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Safeguards by Design process of LDR-50 concept with consideration of safety and security

Finnish LDR-50 is an SMR concept designed for district heating production. This paper examines the important integration of Safeguards by Design (SBD) principles within the development and deployment of LDR-50 design to ensure effective and cost-efficient implementation of nuclear safeguards. SBD process and relevant considerations related to 3S interfaces will be discussed.

The concept of SBD involves integrating safeguards considerations into the design phase of nuclear facilities. While traditional large-scale nuclear reactors have well-established safeguards concepts, the unique characteristics of SMRs necessitate tailored approaches to address safeguards challenges effectively. A specific challenge is cost-efficiency from the perspective of both the IAEA safeguards and the nuclear operator.

Key topics to be discussed in the paper include:

• Design Integration: Examining strategies for seamlessly integrating safeguards measures into the security and safety processes of SMRs, considering operational flexibility.

• Technological Solutions: Assessing the development of advanced technologies, such as remote operation and monitoring, to assist in achieving the objectives of SBD. Additionally, the reactor and its fuel handling processes should be designed with safeguards in mind, to avoid costly problems during construction, commissioning, and operation phases.

• Regulatory Frameworks: Analyzing active role of regulatory body in Finland (STUK) in promoting SBD for LDR-50 design and developing new regulatory framework aiming at efficient implementation of safeguards in SMRs together with safety and security.

• International Collaboration: Highlighting the importance of international cooperation and knowledge-sharing initiatives to facilitate the adoption of SBD practices.

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