

Improving Environmental Reviews through a Categorical Exclusion for Microreactors



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I. Introduction

Environmental review reform at the Nuclear Regulatory Commission (NRC) is needed to accelerate the deployment of new nuclear reactors to meet U.S. energy needs. The NRC has already demonstrated initiative in improving the efficiency of environmental reviews and now has an opportunity to build upon this momentum to drive even greater progress. One well-suited approach is the establishment of a categorical exclusion for microreactors from the National Environmental Policy Act (NEPA) requirement to conduct an Environmental Impact Statement (EIS). This categorical exclusion would reduce the time and resources needed for environmental review while sufficiently assessing the environmental effects of microreactor deployment. The NRC should establish this categorical exclusion to enable deployment of nuclear energy at the scale needed to enhance energy security and meet clean energy goals.

Part I of this proposal provides background on NEPA and summarizes current NRC environmental review practices. Part II assesses the need for a categorical exclusion for microreactors. Part III identifies necessary procedures to establish the categorical exclusion.

II. Background on NEPA & Environmental Review at the NRC

The NRC is required to conduct environmental reviews pursuant to the National Environmental Policy Act¹ (NEPA), which requires all federal agencies to assess the environmental impacts of “major Federal actions significantly affecting the quality of the human environment.”² Agency compliance with NEPA can take three different forms:

1. Environmental Impact Statement (EIS)
2. Environmental Assessment (EA)
3. Categorical Exclusion (CATEX)

Environmental Impact Statements (EIS) are the most detailed and resource-intensive form of review. NEPA requires this level of review for federal actions that have “a reasonably foreseeable significant effect on the quality of the human environment.”³ Completing an EIS is a demanding, time-intensive process: on average across various federal agencies, EISs take four and a half years to complete, and 25 percent can take more than six years.⁴

Under current regulations in 10 C.F.R. § 51.20, the NRC requires an EIS for each new license to construct or operate a nuclear reactor.⁵ Applicants for an NRC Construction Permit (CP) or Combined License (COL) are required to prepare and submit an environmental report as part of their CP or COL application package,⁶ which is then used by NRC staff as the basis for the development of the EIS for the licensing decision. The ongoing licensing of the TerraPower

¹ National Environmental Policy Act of 1969, Pub. L. No. 91-190, 83 Stat. 852 (1970) [hereinafter “NEPA”].

² *Id.* § 102(2)(c) (codified as 42 U.S.C. 4331). A “major Federal action” is defined as “an action that the agency carrying out such action determines is subject to substantial federal control and responsibility.” *Id.* § 111(10)(A).

³ NEPA § 106(a)(1) (codified as 42 U.S.C. 4336).

⁴ Council on Environmental Quality, [Environmental Impact Statement Timelines, 2010-2018 \(2020\)](#).

⁵ See 10 C.F.R. § 51.20(a)(1)-(2), (b)(1)-(2).

⁶ NRC [Regulatory Guide 4.2, Revision 3, Preparation of Environmental Report for Nuclear Power Stations](#).

Natrium project is an example of the NRC EIS review process. TerraPower submitted a 1501-page environmental report to the NRC as part of its CP application in April 2024.⁷ The NRC is expected to complete the EIS in June 2026 following approximately two years of staff development, legal reviews, and public comment.⁸

To make the EIS drafting process more efficient, the NRC is in the rulemaking process to establish a Generic Environmental Impact Statement (GEIS) for new reactors.⁹ To be eligible to use the GEIS, an applicant's reactor must fall within the GEIS's "parameter envelope." This parameter envelope includes limits for eligibility, such as a maximum plant footprint, a maximum rate of water usage, and a minimum distance from residential areas. Even if a reactor meets these requirements and qualifies for the GEIS, a project-specific Supplemental Environmental Impact Statement (SEIS) will be required. Since rulemaking for the GEIS is ongoing and has yet to be used by any applicant, the time and resources required to draft a project-specific SEIS remain uncertain. However, during rulemaking, the NRC estimated the cost savings for both the NRC and applicants to be approximately "\$2 million per application if the NR GEIS is fully utilized."¹⁰

