

Summary of Recommendations - NEI White Paper: Assessment of the NRC Environmental Requirements for Siting

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1 INTRODUCTION

In August 2023, NEI completed an assessment of the regulatory framework for the environmental requirements associated with siting new nuclear reactors. The associated report familiarized readers with the framework and also recommended changes that the Nuclear Regulatory Commission (NRC) can make to reduce the regulatory burden and streamline environmental reviews for advanced nuclear reactors (ANRs). This white paper provides a summary of the recommendations discussed in the report.

2 GENERAL RECOMMENDATIONS BY TOPIC

2.1 Purpose and Need

Prioritize business objectives when siting a new reactor as it relates to:

- Defining the service area or a specific end-user
- Identifying the “region of interest”
- Evaluating alternatives

2.2 Radiological Doses

Revise regulatory guidance to scale down the 50-mile radius distance to a lesser distance when evaluating impacts to the members of the public and the 100-mile radius when evaluating other nuclear energy projects based on the ingestion pathway for the emergency planning zone (EPZ) extending 50 miles around each plant, since ANRs are anticipated to have a “plume and ingestion pathway” exposure distance of less than 50-miles and a smaller EPZ.

2.3 Characterizing Water Quality and Ecological Baseline Conditions

Revise regulatory guidance associated with conducting “water quality and terrestrial ecological studies for baseline conditions” to clarify that:

- Existing current and historical water-quality monitoring reports may serve as a substitute for characterizing water quality conditions for surface waterbodies and groundwater aquifers, if representative of the current conditions in or near the site area.
- Existing botanical and wildlife inventory data may serve as a substitute for new field surveys in areas where habitat has not changed significantly.
- Reconnaissance-level evaluations using published and online data sources and perhaps a single site visit may be adequate for certain resource areas, depending on the characteristics of the proposed new ANR and site.

2.4 Area of Potential Effects

Due to the small footprint associated with an ANR (e.g., approximately 100 acres), the “designated site vicinity” typically defined as a 6-mile radius within the site should be scaled downward to specify that

resource assessments only must be performed for the onsite area occupied by the reactor and not open to interpretation as to the spatial extent of the analysis.

2.5 Alternative Sources for Meteorological Data Measurements

Revise regulatory guidance to specify that offsite sources can be utilized for “meteorological data” measurements at the site to satisfy baseline and operational conditions in lieu of an onsite meteorological tower since reliable data would be readily available and maintained by the National Weather Service and other nearby legitimate weather stations to satisfy the required monitoring specified by Regulatory Guide 1.23.

2.6 Evaluation of Category 2 Issues

Evaluation of “climate change” as discussed in Draft NUREG-2249 should be reclassified from a Category 2 issue requiring a site-specific evaluation to a Category 1 issue since this issue is already subsumed in the Category 2 issue of “Cumulative Effects.”

3 RECOMMENDATIONS BY REGULATION OR GUIDANCE DOCUMENT

3.1 NEPA

Evaluate the impact on the NRC site selection and alternative site analysis if the proposed CEQ regulations are adhered to.

3.2 10 CFR 100 (Reactor Site Criteria)

- Changes to 10 CFR Part 100 would entail rulemaking. The most significant changes include modifying wording to reflect the nature of ANRs including relatively small cores, passive safety features, or other design features, anticipated to result in smaller postulated accident releases and associated radiological doses.
- Consideration of the safety improvements of ANRs in the siting process would reduce the burden on both the applicant and the NRC by reducing the siting and EPZ requirements, while still maintaining protection of the population and the environment in the surrounding environs of the proposed plant.

3.3 Regulatory Guide 4.2 “Preparation of Environmental Reports for Nuclear Power Stations,” Revision 3

- The text in the Region of Interest section should be clarified to state it is based on the owner-operator’s business objectives (e.g., profitability, revenue, costs, cash flow, sustainable growth, competitive positioning, greenhouse gas emission goals) for the proposed plant.
- The text pertaining to resource areas should be clarified to specify that resource assessments must be performed only for the Area of Potential Effect (APE). As currently worded, it is open to interpretation as to the spatial extent of the analysis.

