U.S.NRC
UNITED STATES NUCLEAR REGULATORY COMMISSION
Protecting People and the Environment

DRAFT

ADVANCED REACTOR APPLICATIONS COL-ISG-030

Environmental Considerations for Advanced Nuclear Reactor Applications that Reference the Generic Environmental Impact Statement (NUREG-2249)

Interim Staff Guidance

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I. PURPOSE

Title 10 of the *Code of Federal Regulations* (10 CFR) 51.20, "Criteria for and Identification of Licensing and Regulatory Actions Requiring Environmental Impact Statements" (10 CFR Part 51-TN250), requires the preparation of an environmental impact statement (EIS) or a supplemental environmental impact statement (SEIS) documenting the U.S. Nuclear Regulatory Commission (NRC) staff's environmental findings for issuance of an early site permit (ESP) or a combined license (COL) under 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants" (TN251), or for issuance of a limited work authorization (LWA), construction permit (CP), or operating license (OL) for a nuclear power reactor under 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities" (TN249). 10 CFR 51.20 applies to licensing applications for advanced nuclear reactor (ANR) designs. Advanced reactors (ANRs) are defined by the Nuclear Energy Innovation and Modernization Act (NEIMA, Public Law 115-439; TN6304) as follows:

> . . . a nuclear fission or fusion reactor, including a prototype plant (as defined in Sections 50.2 and 52.1 of Title 10 of the Code of Federal Regulations [as in effect on the date of enactment of this Act]), with significant improvements compared to commercial nuclear reactors under construction as of the date of enactment of this Act, including improvements such as the following:
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> (A) additional inherent safety features;
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> (B) significantly lower levelized cost of electricity;
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> (C) lower waste yields;
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> (D) greater fuel utilization;
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> (E) enhanced reliability;
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> (F) increased proliferation resistance;
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> (G) increased thermal efficiency; or
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> (H) ability to integrate into electric and nonelectric applications.

The purpose of this interim staff guidance (ISG) is to modify existing guidance and provide supplemental guidance to assist the NRC staff in determining the scope and scale of environmental reviews of ANRs that reference NUREG-2249, "Generic Environmental Impact Statement [GEIS] for Advanced Nuclear Reactors" (NUREG-2249, ANR GEIS; NRC 2021-TN7080). The guidance highlights unique considerations for ANRs in each resource area typically covered in the staff's environmental review. The staff should be familiar with the following guidance documents that support the preparation of an EIS or SEIS:

- NUREG-1555, *Standard Review Plans for Environmental Reviews for Nuclear Power Plants*: Environmental Standard Review Plan, issued in 2000 and updated in 2007 (NRC 2000, 2007-TN614);
- COL/ESP-ISG-026, "Environmental Issues Associated with New Reactors" (NRC 2014-TN3767), issued August 2014;
- COL/ESP-ISG-027, "Specific Environmental Guidance for Light Water Small Modular Reactor Reviews" (NRC 2014-TN3766), issued August 2014; and
- COL-ISG-029, "Environmental Considerations Associated with Micro-reactors" (NRC 2020-TN6710), issued October 2020.

The NRC staff should also consider the guidance in this ISG along with that in Regulatory Guide (RG) 4.2,[1] *Preparation of Environmental Reports for Nuclear Power Stations* (NRC 2022-TN7081), when preparing EISs. While RG 4.2 is directed at applicants preparing licensing applications, it was updated more recently than the Environmental Standard Review Plan (ESRP; NUREG-1555; NRC 2000, 2007-TN614) and, therefore, reflects more current guidance for some issues. For example, guidance in ISG-026 (NRC 2014-TN3767) and ISG-027 (NRC 2014-TN3766) has already been incorporated into RG 4.2. In addition, the staff has drafted changes to RG 4.2 to address the use of the ANR GEIS (NRC 2021-TN7080) and Table C-1 of 10 CFR Part 51 Subpart A (TN250).

In its environmental report (ER), an ANR applicant may reference generic analyses in NUREG-2249 (NRC 2021-TN7080) if the proposed project meets certain conditions described below. If the conditions are met, the NRC staff would issue an EIS for the proposed action that is a supplement to the ANR GEIS.

This ISG focuses on identifying considerations and approaches to better align the environmental reviews with the unique aspects of ANRs that reference the ANR GEIS and Table C-1 of 10 CFR Part 51 Subpart A. This ISG outlines what the NRC staff considers to be an appropriate scope and level of detail for the specific aspects of the staff's environmental review that references generic conclusions in the ANR GEIS (NRC 2021-TN7080). An ANR may have some, but not necessarily all, of the following characteristics:

- occupies only a small area of land, disturbs only previously disturbed lands, or both
- uses zero or only small quantities of resources, such as water or fuel
- releases zero or only small quantities of emissions to the environment
- avoids environmentally sensitive areas such as wetlands and floodplains
- avoids areas with cultural, historic, or environmental justice significance
- avoids habitat for threatened or endangered species
- uses mitigation to reduce impacts
- involves only low levels of employment for both construction and operation
- uses simpler designs than those for large light-water reactors (LWRs), with limited interfaces with the exterior environment.

The scope of this ISG is limited to environmental review considerations specific to an ANR that references the ANR GEIS. The NRC staff should review other guidance documents, such as ISG-026 (NRC 2014-TN3767), ISG-027 (NRC 2014-TN3766), and ISG-029 (NRC 2020-TN6710), for guidance related to other aspects of the review, such as the following:

- preapplication interactions
- purpose and need for the proposed project
- mitigation
- need for power and alternatives
- fuel cycle impacts, transportation of fuel and waste, and continued storage of spent fuel
- cumulative impact analysis
- consistency with safety licensing documents
- incorporation by reference.

The NRC staff will continue to look for other opportunities to effectively streamline environmental reviews and work with prospective applicants to identify opportunities to streamline ERs and still meet the NRC's regulations.

[1] Unless stated otherwise, references to RG 4.2 in this document refer to DG-4032, the draft revision to RG 4.2, which is being published at the same time as this draft ISG.

II. BACKGROUND

The ANR GEIS (NRC 2021-TN7080) was prepared to address impact analyses for the environmental issues common to many or most ANRs that can be addressed generically, thereby eliminating the need to repeatedly reproduce the same analyses each time a licensing application is submitted and allowing applicants and NRC staff to focus future environmental review efforts on issues that can only be resolved once a site is identified. The ANR GEIS identifies environmental impact issues for which generic analysis was possible, and impact issues that require project-specific analyses.

ANRs are not defined on the basis of specific technologies, purposes, power outputs, or sizes. Multiple technologies may meet the definition of an ANR, including LWRs, non-LWRs, small modular reactors (SMRs), and fusion reactors. These reactor technologies vary with respect to fuel used, neutron moderators employed, cooling processes, and other factors. ANRs might serve various possible purposes, such as generating electrical power for sale to the public or supplying a specific facility or installation such as a military base. In addition, an ANR may have a cogeneration purpose (supplying electricity to the public and thermal power to an industrial facility), or a specific non-electricity purpose, such as desalinating water.

SMRs are generally defined as reactor units with an electrical output of less than 300 megawatts-electric (MWe) that are produced using modular fabrication and construction techniques. The terms "unit" and "module" both refer to a reactor and are used interchangeably in this ISG. A non-LWR is generally defined as a nuclear power reactor using a coolant other than water. An SMR can be a LWR or a non-LWR. An ANR may also be a microreactor recognized by DOE as generating less than 20 MWe. All SMRs are expected to meet the definition of an ANR, but not all ANRs will be SMRs.

There are two approaches to developing an ER to support environmental reviews of ANR applications. The first approach would be for the ER and the associated SEIS to incorporate by the reference the applicable findings from the ANR GEIS (NRC 2021-TN7080). The second approach would be for an applicant to prepare its ER without referencing the ANR GEIS, and the staff would, in its associated EIS, evaluate all of the issues without relying on the analysis in the ANR GEIS. In an ANR EIS, the staff should use the same three-level standard of significance (SMALL, MODERATE, and LARGE) that is used for license renewal. These impact categories are defined in a footnote to Table B-1 of 10 CFR Part 51 Subpart A (TN250).

Non-LWR designs (e.g., high-temperature gas-cooled, liquid-metal, molten salt, and fusion reactors) will present some unique issues associated with environmental analyses of the impacts of operation. While the ESRP (NRC 2000, 2007-TN614); ISGs-026, -027, and -029 (NRC 2014-TN3767, NRC 2014-TN3766, and NRC 2020-TN6710, respectively); and Sections A through D of RG 4.2 (NRC 2022-TN7081) do not specifically address non-LWRs, most of the guidance contained in them could be used for such reactors. Exceptions would include areas such as accidents, fuel cycle, transportation of radioactive materials, and decommissioning, which are addressed in the ANR GEIS (NRC 2021-TN7080). The ER for a non-LWR ANR may reference the ANR GEIS in accordance with the guidance related to the GEIS.

Section 1.4.1 of the ANR GEIS (NRC 2021-TN7080) describes the methodology used by the NRC staff to develop the GEIS. In summary, the staff developed generic analyses that evaluated the environmental impacts of building, operating, and decommissioning an ANR sited anywhere within the United States and its territories, bounded by specific values and assumptions. Because ANRs are not specific to only one reactor design and could be sited anywhere in the United States and its territories that meets NRC siting requirements as set forth in 10 CFR Part 100 (TN282), the NRC decided to pursue a technology-neutral, performance-based approach using a plant parameter envelope (PPE). The PPE consists of parameters for specific reactor design features regardless of the site. Examples of parameters include the footprint of

disturbance, building height, water use, air emissions, employment levels, and noise-generation levels. For each PPE parameter, the staff developed a set of bounding values and assumptions.

In addition, the staff developed a set of site-related parameters termed the site parameter envelope (SPE). Examples of parameters include the site size, size of water bodies supplying water to the reactor, and demographics of the region surrounding the site. For each SPE parameter, the staff developed a set of bounding values and assumptions related to the condition of the affected environment, such as the extent and occurrence of wetlands and floodplains, position near aquatic features, and proximity to sensitive noise receptors. The ANR GEIS (NRC 2021-TN7080) presents generic analyses that evaluate the possible impacts of a reactor that fits within the bounds of the PPE on a site that fits within the bounds of the SPE. The PPE and SPE are presented in Appendix G of the ANR GEIS.

In the ANR GEIS (NRC 2021-TN7080), the staff identified specific types of impacts relevant to each of 16 environmental resource areas. Each type of impact is termed an issue. Each issue corresponds to a specific type of environmental impact determined by the staff that could potentially result from construction, operation, or decommissioning of an ANR. For each issue, the staff then determined whether it would be possible to identify values and assumptions in the PPE and SPE that could effectively bound a meaningful generic analysis and provided the basis for each value and assumption. The staff then performed and described their generic analyses for each issue for a hypothetical reactor/site that meets the PPE and SPE values and assumptions. For the ANR GEIS, the values and assumptions were set such that the staff could reach a generic conclusion of SMALL adverse impacts, which are designated as Category 1 issues (i.e., issues for which a generic analysis was possible). Issues for which the impacts are beneficial are also designated as Category 1.

After considering potential values and assumptions for the PPE and SPE for some environmental impact issues, the staff could not reach a generic conclusion. In some cases, this was due to requirements of other statutes, such as the National Historic Preservation Act (NHPA; 54 U.S.C. §§ 300101 *et seq.*; TN4157) and the Endangered Species Act (ESA; 16 U.S.C. §§ 1531 *et seq.*; TN1010). In other cases, the wide range of potential reactor designs and potential site locations made it impossible for the staff to reach a generic conclusion. These issues are designated as Category 2 issues, which would require a project-specific analysis in an NRC EIS.

In summary, the categories for the issues are as follows:

- Category 1 issues – environmental issues for which the NRC has been able to make a generic finding of SMALL adverse environmental impacts, or beneficial impacts, provided that the applicant's proposed reactor facility and site meet or are bounded by the relevant values and assumptions in the PPE and SPE that support the generic finding for that Category 1 issue.[2]
- Category 2 issues – Environmental issues for which a generic finding regarding the environmental impacts cannot be reached because the issue requires the consideration of project-specific information that can only be evaluated once the proposed site is identified. The impact significance (i.e., SMALL, MODERATE, or LARGE) for these issues will be determined in a project-specific evaluation.

In addition, as discussed in Section 1.4.3.3 of the ANR GEIS, there are two issues for which the state of the science is currently inadequate, and no generic conclusion on human health impacts is possible.

[2] Beneficial impacts may include increased tax revenues associated with the increased assessed value of new reactor projects, and other economic activity such as increases in local employment, labor income, and economic output.

These are designated as N/A (i.e., impacts are Uncertain), which are neither Category 1 nor 2 (NRC 2021-TN7080).

III. APPLICABILITY

This ISG is applicable to the environmental reviews for licensing actions for ANRs that reference the ANR GEIS. Specifically, this ISG applies to environmental reviews for ANRs associated with LWA, CP, and OL applications submitted under 10 CFR Part 50 (TN249), and with ESP and COL applications under 10 CFR Part 52 (TN251). Elements of this ISG may also be applicable to other ANR projects. Applicants are encouraged to discuss this applicability during the preapplication phase. This ISG also provides the framework for conducting impact analyses and preparing sections for a project-specific SEIS. The ISG also provides for (1) the verification of an applicant's demonstration that values and assumptions of the PPE and SPE are met or bounded and (2) the consideration of new and significant information for Category 1 issues.

IV. GUIDANCE

This ISG uses the following format:

1. Introduction to the EIS
2. Description of the Proposed Action and Alternatives
3. Guidance for Individual Resource Areas
4. Comparing Alternatives to the Proposed Action
5. Summary and Conclusions

Chapters 1 and 2 guide the description of the proposed action, the development of the purpose and need for the proposed action, and the identification of reasonable alternatives to the proposed action. Chapter 3 addresses the analysis of environmental impacts, including the affected environment. It guides the review of the potential environmental impacts associated with ANR construction, operation, and decommissioning. Chapter 4 addresses the evaluation of the alternatives to authorizing the ANR and the comparison of the proposed action with reasonable alternatives. Chapter 5 summarizes the conclusions regarding the environmental impacts of authorizing the ANR.