Environmental Assessments (EAs) are a less resource-intensive form of review used by a federal agency to determine if an EIS is necessary. NEPA requires agencies to prepare an EA for an action which "does not have a reasonably foreseeable significant effect on the quality of the human environment, or if the significance of such effect is unknown."¹¹ If an EA concludes that an action will not have a significant environmental impact, the agency will issue an "Finding of No Significant Impact" (FONSI), documenting the review and fulfilling the statutory obligation under NEPA. If, however, an EA concludes that an action *will* have a significant environmental impact that cannot be mitigated, the agency must prepare an EIS to assess the impact's significance.¹² If the agency fails to prepare an EIS, it risks litigation, during which a court may compel it to do so.¹³

Recently, the NRC demonstrated the use of an EA instead of an EIS for environmental review of advanced reactors. The NRC exempted two research and test reactor license applicants from the EIS requirement in 10 C.F.R. § 51.20, instead requiring only the preparation of an EA.¹⁴ Both EAs concluded with a FONSI and avoided the need for further environmental reviews in the form of an EIS. This pilot proved the effectiveness of EAs: the NRC was able to

⁷ [Kemmerer Power Station Unit 1 Environmental Report](#)

⁸ [TerraPower Kemmerer 1 Scheduling and Resource Letter](#); [TerraPower Kemmerer 1 Application Dashboard](#).

⁹ [New Nuclear Reactor Generic Environmental Impact Statement](#)

¹⁰ Generic Environmental Impact Statement for Licensing of New Nuclear Reactors, 89 Fed. Reg. 80797, 80798 (Oct. 4, 2024) (to be codified at 51 C.F.R. pt. 51).

¹¹ NEPA § 106(b)(2) (codified as 42 U.S.C. 4336). NEPA itself does not define a "significant effect," though Council on Environmental Quality regulations have previously defined an impact's "significan[ce]" in terms of its "context" and "intensity." 40 C.F.R. § 1508.27. See *also* *Oak Ridge Env't Peace All. v. Perry*, 412 F. Supp. 3d 786 (E.D. Tenn. 2019).

¹² *Id.*

¹³ See *W. Org. of Res. Councils v. Zinke*, 892 F.3d 1234, 1241 (D.C. Cir. 2018).

¹⁴ [EA and FONSI for the Construction Permits and Environmental Review Exemptions for the Kairos Hermes 2 Test Reactors](#).

complete sufficient environmental review in one year instead of two, while reducing the resource burden on both the NRC and the applicants.¹⁵

Categorical Exclusions (CATEXs) are the least resource-intensive form of environmental review. NEPA allows an agency to establish a categorical exclusion for a category of actions that does not have a significant impact on the human environment. If a proposed action falls within an already established categorical exclusion, an agency does not need to prepare a standalone EA or EIS for that action. Instead, an agency may document its application of a categorical exclusion to a particular project with a shorter written record. As part of this project-specific documentation, an agency may also decide to increase the level of review to an EA or EIS if “extraordinary circumstances” have increased the potential for a significant impact. More information on the legal framework for establishing a categorical exclusion is included in Part III below.

III. Assessing the Need for a Categorical Exclusion for Microreactors

Establishing a categorical exclusion for microreactors would significantly enhance the efficiency of environmental reviews at the NRC. The NRC has already made progress by incorporating EAs and is developing a GEIS for eligible new reactors. Adding a categorical exclusion for microreactors would further enhance the NRC’s environmental review process, allowing for less resource-intensive assessments when appropriate. This approach would help ensure that the resources allocated to a reactor’s environmental review align with its potential impact.

Environmental reviews of proposed microreactor projects have consistently found minimal impacts from their construction and operation. Of the six completed reviews — two EISs and four EAs — all concluded that the assessed microreactor projects posed no significant environmental impact (Table 1).

