

Enclosure 1
Presentation Slides for the May 3, 2023
ACRS Meeting
(Non-Proprietary)



Kairos Power

Hermes PSAR Overview

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ACRS FULL COMMITTEE MEETING

MAY 3, 2023



Kairos Power's mission is to enable the world's transition to clean energy, with the ultimate goal of dramatically improving people's quality of life while protecting the environment.

Overview of Kairos Power

- Nuclear energy engineering, design and manufacturing company *singularly focused* on the commercialization of the fluoride salt-cooled high-temperature reactor (FHR)
 - Founded in 2016
 - Current Staffing:
 - Over 300 Employees (*and growing*)
 - ~90% Engineering Staff
- Private funding commitment to engineering design and licensing program and physical demonstration through nuclear and non-nuclear technology development program
- Schedule driven by the goal for U.S. commercial demonstration by 2031 (or earlier) to enable rapid deployment in 2030s
- Cost targets set to be competitive with natural gas in the U.S. electricity market

Kairos Power Headquarters



Kairos Power Team



Hermes Overview

- The purpose of Hermes is to test and demonstrate the key technologies, design features, and safety functions for KP-FHR technology
- 35 MWth non-power reactor facility, 4-year licensed lifetime
- Located in Oak Ridge, Tennessee at the East Tennessee Technology Park (Former site of Oak Ridge Gaseous Diffusion Plant)
- Research and development programs to resolve safety questions will be resolved before the completion of construction
- Hermes is a single unit reactor that does not share any systems or equipment to perform safety functions

Hermes PSAR Overview

- 10 CFR 50 Licensing Pathway
 - Construction Permit Application – Submitted Fall 2021
 - Environmental Report
 - Preliminary Safety Analysis Report (PSAR)
 - Next Licensing Step: Operating License Application
 - Final Safety Analysis Report (FSAR)
- Hermes PSAR Application Format and Content
 - Developed using guidance in NUREG-1537
 - Presents preliminary design and preliminary safety analysis consistent with 10 CFR 50.34(a)
 - PSAR does not request commission approval of the safety of any design feature or specification
 - *10 CFR 50.35(b) A construction permit will constitute an authorization to the applicant to proceed with construction but will not constitute Commission approval of the safety of any design feature or specification unless the applicant specifically requests such approval and such approval is incorporated in the permit.*

* Not Applicable to Hermes –
Chapter has no technical
content

** Minimal Content at PSAR

Hermes PSAR Format

- Chapter 1 – The Facility
- Chapter 2 – Site Characteristics
- Chapter 3 – Design of Structures, Systems, and Components
- Chapter 4 – Reactor Description
- Chapter 5 – Heat Transport System
- Chapter 6 – Engineered Safety Features
- Chapter 7 – Instrumentation and Control Systems
- Chapter 8 – Electric Power Systems
- Chapter 9 – Auxiliary Systems
- Chapter 10 – Experimental Facilities and Utilization*
- Chapter 11 – Radiation Protection Program and Waste Management**
- Chapter 12 – Conduct of Operations**
- Chapter 13 – Accident Analysis
- Chapter 14 – Technical Specifications**
- Chapter 15 – Financial Qualifications**
- Chapter 16 – Other License Considerations*
- Chapter 17 – Decommissioning and Possession-only License Amendments*
- Chapter 18 – Highly Enriched to Low Enriched Uranium Conversion*

Kairos Power Reports Referenced in PSAR

- Topical Reports
 - KP-TR-003 – Principal Design Criteria
 - KP-TR-004 – Regulatory Analysis
 - KP-TR-005 – Reactor Coolant
 - KP-TR-010 – Fuel Performance Methodology
 - KP-TR-011 – Fuel Qualification Methodology
 - KP-TR-012 – Mechanistic Source Term Methodology
 - KP-TR-013 – Metallics Qualification Methodology
 - KP-TR-014 – Graphite Qualification Methodology
- Technical Reports
 - KP-TR-017 – Core Design Methodology
 - KP-TR-018 – Postulated Event Methodology

Hermes PSAR Review Status

- ✓ NRC staff has completed the safety review of the PSAR
 - Kairos Power addressed all questions received from the NRC
- ✓ The ACRS Kairos Power subcommittee has completed their review of the PSAR during meetings conducted March 1, 4, 23, 24, and April 18 and 19
 - Kairos Power submitted changes to the PSAR to resolve internal PSAR inconsistencies identified during the subcommittee review

Kairos Power is not aware of any unresolved PSAR questions at this time that preclude issuance of a construction permit.



Questions