Advanced Safeguards Approaches for New Reprocessing Facilities

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Advanced Safeguards Approaches for New Reprocessing Facilities

- **Project sponsored by U.S. NNSA, Office of NA-243 to develop advanced safeguards approaches for**
  - New Reprocessing Facilities
  - New TRU-Fuel Fabrication Facilities
  - New Fast Reactors
- **Safeguards Approaches consistent with International (IAEA) Safeguards, because:**
  - Technology might be shared with partner states under international safeguards (having INFCIRC/153 agreements with the IAEA),
  - New processes and technology are to be more proliferation resistant and more amenable to nuclear material safeguards.

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- **Presentation summarizes Advanced Safeguards Approach study for Safeguarding New Reprocessing Facilities**
- **Study identifies "development needs" for technologies and methods to safeguard future reprocessing plants**
- **Safeguards methods and approaches considered in this study:**
  - West Valley, New York, USA
  - U.S. DOE PUREX Plant, Hanford Site, USA
  - JAEA Tokai Reprocessing Plant, Tokaimura, Japan
  - JNFL Rokkasho Reprocessing Plant, Rokkashomura, Japan

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- **Results from the Study:**
  - **An International Safeguards Project and Forum is needed** to address SG criteria for pyro-reprocessing and very large scale reprocessing
  - **The use of "Remote Monitoring" and "Process Monitoring" will be required** to more effectively and efficiently safeguard future reprocessing plants
  - **On-line assay techniques for determining nuclear material content in process streams are needed** for implementing remote monitoring (and near-real time accounting)
  - **NDA techniques are needed to more accurately determine the nuclear material content of spent fuel** (+/- 5% total Pu and actinides)
  - **More highly integrated unattended safeguards and surveillance data collection and evaluation systems are needed.** (Review of this data must be automated).

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- **Results from the Study:**
  - **It may be possible to reduce batch verification frequency** if "Process Monitoring" is developed
  - **An effective Safeguards Approach for the aqueous line at AFCF can be developed,** based on the approach at RRP
  - **It will be very challenging to meet the IAEA inspection goals for a 3,000 tonne per year plant (CFTC)**
  - **It would be easier to meet these goals if the plant were constructed of four 700 to 800 tonne per year process lines**
  - **Development work is needed to measure the Pu and actinide content in metallic pyroprocessing solutions (to meet +/- 1% accuracy)**

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Reference- Simplified Process Flow Schematic of PUREX Process at RRP