Table 1: Completed Microreactor Environmental Reviews

Project Name	Year	Agency or Department	EA or EIS	Significant Impact?¹⁶
MARVEL	2021	Department of Energy	EA ¹⁷	No
Project Pele	2022	Department of Defense	EIS ¹⁸	No
MCRE	2023	Department of Energy	EA ¹⁹	No
Kairos Hermes 1	2023	NRC	EIS ²⁰	No
Kairos Hermes 2	2024	NRC	EA ²¹	No
ACU MSRR	2024	NRC	EA ²²	No

¹⁶ For EAs, this column indicates whether the EA resulted in a Finding of No Significant Impact. For an EIS, this column indicates if any environmental impact was determined to be greater than “small.”

¹⁷ [Final Environmental Assessment for the MARVEL Project at Idaho National Laboratory](#)

¹⁸ See Record of Decision for the Construction and Demonstration of a Prototype Mobile Microreactor Environmental Impact Statement, 87 Fed. Reg. 22521, 22522-23 (“As described in the Final EIS, implementing the Proposed Action at the INL Site is expected to have small environmental consequences that would not

Although use of an EA is preferable to an EIS for an activity with minimal environmental impact, a categorical exclusion is likely the most appropriate option for microreactors. Even with EAs, the environmental review process can be a limiting factor in a microreactor application's review timeline. For example, the EA for the Kairos Hermes 2 reactor took 12 months to complete, finishing one month after staff had completed the safety review.²³ While the NRC's use of an EA successfully met the schedule, it also highlighted how future environmental reviews could become a bottleneck for scaling microreactor deployment. Given that microreactors have little or no environmental impact, a categorical exclusion would prevent environmental review bottlenecks while still fulfilling NEPA's statutory requirements and intent.

A categorical exclusion would still allow the NRC to conduct an EA or EIS if project-specific conditions warrant further review. For example, deploying microreactors in environmentally sensitive areas may require the use of an EA or EIS to document potential environmental impacts. As part of establishing a categorical exclusion for microreactors, the NRC may also identify "extraordinary circumstances" that necessitate more in-depth environmental review (discussed in section IV). Figure 1 compares the recommended categorical exclusion for microreactors to NRC's current environmental review pathways.

substantially contribute to cumulative impacts."); [Project Pele Mobile Nuclear Reactor Final Environmental Impact Statement Volume 1](#).

¹⁸ See Record of Decision for the Construction and Demonstration of a Prototype Mobile Microreactor Environmental Impact Statement, 87 Fed. Reg. 22521, 22522-23 ("As described in the Final EIS, implementing the Proposed Action at the INL Site is expected to have small environmental consequences that would not substantially contribute to cumulative impacts."); [Project Pele Mobile Nuclear Reactor Final Environmental Impact Statement Volume 1](#).

¹⁹ [Final Environmental Assessment for the MCRE Project](#)

²⁰ [Environmental Impact Statement for the Construction Permit for the Kairos Hermes Test Reactor](#)

²¹ [Environmental Assessment and Finding of No Significant Impact for the Construction Permits and Environmental Review Exemptions for the Kairos Hermes 2 Test Reactors](#)

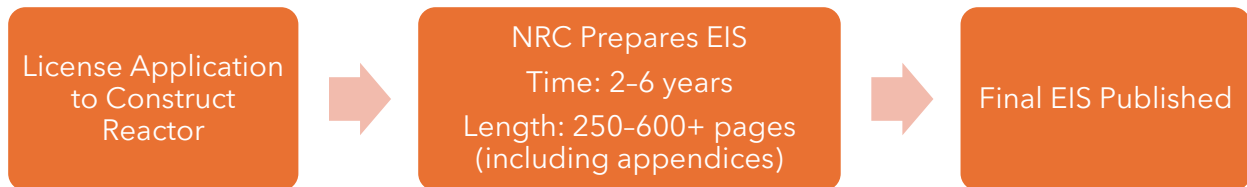
²² [Environmental Assessment for the Construction Permit Application for the Abilene Christian University Molten Salt Research Reactor](#)

²³ [Kairos Hermes 2 Construction Permit Application – Key Milestones](#) (noting date of issuance for the Final Environmental Assessment on Aug. 30, 2024, approximately one month after issuance of the Final Safety Evaluation on Jul. 19, 2024).

