



# Graphite in the SSR-U

A brief overview

**July 2022**

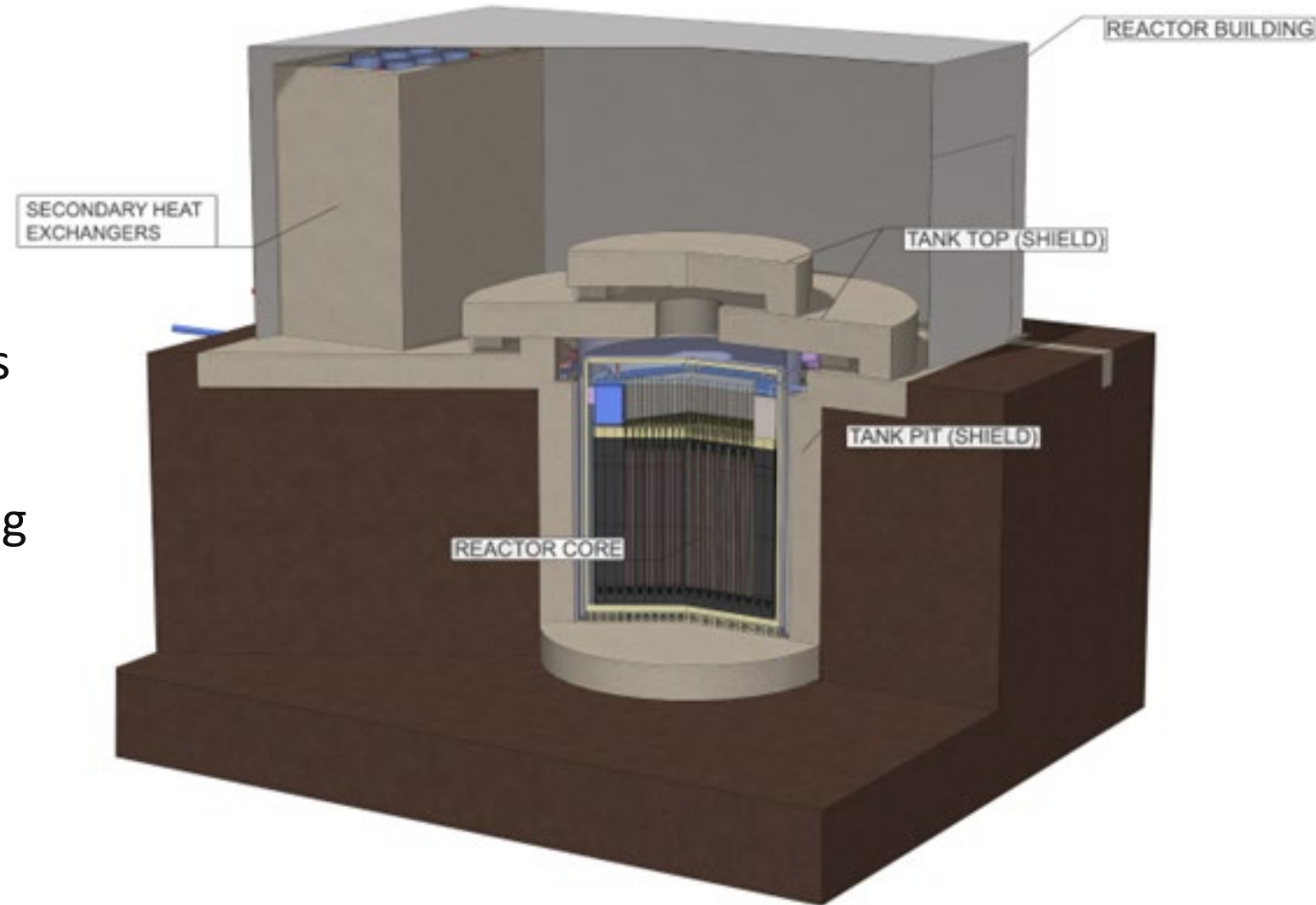
**Guy Anderson, Moltex Energy Chief Nuclear Officer**

