Why does sodium perform better as a coolant during nominal operation?

Sodium performs better as a coolant during nominal operation due to its higher thermal conductivity compared to lead. This results in a smaller temperature drop between the fuel cladding and the coolant. Additionally, the flow velocity in sodium-cooled reactors can be higher than in lead-cooled reactors, allowing for a smaller flow area in the former. (Pages 79-80)

What makes lead a better choice for passive decay heat removal?

Lead has better heat transfer properties than sodium, making it a better choice for passive decay heat removal. Additionally, lead has a higher boiling temperature and lower vapor pressure than sodium, reducing the risk of leakage in a loss-of-coolant accident. (found on page 81)

How does coolant activation impact operation, maintenance and decommissioning?

Coolant activation can lead to the production of radioactive isotopes which can impact the operation and maintenance of a nuclear reactor, as well as the decommissioning process. The radioactive isotopes can affect materials and structures, leading to the need for specialized maintenance procedures and increasing the complexity and cost of decommissioning. (Page 107)

What are the goals of Generation-IV reactors and how are they achieved using fast neutron spectrum?

The goals of Generation-IV reactors are to operate the fuel with a conversion ratio larger than unity, in conjunction with the capability of burning minor actinides. This is achieved by operating nuclear reactors on a fast neutron spectrum, which allows for greater efficiency and potential for waste reduction. This is mentioned in the background section of page 77 in the document "Fast neutron Generation IV reactors" by J. Wallenius & S. Bortot.

What benefit does using liquid metals for heat transport provide in nuclear reactors?

Using liquid metals for heat transport in nuclear reactors allows for operating the reactor under ambient pressure, eliminating issues related to loss of pressure accidents. Liquid metals also provide the necessary conditions for achieving a convention ratio larger than unity and for burning minor actinides. Page 77-78.

What determines the difference in heat transfer between sodium and lead in reactors?

The primary factor that determines the difference in heat transfer between sodium and lead in reactors is the hydraulic diameter of the coolant channel, which is three times larger for lead due to limitations in flow velocity. This results in a poorer transfer of heat from the cladding to the bulk coolant. (Page 8)