Figure 1: Options for NEPA Compliance at the NRC

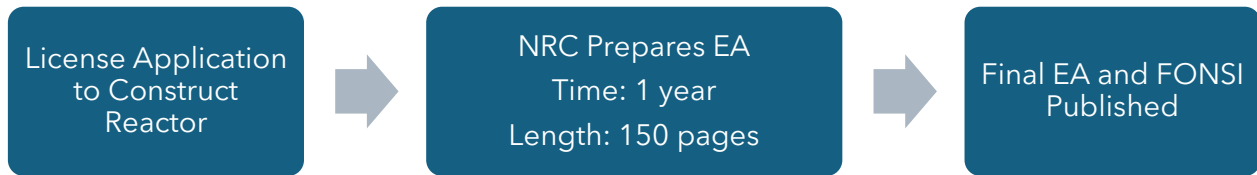
Environmental Impact Statements: Traditional Environmental Review

- Required by NEPA for major federal actions with significant environmental impacts
- Currently required by the NRC for all new reactors
- Recently used for Vogtle 3 & 4, Kairos Hermes 1, and TerraPower Kemmerer Power Station



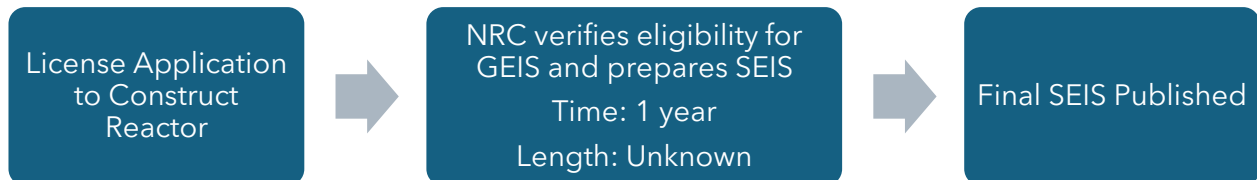
Environmental Assessments: Recently Tested Environmental Review

- Allowed under NEPA for actions with insignificant or unknown environmental impacts
- Requires regulatory exemption under 10 C.F.R. § 51.20
- Used for Kairos Hermes 2 reactor and ACU MSRR



Generic Environmental Impact Statement: Ongoing Rulemaking

- Final rulemaking expected June 2026



Categorical Exclusion: Recommended Path for Microreactors

- Allowed under NEPA for categories of actions with insignificant environmental impacts
- Would allow use of EA or EIS in the presence of potentially significant impacts



IV. Framework to Establish a Categorical Exclusion for Microreactors

Establishing a categorical exclusion for microreactors will require formally defining the microreactor category and ensuring compliance with NEPA and NRC regulations. This process includes publishing a written record of environmental analysis and completing the formal rulemaking process. Additionally, the NRC may consider Council on Environmental Quality (CEQ) regulations and guidance to clarify how to establish and implement the categorical exclusion. The status of CEQ NEPA regulations is in flux.²⁴ While such regulations do not appear to be formally binding on the NRC, depending on their status, compliance could strengthen the legal basis of the categorical exclusion should it be challenged.

A. Definition of the Microreactor Category

The NRC must first define the category of microreactors eligible to use the categorical exclusion. To create this definition, the NRC could supplement the informal industry definition of a microreactor with specific parameters linked to minimal environmental impact. Previous environmental reviews of microreactor projects (Table 1) would aid in identifying microreactor characteristics linked to potential for environmental impact. A definition could include both qualitative and quantitative parameters that define limits to these characteristics, ensuring that licensing microreactors as a category would not result in significant environmental effects.