The guidance in Chapter 3 of this ISG also addresses Category 1 and 2 issues and the search for new and significant information, including providing guidance regarding the following:

- evaluation of the applicant's process for identifying and evaluating new information;
- evaluation of information submitted by members of the public during the scoping process, and information identified during the environmental review to determine whether new information is significant;
- verification of the information provided by the applicant to demonstrate that the applicable values and assumptions for an issue have been met;
- identification of the information required to complete a project-specific review of all Category 2 issues, as well as Category 1 issues for which (1) the values and assumptions have not been met or bounded and/or (2) new and significant information has been identified; and
- preparation of analysis and conclusions for the SEIS.

The following sources of information should be considered by the authors of the sections of the SEIS:

- applicant's ER
- the ANR GEIS, NUREG-2249 (NRC 2021-TN7080)
- previous NRC final EISs and other environmental documents (e.g., SEISs)

- applicant's Safety Analysis Report or Updated Final Safety Analysis Reports
- scoping comments
- NRC Safety Evaluation Reports
- other Federal, State, and local agencies, including formal and informal consultations
- other reliable information sources

General Instructions for Developing a SEIS to the ANR GEIS

See the Introduction to the ESRP (NRC 2000, 2007-TN614) for general instructions. The NRC staff expects the U.S. Army Corps of Engineers (USACE) to be a cooperating agency with the NRC for most ANR licensing reviews. There could also be other cooperating agencies. Each reviewer should coordinate the review of their resource area with the reviewers for any cooperating agency. In addition, if the proposed project is to be co-located with an existing plant, the reviewer should coordinate with other NRC staff as appropriate on any recent or ongoing issues and reviews at the existing plant. Throughout the process of developing the SEIS, each reviewer should coordinate with other reviewers for issues that overlap between resource areas ("review interfaces in the ESRP"). However, each reviewer should look for unique interfaces for ANRs that go beyond those in the ESRP. The reviewer should initiate this coordination early in the review process to understand how their resource may relate to other subject areas.

Each reviewer should begin by reading the sections in the ER and ANR GEIS (NRC 2021-TN7080) for their resource area, as well as the direction provided in RG 4.2 (NRC 2022-TN7081), the latest version of the ESRP (including the draft sections published for use and comment in 2007 [NRC 2000, 2007-TN614]), and any applicable ISGs. The guidance in the ESRP (NRC 2000, 2007-TN614), ISG-026 (NRC 2014-TN3767), ISG-027 (NRC 2014-TN3766), ISG-029 (NRC 2020-TN6710), and RG 4.2 is generally applicable to ANRs, as modified below.

The reviewers typically visit the proposed and alternative sites to gather additional information to support the preparation of the SEIS. However, such site visits may not always be necessary for every resource area. The reviewer should consider the information provided in the ER and other information that has been gathered (e.g., from preapplication interactions and scoping) to determine whether a site visit is warranted. For example, if all of the issues for a given resource area are Category 1, and the relevant values and assumptions have been met, a site visit may not be warranted. The reviewers also typically participate in a site audit to review documents held by the applicant. The scope of the site audit should be limited to the information the reviewer has determined is needed to complete the review for the resource area. If, after completion of the audit, the reviewer still requires more information, then a request for additional information (RAI) should be developed. These processes are similar to past staff practice, except that the scale of the activities may be adjusted for Category 1 issues for which the applicant has demonstrated that the relevant PPE and SPE values and assumptions have been met.

Chapter 1: Introduction to the Environmental Impact Statement

This section provides guidance for the preparation of the Chapter 1, Introduction, for the proposed project's environmental impact statement. The Introduction includes a brief description of the proposed action, the review process, the purpose and need for the proposed action, and the status of reviews, approvals, and consultations that the project must obtain or complete. The reviewer for this chapter should be familiar with the associated guidance in the ESRP (NRC 2000, 2007-TN614), ISG-026 (NRC 2014-TN3767), ISG-027 (NRC 2014-TN3766), ISG-029 (NRC 2020-TN6710), and RG 4.2 (NRC 2022-TN7081).

NRC regulations at 10 CFR Part 51 (TN250) provide the information that must be included in an EIS prepared by the Commission to meet its responsibilities under the National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. §§ 4321 *et seq.*; TN661). In appropriate cases, the format for an EIS may expand upon or differ from the format in 10 CFR Part 51. The introduction should describe the format and organization of the EIS. The reviewer should identify the applicant, describe the proposed action, and describe the NRC's NEPA process, including how the staff will develop a SEIS tiering to the ANR GEIS (NRC 2021-TN7080). The introduction should also present the Commission's definition of purpose and need. Finally, the NRC staff must consider the concerns and requirements of other agencies that have regulatory authority over the proposed project.

The purpose and need for an ANR may be unlike the purpose and need that has been typical for large light-water cooled reactors. RG 4.2, "Preparation of Environmental Reports for Nuclear Power Stations" (NRC 2022-TN7081), provides additional guidance related to purpose and need in Part C, Section 1.2, and in Appendix C, Section C.2.1. A discussion of purpose and need is also found in Section 1.4.3.2.3.1 of the ANR GEIS (NUREG-2249; NRC 2021-TN7080). The purpose and need as defined in the EIS is the Commission's purpose and need and may differ from the purpose and need defined by the applicant in its ER.

The material to be prepared is informational in nature; no specific analysis of the data is required. However, the Chapter 1 author should consult with the reviewers for Need for Power and Alternatives to confirm that the purpose and need is consistent with the evaluations of the need for power and the alternatives. In addition, the Chapter 1 author should consult with all other technical reviewers to ensure that the list and status of reviews, approvals, and consultations is accurate and current. RG 4.2, Part C, Chapter 1 and Appendix C, Section C.2.1 (NRC 2022-TN7081) provide guidance related to the contents of the Introduction.

Chapter 2: Description of Proposed Action and Alternatives

This section provides guidance for the preparation of the discussion of alternatives and the proposed action. The proposed action is also discussed in general terms in the Introduction to the SEIS. The reviewer for this chapter should be familiar with the associated guidance in the ESRP (NRC 2000, 2007-TN614), ISG-026 (NRC 2014-TN3767), ISG-027 (NRC 2014-TN3766), ISG-029 (NRC 2020-TN6710), and RG 4.2 (NRC 2022-TN7081). The ANR GEIS (NRC 2021-TN7080) does not address alternatives for a specific project.

The purpose of this section is to (1) provide a more detailed description of the proposed action for the SEIS and (2) provide a brief description of the alternatives.

Issuance of a license or permit to build and operate a nuclear reactor is defined in 10 CFR Part 51 (TN250) as a major Federal action requiring the preparation of an EIS. The introductory paragraphs prepared for this chapter should clearly define the action and provide the readers with background information related to the proposed action.

This chapter should discuss the no-action alternative, the proposed action, and the reasonable alternatives. Alternatives should be included that will avoid or minimize adverse effects upon the quality of the human environment while still meeting the purpose of the proposed action. The discussion in this chapter should provide basic information about the alternatives and supports the comparison of the proposed action and the reasonable alternatives later in the SEIS. The chapter should also briefly describe alternatives that the staff concluded were not reasonable (i.e., would not meet the purpose and need for the project), explaining the basis for this conclusion. The discussion of each alternative should

provide enough information for a reader to understand how its impact was determined and should also be summarized in a table, to make comparisons clear to the reader.

Much of the required material may be taken directly from the applicant's ER. The reviewer should reflect the applicant's schedule for activities for the proposed project.

Chapter 3: Affected Environment and Environmental Impacts

General Guidance for All Resource Area Reviewers

This section provides guidance for the preparation of the discussion of the affected environment, as well as the impacts of building, operating, and decommissioning the proposed project. After discussing some guidance that is applicable to most of the individual resource areas, this section should provide resource-specific guidance.

The scope of Chapter 3 of the SEIS includes (1) a description of the affected environment for the proposed site and the surrounding region over which impacts will be felt, and (2) analysis of the environmental impacts that will result from building, operating, and decommissioning the proposed project.

The review conducted under this section leads to preparation of a portion of the SEIS describing the affected environment that provides background information that will then be used in evaluating the environmental impacts of project construction, operations, and decommissioning.

The ANR GEIS (NRC 2021-TN7080) does not explicitly discuss the affected environment because the affected environment is site-specific. However, many of the values and assumptions in the site parameter envelope involve the affected environment. Each reviewer should briefly describe those aspects of the environment related to their resource area that could be affected by the proposed project. The description of the affected environment should be brief and focus only on providing sufficient information to support (1) demonstrating whether relevant PPE and SPE values and assumptions for Category 1 issues are met and (2) the evaluation of the environmental impacts of Category 2 issues, and any Category 1 issues for which the associated values and assumptions are not met, or for which new and significant information has been identified.

In the ANR GEIS, the staff treated climate change and cumulative impacts as issues that cut across multiple resources (NRC 2021-TN7080). Both of these issues are Category 2 issues, requiring project-specific analyses. All reviewers should be familiar with current guidance (e.g., the ESRP (NRC 2000, 2007-TN614), ISG-026 [NRC 2014-TN3767], and RG 4.2 [NRC 2022-TN7081]), and with the most recent new reactor EISs to determine how to integrate these issues into the analyses for their resource area(s). For example, the water resource reviewer should consider whether changes in water availability due to cumulative impacts and climate change would affect the demonstration that some values and assumptions are met. As another example, the terrestrial and aquatic ecology reviewers should consider how reasonably projected changes in seasonal temperatures and precipitation could affect the demonstration that some values and assumptions are met.

An applicant, and the staff, may rely on the generic analysis in the ANR GEIS (NRC 2021-TN7080) for any Category 1 issue for which the applicant can demonstrate that the relevant values and assumptions of the PPE and SPE have been met, and for which no new and significant information has been identified. Therefore, this demonstration is a key aspect related to the use of the ANR GEIS. See Table C-1 in Appendix C to Subpart A of 10 CFR Part 51 (TN250) for a list of which values and assumptions are relevant to each environmental issue. See RG 4.2, Appendix C, including its Table C-1, for guidance

about how an applicant can demonstrate that it meets each of the values and assumptions (NRC 2022-TN7081).

Demonstrating Consistency with PPE/SPE Values

The NRC reviewer should use the application, information from scoping, the site audit, and other available information to determine whether each value and assumption on which the applicant is relying has been demonstrated as being met. In addition, because the same value or assumption may be used for multiple resource areas, the reviewer should coordinate with other reviewers evaluating the demonstration for that value or assumption. The complexity of the demonstration varies considerably. For example, it is simple for an applicant to demonstrate that it meets the value for building height. However, the demonstration for groundwater drawdown at the site boundary will require a detailed analysis. While RG 4.2, Appendix C (NRC 2022-TN7081), provides guidance to the applicants for an acceptable method to demonstrate that any given value or assumption is met, applicants may choose to use a different method. In such a case, the reviewer must determine whether the alternate method used by the applicant is an effective method for demonstrating that the value or assumption is met.

The ANR GEIS included the assumption that the USACE would be a cooperating agency for any ANR SEIS. The ANR GEIS did not, therefore, distinguish between the impacts of NRC-authorized construction, and preconstruction. The values and assumptions in the PPE and SPE also include, and do not differentiate between, the impacts of NRC-authorized construction and preconstruction. If, for a particular ANR review, the USACE is not a cooperating agency, then the impacts of preconstruction would be considered cumulative impacts. However, the reviewer must still include both NRC-authorized construction and preconstruction when it is evaluating whether the values and assumptions in the PPE and SPE have been met.

In the SEIS, the reviewer should briefly document how the PPE/SPE values and assumptions for Category 1 issues are met using a level of detail appropriate to the complexity of the analysis[3]. If all of the relevant values and assumptions for a Category 1 issue are met, then the staff may rely on the generic conclusion of SMALL impacts in the ANR GEIS for that issue, incorporating the analysis in the GEIS by reference (NRC 2021-TN7080). Cite the pages of the ANR GEIS containing the relevant generic analyses, but it is not necessary to summarize or paraphrase the analyses.

If any of the values and assumptions relevant to a Category 1 issue are not met, or if new and significant information has been identified for the issue, then the reviewer cannot rely on the generic analysis in the ANR GEIS for that issue. The reviewer should complete a project-specific analysis in accordance with the latest version of the ESRP, ISGs, and RG 4.2. The reviewer may incorporate all or a portion of the generic analysis in the ANR GEIS, expanding it to account for project-specific information. For Category 2 issues, the reviewer should complete a project-specific analysis in accordance with the latest version of the ESRP, ISGs, and RG 4.2.

New and Significant Information

The regulation at 51.75(d) requires the NRC staff to address any new and significant information that changes the conclusions in the ANR GEIS. For a Category 1 issue, new information is information that was not available or available but not considered in the assessment of impacts evaluated in the GEIS. Such information is significant if it could lead to a change in the environmental consequences of the action from that codified in Table C 1. New and significant information may also be information that

[3] As used in this document, when the staff states that the project meets a value or assumption of the PPE or SPE, it should be read as to mean that the project meets or is bounded by the value or assumption.

identifies a significant environmental impact issue that was not considered or addressed in the ANR GEIS (NRC 2021-TN7080) and, consequently, not codified in Table C 1, "Summary of Findings on NEPA Issues for Advanced Nuclear Reactors," in Appendix C, "Environmental Effect of Licensing an Advanced Nuclear Reactor," to Subpart A, "National Environmental Policy Act—Regulations Implementing Section 102(2)," of 10 CFR Part 51 (TN250). When no new and significant information is found, a statement should be included in the SEIS that briefly describes the search for and evaluation of new information and states that no new information was identified or the new information was determined not to be significant.

