams, lakes, and rivers. USACE also may include an appendix analyzing its public interest review factors. The USACE alternatives analysis under Section 404 of the Clean Water Act provides a basis for the least environmentally damaging practicable alternative determination that USACE makes in its record of decision. The USACE may require additional information to complete its analysis. USACE is responsible for these sections.

**Attachments**

Attachment 1—Staff Guidance for Greenhouse Gas and Climate Change Impacts (NRC 2014a)
Attachment 2—Staff Guidance for Socioeconomics and Environmental Justice (NRC 2014b)
Attachment 3—Staff Guidance for Historic and Cultural Resources (NRC 2014c)
Attachment 4—Staff Guidance for Cumulative Impacts (NRC 2014d)
Attachment 5—Staff Guidance for Need for Power (NRC 2014e)
Attachment 6—Staff Guidance for Alternatives (NRC 2014f)

**Final Resolution Method**

The interim staff guidance in this ISG will be resolved by updating the next revision to NUREG-1555, the Environmental Standard Review Plan, and related guidance documents.

**Applicability**

This ISG is applicable to the review of all ESP and COL applications, including those applicants requesting an LWA. The need for power and the alternative energy guidance is only applicable to those ESP applications that include need for power and alternative energy.

**References**


1. 10 CFR 50.10: *Code of Federal Regulations*, Title 10, *Energy,* "License Required; Limited Work Authorization."

2. 10 CFR 51.51: *Code of Federal Regulations*, Title 10, *Energy,* "Table S–3, Table of Uranium Fuel Cycle Environmental Data."

3. Intergovernmental Panel on Climate Change (IPCC). 2012: "*Renewable Energy Sources and Climate Change Mitigation: Special Report of the Intergovernmental Panel on Climate Change."* Intergovernmental Panel on Climate Change. Cambridge University Press, 2012.

4. National Environmental Policy Act of 1969, as amended (NEPA). 42 U.S.C. 4321, *et seq.*

5. National Historic Preservation Act of 1966, as amended (NHPA). 16 U.S.C. 470, *et seq*.

6. Nuclear Regulatory Commission (NRC). 2000: "*Environmental Standard Review Plan – Standard Review Plans for Environmental Reviews for Nuclear Power Plants."* NUREG-1555. Includes 2007 drafts to selected sections.

7. Nuclear Regulatory Commission (NRC). 2003: 68 FR 55905. September 29, 2003. *"Nuclear Energy Institute; Denial of Petition for Rulemaking." Federal Register.* U.S. Nuclear Regulatory Commission.

8. Nuclear Regulatory Commission (NRC). 2004: 69 FR 52040. August 24, 2004. *"Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions." Federal Register.* U.S. Nuclear Regulatory Commission.

9. Nuclear Regulatory Commission (NRC). 2007a: U.S. Nuclear Regulatory Commission, Memorandum and Order (CLI-07-27) in the Matter of Dominion Nuclear North Anna, LLC. (Early Site Permit for North Anna ESP Site), November 20, 2007. Docket No. 52-008-ESP, Agencywide Documents Access and Management System (ADAMS) Accession No. ML082521051.

10. Nuclear Regulatory Commission (NRC). 2007b: 72 FR 57416. October 9, 2007. *"Limited Work Authorizations for Nuclear Power Plants." Federal Register.* U.S. Nuclear Regulatory Commission.

11. Nuclear Regulatory Commission (NRC). 2008: *Memorandum of Understanding: Environmental Reviews Related to the Issuance of Authorizations to Construct and Operate Nuclear Power Plants.* September 12, 2008, U.S. Department of the Army and U.S. Nuclear Regulatory Commission, Washington, DC. ADAMS Accession No. ML082540354.

12. Nuclear Regulatory Commission (NRC). 2009a: 74 FR 8124. February 23, 2009. *"Interim Staff Guidance on the Definition of Construction and on Limited Work Authorizations." Federal Register.* U.S. Nuclear Regulatory Commission.

13. Nuclear Regulatory Commission (NRC). 2009b: U.S. Nuclear Regulatory Commission (NRC), Memorandum and Order (CLI-09-21) In the Matter of Duke Energy Carolinas, LLC, and Tennessee Valley Authority. (Combined License Application for Williams States Lee III Nuclear Station, Units 1 and 2 and Bellefonte Nuclear Power Plant, Units 3 and 4), November 3, 2009. Docket Nos. 52-014-COL, 52-015-COL, 52-018-COL, 52-019-COL. ADAMS Accession No. ML093070690.

14. Nuclear Regulatory Commission (NRC). 2010: Memorandum from Michael Johnson to R. W. Borchardt. Subject: "Consideration of Certain Environmental Impacts Relevant to Greenhouse Gas Emissions." January 15, 2010. ADAMS Accession No. ML093520734.

15. Nuclear Regulatory Commission (NRC). 2011: Memorandum from Brent Clayton to Scott Flanders. Subject: "Revision 1—Addressing the Construction and Preconstruction Activities, Greenhouse Gas Issues, General Conformity Determinations, Environmental Justice, the Need for Power, Cumulative Impact Analysis and Cultural/Historical Resources Analysis Issues in Environmental Impact Statements." March 4, 2011. ADAMS Accession No. ML110380369

16. Nuclear Regulatory Commission (NRC). 2013: Office of Nuclear Reactor Regulation (NRR), Office Instruction Number LIC-203 revision 3, "Procedural Guidance for Preparing Categorical Exclusions, Environmental Assessments, and Considering Environmental Issues." ADAMS Accession No. ML12234A708.

17. Nuclear Regulatory Commission (NRC). 2014a: Interim Staff Guidance, Attachment 1: Staff Guidance for Greenhouse Gas and Climate Change Impacts. ADAMS Accession No. ML13350A134.

18. Nuclear Regulatory Commission (NRC). 2014b: Interim Staff Guidance, Attachment 2: Staff Guidance for Socioeconomic and Environmental Justice. ADAMS Accession No. ML113350A399.

19. Nuclear Regulatory Commission (NRC). 2014c: Interim Staff Guidance, Attachment 3: Staff Guidance for Cultural and Historical Resources. ADAMS Accession No. ML13347B223.

20. Nuclear Regulatory Commission (NRC). 2014d: Interim Staff Guidance, Attachment 4: Staff Guidance for Cumulative Impacts. ADAMS Accession No. ML113347B214.

21. Nuclear Regulatory Commission (NRC). 2014e: Interim Staff Guidance, Attachment 5: Staff Guidance for Need for Power. ADAMS Accession No. ML13350A444.

22. Nuclear Regulatory Commission (NRC). 2014f: Interim Staff Guidance, Attachment 6: Staff Guidance for Alternatives. ADAMS Accession No. ML13347B173.

# Attachment 1: Staff Guidance for Greenhouse Gas and Climate Change Impacts for New Reactor Environmental Impact Statements
# COL/ESP-ISG-026

## Purpose

The principal purpose of this guidance is to provide the framework for considering and the format and content for presenting the U.S. Nuclear Regulatory Commission (NRC or Commission) staff's evaluation of greenhouse gas (GHG) emissions and climate change in the environmental reviews for new reactors in a manner that implements the Commission's direction. This Interim Staff Guidance (ISG) addresses treatment of GHG emissions and impacts associated with the current environment, building activities, operation, fuel cycle, cumulative impacts, alternative energy and alternative sites.

## Background

In recent licensing actions, NRC's Atomic Safety Licensing Board Panels have referred rulings on GHG emissions and climate change to the Commission suggesting that it may want to consider the "… potential generic significance of the issue …" In CLI-09-21 (NRC 2009), the Commission provided additional guidance to the staff. The staff outlined its general plan for implementing the Commission's guidance in a memorandum from M. Johnson to R.W. Borchardt on January 15, 2010 (NRC 2010).

## Rationale

This guidance directs the staff's consideration of GHG emissions and the treatment of climate change in environmental reviews for new reactors. A National Environmental Policy Act (NEPA) analysis (Environmental Impact Statement or Environmental Assessment) is the appropriate forum to consider the interface and potential consequences of new projects and the environment. Additionally, this guidance notes that the air quality analysis and requirement to determine if the proposed action conforms to the State Implementation Plan under Title 40 of the *Code of Federal Regulations* (40 CFR) Part 93 described in Environmental Standard Review Plan (ESRP) or NUREG-1555, Sections 2.7 and 4.4.1, should be performed in Environmental Impact Statement (EIS), Chapters 4, 5, 6, 7, and 9. For information on general conformity determinations, refer to the staff guidance memo for conducting general conformity determinations (NRC 2013a) (Agencywide Documents Access and Management System (ADAMS) Accession No.ML12313A190).

## Staff Guidance

### Definitions

C*arbon dioxide ($CO_2$) equivalent* is a metric that describes, for a given mixture and amount of greenhouse gas, the amount of $CO_2$ that would have the same global warming potential (GWP), when measured over a specified timescale (generally, 100 years).

*Global warming potential* (GWP) is a measure of the total energy that a gas absorbs over a particular period of time (usually 100 years), as compared to $CO_2$.

*NRC-authorized impacts* are the impacts from NRC-authorized construction activities identified in Chapter 4 and the operational impacts identified in Chapter 5 of the EIS.

Review Interfaces

The air quality reviewer should obtain input from and provide input to the reviewers for the following EIS chapters, as indicated:

- Chapter 2, Affected Environment. Subject matter experts obtain information on regional climate change for the proposed site location from the U.S. Global Change Research Program (USGCRP) Report. This will form the baseline for the climate change discussion. The staff should consider the effects of a changing climate on air and water resources, ecological resources, and human health issues. Climate change in the affected environment section should cover the project period and resources that are likely to be impacted by climate change during this period.

- Chapters 4 and 5, Construction Impacts at the Proposed Site and Operational Impacts at the Proposed Site. Provide input on estimated air emissions (including GHGs) and mitigation measures or plans to control air emissions from preconstruction/construction and operations, including traffic.

- Chapter 6, Fuel Cycle, Transportation, and Decommissioning. Provide input on GHG emissions from the uranium fuel cycle (including impacts from fossil fuel combustion and decommissioning activities).

- Chapter 7, Cumulative Impacts. Provide input on cumulative GHG emissions from all phases of the proposed action. Provide input on reasonably foreseeable changes in the climate and the associated effects on specific resource areas during the period of the proposed action for the proposed site location cumulative impacts analysis. Each subject area should contain a discussion of climate change impacts on the specific resource being considered.

- Chapter 9, Environmental Impacts of Alternatives. Provide input on GHG emissions from alternative energy sources. Provide input on air quality impacts, including GHG emissions, for each of the alternative sites. Provide input on reasonably foreseeable changes in the climate and the associated effects on specific resource areas during the period of the proposed action for each of the alternative sites.

Data and Information Needs

The following sources of information could be useful for the GHG analysis:

- U.S. Global Change Research Program Report (USGCRP) (http://www.globalchange.gov/) and peer-reviewed assessments from USGCRP.

- Intergovernmental Panel on Climate Change Periodic Report (IPCC 2012).

- U.S. Environmental Protection Agency (EPA) Periodic Report *Inventory of U. S. Greenhouse Gas Emissions and Sinks* (EPA 2012a).

- Applicant's Environmental Report (ER) – emission estimates, mitigation plans, alternative energy sources emissions.

Appendix A of Attachment 1 presents a generic GHG footprint for a 1000-MW(e) reactor to be scaled by reactor type and number of units proposed to be built. The NRC staff can rely upon the generic analysis as a starting point; however, the unique aspects of each proposal must be reflected in the material included in the air quality sections of the EIS. If a site-specific analysis is provided in the ER, the reviewer should discuss both the applicant's GHG emissions estimates and the staff's emissions estimates scaled from the generic analysis in Appendix A.

## I. ACCEPTANCE CRITERIA

Acceptance criteria for the GHG and climate change impacts associated with the proposed activities are the following:

- Title 10 of the *Code of Federal Regulations* (10 CFR) 51.10(a) with respect to NRC policy to voluntarily take account, subject to certain conditions, of the regulations of Council on Environmental Quality (CEQ) implementing NEPA. On February 23, 2010, the CEQ issued (75 FR 8046) draft guidance for public comment on "Consideration of the Effects of Climate Change and Greenhouse Gas Emissions." As of July 2013, this guidance has not yet been finalized.
- 10 CFR 51.45 with respect to the need to discuss the impact of the proposed action on the environment in the ER.
- 10 CFR 51.71 with respect to the need to discuss the environmental effects of the proposed action and alternatives in an EIS.

### Technical Rationale

The technical rationale for evaluating GHG impacts associated with the applicant's proposed activities is the draft CEQ guidance (75 FR 8046) on "Consideration of the Effects of Climate Change and Greenhouse Gas Emissions" (CEQ 2010).

The following excerpted text from the CEQ's draft guidance is considered relevant by the NRC staff in shaping its consideration of GHG emissions and the effects of climate change as part of its NEPA reviews of new reactor applications and its preparation of EISs:

> *Because climate change is a global problem that results from global GHG emissions, there are more sources and actions emitting GHGs (in terms of both absolute numbers and types) than are typically encountered when evaluating the emissions of other pollutants. From a quantitative perspective, there are no dominating sources and fewer sources that would even be close to dominating total GHG emissions. The global climate change problem is much more the result of numerous and varied sources, each of which might seem to make a relatively small addition to global atmospheric GHG concentrations. CEQ proposes to recommend that environmental documents reflect this global context and be realistic in focusing on ensuring that useful information is provided to*

*decision makers for those actions that the agency finds are a significant source of GHGs.*

*Under this proposed guidance, agencies should use the scoping process to set reasonable spatial and temporal boundaries for this assessment and focus on aspects of climate change that may lead to changes in the impacts, sustainability, vulnerability and design of the proposed action and alternative courses of action. At the same time, agencies should recognize the scientific limits of their ability to accurately predict climate change effects, especially of a short-term nature, and not devote effort to analyzing wholly speculative effects.*

*In the agency's analysis of direct effects, it would be appropriate to: (1) quantify cumulative emissions over the life of the project; (2) discuss measures to reduce GHG emissions, including consideration of reasonable alternatives; and (3) qualitatively discuss the link between such GHG emissions and climate change. However, it is not currently useful for the NEPA analysis to attempt to link specific climatological changes, or the environmental impacts thereof, to the particular project or emissions, as such direct linkage is difficult to isolate and to understand. The estimated level of GHG emissions can serve as a reasonable proxy for assessing potential climate change impacts, and provide decision makers and the public with useful information for a reasoned choice among alternatives.*

## II. REVIEW PROCEDURES

The Commission provided guidance to the staff in CLI-09-21 (NRC 2009) regarding carbon dioxide and other GHGs in its environmental reviews for major licensing actions under NEPA. The Commission's guidance stated that the staff's analysis for reactor applications should evaluate emissions from the uranium fuel cycle as well as from construction and operation of the facility to be licensed.

The staff has previously developed a framework document to address GHG issues and climate change (NRC 2011). This ISG updates and formalizes that framework. Climate change is to be addressed in Chapter 2 as a changing affected environment under the discussion of climate; thereafter, it is to be considered in particular resource areas (air and water resources, ecological resources, and human health areas) as part of the cumulative impacts analysis (reflecting past, present and reasonably foreseeable effects) in Chapter 7 for the proposed site and in Chapter 9 for the alternative sites. $CO_2$ and other GHG emissions are to be considered as direct, indirect or cumulative impacts on air quality (along with criteria pollutants) in Chapter 4 (Building Impacts), Chapter 5 (Operational Impacts), Chapter 6 (Fuel Cycle and Decommissioning), Chapter 7 (Cumulative Impacts at the Proposed Site), and Chapter 9 (Alternative Energy Sources and Cumulative Impacts at the Alternative Sites). For more information, refer to the updated GHG guidance memo (NRC 2013b) (ADAMS Accession No. ML12356A500).

With the purpose of informing decision-making, CEQ proposes in its 2010 draft NEPA guidance on "Consideration of the Effects of Climate Change and Greenhouse Gas Emissions" (CEQ 2010) that the NEPA process should incorporate consideration of both the impact of an agency action on the environment through the mechanism of GHG emissions and the impact of changing climate on that agency action (75 FR 8046). CEQ recommends that GHG emissions can be used as a "proxy" for assessing climate change impacts. For new reactor licensing actions where an EIS is being prepared to

fulfill its responsibilities under NEPA, the NRC staff should consider (1) the potential impacts of the proposed action on the environment and (2) the changes in significant resource areas that may occur during the lifetime of the proposed action as a result of a changing climate.

Steps to perform the resource specific analysis

AFFECTED ENVIRONMENT (EIS Chapter 2)

The initial discussion of climate change effects is based on the historical record for the area being considered. Following this discussion, climate change in the affected environment section should cover the project period and resources that are likely to be impacted by climate change during this period. The reviewer should recognize the uncertainty with predicting climate change effects in the short-term. Agencies should be clear about the basis for projecting the changes from the existing environment to the reasonably foreseeable affected environment, including what would happen under this scenario and the probability or likelihood of this future condition (CEQ 2010). Reviewers should also consider the particular impacts of climate change on vulnerable communities where this may affect the design of the action or the selection among alternatives (CEQ 2010). This could include environmental justice communities, especially American Indian and Alaska Native peoples who have a special spiritual and cultural link to their environment, communities using subsistence farming or fishing practices, or projects located in coastal areas that could be impacted by sea level rise. Information regarding the estimated changes in climate conditions on a regional basis is provided in the USGCRP report. A convenient source for this information is the Regional Climate Information tab from the USGCRP website home page. Additionally, peer-reviewed literature discussing regional climate change impacts may be available for the area being considered. It is appropriate to consider the anticipated changes in precipitation, temperature, frequency and severity of storms, sea level, floods and droughts during the period of the proposed action. The EIS discussion should be commensurate in scope and depth with the discussion of current climate conditions.

ENVIRONMENTAL CONSEQUENCES (EIS Chapters 4, 5, 6, 7 and 9)

- Carbon Dioxide and Other Greenhouse Gas Emissions

The reviewer should evaluate air quality conditions (i.e., status with regard to National Ambient Air Quality Standards) and potential emissions from sources and activities associated with building and operating a new nuclear power plant. In addition to consideration of the traditional criteria pollutants, air conformity reviews, visibility impairment in Prevention of Significant Deterioration Class I areas, etc., the NRC Staff considers the emission of $CO_2$ and other GHGs as an important air quality issue consistent with CEQ's draft guidance; i.e., "[T]his is not intended as a 'new' component of NEPA analysis, but rather as a potentially important factor to be considered within the existing NEPA framework." Consequently, discussions related to the consequences of $CO_2$ and other GHG emissions should be included within the context of air quality issues in EISs for new reactor application reviews. The generic GHG footprint presented in Appendix A should be referenced and adjusted according to the proposed action (number of units, electrical output).

