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Proliferation Potential and Safeguards Challenges of Pyroprocesses

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The nuclear industry has continued to evolve technologically in the area of advanced reactors and other advanced fuel cycle facilities. With regard to recycling spent fuel, pyroprocesses have undergone a resurgence of interest in the last decade or so. Considering the ongoing development of pyroprocessing technologies worldwide, the IAEA is enhancing its technical knowledge related to pyroprocesses and developing generic safeguards approaches for model pyroprocessing facilities to ensure future facilities will be 'safeguards friendly' allowing for the implementation of effective and efficient safeguards.

The following R&D activities related to the development of safeguards approaches for pyroprocessing facilities are being performed or planned under IAEA Member State Support Programmes:

- Safeguards Approach for Reference Engineering-scale Pyroprocessing Facility (ROK)
- Trilateral Safeguards and Security Working Group under the USA/ROK Joint Fuel Cycle Study (ROK, USA)
- Safeguards Technical Report on Pyroprocessing (EC, France, Japan, ROK)
- Field Test of Safeguards Measures and Equipment at Pyroprocessing Facilities (under discussion with ROK)

In parallel to the R&D activities, preliminary assessment of the proliferation potential of pyroprocessing technology and a study on generic technical objectives and applicable safeguards measures/activities for pyroprocessing facilities were performed to identify safeguards challenges to be addressed and to guide the direction and focus of the R&D activities.

The assessment of the proliferation potential of the pyroprocess has led to the identification of a number of safeguards challenges, categorized as follows:

- Larger measurement uncertainties of feed, product, waste and in-process material,
- Sampling procedures, destructive analysis and non-destructive analysis for feed, product, waste and in-process materials are not yet established
- Process parameters are not well established
- Signature and indicators of the physical model need to be updated

The paper summarizes the development of concept and technology to meet future safeguards needs of pyroprocessing facilities.

Country or International Organization

International Atomic Energy Agency

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Primary author: HORI, Masato (IAEA)

Co-authors: PELLECHI, Mark (IAEA); LI, Shelly (IAEA)

Presenter: HORI, Masato (IAEA)

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