



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

July 11, 2023

MEMORANDUM TO: Joseph A. Proffitt, Acting Chief
Advanced Reactor Licensing Branch 1
Division of Advanced Reactors and Non-Power
Production and Utilization Facilities
Office of Nuclear Reactor Regulation

FROM: Michael Orenak, Project Manager **/RA/**
Advanced Reactor Licensing Branch 1
Division of Advanced Reactors and Non-Power
Production and Utilization Facilities
Office of Nuclear Reactor Regulation

SUBJECT: SUMMARY OF THE JUNE 28, 2023, OBSERVATION MEETING
BETWEEN THE U.S. NUCLEAR REGULATORY COMMISSION
STAFF AND KAIROS POWER, LLC TO PROVIDE AN
OVERVIEW OF THE HERMES 2 CONSTRUCTION PERMIT
APPLICATION

Meeting Information:

Applicant: Kairos Power, LLC (Kairos)

Docket/Project Nos. 05000611 and 05000612

EPID: L-2018-LRM-0071

Meeting Title: Kairos Power Future Plans

Meeting Type: Observation

Public Meeting Notice Agencywide Documents Access and Management System (ADAMS):
ML23167C153

Industry Slides: ML23178A276

Meeting Attendees: See Enclosure for list of meeting attendees.

Meeting Summary:

The U.S. Nuclear Regulatory Commission (NRC) staff held a virtual observation meeting with representatives from Kairos Power. This meeting was for Kairos to provide their future plans, specifically their plans to submit a construction permit application (CPA) for the Hermes 2 test reactor facility (Hermes 2).

During the meeting, representatives of Kairos presented their slides that described the differences between the Hermes and the Hermes 2 construction permit applications.

The first discussion centered around the replacement of parts. Because planned lifetime of Hermes 2 is 11 years, components may need to be replaced. The NRC staff asked if Kairos is planning to discuss this issue in the CPA or wait until the operating license application (OLA). Kairos responded that they intend to have the same level of discussion in the Hermes 2 CPA as provided in the Hermes CPA.

The NRC staff requested further discussion as to why Hermes 2 plans on having an intermediate heat transfer loop. Kairos responded that they took out the intermediate loop from Hermes because they were seeing reactions with the lithium fluoride/beryllium fluoride (Flibe) salt and water. The intermediate loop has a salt that is compatible with Flibe salt and water.

The NRC staff asked if the Hermes 2 CPA will be clear about Kairos's plans to sell some portion of the produced power and also clear about which Section of the Atomic Energy Act that the CPA will be requested under. Kairos responded that they are aware of the revenue requirements and do intend to meet them. The details of this issue are still being worked out by Kairos. Kairos stated that the Hermes 2 CPA will be for a test reactor.

The NRC staff made two other statements about the selling of power that Kairos should be aware of. First, there exists a law called Fixing America's Surface Transportation Act, Title 41, signed in 2015, for Kairos to be aware of. Additionally, there is another governmental organization called the Federal Permitting Improving Steering Council that Kairos should be aware of. Kairos responded to these comments that they do not intend to become a commercial power plant and do intend to meet the revenue and testing demonstration requirements.

Regarding the PSAR Chapter 5 slide, the NRC staff asked about the sodium fluoride/beryllium fluoride (BeNaF) salt and whether there is any operating experience or compatibility testing with different materials and other salts. Kairos responded that the Flibe salt and BeNaF salt are very chemically similar and corrosion properties are expected to be very similar. The NRC staff asked if there was any non-nuclear industrial operating experience with BeNaF. Kairos responded that they weren't aware of any, but they do plan on testing for compatibility with Flibe.

The NRC staff asked about the heat removal systems, specifically the heat rejector radiator (HRR) and the decay heat removal systems (DHRS) and in what situations they are used. Kairos responded that the details of these systems will be provided in the OLA, but the plans are to have the HRR only turned on in normal shutdown, but the DHRS will not have to be turned on and will already in use before an event takes place.

The NRC staff asked why an 11-year lifetime was chosen for the Hermes 2. Kairos responded that the 11-year lifetime is from the business case for Hermes 2 (a business sensitive subject) and not related to a component lifetime.