- Environmental Consequence Analyses

The Commission directed in CLI-09-21 (NRC 2009) that the NRC staff's NEPA analysis for reactor applications should "… encompass emissions from the uranium fuel cycle as well as

from construction and operation of the facility to be licensed." For new reactor EISs, the NRC Staff encompasses the direction outlined by the Commission and considers $CO_2$ and the other GHG as $CO_2$ equivalent emissions in the following air quality analyses:

1) the direct and indirect impacts of building[a] the nuclear power plant (excluding the manufacturing of components);

2) the direct and indirect impacts of operating the nuclear power plant;

3) the indirect impacts of fuel cycle activities (i.e., uranium mining and milling, enrichment, fuel fabrication, and transportation);

4) the direct and indirect impacts of decommissioning the nuclear power plant;

5) the incremental impacts of the proposed project within the cumulative impacts analysis;

6) the comparison of the proposed project impacts at the proposed site to alternative energy source impacts that meet the purpose and need (i.e., baseload power generation); and

7) the comparison of the proposed project impacts at the proposed site to potential impacts at alternative sites in the context of cumulative impacts.

The electrical energy that is used to produce and manage the fuel for a nuclear power plant is highly likely to require the combustion of fossil fuels; this is considered in the analysis of the indirect GHG emissions associated with fuel cycle activities for a nuclear power plant. Table S-3, Table of Uranium Fuel Cycle Environmental Data, in 10 CFR 51.51 provides the NRC a framework for assessing the contribution of the environmental effects of uranium mining and milling, the production of uranium hexafluoride, isotopic enrichment, fuel fabrication, reprocessing of irradiated fuel, transportation of radioactive materials and management of low-level wastes and high-level wastes related to uranium fuel cycle activities to the environmental costs of licensing the nuclear power plant.

Table S-3 did not consider GHG emissions explicitly. However, the staff uses the annual electrical energy and process heat needs and the amount of fossil fuels consumed to generate the necessary electrical power and process heat to estimate the annual GHG emissions associated with the uranium fuel cycle. Appendix A presents a generic GHG footprint of $CO_2$ and other GHG emissions, reported as $CO_2$ equivalent emissions. The generic GHG footprint should be referenced in an EIS for a new reactor application. If a site-specific analysis is provided in the ER, the reviewer should discuss both the applicant's GHG emissions estimates and the staff's emissions estimates scaled from the generic analysis in Appendix A. When using the generic GHG footprint in Appendix A, certain values may need to be scaled by activity, number of units, electrical output, or capacity factor. The analysis is to be made unique to the project using project-specific adjustment factors without departure from the underlying generic analysis; therefore, this approach is analogous to the use of Table S-3.

[a] Building includes both preconstruction and NRC-authorized construction as defined in 10 CFR 50.10.

The emission estimates in Appendix A are for a 1000-MW(e) large light-water reactor. If the proposed action involves a small modular reactor rather than a large light-water reactor, the emissions associated with construction and preconstruction activities may be less than the Appendix A estimates due to the smaller footprint associated with small modular reactors. However, emissions from building activities are a small fraction of those from the entire nuclear power plant lifecycle, and a reduction in construction and preconstruction emissions may not have a significant impact on the resulting lifecycle emissions.

Chapter 4: Construction and Preconstruction Emissions.

The total emissions from construction and preconstruction activities for a 1000-MW(e) reactor are estimated in the generic GHG footprint in Appendix A. From Appendix A, Table A-3, this value is the sum of the emissions from the construction equipment plus the workforce. This value is 39,000 MT $CO_2$(eq) plus 43,000 MT $CO_2$(eq), for a total lifetime estimate of 82,000 MT $CO_2$(eq) for a 1000-MW(e) reactor.

Chapter 5: Operations Emissions.

From Appendix A, Table A-3, this value is the sum of the emissions from nuclear power plant operations plus the operations workforce. This value is 181,000 MT $CO_2$(eq) plus 136,000 MT $CO_2$(eq), for a total lifetime estimate of 317,000 MT $CO_2$(eq) for a 1000-MW(e) reactor.

Chapter 6: Uranium Fuel Cycle and Decommissioning Emissions.

From Appendix A, Table A-3, this value is 10,100,000 MT $CO_2$(eq) for the uranium fuel cycle. The decommissioning emissions estimate is the sum of the emissions from the decommissioning equipment and the decommissioning workforce. This value is 19,000 MT $CO_2$(eq) plus 8,000 MT $CO_2$(eq) for a total lifetime estimate of 27,000 MT $CO_2$(eq) for a 1000-MW(e) reactor. The SAFSTOR emissions value in Table A-3 may be added if the reviewer chooses to discuss this decommissioning option in the EIS.

For more information, refer to the updated GHG guidance memo (NRC 2013b) (Adams Accession No. ML12356A500).

Chapter 7: Cumulative Impacts.

The reviewer should discuss the total GHG emissions from all phases of the proposed action in the cumulative impacts analysis, drawing from the generic GHG footprint in Appendix A of this Attachment. This would also be the sum of the impacts addressed in EIS Chapters 4, 5, and 6. From Appendix A, Table A-3, the total nuclear power plant lifetime GHG footprint is 10,500,000 MT $CO_2$(eq) for a 1000-MW(e) reactor. This is equal to approximately 37.5 g $CO_2$eq/kWh (Harvey 2013). The proposed action's emissions should be discussed along with GHG emissions from other past, present, and reasonable foreseeable future activities, including the development of associated support infrastructure such as roads, housing, and schools. The total GHG emissions from the proposed action should be put into context for decision makers. For more information on putting total GHG emissions into context for the cumulative impacts analysis, refer to the updated GHG guidance memo (NRC 2013b) (ADAMS Accession No. ML12356A500).

CEQ recommends that GHG emissions can be used as a "proxy" for assessing climate change impacts. The updated GHG guidance memo provides information on addressing climate

change in the cumulative impacts analysis. The Chapter 7 climate change discussions for each subject area should focus on reasonably foreseeable conditions; the subject area reviewers may reference the USGCRP report and available peer-reviewed literature for regional impacts.

ENERGY ALTERNATIVES AND ALTERNATIVE SITES (EIS Chapter 9)

- Energy Alternatives

The reviewer should discuss the emissions from competitive energy alternatives that are capable of meeting the purpose and need of the proposed action in Section 9.2.2 (Alternatives Requiring New Generating Capacity) of the EIS.

To put emissions into context for decision makers, the EIS should include a comparison of emissions from competitive energy alternatives. The Intergovernmental Panel on Climate Change (IPCC) Special Report on Renewable Energy Sources and Climate Change Mitigation (IPCC 2012) contains a comparison of lifecycle GHG emissions in $gCO_2(eq)/kWh$ for various energy alternatives in Figure SPM.8 and Table A.II.4. This may be a useful resource for the reviewer. The reviewer should maintain awareness of subsequent IPCC reports. If IPCC does not publish subsequent reports in the future, the reviewer should consider using other published reports referenced by the CEQ and Federal programs and agencies charged with the responsibility to assess and report on the science of climate change (e.g., USGCRP).

- Alternative Sites

Impacts to air quality from criteria pollutants and impacts from GHG emissions at each alternative site are addressed in the same manner as in Chapters 4, 5, and 6 for the proposed site. Cumulative impacts are addressed in the same manner as in Chapter 7 for the proposed site.

EVALUATION FINDINGS

For Chapters 4 and 5:

Wording of the conclusion in the section will depend on whether the impacts are SMALL or MODERATE or LARGE. Use words below:

If impact is SMALL – Provide the reason for the conclusion, then state, “As a result, the NRC staff concludes that the impacts on air quality would be SMALL, and no further mitigation is warranted.”

If impact is MODERATE or LARGE - Summarize why the basis for the conclusion (the full explanation should be provided in the preceding analysis). In the next paragraph, state the NRC-authorized impact and provide a discussion as to whether the NRC-authorized activity is a significant contributor to MODERATE or LARGE impact. Sufficient information should be provided to show whether the NRC-authorized activity caused the impact to go from SMALL to MODERATE or MODERATE to LARGE. For example, if the NRC-authorized increment is SMALL, but the current environment is degraded or the impacts from preconstruction are the principal contributors to the MODERATE rating, state this. For other than a SMALL impact, discuss if, and to what extent, the NRC-authorized increment contributes to the “other than

SMALL" impact. For guidance on considering mitigation in impact determinations, refer to ISG-026 cover memo.

For Chapter 6:

Provide a basis for the fossil fuel impacts from the uranium fuel cycle and decommissioning, and make a conclusion for the impact on air quality.

If the reactor design is one that is addressed in NUREG-0586 Supplement 1 (NRC 2002), determine if the impacts are bounding for the proposed project. Provide a basis for the conclusion for the impact on air quality, and determine if the impact is SMALL, MODERATE or LARGE.

For Chapter 7:

Provide a basis for the cumulative impacts to air quality including GHG emissions, and the impact from the projects listed in Table 1 in the cumulative impacts portion of this ISG (Attachment 4). State the incremental impact from NRC-authorized activities and provide a discussion as to whether the NRC-authorized activity is a significant contributor to the impact. If, for example, the purpose and need for the project includes replacing large GHG-emitting fossil fuel facilities with a lower GHG-emitting nuclear power plant, the incremental impact of the project would be beneficial and would reduce GHG emissions and the resulting contribution to climate change for those resource areas affected. In addition, consider reductions in criteria pollutants if a fossil fuel facility is being replaced by a nuclear power plant.

For more information, refer to the updated GHG guidance memo (NRC 2013b) (ADAMS Accession No. ML12356A500).

For Chapter 9:

9.2.2.x (Energy Alternatives): Provide a basis and conclusion for the impact on air quality of SMALL, MODERATE or LARGE for each competitive energy alternative.

9.2.5 (Summary Comparison of Alternatives): Provide a conclusion regarding whether any of the competitive energy alternatives are preferable to the proposed action of building and operating a new nuclear power plant, including consideration of GHG emissions.

9.3.x (Alternative Sites): Provide a basis and conclusion for the impact on air quality of SMALL, MODERATE or LARGE for the building and operation of a nuclear power plant at each alternative site, and the cumulative impacts on air quality at each alternative site. State the incremental impact from NRC-authorized activities and provide a discussion as to whether the NRC-authorized activity is a significant contributor to the impact.

## III. IMPLEMENTATION

The method described in this guidance should be used by the staff in evaluating conformance with NRC requirements, except in those cases in which the applicant proposes an acceptable alternative for complying with specified portions of the requirements.

## IV. REFERENCES


1. 10 CFR 51.10, *Code of Federal Regulations*, Title 10, *Energy*, "Purpose and scope of subpart; application of regulations of Council on Environmental Quality."

2. 10 CFR 51.45, *Code of Federal Regulations*, Title 10, *Energy,* "Environmental report."

3. 10 CFR 51.51: Code of Federal Regulations, Title 10, *Energy,* "Table S–3, Table of Uranium Fuel Cycle Environmental Data."

4. 10 CFR 51.71, *Code of Federal Regulations*, Title 10, *Energy,* "Draft Environmental Impact Statement - Contents."

5. 40 CFR Part 93, *Code of Federal Regulations*, Title 40, *Protection of Environment,* "Determining Conformity of Federal Actions to State or Federal Implementation Plans."

6. Council on Environmental Quality (CEQ). 2010: 75 FR 8046. February 18, 2010. Memorandum for Heads of Federal Departments and Agencies. Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions. *Federal Register*. Council on Environmental Quality.

7. Environmental Protection Agency (EPA). 2009: 74 FR 66496. December 15, 2009. Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act. *Federal Register.* U.S. Environmental Protection Agency, Washington, D.C

8. Environmental Protection Agency (EPA). 2012a. *Inventory of U. S. Greenhouse Gas Emissions and Sinks: 1990-2010*. EPA 430-R-12-001. U.S. Environmental Protection Agency, Washington, D.C.

9. Environmental Protection Agency (EPA). 2012b. U.S. Environmental Protection Agency, Clean Energy: Calculations and References. Accessed October 10, 2012 at http://www.epa.gov/cleanenergy/energy-resources/refs.html.

10. Harvey B. 2013. "Greenhouse emissions for the fossil fuel sources identified in Table S-3." Office of New Reactors, U.S. Nuclear Regulatory Commission, Washington, D.C. Agencywide Documents Access and Management System (ADAMS) Accession No. ML12299A401.

11. Intergovernmental Panel on Climate Change (IPCC). 2012: *Renewable Energy Sources and Climate Change Mitigation: Special Report of the Intergovernmental Panel on Climate Change.* Intergovernmental Panel on Climate Change. Cambridge University Press, 2012.

12. National Environmental Policy Act of 1969, as amended (NEPA). 42 U.S.C. 4321, *et seq*

13. Nuclear Regulatory Commission (NRC). 2002: *Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities: Supplement 1.* NUREG-0586, Supplement 1, Washington, D.C.

14. Nuclear Regulatory Commission (NRC). 2009: Memorandum and Order (CLI-09-21) In the Matter of Duke Energy Carolinas, LLC, and Tennessee Valley Authority. (Combined License Application for Williams States Lee III Nuclear Station, Units 1 and 2 and Bellefonte Nuclear Power Plant, Units 3 and 4), November 3, 2009. Docket Nos. 52-014-COL, 52-015-COL, 52-018-COL, 52-019-COL. Washington, D.C. ADAMS Accession No. ML093070689.

15. Nuclear Regulatory Commission (NRC). 2010: Memorandum from Michael Johnson to R.W. Borchardt. "Consideration of Certain Environmental Impacts Relevant to Greenhouse Gas Emissions." January 15, 2010. ADAMS Accession No. ML093520734.

16. Nuclear Regulatory Commission (NRC). 2011: Memorandum from Brent Clayton to Scott Flanders. "Revision 1- Addressing The Construction and Preconstruction Activities, Greenhouse Gas Issues, General Conformity Determinations, Environmental Justice, the Need For Power, Cumulative Impact Analysis And Cultural/Historical Resources Analysis Issues in Environmental Impact Statements." March 4, 2011. ADAMS Accession No. ML110380369.

17. Nuclear Regulatory Commission (NRC). 2013a. Memorandum from Ryan Whited to Scott Flanders. "Revision to Staff Guidance for Conducting General Conformity Determinations." April 25, 2013. Washington, D.C. ADAMS Accession No. ML12313A190.

18. Nuclear Regulatory Commission (NRC). 2013b. Memorandum from Stacey Imboden to Ryan Whited. "Staff Guidance to Support ISG regarding Greenhouse Gas and Climate Change Impacts." April 29, 2013. Washington, D.C. ADAMS Accession No. ML12356A500.

# Appendix A

## Greenhouse Gas Footprint Estimates for a Reference 1000-MW(e) Reactor

The review team has estimated the GHG footprint of various activities associated with nuclear power plants. These activities include building, operating, and decommissioning a nuclear power plant. The estimates include direct emissions from the nuclear facility and indirect emissions from workforce transportation and the fuel cycle.

Preconstruction/construction equipment estimates listed in Table A-1 are based on hours of equipment use estimated for a single nuclear power plant at a site requiring a moderate amount of terrain modification (UniStar 2007).

Preconstruction/construction equipment carbon monoxide (CO) emission estimates were derived from the hours of equipment use and carbon dioxide ($CO_2$) emissions were then estimated from the CO emissions using a scaling factor of 172 tons of $CO_2$ per ton of CO. The scaling factor is based on the ratio of $CO_2$ to CO emission factors for diesel fuel industrial engines as reported in Table 3.3-1 of AP-42 (EPA 2012a). A $CO_2$ to total GHG equivalency factor of 0.991 is used to account for the emissions from other GHGs such as methane ($CH_4$) and nitrous oxide ($N_2O$). The equivalency factor is based on non-road/construction equipment (Chapman et al. 2012). Equipment emissions estimates for decommissioning are assumed to be one half of those for preconstruction/construction. Data on equipment emissions for decommissioning are not available; the one-half factor is based on the assumption that decommissioning would involve less earth moving and hauling of material, and fewer labor hours, as compared to preconstruction/construction.

**Table A-1**. GHG Emissions from Equipment Used in Preconstruction/Construction and Decommissioning (MT $CO_2$(eq))

| Equipment | Preconstruction/Construction Total[(a)] | Decommissioning Total[(b)] |
|---|---|---|
| Earthwork and Dewatering | 12,000 | 6,000 |
| Batch Plant Operations | 3,400 | 1,700 |
| Concrete | 5,400 | 2,700 |
| Lifting and Rigging | 5,600 | 2,800 |
| Shop Fabrication | 1,000 | 500 |
| Warehouse Operations | 1,400 | 700 |
| Equipment Maintenance | 10,000 | 5,000 |
| TOTAL[(c)] | 39,000 | 19,000 |

(a) Based on hours of equipment usage over 7-year period
(b) Based on equipment usage over 10-year period
(c) Results are rounded

Table A-2 lists the review team's estimates of the $CO_2$ equivalent emissions associated with workforce transportation. Workforce estimates for new plant preconstruction/construction are conservatively based on estimates in various combined license applications (Chapman et al. 2012), and the operational and decommissioning workforce estimates are based on Supplement 1 to NUREG-0586 (NRC 2002). The table lists the assumptions used to estimate total miles traveled by each workforce and the factors used to convert total miles to metric tons (MT) $CO_2$ equivalent. The workers are assumed to travel in gasoline-powered passenger vehicles (cars, trucks, vans, and sport utility vehicles) that get an average of 21.6 miles per gallon of gas (FHWA 2012). Conversion from gallons of gasoline burned to $CO_2$ equivalent is based on EPA emission factors (EPA 2012b).

**Table A-2**. Workforce GHG Footprint Estimates

| | **Preconstruction/ Construction Workforce** | **Operational Workforce** | **Decommissioning Workforce** | **SAFSTOR Workforce** |
|---|---|---|---|---|
| Commuting Trips (round trips per day) | 1,000 | 550 | 200 | 40 |
| Commute Distance (miles per round trip) | 40 | 40 | 40 | 40 |
| Commuting Days (days per year) | 365 | 365 | 250 | 365 |
| Duration (years) | 7 | 40 | 10 | 40 |
| Total Distance Traveled (miles)[(a)] | 102,000,000 | 321,000,000 | 20,000,000 | 23,000,000 |
| Average Vehicle Fuel Efficiency[(b)] (miles per gallon) | 21.6 | 21.6 | 21.6 | 21.6 |
| Total Fuel Burned[(a)] (gallons) | 4,700,000 | 14,900,000 | 900,000 | 1,100,000 |
| $CO_2$ emitted per gallon[(c)] (MT $CO_2$) | 0.00892 | 0.00892 | 0.00892 | 0.00892 |
| Total $CO_2$ Emitted[(a)] (MT $CO_2$) | 42,000 | 133,000 | 8,000 | 10,000 |
| $CO_2$ equivalent factor[(c)] (MT $CO_2$/ MT $CO_2$(eq)) | 0.977 | 0.977 | 0.977 | 0.977 |
| Total GHG Emitted[(a)] (MT $CO_2$ (eq)) | 43,000 | 136,000 | 8,000 | 10,000 |

(a) Results are rounded
(b) FHWA (2012)
(c) EPA (2012b)

10 CFR 51.51(a) states that every environmental report prepared for the combined license stage of a light-water-cooled nuclear power reactor shall take Table S-3 from 10 CFR 51.51(b) as the basis for evaluating the contribution of the environmental effects of the uranium fuel cycle in licensing the nuclear power reactor. 10 CFR 51.51(a) further states that Table S-3 shall be included in the environmental report and may be supplemented by a discussion of the environmental significance of the data set forth in the table as weighted in the analysis for the proposed facility.

