From:	Rani Lea Franovich <rani@thebreakthrough.org>
Sent:	Monday, December 5, 2022 5:18 PM
To:	Tami Dozier; peyton.taub@nrc.gov
Cc:	Adam Stein; Leigh Anne Lloveras; Charlyne Smith
Subject:	[External_Sender] Comment on NRC's Draft EIS for the Hermes Test Reactor Construction Permit Application
Attachments:	Final Written Comment on Hermes Draft EIS.pdf

Good evening Tami and Peyton,
Please find attached the subject comment.
Best wishes for a pleasant holiday season.
Kind regards,
Rani

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Rani Franovich (she/her)
Senior Policy Advisor, Nuclear Energy Innovation
The Breakthrough Institute
923 15th Street NW, Suite 300
Washington, DC 20005

rani@thebreakthrough.org
Twitter: @RFMeraxes

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"Adam Stein" <adam@thebreakthrough.org>
Tracking Status: None
"Leigh Anne Lloveras" <leighanne@thebreakthrough.org>
Tracking Status: None
"Charlyne Smith" <charlyne@thebreakthrough.org>
Tracking Status: None
"Tami Dozier" <Tamsen.Dozier@nrc.gov>
Tracking Status: None
"peyton.taub@nrc.gov" <peyton.taub@nrc.gov>
Tracking Status: None

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BREAKTHROUGH INSTITUTE

December 5, 2022

Tamsen Dozier, Environmental Project Manager
Payton Taub, Environmental Project Manager
U.S. Nuclear Regulatory Commission
Rockville, MD 20852

Subject: Comment on NRC's Draft Environmental Impact Statement (EIS) for the Kairos Power HERMES Test Reactor, Docket No. 05007513

Dear Tamsen Dozier and Payton Taub,

It was a pleasure to see you both at the November 16, 2022, public meeting in Oak Ridge, TN, to solicit public comments on your draft Environmental Impact Statement (EIS) for the HERMES test reactor. I write on behalf of the Breakthrough Institute to again commend the staff's important work on this project, to express my appreciation of the opportunity to comment on the draft EIS, and to supplement the comments I offered during the public meeting.

As you both know, the Breakthrough Institute is an independent 501(c)(3) global research center that identifies and promotes technological solutions to environmental and human development challenges. We advocate for appropriate regulation in licensing and oversight of advanced nuclear reactors to enable the timely deployment of safe, innovative, and economically viable emerging nuclear technologies. We believe new and advanced reactors represent critical pathways to climate mitigation and deep decarbonization. The Breakthrough Institute does not receive funding from industry.

The domestic and international dialogue on nuclear energy has evolved over the last decade, with increasing support for civilian nuclear power from environmentalists, scientists, scholars, activists, thought leaders, and policy makers. Congress and the public are calling upon the NRC to modernize its regulatory frameworks and to enable the safe civilian use of nuclear energy.

I. Congressional Mandate to Modernize

When Congress passed the Nuclear Energy Innovation and Modernization Act of 2019 (NEIMA), it mandated that the NRC modernize and streamline nuclear licensing and other regulatory procedures commensurate with a new generation of smaller, safer reactor technologies that rely on a variety of fuels and fuel cycles. To modernize its regulatory practices, satisfy NEIMA, and effectively serve the public's interests, the NRC staff must conduct timely and efficient environmental reviews

II. Vital Importance of Timely, Efficient Environmental Reviews

We commend the NRC staff for publishing the Hermes draft EIS for comment six weeks ahead of schedule. This level of customer service should be encouraged and rewarded by NRC's leadership. However, we note the NRC staff prepared an EIS when an environmental assessment (EA) would have sufficed for the instant Federal action: issuance of a construction permit for a non-

power test reactor. It is not clear how this constitutes a major Federal action, for which an EIS is required by the National Environmental Policy Act (NEPA).

As a general matter, the NRC should incentivize innovation and reward improved safety outcomes by eliminating or reducing unnecessary costs and schedule delays for an applicant. For example, the NRC staff should prepare an EA in lieu of an EIS to the maximum extent possible for non-major Federal actions involving the construction, operation, and decommissioning of test reactors and larger scale commercial reactors. Next generation light-water and nonlight-water reactors pose far fewer and much smaller negative impacts to the environment than non-nuclear energy and industrial complexes. In fact, as the NRC staff has noted in the instant Draft EIS, the long-term benefits of these reactors to Society far outweigh any short-term negative impacts (see Section IV of this comment). As such, EAs offer a less resource-intensive, time-consuming and costly alternative means to satisfy NEPA. Preparation of EAs should be the NRC's preferred approach, consistent with the NRC's Efficiency Principle of Good Regulation.

When a licensing decision clearly constitutes a major Federal action, we encourage the NRC staff to make maximum use of the Generic EIS (GEIS) for advanced reactors. Generically evaluating and characterizing the economic benefits and much smaller environmental impacts of these sleek, environmentally harmonious new designs significantly reduces review schedules and costs. Additionally, failure to license and deploy new and advanced reactors has significant negative consequences to the environment, climate change and human health. These detrimental impacts of the "no action" alternative should be generically characterized in the GEIS for advanced reactors.

