



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

November 29, 2021

Mr. Peter Hastings
Vice President, Regulatory Affairs
and Quality
Kairos Power LLC
707 W Tower Ave
Alameda, CA 94501

SUBJECT: ACCEPTANCE FOR DOCKETING OF THE HERMES
NON-POWER TEST REACTOR CONSTRUCTION
PERMIT APPLICATION SUBMITTED BY KAIROS
POWER LLC (EPID: L-2021-NEW-0011 AND L-2021-
NEW-0012)

Dear Mr. Hastings:

By letter to the U.S. Nuclear Regulatory Commission (NRC) dated September 29, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession Number (No.) ML21272A375), Kairos Power LLC (Kairos) submitted an application for a construction permit for the Hermes non-power test reactor, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," and Section 104c of the Atomic Energy Act of 1954, as amended. Additionally, by letter dated October 31, 2021 (ADAMS Accession No. ML21306A131), Kairos submitted an Environmental Report in support of its Hermes construction permit application. The test reactor is to be built in Oak Ridge, Tennessee. The purpose of this letter is to inform you of the results of the NRC staff's acceptance review of this application.

The NRC staff performed an acceptance review and determined that Kairos submitted sufficient information in accordance with 10 CFR 2.101, "Filing of Application"; 10 CFR 50.33, "Contents of applications; general information"; 10 CFR 50.34, "Contents of application; technical information"; and 10 CFR 51.50, "Environmental report-construction permit, early site permit, or combined license stage." The acceptance review confirmed that the NRC staff will be able to conduct its detailed safety and environmental technical reviews and to complete the reviews on a predictable schedule.

The NRC staff performed the acceptance review of the construction permit application in accordance with 10 CFR Part 2, "Agency Rules of Practice and Procedure," Part 50, and the agency's procedures; assessing the various criteria and considerations specified in the agency's procedures associated with accepting an application. The NRC staff concluded that the application is acceptable for docketing. However, the NRC staff's determination does not preclude requests for additional information (RAIs) as the review proceeds. The docket number established for the Hermes non-power test reactor is 50-7513.

The NRC staff will conduct its safety-focused review based on the guidance in NUREG-1537, "Guidelines for the Preparation and Review of Applications for the Licensing of Non-Power

Reactors," Part 1, "Format and Content" (ADAMS Accession No. ML042430055) and Part 2, "Standard Review Plan and Acceptance Criteria" (ADAMS Accession No. ML042430048). The Hermes application review will be the first time the NRC has evaluated (1) tri-structural isotropic particle fuel and (2) molten salt coolant for a license or permit. A few of the novel aspects on which the NRC staff will focus its safety review include the separation of hot and cold legs in the primary system, assurance of stable flow in the decay heat removal system, tritium management, and the effects of molten salt on graphite. Because of the novel aspects of this design, the NRC staff anticipates that the application review will be greatly aided by the pre-application activities undertaken by Kairos and will continue to require additional focus from Kairos and the NRC staff to ensure a timely review.

On November 16, 2021, Kairos notified the NRC staff via e-mail (ADAMS Accession No. ML21320A217), of a possible design change in the secondary side coolant salt. Kairos stated that it does not believe that such a design change would affect the Hermes safety case. However, the Preliminary Safety Analysis Report would need to be revised if the secondary salt is changed. The NRC staff will consider new information related to a possible design change in the secondary salt when it is submitted. A secondary salt change or other design changes could affect the review schedule.

Based in part on the extensive pre-application engagement by Kairos, the NRC staff estimates that it will complete and issue the Final Safety Evaluation Report and the Final Environmental Impact Statement by September 2023. This date could change due to several factors, including RAIs, unanticipated changes to the scope of the review, unsolicited supplements to the application, design changes, and other factors. The NRC staff will provide a review schedule with key milestones and resource estimates within 30 days of the date of this letter.

A notice of acceptance for docketing will be published by the *Office of the Federal Register*.

If you have any questions, please contact me at (301) 415-2062, or via email at Benjamin.Beasley@nrc.gov.

Sincerely,

Benjamin Beasley, Senior Project Manager
Advanced Reactor Licensing Branch
Division of Advanced Reactors and Non-Power
Production and Utilization Facilities
Office of Nuclear Reactor Regulation

Docket No.: 50-7513

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