Building Future Safeguards Capabilities
SYMPOSIUM
ON INTERNATIONAL SAFEGUARDS

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Study on applicability of ultrasonic inspection technique to improve the CoK of Geological disposal canister containing spent fuels

The government of Japan has initiated the research study for the direct disposal of spent fuels (SFs) in stable deep geological formation from the standpoint of securing a broad range of options according to the Strategic Energy Plan issued in 2014.
In this study, SFs are disposed in a geological repository after encapsulated in a disposal canister, and the disposal canisters shall be managed under the Agency safeguards to provide a credible assurance of non-diversion. Once SFs are encapsulated with rid welding, it's impractical to re-verify SFs directly and the robust CoK (Continuity of Knowledge) measure is required. The CoK has to be maintained for long period taking into account retrieval of SFs based on a national strategy. In order to satisfy these requirements, we focused on the observation of inside weld zone by ultrasonic inspection technique. The unique natural characteristics (blowhole, beads, cracks etc.) are generated at the closed weld that could be used for a canister identification and a measure to confirm maintaining CoK, and the artificial characteristics applied inside weld may be more practical because size, number and distribution etc. of natural characteristics are uncertain. Then, we studied size, depth, array and distance of artificial characteristics in order that artificial characteristics could be used for an identification and a measures to confirm maintaining CoK, while they give no effect on the integrity of weld. We studied applicability and capability of ultrasonic technique by performing simulation of ultrasonic waves and by measuring a test peace with artificial characteristics. Finally, we found the ultrasonic inspection technique could be applied for long term CoK of disposal canister. This paper provides the results of the study on applicability of natural and artificial characteristics inside weld and ultrasonic measurement technique as a verification measure.

Which "Key Question" does your Abstract address?

NEW2.1

Topics

NEW2

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