The NRC staff must identify any new and significant information related to the environmental impacts of ANR licensing. Other interested parties may also identify new and significant information during the scoping and public comment periods. The process for identifying new and significant information should include the following:

- **The applicant's ER.** Applicants are required by 10 CFR 51.50(d) to disclose new and significant information of environmental impacts of the project of which they are aware and describe the process it used to search for new and significant information. The process for identifying new information could include the review of environmental monitoring reports, scientific literature, interviews with applicant staff, discussions with licensees and other peer groups and industry organizations, consultations with experts knowledgeable about the local environment, and consultations with other Federal, State, local, and Tribal environmental, natural resource, permitting, and land use agencies. In reviewing the applicant's ER, NRC staff must evaluate the applicant's process for discovering and evaluating the significance of any new information. Is the process adequate to ensure a reasonable likelihood that the applicant would be aware of new information, if it existed? The applicant need not include detailed supporting documentation in the ER about the discovery of new and significant information, but such information should be available for review by the NRC staff.
- **Records of public meetings and correspondence related to the application, including scoping.** Compare information presented by the public with information considered in the ANR GEIS (NRC 2021-TN7080). Is the information new in the sense that the posted dates of the analysis are later than the analysis conducted for the GEIS, and if so, does that information change the GEIS's conclusions with regard to the affected Category 1 issue?
- **Environmental quality standards and regulations.** Have the applicable environmental quality standards and regulations changed since the analysis conducted for the ANR GEIS (NRC 2021-TN7080)? If so, do the changes in the standards and regulations change the GEIS's conclusions with regard to the affected Category 1 issue?
- **Technical literature.** Does recent technical literature contain information that would change conclusions in the ANR GEIS (NRC 2021-TN7080) for Category 1 issues? Does the information indicate that there may be environmental impacts that were not considered in the GEIS?

The reviewer should be familiar with the guidance in the ESRP (NUREG-1555; NRC 2000, 2007-TN614) and other guidance documents related to the process for identifying new and significant information. Any new information should be used to develop an analysis of the relevant environmental impact issues. After the impact issues have been defined, the significance level of each issue should be determined using the significance level definitions in Table B-1 of 10 CFR Part 51 (TN250). Appropriate mitigation measures should be identified and considered for each issue for which there is an adverse environmental impact. The consideration of mitigation measures should be in proportion to the potential adverse impact.

If the reviewer's analysis shows that the impact category is changed to greater than SMALL (i.e., MODERATE or LARGE), the reviewer should prepare an impact assessment for inclusion in the appropriate section of the project-specific SEIS. The assessment should include a concise description of the new environmental impact information (including source) and how this information applies to the nuclear plant. The statement also should list any mitigation measures that would be considered

appropriate. A summary statement and a list of references cited in the impact assessment also should be provided.

Impact Conclusions in the SEIS

The staff should include in the SEIS a table listing all environmental issues that are applicable to the project, whether each issue is deemed a Category 1 or 2 issue, and an explicit statement about whether or not the issue can be generically resolved (i.e., the relevant PPE and SPE values and assumptions are met and no new and significant information was identified). An example of such a table including different issues and scenarios is presented below:

Issue	Section of the SEIS where the issue is analyzed	Is the issue a Category 1 or a Category 2 issue?	Can the issue be generically resolved?
Onsite Land Use	xxx	Category 1	Yes. All PPE values and assumptions in Table 4-1 are met.
Surface Water Use Conflicts during Construction	xxx	Category 1	No. Information provided by the applicant indicates that the total plant water demand exceeds the PPE threshold of 6,000 gpm.
Important Species and Habitats – Resources Regulated under the Endangered Species Act of 1973	xxx	Category 2	No. All Category 2 issues require site-specific analysis.

If the reviewer concludes that the applicant has demonstrated that all of the relevant values and assumptions have been met for one or more Category 1 issue in their resource area, and that there is no new and significant information, then a determination similar to the following should be included in the SEIS:

> The NRC staff, based on its review of [state sources such as: [APPLICANT'S] ER, the site audit, the scoping process, and responses to requests for additional information (RAIs)], concludes that [APPLICANT] has demonstrated that the relevant PPE/SPE values and assumptions for the following Category 1 issues have been met; [LIST CATEGORY 1 ISSUES]. The NRC has not identified any information or impacts related to these issues that would change the generic conclusions presented in the ANR GEIS. Therefore, based on the generic analyses presented in the ANR GEIS, the staff concluded that the impact level for each of these issues is SMALL.

For Category 2 issues, and for any Category 1 issue for which any of the relevant values and assumptions are not met, or for which new and significant information has been identified, the reviewer should follow the guidance in the ESRP (NRC 2000, 2007-TN614), applicable ISGs, and RG 4.2 (NRC 2022-TN7081) to develop the appropriate conclusion.

3.1 LAND USE

The existing land use guidance in Section 3.0 above, the ESRP (NRC 2000, 2007-TN614), applicable ISGs, and RG 4.2 (NRC 2022-TN7081) may generally be followed for ANRs. Before writing, the reviewer should inspect any ground-level or aerial (or satellite) photography and maps covering the site and surrounding area included in the application or readily available in online databases. Useful online databases include the U.S. Geological Survey database of 7.5-minute topographic map coverage, the Natural Resources Conservation Service (NRCS) database of soil survey map coverage, and the Flood Insurance Management Agency database of flood insurance rate maps. The reviewer should identify potentially sensitive land use features on or adjacent to the site or any associated offsite rights-of-way (ROWs) or project outparcels. Sensitive land use features include National and State parks, local parks, preserves, and conservation areas, Wild and Scenic River segments, American Heritage Rivers, Class I areas designated under the Clean Air Act (42 U.S.C. §§ 7401 *et seq.*; TN1141), 100-year floodplains, and riparian lands. Ensure that sensitive land use features are identified out to the distances from the site (and offsite ROWs and outparcels) necessary to determine whether the assumptions established in the ANR GEIS regarding land use issues are met. Obtain copies of the zoning maps and any comprehensive land use plans for each local jurisdiction(s) for the site.

Even when relying on the ANR GEIS (NRC 2021-TN7080) for all land use issues, the site-specific text for land use should still open with some basic data that will support the review of other resources as well. Present basic statistics regarding the site that will be used by multiple reviewers, such as the site acreage; the length, width, and acreage of any associated ROWs; acreage and location of any affected outparcels such as borrow pits; the cities, counties, and other local jurisdictions involved; and the distance of the site from key landmarks such as cities, major rivers and lakes, and arterial highways. The text should briefly characterize existing land uses on the site (and offsite ROWs and outparcels) and adjacent properties as well as the predominant existing land uses in the surrounding landscape. The text or maps should indicate each local jurisdiction encompassing all or part of the site and surrounding landscape. The text should indicate the site's ownership and briefly explain any ownership issues such as leases, easements, or ROWs. Enough general information about the site's location and position in the landscape should be provided to set the tone for descriptions prepared by the reviewers for other resources.

The impact assessment should use text and/or tables to quantify and briefly describe the proposed footprint of disturbance, including any areas of disturbance only for purposes of grading or clearing vegetation. Distinguish between the permanent and temporary footprints of disturbance. Present the footprints of disturbance in a figure. Address offsite outparcels in the manner used for the site, but the footprints of disturbance for ROWs may be presented in a more generalized manner. For example, disturbances within an ROW can be described broadly, such as stating that building a new transmission line would involve clearing a specific width of vegetation and placing poles at a specified distance, with a disturbance of a specified area per pole. Indicate, however, if any disturbance will take place in sensitive land use features.

The land use section must document compliance with the Farmland Protection Policy Act (7 U.S.C. §§ 4201 *et seq.*; TN708) and the Coastal Zone Management Act (16 U.S.C. §§ 1451 *et seq.*; TN1243). Even when using the generic analysis in the ANR GEIS (NRC 2021-TN7080) to address the prime and unique farmland issue, state why the action is exempt from the Farmland Protection Policy Act or document evidence of compliance. If the project is not exempt, initiate communication (written and/or electronic) with the NRCS to determine what actions the staff or applicant must perform to comply. In the text, cite and summarize any farmland evaluations performed and mitigation measures recommended. If any elements of the project fall within areas designated as Coastal Zone, summarize communications between the staff and applicant. Indicate whether the State has issued a Consistency Determination.

Cite and briefly summarize the Consistency Determination. If all the project site and any associated offsite ROWs or outparcels are situated outside of areas designated as part of the Coastal Zone, state so.

The ANR GEIS identifies all land use environmental issues as Category 1 (NRC 2021-TN7080). The reviewer should address each of these issues as described in the General Instructions for this chapter. After reviewing the application materials and the information gained through scoping and the site audit, use the guidance in RG 4.2, Appendix C (NRC 2022-TN7081), to identify each issue for which the applicant has adequately demonstrated that relevant PPE and SPE values and assumptions are met. For each such issue, indicate that the generic analysis provided in the GEIS is applicable and state that the staff concludes that impacts would be SMALL. Cite the pages of the ANR GEIS containing the relevant generic analyses, but it is not necessary to summarize or paraphrase the analyses. Briefly explain how the assumptions are met.

For Category 1 issues not meeting the PPE/SPE or for which new and significant information is identified, the reviewer should consult RG 4.2 (NRC 2022-TN7081), applicable ISGs, and the ESRP (NRC 2000, 2007-TN614) for guidance on impact assessment. For each issue, the reviewer should present the conclusion (SMALL, MODERATE, or LARGE) and provide a brief rationale, incorporating information from the ANR GEIS (NRC 2021-TN7080) by reference wherever possible.

3.2 VISUAL RESOURCES

The existing visual resources guidance in Section 3.0 above, the ESRP (NRC 2000, 2007-TN614), applicable ISGs, and RG 4.2 (NRC 2022-TN7081) may generally be followed for ANRs. Even when relying on the ANR GEIS for visual issues, the reviewer should be sure to identify any offsite features such as transmission lines, access roads, and pipelines, as well as related actions on outparcels. The reviewer should inspect any ground-level or aerial (or satellite) photography covering the site and surrounding area included in the application or readily available in online databases. Useful online resources include the aerial photography included in web-based applications such as Google Earth and the U.S. Geological Survey database of 7.5-minute topographic map coverage. The review should extend to enough of the surrounding area to identify potentially sensitive viewsheds that could be affected by the project, and the determination will need to account for factors such as topography, vegetation (including winter or “leaf-off” vegetation), and climatological factors such as haze, fog, or clouds.

The visual resources section should begin with a brief discussion of the visual sensitivity of the landscape surrounding the site and offsite ROWs and parcels and briefly identify sensitive viewsheds used for the analysis. Visual simulations, in which an image of the proposed new facilities is superimposed onto a baseline photograph taken from one or more sensitive viewpoints, are rarely necessary, even for projects that do not meet all of the PPE and SPE values and assumptions needed to rely on the generic analysis in the ANR GEIS (NRC 2021-TN7080). The need for any visual simulations would typically be driven by public comments or the potential for intervention.

The ANR GEIS identifies all visual environmental issues as Category 1 (NRC 2021-TN7080). The reviewer should address each of these issues as described in the General Instructions for this chapter. After reviewing the application materials and the information gained through scoping and the site audit, use the guidance in RG 4.2, Appendix C (NRC 2022-TN7081), to identify each issue for which the applicant has adequately demonstrated that relevant PPE and SPE values and assumptions are met. For each such issue, indicate that the generic analysis provided in the GEIS is applicable and state that the staff concludes that impacts would be SMALL. Cite the pages of the ANR GEIS containing the relevant generic analyses, but it is not necessary to summarize or paraphrase the analyses. Briefly explain how the assumptions are met.

For Category 1 issues not meeting the PPE/SPE or for which new and significant information is identified, the reviewer should consult RG 4.2 (NRC 2022-TN7081), applicable ISGs, and the ESRP (NRC 2000, 2007-TN614) for guidance on impact assessment. For each issue, the reviewer should present the conclusion (SMALL, MODERATE, or LARGE) and provide a brief rationale, incorporating information from the ANR GEIS (NRC 2021-TN7080) by reference wherever possible.

3.3 METEOROLOGY AND AIR QUALITY

The existing air quality guidance in Section 3.0 above, the ESRP (NRC 2000, 2007-TN614), applicable ISGs, and RG 4.2 (NRC 2022-TN7081) may generally be followed for ANRs.

The air quality and meteorology reviewer should coordinate with the environmental justice reviewer to provide meteorological data, such as wind rose maps, and air quality information important to the determination of the disproportionately large and adverse impacts on minority or low-income communities. The air quality and meteorology reviewer should also coordinate with the noise impacts reviewer to provide data on baseline and expected noise levels during the building and operations of the proposed project to determine potential human health impacts and coordinate impacts from construction and operation traffic impacts. The air quality and meteorology reviewer should coordinate with the ecologists to share data regarding salt deposition on terrestrial and aquatic habitats and should coordinate with any reviewer concerned with visual impacts from cooling tower plumes. The air quality reviewer should coordinate with the reviewers for decommissioning, fuel cycle, and transportation of waste and fuel.

If the project is in an area that is not in attainment, or is a maintenance area, the reviewer should verify the applicant provided estimates of emissions of criteria pollutants, hazardous air pollutant and greenhouse gases (GHGs) during construction and operation activities. In such a case, the emissions from vehicular traffic and standby nonelectric generators related to construction and operation should be reviewed. Finally, the reviewer should review the applicant's applicability analysis to determine if a General Conformity Determination is needed.

The ANR GEIS identifies all air quality environmental issues as Category 1 (NRC 2021-TN7080). The reviewer should address each of these issues as described in the General Instructions for this Chapter. After reviewing the application materials and the information gained through scoping and the site audit, use the guidance in RG 4.2, Appendix C (NRC 2022-TN7081), to identify each issue for which the applicant has adequately demonstrated that relevant PPE and SPE values and assumptions are met. For each such issue, indicate that the generic analysis provided in the GEIS is applicable and state that the staff concludes that impacts would be SMALL. Cite the pages of the ANR GEIS (NRC 2021-TN7080) containing the relevant generic analyses, but it is not necessary to summarize or paraphrase the analyses. Briefly explain how the assumptions are met.