Table S-3 does not provide an estimate of GHG emissions associated with the uranium fuel cycle; it only addresses pollutants that were of concern when the table was promulgated in the 1980's. However, Table S-3 does state that 323,000 MW-hour is the assumed annual electric energy use for the reference 1000 MWe nuclear power plant and this 323,000 MW-hour of annual electric energy is assumed to be generated by a 45 MWe coal-fired power plant burning 118,000 MT of coal. Table S-3 also assumes approximately 135,000,000 standard cubic feet (scf) of natural gas is required per year to generate process heat for certain portions of the uranium fuel cycle. The review team estimates that burning 118,000 MT of coal and 135,000,000 scf of natural gas per year results in approximately 253,000 MT of $CO_2$ equivalent being emitted into the atmosphere per year due to the uranium fuel cycle (Harvey 2013).

The review team estimated GHG emissions related to plant operations from a typical usage of various diesel generators onsite (UniStar 2007). Carbon monoxide emission estimates were derived assuming an average of 600 hrs of emergency diesel generator operation per year (four generators, each operating 150 hours per year) and 200 hrs of station blackout diesel generator operation per year (two generators, each operating 100 hours per year). A scaling factor of 172 was then applied to convert the CO emissions to $CO_2$ emissions and a $CO_2$ to total GHG equivalency factor of 0.991 was used to account for the emissions from other GHGs such as methane ($CH_4$) and nitrous oxide ($N_2O$).

Given the various sources of GHG emissions discussed above, the review team estimates the total lifecycle GHG footprint for a reference 1000 MW(e) nuclear power plant with an 80 percent capacity factor to be about 10,500,000 metric tons. The components of the footprint are summarized in Table A-3. The uranium fuel cycle component of the footprint dominates all other components. It is directly related to power generated. As a result, it is reasonable to use reactor power to scale the footprint to differently sized reactors.

The IPCC released a special report on renewable energy sources and climate change mitigation in 2012 (IPCC 2012). Annex II of this IPCC report includes an assessment of previously published works on lifecycle GHG emissions from various electric generation technologies, including nuclear energy. The IPCC report included in its assessment only material that passes certain screening criteria for quality and relevance. The IPCC screening yielded 125 estimates of nuclear energy lifecycle GHG missions from 32 separate references. The IPCC-screened estimates of the lifecycle GHG emissions associated with nuclear energy, as shown in Table A.II.4 of the report, ranged more than two orders of magnitude, from 1 to 220 grams (g) of $CO_2$ equivalent per kWh, with 25 percentile, 50 percentile, and 75 percentile values of 8 g $CO_2$eq/kWh, 16 g $CO_2$eq/kWh, and 45 g $CO_2$eq/kWh, respectively. The range of the IPCC estimates is due, in part, to assumptions regarding the type of enrichment technology employed, how the electricity used for enrichment is generated, the grade of mined uranium ore, the degree of processing and enrichment required, and the assumed operating lifetime of a nuclear power plant.

The review team's lifecycle GHG estimate of approximately 10,500,000 MT $CO_2$ equivalent for the reference 1000 MWe nuclear plant is equal to about 37.5 g $CO_2$eq/kWh, which places the review team estimate between the 50 and 75 percentile values of the IPCC estimates in Table A.II.4 of the report.

In closing, the review team considers the footprint estimated in Table A-3 to be appropriately conservative. The GHG emissions estimates for the dominant component (uranium fuel cycle) are based on 30-year old enrichment technology assuming that the energy required for enrichment is provided by coal-fired generation. Different assumptions related to the source of energy used for enrichment or the enrichment technology that would be just as reasonable could lead to a significantly reduced footprint.

**Table A-3**. Nuclear Power Plant Lifetime GHG Footprint

| Source | Activity Duration (yr) | Total Emissions (MT $CO_2$eq) |
|---|---|---|
| Preconstruction/construction Equipment | 7 | 39,000 |
| Preconstruction/construction Workforce | 7 | 43,000 |
| Plant Operations | 40 | 181,000 |
| Operations Workforce | 40 | 136,000 |
| Uranium Fuel Cycle | 40 | 10,100,000 |
| Decommissioning Equipment | 10 | 19,000 |
| Decommissioning Workforce | 10 | 8,000 |
| SAFSTOR Workforce | 40 | 10,000 |
| TOTAL[(a)] | | 10,500,000 |

[(a)] Results are rounded

Emissions estimates presented in the body of this EIS have been scaled to values that are appropriate for the proposed project. The uranium fuel cycle emissions have been scaled by reactor power and plant capacity factor using the scaling factor determined in Chapter 6 and by the number of reactors to be built. Plant operations emissions have been adjusted to represent the number of large GHG emissions sources (diesel generators, boilers, etc.) associated with the project. The workforce emissions estimates have been scaled to account for differences in workforce numbers and commuting distance. Finally, equipment emissions estimates have been scaled by estimated equipment usage. As can be seen in Table A-3, only the scaling of the uranium fuel-cycle emissions estimates makes a significant difference in the total carbon footprint of the project.

## A.1 References

1. Chapman, E.G., J.P. Rishel, J.M. Niemeyer, K.A. Cort, and S.E. Gulley. 2012. *Assumptions, Calculations, and Recommendations Related to a Proposed Guidance Update on Greenhouse Gases and Climate Change.* Pacific Northwest National Laboratory, Richland, Washington. PNNL-21494. ADAMS Accession No. ML12310A212.

2. Federal Highway Administration (FHWA). 2012. *Highway Statistics 2010 (Table VM-1).* Office of Highway Policy Information, Washington, D.C. Accessed October 10, 2012 at http://www.fhwa.dot.gov/policyinformation/statistics/2010/pdf/vm1.pdf. ADAMS Accession No. ML12292A645.

3. Harvey B. 2013. "Greenhouse emissions for the fossil fuel sources identified in Table S-3." Office of New Reactors, U.S. Nuclear Regulatory Commission, Washington, D.C. ADAMS Accession No. ML12299A401.

4. Intergovernmental Panel on Climate Change (IPCC). 2012. IPCC Special Report on Renewable Energy Sources and Climate Change Mitigation. O. Edenhofer, R. Pichs-Madruga, Y. Sokona, K. Seyboth, P. Matschoss, S. Kadner, T. Zwickel, P. Eickemeier, G. Hansen, S. Schlömer, C. von Stechow (editors). Cambridge University Press, Cambridge, United Kingdom.

5. UniStar Nuclear Energy, LLC (UniStar). 2007. *Technical Report in Support of Application of UniStar Nuclear Operating Services, LLC for Certificate of Public Convenience and Necessity Before the Maryland Public Service Commission for Authorization to Construct Unit 3 at Calvert Cliffs Nuclear Power Plant and Associated Transmission Lines*. Prepared for the Public Service Commission of Maryland, dated 6 November 2007. ADAMS Accession No. ML090680065.

6. U.S. Environmental Protection Agency (EPA). 2012a. *Technology Transfer Network Clearinghouse for Inventories & Emissions Factors: AP-42, Fifth Edition, Volume I Chapter 3: Stationary Internal Combustion Sources.* Accessed October 10, 2012 at http://www.epa.gov/ttnchie1/ap42/ch03/. ADAMS Accession No. ML12292A637.

7. U.S. Environmental Protection Agency (EPA). 2012b. *Clean Energy: Calculations and References*. Accessed October 10, 2012 at http://www.epa.gov/cleanenergy/energy-resources/refs.html. Accession No. ADAMS ML12292A648.

8. U. S. Nuclear Regulatory Commission (NRC). 2002. *Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities, Supplement 1 Regarding the Decommissioning of Nuclear Power Reactors.* NUREG-0586 S1, Vol. 1, Washington, D.C.

## Attachment 2: Staff Guidance for the Socioeconomic and Environmental Justice Analysis for New Reactor Environmental Impact Statements COL/ESP-ISG-026

### Background

While preparing the Environmental Impact Statements (EISs) for the first group of combined license (COL) and early site permit (ESP) applications, the U.S. Nuclear Regulatory Commission (NRC or Commission) staff identified a number of issues that necessitate changes to staff guidance.

The guidance in this attachment includes both clarifications and changes. Clarifications address cases in which the Environmental Standard Review Plan (ESRP) already addresses the issue but the staff has determined it would be useful to provide some clarification. Changes address cases in which the ESRP does not address the issue. For changes, the guidance includes a "Reason for Changes" to explain why new guidance is being developed.

### Rationale

The purpose of this guidance is to clarify certain aspects of the NUREG-1555. This guidance clarifies NUREG-1555, Part 2.5.1 (Environmental Description, Demography). It also applies to the socioeconomic characterization of alternative sites discussed in NUREG-1555, Section 9.3 in the context of a "reconnaissance level" analysis. This guidance either provides clarifications on sections that could be subject to misinterpretation, or provides clarification to sections where standard practices have evolved over time. Because an applicant may use the ESRP to help ensure the Environmental Report (ER) in a new reactor application meets the agency's needs, it is important to point out that none of the clarifications in this guidance impose new analytical requirements. In fact, several of the clarifications included in this guidance reduce or eliminate analytical steps recommended by the 2000 ESRP (NRC 2000) and its 2007 update (NRC 2007a).

### Staff Guidance

ESRP Section 2.5.1 - DEMOGRAPHY

Issue Discussion: The changes to the Demography section involve a detailed description of the information requirements for analyzing and presenting demographic data in EISs. There is no change in the resource burden needed by the staff to perform demographic analyses under the new approach. Instead, this revised guidance is an accurate characterization of how the staff currently interprets and applies the guidance under NUREG-1555. The technical language included below is strictly a clarification of the current ESRP in the context of how the staff's processes have evolved over time.

Reason for Changes: In the past, the staff relied upon use of the decennial census from the U.S. Census Bureau (USCB or Census) because it was the main federal source for data that was disaggregated to the census block group level. (A census block is the smallest geographically defined area for which census data are gathered, and a census block group is the smallest geographically identified area for which the Census develops detailed demographic data.) With the latest decennial census, the USCB stopped including survey estimates of

poverty data. However, the another data series, the American Community Survey Five-Year Summary (ACS), tracks census block group level data estimates for poverty on a five year moving average, based upon survey data. For poverty data, this is the only source for census block group data. Because of this change in demographic sources, the reviewer should in the EIS use the ACS Five-year Summary file estimates for all race ethnicity and poverty information.

However, it is acceptable to use the decennial Census if it has been recently released and after confirming that there is no significant change when compared to the ACS information.

The ACS Five-Year Summary data are available at www.census.gov through the American FactFinder page at http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml for highly disaggregated geographical areas or through the ACS website at http://www.census.gov/acs/www for census block group data. Instructions on how to use the ACS 5-Year Summary data is available using the ACS 5-year Technical Documentation Manual (USCB 2010).

The following language fully replaces the language in the Data and Information Needs section of ESRP 2.5.1 and provides information for the REVIEW PROCEDURES section. It also provides input for the EVALUATION FINDINGS section of ESRP 2.5.1:

**Beginning of change**

Data and Information Needs

Socioeconomic and demographic conditions could change as a result of implementing the proposed action. The level of detail in the EIS should be commensurate with the reasonably foreseeable magnitude of the potential impact. The staff's environmental justice (EJ) analysis of the proposed site and all alternative sites should encompass a circle with a 50 mile radius centered upon the power block(s) of that site. The reviewer should consider this 50-mile radius as a starting point that establishes the outer limit of all potential impacts and that a detailed analysis of the majority of impacts will constitute a much smaller area within the 50 mile radius. The staff should begin with the applicant's ER, verify the accuracy and relevance of that data, and supplement it with such additional data as the staff may deem necessary for the full discussion of all important impact categories of the affected area. The source for demographic data should be the ACS 5-Year Summary Data on race, ethnicity, and poverty, which includes the demographic categories below at the Census block group level. If the applicant submitted the decennial census information the reviewer will compare the ACS information to the decennial information. If the ACS information indicates large deviations from the decennial census, the reviewer should discuss those differences in the EIS but still use ACS information.

Demographic data to be collected must include the following categories:

1. Race (Not Hispanic or Latino)

    (1) White
    (2) African American or Black
    (3) American Indian or Alaska Native
    (4) Asian
    (5) Native Hawaiian or Other Pacific Islander (NHOPI)
    (6) "Other" Race (including races not mentioned above and Two or More Races)

2. Ethnicity

    (1) Hispanic or Latino (of any race)

3. Aggregate minority

4. Low-income populations (individuals or households at or below the poverty level)

Other general demographic and socioeconomic characteristics of the affected area should be included to provide the full characterization of the proposed site and region. For example:

1. Gender

2. Age

3. Educational attainment

4. Income levels

5. Employment and unemployment

6. Employment by industry

7. Migrant workers (see Census of Agriculture, Table 7. Hired Farm Labor, "Number of farm workers working less than 150 days" and other related information in this table)

8. Vehicle access for households

When deviating from the ACS as the data source, the reviewer should provide a discussion in the EIS as to why the alternative data source is acceptable, and should use data sources that are:

1. most up to date

2. developed by a federal, state, or academic institution

3. able to be disaggregated across

    a. demographic sub-groups (see demographics list, above)
    b. geopolitical boundaries

4. linked to a geographic information system for mapping purposes for areas down to the Census block group level

5. readily accessible to the general public, preferably at no charge

**End of change**

Issue Discussion: This Interim Staff Guidance (ISG) offers definitions of several terms used in the socioeconomics section of the EIS. These definitions are either a clarification of the language that currently exists in the ESRP or are new definitions offered where none had been provided.

"*Aggregate minority*" has often been mistakenly calculated for demographic purposes as either the Total Population minus "White," or by summing the populations of all non-white racial group total populations. Both of these approaches ignore the fact that the Hispanic or Latino population, while a minority category, is not a racial category. The demography section of Chapter 2 of the EIS should include the following statement:

> For EIS purposes, "Aggregate Minority Population" should be calculated as the total population minus people who identified themselves as "White, Not Hispanic, or Latino."

The relevant regions for analysis are included in this ISG because there has been no standardized nomenclature used in the past for discussions of the various areas that could be potentially affected. For analytical work, the socioeconomic reviewer should limit the discussion to:

1. the "*50 mile region*," which is an area defined by a circle with a 50-mile radius centered on the power block(s) of the proposed site; and

2. the "*economic impact area*," which is a specific subset of counties or other politically defined areas where the staff expects (1) the construction/operations work force would be principally drawn and reside, (2) the majority of the stresses to community services by a change of residence of construction/operations workers would occur, and (3) the majority of other economic impacts of the proposed project would occur. The reviewer should avoid using the acronym, EIA, as a substitute for "economic impact area" because the acronym carries numerous conflicting definitions.

Deletions: NUREG-1555 contains guidance recommending the inclusion of sector charts (see ESRP Section 2.5.1, pages 4 through 7). Given that these charts were originally intended for use in emergency planning and are found in the applicant's Safety Analysis Report (SAR), and that the staff does not perform any impact analyses based upon sectors, the staff has determined that the charts are not necessary for the purposes of the EIS. The reviewer should also note that this deletion should also be performed in the appropriate appendix, where the tabular data for the sector analysis has been made available.

Clarification: The reviewer should establish a social and economic impact area that is relevant to the environmental review and avoid creating an unnecessary nexus between the safety analysis and those of the environmental work. Discussions of the demographic baseline in terms of "Exclusion Area Boundary," "2-mile radius," "5-mile radius," and "10-mile radius," have specific meanings in the context of the safety review, which are not relevant to the environmental review. However, there may be special cases where it makes sense to discuss the demographic information in safety terms. The environmental and the safety review both look at demographic information, and the reviewers should discuss their findings.

## STAFF GUIDANCE FOR THE ENVIRONMENTAL JUSTICE ANALYSIS FOR NEW REACTOR ENVIRONMENTAL IMPACT STATEMENTS

### Background

In 2007, the Commission ruled in favor of issuing an ESP for the North Anna ESP Site, with one Commissioner dissenting (NRC 2007b). The basis for the dissent was the lack of specificity in the EJ discussion in the EIS. The staff subsequently determined that, while the ESRP was fully compliant with the Commission's policy statement on the treatment of EJ matters in licensing actions (NRC 2004), the presentation of the staff's analysis should have been more extensive.

### Rationale

The purpose of this portion of the ISG is to ensure that in all permit actions, the staff's analysis of EJ issues is supported by a level of detail sufficient to describe the basis for the staff's conclusions.

### Staff Guidance

The following list comprises the set of specific clarifications or revisions will preserve and refine the NRC's EJ analytical process within the spirit of applicable Commission guidance documents and the Council on Environmental Quality (CEQ) guidance they reference:

- LIC-203, Revision 3, Appendix D (NRC 2013), referencing CEQ guidance (CEQ 1997) with respect to the process by which Census data should be used to identify and locate potentially affected minority or low-income populations. The ESRP does not provide guidance on this process and refers the reviewer to these earlier documents. The language in the CEQ guidance has led to interpretations in the past that can understate minority and low-income populations in the 50-mile region. This guidance clarifies this process to provide a more detailed EJ assessment.

- LIC-203, Revision 3, Appendix D, directs the reviewer to "obtain the most recent 10-year demographic data (census data) for the 50-mile radius and surrounding communities." The ESRP identifies the use of "current decade census data, and where available, more recent data." This indicates that the reviewer should consider more recent data than the decennial Census when such data are available. The source for demographic data should be the ACS 5-Year Summary Data on race, enthnicty and poverty, at the Census block group level. If the applicant submitted the decennial census information the reviewer will compare the ACS information to the decennial information. It is acceptable for the reviewer to use the decennial Census if it has been recently released and after confirming that there is no significant change when compared to the ACS information.

- The ESRP does not explicitly state the geographic scale of the census data analysis should be the census block group level. The ESRP does not contain the phrase "block group" anywhere within the 2007 update, and in the EJ Section 2.5.4, the word "block" appears only once (it only discusses the data *availability* of block data in the Data and Information Needs discussion). LIC-203, Revision 3, Appendix D recommends the use of census block group data. However, that discussion is useful to the reviewer only if they research the ESRP's reference documents. This guidance establishes the scale of analysis within the ESRP.

