



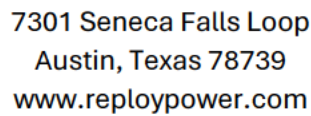
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Enclosure 1

Environmental Impact Report Approach for SPS Units

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1. Introduction

This white paper outlines REPLOY Power’s anticipated approach to assessing the environmental impacts of Submerged Power System (SPS) units under normal operations and postulated accident scenarios. The SPS unit is the entire system including the reactor and power plant as well as the submerged unit. The paper also presents the framework for a generic Environmental Report (ER) covering SPS maritime deployments and a methodology to classify environmental factors across regions and site-specific locations.

1.1. Contact Information

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2. Abbreviations & Nomenclature

- Advanced Nuclear Reactor (ANR)
- Bureau of Ocean Energy Management (BOEM)
- Categorical Exclusions (CatEx)
- Code of Federal Regulations (CFR)
- Combined Operating License (COL)
- Combined Operating License Application (COLA)
- Construction Permit (CP)
- Design Certification (DC)
- Draft Guide (DG)
- Early Site Permit (ESP)
- Environmental Assessment (EA)
- Environmental Impact Statements (EIS)
- Environmental Reports (ER)
- Environmental Resource Area (ERA)
- Generic Environmental Impact Statement (GEIS)
- Interim Staff Guidance (ISG)
- Light Water Reactor (LWR)
- Manufacturing License (ML)
- Nth-of-a-kind (NOAK)
- Nuclear Regulatory Commission (NRC)

- Nuclear Reactor (NR)
- Plant Parameter Envelope (PPE)
- Regulatory Guide (RG)
- REPLOY Power (REPLOY)
- REPLOY Hub (Hub)
- Site Environmental Impact Statement (SEIS)
- Site Parameter Envelope (SPE)
- Small Modular Reactor (SMR)
- Submerged Power System (SPS)

3. Maritime Deployment Model and Determination of Environmental Impact

3.1. Maritime Deployment

[Withheld per 10 CFR 2.390

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[Withheld per 10 CFR 2.390]

3.2. REPLOY Power Maritime Environmental Approach

REPLOY Power plans to maximize environmental baseline studies the company is required to complete while reducing the repetitive work that occurs when environmental reports (ER) address each site specifically. [Withheld per 10 CFR 2.390

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[Withheld per 10 CFR 2.390

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4. Generic Environmental Impact Regulatory Guidance

10 CFR 51 contains environmental protection regulations applicable to NRC's domestic licensing and related regulatory functions. As such, 10 CFR 51 contains direction for the requirements necessary to illustrate environmental protection. Part 51 contains three sets of criteria:

1. Criteria for and identification of licensing and regulatory actions requiring EISs.
2. Criteria for and identification of licensing and regulatory actions requiring environmental assessments (EAs).
3. Criterion for categorical exclusion (CatEx); identification of licensing and regulatory actions eligible for categorical exclusion or otherwise not requiring environmental review.

10 CFR 51.45, Environmental report, states:

... each applicant or petitioner for rulemaking shall submit with its application or petition for rulemaking one signed original of a separate document entitled "Applicant's" or "Petitioner's Environmental Report," as appropriate.

(c) Analysis. The environmental report must include an analysis that considers and balances the environmental effects of the proposed action...

10 CFR 51 allows EISs, EAs, and CatEx. The amount of information required for the applicant's ER depends on whether an EIS, EA, or CatEx is necessary to address environmental concerns. On the site level, REPLOY Power proposes to develop an ER based on a GEIS for maritime REPLOY SPS deployment and region-specific environmental considerations, thus reducing the deployment duration and resources required for a specific site ER.

SECY-25-0052, Enclosure 3, #2 – Grading the Level of Site Characterization states the following:

Several microreactor developers have communicated that they plan to design microreactors using a set of postulated site parameters that would be bounding for a large majority of potential sites throughout the U.S., so that the reactors can be deployed without the need to customize the designs for each proposed site.

An application for a COL or CP may reference a standard design certification or the use of a manufactured nuclear power reactor. Under the existing power reactor regulations, the applicant would need to determine the actual characteristics of the proposed site. An applicant would need to verify that the site parameter values specified in the DC under 10 CFR 52.47(a)(1) or an ML under 10 CFR 52.157(f)(19) bound the corresponding site characteristic values.