For Category 1 issues not meeting the PPE/SPE or for which new and significant information is identified, the reviewer should consult RG 4.2 (NRC 2022-TN7081), applicable ISGs, and the ESRP (NRC 2000, 2007-TN614) for guidance on impact assessment. For each issue, the reviewer should present the conclusion (SMALL, MODERATE, or LARGE) and provide a brief rationale, incorporating information from the ANR GEIS (NRC 2021-TN7080) by reference wherever possible.

3.4 WATER RESOURCES

The existing guidance relative to water resources in Section 3.0 above, the ESRP (NRC 2000, 2007-TN614), applicable ISGs, and RG 4.2 (NRC 2022-TN7081) may generally be followed for ANRs. As discussed in the general guidance provided above, each reviewer should review the information in the

applicant's ER related to water resources that may be included in or used by other sections and interface with the subject matter experts of those sections, as needed. These sections may include geology, terrestrial resources, aquatic ecology, land use, environmental hazards, waste management, postulated accidents, socioeconomics, environmental justice, and decommissioning. For water resources, the reviewer may need to review the following information to ensure that PPE and SPE values and assumptions for Category 1 issues have been met and that the data provided in the ER is sufficient and appropriate for use in the environmental review:

- site and vicinity maps,
- water resources data sets and descriptions,
- site location in relation to water features,
- regional surface and subsurface characterizations,
- nearby surface and groundwater use and quality data included in the ER or readily available online databases,
- flood-related data like Federal Emergency Management Agency (FEMA) flood insurance rate maps, historical floods, water levels, and inundation areas.

These data and information are readily available from agencies like U.S. Geological Survey (USGS), State departments that regulate natural resources and the environment, FEMA, National Oceanic and Atmospheric Administration (NOAA), and Great Lakes Environmental Research Laboratory. This information should be included, as needed, in the SEIS to support the discussion of Category 1 hydrological issues.

The reviewer should verify that the plant's hydrologic setting description includes potential interfaces with surface water features and groundwater aquifers and sufficient surface and groundwater data to establish baseline conditions regarding high and low water flows and groundwater levels, water users and quantities, water quality, instream flow requirements, and transport characteristics.

As indicated in the general guidance above, the reviewer should normally participate in a site visit unless the plant's interface with the hydrologic environment is minimal (e.g., a small plant that has all water withdrawal and wastewater discharge needs provided by a municipal service may not require a site visit).

If a site visit is performed, the reviewer should do the following if needed to confirm that the PPE and SPE values and assumptions for Category 1 issues have been met:

- View surface water features including withdrawal or discharge locations; groundwater well locations; coastal or littoral areas; streamflow, water levels, and water quality monitoring locations; and the locations of plant's proposed interfaces with the hydrologic environment.
- Discuss current and future water use plans (including those related to the project), sensitive issues that affect water use and quality, and water availability of regional surface water, groundwater, and municipal sources with water planning and permitting agencies.

The permits related to water use, in-water construction, and impacts on water quality may require coordination among several local, regional, State, and Federal agencies (e.g., city governments, water conservation districts, State departments that regulate natural resources and the environment, the U.S. Environmental Protection Agency [EPA], USACE). At the time of the application and the staff's review, the processes to obtain permits required for construction and operation of the plant may be in various stages of completion. The reviewer should obtain an understanding of these processes, describe these processes in the section, and use specific information related to these processes in the project-specific SEIS, as needed.

The impacts assessment for water resources should include a clear description of total plant water withdrawal and discharge including daily rates. The quantities or rates of water withdrawn from all proposed sources for all plant uses should be clearly and individually identified for (1) plant construction and (2) plant operations. Similarly, the rates of discharge, the water quality of the discharge flows, and the receiving water bodies should be clearly and individually identified for construction and operations.

The ANR GEIS identified environmental issues related to water use and water quality that may arise from construction and operations activities for a proposed ANR power plant (NRC 2021-TN7080). With the exception of surface water quality degradation due to chemical and thermal discharges during operations, the NRC staff determined that the identified water resources issues are Category 1. Impacts for all Category 1 issues were determined by the staff to be SMALL when the applicable PPE/SPE parameter values and associated assumptions are met. For each Category 1 issue, use the application materials and information gained through scoping and the site audit to evaluate whether the proposed plant parameters and site characteristics meet the PPE/SPE values and assumptions applicable to the issue, as defined in the relevant ANR GEIS section (NRC 2021-TN7080). For some PPE/SPE values this evaluation may be relatively simple, e.g., establishing that the total plant water demand is less than 6,000 gallons per minute. Some PPE/SPE values or assumptions may require a more complex evaluation, e.g., establishing that plant groundwater withdrawals result in less than one foot of drawdown at the site boundary. Consult RG 4.2 (Addendum 1 of Appendix C) for guidance on methods of demonstrating that the PPE/SPE values and assumptions have been met (NRC 2022-TN7081). Consult the ESRP (NRC 2000, 2007-TN614) for guidance on reviewing technical information. When the PPE/SPE values and assumptions are met, briefly document the staff's evaluation using a level of detail appropriate to the complexity of the analysis. In this case, the generic analysis included in the ANR GEIS (NRC 2021-TN7080) is applicable for this issue and the impacts would be SMALL.

For Category 1 issues not meeting the PPE/SPE or for which new and significant information is identified, the reviewer should consult RG 4.2 (NRC 2022-TN7081), applicable ISGs, and the ESRP (NRC 2000, 2007-TN614) for guidance on impact assessment. For each issue, the reviewer should present the conclusion (SMALL, MODERATE, or LARGE) and provide a brief rationale, incorporating information from the ANR GEIS (NRC 2021-TN7080) by reference wherever possible.

Surface water quality degradation due to chemical and thermal discharges during operations was determined in the ANR GEIS to be a Category 2 issue with SMALL, MODERATE, or LARGE impacts depending on project-specific characteristics (NRC 2021-TN7080). The ANR GEIS does not include a generic analysis for this issue because impacts from chemical and thermal discharges require consideration of project-specific information on a case-by-case basis. This review should follow existing guidance included in the ESRP (NRC 2000, 2007-TN614), RG 4.2 (NRC 2022-TN7081), and ISGs, as applicable.

3.5 TERRESTRIAL ECOLOGY

The existing terrestrial ecology guidance in Section 3.0 above, the ESRP (NRC 2000, 2007-TN614), applicable ISGs, RGs 4.11 and 4.2 (NRC 2012-TN1967 and NRC 2022-TN7081, respectively) may generally be followed for ANRs. The terrestrial ecology reviewer should coordinate with other reviewers such as the water resource reviewer, radiation human health and waste reviewer, air quality reviewer, and aquatic ecology reviewer.

Using information in the ER, the reviewer should identify terrestrial and wetland habitats present on the site and offsite ROWs and outparcels and gain an understanding of the types of terrestrial habitats present in the surrounding landscape. The reviewer should review any wetland delineations and maps included with the ER and verify that the applicant has a plan for obtaining any necessary jurisdictional

determinations and wetland permits from the USACE and State agencies that regulate wetlands. The reviewer should be able to assign a terrestrial or wetland habitat type to each land area on the site(s) and ROWs. If basic information about terrestrial and wetland habitats is not provided, the reviewer should request that information from the applicant. The reviewer should identify each terrestrial species and habitat meeting the definition of "important" in the ecology sections of RG 4.2 (NRC 2022-TN7081). Unless the applicant effectively demonstrates that the project would alter only paved areas or areas previously occupied by buildings or other man-made structures, the terrestrial reviewer should normally participate in a site visit. Depending on the complexity of the potentially affected habitats, it might be possible for only one ecologist, terrestrial or aquatic, to participate in the site visit.

The terrestrial ecology section should open with a brief description of the affected ecoregions and then proceed to a general description and map of the terrestrial and wetland habitats on the site(s), ROWs, and surrounding landscapes. Incorporation by reference of a habitat map and habitat descriptions from the ER or other sources is acceptable, especially if the assessment of impacts on terrestrial resources will be relying on the generic evaluations in the ANR GEIS (NRC 2021-TN7080) for all or most Category 1 terrestrial ecology issues. Incorporation by reference of species lists using the ER and other published sources is encouraged even if some terrestrial ecology issues will be addressed individually rather than by relying on the generic analyses. Using text or a table, the reviewer should identify each species or habitat determined to be "important" but should refer the reader to the ER or to other widely available published information sources for descriptive life history information.

The impact assessment text for terrestrial ecology should open with a brief description of what terrestrial habitats would be lost as a result of building the new reactor and supporting facilities, including offsite facilities. The text should include, or incorporate by reference, a figure overlaying the proposed footprint of disturbance over a baseline map of terrestrial and wetland habitats and a table that quantifies losses by habitat type, distinguishing between permanent and temporary losses. The text should also briefly indicate how the action could affect each important species and habitat, citing the ER or other sources wherever possible and using a table if more than a few important species and habitats are involved. The reviewer should coordinate with the radiological environmental reviewer for the radiological impacts on terrestrial species.

The ANR GEIS identifies most terrestrial ecology issues, other than impacts on Federally listed threatened or endangered species, as Category 1 (NRC 2021-TN7080). The reviewer should address each of these issues as described in the General Instructions for this chapter. After reviewing the application materials and the information gained through scoping and the site audit, use the guidance in RG 4.2, Appendix C (NRC 2022-TN7081), to identify each issue for which the applicant has adequately demonstrated that relevant PPE and SPE values and assumptions are met. For each such issue, indicate that the generic analysis provided in the GEIS is applicable and state that the staff concludes that impacts would be SMALL. Cite the pages of the ANR GEIS containing the relevant generic analyses, but it is not necessary to summarize or paraphrase the analyses. Briefly explain how the assumptions are met.

For Category 1 issues not meeting the PPE/SPE or for which new and significant information is identified, the reviewer should consult RG 4.2 (NRC 2022-TN7081), applicable ISGs, and the ESRP (NRC 2000, 2007-TN614) for guidance on impact assessment. For each issue, the reviewer should present the conclusion (SMALL, MODERATE, or LARGE) and provide a brief rationale, incorporating information from the ANR GEIS (NRC 2021-TN7080) by reference wherever possible.

Resources regulated under the ESA is a Category 2 issue and should be addressed by following guidance in RG 4.2 (NRC 2022-TN7081), the ESRP (NRC 2000, 2007-TN614), and applicable ISGs. The terrestrial reviewer is responsible for working with the aquatic reviewer to complete the consultations

required under ESA Section 7. Completion of the consultation typically requires early informal communications with the Service agencies that administer the Section 7 process, including the U.S. Fish and Wildlife Service (FWS) and NOAA Fisheries Service (sometimes referred to as the National Marine Fisheries Service) and may involve preparation of a Biological Assessment.

3.6 AQUATIC ECOLOGY

The existing aquatic ecology guidance in Section 3.0 above, the ESRP (NRC 2000, 2007-TN614), applicable ISGs, and RG 4.2 (NRC 2022-TN7081) may generally be followed for ANRs. The aquatic ecology reviewer should coordinate with other reviewers such as the water resource reviewer, radiation human health and waste reviewer, air quality reviewer, and terrestrial ecology reviewer.

The aquatic reviewer should begin by reading the aquatic ecology sections in the ER and ANR GEIS (NRC 2021-TN7080), the terrestrial ecology direction provided in RG 4.2 (NRC 2022-TN7081), the latest version of the ESRP, and applicable ISGs. The reviewer should also read RG 4.24 (NRC 2017-TN6720), especially if the applicant submitted aquatic field studies with the application. The reviewer should also read sections of the ER addressing related issues such as terrestrial ecology, hydrology, and land use to seek out information relevant to aquatic ecology. The reviewer should inspect any ground-level or aerial (or satellite) photography covering the site and surrounding area included in the application or readily available in online databases. Other useful information might be available from online databases, including the U.S. Geological Survey database of 7.5-minute topographic map coverage. The reviewer should inspect any maps of the site and surrounding landscape provided with the application or readily available online. If reviewers are unfamiliar with the aquatic ecology of the portion of the United States where the project (and alternatives) is proposed, they should read about the ecoregion(s) involved using data available from the EPA. Becoming familiar with other scientific literature about the regional ecological setting of the project site and alternatives may also be appropriate.

Using information in the ER, the reviewer should identify aquatic habitats present on the site and offsite ROWs and gain an understanding of the types of aquatic habitats present in the surrounding landscape. Aquatic habitats can include oceans, estuaries, lakes, ponds, reservoirs, rivers, perennial and intermittent streams, springs, and other surface water features. For purposes of NRC environmental reviews, wetlands with emergent vegetation are generally addressed as terrestrial habitats, while wetlands with only submerged aquatic vegetation are generally addressed as aquatic habitats (see RG 4.24 [NRC 2017-TN6720]). In addition to the aquatic habitats themselves, the reviewer should use topographic maps and available aerial photography to identify and characterize the specific watersheds occurring within and around the site and offsite ROWs. The aquatic reviewer should communicate with the terrestrial reviewer to ensure that the applicant has a plan for obtaining any necessary jurisdictional determinations and permits from the USACE and State agencies that regulate waters of the United States or the State. If basic information about aquatic habitats is not provided, the reviewer should request the information from the applicant. The reviewer should identify each aquatic species and habitat meeting the definition of “important” in the ecology sections of RG 4.2 (NRC 2022-TN7081). Unless the proposed action does not involve disturbance of aquatic habitats or their associated shorelines and riparian areas and does not involve any surface water withdrawals or discharges, the aquatic reviewer should normally participate in a site visit. Depending on the complexity of the potentially affected habitats and impacts, it might be possible for only one ecologist, terrestrial or aquatic, to participate in the site visit.