# Objective:

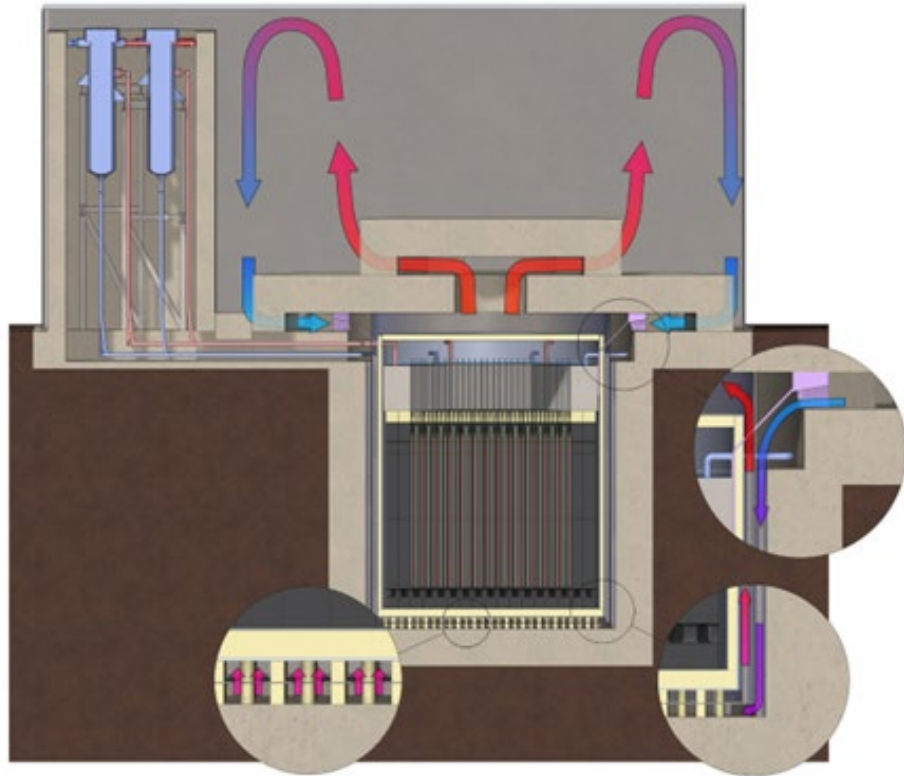
- Provide a very brief outline of the Moltex SSR-U reactor.
- Provide information on how graphite is to be used in the reactor and the issues surrounding an approach to substantiation of its performance.

# SSR-U Reactor

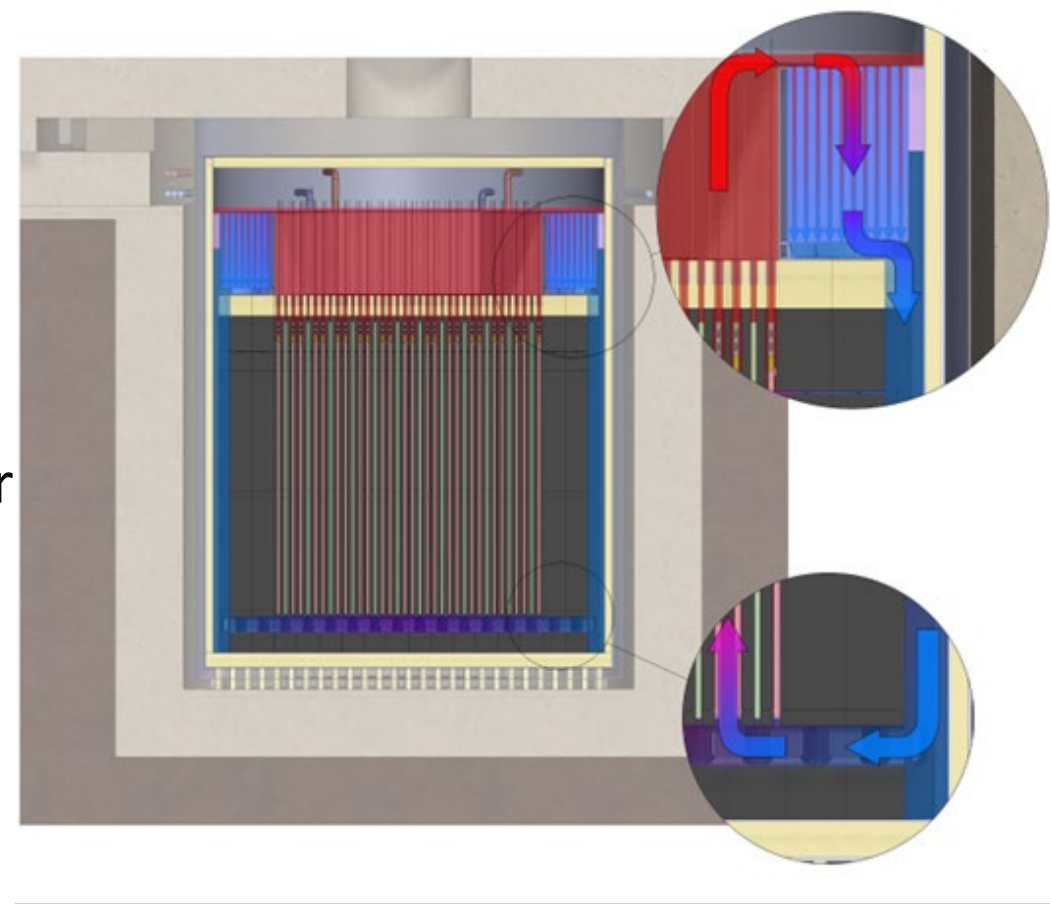
- Nominal 40 MW(th)
- Fuel salt in pins cooled by natural circulation of coolant salt.
- Fuel Pins in individual channels in graphite.
- Core made up from interlocking graphite blocks.
- Leaning on UK AGR / Magnox technology and experience for high temperatures and use of graphite



