

NE-20-23935, RELAP5-3D Development and Assessment for Liquid-fueled Molten Salt Reactor Licensure

Natura Resources (Natura) is a company that commercializes a diverse line of advanced liquid fueled molten salt micro-reactors. Natura's vision is to commercialize a diverse line of advanced liquid fueled molten salt micro-reactors that support global needs for remote application energy solutions that are inherently safe, sustainable, and environmentally responsible. With this goal, the biggest corporate challenge facing Natura is developing the comprehensive funding portfolio required to reach profitability due the innovative nuclear system technology.

The capability to license a novel low power Molten Salt Research Reactor (MSRR) using a fluoride-based salt fuel mixture poses unique challenges to the data boundaries and functionality of current modeling software tools. These software tools are required in design decisions and in licensing review. The limitation in data and modeling software pose a significant design and licensing challenge to understanding the MSRR response in normal and accident conditions.

Idaho National Laboratory will support operation, modification, and assessment of the RELAP5-3D code for application to the MSRR design and licensing pathway to resolve data limitations for both the input models for the plant design and models specific to the liquid fuel molten salt core. An advanced RELAP5-3D code is an important capability for reaching Natura goals and will provide benefit to other molten salt reactor companies seeking to advance this technology.