The aquatic ecology section should open with a brief description of the typical aquatic biota in affected ecoregions and then proceed to a general description and map of the aquatic habitats (and their associated watersheds) on the site(s), ROWs, and surrounding landscapes. Site-specific information characterizing aquatic biota in specific aquatic habitats is not normally necessary for habitats not subject to direct physical disturbance or the building and operation of intake or discharge structures.

Incorporation by reference of habitat descriptions from the ER or other sources may be acceptable even for aquatic habitats subject to physical disturbance or intake or discharge structures, especially if the assessment of impacts on terrestrial resources will be relying on the generic evaluations in the ANR GEIS (NRC 2021-TN7080) for all or most Category 1 terrestrial ecology issues. Incorporation by reference of species lists using the ER and other published sources is encouraged. Using text or a table, the reviewer should identify each species or habitat determined to be "important" in those aquatic habitats subject to physical disturbance, intakes, or discharges. However, the reviewer should refer the reader to the ER or other widely available published information sources for any necessary descriptive life history information.

The impact assessment text for aquatic ecology should open with a brief description of what aquatic habitats would be disturbed as a result of building the new reactor and supporting facilities, including offsite facilities. The text should include, or incorporate by reference, a figure overlaying the proposed footprint of disturbance over a baseline map of aquatic habitats. The figure should prominently depict the proposed locations for any intake or discharge structures, including any riparian land or submerged land subject to physical disturbance. The text should also briefly indicate how the action could affect each important species and habitat (only address those adversely affected), citing the ER or other sources wherever possible and using a table if more than a few important species and habitats are involved. The reviewer should address impacts caused by development in the watershed as well as directly encroachment into the aquatic habitats themselves. The text should briefly summarize the findings of relevant technical studies such as discharge plume modeling or water level drawdown modeling, but the reviewer is encouraged to reference the ER or other technical documents submitted by the applicant for details. The reviewer is also encouraged to reference any applicable National Pollutant Discharge Elimination System permits for details regarding permitted discharge parameters and monitoring requirements. The reviewer should coordinate with the radiological environmental reviewer for the radiological impacts on aquatic species.

The ANR GEIS identifies most aquatic ecology issues as Category 1 (NRC 2021-TN7080). The reviewer should address each of these issues as described in the General Instructions for this chapter. After reviewing the application materials and the information gained through scoping and the site audit, use the guidance in RG 4.2, Appendix C (NRC 2022-TN7081), to identify each issue for which the applicant has adequately demonstrated that relevant PPE and SPE values and assumptions are met. For each such issue, indicate that the generic analysis provided in the GEIS is applicable and state that the staff concludes that impacts would be SMALL. Cite the pages of the ANR GEIS containing the relevant generic analyses, but it is not necessary to summarize or paraphrase the analyses. Briefly explain how the assumptions are met.

For Category 1 issues not meeting the PPE/SPE or for which new and significant information is identified, the reviewer should consult RG 4.2 (NRC 2022-TN7081), applicable ISGs, and the ESRP (NRC 2000, 2007-TN614) for guidance on impact assessment. For each issue, the reviewer should present the conclusion (SMALL, MODERATE, or LARGE) and provide a brief rationale, incorporating information from the ANR GEIS (NRC 2021-TN7080) by reference wherever possible.

Thermal impacts on aquatic biota, other effects of cooling water discharges on aquatic biota, and resources regulated under the ESA and Magnuson Stevens Act are Category 2 issues and should be addressed following guidance in RG 4.2 (NRC 2022-TN7081) and the ESRP (NRC 2000, 2007-TN614). The aquatic reviewer is responsible for completing any consultations required under the Magnuson Stevens Act, including preparing any technical reports required to complete the consultation. The aquatic reviewer is also responsible for working with the terrestrial reviewer to complete the consultations required under ESA Section 7. Completion of the consultation typically requires early informal communications with the Service agencies that administer the Section 7 process, including the FWS and

NOAA Fisheries Service (sometimes referred to as the National Marine Fisheries Service) and may involve preparation of one or more Biological Assessments.

3.7 HISTORIC AND CULTURAL RESOURCES

Historic and cultural resources are the remains of past human activities and include precontact (i.e., prehistoric) and historic era archaeological sites, districts, buildings, structures, and objects. Precontact era archaeological sites predate the arrival of Europeans in North America and may include small temporary camps, larger seasonal camps, large village sites, or specialized-use areas associated with fishing or hunting or with tool and pottery manufacture. Historic era archaeological sites post-date European contact with American Indian Tribes and may include farmsteads, mills, forts, residences, industrial sites, and shipwrecks. Architectural resources include buildings and structures. Historic and cultural resources also include elements of the cultural environment such as landscapes, sacred sites, and other resources that are of religious and cultural importance to American Indian Tribes, such as traditional cultural properties important to a living community of people for maintaining its culture.

A historic or a cultural resource is deemed to be historically significant, and thus, a "historic property" within the scope of the NHPA (54 U.S.C. §§ 300101 *et seq.*; TN4157), if it has been determined to be eligible for listing or is listed on the National Register of Historic Places (NRHP or National Register). The NRHP is maintained by the U.S. National Park Service in accordance with its regulations in 36 CFR Part 60 (TN1682). The NRHP criteria for evaluating the eligibility of a property are set forth in 36 CFR 60.4. A historic property is at least 50 years old, although exceptions can be made for properties determined to be of "exceptional significance."

NEPA requires Federal agencies to consider the potential effects of their actions on the "affected human environment," which includes "aesthetic, historic, and cultural resources as these terms are commonly understood, including such resources as sacred sites" (CEQ and ACHP 2013-TN4603). For NEPA compliance, impacts on cultural resources that are not eligible for or listed in the National Register should also be considered (CEQ and ACHP 2013-TN4603). The Advisory Council on Historic Preservation (ACHP) is an independent Federal agency that oversees the NHPA Section 106 review process and issues its implementing regulations in 36 CFR Part 800, "Protection of Historic Properties" (36 CFR Part 800-TN513). Section 106 of the NHPA requires Federal agencies to take into account the effects of their undertakings on historic properties and consult with the appropriate consulting parties as defined in 36 CFR 800.2. Consulting parties consist of the State Historic Preservation Officer, ACHP, Tribal Historic Preservation Officer, American Indian Tribes that attach cultural and religious significance to historic properties on a government-to-government basis, and other parties that have a demonstrated interest in the effects of the undertaking, including local governments and the public, as applicable. Issuing a license for an ANR is an undertaking that requires compliance with NHPA Section 106 (54 U.S.C. § 306108-TN4839).

The existing guidance for historic and cultural resources in Section 3.0 above, the ESRP (NRC 2000, 2007-TN614), applicable ISGs, and RG 4.2 (NRC 2022-TN7081) may generally be followed for ANRs. In the ANR GEIS, the staff determined that historic and cultural resources is a Category 2 issue, requiring a project-specific analysis (NRC 2021-TN7080). The reviewer should be familiar with existing guidance regarding historic and cultural resources in the ANR GEIS, ESRP, ISG-026 (NRC 2014-TN3767), ISG-029 (NRC 2020-TN6710), and RG 4.2, including RG 4.2 Appendixes B and C. The reviewer should also be familiar with the methods the NRC staff has used to address impacts on historic and cultural resources in recent new reactor EISs. The general approach for assessing effects on historic properties and historic and cultural resources, along with the associated consultation under Section 106 of the NHPA (54 U.S.C. § 306108-TN4839), for an ANR would be the same as that for other new reactor reviews.

3.8 ENVIRONMENTAL HAZARDS

3.8.1 Radiological Environment

The existing radiological environment guidance in Section 3.0 above, the ESRP (NRC 2000, 2007-TN614), applicable ISGs, and RG 4.2 (NRC 2022-TN7081) may generally be followed for ANRs.

The reviewer should coordinate with the terrestrial and aquatic ecology reviewers and should also coordinate with the corresponding safety reviewers for radiation protection program, radiological monitoring (occupational and effluents), radiological waste management, and accidents to ensure consistency between the reviews and to coordinate any necessary audits and information requests.

To present the reader with a baseline understanding, the radiological environment section should begin with a general description of the sources of radiation and pathways of exposure. This section should also present a summary of information regarding the property bounding the facility, known site radiological contamination either at the site itself or in proximity to the site, summary accident information, and a brief overview of the facility emergency plans.

A description of the appropriate radiological protection standards (regulations), facility radiological protection programs, and any health effect studies performed in the region should follow. Section 3.8 of the ANR GEIS contains a list of applicable radiological protection regulations (NRC 2021-TN7080). Additionally, any proposed facility program designed to minimize or manage radiological emissions or exposures should be briefly mentioned.

The impact assessment text for the radiological environment should define the occupational and public health impacts during construction and operation from radiological exposures, and then outline any proposed mitigation measures. This section should summarize and explain monitoring results or modeling results and occupational monitoring program. The radiological environment section should provide the reader with enough information to determine that the applicable regulations are met or will be met, and that the applicant is being cognizant in maintaining the safety and health of its occupational workers and members of the public.

Summary information regarding a general description of sources and pathways of exposure, environmental protection standards, programs, and occupational and health impacts should be presented even for a project for which all the relevant PPE and SPE values and assumptions in the ANR GEIS (NRC 2021-TN7080) for the radiological environment are met because the information is relevant to assessing impacts on environmental resources other than radiological environment.

The ANR GEIS identifies all radiological environment issues as Category 1 (NRC 2021-TN7080). The reviewer should address each of these issues as described in the General Instructions for this chapter. After reviewing the application materials and the information gained through scoping and the site audit, use the guidance in RG 4.2, Appendix C (NRC 2022-TN7081), to identify each issue for which the applicant has adequately demonstrated that relevant PPE and SPE values and assumptions are met. For each such issue, indicate that the generic analysis provided in the GEIS is applicable and state that the staff concludes that impacts would be SMALL. Cite the pages of the ANR GEIS containing the relevant generic analyses, but it is not necessary to summarize or paraphrase the analyses. Briefly explain how the assumptions are met.

For Category 1 issues not meeting the PPE/SPE or for which new and significant information is identified, the reviewer should consult RG 4.2 (NRC 2022-TN7081), applicable ISGs, and the ESRP (NRC 2000, 2007-TN614) for guidance on impact assessment. For each issue, the reviewer should present the

conclusion (SMALL, MODERATE, or LARGE) and provide a brief rationale, incorporating information from the ANR GEIS (NRC 2021-TN7080) by reference wherever possible.

3.8.2 Nonradiological Environment

The existing nonradiological environment guidance in Section 3.0 above, the ESRP (NRC 2000, 2007-TN614), applicable ISGs, and RG 4.2 (NRC 2022-TN7081) may generally be followed for ANRs.

The reviewer should identify potentially sensitive receptors on or adjacent to the site or any associated offsite ROWs or project outparcels. Sensitive receptors may include hospitals, schools, daycare facilities, and elderly care facilities. Ensure that sensitive receptors are identified out to the distances from the site (and offsite ROWs and outparcels) necessary to determine whether the assumptions established in the ANR GEIS regarding the nonradiological environment are met. The reviewer should be able to identify sources and pathways of chemical exposure, biological hazards, electromagnetic field (EMF) exposure and physical hazards.

To present the reader with a baseline understanding, the nonradiological environment section should begin with a general description of the sources (such as types of chemicals) and pathways of exposure. This section should also present brief summary information regarding the property bounding the facility, known site contamination either at the site itself or in proximity to the site, summary accident information, if available, and a brief description of emergency plans.

A description of the appropriate environmental protection regulations, facility programs, facility permits, and any health effect studies performed in the region should follow. Regulations, such as the Clean Air Act, the Clean Water Act (codified as the Federal Water Pollution Control Act of 1972, 33 U.S.C. §§ 1251 *et seq.*; TN662), and the Occupational Safety and Health Act (29 U.S.C. §§ 651 *et seq.*; TN4453), which establish practices, procedures, exposure limits, and equipment specifications, should be discussed, along with any permits (obtained or applied for) associated with applicable regulations. Additionally, any proposed facility program designed to minimize or manage chemical hazards, biological hazards, EMFs, or physical hazards should be briefly mentioned.

The impact assessment text for the nonradiological environment should define the occupational and public health impacts during construction and operation from chemical hazards, biological hazards, EMF, and physical hazards, and then outline any proposed mitigation measures. This section should summarize and explain monitoring results or modeling results and detail occupational injury rates or occupational fatality rates. Even when using the generic analysis in the ANR GEIS (NRC 2021-TN7080) to address nonradiological environmental hazards, list the permits the applicant has or has applied for and state the regulation each permit is intended to meet. The nonradiological environment section should provide the reader with enough information to determine that the applicable regulations and permits are met or will be met, and that the applicant is cognizant in maintaining the safety and health of its occupational workers and members of the public.

Summary information regarding the general description of sources and pathways of exposure, environmental protection standards, programs, and permits, and occupational and health impacts should be presented even for projects where all the PPE and SPE values and assumptions for the nonradiological environment are met in the ANR GEIS (NRC 2021-TN7080), because the information is relevant to assessing impacts on environmental resources other than the nonradiological environment.

The ANR GEIS identifies four environmental issues (NRC 2021-TN7080). Building impacts of chemical, biological, and physical nonradiological hazards, and construction impacts of chemical, biological, and physical nonradiological hazards are classified as Category 1 issues. The reviewer should address each

of these issues as described in the General Instructions for this chapter. After reviewing the application materials and the information gained through scoping and the site audit, use the guidance in RG 4.2, Appendix C (NRC 2022-TN7081), to identify each issue for which the applicant has adequately demonstrated that relevant PPE and SPE values and assumptions are met. For each such issue, indicate that the generic analysis provided in the GEIS is applicable and state that the staff concludes that impacts would be SMALL. Cite the pages of the ANR GEIS (NRC 2021-TN7080) containing the relevant generic analyses, but it is not necessary to summarize or paraphrase the analyses. Briefly explain how the assumptions are met.

