



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

July 8, 2024

MEMORANDUM TO: Josh Borromeo, Chief
Advanced Reactor Licensing Branch 1
Division of Advanced Reactors and Non-Power
Production and Utilization Facilities
Office of Nuclear Reactor Regulation

FROM: Cayetano Santos Jr., Senior Project Manager
Advanced Reactor Licensing Branch 1
Division of Advanced Reactors and Non-Power
Production and Utilization Facilities
Office of Nuclear Reactor Regulation

SUBJECT: SUMMARY OF JUNE 5, 2024, MEETING WITH KAIROS ON THE
FOUNDATION DESIGN FOR HERMES TEST REACTOR

Meeting Information:

Applicant: Kairos Power LLC (Kairos)

Project No.: 99902069

Meeting Type: Partially Closed Observation Meeting

Public Meeting Notice: Agencywide Documents Access and Management System (ADAMS)
Accession No.: ML24144A125

Applicant Presentation Slides: ML24155A060

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Meeting Summary:

On June 5, 2024, a virtual partially closed observation meeting was held between the U.S. Nuclear Regulatory Commission (NRC) staff and representatives of Kairos Power, LLC (Kairos). The purpose of the meeting was to discuss the foundation design for the Hermes test reactor.

Kairos representatives described the proposed foundation construction design concept of drilled piers socketed into sound rock. This differs from the foundation design described in the Hermes preliminary safety analysis report (PSAR) in which the foundation mat rested on a concrete fill over the sound rock after an open excavation of the site. Kairos representatives also discussed the inspection and testing that will be implemented to meet a geological mapping condition in the Hermes construction permit (CP).

Below is a summary of the comments and discussions:

- Kairos presented a preliminary plan that showed the design and location of drilled pier locations. The NRC staff observed that the distribution of piers is not uniform and asked about the bearing capacity of the piers. Kairos representatives stated that the piers are distributed such that the structural loads are resisted solely by the piers with no reliance on the soil or weathered rock between the piers. Some of the pier locations were also adjusted to accommodate a structural design feature that would be located between piers. Analyses are still in progress, but the load design will consider both axial and lateral loads with an expected factor of safety greater than 3 for static conditions. The analysis for lateral loads includes a large uncertainty range to account for differences that may be encountered between what materials are found versus those that are expected.
- The NRC staff asked how sound rock will be determined. Kairos representatives stated that sound rock would have minor levels of weathering, no signs of voids, and a rock quality designation (RQD) greater than 85%. The bearing capacity of the piers will be determined based on the parameters such as RQD and geological strength index.
- The NRC staff observed the varying depth of piers in the foundation design in a side-view drawing of the piers and asked how this would impact differential settlement. Kairos representatives stated that settlement of the foundation is expected to be small and would be accommodated in the design of the structures above it.
- The NRC staff observed that the preliminary design layout shows piers extending a minimum of 10 feet into sound rock and asked what Kairos would do if this could not be achieved. Kairos representatives stated that the acceptability of each socket would be determined on a case-by-case basis and there is sufficient margin in the design such that a shorter distance and lower factor of safety may be justifiable by analysis. The NRC staff stated that if this adjustment is needed for multiple piers in close proximity, this could negatively impact pier performance.
- The Hermes CP includes a condition which states that “Kairos shall perform detailed geologic mapping of excavations for safety related engineered structures; examine and evaluate geologic features discovered in those excavations; and notify the Director of the Office of Nuclear Reactor Regulation, or the Director’s designee, as specified in 10 CFR 50.4, ‘Written communications,’ once excavations for safety related structures

are open for examination by the NRC.” The wording of this condition was based on the PSAR description that the foundation mat would rest on a concrete fill over the sound rock after an open excavation of the site. The NRC staff asked how Kairos intends to meet this permit condition given the revised drilled pier design concept. Kairos representatives stated that they will meet the permit condition as written by performing a comprehensive geophysical and geotechnical characterization of the site. Kairos will precisely map all the contacts which are relied upon for the foundation. A temporary casing will be placed around each socket as it is excavated, and a camera will be used to perform a visual inspection to map the entire socket. If the socket fills with water, it will be flushed and cleaned so a visual examination can be performed. The NRC staff expressed a concern with the information obtained using this approach compared to that obtained from an open excavation because geological mapping of an open excavation would provide a clearer picture of the lateral extent of the karst features at the site.

- The NRC staff also expressed a concern that the permit condition as currently worded may not be appropriate for a drilled pier design. Kairos representatives added that no changes to the permit condition are needed as a result of the new drilled pier design. The PSAR contains only preliminary design information and is subject to change prior to submission of the operating license (OL) application. The NRC staff acknowledged this general characterization of PSAR information is accurate but stated that the foundation design is unique given its relationship to the permit condition.
- Kairos representatives stated that preliminary cores for the piers have been obtained and information related to them could be made available to the staff.

Members of the public voiced no comments or questions.

Enclosure:
List of Attendees

cc: Kairos Power Hermes via GovDelivery

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NAME	CSantos	DGreene	JBorromeo	CSantos
DATE	6/13/2024	6/18/2024	7/8/2024	7/8/2024

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List Of Attendees

Summary of June 5, 2024, Meeting with Kairos on the Foundation Design for Hermes Test Reactor

June 5, 2024

Name	Organization
Cayetano Santos	U.S. Nuclear Regulatory Commission (NRC)
Michael Orenak	NRC
Matthew Hiser	NRC
Jenise Thompson	NRC
Amitava Ghosh	NRC
Sarah Tabatabai	NRC
Phil O'Bryan	NRC
Nicole Coovert	NRC
George Khouri	NRC
Billy Gleaves	NRC
Luis Colon Fuentes	NRC
Pravin Sawant	NRC
Laurel Bauer	NRC
Martin Bryan	Kairos Power, LLC (Kairos)
Brian Song	Kairos
Antonio Fernandez	Kairos
Wayne Massie	Kairos
Michael Ellett	Kairos
Drew Peebles	Kairos
Benjamin D. Kosbab	Kairos
Atilla Kurt	Kairos
Jordan Hagaman	Kairos
Peter Hastings	Kairos
Ravi Singaraju	Kairos
Darrell Gardner	Kairos
Somayeh Mirhosseini	Kairos

Enclosure