The NRC staff anticipates that a graded approach can be used for both first-of-a-kind and NOAK CP or COL applications. The graded approach will align the level of the site characterization that needs to be performed at the deployment sites with the safety margins and radiological consequences demonstrated for the approved standard microreactor design.

The existing siting requirements in 10 CFR Part 100, Reactor Site Criteria, call for extensive site characterizations and investigations of the actual physical, environmental, and demographic features of a proposed site. Much of the associated regulatory guidance was developed with large light-water reactors (LWRs) in mind. This extensive site characterization is appropriate for large LWRs because they have high thermal power levels, large site footprints, large radionuclide inventories, and complex designs that generally rely on active safety systems, which results in designs that can account for only so much uncertainty in associated site data. By contrast,

microreactors are anticipated to have relatively simple designs, enhanced safety characteristics, and small site footprints. Based on the anticipated enhanced safety margins in these designs, the NRC staff has determined that the extent of data developed for a microreactor could be reduced and the uncertainty in the site data need not be reduced to the level needed for siting a large LWR. Accordingly, a COL or CP applicant referencing a microreactor could use a graded approach to develop the data for site characterization for microreactors of a standard design.

REPLOY Power plans to develop a GEIS approach that first looks at generic maritime environmental conditions and requirements, then potentially the environmental requirements for the seven currently identified maritime geographic regions, as defined on page 6. The generic maritime GEIS will identify the bounding parameters for all marine environments considering a generic Plant Parameter Envelope (PPE) and Site Parameter Envelope (SPE). The seven currently identified maritime geographic regions will then be considered as appendices to reduce the quantity of Category 2 issues and not covered by the GEIS for maritime operations.

The intent is to design the standard power system to meet the generic maritime requirements and bound as many geographic regions as possible. The specific site requirements (Category 2) would be minimized due to GEIS completed studies. It is anticipated that the GEIS reducing the number of environmental studies that need to be addressed in the site-specific Early Site Permit (ESP) and/or the COLA and reducing the amount of information to be addressed in the specific site ER. REPLOY Power believes that this is an acceptable approach.

SECY 25-0052, Enclosure 2, Environmental Reviews for Nth-of-a-Kind Microreactors defines a path forward for streamlining environmental reviews for manufactured reactor systems that are the same design and construct. REPLOY Power plans on pursuing Alternative E2: Design-specific Generic Environmental Impact Statement.

NUREG-2249, Generic Environmental Impact Statement for Licensing of New Nuclear Reactors: Draft Report for Comment, refers to the evolving GEIS process.

The purpose and need for this GEIS is to present impact analyses for the environmental issues common to many new nuclear reactors 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.

This GEIS is intended to improve the efficiency of licensing new nuclear reactors by (1) identifying the possible types of environmental impacts of constructing and operating a nuclear reactor, (2) assessing impacts that are expected to be generic (the same or similar) for many nuclear reactors, and (3) defining the environmental issues that will need to be addressed in project-specific supplemental environmental impact statements (SEISs) addressing specific projects.

Values and assumptions regarding the design of the plant are termed the plant parameter envelope (PPE) and values and assumptions regarding site conditions are termed the site parameter envelope (SPE).

This GEIS will allow licensing applications for new nuclear reactors to reference the generic analysis for each Category 1 environmental issue for which it can demonstrate that the project is bounded by the applicable assumptions in the PPE and SPE and for which there is no new and significant information affecting the evaluation.

The SEIS would also evaluate the environmental impacts of any issues for which an application cannot demonstrate that the relevant assumptions in the PPE and SPE are met, as well as issues that the staff could not address generically in this GEIS.

REPLOY Power proposes the following actions.

[Withheld per 10 CFR 2.390

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5. Approach to the Determination of Environmental Impact

5.1. Changing Regulatory Environment

The regulatory environment has been changing over the past few decades. NUREG-1555 is the review standard used by the NRC staff for the review of ERs. COL-ISG-027 provides interim staff guidance for the ERs of light water small modular reactors (SMRs). This guide, along with a companion ISG for advanced reactors, was incorporated into RG 4.2 for the preparation of an ER. Thus, RG 4.2 provides a more current reflection of ERs versus NUREG-1555. Even more current is draft guide DG-4032, which is proposed revision 4 to RG 4.2. DG-4032 supports the development of an ER in support of a GEIS. COL-ISG-30 addresses the development of a GEIS and supplements NUREG-2249. Also noted is RG 4.24 which addresses aquatic environments.