For Category 1 issues not meeting the PPE/SPE or for which new and significant information is identified, the reviewer should consult RG 4.2 (NRC 2022-TN7081), applicable ISGs, and the ESRP (NRC 2000, 2007-TN614) for guidance on impact assessment. For each issue, the reviewer should present the conclusion (SMALL, MODERATE, or LARGE) and provide a brief rationale, incorporating information from the ANR GEIS (NRC 2021-TN7080) by reference wherever possible.

The building impacts of EMF and the operations impacts of EMF are classified as uncertain because there is no generic conclusion about human health impacts from EMFs and there are no U.S. Federal standards limiting residential or occupational exposure; however, a reviewer should look for new scientific information about EMFs that may allow for a categorization of the issue.

3.9 NOISE

The existing noise guidance in Section 3.0 above, the ESRP (NRC 2000, 2007-TN614), applicable ISGs, and RG 4.2 (NRC 2022-TN7081) may generally be followed for ANRs.

The noise section should present basic statistics regarding construction and operation activities at the site that may generate noise, including the results of any ambient noise studies that have been conducted, including the locations of noise sources, receptor locations, and corresponding noise levels. The noise section should also document compliance with State and/or local noise abatement laws and ordinances, including any variances or mitigation required, and document any best management practices implemented to minimize impacts. The reviewer should identify potentially sensitive receptors on or adjacent to the site or any associated offsite ROWs or project outparcels. Ensure that sensitive receptors are identified out to the distances from the site (and offsite ROWs and outparcels) necessary to determine whether the assumptions established in the ANR GEIS regarding noise are met.

The ANR GEIS identifies all noise issues as Category 1 (NRC 2021-TN7080). The reviewer should address each of these issues as described in the General Instructions for this chapter. After reviewing the application materials and the information gained through scoping and the site audit, use the guidance in RG 4.2, Appendix C (NRC 2022-TN7081), to identify each issue for which the applicant has adequately demonstrated that relevant PPE and SPE values and assumptions are met. For each such issue, indicate that the generic analysis provided in the GEIS is applicable and state that the staff concludes that impacts would be SMALL. Cite the pages of the ANR GEIS containing the relevant generic analyses, but it is not necessary to summarize or paraphrase the analyses. Briefly explain how the assumptions are met.

For Category 1 issues not meeting the PPE/SPE or for which new and significant information is identified, the reviewer should consult RG 4.2 (NRC 2022-TN7081), applicable ISGs, and the ESRP (NRC 2000, 2007-TN614) for guidance on impact assessment. For each issue, the reviewer should present the conclusion (SMALL, MODERATE, or LARGE) and provide a brief rationale, incorporating information from the ANR GEIS (NRC 2021-TN7080) by reference wherever possible.

3.10 WASTE MANAGEMENT

3.10.1 Radiological Waste Management

The existing guidance in Section 3.0 above, the ESRP (NRC 2000, 2007-TN614), applicable ISGs, and RG 4.2 (NRC 2022-TN7081) may generally be followed for ANR radiological waste management.

The reviewer should determine the physical layout of the radiological waste systems and buildings, especially for cases where an ANR could be installed at an existing nuclear facility. Items to be considered include whether the ANR is a physically separate nuclear facility or, if there is adequate land, whether the ANR radiological management systems and storage structures are integrated within the boundaries of an existing nuclear power plant or other nuclear facility. If the ANR is a stand-alone facility, the space needed to store onsite radiological wastes would be within the planned footprint of the facility. If the ANR is sited at an existing nuclear facility, the existing radiological waste infrastructure and management program would need to be reviewed to ensure the existing facility can likely support the additional radiological wastes generated by the ANR. This aspect of the radiological waste management environmental review must be closely coordinated with the safety review.

The reviewer should be familiar with the Commission's licensing requirements for the land disposal of low-level radioactive waste (LLRW) as set forth in 10 CFR Part 61 (TN252), "Licensing Requirements for Land Disposal of Radioactive Waste." Specifically, the review should ensure the applicant is adhering to how Part 61 defines LLRW as "radioactive waste not classified as high-level radioactive waste [HLRW], transuranic [TRU] waste, spent nuclear fuel, or byproduct material as defined in paragraphs (2), (3), and (4) of the definition of byproduct material set forth in § 20.1003 of this chapter" and has established a classification system that categorizes LLRW as Class A, B, C, or Greater Than Class C (GTCC) according to the NRC's regulation in 10 CFR 61.55. Under the NRC's current regulations, GTCC waste is considered to be generally unacceptable for near-surface disposal and must be disposed of in a geologic repository unless the Commission approves, on a case-by-case basis, disposal of such waste in a disposal site licensed pursuant to 10 CFR 61.55(a)(2)(iv). Additionally, as described in the ANR GEIS (NRC 2021-TN7080), the reviewer should be familiar with the Low-Level Waste Compacts (NRC 2020-TN7083) and the four operating disposal facilities in the United States that are licensed to accept LLRW from commercial facilities (including nuclear power plants) (NRC 2020-TN6516) and which ones the ANR licensee, if approved, could engage for LLRW disposal.

Regarding high-level waste, the reviewer should determine if the ANR design has any online refueling capabilities and any online capacity to remove fission products and other radionuclides (such as activated corrosion products) for a liquid-fueled molten-salt reactor. For spent nuclear fuel storage, the reviewer should evaluate the impacts for the facility, either in a spent fuel pool or in non-water-based spent nuclear fuel storage with an appropriate holding period and transfer to a dry cask storage in an at-reactor independent spent fuel storage installation (ISFSI) under a general license or a stand-alone ISFSI under specific license. If the reactor core is handled as one unit, the reviewer should assess the environmental impacts for onsite spent nuclear fuel storage of the depleted core in a similar manner.

For mixed wastes, the reviewer needs to coordinate the review with the environmental nonradiological waste management reviewer because mixed wastes are also regulated under the Resource Conservation and Recovery Act of 1976, as amended (RCRA; 42 U.S.C. §§ 6901 *et seq.*; TN1281) and are subject to dual regulation by the EPA or an authorized State for their hazardous chemical components. As for LLRW, the reviewer should verify that any mixed waste is accumulated onsite in designated areas as authorized under RCRA, then shipped offsite for treatment as appropriate, and for disposal at either the EnergySolutions or the Waste Control Specialists, LLC facilities.

The ANR GEIS identifies all radiological environment issues as Category 1 (NRC 2021-TN7080). The reviewer should address each of these issues as described in the General Instructions for this chapter. After reviewing the application materials and the information gained through scoping and the site audit, use the guidance in RG 4.2, Appendix C (NRC 2022-TN7081), to identify each issue for which the applicant has adequately demonstrated that relevant PPE and SPE values and assumptions are met. For each such issue, indicate that the generic analysis provided in the GEIS is applicable and state that the staff concludes that impacts would be SMALL. Cite the pages of the ANR GEIS (NRC 2021-TN7080) containing the relevant generic analyses, but it is not necessary to summarize or paraphrase the analyses. Briefly explain how the assumptions are met.

For Category 1 issues not meeting the PPE/SPE or for which new and significant information is identified, the reviewer should consult RG 4.2 (NRC 2022-TN7081), applicable ISGs, and the latest version of the ESRP for guidance on impact assessment. For LLRW, compare the expected annual quantities of LLRW to the total annual quantity shipped to the appropriate disposal site as provided in Tables 3.15-5 and 3.15-6 the ANR GEIS (NRC 2021-TN7080). If the quantity of LLRW is a small percentage of the disposal site's total annual quantity (e.g., less than 5 percent), then the impacts should be concluded as SMALL. For each issue, the reviewer should present the conclusion (SMALL, MODERATE, or LARGE) and provide a brief rationale, incorporating information from the ANR GEIS by reference wherever possible.

3.10.2 Nonradiological Waste Management

The existing nonradiological waste guidance in Section 3.0 above, the ESRP (NRC 2000, 2007-TN614), applicable ISGs, and RG 4.2 (NRC 2022-TN7081) may generally be followed for ANRs.

The reviewer should inspect any maps of the site and surrounding landscape provided with the application or online in order to determine the locations of receptors (occupational workers or members of the public) and identify potentially sensitive receptors on or adjacent to the site or any associated offsite ROWs or project outparcels. Sensitive receptors may include hospitals, schools, daycare facilities, and elderly care facilities. Ensure that sensitive receptors are identified out to the distances from the site (and offsite ROWs and outparcels) necessary to determine whether the assumptions established in the ANR GEIS regarding nonradiological waste are met. The reviewer should be able to identify management plans for gaseous, liquid, and solid wastes generated by facility processes.

The nonradiological waste section should begin with a general description of the sources of waste by type (gaseous, liquid, and solid forms) that would occur during construction or operation. This section should present how the waste is stored, whether it is stored onsite, and how it is treated. For instance, gaseous waste is generally treated by running it through a scrubber or filter and discharging it through exhaust stacks; while liquid waste, such as sanitary waste sewage, is piped to a permitted municipal sewage treatment facility. If the ANR is co-located with a LLRW- or other nonradiological waste-producing facility, this section should present information defining hazardous and nonhazardous waste disposal amounts over the past 5 years with estimated amounts by year for the additional ANR, identify onsite storage capacity, and the disposal company or facility where applicable. If the ANR is not co-located, the section should present information defining hazardous and nonhazardous waste disposal estimates by year, identify onsite storage capacity, and the disposal company or facility where applicable. The reviewer should determine the physical layout of the nonradiological waste systems and buildings, especially for cases where an ANR could be installed at an existing facility, and inspect any waste management plans or permits listed in the application or those available via State or Federal agency websites.

The discussion should include a description of the appropriate environmental protection standards (regulations), facility programs, facility permits, and any relevant health effect studies. Regulations such as the Clean Air Act, Clean Water Act, and RCRA, should be discussed, along with any permits (obtained

or applied for), associated with applicable regulations. Additionally, any proposed facility program designed to minimize or manage nonradiological waste should be briefly mentioned.

The impact assessment text for the nonradiological waste management section should define the nonradiological waste impacts during construction and operation, the outline any proposed mitigation measures.

The ANR GEIS identifies all nonradiological environment issues as Category 1 (NRC 2021-TN7080). The reviewer should address each of these issues as described in the General Instructions for this chapter. After reviewing the application materials and the information gained through scoping and the site audit, use the guidance in RG 4.2, Appendix C (NRC 2022-TN7081), to identify each issue for which the applicant has adequately demonstrated that relevant PPE and SPE values and assumptions are met. For each such issue, indicate that the generic analysis provided in the GEIS is applicable and state that the staff concludes that impacts would be SMALL. Cite the pages of the ANR GEIS (NRC 2021-TN7080) containing the relevant generic analyses, but it is not necessary to summarize or paraphrase the analyses. Briefly explain how the assumptions are met.

For Category 1 issues not meeting the PPE/SPE or for which new and significant information is identified, the reviewer should consult RG 4.2 (NRC 2022-TN7081), applicable ISGs, and the ESRP (NRC 2000, 2007-TN614) for guidance on impact assessment. For each issue, the reviewer should present the conclusion (SMALL, MODERATE, or LARGE) and provide a brief rationale, incorporating information from the ANR GEIS (NRC 2021-TN7080) by reference wherever possible.

3.11 POSTULATED ACCIDENTS

The existing guidance for postulated accidents in Section 3.0 above, the ESRP (including the draft sections published in 2007 [NRC 2000, 2007-TN614]), applicable ISGs, and RG 4.2 (NRC 2022-TN7081) may generally be followed for ANRs. In addition to these documents, the reviewer should base the review of accidents on the Commission's Policy Statement "Nuclear Power Plant Accident Considerations Under National Environmental Policy Act of 1969" (45 FR 40101-TN4270), NUREG-0800 (NRC 2007/2019-TN6221), 10 CFR Part 50 (TN249), 10 CFR Part 52 (TN251), 10 CFR Part 100 (TN282), RGs 1.200 (NRC 2009-TN6211), 1.145 (NRC 1983-TN279), 1.183 (NRC 2000-TN517) and 1.233 (NRC 2020-TN6441), other probabilistic risk assessment guidance, and the Final Safety Analysis Report/Preliminary Safety Analysis Report (FSAR/PSAR), as appropriate. If there is the potential for accidents involving releases of hazardous chemicals, the reviewer should apply 40 CFR Part 68 (TN5494) and 40 CFR Part 355 (TN5493); NUREG-1520 (NRC 2015-TN6822) may also provide useful information. When evaluating the radiological and hazardous chemical releases from postulated accidents, the reviewer should consider the design's safety features and analyses, including the results of a probabilistic risk assessment, as appropriate, and as presented in the applicant's FSAR/PSAR. The reviewer should also coordinate the review of such postulated radiological and hazard chemical accidents with the NRC safety reviewers. The results of the NRC safety reviews will be published in the Final Safety Evaluation Report for the ANR application.

The ANR GEIS identifies postulated accidents issues as Category 1, except for severe accidents, which were identified as a Category 2 issue (NRC 2021-TN7080). The reviewer should address each of the Category 1 issues as described in the General Instructions for this chapter. After reviewing the application materials and the information gained through scoping and the site audit, use the guidance in RG 4.2, Appendix C (NRC 2022-TN7081), to identify each issue for which the applicant has adequately demonstrated that relevant PPE and SPE values and assumptions are met. For each such issue, indicate that the generic analysis provided in the GEIS is applicable and state that the staff concludes that impacts would be SMALL. Cite the pages of the ANR GEIS (NRC 2021-TN7080) containing the relevant

generic analyses, but it is not necessary to summarize or paraphrase the analyses. Briefly explain how the assumptions are met.