The NRC staff asked about the control room layout for Hermes and whether they would be shared for the two units and if the controls/displays will be separated. Kairos responded that was the plan, but details have yet to be worked out.

The NRC staff asked for clarification of the 11-year operating life. Kairos responded that it's planned to be 10 effective full power years and one year to account for startup testing.

The NRC staff asked if the environmental report will account for the additional land occupied by the two additional units. Kairos responded that yes, it will account for it.

The NRC staff asked about the submittal timelines for the Hermes OLA and the Hermes 2 CPA. Kairos stated that they plan on submitting the Hermes 2 CPA in July and the Hermes OLA early 2024.

Two public questions were asked during the public comment period. The first was regarding tritium generation being underestimated in Hermes 2 given the addition of the intermediate loop with BeNaF salt. The NRC responded that this is the first time the NRC learned that BeNaF salt would be used. The BeNaF salt will be in the secondary system and additional creation of tritium in Hermes 2 is not expected. The same member of the public asked what the power generated by Hermes 2 is going to be used for. The NRC responded that this is a demonstration reactor and Kairos can sell some portion of the power generated by the facility. The NRC has no regulatory authority regarding what Kairos does with the power.

CONTACT: Michael Orenak, NRR/DANU
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SUBJECT: SUMMARY OF THE JUNE 6, 2023, PARTIALLY CLOSED MEETING BETWEEN THE U.S. NUCLEAR REGULATORY COMMISSION STAFF AND KAIROS POWER, LLC TO PROVIDE AN OVERVIEW OF THE HERMES 2 CONSTRUCTION PERMIT APPLICATION DATED: JULY 11, 2023

DISTRIBUTION:

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ADAMS Accession Number: ML23189A007

NRR-052

OFFICE	NRR/DANU/UAL1/ PM	NRR/DANU/UAL1/ BC(A)	NRR/DANU/UAL1/PM
NAME	MOrenak	AProffitt	MOrenak
DATE	7/8/2023	7/10/2023	7/11//2023

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List of Attendees

Observation meeting between the U.S. Nuclear Regulatory Commission Staff and Kairos Power, LLC regarding Kairos's Future Plans Tuesday, June 28, 2023

<u>Name</u>	<u>Organization</u>
Mike Orenak	U.S. Nuclear Regulatory Commission (NRC)
Pravin Sawant	NRC
Dan Beacon	NRC
Greg Oberson	NRC
Cheng Yuan	NRC
Andrew Proffitt	NRC
Alex Chereskin	NRC
Peyton Doub	NRC
Ken Erwin	NRC
Ryann Bass	NRC
Meg Audrain	NRC
Cayetano Santos	NRC
Michelle Hart	NRC
Matt Hiser	NRC
Candace de Messieres	NRC
Drew Peebles	Kairos Power, LLC (Kairos)
Anthonie Cilliers	Kairos
Darrell Gardner	Kairos
Brian Song	Kairos
Kieran Dolan	Kairos
Nader Satvat	Kairos
Oded Doron	Kairos
Jordan Hagaman	Kairos
Andrew Lingenfelter	Kairos
David Warnica	Kairos
Austin Clark	Kairos
Martin Bryan	Kairos
Peter Hastings	Kairos
John Price	Kairos
Ashley Lewis	Kairos
Brianne Hughes	Kairos
Hadi Razavi	Kairos
Matt Warner	Kairos
Michael Ellett	Kairos
Nicolas Zweibaum	Kairos
Tim Drzewiecki	Kairos
Zayd Hussain	Kairos
Matthew Denman	Kairos

Enclosure

Delaney Simmons	Kairos
Rachel Haigh	Kairos
Margaret Ellenson	Kairos
Adam Stein	The Breakthrough Institute
Charlyne Smith	The Breakthrough Institute
Leigh Anne Lloveras	The Breakthrough Institute
Michael Montecalvo	Terrapower
Steve Bennett	RIZZO International, Inc.
Ed Lyman	Union of Concerned Scientists