- LIC-203, Revision 3, Appendix D, and the CEQ guidance document spend a great deal of time carefully explaining the need for a two-part assessment of impacts: effects on human health, and effects on the environment. This language is absent in the ESRP and was identified in the Commission's North Anna ESP decision as an information area that could have been expanded upon. This guidance makes that two-part assessment an explicit part of the ESRP.

The 2007 ESRP update shows the EJ discussion as a final section of the socioeconomics section of the EIS. Current practice has moved the EJ discussion to its own section in the EIS, immediately following the socioeconomics discussion.

The discussion of baseline socioeconomic impacts in an EIS for an ESP or COL application can typically be found in Chapter 2 Affected Environment, in the following sections. Potentially affected minority and low-income populations, including subsistence consumption of fish and wildlife, migrant populations, and minority and low-income communities with unique characteristics should be described.

2.6 Environmental Justice Populations

2.6.1 Methodology and Analysis

2.6.2 Scoping and Outreach
Minority and Low-income populations
Subsistence Consumption of Fish and Wildlife
Communities with Unique Characteristics
Migrant Populations

2.6.3 Environmental Justice Summary

ESRP Section 2.5.4 - ENVIRONMENTAL JUSTICE

The following guidance fully replaces the REVIEW PROCEDURES section of the guidance in the ESRP.

**Beginning of change**

III. REVIEW PROCEDURES

The reviewer's analysis of minority and low-income populations should be closely linked with the impact-assessment review of environmental issues described by the ESRP Sections 4.1.1 through 4.6, 5.1.1 through 5.6, 7.1, and 7.3 to establish the environmental pathways, if any, by which minority and low-income populations could be disproportionately affected. The Environmental Justice (EJ) reviewer should enlist the assistance of the human health impacts reviewer in preparing and/or reviewing any statements concerning human health effects on minority and low-income populations. The analysis of important demographic groups (e.g., migrant populations), environmental concerns (e.g., Native American cultural sites), or data sources (e.g., social science studies on minority and low-income populations performed by an academic institution) may provide useful information. Commensurate with the significance of this information, the reviewer should incorporate it into the EIS and advise the Environmental Project Manager (EPM) and the relevant safety reviewer of the existence of this new information. To analyze the population distribution within the 50-mile region of the proposed site, the reviewer should:

1. review and verify the applicant's methods for identifying and describing minority and low-income EJ populations in the ER

    a. assess sources for the basic demographic data

    b. determine how the applicant estimated populations within 80 km (50 mi) of the site

    c. determine how the applicant extrapolated population projections to three years beyond the full commercial operation of the proposed project

2. supplement the demographic data in the ER with new and significant information as necessary

3. perform reconnaissance level verification of the EJ population and other relevant demographic data in the ER and any supplemental data gathered by the staff with:

    a. internet verification through

        i. Federal, state, local, and academic data bases

        ii. websites for affected communities within the 50 mile region of the proposed and alternative sites

        iii. newspapers and other publications

        iv. other on-line resources deemed important by site-specific characteristics

b. on-site verification through

i. interviews with local community leaders in the affected areas, such as

1. mayors, county or city administrators, chiefs of fire and police

2. utility managers, road management administrators, county or city planners

3. school boards and/or administrators

4. Chambers of Commerce and Economic Development organizations

ii. Interviews with local community organizations

1. Churches and philanthropic organizations

2. Minority- and ethnicity-based service or advocacy organizations

4. supplement the demographic information in the ER based on new information gathered during reconnaissance and on-site verification

a. develop the staff's baseline demographic description of EJ populations for the EIS that includes

b. a summary description of the EJ population review process, including

i. descriptions of all extrapolation techniques in sufficient detail that the demographic review process is fully reproducible

ii. explanations for all limiting assumptions of the analysis

iii. identification of any unique EJ population and/or community characteristics, such as high transient population (daily or seasonal) or new EJ communities.

c. such other discussion as necessary to characterize the unique characteristics of the affected EJ population(s)

5. report the final assessment of potentially affected minority and low-income populations in the EIS

a. provide information in text identifying areas the staff believes key human health and other environmental pathways that may affect EJ populations

b. develop relevant tables, maps, and graphs to fully characterize the EJ population demographic characteristics of the Region and economic impact area

The staff should take care to ensure that all of these steps are discussed in the description of the process used to determine EJ impacts. For baseline purposes, the discussion should not

include any determination of impacts, only the potential for impacts to occur to EJ populations and affected pathways.

The staff's preferred source for demographic data is the ACS 5-Year Summary Data for all race, ethnicity, and poverty data. When collecting demographic data for EJ populations, the staff will compile information in a similar manner as described in Section 2.5.1 Demography Data and Information Needs of Attachment 2 of this ISG. The NRC EJ demographic analysis must be based on the analysis performed in Section 2.5.1.

The NRC's process for identifying minority and low-income populations is based upon the CEQ's guidance and NRC's "Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions". Under current NRC staff guidance, a minority or low-income community is identified by comparing the percentage of the minority or low-income population in the impacted area to the percentage of the minority or low-income population in the County and the State. If the percentage in the impacted area significantly exceeds that of the State or the County percentage for either the minority or low-income population then EJ will be considered in greater detail (69 FR 52048). The following language should be included in the EIS discussion of the methodology used to identify minority and low-income populations of interest:

> "If a census block group meets either of the two criteria discussed below for any of the identified minority or low-income populations, that census block group is considered a minority or low-income population block group warranting further investigation. The two criteria are whether:
>
> - the minority, ethnic, or low-income population that resides in the census block group exceeds 50 percent of the total population for that census block group; or
>
> - the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. The percentage of the minority, ethnic, or low-income population in the census block group is at least 20 percentage points greater than the minority or low-income population's percentage in the County and the State."

LIC-203, Revision 3, Appendix D, and CEQ guidance discuss the need for a two-part assessment of impacts to minority and low-income populations consisting of the assessment of human health effects and environmental effects. The Methodology and Analysis portion of this section of the EIS should include a discussion of the process used to assess human health and environmental effects as an integral part of the EJ review. The reviewer should look to recent EISs for permitting actions to find suitable language as a guide for including it in the Methodology discussion.

Scoping and Outreach

Scoping and outreach are a central aspect of Executive Order 12898 (E.O. 12898) and the staff should describe in several paragraphs the steps taken to identify EJ populations, document concerns, and provide opportunities for public involvement. This discussion should be supported by trip reports, telephone logs, and other documentation as necessary to support the process and conclusions.

Subsistence Consumption of Fish and Wildlife (E.O. 12898, Sec. 4–4) and Communities with Unique Characteristics

Subsistence consumption of fish and wildlife is one of the key food pathways affecting human health identified by Executive Order 12898 through which minority and low-income populations may be affected. This section of the EIS should document the process by which the staff reached its subsistence-related conclusions. If the proposed project is located adjacent to existing reactors then the process should include a review of recent Radiological Environmental Monitoring program (REMP) reports on existing operating reactor, reconnaissance level searches of journal articles, and other reports, on-site investigations and interviews, and site visit personal observations.

Migrant Populations

Migrant populations, especially migrant farm workers, may have unique food and environmental pathways by which they may be affected by the proposed action. This section of the baseline EJ review should provide a brief explanation of the staff's findings with regard to this demographic group. Related information on the possible number of migrant workers per county can be found in the Census of Agriculture, Table 7. Hired farm Labor, "Number of farm workers working less than 150 days" and other related information in Table 7

**End of change**

ESRP Section 4.4.3 - ENVIRONMENTAL JUSTICE CONSTRUCTION IMPACTS

**Background**

The following subsections form the typical layout for the discussion of construction-related impacts to potentially affected EJ populations in an EIS. The staff should revise this layout as needed for the complete and transparent discussion of impacts and mitigating measures.

4.5 Environmental Justice Impacts

4.5.1 Human Health Effects
Subsistence Consumption of Fish and Wildlife

4.5.2 Environmental Effects
4.5.2.1 Soil
4.5.2.2 Water
4.5.2.3 Air
4.5.2.4 Noise

4.5.3 Socioeconomic Impacts

4.5.4 Special Conditions and Unique Characteristics

4.5.5 Summary of Environmental Justice Impacts

While the staff's changes to the guidance for the construction-related impacts on EJ populations and communities are not as extensive as those found in the baseline discussion above, the staff determined the extent of the changes still warranted a full replacement of the existing text in this guidance.

The following guidance fully replaces the REVIEW PROCEDURES discussion in the guidance of the ESRP.

**Beginning of change**

III. REVIEW PROCEDURES

To determine which impacts are likely to be of concern and, therefore, what environmental impact areas should be discussed, the reviewer should take the following steps:

1. Coordinate with the other environmental resource reviewers of ESRP Sections 4.1 through 4.6 to ensure that the appropriate impact areas are being discussed.

2. Examine the record of public comments received during scoping to determine whether environmental impact areas are being discussed appropriately with respect to environmental justice.

3. Analyze the potential human health and environmental effects on minority and low-income populations.

a. Briefly describe human health pathways by which any environmental impact during construction may result in disproportionate environmental impacts on minority or low-income population blocks (including cultural and economic factors).

b. Assess (qualitatively or quantitatively, as appropriate) the degree to which each minority or low-income population block may experience disproportionately high and adverse human health or environmental (including socioeconomic) effects during construction as compared to the general population.

c. Assess (qualitatively or quantitatively, as appropriate) the significance of environmental impacts on each minority and low-income population block. Significance is determined by considering the disproportionate exposure, multiple-hazard, and cumulative hazard conditions outlined in the CEQ guidance.

d. Discuss any mitigative measures for which credit is being taken to reduce EJ concerns.

**End of change**

ESRP Section 5.8.3 - ENVIRONMENTAL JUSTICE OPERATIONS IMPACTS

**Background**

The following subsections form the typical layout in the EIS for the discussion of operations-related impacts to potentially affected EJ populations. The staff should revise this layout as needed for the complete and transparent discussion of impacts and mitigating measures.

5.5 Environmental Justice Impacts

- 5.5.1 Health Effects
  Subsistence Consumption of Fish and Wildlife
- 5.5.2 Environmental Effects
  - 5.5.2.1 Soil
  - 5.5.2.2 Water
  - 5.5.2.3 Air
  - 5.5.2.4 Noise
- 5.5.3 Socioeconomic Impacts
- 5.5.4 Special Conditions and Unique Characteristics
- 5.5.5 Summary of Environmental Justice Impacts

While the staff's changes to the guidance for the operations-related impacts on EJ populations and communities are not as extensive as those found in the baseline discussion above, the staff determined the extent of the changes still warranted a full replacement of the existing text.

The following guidance fully replaces the REVIEW PROCEDURES discussion in the guidance of the ESRP.

**Beginning of change**

III. REVIEW PROCEDURES

To determine which impacts are likely to be of concern and, therefore, what environmental impact areas should be discussed, the reviewer should take the following steps:

1. Coordinate with the other environmental resource reviewers of ESRP Sections 5.1 through 5.8 to ensure that the appropriate impact areas are being discussed.

2. Examine the record of public comments received during scoping to determine whether environmental impact areas are being discussed appropriately with respect to environmental justice.

3. Analyze the potential human health and environmental effects on minority and low-income populations.

a. Briefly describe human health pathways by which any environmental impact during operations may result in disproportionate environmental impacts on minority or low-income population blocks (including cultural and economic factors).

b. Assess (qualitatively or quantitatively, as appropriate) the degree to which each minority or low-income population block may experience disproportionately high and adverse human health or environmental (including socioeconomic) effects during operations as compared to the general population.

c. Assess (qualitatively or quantitatively, as appropriate) the significance of environmental impacts on each minority and low-income population block. Significance is determined by considering the disproportionate exposure, multiple-hazard, and cumulative hazard conditions outlined in the CEQ guidance.

d. Discuss any mitigative measures taken to reduce EJ concerns.

**End of change**

ESRP Section 9.3 - ALTERNATIVE SITES GUIDANCE

**Socioeconomic Guidance**

The reviewer should refer to the section of this guidance that deals with alternative sites in general for an overall assessment of the clarifications to the existing ESRP that are being made. In the context of the socioeconomic impacts anticipated at each alternative site, the following specific direction should be applied.

The Data and Information Needs subsection of ESRP 9.3 states:

> " . . . The following data or information should be obtained: . . . (2) A description of the geographic area considered by the applicant, including (from the ER): . . . economic, demographic, and community characteristics (ESRP Sections 2.5.1 through 2.5.3)"

The reviewer should interpret this guidance to mean that the EIS discussion for each alternative site should include an analysis at the appropriate level of discussion for each of the socioeconomic topic areas listed in the representative table of contents for Chapters 4.4, 4.5, 5.4, and 5.5 of the EIS. The reviewer should interpret "appropriate level of discussion" to mean that, given the ESRP's and this guidance's direction for reconnaissance level analyses, each topic area should be discussed at a level that provides the reader with sufficient information to reach a significance level conclusion. The reviewer should ensure that for each topic area for the proposed site where a greater than minor impact was identified, the analogous topic area for each alternative site addresses similar concerns and conditions. For example, with regard to traffic impacts during construction, which tends to have a noticeable adverse impact near the site, the reviewer should provide a well-reasoned estimation of existing and projected traffic conditions, such that a comparison between the proposed site and the alternative site can be made.

Table 9.3-2 in the ESRP (Evaluation of Alternative Sites) provides a single row for describing the socioeconomic and EJ characteristics for each alternative site. The socioeconomic impact assessment is complex and unique in an EIS for the following reasons:

1. While some impacts are adverse, other categories of impacts may be beneficial

2. The same category may have impact levels that are adverse in some locations and beneficial in others

3. Impact levels can vary in magnitude in different areas in the 50 mile region

4. Impact levels can vary temporally for the same location for the same category during the same phase of the project (for example, the staff typically assesses traffic impacts for the period of peak construction employment, which is a relatively short period of time during construction, and even within the peak employment period, traffic impacts are limited to only those hours when workers commute)

The reviewer should take care to subdivide this row into a sufficient number of categories to fully characterize the differences between impact categories and the differences within categories

between the proposed and alternative sites. For categories with other than SMALL impact subdivide the row .

The process for determining whether an alternative site is in fact environmentally preferable to the proposed site (or if an alternative generating technology or design would be environmentally preferable) is deferred to a separate discussion in this guidance.

**Environmental Justice Guidance**

The guiding principle behind the discussion of EJ impacts at the alternative sites in an EIS is that the level of detail for the identification of minority and low-income populations is the same as that done for the proposed site, except for the need for on-site interviews and visits. The staff should take care to address any specific human health risk pathways, characteristics, or other unique characteristics that define the proposed site to assess the magnitude (if any) of those same concerns at each alternative site. The investigation is done at the reconnaissance level, which recognizes that available EISs from other recent actions (nearby Federal major actions—including other reactor licensing actions and license renewal reviews) offer opportunities for incorporation by reference, so long as the methodology employed by those other reviews is sufficiently rigorous for the staff to rely upon them. Environmental justice assessments for alternative sites are done at the census block group level.

## VI. REFERENCES


1. 10 CFR 50.10: Code of Federal Regulations, Title 10, *Energy,* "License Required; Limited Work Authorization."

2. Council on Environmental Quality (CEQ). 1997: "Environmental Justice: Guidance Under the National Environmental Policy Act." CEQ Guidance, December 10, 1997, Washington, D.C.

3. Executive Order (E.O.) 12898: 59 FR 7629. February 16, 1994. "Federal Actions to Address Environmental Justice in Minority and Low-Income Populations." *Federal Register.* U.S. Office of the President.

4. Nuclear Regulatory Commission (NRC). 2000: *Environmental Standard Review Plan – Standard Review Plans for Environmental Reviews for Nuclear Power Plants.* NUREG-1555. Washington, D.C.

5. Nuclear Regulatory Commission (NRC). 2004: 69 FR 52040. August 24, 2004. "Policy Statement on the Treatment of Environmental Justice Matters in NRC Regulatory and Licensing Actions." *Federal Register.* U.S. Nuclear Regulatory Commission.

6. Nuclear Regulatory Commission (NRC). 2007a: *Environmental Standard Review Plan – Standard Review Plans for Environmental Reviews for Nuclear Power Plants.* NUREG-1555, Revision 1. Washington, D.C.

7. Nuclear Regulatory Commission (NRC). 2007b: U.S. Nuclear Regulatory Commission (NRC), Memorandum and Order (CLI-07-27) in the Matter of Dominion Nuclear North Anna, LLC. (Early Site Permit for North Anna ESP Site), November 20, 2007. Docket No. 52-008-ESP, Washington, DC. Agencywide Documents Access and Management System (ADAMS) Accession No. ML082521051.

8. Nuclear Regulatory Commission (NRC). 2011: Memorandum from Brent Clayton to Scott Flanders, "Revision 1- Addressing The Construction and Preconstruction Activities, Greenhouse Gas Issues, General Conformity Determinations, Environmental Justice, the Need For Power, Cumulative Impact Analysis And Cultural/Historical Resources Analysis Issues in Environmental Impact Statements." ADAMS Accession No. ML110380369.

9. Nuclear Regulatory Commission (NRC). 2013: Office of Nuclear Reactor Regulation (NRR), Office Instruction Number LIC-203, Revision 3, "Procedural Guidance for Preparing Categorical Exclusions, Environmental Assessments, and Considering Environmental Issues." ADAMS Accession No. ML12234A708.

10. United States Census Bureau (USCB). 2010: U.S. Census Bureau (USCB), "2006-2010 ACS 5-Year Summary File Technical Documentation, Version 2," December 8, 2011.

## Attachment 3: Staff Guidance for Historic and Cultural Resource Reviews for New Reactor Environmental Impact Statements COL/ESP-ISG-026

### Background

In 2007, the U.S. Nuclear Regulatory Commission (NRC) amended its regulations with regard to limited work authorizations (LWAs). An LWA allows certain NRC-regulated construction activities to commence before a construction permit (CP) or combined license (COL) is issued (*Federal Register* notice (FR), 72 FR 57416) (NRC 2007). In the 2007 amendments, NRC modified the definition of "construction" to clarify that certain activities do not require NRC approval because they fall outside the NRC's regulatory authority, including (a) preparation of a site for construction (clearing, grading, construction of temporary roads and borrow areas), (b) excavation, (c) erection of support buildings, and (d) building of service facilities (paved roads, parking lots, railroad spurs, sewage treatment facilities, and transmission lines). Because these activities are not in the definition of construction, they are also referred to as "preconstruction" activities. For purposes of the National Environmental Policy Act (NEPA), these preconstruction activities are addressed as cumulative impacts in NRC Environmental Impact Statements (EISs).

