Spent Fuel Monitoring

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Recommendations of the Commission

- Develop geological disposal facilities
- Consolidated interim storage facilities
- US leadership in international efforts to address safety, waste management, non-proliferation and security concerns
- DOE to review its R&D “road map”

Consequences

- Spent fuel will be moved from current locations to centralized storages

Challenges

- Monitoring of spent fuel can last over 100 years
- Calls for

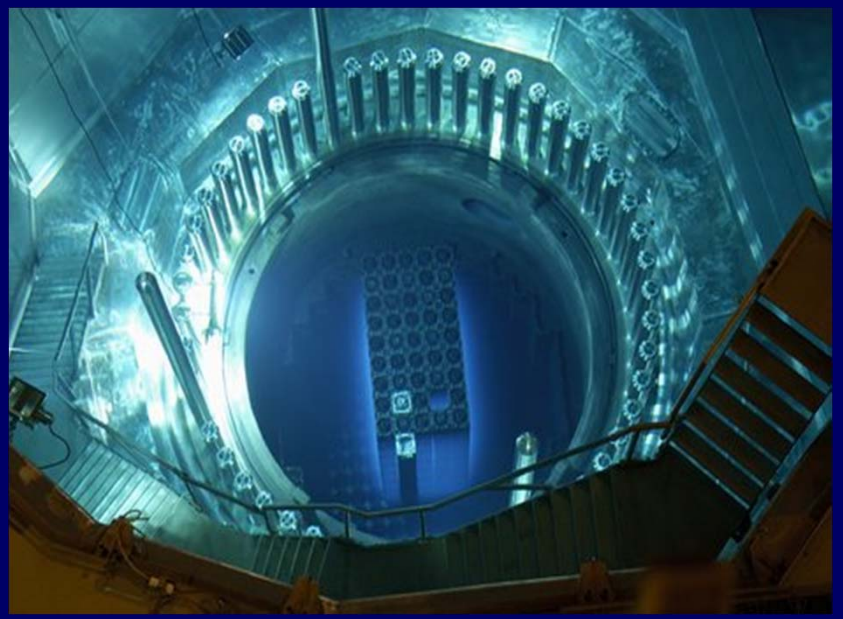
- less resource consuming approaches
- simple robust remotely interrogated verification systems
- minimum need for re-verification of spent fuel

Opportunities

- Safeguards-By-Design taking into account safety, security and safeguards requirements from the beginning
- Paves way for “from cradle to grave” approach which reduces proliferation risks
- STR-360 Facility Design and Plant Operation Features that facilitate the Implementation of IAEA Safeguards, 2009

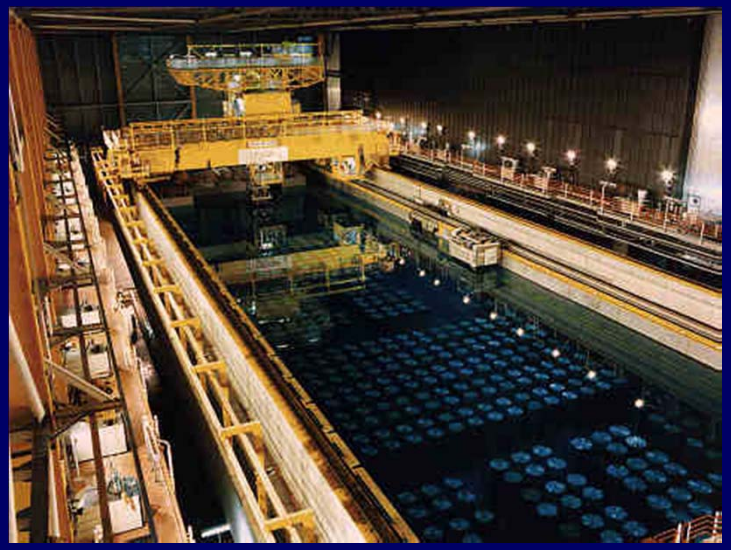
IAEA Verification Experience

- Experience in monitoring spent fuel at power and research reactors



IAEA Verification Experience

- Spent fuel in wet and dry storages e.g. Japan, Kazakhstan, Sweden, Canada and Germany



IAEA Verification Experience

- Shipment and storing of vitrified high level waste

Verification Requirements – Wet Storages

- Verification by a Cherenkov viewing device
- Kept under optical surveillance
- Traditionally re-verification once a year; under integrated safeguards once in three years

Dual C/S

- Spent fuel - “difficult to assess item”
- Verification prior to fuel transferred into casks
- Cask sealing and optical surveillance.

