Nuclear power company case on nuclear waste management, developing methods tools and skills

Dr. Sami Hautakangas, 12 April, 2018
Policies and responsibilities for safe nuclear waste management in Finland
Fortum has gained hands-on nuclear experience since the 1960’s. Result: Unique position in the nuclear industry.

- Nuclear license holder
- Nuclear power plant & waste management operator
- Nuclear service & technology provider
- Strong in-house nuclear know-how and expertise
  - several NPP technologies
  - all phases of the plant lifecycle

Nuclear power capacity: 2,814 MW

- 36% Loviisa 1,009 MW
- 26% Forsmark 727 MW*
- 22% Oskarshamn 607 MW*
- 17% Olkiluoto 471 MW*

* Fortum's share
Managing Low and Intermediate level waste from the controlled area at Loviisa NPP, Finland

All waste generated in the controlled area

Activity above the exemption limit

To final disposal into the final repository (VLJ)

Activity below the exemption limit

Metal, wood, cardboard
To recycling

Waste
To landfill

Hazardous waste
To hazardous waste treatment plant
Final Repository for Low and Medium Level Waste

- Main stairway
- Elevator and stairway shaft
- Control and service rooms
- Access tunnel
- Final disposal caverns for decommissioning waste
- Decommissioning waste halls
- Cavern for large primary circuit components
- Reactor silos
- Connection tunnel
- Ventilation shaft
- Maintenance waste halls
- Hall for solidified waste
- Planned extension for decommissioning waste
Nures® for purifying radioactive waters

- The best available technology for removing cesium, cobalt, strontium and antimony

- Nures® purifies liquid radioactive waste to a fraction of the original waste volume

- Effective purification results and significant savings in waste treatment costs

- Supplied to over 60 customers around the world since the 1990’s

- Significant volumes to Fukushima, Japan, to solve the wastewater problem
NURES® technology used as a part of ALPS™ system in Fukushima, Japan

- About 1000-1200 m³ cleaned a day

- Record decontamination factors have been achieved!
  - Max decontamination factor for cesium has been over 8,000,000
  - Max decontamination factor for strontium has been over 165,000,000 (precipitation + SrTreat®)
We offer a wide range of nuclear services
Our expertise is based on nuclear experience since the 1960’s

Highly efficient software Apros® for simulating all processes of a power plant and testing I&C; different simulators.

One of the World’s most effective solutions for purification of radioactive liquids NURES®

Solutions for interim storage and final disposal of nuclear waste. Decommissioning services.

Method of system engineering ADLAS® for licensing and safety systems design. Consulting for safety upgrade, power upgrade, lifetime extensions, new-build projects.

Applications of virtual reality, augmented reality, 360 video for training and more efficient maintenance and projects execution.

Methods ReMaint® for optimization of maintenance activities and execution of annual outages to increase nuclear plants availability and safety.
Overview of Fortum’s current nuclear solutions

- **Apros**: Full scale, multi-purpose advanced process simulator

- **Nures**: Purification of radioactive liquids

- **ADLAS®**: Advanced Licensing and Safety method for NPPs

- **Design**: Nuclear waste management facilities, high density fuel racks, control rooms, etc.

- **Consulting**: Expertise from nuclear waste management and nuclear safety to plant performance and modernizations etc.

- **Virtual Panels**: Innovative human machine interface for nuclear power plant simulators

- **Pati**: Nuclear material management system

- **Maintenance concept**: 12-step management model to improve NPP maintenance

- **Solidification plant design**: Design and support in setting up facility for handling all liquid waste
Thank you!

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