



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

**KAIROS POWER, LLC – FLIBE THERMOPHYSICAL PROPERTIES AUDIT PLAN
(CAC/EPID NO. 000431/99902069/L-2021-LRM-0085)**

APPLICANT INFORMATION

Applicant: Kairos Power LLC
Applicant Address: 707 W. Tower Ave, Alameda, CA 94501
Plant Name(s) and Unit(s): Kairos – Hermes Test Reactor
Project No(s): 99902069

Background:

Kairos Power LLC (Kairos) began pre-application discussions with the U.S. Nuclear Regulatory Commission (NRC) staff on their Kairos Power Fluoride-Salt-Cooled, High-Temperature Reactor (KP-FHR) in October 2018. In December of 2020, Kairos announced that the Hermes test reactor would be used to support future development of the KP-FHR. Over the past several years, Kairos has submitted several topical and technical reports that apply to both the Hermes test reactor, as well as the full-scale KP-FHR reactor. As discussed in meetings held on January 27 and March 3, 2021, Kairos plans to submit an application for a construction permit (CP), including a preliminary safety analysis report (PSAR), for the Hermes test reactor in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic licensing of production and utilization facilities." A key reference in the preliminary safety evaluation will be the Reactor Coolant topical report which provides key thermophysical properties for use in safety analyses. This topical report was reviewed and approved by the NRC staff subject to Limitations and Conditions. One such condition is for Kairos to perform confirmation analyses to ensure referenced data from the Oak Ridge National Laboratory (ORNL) Molten Salt Reactor Experiment (MSRE) is quality data and applicable to Kairos reactor designs. As per the Kairos presentation to the NRC staff dated January 27, 2021, it is expected that Kairos will reference this topical report in the PSAR for the Hermes test reactor. A copy of the January 27, 2021, presentation is available electronically in the NRC's document system (Agencywide Documents Access and Management System (ADAMS)), under Accession No. ML21021A364.

Purpose:

The purpose of this audit is for the NRC staff to gain a better understanding of Kairos's process to determine that referenced historical data is appropriate to use in safety analyses for the Hermes and KP-FHR reactor designs. Therefore, the staff is requesting access to internal documents associated with confirmation of thermophysical property data and correlations and their associated uncertainties as part of the Reactor Coolant topical report. In addition, the staff

is requesting any documents referenced in the evaluation of the thermophysical property data that are not already available to the NRC staff. The NRC staff will summarize its observations in an audit report to be provided to Kairos, as discussed below.

Regulatory Audit Basis:

The bases for the audit are the regulations in 10 CFR Part 50, Sections 50.34(a), "Preliminary Safety Analysis Report," and 50.35, "Issuance of construction permits."

Regulatory Audit Scope

This audit will focus on information provided by Kairos on the online reference portal.

Information and Other Material Necessary for the Regulatory Audit

Documents associated with confirmation of thermophysical property data and correlations that will be used to satisfy Limitations and Conditions from the NRC staff safety evaluation for the Kairos Power Reactor Coolant topical report. The staff request that the following documents be available on Kairos online reference portal for the audit:

- Review of Fluibe Thermophysical Property Legacy Data: Density, Revision 0
- Review of Fluibe Thermophysical Property Legacy Data: Thermal Conductivity, Revision 0
- Review of Fluibe Thermophysical Property Legacy Data: Heat Capacity, Revision 0
- Review of Fluibe Thermophysical Property Legacy Data: Viscosity, Revision 0

Team Assignments

Alexander Chereskin	Materials Engineer, Audit Lead responsible for audit summary report preparation
Jeffrey Schmidt	Sr. Reactor Systems Engineer
Boyce Travis	Reactor Systems Engineer
Zee St. Hilaire	Student Intern
Nicholas Savvoir	Reactor Operations Engineer (Quality Assurance)
Samuel Cuadrado	Project Manager responsible for audit logistics
Richard Rivera	Project Manager
Stewart Magruder	Sr. Project Manager

Additional audit team members may be added as needed.

Logistics

Entrance Meeting	August 16, 2021
Exit Meeting	September 30, 2021

Audit meetings take place in a virtual format, using Microsoft Teams, or via other, similar platform. Audit meetings will be scheduled on an as needed basis after the entrance meeting and once the NRC staff has had the opportunity to review any documents placed in the online reference portal. The audit duration is anticipated to be approximately 7 weeks with activities occurring intermittently during that period. The NRC staff estimates that the level of effort for the audit is approximately 115 hours.

Special Requests

The NRC staff requests that Kairos Power ensure that their technical staff are available to answer questions during the audit. The NRC staff also requests that Kairos Power provide access to supporting documents via the Kairos online reference portal.

Deliverables

At the completion of the audit, the audit team will issue an audit summary within 90 days after the exit meeting. The audit summary will be declared and entered as an official agency record in NRC's ADAMS and be made available for public viewing through the publicly available records component of ADAMS.

References

Title 10 of the *Code of Federal Regulations*.

Please contact Samuel Cuadrado de Jesus (NRC) at 301-415-2946 or by email at samuel.cuadradodejesus@nrc.gov about any issues related to the conduct of the audit.

Date: August 20, 2021



Cuadrado de Jesus, Samuel signing on behalf
of Kennedy, William
on 08/19/21

Samuel Cuadrado, Project Manager for
William B. Kennedy, Acting Chief
Advanced Reactors Licensing Branch
Division of Advanced Reactors and Non-Power
Production and Utilization Facilities
Office of Nuclear Reactor Regulation

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PLAN (CAC/EPID NO. 000431/99902069/L-2021-LRM-0085)
DATED: AUGUST 20, 2021**

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OFFICE	NRR/DANU/UART/BC	NRR/DANU/UARL/BC	NRR/DANU/UARL/PM
NAME	MOrenak	WKennedy	SCuadrado
DATE	08/17/2021	08/17/2021	08/20 /2021

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