Other federal agencies' categorical exclusions provide examples of successful definitions under the same NEPA statutory obligations.²⁵ For example, the Department of Energy established a categorical exclusion for the installation of solar photovoltaic systems on previously disturbed land, defining the excluded category of actions as the following:

B5.16 SOLAR PHOTOVOLTAIC SYSTEMS.

(a) The installation, modification, operation, or decommissioning of commercially available solar photovoltaic systems:

(1) Located on a building or other structure (such as rooftop, parking lot or facility, or mounted to signage, lighting, gates, or fences); or

(2) Located within a previously disturbed or developed area.

(b) Covered actions would be in accordance with applicable requirements (such as land use and zoning requirements) in the proposed project area and the integral elements listed at the start of appendix B of this part, and would be consistent with applicable plans for the management of wildlife and habitat, including plans to maintain habitat connectivity, and incorporate appropriate control technologies and best management practices.²⁶

²⁴ Council on Environmental Quality. (n.d.). Laws & regulations: Regulations. U.S. Department of Energy. <https://ceq.doe.gov/laws-regulations/regulations.html>

²⁵ For a list of categorical exclusions across all federal agencies, see generally "[List of Federal Agency Categorical Exclusions](#)" (2024).

²⁶ 10 C.F.R. Pt. 1021, Appendix B, 5.16.

The Department of Energy supplements this defined category with conditions (called “integral elements”) that apply to each of the agency’s categorical exclusions listed in 10 C.F.R. Part 1021, Appendix B. Specifically, excluded actions must have no “potential to cause significant environmental impacts on environmentally sensitive resources,”²⁷ such as “a threatened violation of applicable environmental, safety, and health requirements.”²⁸ These supplemental criteria are preconditions for the Department of Energy’s application of a categorical exclusion to a particular project.²⁹

B. Necessary Procedures

The NRC would then need to complete rulemaking that meets the requirements of NEPA and NRC’s own regulations. NEPA itself does not define procedures to establish a categorical exclusion in detail, instead requiring a “determin[ation]” by an agency that the category of actions “does not significantly affect the quality of the human environment.”³⁰ The NRC’s own regulations on establishing categorical exclusions require that the Commission “declare[.]” the categorical exclusion “after first finding that the category of actions does not individually or cumulatively have a significant effect on the human environment.”³¹

The NRC may find it useful to consider CEQ’s past guidance on how to establish new categorical exclusions.³² CEQ guidance lays out three elements for establishing a new categorical exclusion:³³ an agency should (1) submit a written record for public comment that substantiates the conclusion “that the category of actions does not have a significant effect, individually or in the aggregate, on the human environment;”³⁴ (2) “identify when documentation of a determination that a categorical exclusion applies to a proposed action is required;”³⁵ and (3) describe how the agency will consider “extraordinary circumstances in which a normally excluded action may have a significant effect.”³⁶

As a first step, the NRC should produce a written record demonstrating that the construction, operation, and decommissioning of microreactors within the categorical exclusion “does not have a significant effect, individually or in the aggregate, on the human environment.”³⁷ CEQ guidance identifies “previously implemented actions” and “information from professional

²⁷ 10 C.F.R. Pt. 1021, Appendix B (providing generally applicable conditions to categorical exclusion eligibility).

²⁸ *Oak Ridge Env’t Peace All. v. Perry*, 412 F. Supp. 3d 786, 845 (E.D. Tenn. 2019) (quoting Department of Energy, National Environmental Policy Act Implementing Procedures, 76 Fed. Reg. 63764, 63769 (Oct. 13, 2011)).

²⁹ *See id.*

³⁰ *See* NEPA § 111(1).

³¹ 10 C.F.R. § 51.22(a).