III. Incomplete Cost-Benefit Analysis

In Section 4.3 "Cost-Benefit of the Alternatives," the NRC staff described the economic benefits of the Hermes project at the alternative Eagle Rock site. However, we did not find a similar assessment of costs and benefits of the proposed action at the preferred site in Oak Ridge, TN.

Consistent with 10 CFR 51.45(c)[1], the applicant described the benefits of the proposed action in Section 6.2.1 of its environmental report (ER).

> *Facility construction would have beneficial socioeconomic effects on the local area such as new construction-related jobs, local spending by the construction workforce, and payment of taxes within the area and region. The in-migration of the construction workforce supports the expansion of existing small businesses or locations for new small businesses that might serve Kairos Power and its employees. The beneficial impacts from the in-migration of the construction workforce and indirect economic output and employment resulting from construction expenditures to the communities within the [region of interest] would decrease once construction is completed.*

[1] 10 CFR 51.45(c) states "… the analysis in the environmental report should also include consideration of the economic, technical, and other benefits and costs of the proposed action and its alternatives."

However, the changes that are the result of increased tax revenues would continue throughout the operational life of the facility.[2]

In its response to Comment 2-19 of the Final Interim Staff Guidance [ISG] Augmenting NUREG-1537, "Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors," the NRC staff wrote:

> *The environmental report should, consistent with the language in 10 CFR 51.45(c), consider the economic, technical, and other benefits and costs* ***of the proposed action*** [emphasis added] *and its alternatives. The ISG provides guidance on the specific information that would be useful for NRC staff to understand and characterize the costs and benefits of the proposed action and alternatives.*[3]

Yet the Draft EIS for the Hermes test reactor does not explicitly consider the proposed action's economic costs and benefits. Rather, it does so obliquely in Section 4.3.1, "Cost-Benefit of the Alternatives." In this section the NRC staff described the economic stimuli from project-related incomes during the construction, operation, and decommissioning of the proposed test reactor – including the hundreds of workers needed to construct and operate the plant. This means skilled jobs for plant workers. The NRC staff further noted that most of the skills needed for these jobs are "available locally" at the alternative site. However, the same should be true at the preferred site in Oak Ridge, TN, or the surrounding communities. Because these benefits are discussed only in the context of an alternative site, they are not explicitly considered for the proposed action. The NRC staff should remedy this oversight in the Final EIS.

The NRC staff characterized any increase in tax revenues from the proposed project as minimal because (1) fewer than 500 workers would be needed to build the plant, and fewer than 100 to operate it; and (2) the project will be of short duration – 12 years from groundbreaking to cessation of operations. Though minimal, this benefit of the proposed action should be explicitly acknowledged in the NRC's Final EIS for the Hermes test reactor.

It is important that economic benefits are factored into NRC's environmental reviews. Though marginal for this project, these economic benefits will be much greater for mass production and rapid deployment on a commercial scale, and they should be explicitly acknowledged in the Hermes EIS. Moreover, these benefits should be generically evaluated and characterized in the GEIS for advanced reactors.

IV. Appropriate Analysis of Near-term Costs and Long-term Benefits

We were pleased to see NRC staff's characterization of the environmental impacts in Section 5.3.2, "Relationship Between Local Short-Term Uses of the Environment and Maintenance and Enhancement of Long-Term Productivity." An excerpt from this section reads as follows:

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[2] ADAMS Accession Number ML21306A133, p. 6-10

[3] ADAMS Accession Number ML12156A061, p. 16

While the uses of, and impacts on, environmental resources would be minimal over the short term, the long-term benefits from implementation of the Hermes project could be substantial.[4]

We agree with this astute assessment and commend the NRC staff for acknowledging the following salient facts:

(1) Operation of the Hermes test facility could help demonstrate the commercial viability of the technology and generate useful data for commercial deployment.
(2) Successful demonstration could lead to large-scale deployment of another economically viable source of energy vital to meeting National climate change objectives.
(3) Use of the technology may help the U.S. meet its climate change goals with less reliance on more land-intensive energy generation (e.g., large solar or wind) that has a more negative aesthetic impact to landscapes and seascapes and greater potential to harm wildlife.

This is a relevant and appropriate consideration as the NRC evaluates the construction permit application for the Hermes test reactor. It also is consistent with the Energy Reorganization Act of 1974, which acknowledges the benefits of nuclear energy to "meet the needs of present and future generations, to increase the productivity of the national economy and strengthen its position in regard to international trade, to make the Nation self-sufficient in energy, to advance the goals of restoring, protecting, and enhancing environmental quality, and to assure public health and safety."[5] The NRC staff deserves much credit for its work on Section 5.3.2 of the Draft EIS. That said, there is room for improvement elsewhere.

V. Short-sighted, Status-Quo Analysis of the No-Action Alternative

As a former member of the NRC staff for 30 years, and branch chief over both safety and environmental reviews for power reactor license renewal, I am very familiar with the NRC staff's long-standing characterization of the "no action" alternative as somehow environmentally benign. However, careful examination of this simplistic assertion reveals a flawed paradigm. It fails to consider pressing concerns about the public's general welfare.