Unattended Monitoring

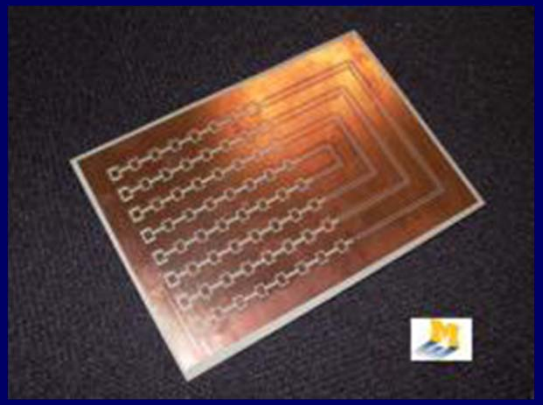
- Witnessing cask loading and unloading resource intensive
- Under water surveillance and monitors

Remote Monitoring/Inspection

- Take advantage of unattended monitoring systems by transmitting images and other data to Vienna
- Combine with unannounced inspections to certifiy the integrity of the system

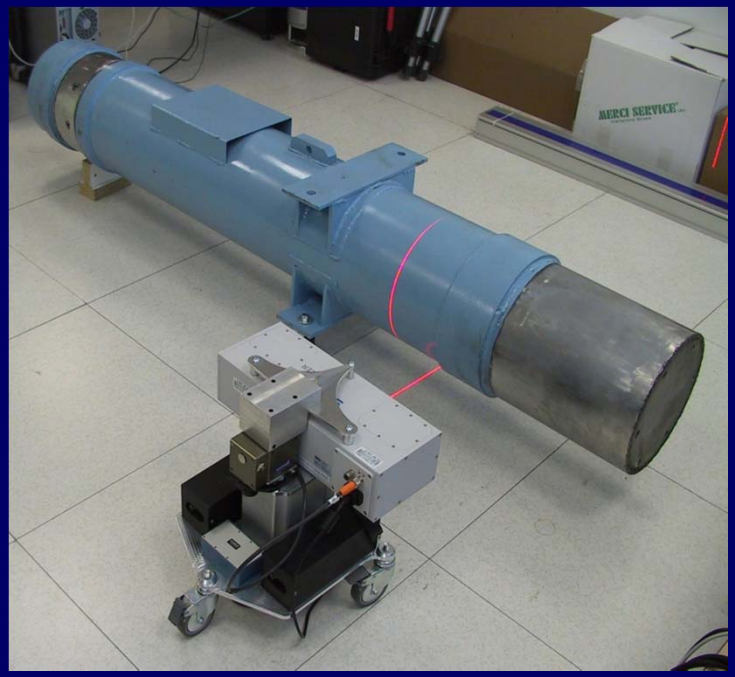
Further developments

- RFID
- Remotely monitored sealing array (RMSA)



