

Advanced Non-Power Reactor Licensing

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**Current and Prospective
Advanced Non-Power
Reactor Applicants**



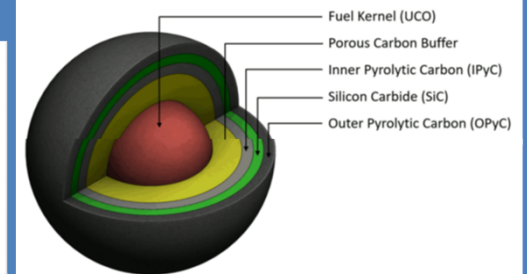
Kairos Power (Hermes)

Technology:

- TRISO pebble bed fuel, fluoride salt coolant, graphite moderator
- Hermes testing facility designed for 35 MW Thermal Power
- Facility to be located at East Tennessee Technology Park in Oak Ridge, TN

Project Status:

- Construction Permit Application and Preliminary Safety Analysis Report (PSAR) submitted to NRC in September 2021
- Project Number: 99902069



Source: Hermes PSAR
(ML21272A378)

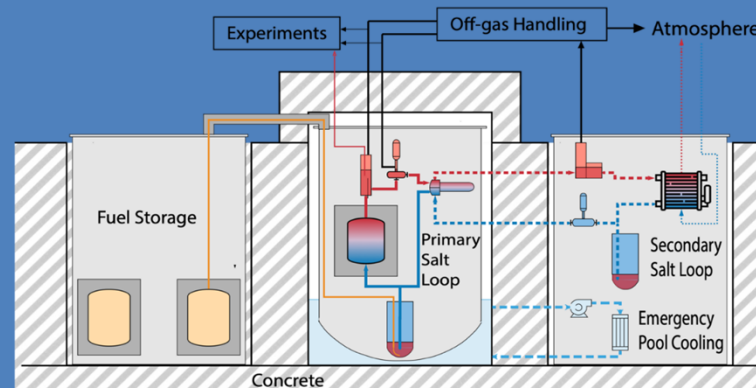
Abilene Christian University (ACU)

Technology:

- Graphite moderated fluoride salt flowing fluid reactor designed for 1 MW Thermal Power (Non-Power Molten Salt Reactor)
- Facility to be located on or near ACU campus in Abilene, TX

Project Status:

- Engaging in preapplication interactions
- Regulatory Engagement Plan and Letter of Intent submitted to NRC in March and July 2020
- Project Number: 99902088



Source: ACU Regulatory
Engagement Plan
(ML20241A071)

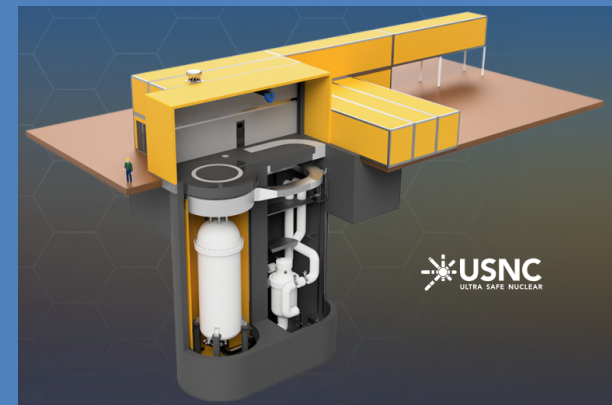
University of Illinois at Urbana- Champaign (UIUC)

Technology:

- Testing facility using Ultra Safe Nuclear's high temperature gas-cooled reactor technology
- 15 MW Thermal Power with electrical power conversion capability for campus use
- TRISO particle fuel encased within a dense silicon carbide matrix
- Facility to be located on UIUC campus in Urbana-Champaign, IL

Project Status:

- Letter of intent submitted May 2021
- Regulatory Engagement Plan expected by the end of 2021
- Project Number: 99902094



**Draft White Paper –
“Preapplication
Engagement to Optimize
Advanced Reactors
Application Reviews”
(ADAMS Accession No.
ML21145A106)**



Purpose

- Provides information to advanced reactor developers on the benefits of robust preapplication engagement in order to optimize application reviews.
- Encourages pre-application interactions with advanced reactor developers to provide stability and predictability in the licensing process through early identification and resolution of technical and policy issues that would affect licensing.
- Proposes a set of pre-application activities that, if fully executed, will enable staff to offer more predictable and shorter schedules and other benefits during the review of an advanced reactor license application.

Benefits of Pre-Application Engagement

- Enhanced regulatory predictability
- Greater review efficiency
- More visibility for public on key topics
- Early engagement and interactions with ACRS and other agencies
- Streamlined acceptance reviews
- Shorter full review schedules than the generic schedules
- Key Assumptions for shortened schedule
 - Timely Responses to Requests for Additional Information (RAIs)
 - No Substantive Changes to Application
 - No Significant Design Changes (Pre-application vs Application)

Pre-Application Engagement

- NRC staff applied a graded approach to identify key safety and environmental licensing areas for pre-application engagement with advanced reactor developers
 - Topical Reports - definitive findings
 - White Papers, Audits and Meetings – feedback and staff awareness

Topical Reports

- Principal Design Criteria for non-light water reactors
- Process for selection of licensing basis events and classification and treatment of structures, systems, and components
- Fuel qualification plan and associated methodologies
- Source term methodology
- Quality Assurance Program description
- Plan for protection of safeguards information
- Safety and accident analysis methodologies

Meetings, Audits and White Papers

- Probabilistic risk assessment
- Regulatory Gap Analysis
- Policy Issues
- Consensus codes and standards and code cases
- Environmental Activities
 - Unique or Novel Methodologies and Issues
 - Alternatives to the Proposed Project
 - Cooling Water Availability
 - Status of Permits and Authorizations
 - Meetings on critical components of environmental reviews identified in the white paper

Pre-Application Readiness Assessment

- Applicant should allow staff to conduct a pre-application readiness assessment
 - See Office Instruction LIC-116, “Pre-Application Readiness Assessment,” ADAMS Accession No. ML20104B698)
- Six months prior to submittal date
- Applicant should provide most current draft of safety analysis report and environmental report, referenced documentation, and applicant staff and contractors
- Right-sized scope based on type of application and extent of pre-application activities leading up to this point

**UNPL/UARL
Collaboration**



UNPL/UARL Collaboration for Advanced Non-Power Reactor Reviews

- Support efficient review of licensing submittals
- Leverage Advanced Reactor Licensing Branch (UARL) experience with licensing reviews involving novel reactor designs
- Leverage Non-Power Production and Utilization Facility Licensing Branch (UNPL) experience with non-power reactor licensing, and associated regulations, guidance, and precedents

UNPL/UARL Collaboration for Advanced Non-Power Reactor Reviews

- Project Managers (PMs) from both UARL and UNPL are assigned for each advanced non-power reactor applicant or prospective applicant, as appropriate
- UARL PM: Primary contact, and primary Project Management responsibility for each applicant or prospective applicant
- UNPL PM: Primary UNPL resource for each applicant or prospective applicant, to provide expertise and ensure consistency with non-power reactor guidance (e.g., NUREG-1537), precedents, and minimum regulation



Questions?