- Characterization of potentially impacted resources generally should not be required to be based on a pre-application monitoring program. This should only be required if adequate data does not already exist from other sources for the APE.
- Clarification on sections related to air resources and climate should be modified to state that offsite meteorological sources can be used rather than an on-site meteorological tower. Modeled diurnal, monthly, and annual meteorological variables should be acceptable based on off-site data sources.
- The requirement for addressing electromagnetic fields could be significantly reduced or eliminated. The NRC has previously determined that studies of the 60-Hz EMFs have not uncovered consistent evidence linking harmful effects with field exposure, and therefore no current generic conclusion on human health impacts could be reached.¹

3.4 Regulatory Guide 4.7, “General Site Suitability Criteria for Nuclear Power Stations,” Revision 3

Consider adding language acknowledging that the likelihood and the magnitude of postulated source terms of ANRs are anticipated to be lower than current operating plants, potentially allowing reduced exclusionary area boundaries (EABs) and low population zones (LPZs). This could permit ANRs to be located closer to a densely populated center containing more than about 25,000 residents.

3.5 Regulatory Guide 4.11, “Terrestrial Environmental Studies for Nuclear Power Stations,” Revision 2

- Clarify that the objectives for terrestrial analysis should apply only within the APE, typically confined to onsite areas for an ANR.
- Clarify that existing botanical and wildlife inventory data serves as a substitute for new field surveys in areas where habitat has not changed significantly.

3.6 Regulatory Guide 4.24 (DG-4023 Proposed Revision 0), “Aquatic Studies for Nuclear Power Stations”

- Given that ANR designs may not have the same water needs as LLWRs, clarify that aquatic environmental studies and analyses need only be conducted within the APE if there is a need for an intake and discharge structures.
- Clarify that use of previous studies and associated data can be used as a substitute for performance of new field studies, provided it is still representative of the species and habitats. For example, studies associated with the conformance of existing intake structures to the EPA 316(b) national technology-based performance and proportional-flow requirements may substitute for new field studies.

¹ NUREG-1437, Revision 1. Generic Environmental Impact Statement for License Renewal of Nuclear Plants. June 2014.

- Provide acknowledgement that habitat modification analysis, and habitat monitoring, are under the jurisdiction of the Environmental Protection Agency’s and state authorized permitting processes.

3.7 COL/ESP-ISG-026, “Environmental Issues Associated with New Reactors”

- Socioeconomic and environmental justice analysis of the proposed site and all reasonable alternative sites should encompass a radius of less than the 50-mi (80-km) radius specified for large light-water reactors (LLWRs), due to the enhanced safety features of ANRs, including smaller source term and reactor size footprint.
- Due to the advanced safety features and likely smaller footprint of ANRs, cumulative impact analysis for all resource areas associated with alternative sites creates an unnecessary burden and cost for the applicant. The requirement should be modified to address cumulative impact analysis of all resource areas for the preferred site that can accommodate the owner-operator’s business objectives. Evaluation criteria established in the alternative site study should be considered adequate for the evaluation of alternative sites.
- Consideration needs to be given to the fact that an “obviously superior” site may not meet the purpose and need of the applicant or the owner’s business objectives (e.g., profitability, revenue, costs, cash flow, sustainable growth, competitive positioning, greenhouse gas emission goals.)
- Revise Attachment 4 to COL/ESP-ISG-026, to account for small modular reactors (SMRs) and some ANRs when evaluating the 100-mile radius as it relates to other nuclear energy projects based on the ingestion pathway for the EPZ extending 50 miles around each plant, since SMRs and some ANRs are anticipated to have a plume and ingestion pathway exposure distance of less than 50-miles and a smaller EPZ.

3.8 COL/ESP-ISG-027, “Specific Environmental Guidance for Light Water Small Modular Reactor Reviews”

- Add clarifying text to the Region of Interest to state it is based on the owner-operator’s business objectives (e.g., profitability, revenue, costs, cash flow, sustainable growth, competitive positioning, greenhouse gas emission goals) for the new plant, as many ANRs may have unique service locations or purposes such as to supply process heat or remote power.
- Expand the applicability of this guidance to include all ANR designs.
- Remove the commentary related to increasing the number of alternative sites during the site selection process due to the smaller size. The fact that impacts will be less with ANRs, and that only one or two specific sites may work to meet the purpose and need of the project, makes this requirement unnecessarily burdensome.

