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Consideration of a Regulatory Framework for Safeguards in SMRs

This study proposes a legal framework to integrate Safeguards by Design (SBD) principles from the design phase of Small Modular Reactors (SMRs), addressing the gap in current practices where safeguards are not considered early in the design and construction phases. The International Atomic Energy Agency (IAEA) encourages early cooperation among designers, operators, regulators, and itself to include detailed nuclear facility information from the beginning of the design phase. However, the existing process only mandates the submission of a preliminary Design Information Questionnaire (DIQ) seven months before construction, with a final DIQ submitted seven months before nuclear material arrival, missing early SBD adoption.

The current legal foundation and licensing process, based on the Nuclear Safety Act, outlines construction and operation permit requirements but lacks integration of safeguards in the early stages. The study suggests amending the Nuclear Safety Act to include safeguards-related documentation in the licensing process, thereby facilitating SBD implementation. This includes expanding the Material Accounting Regulation for Nuclear Facilities (MARN) content to support SBD practices effectively.

Additionally, utilizing subsidiary documents and the Regulation on the Report of International Strategic Materials (RISM) could enforce SBD principles by requiring the submission of design information at each construction stage. This approach requires proactive collaboration from licensees and a regulatory framework that includes specific penalties for non-compliance with design change disclosures.

The study concludes that incorporating safeguards into the licensing process through legislative amendments or by leveraging existing regulations could ensure SBD implementation from the initial design phase, emphasizing the need for close collaboration among all stakeholders to overcome current challenges in safeguard integration.

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