### Rationale

The purpose of this document is to supplement the guidance provided in NUREG-1555, Environmental Standard Review Plan (ESRP), Sections 4.1.3 and 5.1.3, Historic Properties, and Section 9.3, Alternative Sites (NRC 2000), regarding the requirements of the National Historic Preservation Act (NHPA) and NEPA. Specifically, this guidance supplements the ESRP guidance for: 1) Using the NEPA process to comply with NHPA requirements, 2) NHPA Section 106 consultation, 3) use of reconnaissance-level information for alternative sites, 4) cumulative impacts for historic and cultural resources, and 5) protecting historic and cultural resource information.

### Staff Guidance

Using the NEPA Process to Comply With NHPA Requirements

The ESRP directs the staff's assessment of potential impacts of the proposed action on historic, archaeological, and traditional cultural resources (referred to collectively as "historic and cultural resources"). In accordance with Title 36 of the *Code of Federal Regulations* (36 CFR) 800.8(c), the NRC may use its NEPA review process instead of the Section 106 procedures set forth in 36 CFR 800.3 through 800.6. Prior to commencing the review, the staff should review the requirements of 36 CFR 800.8(c).

The NRC's NEPA review focuses on the "proposed action" under consideration – for example, issuance of a COL for construction and operation of a new nuclear reactor. If a cooperating agency participates in the development of an EIS because it has a permit/license action before it, the EIS will also identify the cooperating agency's proposed action. Activities outside the NRC's regulatory authority, including but not limited to preconstruction activities and their impacts on cultural and historic properties, are considered as cumulative impacts of the NRC's proposed action.

By contrast, NHPA consultation focuses on the federal "undertaking" under consideration, as defined in 36 CFR 800.16(y). The definition of federal undertaking includes activities "requiring a Federal permit, license or approval."[1]

The NRC views site preparation activities with no nexus to radiological health and safety or common defense and security as private actions that would not be subject to NHPA through the NRC. However, site preparation activities may be subject to NHPA review by another Federal Agency such as the U.S. Army Corps of Engineers.

The NRC is required to comply with the NHPA including the anticipatory demolition clause, Section 110(k) of the NHPA (16 U.S.C. § 470h-2(k)). When fulfilling its NHPA obligations, the NRC views site preparation activities with no nexus to radiological health and safety or common defense and security as private actions that are not part of the NRC's Federal undertaking. However, those site preparation activities may be subject to NHPA review to the extent they are encompassed by the Federal undertaking of another Federal Agency, such as the USACE. Certain site preparation activities may have other specific NHPA consequences. The staff during pre-application interactions should inform the applicant that if they decide to commence pre-construction or site preparation activities, the applicant should be cognizant of the anticipatory demolition statutory provision in Section 110(k) of the NHPA (16 U.S.C. § 470h-2(k)) which states:

> Each Federal agency shall ensure that the agency will not grant a loan, loan guarantee, permit, license, or other assistance to an applicant who, with intent to avoid the requirements of Section 106 of this Act, has intentionally significantly adversely affected a historic property to which the grant would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the agency, after consultation with the Council, determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant.

The staff during the acceptance review and throughout the review should inform management if it appears anticipatory demolition may have occurred and if necessary consult with the Advisory Council on Historic Preservation (ACHP) to determine what action may be appropriate.

Section 106 Consultation

Section 106 Consultation is conducted for the federal undertaking. In accordance with 36 CFR 800.8(c)(1), historic properties are identified and effects of the undertaking on such properties are assessed in consultation with the identified parties. For applications where NRC chooses to substitute its NEPA review process for the Section 106 process in 36 CFR 800.3 through 800.6 (as permitted by the NHPA implementing regulations at 36 CFR 800.8), the EIS will discuss the consultation process used to identify historic properties, assess the effects of the undertaking on such properties in a manner consistent with the standards and criteria of Sections 800.4 through 800.5 and develop proposed measures to avoid, minimize or mitigate

[1] In addition, the NRC exercises its regulatory authority in a manner consistent with the fundamental principles expressed in Executive Order 13175, "Consultation and Coordination With Indian Tribal Governments" (Nov. 6, 2000). This Executive Order encourages federal agencies to consult with Indian Tribal Governments on the development of policies that have tribal implications. As a result, the NRC may have responsibilities to consult with Tribal goverments on licensing actions that are not necessarily triggered by the NEPA or NHPA. The NRC staff should contact the Intergovermental Liaison Branch (ILB) of the Division of Intergovernmental Liaison and Rulemaking, Office of Federal and State Materials and Environmental Management Programs (FSME) with any questions regarding outreach and communication with Native American Tribal communities and Tribal representatives.

any adverse effects of the undertaking on historic properties and describe them in the environmental assessment (EA) or draft EIS. The status of the consultation should also be included in Chapters 2, 4 and 5.

The area within which historic properties should be identified is referred to as the Area(s) of Potential Effects (APE(s)). The APE is defined at 36 CFR 800.16(d) as the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking (36 CFR 800.16(d)). The staff should consider the scope of the proposed project and the NRC's definition of construction (Title 10 of the *Code of Federal Regulations* (10 CFR) 50.10, 10 CFR 51.4), and consult with the State Historic Preservation Officer (SHPO) or Tribal Historic Preservation Officer (THPO) when determining the APE(s).

If the staff determines that adverse effects to historic properties exist, the adverse effects would be resolved via consultation with the SHPO and/or the THPO, affected federally recognized tribes, local government, members of the public, the applicant, and other affected parties. (In some cases, the ACHP may become involved in these site-specific negotiations.) Specifically, 36 CFR 800.8(c)(1)(v) provides that the federal agency develop proposed measures in consultation with the identified consulting parties that might avoid, minimize, or mitigate such effects. Such measures, as appropriate, should be discussed in the EIS. If the staff determines that adverse effects exist, it can develop a Memorandum of Agreement (MOA) or Programmatic Agreement (PA) (*See* 36 CFR 800.8(c)(4)) as a way to address adverse effects.

The federal agency also consults with the relevant parties when developing an MOA or a PA. As defined 36 CFR 800.16(o), an MOA is a document that records the terms and conditions agreed upon to resolve the adverse effects of an undertaking upon historic properties. The PA is defined in 36 CFR 800.16(t) as a document that records the terms and conditions agreed upon to resolve the potential adverse effects of a Federal agency program, complex undertaking or other situations in accordance with Section 800.14(b). Whichever is used, the MOA or PA must specify who is responsible for carrying out the agreed-upon measures. The NRC staff should consult with the Office of General Counsel on a case-by-case basis about the circumstances under which the NRC may participate in the development of an MOA/PA and about referencing any such agreement in the environmental protection plan.

Reconnaissance-level Information and Reconnaissance Activities

There is a difference between "reconnaissance-level information" as used in NRC environmental reviews and the term "reconnaissance activities" as used by cultural resource professionals. For the purpose of its NEPA review, the NRC considers reconnaissance-level information, which is information that is available from the applicant, governmental, Tribal, commercial, and/or public sources, when reviewing alternative sites.[2] Reconnaissance-level information does not normally require the collection of new data or field studies. For example, the historic and cultural resources subject matter expert can gather this information from the application, through visits to the alternative sites, and through interactions with the appropriate THPO/SHPO.

[2] ESRP Section 9.3 identifies potential sources of information.

Among cultural resource professionals, the term "reconnaissance activities" has a particular meaning. Typically, these activities include preliminary field investigations to confirm the presence or absence of historic and cultural resources. For the NEPA analysis, data about historic and cultural resources from reconnaissance activities (such as field investigations) are typically available for the proposed site but not for the alternative sites. For the alternative sites considered in the EIS, the NRC's analysis of impacts to historic and cultural resources typically relies on available (reconnaissance-level) information rather than on collection of new data or field studies. Reconnaissance activities are not generally required for alternative sites.

Cumulative Impacts

The NEPA cumulative impacts assessment considers the impacts of the proposed action on historic and cultural resources when combined with the impacts of other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time. The area over which cumulative impacts are considered can vary for different types of impact. For the NEPA analysis of cumulative impacts to historic and cultural resources from the proposed action, it is usually appropriate for the impacts analysis to start by considering the impacts within the APE identified for NHPA purposes, as well as the impacts on historic and cultural resources from preconstruction activities. However, the NEPA analysis should also consider cumulative impacts from other activities outside the APE (e.g., if there are past, present, or reasonably foreseeable future impacts outside the APE that would affect the same historic or cultural resources).

Discussions with the THPO/SHPO may provide information on past, present, and future actions within the APE and the potential impacts to the resources located there. Information on impacts from these past, present, and reasonably foreseeable future actions (including preconstruction activities) should be included in the applicant's environmental report. This will both aid the staff in its NEPA cumulative impacts analysis and inform the staff's evaluation of potential adverse effects to historic properties under NHPA, including, if appropriate, consideration of possible "anticipatory demolition" issues at the site.

Protecting Cultural Resource Information

Cultural resource information (i.e., reports, maps, site forms) that discloses locations of certain historic and cultural resources should not be made available to the public because there is a risk of looting. The NRC protects cultural resource information disclosing the location of cultural resources (e.g., maps) under Section 304 of the NHPA,[3] consistent with 10 CFR 2.390(a)(3). Section 304 of NHPA requires the NRC to "withhold from disclosure to the public, information about the location, character, or ownership of a historic resource if the agency and the Secretary of the Interior agree that disclosure may (1) cause a significant invasion of privacy, (2) risk harm to the historic resource, or (3) impede the use of a traditional religious site by practitioners."

The Secretary of the Interior acts through the Keeper of the National Register of Historic Places, a position within the National Park Service (NPS). The NRC, therefore, consults with the Keeper of the Register to make a determination to withhold information from the public if there is a request to disclose this information. Memorandum dated June 7, 2010 (Agencywide

[3] *See* 36 CFR 800.11(c).

Documents Access and Management System (ADAMS) Accession No. ML111080735) "Staff Guidance for Withholding Sensitive Information About Historic Resources in Accordance With the National Historic Preservation Act" (NRC 2010) contains detailed guidance on withholding sensitive cultural information.

References


1. 36 CFR Part 800. Code of Federal Regulations, Title 36, *Parks, Forests, and Public Property,* Part 800, "Protection of Historic Properties."

2. National Environmental Policy Act of 1969, as amended (NEPA). 42 U.S.C. 4321, *et seq*

3. National Historic Preservation Act of 1966, as amended (NHPA). 16 U.S.C. 470, *et seq*.

4. Nuclear Regulatory Commission (NRC). 2000. *Environmental Standard Review Plan: Standard Plans for Environmental Reviews for Nuclear Power Plants.* NUREG-1555, Includes 2007 Updates, Office of Nuclear Reactor Regulation, Washington, D.C. Accessed at http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1555/toc/index.html

5. Nuclear Regulatory Commission (NRC). 2007. 72 FR 57416. October 9, 2007. "Limited Work Authorizations for Nuclear Power Plants." *Federal Register*. U.S. Nuclear Regulatory Commission.

6. Nuclear Regulatory Commission (NRC). 2010. Memorandum dated June 7, 2010 "Staff Guidance for Withholding Sensitive Information About Historic Resources in Accordance With the National Historic Preservation Act" (ADAMS Accession No. ML111080735)

## Attachment 4: Staff Guidance for Cumulative Analysis for New Reactor Environmental Impact Statements
## COL/ESP-ISG-026

### Background

Council on Environmental Quality regulations define cumulative impacts as 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. See 40 CFR 1508.7. The U.S. Nuclear Regulatory Commission (NRC) regulations state that Title 40 of the *Code of Federal Regulations* (40 CFR) 1508.7 definitions will be used by the NRC in implementing National Environmental Policy Act (NEPA) (Title 10 of the *Code of Federal Regulations* (10 CFR) 51.14(b)).

In 2007, the NRC amended 10 CFR 50.10 regarding limited work authorizations (LWA), to allow certain construction activities to commence before a construction permit or combined operating license is issued (*Federal Register n*otice (FR), 72 FR 57416) (NRC 2007). In particular, NRC modified the definition of "construction" to eliminate construction activities that do not have a nexus to radiological health and safety, and common defense and security. These activities are considered "preconstruction" activities not under NRC's jurisdiction. The preconstruction activities are evaluated as part of the cumulative impact analysis. The preconstruction activities are specified in 10 CFR 50.10 (a)(2) and include preparation of a site for construction (clearing, grading, installation of environmental mitigation measures, building of temporary roads and borrow areas), (b) excavation,(c) erection of support buildings, and (d) building of service facilities (paved roads, parking lots, railroad spurs, sewage treatment facilities, and transmission lines).

### Rationale

The purpose of this guidance is to clarify the cumulative analysis at the proposed site for new reactor Environmental Impact Statements (EIS). This guidance directs the staff's cumulative impacts analysis associated with the proposed project when considered in the context of other past, present, and reasonably foreseeable future actions. This plan includes guidance on identifying the time frame of the analysis, the geographic area of interest, the baseline for the analysis and other actions that could contribute to the cumulative impact. The guidance in this section is generally applicable to all the resource areas. If the specific guidance is applicable to only one resource area it will be so identified. The basis for the guidance is specified below:

- 10 CFR 51.10(a) with respect to NRC policy to voluntarily take account, subject to certain conditions, of the regulations of Council on Environmental Quality (CEQ) implementing the NEPA. The CEQ regulations specify that an EIS discuss cumulative impacts (40 CFR 1508.25(c)(3));

- 10 CFR 51.45 with respect to the need to discuss cumulative impacts in an environmental report;

- 10 CFR 51.75 with respect to the need to discuss cumulative impacts in an EIS;

- 40 CFR 1508.25 and 10 CFR 51.14(b) with respect to the scope of an EIS and consideration of the cumulative impacts of connected, cumulative, and similar actions.

**Staff Guidance**

Definitions

*Baseline* is the site as described in Chapter 2 of the EIS.

*NRC-authorized impact*s are the impacts from NRC-authorized construction activities identified in Chapter 4 and the operational impacts identified in Chapter 5 of the EIS.

*Construction* is defined in 10 CFR 51.4

Data Needs from Other Chapters of the EIS

The reviewer should obtain input from and provide input to the reviewers for the following Chapters:

- Chapter 2. Chapter 2 provides the baseline information for starting the cumulative review.

- Chapters 4, 5 and 6. Obtain impacts from Chapter 4, 5 and 6. The impact from Chapter 4, 5 and 6 will be considered along with other Federal and non-Federal actions to determine the cumulative impacts. Impacts from preconstruction activities that are not under NRC jurisdiction are considered as cumulative impacts. If pre-construction activities were not evaluated in Chapter 4 then fully discuss them in the analysis in chapter 7.

- Chapter 9 and Chapter 10. Provide cumulative impact characterization of the proposed action to be considered in the alternatives and cost benefit analysis.

- Interface with Environmental Project Manager (EPM). Consult with the EPM on any cumulative impacts characterized as MODERATE or LARGE. Potential mitigation measures and their merits should be discussed for all impact levels.

Steps to perform the resource specific analysis

The resources to be evaluated for cumulative impacts are generally the same ones evaluated in EIS Chapters 4, 5, and 6. The reviewer's analysis should identify and evaluate the cumulative impacts associated with the proposed plant. Each cumulative impact is to be discussed in proportion to the significance of the impact attributed to the proposed plant. It is generally more efficient to have one reviewer do the research to identify the projects in the general area of the plant that may have a cumulative impact using the guidance in step 3. The resource area reviewers can add or remove projects as they perform their resource specific review. For each resource area for which there is a direct or indirect impact, reviewers should perform the following steps:

1) Identify the geographic area to be considered in evaluating cumulative impacts for each resource and ecological component. For each resource area the reviewer needs to define the geographical area of interest analyzed for this resource and provide a brief explanation of how and why the area of interest was selected. The geographic area of interest will be different for each resource area, as different resources have different impact areas. The geographic boundaries used in evaluating cumulative impacts for a resource should generally be the same as the one used in Chapters 4 and 5.

   CEQ guidance recommends applying natural ecological or socio-cultural boundaries (CEQ 1997). Possible geographic areas that could be used to determine the appropriate geographic area for a cumulative impact analysis are in Table 2-2 of the CEQ Guidance. EPA guidance recommends that the scope include geographical areas that sustain the resources of concern, but not be extended to the point of becoming unwieldy (EPA 1999). Geographical proximity to the proposed action should be considered but is not a decisive factor for including other actions. Jurisdictional borders are sometimes useful in defining the geographical area of interest for resource areas such as land use and some socioeconomic areas; however, this approach may not be applicable for defining the geographical area for ecological resources such as aquatic ecology. For example, in socioeconomics, the reviewer may start with the 50-mile radius around site but focus and draw the impact based on the economic impact areas, which is likely to be the nearby counties. For aquatic resources, the reviewer should use the watersheds/water bodies affected by this action. The reviewer needs to use their professional judgment to set the geographic area of interest.

2) The time frame for analyzing cumulative impacts is defined as follows:

   Past time frame is prior to the receipt of the combined license (COL) or early site (ESP) application.

   The past time frame is the point in time prior to the receipt of the application. This could include the time at which a certain land-use was established, or an even more historical baseline that represents the pre-disturbance conditions. The availability of data often determines how far back and to what extent past effects are examined. Certain types of data may be available for extensive periods in the past while other data may be available only for shorter periods of time. Due to lack of data, the analysis of past effects is usually qualitative (CEQ 1997). In many cases, discussion of the past actions may entail a brief paragraph telling the story of how the resource has evolved to its current condition by describing past actions and/or referring to the baseline discussion in Chapter 2.

   Example - Historically, the site and vicinity was a combination of wetlands, forests, and agricultural lands. Agriculture was the dominant land use in the region since the 1890s. Residential development in the area began in the early 1900s, and increased steadily until the Energy Complex was built in 1975. The general trend over the past few decades has been an increase in residential areas, roads, utilities, and businesses and a decrease in wetlands, forests, and agricultural lands. See Chapter 2 for a more detailed discussion of these past activities.

Present time frame is from the time of the COL or ESP application until the start of NRC-authorized construction of the proposed new unit(s).

The present time frame is the shortest time frame and should capture any ongoing actions. Many of the resource areas measure the environment as it currently exists. These measurements capture the cumulative impact to the resource from the past and present projects and should be part of the baseline for the resource in chapter 2.

Future time frame is from the start of NRC-authorized construction of the proposed new unit(s) through building and operating of the proposed new unit(s) including decommissioning.

The future time frame captures the reasonably foreseeable future actions. The reviewer then needs to add the impact from any proposed projects and any other actions that could have an overlapping impact on the resource to evaluate the cumulative impact.

Cumulative impacts should be reasonably foreseeable during the time-frame of construction, operation, and decommissioning of the proposed plant. When considering future actions, the following may fall under the definition of reasonably foreseeable:

a) Actions unrelated to the project but which have been approved by the proper authorities, have submitted license/permit applications, or which may not require approval of a regulating agency, but for which procurement contracts have been signed.

b) Actions conditioned upon approval of the project under review.

