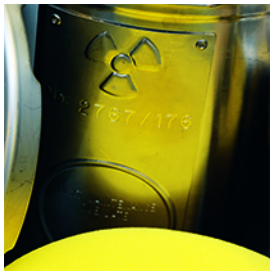

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Bridging nuclear safety, security and safeguards at predisposal and geological disposal of high-level radioactive waste and spent nuclear fuel

In order to consider predisposal and geological disposal of high-level radioactive waste and spent nuclear fuel, if declared as waste, in all its complexity, related nuclear safety, security and safeguards issues must be taken into account. While safety can benefit from some provisions regarding safeguards and physical protection (security), it may also be contravened by others. Some techniques for monitoring geological repositories, such as environmental sampling, could provide relevant data for safety, security and safeguards. Other techniques, such as geophysical measurements for safeguards verification, are to be placed in a way that does not infringe safety requirements.

Therefore, identifying both synergies in overlapping methods or techniques and differences in the requirements with respect to safety, security and safeguards may help to take advantage of inherent synergies and conflicting requirements at the same time.

The IAEA generally considers safety, security and safeguards as essential elements in all life cycle stages of nuclear facilities. In this context, the IAEA is issuing a guidance document aimed at informing stakeholders how to design facilities for nuclear waste management by early consideration of safeguards in the planning stage so that provisions can be better integrated with other design requirements as to safety and security.

Here we show that the implementation of this approach, also referred to as “safeguards by design”(SBD), or, as an augmented term, “safety, security, safeguards by design”(3SBD), requires further R&D for fully understanding the common and conflicting requirements relating to safeguards, security and safety. Further R&D can result in methods and technologies that would be best suited for the holistic consideration of safety, security and safeguards provisions while minimizing their impacts on long-term interim storage facilities and geological repositories during their life cycle stages, including the post-closure stage of geological repositories. The presentation discusses, whether a 3SBD toolbox can be developed, including nuclear measurements, containment and surveillance, environmental monitoring, continuity of knowledge, to the benefit of all safety, security and safeguards at predisposal and geological disposal. At the end of the day, this may reduce efforts and costs related to nuclear waste management.

Therefore it is proposed to develop a coordinated, complementary approach to address and manage safety, security, and safeguards aspects of predisposal and geological disposal of high-level radioactive waste and spent nuclear fuel in the most effective and efficient way possible.

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