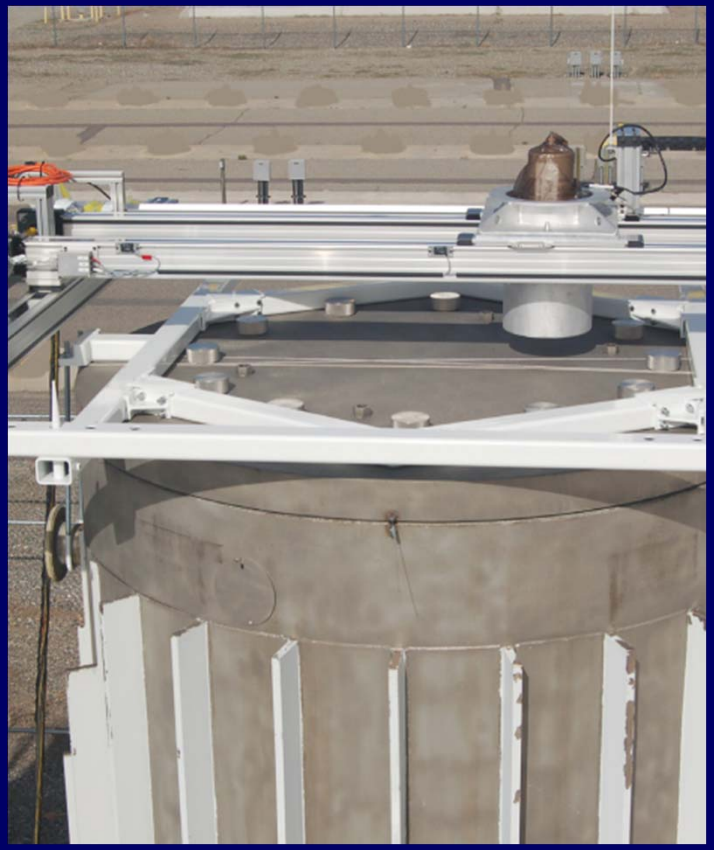
Further developments

- Canister integrity using laser surface mapping of welds



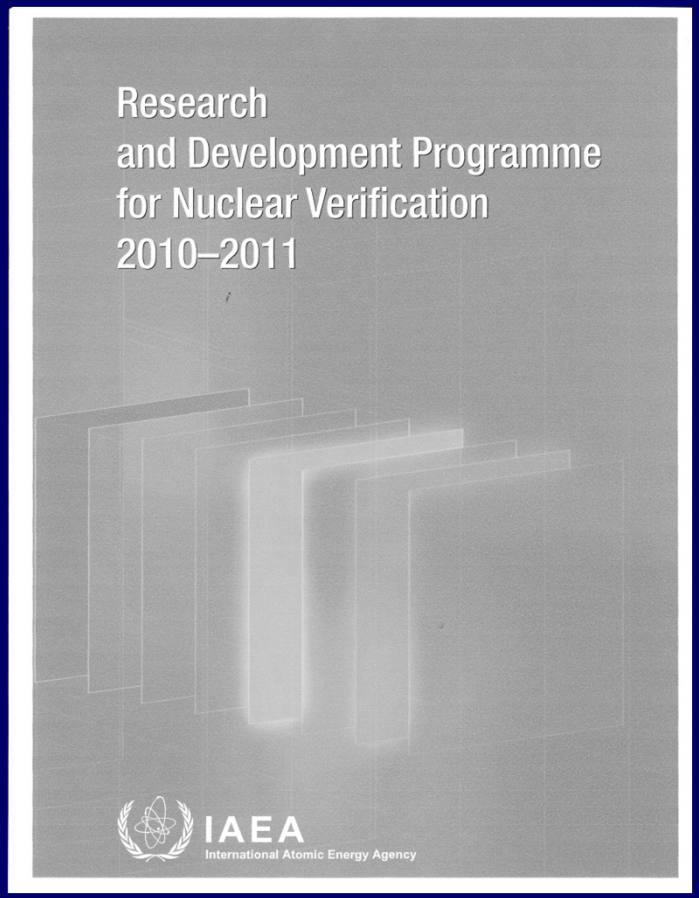
Further developments

- Gamma scanning of containers
- In-situ measurements of neitron signatures



R&D – Key to Success

- The IAEA publishes its next R&D needs document in February 2012



To-morrow's Tools

- You cannot win to-morrow's wars with yesterday's tools
- Develop approaches requiring less inspection resources

In Summary

- Safeguards, security and safety by design
- Tap to new technologies with remote inspections combined with announced access scheme