Improvement toward modernization starts with the recognition that NRC's issuance of an operating license or construction permit is a necessary Federal action to mitigate climate change, reduce adverse health effects of alternatives that emit air pollutants, and reduce threats to the Nation's energy security. From this holistic perspective, public health and safety are undermined when the Federal government takes no action, takes too long, or charges the applicant excessive review fees that disincentivize deployment of safe new nuclear generation.

a. The No-Action Alternative is not Environmentally Beneficial

The Breakthrough Institute and other stakeholders commented during the NRC scoping meeting on March 23, 2022, that the environmental impact of constructing and operating the

[4] ADAMS Accession Number ML22259A126, p. 5-9
[5] ADAMS Accession Number ML13274A489, Sec. 2. "Declaration of Purpose"

Hermes test reactor should be considered and weighed against the more significant environmental impacts and health effects associated with alternative energy technologies that might supplant nuclear energy generation, primarily fossil sources that emit carbon dioxide and other pollutants. Although the NRC staff acknowledged the long-term benefits of nuclear energy that outweigh any short-term environmental impacts of this project, it appears that the staff did not apply this comment in its review of the "no action" alternative, discussed in Section 4 and presented in Table 4-1. Section 4.1, "No-Action Alternative," includes the following excerpt:

> *None of the environmental effects described in Section 3.0 of this draft EIS would occur under the no action alternative. But because Section 3.0 characterizes all potential environmental impacts of the proposed action as SMALL, any* ***environmental benefits from selecting the no action alternative*** [emphasis added] *instead of the proposed action would be minimal.*[6]

The NRC staff's characterization of the "no action" alternative as environmentally beneficial is inaccurate; it fails to consider the lost benefits of the Hermes project discussed in Section 5.3.2 of the draft EIS. There ***are no*** environmental benefits to the "no action" alternative. Rather, this alternative is detrimental to Society's interest in realizing the benefits of safe, clean, baseload capacity from nuclear generation. The Hermes EIS should be revised to reflect this.

b. The No-Action Alternative is Harmful to the Environment and Human Health

Final Interim Staff Guidance Augmenting NUREG-1537, Part 1, "Guidelines for Preparing and Reviewing Applications for the Licensing of Non-Power Reactors: Format and Content," dated October 17, 2012, includes the following statement in Section 19.5.1, "No-Action Alternative."

> *For applications to construct and operate a new non-power reactor, the no-action alternative usually considers the environmental impacts if the construction permit or operating license is denied. In such case,* ***the environmental impacts would generally be the same as the status quo*** [emphasis added].[7]

This characterization omits any discussion of the harms of "status quo" energy sources. As long as energy demand outpaces supply, and fossil alternatives are available, failure to license, construct or operate a safe, emission-free nuclear power reactor is absolutely detrimental to Society. The "no action" alternative perpetuates global climate change, degrades environmental quality, harms human health, and undermines National energy security. This substantial impact to the local, National and global community needs to be duly considered in all environmental reviews undertaken by the NRC staff and reflected in their EISs – including the GEIS for advanced reactors and the Final EIS for the Hermes test reactor. Guidance associated with NUREG-1537 should be updated to reflect the environmental harms and negative human health effects of the "no action" alternative. The NRC staff should make conforming changes to any other guidance governing NRC's review of environmental impacts caused by its decision-making (or failure to take a Federal action).

[6] ADAMS Accession Number ML22259A126, p. 4-2
[7] ADAMS Accession Number ML12156A069, p. 121

VI. Comment Summary

As mentioned earlier, the Breakthrough Institute receives no funding from the nuclear industry and represents the public's interests. In light of the urgent public concerns described herein, the Breakthrough Institute strongly encourages the NRC to (1) prepare EAs in lieu of EISs to the maximum extent possible for non-major Federal actions involving the construction, operation, and decommissioning of test reactors and their larger scale commercial reactors; (2) make maximum use of the GEIS for advanced reactors when a licensing decision clearly constitutes a major Federal action; (3) more fully and directly examine and characterize the economic benefits of the proposed action; and (4) acknowledge and holistically consider the substantial adverse environmental and human health impacts of taking no Federal action. Thoughtful consideration of these impacts should be reflected not only in the Final EIS for the Hermes test reactor, but for **all** generic and site-specific reviews of Federal actions involving **any** nuclear power generation from either the currently operating fleet or emergent commercial designs and technologies.

In closing, we reiterate our appreciation of this opportunity to supplement and clarify the verbal comment I offered on November 16, 2022. We also commend the NRC staff's timely release of the draft EIS for comment and their thoughtful consideration of the substantial long-term benefits from implementation of the Hermes project. The Hermes reactor is a vital step toward proving the safety and security of commercial deployment of larger-scale reactors of its design. Rapid deployment of these power reactors will advance the Nation's clean energy goals, enhance environmental quality, and supply reliable electricity to the transmission grid. These pressing public interests must be considered in any environmental review informing NRC's regulatory decision-making.

Sincerely,

Rani Franovich
Senior Policy Advisor, Nuclear Energy Innovation
The Breakthrough Institute