For Category 1 issues not meeting the PPE/SPE or for which new and significant information is identified, the reviewer should consult RG 4.2 (NRC 2022-TN7081), applicable ISGs, and the latest version of the ESRP for guidance on impact assessment. If the PPE values and assumptions for accidents involving releases of hazardous chemicals are exceeded and an ANR facility has the potential to release hazardous chemicals from licensed operations, then the analysis in the ER that contains the estimates of the consequences to members of the public in the event of such a release should be reviewed. This review should be coordinated with the NRC safety reviewers. Generally available information about protective emergency guidelines can also be useful when characterizing the consequences (e.g., Acute Exposure Guideline Levels [AEGLs], Emergency Response Planning Guidelines [ERGPs], Temporary Emergency Exposure Limits [TEELs], or Protective Action Criteria for Chemicals [PACs]). Relevant analysis prepared for compliance with other State or Federal regulations (e.g., a Risk Management Plan submitted under 40 CFR Part 68 [TN5494]) should be reviewed as applicable. If the reviewer determines that the ANR satisfies the protective emergency guidelines, the conclusion of SMALL should be presented along with a brief rationale. Incorporate information from the ANR GEIS (NRC 2021-TN7080) by reference wherever possible.

The ANR GEIS (NRC 2021-TN7080) identifies severe accidents as a Category 2 issue, which means that a meaningful generic analysis of environmental impacts is not possible because the issue requires consideration of project-specific information. Based on the analysis in the FSAR/PSAR regarding severe accidents and PRAs, if an ANR design has severe accident progressions that involve radiological or hazardous chemical releases, then an environmental risk evaluation must be performed. The review of the environmental risk evaluation should be coordinated with the NRC safety reviewers and carried out in accordance with the existing guidance discussed above.

3.12 SOCIOECONOMICS

The existing socioeconomic guidance in Section 3.0 above, the ESRP (NRC 2000, 2007-TN614), applicable ISGs, and RG 4.2 (NRC 2022-TN7081) may generally be followed for ANRs. The socioeconomics reviewer should inspect any ground-level and aerial (or satellite) photography covering the site and surrounding area included in the application or readily available in online databases, such as Google Earth.

Building and operating an ANR will most likely affect all socioeconomic resources, including the demographic characteristics of local communities; community services including education, first responders, healthcare, and other social services; local governments; and infrastructure concerns such as housing resources, transportation networks, public service utilities, and recreational resources.

Following any site visit and coordination with other reviewers, the reviewer should develop the impacts discussion of the social, economic, and infrastructure characteristics of the relevant impact area. Using text and/or tables, the reviewer should quantify and briefly describe the proposed project's socioeconomic baseline conditions. The level of detail should be commensurate with the expected magnitude of potential post-mitigation impacts on the socioeconomic resources under review.

The ANR GEIS identifies all socioeconomic environmental issues as Category 1 and, while potentially greater than SMALL, beneficial impacts are also considered Category 1 (NRC 2021-TN7080). The reviewer should address each of these issues as described in the General Instructions for this chapter. After reviewing the application materials and the information gained through scoping and the site audit, use the guidance in RG 4.2, Appendix C (NRC 2022-TN7081), to identify each issue for which the

applicant has adequately demonstrated that relevant PPE and SPE values and assumptions are met. For each such issue, indicate that the generic analysis provided in the GEIS is applicable and state that the staff concludes that impacts would be SMALL. Cite the pages of the ANR GEIS (NRC 2021-TN7080) containing the relevant generic analyses, but it is not necessary to summarize or paraphrase the analyses. Briefly explain how the assumptions are met.

For Category 1 issues not meeting the PPE/SPE or for which new and significant information is identified, the reviewer should consult RG 4.2 (NRC 2022-TN7081), applicable ISGs, and the ESRP (NRC 2000, 2007-TN614) for guidance on impact assessment. For each issue, the reviewer should present the conclusion (SMALL, MODERATE, or LARGE) and provide a brief rationale, incorporating information from the ANR GEIS (NRC 2021-TN7080) by reference wherever possible.

3.13 ENVIRONMENTAL JUSTICE

The staff determined environmental justice is a Category 2 issue, requiring a project-specific analysis. The reviewer should be familiar with existing guidance regarding environmental justice in the ESRP (NRC 2000, 2007-TN614), Office Instruction LIC-203 (NRC 2020-TN6399), ISG-026 (NRC 2014-TN3767), ISG-029 (NRC 2020-TN6710), and RG 4.2 (NRC 2022-TN7081). The reviewer should also be familiar with the methods the NRC staff has used to address impacts of environmental justice in recent new reactor EISs. The general approach for assessing environmental justice for an ANR would be the same as that for other new reactor reviews.

3.14 FUEL CYCLE

The existing guidance in Section 3.0 above, the ESRP (NRC 2000, 2007-TN614), applicable ISGs, and RG 4.2 (NRC 2022-TN7081) may generally be followed for the ANR fuel cycle.

The reviewer should be familiar with the uranium fuel cycle section of the License Renewal GEIS Section 4.12.1 (NRC 2013-TN2654), WASH-1248 (AEC 1974-TN23), NUREG-0116 (NRC 1976-TN292), the PNNL Non-LWR Fuel Cycle Environmental Data Report (PNNL-29367 Rev. 2; Napier 2020-TN6443), NUREG-2157 (NRC 2014-TN4117), and the applicable regulations. The reviewer should inspect the information about the fuel cycle provided by the applicant and should be aware of any environmental reviews for fuel cycle facilities that have been developed or modified to support ANRs. The reviewer will need to coordinate with the corresponding environmental and safety reviewers along with NRC facility licensing managers (as appropriate) of the various fuel cycle facilities licensed to support ANR fuels to evaluate any necessary updated fuel cycle facility and process information.

The ANR GEIS identifies all fuel cycle environmental issues as Category 1 (NRC 2021-TN7080). The reviewer should address each of these issues as described in the General Instructions for this chapter. The impact assessment text for the fuel cycle section should compare the fuel cycle environmental data to that of Table S-3. Table S-3 presents environmental data for the entirety of the fuel cycle, thus the full fuel cycle for the advanced fuel should be compared. The reviewer should keep in mind that environmental data higher than Table S-3 for one part of the fuel cycle may be compensated by lower impacts in other parts of the fuel cycle. The fuel cycle section should provide the reader with enough information to determine that the applicable regulations are met or will be met, and that the applicant is being cognizant of minimizing impacts from the fuel cycle.

Summary information regarding a general description of the fuel cycle should be presented even for projects where all the PPE values and assumptions for the fuel cycle are met in the ANR GEIS (NRC 2021-TN7080) (see Appendix G) because the information is relevant to assessing impacts on environmental resources other than for the radiological environment.

After reviewing the application materials and the information gained through scoping and the site audit, identify each issue for which the applicant has adequately demonstrated that relevant PPE values and assumptions are met. For each such issue, indicate that the generic analysis provided in the GEIS is applicable and state that the staff concludes that impacts would be SMALL. Cite the pages of the ANR GEIS (NRC 2021-TN7080) containing the relevant generic analyses, but it is not necessary to summarize or paraphrase the analyses. Briefly explain how the assumptions are met and that there is no new and significant information identified.

For any of the six environmental issues that may not be bounded by Table S-3, consult RG 4.2 (NRC 2022-TN7081), applicable ISGs, the latest version of the ESRP, PNNL-29367 Rev. 2 (Napier 2020-TN6443), and, if necessary, NUREG-2157 (NRC 2014-TN4117) for guidance on fuel cycle impact assessment. For each such issue, present the conclusion (SMALL, MODERATE, or LARGE) and provide a brief rationale. If the environmental finding is MODERATE or LARGE, describe any mitigation that could be implemented to reduce the impacts to SMALL. Incorporate information from the ANR GEIS (NRC 2021-TN7080) by reference wherever possible.

3.15 TRANSPORTATION OF FUEL AND WASTE

The existing guidance for the transportation of fuel and waste in Section 3.0 above, the ESRP (NRC 2000, 2007-TN614), and RG 4.2 (NRC 2022-TN7081) may generally be followed for ANRs. The reviewer should also be familiar with WASH-1238 (AEC 1972-TN22), NUREG–75/038 (NRC 1975-TN216), NUREG/CR-6703 (Ramsdell et al. 2001-TN4545), 10 CFR Part 71 (TN301), 49 CFR Parts 171-177 (TN5466), DOE's Transportation Risk Assessment Handbook (DOE 2002-TN418), and Maheras (2020-TN6509). Potential interfaces include reviewers involved with licensing reviews of reactor type and rated core thermal power, the fuel assembly description, and the average irradiation level of irradiated fuel; characteristics, treatment, and packaging systems for radioactive waste; and transportation packages and transport modes.

Table S-4, which provided the environmental effects of transportation of fuel and waste, is only applicable to LWRs that use uranium oxide, or UO_2, fuel that meets specific criteria in 10 CFR 51.52(a) and as extended in Section 4.12.1.1 in Revision 1 of NUREG-1437 (NRC 2013-TN2654). ANR developers are expected to use uranium fuel with enrichment levels of up to 20 percent enrichment, known as high-assay low-enriched uranium, or HALEU. In addition, several of the potential non-LWR designs are expected to deploy non-UO_2 fuels (e.g., uranium metal, uranium carbide, uranium in a molten salt, etc.) or deploy ANRs based on a Th-232/U-233 fuel cycle. While Table S-4 does not apply to non-LWRs and non-UO_2 fuels, the transportation of fuel and waste is a connected action under NEPA regulations, guidance, and case law. Therefore, the reviewer must still evaluate transportation impacts for non-LWR fuel and waste to meet its obligations under NEPA as has been done for large LWRs using UO_2 fuels. Both the radiological and nonradiological environmental impacts from incident-free and accident conditions resulting from (1) shipment of unirradiated fuel to the ANR site, (2) shipment of LLRW and mixed waste to offsite disposal facilities, and (3) shipment of spent fuel to an interim storage facility or a permanent geologic repository must be addressed by the applicant and reviewed.

Based on the criteria in 10 CFR 51.52 (TN250) and NUREG-1437 Section 4.12.1.1 (NRC 2013-TN2654), it is unlikely that an ANR would satisfy the conditions to apply Table S-4. There is limited information regarding the transportation of several forms of non-LWR fuel due to the expected higher enrichment levels (i.e., HALEU fuel) and the physical form of the non-LWR fuel being shipped. Accordingly, the reviewer should consider the following in the review of ANR transportation packages for unirradiated and irradiated non-LWR fuel and radioactive waste:

- non-LWR fresh fuel shipments likely to be similar to those for LWRs (except for molten salt);

- significantly different processing operations and transportation for molten-salt reactors and sodium fast reactors than for the current reactor fleet; and
- uncertainty in the post irradiation forms for transport and storage.

The reviewer should be aware of the transportation of fuels and wastes involving a fusion reactor. There would be some volume of LLRW generated in a fusion facility to be shipped to a licensed disposal facility. This LLRW would be from the operations of the fusion reactor, such as equipment maintenance, and from the management of the tritium fuel that is considered by the reviewer.

The ANR GEIS identifies all transportation environmental issues as Category 1 (NRC 2021-TN7080). The reviewer should address each of these issues as described in the General Instructions for this chapter. After reviewing the application materials and the information gained through scoping and the site audit, use the guidance in RG 4.2, Appendix C (NRC 2022-TN7081), to identify each issue for which the applicant has adequately demonstrated that relevant PPE and SPE values and assumptions are met. For each such issue, indicate that the generic analysis provided in the GEIS is applicable and state that the staff concludes that impacts would be SMALL. Cite the pages of the ANR GEIS (NRC 2021-TN7080) containing the relevant generic analyses, but it is not necessary to summarize or paraphrase the analyses. Briefly explain how the assumptions are met.

For Category 1 issues not meeting the PPE/SPE or for which new and significant information is identified, the reviewer should consult RG 4.2 (NRC 2022-TN7081), applicable ISGs, and the ESRP (NRC 2000, 2007-TN614) for guidance on impact assessment. For each issue, the reviewer should present the conclusion (SMALL, MODERATE, or LARGE) and provide a brief rationale, incorporating information from the ANR GEIS (NRC 2021-TN7080) by reference wherever possible.

3.16 DECOMMISSIONING

The existing guidance for the impacts of decommissioning in Section 3.0 above, the ESRP (NRC 2000, 2007-TN614), applicable ISGs, and RG 4.2 (NRC 2022-TN7081) may generally be followed for ANRs.

Reviewers should be familiar with NUREG-0586 Supplement 1 and NUREG-1496. The ANR GEIS identifies decommissioning as a Category 1 issue (NRC 2021-TN7080). Additionally, NUREG-0586 Supplement 1 was published in 2002; decommissioning impacts have been modified in new reactor EISs from what is presented in the version of the ESRP published in March 2000 (NRC 2000, 2007-TN614). The reviewer should examine the decommissioning section in the recent new reactor EISs for site-specific examples of this modification.

To present the reader with a baseline understanding, the site-specific decommissioning section in the SEIS should begin with a general description of the decommissioning process. The description should include a discussion of how the decommissioning of the ANR could vary (if at all) from the decommissioning process discussed in the ANR GEIS (NRC 2021-TN7080). Summary information regarding a general description of the decommissioning should be presented even for projects where all the PPE values and assumptions for the decommissioning are met in the ANR GEIS, because the information may be relevant to assessing impacts on other environmental resources (e.g., land use, ecology, and historical and cultural impacts).

The ANR GEIS identifies decommissioning as a Category 1 issue (NRC 2021-TN7080). The reviewer should address this issue as described in the General Instructions for this chapter. After reviewing the application materials and the information gained through scoping and the site audit, use the guidance in RG 4.2, Appendix C (NRC 2022-TN7081), to determine whether the applicant has adequately demonstrated that relevant PPE and SPE values and assumptions are met and that no new and

significant information was identified. If all of the relevant values and assumptions are met, indicate that the generic analysis provided in the GEIS is applicable and state that the staff concludes that impacts would be SMALL. Cite the pages of the ANR GEIS (NRC 2021-TN7080) containing the relevant generic analyses, but it is not necessary to summarize or paraphrase the analyses. Briefly explain how the assumptions are met.