³² The D.C. Circuit has recently held that these regulations are not legally binding on other federal agencies. *See Marin Audubon Soc’y v. Fed. Aviation Admin.*, 121 F.4th 902, 908 (D.C. Cir. 2024) (“The CEQ regulations, which purport to govern how all federal agencies must comply with the National Environmental Policy Act, are *ultra vires*.” *Id.*). It is also reasonable to anticipate ongoing change to specific NEPA requirements due to the change in presidential administrations.

³³ 40 C.F.R. § 1507.3(c)(8); Council on Environmental Quality “Establishing, Applying, and Revising Categorical Exclusions under the National Environmental Policy Act” (2010) [https://ceq.doe.gov/docs/ceq-regulations-and-guidance/NEPA_CE_Guidance_Nov232010.pdf].

³⁴ 40 C.F.R. § 1507.3(c)(8)(ii).

³⁵ 40 C.F.R. § 1507.3(c)(8)(i).

³⁶ 40 C.F.R. § 1501.4(b); 40 C.F.R. § 1507.3(c)(8)(iii).

³⁷ 40 C.F.R. § 1507.3(c)(8)(ii).

staff, expert opinions, and scientific analyses³⁸ as relevant sources to substantiate this conclusion. A recent Technical Support Document from the Department of Energy, published as part of its rulemaking to support the expansion of categorical exclusions, provides an example of what this written record may look like.³⁹ This document analyzed past EISs, EAs, and FONSIIs from multiple agencies to substantiate the conclusion that the expanded categories of actions did not result in significant environmental impacts.

The NRC's next step would be to "identify when documentation that a categorical exclusion applies to a proposed action is required."⁴⁰ Given the nature of the microreactor categorical exclusion, documentation will likely be necessary in *all* cases to verify that the proposed technology meets the specified definition. Generally, maintaining a record of categorical exclusion determinations would enhance confidence in the agency's determination and provide a stronger foundation during judicial review.⁴¹

Lastly, the NRC must describe how it will consider "extraordinary circumstances in which a normally excluded action may have a significant effect."⁴² This so-called "extraordinary circumstances analysis" is used to verify that any site-specific issues do not amount to significant environmental impact, and the NRC would need to identify such circumstances to be considered for each project. If an extraordinary circumstance is present in a particular analysis, the NRC could: (1) determine that the circumstance does not lead to potentially significant effects, or (2) modify the proposed action to avoid the potential effects.⁴³ If it cannot avoid a significant effect, "the agency shall prepare an environmental assessment or environmental impact statement, as appropriate."⁴⁴

V. Conclusion

Establishing a categorical exclusion for microreactors would accelerate the deployment of advanced nuclear energy while ensuring an appropriate level of regulatory oversight. Initial Environmental Impact Statements (EISs) and Environmental Assessments (EAs) conducted by multiple agencies have determined that microreactors have minimal to no environmental impact, underscoring the need for a more efficient review process to satisfy NEPA. Rather than requiring a costly and time-consuming EIS or EA for each microreactor, the NRC should proactively establish a categorical exclusion. This approach would conserve agency and applicant resources, reduce unnecessary delays, and enable microreactors to provide clean, reliable, and abundant energy to support energy security and climate goals.

³⁸ Council on Environmental Quality "Establishing, Applying, and Revising Categorical Exclusions under the National Environmental Policy Act" (2010).

³⁹ [Department of Energy, Technical Support Document, Notice of Final Rulemaking, April 2024.](#)

⁴⁰ 40 C.F.R. § 1507.3(c)(8)(i).

⁴¹ See *California v. Norton*, 311 F.3d 1162, 1176 (9th Cir. 2002) ("It is difficult for a reviewing court to determine if the application of an exclusion is arbitrary and capricious where there is no contemporaneous documentation to show that the agency considered the environmental consequences of its action and decided to apply a categorical exclusion to the facts of a particular decision.").

⁴² 40 C.F.R. § 1501.4(b); 40 C.F.R. § 1507.3(c)(8)(iii).

⁴³ 40 C.F.R. § 1501.4(b)(1).

⁴⁴ 40 C.F.R. § 1501.4(b)(2).