The regulatory basis for the methodology of this white paper is [Withheld per 10
] These regulatory documents address one of two documents, CFR 2.390
 the GEIS or the ERs, to address the environmental concerns for a [Withheld per 10
] CFR 2.390

5.2. Consideration of a Maritime GEIS

REPLOY Power believes that there is enough similarity in maritime deployment to provide sufficient basis for a generic environmental approach to that deployment. NUREG-2249 lists sixteen Environmental Resource Areas which could serve as a basis for a GEIS and the associated generic SPE. REPLOY Power understands that some environmental issues must be addressed at the site level (i.e., **dependent on depth and type of installation and/or species prevalent in the water column near the SPS**) or at a regional level, as previously noted. COL-ISG-30 further updated the sixteen environmental resource areas and should serve as a basis for the maritime GEIS based on the new reactor EIS.

TABLE 1. THE NRC'S ENVIRONMENTAL RESOURCE AREAS

1	Land Use
2	Visual Resources
3	Meteorology
4	Water Resources
5	Terrestrial Ecology
6	Aquatic Ecology
7	Historic and Cultural Resources
8	Environmental Hazards
9	Noise
10	Waste Management
11	Postulated Accidents
12	Socioeconomics
13	Environmental Justice
14	Fuel Cycle
15	Transportation of Fuels and Waste
16	Decommissioning

5.3. Environmental Reports

RG 4.2 addresses the preparation of the applicant's ER. This regulatory guide has incorporated COL-ISG-026 for new reactors and COL-ISG-027 for light water (SMRs). Furthermore, DG-4032 (draft RG 4.2, rev. 4) supports the use of a GEIS and works in conjunction with COL-ISG-30. Appendix C of DG-4032 does not preclude the guidance from being applied to SMRs.

Per DG-4032:

The ANR GEIS evaluated the impacts of building, operating, and decommissioning an ANR sited within the United States and its territories that is bounded by the parameters and assumptions in Appendix G and the analyses in the GEIS.

[Withheld per 10 CFR 2.390

]Per COL-ISG-30:

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.

COL-ISG-30 further emphasizes this point.

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.

NUREG-2249 refers to Affected Environment and Environmental Consequences in Chapter 3. COL-ISG-30 refers to the same subject matter as Environmental Resources and lists sixteen corresponding subsections.

COL-ISG-30 further states:

In the SEIS, the reviewer (NRC) 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. 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 NR GEIS for that issue, incorporating the analysis in the GEIS by reference.

In developing the ER for the SPS, REPLOY Power will demonstrate that most Category 1 issues under the maritime GEIS are met using the maritime PPE. If any Category 1 issue cannot be met generically, they will be addressed in the site-specific ER along with the Category 2 issues. This approach includes the discovery of new and significant information. The ISG states that PPE/SPE values and assumptions for Category 1 issues are met using a level of detail appropriate for the issue. COL-ISG-30 also instructs the NRC reviewer to identify environmental issues applicable to the project.

Draft guide DG-4032 [Reg. Guide 4.2, Rev. 4 (DRAFT)] provides guidance to applicants for the format and content of ERs.

5.4. Environmental Resource Areas for Maritime Application

COL-ISG-30 establishes sixteen Environmental Resource Areas. These sixteen Environmental Resource Areas will serve as the basis for the maritime GEIS. [

environmental issues from the contents of the sixteen areas. []The NRC derived 100

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5.5. Generic SPE and PPE

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6. Summary and Conclusion

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7. Proposed Actions

[Withheld per 10 CFR 2.390

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8. References

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6. COL-ISG-030, Advanced Reactor Applications, Environmental Considerations for Advanced Nuclear Reactor Applications that Reference the Generic Environmental Impact Statement (NUREG-2249), Interim Staff Guidance, United States Nuclear Regulatory Commission, DRAFT
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