If the issue does not meet the PPE/SPE or if new and significant information was identified, the reviewer should consult RG 4.2 (NRC 2022-TN7081), applicable ISGs, and the ESRP (NRC 2000, 2007-TN614) for guidance on impact assessment. For this issue, the reviewer should present the conclusion (SMALL, MODERATE, or LARGE) and provide a brief rationale, incorporating information from the ANR GEIS (NRC 2021-TN7080) by reference wherever possible.

3.17 ISSUES APPLYING ACROSS ALL RESOURCES

The ANR GEIS identified two issues as applying across all resource areas: climate change and cumulative impacts (NRC 2021-TN7080). Both issues were classified as Category 2. This section provides guidance for these two issues. The reviewer should scale the depth of review for these issues based on the expected level of impacts on any individual resource under consideration.

3.17.1 Climate Change

The reviewer should be familiar with existing guidance regarding climate change in the ESRP (NRC 2000, 2007-TN614), ISG-026 (NRC 2014-TN3767), and RG 4.2 (NRC 2022-TN7081). The reviewer should also be familiar with the methods the NRC staff has used to address climate change in recent new reactor EISs. The general approach for addressing climate change for an ANR would be the same as that for other new reactor reviews.

3.17.2 Cumulative Impacts

The reviewer should be familiar with existing guidance regarding cumulative impacts in the ESRP (NRC 2000, 2007-TN614), ISG-026 (NRC 2014-TN3767), ISG-027 (NRC 2014-TN3766), ISG-029 (NRC 2020-TN6710), and RG 4.2 (NRC 2022-TN7081), including RG 4.2 Appendix C. The reviewer should also be familiar with the methods the NRC staff has used to address cumulative impacts in recent new reactor EISs. The general approach for addressing cumulative impacts for an ANR would be the same as that for other new reactor reviews.

3.18 NON-RESOURCE RELATED ISSUES

The ANR GEIS identified multiple non-resource related issues (NRC 2021-TN7080). This section discusses the purpose and need and the need for power. Both issues were classified as Category 2. Alternatives are discussed in Section 4.0.

3.18.1 Purpose and Need

The reviewer should consider existing guidance regarding the purpose and need in the ESRP (NRC 2000, 2007-TN614), ISG-026 (NRC 2014-TN3767), ISG-027 (NRC 2014-TN3766), ISG-029 (NRC 2020-TN6710), and RG 4.2 (NRC 2022-TN7081), including RG 4.2 Appendix C. The reviewer should also be familiar with the methods the NRC staff has used to address the purpose and need in recent new reactor EISs. The general approach for addressing the purpose and need for an ANR providing electricity to the grid would be the same as that for other new reactor reviews. However, some ANRs may present a

purpose and need that includes industrial uses other than providing electricity, such as process steam for industrial uses or area heating. In such cases, the reviewer should consult ISG-027 and ISG-029.

3.18.2 Need for Power

The reviewer should consider existing guidance regarding the need for power in the ESRP (NRC 2000, 2007-TN614), ISG-026 (NRC 2014-TN3767), ISG-027 (NRC 2014-TN3766), ISG-029 (NRC 2020-TN6710), and RG 4.2 (NRC 2022-TN7081), including RG 4.2 Appendix C, and the need for power discussions in recent new reactor EISs. The general approach for addressing the need for power for an ANR would be the same as that for other new reactor reviews. However, the purpose of the ANR could be other than generating electricity (e.g., process heat). In such cases, the reviewer should provide a brief discussion of how the need for non-electricity related uses serves a useful purpose.

Chapter 4: Comparing Alternatives to the Proposed Action

The ANR GEIS identified three classes of alternatives: site alternatives, energy alternatives, and system design alternatives (NRC 2021-TN7080). All three of these issues were classified as Category 2. This section provides guidance for comparing these three classes of alternatives to the proposed action.

4.1 SITE ALTERNATIVES

The reviewer should be familiar with existing guidance regarding site alternatives in the ESRP (NRC 2000, 2007-TN614), ISG-026 (NRC 2014-TN3767), ISG-027 (NRC 2014-TN3766), ISG-029 (NRC 2020-TN6710), and RG 4.2 (NRC 2022-TN7081), including RG 4.2 Appendix C. The reviewer should also be familiar with the methods the NRC staff has used to address site alternatives in recent new reactor EISs. The general approach for addressing the site alternatives for an ANR would be the same as that for other new reactor reviews. As discussed in ISG-027, there may be cases in which the region of interest for siting is much smaller than has been typical for large LWRs. But the basic process will be the same, simply using that smaller region of interest.

The ANR GEIS can be used for both the proposed and alternative sites for the evaluation of resource impacts. However, the staff must compare the differences between the proposed and alternative sites, so that a determination can be made about whether an alternative site is environmentally preferable or obviously superior to the proposed site.

4.2 ENERGY ALTERNATIVES

The reviewer should be familiar with existing guidance regarding energy alternatives in the ESRP (NRC 2000, 2007-TN614), ISG-026 (NRC 2014-TN3767), ISG-027 (NRC 2014-TN3766), ISG-029 (NRC 2020-TN6710), RG 4.2 (NRC 2022-TN7081), including RG 4.2 Appendix C, and the staff white paper on energy alternatives (NRC 2021-TN7078). The reviewer should also be familiar with the methods the NRC staff has used to address energy alternatives in recent new reactor EISs. The general approach for addressing the energy alternatives for an ANR would be the same as that for other new reactor reviews. However, the small size of some ANRs may require the staff to further evaluate some energy alternatives that are typically eliminated for large LWRs. In other cases, the purpose and need for the project (i.e., demonstration of a specific technology) may obviate the need for a consideration of energy alternatives.

4.3 SYSTEM DESIGN ALTERNATIVES

The reviewer should be familiar with existing guidance regarding system design alternatives in the ESRP (NRC 2000, 2007-TN614), ISG-026 (NRC 2014-TN3767), ISG-027 (NRC 2014-TN3766), ISG-029 (NRC

2020-TN6710), and RG 4.2 (NRC 2022-TN7081), including RG 4.2 Appendix C. The reviewer should also be familiar with the methods the NRC staff has used to address system design alternatives in recent new reactor EISs. The general approach for addressing the system design alternatives for an ANR would be the same as that for other new reactor reviews. However, because the system design alternatives are all related to the cooling water system, such alternatives would not be applicable to a plant that does not use cooling water. In addition, if, because of the small size of an ANR, all of the impacts caused by the cooling system are SMALL, then the consideration of system design alternatives (which are, in effect, mitigation) would not be warranted.

Chapter 5: Conclusions and Recommendations

The reviewer should be familiar with existing guidance regarding the conclusions and recommendations chapter in the ESRP (NRC 2000, 2007-TN614), ISG-026 (NRC 2014-TN3767), ISG-027 (NRC 2014-TN3766), and RG 4.2 (NRC 2022-TN7081), including RG 4.2 Appendix C. The reviewer should also be familiar with the methods the NRC staff has used to address the conclusions and recommendations chapter in recent new reactor EISs. The general approach for addressing the conclusions and recommendations chapter for an ANR would be the same as that for other new reactor reviews.

V. IMPLEMENTATION

The NRC staff will use the information discussed in this ISG when performing environmental reviews of ANR licensing actions that rely at least in part on the ANR GEIS (NRC 2021-TN7080).

VI. BACKFITTING AND ISSUE FINALITY DISCUSSION

Discussion to be provided in the final ISG.

VII. CONGRESSIONAL REVIEW ACT

Discussion to be provided in the final ISG.

VIII. FINAL RESOLUTION

This guidance will be incorporated into the next revision of NUREG-1555, "Environmental Standard Review Plans" as part of a wider 10 CFR Part 51 rulemaking effort (NRC 2020-TN7104) that the staff anticipates being completed in 2026. Following the transition of this guidance to NUREG-1555, this ISG will be closed.

IX. REFERENCES

10 CFR Part 50. *Code of Federal Regulations*, Title 10, *Energy*, Part 50, "Domestic Licensing of Production and Utilization Facilities." TN249.

10 CFR Part 51. *Code of Federal Regulations*, Title 10, *Energy*, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions." TN250.

10 CFR Part 52. *Code of Federal Regulations*, Title 10, *Energy*, Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants." TN251.

10 CFR Part 61. *Code of Federal Regulations*, Title 10, *Energy*, Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste." TN252.

10 CFR Part 71. *Code of Federal Regulations*, Title 10, *Energy*, Part 71, "Packaging and Transportation of Radioactive Material." TN301.

10 CFR Part 100. *Code of Federal Regulations*, Title 10, *Energy*, Part 100, "Reactor Site Criteria." TN282.

36 CFR Part 60. *Code of Federal Regulations*, Title 36, *Parks, Forests, and Public Property*, Part 60, "National Register of Historic Places." TN1682.

36 CFR Part 800. *Code of Federal Regulations*, Title 36, *Parks, Forests, and Public Property*, Part 800, "Protection of Historic Properties." TN513.

40 CFR Part 68. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 68, "Chemical Accident Prevention Provisions." TN5494.

40 CFR Part 355. *Code of Federal Regulations*, Title 40, *Protection of Environment*, Part 302, "Emergency Planning and Notification." TN5493.

49 CFR Parts 171-177. *Code of Federal Regulations*, Title 49, *Transportation*, Subchapter C, "Hazardous Materials Regulations (49 CFR Parts 171-177)." TN5466.

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Appendix A

Incorporation by Reference Guidance for an Environmental Impact Statement

Purpose

The U.S. Nuclear Regulatory Commission (NRC) promotes measures to streamline internal processes to improve efficiency. Efficiency measures include those aimed at optimizing the environmental reviews performed by the NRC staff. One initiative to streamline the environmental review process and reduce unnecessary repetition of previous analyses is to incorporate by reference publicly available documents. This appendix provides methodologies for incorporating previous analyses by reference into environmental review documentation.

Background

Consistent with Title 10 of the *Code of Federal Regulations* (10 CFR) 51.95(a) (TN250), the NRC staff may incorporate by reference any information contained in a final environmental document previously prepared by the NRC staff that relates to the same facility. Additionally, 10 CFR Part 51, "Environmental protection regulations for domestic licensing and related regulatory functions," Subpart A, "National Environmental Policy Act (NEPA)—Regulations Implementing Section 102(2)," Appendix A, "Format for Presentation of Material in Environmental Impact Statements," states, in part, that the technique of incorporation by reference described in 40 CFR 1502.21 (TN2123), "Implementation," of the Council on Environmental Quality's regulations implementing NEPA (42 U.S.C. §§ 4321 *et seq.*; TN661) may be used as appropriate to aid in the presentation of issues, eliminate repetition, or reduce the size of an environmental impact statement (EIS). The regulation at 40 CFR 1502.21, "Incorporation by reference," states the following[4]:

> Agencies shall incorporate material into an environmental impact statement by reference when the effect will be to cut down on bulk without impeding agency and public review of the action. **The incorporated material shall be cited in the statement and its content briefly described.** No material may be incorporated by reference unless it is reasonably available for inspection by potentially interested persons within the time allowed for comment. Material based on proprietary data which is itself not available for review and comment shall not be incorporated by reference. [Emphasis added]

These regulations allow NRC technical reviewers to comply with the requirements of NEPA by referring to materials already published elsewhere.

[4] A recent change to the Council of Environmental Quality regulations, to become effective September 14, 2020 (85 FR 43304-TN6485), moves the "Incorporation by reference" section to 40 CFR 1501.12 (TN4876), and modifies the language to read the following: "Agencies shall incorporate material, such as planning studies, analyses, or other relevant information, into environmental documents by reference when the effect will be to cut down on bulk without impeding agency and public review of the action. Agencies shall cite the incorporated material in the document and briefly describe its content. Agencies may not incorporate material by reference unless it is reasonably available for inspection by potentially interested persons within the time allowed for comment. Agencies shall not incorporate by reference material based on proprietary data that is not available for review and comment." However, the NRC will follow 10 CFR Part 51 regulations (TN250) until rulemaking changes are made to 10 CFR Part 51.

General Staff Guidance

When incorporating by reference, technical reviewers should adhere to the following three principles to meet the criteria of 40 CFR 1502.21 (TN2123):

(1) Specificity: After ensuring that reference material is publicly available, identify the documents that are being incorporated by reference and specify the section or page range, or both, that is being incorporated.

(2) Summarize: Provide a summary of the information being incorporated by reference.

(3) Address new information: Identify and discuss any new information relevant to environmental concerns and bearing on the proposed action or its impacts that was not considered in the documents being incorporated by reference.

Environmental reviewers are encouraged to incorporate by reference any relevant information from other publicly available documents (from the NRC, applicant documents submitted for the record, or any other reputable source, such as other governmental entities or academic institutions). The staff must only incorporate by reference documents that are publicly available and properly cite them in the EIS reference list. Incorporating material from applicant documents (such as the environmental report and safety analysis report) may be appropriate. The staff should not, however, incorporate by reference conclusions from the applicant's environmental report.

The regulations at 10 CFR 51.41 (TN250), "Requirement to submit environmental information," state that "[t]he Commission will independently evaluate and be responsible for the reliability of any information which it uses." As such, the staff is responsible for evaluating and verifying the reliability of the information that is incorporated by reference.

Generic Example

When NRC technical reviewers decide to use incorporation by reference for applicable documents, the staff's review document should contain a clear statement to that effect. For example, at first usage in an EIS, the staff can accomplish incorporation by reference by using language similar to the following:

> Where appropriate, the NRC staff has summarized and incorporated by reference material from the EIS for [XXX].

At the first appearance of each document incorporated by reference, the text should fully spell out the title, and the EIS reference list should properly cite each document mentioned.

References

10 CFR Part 51. *Code of Federal Regulations*, Title 10, *Energy*, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions." TN250.

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