Actions that are *not* reasonably foreseeable are those that are based on mere speculation or conjecture, or those that have only been discussed on a conceptual basis. Future actions that do not fall under the definition of reasonably foreseeable, but could potentially take place as indicated by trending in the vicinity or less formal communications, may be addressed in a general manner. The reviewer should acknowledge that various industrial, commercial, recreational, or residential developments are likely to occur in the area, but absent specific proposals to a government agency, or evidence of a signed procurement contract, the impacts of such actions should not be included in the EIS.

3) Identify past, present, and reasonably foreseeable future Federal, non-Federal, and private actions that could have meaningful cumulative impacts with the proposed action. At minimum, the following sources are to be searched for information that could be relevant to cumulative effects within the geographic area identified:

a) The applicant's Environmental Report (ER)

b) EISs from the U.S. EPA's NEPA website describing direct, indirect, and cumulative effects within the geographic area (NEPAssist)

c) Government websites identifying potential future actions

d) State Department of Transportation and Environmental Protection websites

e) Information provided by the applicant or other government agencies.

f) Information obtained through site audits at the proposed and alternative sites

g) Local and County land use development planning documents

If the proposed plant is located on the site of one or more existing unit(s), the reviewer should consider the cumulative impacts of the new plant and the existing plant when the new plant is under construction and when the new and existing plant are both operating.

The level of detail available for each project identified as contributing to the cumulative impact will vary, but some of the following information may be helpful in adequately analyzing the cumulative effects: location and size of the facilities, environmental releases, lifetime of the action, workforce (temporary and permanent), frequency of use, transportation routes, approvals/permits required.

Following the above guidance the person assigned will develop a table listing the significant projects that could contribute to the cumulative impact. The table will identify reasonably foreseeable projects and other actions within a 100 mile radius for other nuclear energy projects and within a 50-mile radius for all other projects. The reason for the 100 mile radius for nuclear plants is that the ingestion pathway for the emergency planning zone extends 50 miles around the plant. Therefore, two plants would have to be 100 miles away not to have an overlapping ingestion pathway. The 50 mi radius for other projects is a guideline. For example, the reviewer can designate the geographic area for their resource as a drainage basin or river system that is more or less than 50 miles. The status of the projects will fall under the category of "Proposed" or "Operational". There is also the potential for long term continuous projects (e.g., various mine remediation projects); these will have the status of "Ongoing." Government lands (parks, game preserves, wildlife areas, etc.) where no development projects are being carried out will have the status of "Development Unlikely." See the example below:

**Table 1:** Past, Present and Reasonably Foreseeable Projects and Other Actions Considered in the Cumulative Analysis

| Project Name | Summary of Project | Location | Status |
|---|---|---|---|
| **Energy Projects** | | | |
| [identify projects other than the proposed project] | [provide short summary of project] | [describe location in relation to proposed project] | [provide status][a] |
| XXX Unit 1 | XXX Unit 1 consists of one XXX-MW(e) nuclear power generating plant. | <1 mi north of proposed site | XXX Unit 1 is currently operational and is licensed to continue operations through XXXX |
| Hydroelectric Station | 14-MW(e) hydroelectric plant | | Operational[b] |

| Project Name | Summary of Project | Location | Status |
|---|---|---|---|
| XXX Natural gas Plant | 71-MW(e) natural gas electric generating plant | about 2 mi south of proposed project | Operational |
| XXX Coal Plant | 460 MWe Coal Plant | About 7 mi south of the proposed plant on XX River | Operational |
| XX Nuclear Station | Two pressurized water reactors | About 52 mi north | Proposed new nuclear plant. Operation would begin in 2021 |
| Transmission Lines | Various transmission lines currently exist throughout region and installation of additional lines would occur if new nuclear plants or other large energy projects are built. | Throughout region | Operational as well as proposed transmission lines |
| **Mining Projects** | | | |
| XXX Quarry | Products include asphalt aggregate, base material, concrete, and aggregate. | 10 mi north of proposed project | Operational |
| **Transportation Projects** | | | |
| Strategic Corridor System Plan | Strategic system of corridors forming the backbone of the state's transportation system. | State Wide | Planning document with no explicit schedules for projects, however, many strategic corridors coincide with routes which would/could be used for development at the proposed site. |
| **Parks and Aquaculture Facilities** | | | |
| XXXX Park | 7500-acre park | 5 mi south of proposed project | Development Unlikely in this area. |
| Planned Wildlife Management Area | 4400-acre wildlife management area | Adjacent to proposed project | Proposed, planned development of wildlife management area to be completed by XXX date. |
| **Other Actions/Projects** | | | |
| City of XXXX | Municipal water withdrawals from the Broad River | About 26 mi southeast | Ongoing |
| Various hospitals and industrial facilities that | Medical isotopes | Throughout region | Operational in |

| Project Name | Summary of Project | Location | Status |
|---|---|---|---|
| use radioactive materials | | | |
| XXX Chemical Plant | Industrial Inorganic Chemicals | About 23 mi north of the propose project on the XXX River | operational |
| Various Wastewater Treatment Facilities (WWTF) | Sewage treatment. | Throughout region | operational |

(a) Source:
(b) Source:

The above table is only an example. The categories of projects may not occur at all sites and therefore the reviewer is to develop a table of projects that are specific to each site. Some of the projects listed within the table may not be relevant to all resource areas. For example, an aquaculture facility located near the proposed nuclear plant under review may have overlapping impacts with the nuclear facility for aquatic resources, but the two projects would not have overlapping impacts for air quality, and therefore, would not be appropriate to discuss in the air quality cumulative impact analysis.

All reviewers should reference the table in their cumulative impacts analyses in order to reduce repetition. If a reviewer is aware of other projects in the area that should be included in the table and the review should inform the EPM.

4) Evaluate the significance and magnitude of cumulative impacts associated with the proposed plant.

a) Reviewers should focus on cumulative impact information that is relevant to reasonably foreseeable significant adverse impacts, is essential to a reasoned choice among alternatives, and can be obtained without exorbitant cost (CEQ 2005). Cumulative effects may result from the accumulation of similar effects or the synergistic interaction of different effects (CEQ 1997).

b) Reviewers should consider if the proposed action will affect the potential for each resource to sustain itself, taking into account how conditions have changed over time and how they are likely to change in the future.

c) At the beginning of each resource section (or subsection as needed), the reviewer summarizes the NRC incremental impact and the preconstruction impact as discussed in Chapters 4 and 5. The description of the affected environment in Chapter 2 serves as the baseline for the cumulative impact assessment. The reviewer should describe the impact to the resource from Chapter 4 and 5. Impact information for the proposed project is presented here

so that the reader can easily follow the logic as the impacts from the proposed project are added to the impacts from other projects.

For the discussion of other proposed projects or actions, provide quantitative or qualitative information on the type and magnitude of impact. If quantitative information is not available from other EISs or permit information or other sources, qualitative information can be used. For example, in the air quality analysis, if the permitted levels of emissions from various sources are unknown, the analysis could state that major sources are operating within regulated permits and that the county is in attainment, indicating that the total level of regulated pollutants within the county are within national ambient air quality standards set by EPA. Be sure that the text describing the other projects provides a logical basis for the cumulative conclusion. For some resource areas, other past, and present, projects have been incorporated in the baseline in chapter 2 or in the analysis in Chapters 4 and 5. For example, in water use, the measured value of water flow in the river used as the cooling source would already include the consumptive water use of the upstream users. Another example is in socioeconomics, an economic model of the area may have been used in chapters 4 and 5 that would have included the proposed project along with the economy of the local region. In this situation, ensure that the analysis in Chapter 7 clearly explains how the analysis in Chapters 4 and 5 considered impacts from other projects. As appropriate, include any additional discussion of cumulative impacts that were not described in Chapters 4 and 5.

d) For each resource area, determine whether the cumulative effect of the proposed action, when overlaid or added to temporary or permanent effects associated with past, present, or reasonably foreseeable future projects, is SMALL, MODERATE, or LARGE.

5) Identify any plans by the applicant for mitigation of adverse cumulative impacts, or modification of alternatives to avoid, minimize, or mitigate cumulative impacts. The reviewer should discuss mitigation that may be required by local, state, and federal authorities, including information regarding restoration actions by separate entities, required mitigation of other projects, or voluntary mitigation and enhancement by the entity taking an action. The reviewer should refer to the cover memo of ISG-026 for more guidance on mitigation.

6) A table similar to Table 2 should be used to summarize the impacts at the end of the cumulative chapter in the EIS for the proposed site.

**Table 2:** Cumulative Impact on Resource Areas, Including the Impacts of Proposed Unit(s)

| Resource Category | Comments | Impact level |
|---|---|---|
| **Land-Use** | | |
| **Water-Related** | | |
| Surface Water Use | | |
| Groundwater Use | | |
| Surface Water Quality | | |
| Groundwater Quality | | |
| **Ecology** | | |
| Terrestrial Ecosystems | | |
| Aquatic Ecosystems | | |
| **Socioeconomic** | | |
| Physical Impacts | | |
| Demography | | |
| Economic Impacts on the Community | | |
| Infrastructure and Community Services | | |
| Aesthetics and Recreation | | |
| **Environmental Justice** | | |
| **Historic and Cultural Resources** | | |
| **Air Quality** | | |
| **Nonradiological Health** | | |
| **Radiological Health** | | |
| **Severe Accidents** | | |
| **Fuel Cycle, Transportation, and Decommissioning** | | |

EVALUATION FINDINGS

Wording of the conclusion in this section will depend on whether the impacts are SMALL, MODERATE or LARGE.

If the impact is SMALL – Provide the basis for the conclusion and describe whether or not further mitigation beyond that described in Chapters 4 and 5 would be warranted.
If the impact is MODERATE or LARGE - Summarize the basis for the conclusion (the full explanation should be provided in the preceding analysis). The principal contributor to the MODERATE or LARGE rating could be due to the proposed project (construction, preconstruction, or operations), the current conditions (i.e., the current degraded state of the resource), or other current and/or reasonably foreseeable projects. In the next paragraph, state the NRC-incremental impact and provide a discussion as to whether the NRC-authorized activity is a significant contributor to the MODERATE or LARGE impact. Sufficient information should be provided to show whether the NRC-authorized activity caused the cumulative impact to go from SMALL to MODERATE or MODERATE to LARGE. For example, if the NRC-authorized increment is SMALL, but the impacts from preconstruction, the existing condition, or other projects are the principal contributors to the MODERATE rating, state this. Another

possibility could be that several projects (including the proposed project) are all individually minor, but when considered together result in a MODERATE or LARGE impact (e.g., no one project is the principal contributor). For other than a SMALL impact, discuss if, and to what extent, the NRC authorized impact contributes to the other than SMALL impact.

REFERENCES


1. 10 CFR 51.4, Code of Federal Regulations, Title 10, *Energy,* 51.4, "Definitions."

2. 10 CFR 51.10, Code of Federal Regulations, Title 10, *Energy,* 51.10, "Purpose and scope of subpart; application of regulations of Council on Environmental Quality."

3. 10 CFR 51.14, Code of Federal Regulations, Title 10, *Energy,* 51.14, "Definitions."

4. 10 CFR 51.45, Code of Federal Regulations, Title 10, *Energy,* 51.45, "Environmental report."

5. 10 CFR 51.70, Code of Federal Regulations, Title 10, *Energy,* 51.70, "Draft environmental impact statement – general."

6. 10 CFR 51.75, Code of Federal Regulations, Title 10, *Energy,* 51.75, "Draft environmental impact statement-construction permit, early site permit, or combined license.

7. 40 CFR 1508, Code of Federal Regulations, Title 40, *Protection of Environment,* Part 1508, "Terminology and Index."

8. Council on Environmental Quality (CEQ). 1997. *Considering Cumulative Effects under the National Environmental Policy Act*. Available at: *Considering Cumulative Effects under the National Environmental Policy Act Accessed* on November 7, 2012

9. Council on Environmental Quality (CEQ). 2005. Memorandum from James L. Connaughton, Chairman CEQ, to Heads of Federal Agencies regarding "Guidance on the Consideration of Past Actions in Cumulative Effects Analysis."

10. Environmental Protection Agency (EPA). 1999. Consideration of Cumulative Impacts in EPA Review of NEPA Documents. EPA Publication 315-R-99-002

11. Environmental Protection Agency (EPA). 2008. *§309 Reviewers Guidance for New Nuclear Power Plant Environmental Impact Statements*. EPA Publication 315-X-08-001

12. Environmental Protection Agency (EPA). 2012. U.S. Environmental Protection Agency, NEPAssit Tool. Accessed on November 7, 2012. Available at: http://www.epa.gov/oecaerth/nepa/nepassist-mapping.html

13. National Environmental Policy Act of 1969, as amended (NEPA). 42 U.S.C. 4321, *et seq*

14. Nuclear Regulatory Commission (NRC). 2002. U.S. Nuclear Regulatory Commission (NRC), Memorandum and Order (CLI-02-14) in the Matter of Duke Energy Corp. (McGuire Nuclear Station, Units 1 and 2; Catawba Nuclear Station, Units 1 and 2), April 12, 2002. Docket Nos. 50-369-LR, 50-370-LR, 50-413-LR, & 50-414-LR, Washington, D.C. Accession No. ML021020595.

15. Nuclear Regulatory Commission (NRC). 2007.: 72 FR 57416. October 9, 2007. "Limited Work Authorizations for Nuclear Power Plants." *Federal Register.* U.S. Nuclear Regulatory Commission.

# Attachment 5: Staff Guidance for Need for Power Reviews in New Reactor Environmental Impact Statements
## COL/ESP-ISG-026

### Background

Chapter 8 of an Environmental Impact Statement (EIS) will include the staff's need for power assessment for a Combined License Application, or an Early Site Permit (ESP) Application, if a need for power discussion has been incorporated into the ESP application. The staff should employ the outline below, revising it to account for project specific needs.

### Rationale

The rationale of this guidance is to clarify certain aspects of NUREG-1555, the Environmental Standard Review Plan (ESRP) for new reactors. This guidance clarifies NUREG-1555, Sections 8.0 through 8.4 (NRC 2000). The ESRP Sections 8.1 through 8.4 were revised in NUREG-1555, Draft Revision 1 in July 2007 (NRC 2007). This guidance is entirely consistent with the existing ESRP. It provides clarifications on sections that had been subject to misinterpretation and expands upon sections where standard practices have evolved over time. As with the guidance in the ESRP, none of the clarifications in this guidance impose new requirements.

### Staff Guidance

ESRP Section 8.0, Need For Power

Summary of Changes:

The following changes in the AREAS OF REVIEW and Review Interfaces sections should completely replace the information currently in ESRP Section 8.0. The information presented in this chapter was not updated in the July 2007 ESRP revision.

I. AREAS OF REVIEW:

This guidance directs the staff's preparation of an introductory section for the portion of the EIS that evaluates the need for power. The U.S. Nuclear Regulatory Commission (NRC) staff's role in the need for power analysis is indicated in a denial of petition for rulemaking (NRC 2003). The introduction will include the Purpose and Need generally in terms of: (1) the amount of power (MWe), (2) location of the service area, (3) expected startup date(s), and (4) the regulatory system and associated requirements in the service area. The scope of the paragraph covered by this section introduces the areas to be addressed in the reviews conducted under ESRP Sections 8.1 through 8.4.

Review Interfaces:

- ESRP Section 1.1 –This section describes the project, the amount of power needed to be produced, the service area, and the timing of the project for the staff to perform a need for power analysis.

- ESRP Section 9.2 - Information from this section will be used in the energy alternatives assessment.

- ESRP Section 9.3 – The service area for the proposed site, as defined in the Purpose and Need statement, defines the relevant area where an alternative site can be considered.

ESRP Section 8.1, Description of Power System

Summary of Changes:

The following changes clarify the information currently in the AREAS OF REVIEW section of ESRP Section 8.1. The AREAS OF REVIEW section was updated in the July 2007 ESRP revision to inform the reviewer about the current state of energy markets in the country. The information in Review Interfaces should be added to the information in ESRP Section 8.1. The guidance below informs the reviewer about the current process for ESRP Section 8.1.

I. AREAS OF REVIEW:

ESRP Chapter 8.1 introduces the four criteria that form the basis upon which the staff determines whether the need for power analysis provided by the applicant or an independent third party (e.g., a state public service commission, Independent System Operator, or Regional Transmission Organization) may be relied on by the NRC, or whether the staff must conduct an independent analysis. The applicant's need for power analysis must be (1) systematic, (2) comprehensive, (3) subject to confirmation, and (4) responsive to forecasting uncertainty. It can be performed directly by the applicant or by an independent third party. If the need for power analysis does not meet the four criteria, the staff should perform its own analysis in accordance with the criteria delineated in the ESRP Sections 8.2.1, 8.3, and 8.4.

If the applicant's analysis of need meets the four criteria provided above, the staff may rely on that analysis for the need for power discussion in the EIS. If the applicant's need for power analysis does not meet the four criteria, the staff must either find a suitable third party analysis that satisfies the four criteria or perform its own assessment of the need for power in the applicant's defined service area. This chapter does not consider the benefits associated with the project. As enumerated by the applicant in its ER, the staff would review benefits as a part of its analysis in Section 10.6 of the EIS. This review provides input to the reviews conducted under ESRP Sections 8.2.1, 8.3, and 8.4.

The ESRP and its 2007 revision identify the four criteria for the acceptability of an analysis provided by an applicant or an independent third party without explicitly defining them. In this Interim Staff Guidance, the staff defines the four criteria for clarification:

- *Systematic* is defined as an analysis that has been performed according to an objective, thorough, methodical, deliberate, and organized manner. The analysis has been presented in a step-wise manner to a logical conclusion that is supported by the data and reasoning provided.

- *Comprehensive* is defined as an analysis that is detailed, broad in scope, and includes a sufficient number of factors that are relevant, so that the reviewer can reasonably conclude that the analysis could be considered "complete." The depth of analysis and discussion for each factor is commensurate with its relative importance.

- *Subject to confirmation* is defined as an analysis that is independently reviewed or confirmed by another entity [e.g. state or federal reviews of Integrated Resource Plans (IRPs) or Federal Energy Regulatory Commission (FERC) reviews of Independent System Operator (ISO) or Regional Transmission Organization (RTO) reports].

- *Responsive to forecasting uncertainty* is defined as a stable and robust methodology. It is not unduly affected by the presence of outliers or other small departures from the model's assumptions, yet remains capable of characterizing the relative importance of uncertainty among input variables during sensitivity analyses.

The current ESRP methodology for determining need for power is still valid. In addition to the methodologies outlined in the ESRP, the reviewer may use the following processes to assess need for power (i.e., that the full capacity of the proposed project three years after the commencement of full operations will be fully utilized in the electricity market):

1. Certification of Need: Demonstrating that the proposed action has obtained formal certification from a utility authority stating the public need for the proposed project is the most direct method for determining the need for power. When such a certification has been achieved, NRC recognizes the primacy of the States in determining the need for power where such regulations are in place and further analysis is not necessary. The reviewer should cite the certification in the conclusions section as the basis for a positive determination of need.

