Westinghouse Transport Package License Review of ATF and >5% Enrichments

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Overview

• Westinghouse Transport Overview
  – World-wide Fleet of Packages

• ATF Transport
  – Features and Licensing
  – Previous Experience

• >5 wt.% U-235 Enrichment Transport
  – Front End Transport
  – Westinghouse Fresh Fuel Package Licensing

• Westinghouse Transport Package Licensing

• Closing
Westinghouse Transport Overview

- Westinghouse has a world-wide fleet of packages to meet customer needs
  - Powder and pellet forms
  - Fresh fuel for PWR, VVER, BWR and AGR
  - Slightly contaminated uranium
Westinghouse Transport Overview

- Focus on Westinghouse Traveller Packages
  - Cylindrical, steel package for one fuel assembly or loose fuel rod container
  - Type AF-96 and B(U)F
  - PWR fuel assemblies and LWR fuel rods
  - Based in U.S., with Part 71 dockets, and world-wide validations in 18 countries
  - Majority of transports are PWR fresh fuel contents
ATF Transport

- **EnCore® Fuel is ATF featured products**
  - Current ATF products being licensed in Westinghouse packages:
    - Chromium-coating and liners for cladding
    - ADOPT™ UO₂ fuels (Al and Cr oxide doping) and U₃Si₂ fuels

- **Package licensing for Traveller (USA/9297/AF-96)**
  - Most cladding enhancement have a minimal impact on package safety case; evaluation based on the mechanical strength of the materials
  - Fuel enhancements require new criticality safety case evaluations

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ATF Transport

• Licensing of ATF in front-end packages
  – Requires safety case evaluation (mechanical and criticality Safety)
  – Fuel powder, pellets, and assemblies are not restricted by any current regulation or guidance

• Westinghouse previous experience
  – In 2019, Westinghouse shipped EnCore lead test assemblies with ADOPT UO2 fuel and Cr-coated cladding to Byron 2 under a NRC Special arrangement for the Traveller package
>5 wt.% U-235 Enrichment Transport

- Focus on front-end transports
  - Restrictions on UF6 based on the Part 71.55(g)(4) and 49CFR173.420 requirement of ANSI N14.1 approved cylinders and thus restricted to 5%U235 for 30B cylinder
  - Westinghouse submitted interest to PNNL to support development of >5 wt.% 30B cylinder
  - Powder/pellet forms using currently licensed, drum-style packagings without further license amendments depending on package
  - Fuel assemblies (more on next slide)

Westinghouse is working to develop new packages and expand existing packages
>5 wt.% U-235 Enrichment Transport

- Westinghouse Fresh Fuel Package Licensing
  - Goal is to maintain packaging design
  - Criticality safety case is the key to maintaining the existing design
  - Loose fuel rod content
    - Safety case can compensate for more conservatisms and still allow for larger quantities of fuel due to restrictions on content
  - Fuel assembly content
    - Requires removing conservatisms from older analyses and using physical results of accident conditions testing to restrain criticality analyses

Evaluation of the safety case allows for >5wt.% U-235 fuels in existing package designs
Westinghouse Transport Package Licensing

- Westinghouse is moving forward with licensing several ATF features in the Traveller package Type AF-96 and B(U)F licenses in 2020
- Westinghouse is working on revising the Traveller package safety case for >5wt.% U-235 fuels (assemblies and rods), and proceeding with package license amendments in the future

Westinghouse seeks to change existing package licenses with new ATF contents
Closing

- Westinghouse and industry are pushing to expand transport packaging safety cases to license new fuel features to meet the demand of the changing environment