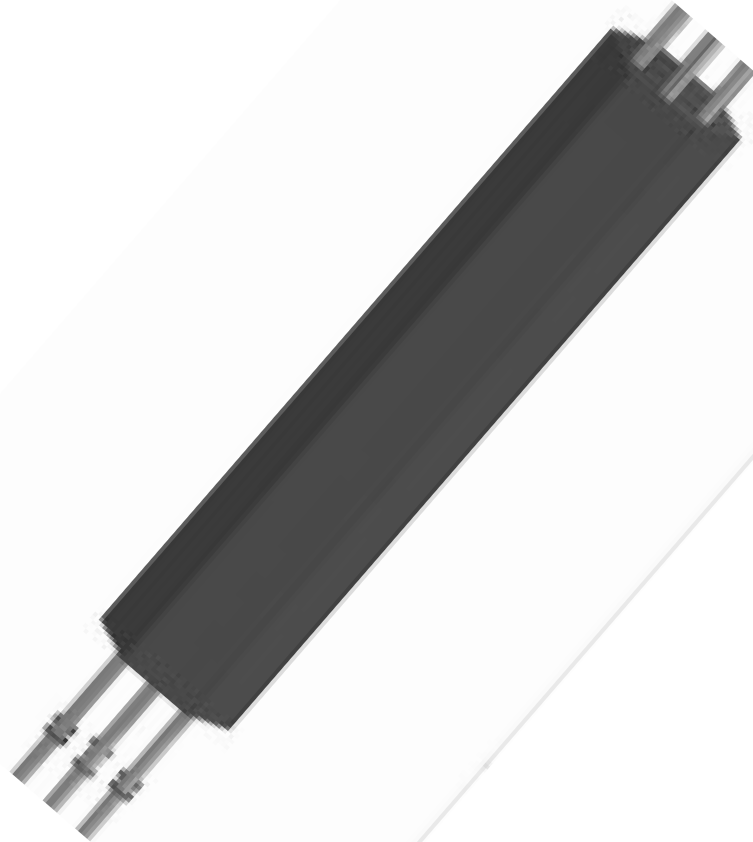
# Heat Removal Paths



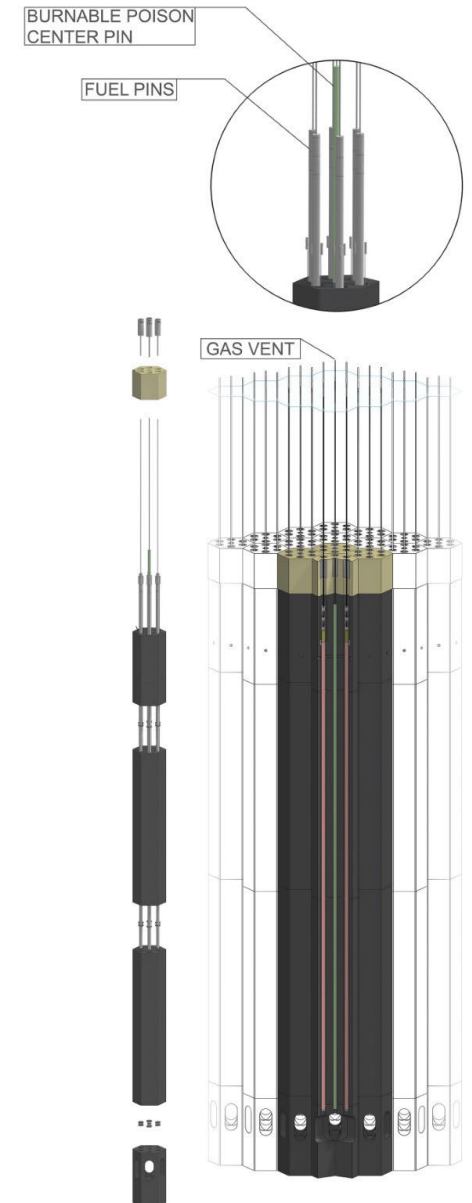
- Reactor operates by responding to the demand for heat.
- Heat supplied to thermal storage salt at 700°C
- Passive decay heat removal via reactor tank walls



# Graphite Core Components



- Hexagonal section graphite bricks
- Axial holes drilled through for fuel pins / tubes and associated coolant paths
- Vertical alignment feature
- Horizontal alignment through hexagonal packing



# Operating Conditions

- Fuel and Coolant Salts are fluorides and don't contain lithium or beryllium.
- Coolant temperatures ~mid 700°C.
- Low power density.
- Natural circulation / modest pressure drops / flow velocities.
- Reactor operates 16 – 20 years between fuelling.
- Refuelling constitutes a full core change with the option also to replace graphite components.

## Current Graphite Work

- Use of graphites more aligned to prior UK experience rather than modern “nuclear” graphites – largely due to cost.
- Chemical compatibility testing between salts, graphite and steel.
- Core physics and thermal hydraulics calculations.
- Early estimated of likely dimensional change and hence stresses / deformation of core bricks.

# THANK YOU