2. Account for the Capacity: Accounting for the full capacity of the proposed project within the relevant market area three years after the commencement of full operations of the project is the most commonly used approach to demonstrating need. For the relevant market area, the comparison of future total peak demand for electricity (including reserve requirements) against future total capacity should include;

    a. All planned capacity additions
    b. All planned closures (including for environmental reasons)
    c. All imports and exports of electricity.

    If the reviewer determines the proposed project carries a surplus (unaccounted for) capacity, the applicant may account for the remaining capacity of the proposed units by demonstrating the remaining capacity of the proposed can be sold to areas outside the applicant's relevant service area.

3. Market-based Assessment: For a regulated utility, demonstrating the need for baseload power is a simple accounting exercise similar to the above strategy because the utility has a fully defined inventory of generating units in a monopoly service area. For a merchant plant, demonstrating the need for baseload is an economic distribution process by which the reviewer demonstrates the proposed project has the economic feasibility to successfully compete in the RTO or ISO hourly market at a frequency consistent with the capacity factor definition of a baseload generating unit.

In all cases, the reviewer is free to employ a need for power assessment that is not explicitly identified by the ESRP or the above list, provided such deviation is accompanied by a detailed explanation as to (1) why the reviewer employed a different approach and (2) a detailed explanation as to why the reviewer's preferred methodology meets the NRC's standards for quality and transparency.

If an acceptable third party analysis does not exist or the staff cannot locate a reliable third party analysis (or a suitable analysis performed by the applicant is not provided), the NRC staff will perform its own analysis using the process presented in the Data and Information Needs section of ESRP Section 8.1, Draft Revision 1. The remainder of this attachment assumes an independent third party analysis (or a suitable analysis performed by the applicant) exists upon which the staff may rely in its need for power assessment.

Review Interfaces:

- ESRP Section 8.0 – Incorporate information from the introductory paragraphs with respect to the purpose and need for the project.
- ESRP Section 9.2 – Information from this section will be used in the energy alternatives assessment.
- ESRP Section 9.3 - For establishing the service area for alternative site selection purposes.

ESRP Section 8.2, Power Demand

Summary of Changes:

The following changes in the AREAS OF REVIEW and Review Interfaces sections are supplemental to the discussion currently in ESRP Section 8.2. The information presented in this chapter was not updated in the July 2007 ESRP revision.

ESRP Sections 8.2.1 and 8.2.2 can be combined effectively under ESRP Section 8.2 without any loss of meaning; therefore, this guidance combines the Subsections 8.2.1 and 8.2.2 under a new Section 8.2 which will be incorporated in the next revision of the ESRP.

I. AREAS OF REVIEW:

This guidance relates to the staff's description in the EIS of the process, requirements, or statutes that guide the staff's assessment of the relevant service area's demand for electricity, based on an acceptable analysis by the applicant or an independent third party. This section should also summarize, if available, the regulatory or statutory requirements guiding the independent third party's analysis, if any (e.g. state requirements for IRPs, federal requirements for reliability from Congress or FERC, or applicable ISO and RTO requirements). This section analyzes reasonably foreseeable power and energy demand requirements at the commencement of operations activities and factors affecting change in demand.

Information in this section should include the following factors of demand between the year of application through three years after the commencement of full operation of the project, if applicable: residential, commercial, industrial, instructional, and other electricity demand, reliability reserve requirements, demand side management (DSM) or energy efficiency (EE) characteristics, new legislative or regulatory requirements affecting the demand for electricity, and any other unique characteristics found by the reviewer.

The reviewer should include a table that presents the important characteristics of total system demand for power in the relevant market area, including the reserve margin, up to three years following commercial operation of the full project. The table should be similar to 8.2-X, adjusted based on site-specific factors.

If no independent third party analysis can be found that meets the NRC's four criteria, the staff shall create, with appropriate information requested from the applicant as necessary through the Request for Additional Information process and its own electricity demand analysis according to the process presented in ESRP Section 8.2.1, Draft Revision 1.

Review Interfaces:

- ESRP Section 8.1 – If the applicant's or independent third party's analysis meets the four criteria, use demand information from that analysis in this section. If no acceptable independent third party analysis can be found, the staff should perform its own analysis based upon available information about the power demand of the service area.

**Table 8.2-X.** Demand Forecast Summary (MW(e))

| | **20XX** | **20XX** | **20XX** | **20XX** | **20XX** | **20XX** | **20XX** | **20XX** | **20XX** | **20YY[1]** |
|---|---|---|---|---|---|---|---|---|---|---|
| Residential | | | | | | | | | | |
| Commercial | | | | | | | | | | |
| Industrial | | | | | | | | | | |
| Other | | | | | | | | | | |
| LESS: DSM or EE | | | | | | | | | | |
| **Total Demand** | | | | | | | | | | |
| Reserve Margin | | | | | | | | | | |
| **Total System Demand** | | | | | | | | | | |

1 20YY indicates three years following the commencement of full operation of the proposed project.

ESRP Section 8.3, Power Supply

Summary of Changes:

The following changes in the AREAS OF REVIEW and Review Interfaces section clarify the information currently in ESRP Section 8.3. No substantive changes have been made to ESRP Section 8.3. This section of the ESRP was updated in July 2007.

I. AREAS FOR REVIEW:

The discussion in this section should include information pertaining to the applicant's proposal to meet its identified purpose and need. The discussion in this section should include information related to present and future characteristics of the applicant's power supply portfolio. Information in this section should include if applicable, the following factors of power supply between the year of application through three years after the commencement of full operation of the project, expected closures and additions of capacity, net electricity imports, and supply-side legislative or regulatory requirements or any other unique characteristics found by the reviewer.

The reviewer should include a table that presents the important characteristics of total system supply in the relevant service area up to three years following commercial operation of the full project, including baseline capacity, projected additions and closures, and net imported power. The table should be similar to 8.3-X, but adjusted based on site-specific factors.

If no independent third party analysis can be found that meets the NRC's four acceptance criteria, the staff shall create, with appropriate information requested from the applicant as necessary through the Request for Additional Information process and its own electricity supply analysis according to the process presented in ESRP Section 8.3, Draft Revision 1.

Review Interfaces:

- ESRP Section 8.1 – If the applicant's or independent third party's analysis meets the four criteria, use supply information from that analysis in this section. If no acceptable independent third party analysis can be found, the staff should perform its own analysis based upon available information about the power supply of the service area.

**Table 8.3-X**. Supply Resources Summary (MW(e))

| | **20XX** | **20XX** | **20XX** | **20XX** | **20XX** | **20XX** | **20XX** | **20XX** | **20XX** | **20YY**[1] |
|---|---|---|---|---|---|---|---|---|---|---|
| Baseload Resources | | | | | | | | | | |
| Intermittent or Peak Resources | | | | | | | | | | |
| LESS: Retirements | | | | | | | | | | |
| PLUS: Additions | | | | | | | | | | |
| **Total Installed Capacity** | | | | | | | | | | |
| Exported Power | | | | | | | | | | |
| Imported Power | | | | | | | | | | |
| Net Transactions | | | | | | | | | | |
| **Total Supply** | | | | | | | | | | |

1 20YY indicates three years following the commencement of full operation of the proposed project.

ESRP Section 8.4, Assessment of Need For Power

Summary of Changes:

ESRP Section 8.4, Draft Revision 1 provides significant guidance on how the staff should perform a need for power analysis. However, no new subject matter should be presented in Section 8.4. This section of the EIS should have a comparison of the applicant's or independent third party's projected future demand and supply, yielding the net MW(e) needed, compared to the capacity of the proposed project, and a conclusion about whether or not there is a need for the power. If the staff performs the need for power analysis, it should summarize the information using the guidance as applicable.

The reviewer should include a table that presents the expected total system demand and supply from Sections 8.2 and 8.3. The table should be similar to 8.4-X, but adjusted based on site-specific factors.

**Table 8.4-X**. Demand and Supply Forecast Summary (MW(e))

| | **20XX** | **20XX** | **20XX** | **20XX** | **20XX** | **20XX** | **20XX** | **20XX** | **20XX** | **20YY**[1] |
|---|---|---|---|---|---|---|---|---|---|---|
| **DEMAND** | | | | | | | | | | |
| System Demand | | | | | | | | | | |
| Reserve Margin | | | | | | | | | | |
| **Total Demand** | | | | | | | | | | |
| | | | | | | | | | | |
| **SUPPLY** | | | | | | | | | | |
| Capacity | | | | | | | | | | |
| Net Transactions | | | | | | | | | | |
| Net Capacity | | | | | | | | | | |
| LESS: Retirements | | | | | | | | | | |
| PLUS: Additions | | | | | | | | | | |
| **Total Supply** | | | | | | | | | | |
| | | | | | | | | | | |
| **Surplus (Deficit) Without the Proposed Project** | | | | | | | | | | |
| Project Capacity | | | | | | | | | | |
| **Surplus (Deficit) With the Proposed Project** | | | | | | | | | | |

1 20YY indicates three years following the commencement of full operation of the proposed project.

**References:**

Nuclear Regulatory Commission (NRC). 2000: *Environmental Standard Review Plan – Standard Review Plans for Environmental Reviews for Nuclear Power Plants.* NUREG-1555. Washington, D.C.

Nuclear Regulatory Commission (NRC). 2003: 68 FR 55905. September 29, 2003. "Nuclear Energy Institute; Denial of Petition for Rulemaking." *Federal Register.* U.S. Nuclear Regulatory Commission.

Nuclear Regulatory Commission (NRC). 2007: *Environmental Standard Review Plan – Standard Review Plans for Environmental Reviews for Nuclear Power Plants.* NUREG-1555, Revision 1. Washington, D.C.

## Attachment 6: Staff Guidance for Alternatives Reviews for New Reactor Environmental Impact Statements
## COL/ESP-ISG-026

### Background

The Environmental Standard Review Plan (ESRP) or NUREG-1555 (NRC 2000) directs the staff's assessment of potential impacts of alternatives to the proposed action. There are various subparts to the alternatives analysis including the no-action alternative, alternative energy sources, site selection, and alternative systems designs. The guidance below is divided between clarifications and changes. Clarifications address cases in which the ESRP already addresses the issue adequately, but the staff has determined it would be useful to provide some clarification. Changes address cases in which the ESRP does not address the issue. For changes, the guidance below also includes a "Reason for Changes" to explain why new guidance is being added to the ESRP.

### Rationale

The purpose of this guidance is to clarify certain aspects of the alternatives analysis for new reactors. This guidance clarifies the ESRP Sections 9.1, No-Action Alternative; 9.2.1, Alternatives Not Requiring New Generating Capacity; 9.2.2, Alternatives Requiring New Generating Capacity; 9.2.3, Assessment of Competitive Alternative Energy Sources and Systems; 9.3, Site Selection Process; and 9.4.3, Transmission Systems. All of these ESRP sections were revised in July 2007, except for Section 9.1 which was last published in March 2000.

### Staff Guidance

ESRP Section 9.1, No-Action Alternative

The current guidance in ESRP Section 9.1 is adequate for the reviews, but warrants some clarification because reviewers continue to have difficulty describing this alternative. In large measure, this is because the no-action alternative isn't really feasible if a need for power in the region of interest (ROI) has been demonstrated in Chapter 8[1]. With a demonstrated need for power, doing nothing would mean significant consequences to people living in the ROI as the power system became unreliable because of inadequate generating capacity. The Council on Environmental Quality (CEQ) guidance states, "Where a choice of "no action" by the agency would result in predictable actions by others, this consequence of the "no action" alternative should be included in the analysis" (CEQ 2012). Reviewers know that regulatory authorities (typically a State public service commission, or equivalent, in conjunction with any regional transmission operator and electrical reliability council) would take action to meet the need for power before the grid became unreliable. Because of this, the staff will generally discuss what other steps might be taken to address the need for power. The no-action alternative in the Final

[1] This discussion relates only to those cases in which a need for power has been established. An early site permit (ESP) is not required to address the need for power. See Section 8.1 of the final EIS for the Clinton ESP for an example of the discussion of the no-action alternative in such a case.

Environmental Impact Statements (FEIS) for the Calvert Cliffs, V.C. Summer, and the South Texas Project combined license (COL) applications may serve as examples for reviewers of the no-action alternative.

ESRP Section 9.2, Energy Alternatives

Issue Discussion: A number of issues have been raised regarding energy alternatives during the development of recent Environmental Impact Statements (EIS). Many of these issues are focused on providing to the readers more information to explain the basis for the staff's analyses and conclusions. In addition, the Commission directed the staff (CLI-09-21, dated November 3, 2009) (NRC 2009) to include consideration of carbon dioxide and other greenhouse gas (GHG) emissions in its environmental reviews for major licensing actions under the National Environmental Policy Act (NEPA) of 1969, as amended. These issues are discussed in the section-specific guidance below.

As a general matter, in considering energy alternatives, the reviewer should apply a principle similar to that used for cumulative impacts regarding whether an activity is "reasonably foreseeable." Specifically, for an energy alternative that has not been proven to be capable of meeting the need for power developed by the reviewer for Chapter 8, the reviewer should evaluate the extent to which development of the alternative is likely, or reasonably foreseeable, in the ROI. In this regard, this guidance is differentiating between the theoretical potential of an alternative (e.g., offshore wind) and the likely development of that resource in the ROI. This is appropriate because analyses performed under NEPA should not be speculative. Rather they should be based on a reasonable analysis using the best available information.

In addition, the reviewer for ESRP Section 9.2 should coordinate with the reviewer for ESRP 8.0 to ensure that there is consistency in the projections of future energy production in the ROI.

Section-specific guidance follows.

ESRP Section 9.2.1, Alternatives Not Requiring New Generating Capacity

The current guidance in ESRP Section 9.2.1 is adequate for the reviews, but warrants some clarification. The reviewer's analysis of conservation and increased energy efficiency[2] as an alternative to construction of the proposed plant should be based on the analysis and evaluation of conservation and substitution received from the reviewer for ESRP Section 8.2.2, and information available from other authoritative sources such as U.S. Department of Energy (DOE) and State regulators. Whereas in Chapter 8 the staff identifies the planned efforts regarding conservation in the relevant service area, the reviewer for ESRP Section 9.2.1 should evaluate whether additional conservation above those plans is reasonably achievable. Information sources for this portion of the review might include an applicant's "high case" for

[2] Conservation and energy efficiency reduce the amount of energy being used either by changing how energy is used (e.g., raising the temperature maintained by a building cooling system 1°F) or using less energy to achieve the same function (e.g., replacing fluorescent bulbs with CFL bulbs). This is differentiated from demand-side management activities (e.g., time-of-day pricing) that are aimed at reducing the peak demand on the system.

conservation, or analysis by authoritative sources regarding how much power might be saved through conservation. The reviewer should consult with and assist the reviewer for ESRP Section 8.2.2 in analyzing the effects of conservation on power demand. The reviewer should consider whether the conservation measures being considered address issues of peak demand versus baseload demand, and compare this to the purpose and need for the project. The reviewer does not need to analyze the potential for conservation if the applicant is proposing to build a merchant plant and did not address the potential for conservation in the Environmental Report (CLI-05-29, Exelon Generation Co., LLC (NRC 2005), see also the South Texas Project COL FEIS (NRC 2011).

ESRP Section 9.2.2, Alternatives Requiring New Generating Capacity

The following information should be considered by the reviewer, in addition to the existing ESRP guidance:

- The capacity factor of the proposed project and each competitive alternative should be considered by the reviewer when determining the equivalence of an alternative. (See, for example, Section 9.2.2 of the draft EIS for the Fermi COL application.) If the proposed project is intended to supply baseload power, then any competitive alternative must also be capable of supplying baseload power.[3]

- If a potentially competitive alternative has a capacity factor significantly lower than that of the proposed project (e.g., wind, solar), consider whether the alternative could be competitive if a form of energy storage or back-up power is included. However, the feasibility and environmental impacts of energy storage or back-up power would have to be included in the evaluation of the alternative. (See, for example, Section 9.2.2 of the draft EIS for the Fermi COL application.)

- If a noncompetitive alternative is available in the relevant service area, also include an evaluation of the projected growth of that alternative for consideration in a combination of alternatives. The reviewer should consult authoritative sources such as a State renewable portfolio standard, State projections, and projections by the DOE for information on the projected growth of energy sources. The reviewer should also consider the existing energy mix in the ROI. (See, for example, Sections 9.2.3.2 and 9.2.3.3 of the draft EIS for the Lee COL application.)

- Alternative generating technologies found to be not competitive as the only source of electricity may be competitive when included in a combination of technologies. The reviewer should develop one or more combinations of alternatives that include some generating sources that were not individually competitive, but which are available in the relevant service area. Using the information on the projected growth of each available source, develop a value (or range of values) for the contribution of that alternative to the

[3] A baseload power plant is designed to operate continuously to supply all or part of the system's minimum load (DOE/EIA 2011). Baseload power plants typically have annual load capacity factors that exceed 75 percent, but usually operate 90 to 98 percent of the time (Hynes 2009).

combination. (See, for example, Section 9.2.4 of the draft EIS for the Lee COL application.) Include in the discussion information regarding the uncertainty in the projections of growth and how different values for growth for individual sources would affect the environmental impacts of the combination of alternatives. (See, for example, Section 9.2.4 of the final EIS for the Calvert Cliffs COL application.)

The reviewer should give priority to the inclusion of those sources with the least environmental impacts. Clearly differentiate between the installed (i.e., nameplate) capacity of an alternative, and its average output as a part of a combination of alternatives. The reviewer should then evaluate the environmental impacts of the combination(s) of alternatives for use in ESRP Section 9.2.3.

Rationale for Changes: Recent experience has shown that the type of detail discussed above is necessary to properly compare alternatives and to develop one or more combinations of alternatives that have a logical basis for the region of interest.

ESRP Section 9.2.3, Assessment of Competitive Alternative Energy Sources and Systems

The following information should be considered by the reviewer, to clarify the existing ESRP guidance:

Cost data is only used in this portion of the review to further evaluate competitive alternatives that are determined to be environmentally preferable to the proposed action. If no environmentally preferable alternative is identified, then cost data is not needed or used.[4] If cost data is used, see Appendix 1 at the end of this portion of the guidance for clarified guidance regarding the methods to be used.

In addition to the existing ESRP guidance, the reviewer should compare the emissions of carbon dioxide from the proposed action to those from all competitive energy alternatives.