3.9 COL-ISG-029, “Environmental Considerations Associated with Micro-Reactors”

Add language that clearly states the requirements for micro-reactors.

3.10 NUREG-1555 (Section 9.3), “Environmental Standard Review Plan, Site Selection Process”

- Add clarifying text to the Region of Interest to state it is based on the owner-operator’s business objectives (e.g., profitability, revenue, costs, cash flow, sustainable growth, competitive positioning, greenhouse gas emission goals) for the new plant.
- Clarify that the identification of suitable sites should be tied to the purpose of the project and needs of the applicant.
- Remove the requirement that if an alternative site is obviously superior to the applicant’s proposed site, considering the purpose and need of the applicant, that the application be denied.
- Clarify that proximity to major centers of population density should be based on the size of the plant’s established EPZ.
- Add language to the examples of proposed and alternative sites to not only include existing nuclear plants but also other retired energy facilities with existing infrastructure, and sites involving a specific-end user or other additional needs other than the production of electricity.

3.11 NUREG-2249, “Generic Environmental Impact Statement for Advanced Nuclear Reactors,” Draft (Draft ANR-GEIS)

Recategorize climate change from a Category 2 to a Category 1 issue; this issue is already subsumed in the Category 2 issue of “Cumulative Effects.”

3.12 DG-4032, “Preparation of Environmental Reports for Nuclear Power Stations,” Draft (Draft Revision 4 to RG 4.2)

- Allow the use of existing current and historical water-quality monitoring reports to characterize baseline conditions for surface waterbodies and groundwater aquifers, provided the reports are representative of the current water quality conditions in or near the site area.
- Strengthen wording that onsite meteorological data is not required when adequate offsite data is available for all required data summaries and analyses.
- The 50-mi (80-km) distance for impacts to members of the public could potentially be scaled down to a lesser distance based on reactor type and source term, as ANRs should have smaller established EAB, LPZ, and plume and ingestion exposure pathway.
- The need for power section should be eliminated, as the applicant should only need to demonstrate that the proposed project meets the purpose and needs of the owner/operator.

3.13 COL-ISG-030

- Insert additional language in the purpose to state that ANRs will likely have smaller EABs and LPZs and distances to the population centers in light of their enhanced safety.

- Clarify language regarding the comparison between the proposed and alternative sites with respect to the “environmentally preferable” or “obviously superior” in comparison to the proposed site.

4 ADDITIONAL RECOMMENDATIONS FOR IMPROVED EFFICIENCIES

- The industry should submit a petition for rulemaking to modify 10 CFR 51.20 to eliminate the list of NRC licensing actions that require an environmental impact statement (EIS) and allow for the flexibility to use environmental assessments (EAs) and categorical exclusions for those licensing actions.
- The regulations and guidance should be strengthened to require the NRC staff to review and incorporate existing environmental analyses into a project’s EA or EIS. NRC released SECY-22-005247 in June 2022; the proposed rule would amend 10 CFR Part 51.50 “Environmental report – construction permit, early site permit, or combined license stage,” to clarify that an applicant for a construction permit can incorporate by reference (IBR) a site environmental document prepared by the NRC for a different approval. The NRC should go a step further to allow incorporation by reference of environmental documents prepared by other federal agencies (e.g., Environmental Protection Agency, U.S. Fish and Wildlife Services) and federally authorized state agency programs (e.g., Clean Water Act, Clean Air Act).
- The NRC should use the applicant’s environmental report (ER) as the draft EIS or draft EA.
- The NRC should reduce burdensome alternative site analyses by limiting the scope of these analyses to those that meet the purpose of the project and needs of the applicant. The latest proposed regulations and rulemaking appear to create additional requirements for potential applicants. More detailed actions are included in Attachment C to this report.