Rationale for Change: In the Commission Memorandum and Order regarding *Duke Energy Carolinas, LLC* (COL Application for Williams States Lee III Nuclear Station, Units 1 and 2) and *Tennessee Valley Authority* (Bellefonte Nuclear Power Plant, Units 3 and 4) CLI-09-21, dated November 3, 2009 (NRC 2009), the Commission directed the staff to "include consideration of carbon dioxide and other greenhouse gas emissions in its environmental reviews for major licensing actions under the National Environmental Policy Act." In response to this direction, the staff issued a memorandum containing detailed guidance for consideration of the effects of GHG and of climate change, including the evaluation of alternative energy sources in Chapter 9 of the EIS (Agencywide Documents Access and Management System (ADAMS) Accession No. ML100990204) (NRC 2010a). The memorandum includes detailed background information regarding GHG and examples of how the effects of GHG can be addressed in an EIS. The guidance in that memorandum has been updated in Attachment 1 to this Interim Staff Guidance.

[4] While the staff does not consider cost when it determines if an alternative is environmentally preferable, some data sources that are frequently used by the staff (e.g., the U.S. Department of Energy, Energy Information Administration, or DOE/EIA) do consider the cost of generated electricity when making projections of the growth of different types of generating sources.

ESRP Section 9.3, Site Selection Process

Issue Discussion: In order for the staff to perform its evaluation, and conduct a reasonable comparison of sites, the staff has determined that it will perform a cumulative impacts analysis for each of the resource areas at each alternative site in the comparison process.[5] This will put the analysis of the alternative sites in Chapter 9 on an equal footing with the analysis of the cumulative impacts at the proposed site in Chapter 7. A key difference is that the analysis of the alternative sites will be performed at a reconnaissance level, as is already discussed in ESRP Section 9.3. ESRP Section 9.3 is not specific as to whether cumulative impacts would be used for the comparison. So this additional guidance specifies that cumulative impacts will be used for comparison of alternative sites. To implement the use of cumulative impacts for the alternative sites, an approach similar to that used in Chapter 7 will be used. The staff issued a memorandum containing detailed guidance (Accession No. ML100621042) (NRC 2010b) for analyzing cumulative impacts at alternative sites. The guidance in that memorandum is being updated in this portion of the interim guidance document. This updated guidance supplements the ESRP direction to the staff for review of the cumulative impacts associated with the proposed project at the alternative sites when considered in the context of other past, present and reasonably foreseeable future actions. The scope of the cumulative impact analysis will include identification of the time frame of the analysis, the geographic area of interest, the baseline for the analysis and other actions that could contribute to the cumulative impact.

As discussed for ESRP Section 9.2.3, the Commission directed the staff to "include consideration of carbon dioxide and other greenhouse gas emissions in its environmental reviews for major licensing actions under the National Environmental Policy Act." The staff developed detailed guidance for consideration of the effects of GHG and of climate change, including the evaluation of alternatives in Chapter 9 of the EIS (Accession No. ML100990204) (NRC 2010a). The guidance in that memorandum has been updated in Attachment 1 of this interim guidance document.

The following information clarifies the existing ESRP guidance:

- "Reconnaissance-level information" is defined as information that is available from the applicant, governmental, tribal, commercial, and/or public sources. Reconnaissance-level information does not normally require the collection of new data or new field studies. Reconnaissance should include more than just a literature search for issues that are critical to the evaluation of sites. So, for example, reconnaissance should include contact with the water management agency regarding water availability in most cases, as discussed in Regulatory Guide (RG) 4.7 (NRC 1998). The amount and quality of information must be sufficient based on the expert judgment of the reviewer to make the required determination for which the information is needed.

- The reviewer must be able to conclude, based on expert judgment, that each alternative site could be used to build and operate the proposed project. For example, as stated in

[5] Cumulative impacts are only considered at the last stage of the site selection process, when the alternative sites are compared to the proposed site.

RG 4.7, there should be reasonable assurance that the applicant could obtain the necessary water use permits for the proposed project at each alternative site.

- For the "obviously superior" test, facility costs should include any additional costs associated with building and operating the proposed unit(s) at the environmentally preferable site. These costs could include items such as the cost of (1) modifying the plant design, (2) additional grading and fill, (3) ecological and cultural resource surveys, (4) the ongoing cost of establishing and operating a new emergency plan (if the proposed site already has such a plan in place), (5) the cost of obtaining the alternative site, and (6) the cost of any delay associated with changing sites. Institutional constraints could include items such as (1) known objections of regulatory agencies, (2) grid stability issues at the alternative site, (3) lack of franchise privileges and eminent domain powers, (4) the need to restructure existing financial and business arrangements, and (5) the feasibility of obtaining the alternative site. For background, see *Consumers Power Company* (Midland Plant, Units 1 and 2), ALAB-458; *Public Service Company of New Hampshire, et al.* (Seabrook Station Units 1 and 2), ALAB-471; and *New England Coalition on Nuclear Pollution v. NRC*, 582 F.2d 87, 95-96 (1st Cir 1978).

The following information should be considered by the reviewer, in addition to the existing ESRP guidance:

- If the proposed action requires an individual permit from the U.S. Army Corps of Engineers (USACE), then USACE will perform its own analysis to determine whether the proposed site is the least environmentally damaging practicable alternative (LEDPA) (40 CFR Part 230). While the USACE evaluation of the LEDPA site and the NRC staff evaluation whether there is an obviously superior alternative site consider similar factors, there are some differences in the focuses of the two evaluations. The LEDPA determination is normally documented in the Record of Decision for the USACE permit, and not in the EIS. The NRC staff reviewer should coordinate with the contact at USACE to ensure both agencies have access to the same supporting data and to minimize the potential for conflicts in such data between the two evaluations. The NRC staff expects that the applicant will likewise work closely with the USACE to minimize the potential for inconsistencies. However, the NRC staff reviewer should review the applicant's submittal(s) to USACE to ensure that the data and supporting information in that document is not inconsistent with the information the applicant has provided to the NRC staff. But the reviewer should also be aware that the conclusions of the two processes are independent and that it is possible for a site to be a reasonable alternative for the purposes of NEPA, and to also be impracticable for the purposes of LEDPA.

- In the consideration of impacts at the candidate sites, cumulative impacts should be considered. For example, the consumptive use of water should not be compared just to the flow in the river. Rather, the consumptive use of water should be compared to the flow in the river in light of other withdrawals from the river and any restrictions on withdrawals by regulatory agencies. See Appendix 2 at the end of this portion of the guidance. The reviewer should include the potential impacts of climate change on the plant at each alternative site.

- The reviewer should include a discussion of the impacts of emissions of GHG (including carbon dioxide) from the proposed unit(s) at each alternative site.

- If one or more of the alternative sites appears to be environmentally preferable to the proposed site, the reviewer should inform the Environmental Project Manager (EPM). The EPM and the reviewer should determine whether there is additional information available from the applicant, other agencies, or other sources, regarding those issues for which the alternative site(s) appear to be better than the proposed site. However, this information would still be reconnaissance level information. If, after reviewing any additional information, one or more alternative sites still appear to be environmentally preferable to the proposed site, then the reviewer must determine whether any such site is obviously superior to the proposed site. This portion of the evaluation brings into consideration factors other than the environmental impacts at the proposed and alternative sites.

Rationale for Changes: The following are the reasons for each of the changes above:

- The USACE is now typically a cooperating agency on NRC EISs for ESPs and COLs. Guidance has been added regarding how this affects the review of alternative sites.

- As discussed in the summary, the NRC staff has determined that it should use cumulative impacts when comparing sites in order to present a complete picture of the impacts.

- As discussed in the summary, and in the interim guidance for ESRP Section 9.2.3, the Commission has directed the staff to consider GHG emissions and climate change in its environmental reviews.

- The current ESRP provides limited guidance on the actions the staff should take if it appears that there is an environmentally preferable site. Because the decision regarding site selection is so important to the overall Agency decision, guidance has been added to look for additional reconnaissance level information to confirm whether an initial determination that an alternative site is environmentally preferable is correct.

ESRP Section 9.4.3, Transmission Systems

ESRP Section 9.4.3 will no longer be used for NRC staff environmental reviews.

Rationale for Change: ESRP Section 9.4.3 directs the staff to evaluate alternatives to the proposed transmission systems. However, with the October 2007 change in the definition of "construction" in Title 10 of the *Code of Federal Regulations* (10 CFR) 50.10 and 10 CFR 51.4, transmission lines are clearly not construction. Because the transmission lines are not within the definition of construction, the staff will no longer consider alternative transmission systems. ESRP Section 9.4.3 will be deleted in a future revision to NUREG-1555.

## Appendix 1: Regarding Cost Considerations for an Energy Alternative that is Environmentally Preferable to the Proposed Action

The economic cost data to be analyzed for competitive alternatives deemed to be environmentally preferable to the proposed action are the estimated costs of constructing the facility and supplying electrical energy services over the expected life of the proposed project. The data should span 40 years. If the useful life of the competitive alternative(s) under review differs from that of the proposed project, the staff should ensure the comparison is performed over the same time period. For instance, if the useful life of a natural gas-fired power plant were to be only 15 years, the staff's analysis should consider a full replacement of the natural gas units after 15 years, and a second full replacement after 30 years. In the case of options involving generation, staff should analyze the 40-year levelized cost of electricity (LCOE), the equivalent annual cost of capital (EAC), the annual cost of operations, maintenance, and fuel for each alternative; at the same level of output and for appropriate plant capacity factors. The analysis should be displayed in a tabular form such as shown in Table 9.2.3-2. The staff should review any independently derived LCOE calculations to ensure they are reasonable. Other tables provided in this ESRP include worksheets that can assist in this evaluation.

The following table and text is a complete replacement for the current ESRP's Table 9.2.3-2 through Table 9.2.3-14.

**Table 9.2.3-2: The Levelized Cost of Electricity--Evaluation of Competitive Alternatives**

| | | Proposed Project | Competitive Alternative |
|---|---|---|---|
| A | Overnight Capital Cost | | |
| B | Equivalent Annual Cost of Capital | | |
| C | Annual Operating and Maintenance Costs | | |
| D | Annual Transmission Investment | | |
| E | Annual Fuel Costs | | |
| F | Decommissioning Costs | | |
| | Levelized Cost of Electricity (B+C+D+E+F) | | |

**Instructions:**

**Overnight Capital Cost** for the proposed project, the overnight capital cost is the total cost of the proposed project, without consideration of the cost of capital. For the competitive alternative, that is also true for the hypothetical units installed at the beginning of the 40 year scope of the analysis. However, the useful life of the competitive alternative will probably not be 40 years, which requires the following adjustments to be made to the value of overnight capital.

- For a useful life greater than 40 years, X, the overnight capital cost is the straight line depreciated value of the alternative over its useful life, summed for only the first 40 years:

$$OCC = \left({}^{AOCC}/_{X}\right) \times 40$$

Where OCC = Overnight Capital Cost
AOCC = Actual Overnight Capital Cost
X = The useful life of the competitive alternative

- For a useful life of less than 40 years, Y, the overnight capital cost is the full cost of the first N units, plus the full cost of any "intermediate" unit(s) (assuming the useful life is short enough to require more than one replacement), and the adjusted overnight capital cost of the last unit(s) according to the equation below.

$$OCC = (N \times AOCC) + \left({}^{AOCC}/_{Y}\right) \times (40 - NY)$$

Where OCC = Overnight Capital Cost

For instance, for a competitive alternative that costs $1 million and has a useful life of 15 years, it would take two full installations and the first 10 years of a third installation to achieve 40 years of operation (the same as the proposed project). So the overnight capital cost of the competitive alternative would be:

$$OCC = (\$1M \times 2) + \left(\frac{\$1{,}000{,}000}{15}\right) \times \left(40 - (2 \times 15)\right)$$

$$OCC = \$2M + \left({}^{\$10{,}000{,}000}/_{15}\right) = \$2{,}666{,}667$$

**Equivalent Annual Cost** (EAC) of capital is the amount one would need to pay annually for 40 years to fully pay for the overnight cost of capital. It is obtained with the following calculation:

$$EAC = \frac{OCC}{CRF}$$

Where EAC = Equivalent Annual Cost of Capital
CRF = the 40-year Capital Recovery Factor

$$CRF = \frac{(1 - 1.07^{-40})}{.07} = 13.3317$$

For our example, the annual amount the applicant would have to spend to fully pay for the $2,666,667 overnight capital cost of the alternative would be

$$\frac{\$2{,}666{,}667}{13.3317} = \$200{,}004.50$$

**Operations, maintenance, transmission, decommissioning, and fuel costs** can be obtained independently through a number of reasonable sources, such as the DOE's Energy Information Administration.

## Appendix 2: Regarding the Consideration of Cumulative Impacts for the Alternative Sites

The evaluation of cumulative impacts at the alternatives sites is performed in much the same way as the evaluation of cumulative impacts at the proposed site in the earlier chapters of the EIS. There are two primary differences. First, for the alternative sites the information being used is reconnaissance level information and is typically not as detailed as the information available for the proposed site. Second, all of the information for the alternative sites is in Chapter 9, while for the proposed site the cumulative impacts evaluation in Chapter 7 draws from Chapters 2 through 6.

For each resource, the reviewer will evaluate the impacts of building and operating the proposed project at each alternative site. Because the results of this portion of the evaluation is not the cumulative impact, the staff will describe impacts, but will not reach a conclusion using the typical significance levels (i.e., the reviewer will not use the terms SMALL, MODERATE, or LARGE). In describing the effects of just the proposed project, the reviewer should use terms that make clear the relative impacts expected. So, depending on the expected effects, a reviewer might describe them as "minor," or "noticeable but not destabilizing," or "significant and potentially destabilizing." The reviewer must ensure that the discussion is sufficient to support the impact determination.

After completing this discussion of the impacts of the proposed project, the information in the table of projects around the site will be used by the reviewer, as appropriate for the resource under consideration, to evaluate the cumulative impacts of the proposed project at the alternative site when considered in combination with other projects and activities affecting the same resource. The reviewer should make clear what projects or activities from the table contributed to the cumulative impacts for a specific resource. (For example, under socioeconomics, the effects of past projects are generally reflected in the current data being used to describe the existing conditions). The cumulative impacts evaluation will end with the designation of the impact level (SMALL, MODERATE, or LARGE) to the resource. In addition, if the impacts are greater than SMALL, the reviewer will state whether or not the proposed project (building and operating one or more nuclear plants) is a significant contributor to the impacts. In the context of this evaluation, "significant" is defined as a contribution that is important in reaching the impact level determination. This information will be used in the comparison of the sites.

After evaluating the cumulative impacts of the proposed project at each of the alternative sites, the reviewer will compare these sites to the proposed site. For the proposed site, the reviewer will use the cumulative impacts information from Chapter 7, as well as the information regarding the impacts of the project from Chapters 4 and 5. For a given resource, the comparison of the cumulative impact characterization (SMALL, MODERATE, or LARGE) will often be sufficient. However, the reviewer will have to consider cases in which the proposed project is not a significant contributor to the impacts at either the proposed or an alternative site. So, for example, assume that both the proposed site and alternative site "A" are described as having a MODERATE impact on terrestrial resources. However, the staff has concluded that building and operating the nuclear unit(s) is a significant contributor to the impacts at the proposed site,

but is not a significant contributor at the alternative site “A.” In such a case, the reviewer will describe the situation so that readers will understand the contribution of the proposed project at each site. This information will also be used by the reviewer in determining whether an alternative site is environmentally preferable to the proposed site.

**References**


1. 10 CFR Part 50. Code of Federal Regulations, Title 10, *Energy*, Part 50, "Domestic Licensing of Production and Utilization Facilities."

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

3. 40 CFR Part 230. Code of Federal Regulations, Title 40, *Protection of Environment*, Part 230, "Section 404(b)(1) Guidelines for Specification of Disposal Sites for Dredged or Fill Material."

4. *Consumers Power Company* (Midland Plant, Units 1 and 2), ALAB-458

5. Council on Environmental Quality (CEQ). 2012. *NEPA's Forty Most Asked Questions*, accessed at http://ceq.hss.doe.gov/nepa/regs/40/40p3.htm, November 7, 2012.

6. Department of Energy, Energy Information Administration (DOE/EIA). 2011. *Electricity Terms and Definitions*, accessed at http://www.eia.gov/cneaf/electricity/page/glossary.html. Accession No. ML12026A660.

7. John Hynes (Hynes). 2009. *How to Compare Power Generation Choices*, Renewable Energy World.com (Oct. 29, 2009), accessed at http://www.renewableenergyworld.com/rea/news/article/2009/10/how-to-compare-powergeneration-choices. Accession No. ML11294A595.

8. National Environmental Policy Act of 1969 (NEPA), as Amended. 42 U.S.C. 4321 et seq.

9. *New England Coalition on Nuclear Pollution v. NRC*, 582 F.2d 87, 95-96 (1st Cir 1978).

10. *Public Service Company of New Hampshire, et al.* (Seabrook Station Units 1 and 2), ALAB-471.

11. Nuclear Regulatory Commission (NRC). 1998. Regulatory Guide (RG) 4.7, *General Site Suitability Criteria for Nuclear Power Stations*, Revision 2. Accession No. ML003739894.

12. Nuclear Regulatory Commission (NRC). 2000. *Environmental Standard Review Plan — Standard Review Plans for Environmental Reviews for Nuclear Power Plants*. NUREG-1555, Vol. 1. Washington, D.C. Includes 2007 revisions.

13. Nuclear Regulatory Commission (NRC). 2005. U.S. Nuclear Regulatory Commission (NRC), Memorandum and Order (CLI-05-29) in the Matter of Exelon Generation Company, LLC. (Early Site Permit for Clinton ESP Site), December 12, 2005. Docket No. 52-007-ESP, Washington, D.C. Accession No. ML053460102.

14. Nuclear Regulatory Commission (NRC). 2009. U.S. Nuclear Regulatory Commission (NRC), Memorandum and Order (CLI-09-21) In the Matter of Duke Energy Carolinas, LLC, and Tennessee Valley Authority. (Combined License Application for Williams States Lee III Nuclear Station, Units 1 and 2 and Bellefonte Nuclear Power Plant, Units 3 and 4), November 3, 2009. Docket Nos. 52-014-COL, 52-015-COL, 52-018-COL, 52-019-COL. Accession No. ML093070689.

15. Nuclear Regulatory Commission (NRC). 2010a. *Supplemental Staff Guidance to NUREG-1555, "Environmental Standard Review Plan," (ESRP) for Consideration of the Effects of Greenhouse Gases and of Climate Change*. Accession No. ML100990204.

16. Nuclear Regulatory Commission (NRC). 2010b. *Supplemental Staff Guidance for Cumulative Effects Analysis*, Enclosure 2, *Cumulative Impacts of the Project at Alternative Sites*. Accession No. ML100621042.

17. Nuclear Regulatory Commission (NRC). 2011. *Environmental Impact Statement for Combined Licenses (COLs) for South Texas Project Electric Generating Station Units 3 and 4*, Final Report, Section 9.2.1. Accession No. ML11049A000.