



APOLLO2-A/ARTEMIS-B TR: Extension to AFM

Alex Bennett

February 21, 2023

AFM Extension for ANP-10350

- Advanced Fuel Management (AFM) includes:
 - Uranium enrichment limit increased to 6.5%
 - Rod average burnup limit increased to 75 GWd/MTU
- Verification of AFM will be performed in terms of:
 - Neutronics
 - Fuel Rod Model (FRM)

Neutronics Verification

- APOLLO2-A / SERPENT BOL comparisons
 - Will be extended using ATRIUM 11 lattices with a maximum fuel rod enrichment of 6.5%
- APOLLO2-A / ARTEMIS-B colorset comparisons
 - Will be extended using ATRIUM 11 lattices with a maximum fuel rod enrichment of 6.5%
- APOLLO2-A / SERPENT burnup comparisons
 - Increased Enrichment
 - Current results show similar error trends for all burnup comparisons
 - This error shape is also expected for increased enrichment
 - Increased Burnup
 - Current results show that the error is relatively insensitive to burnup at high burnups
 - High burnup nodes have a small effect on the nodal solution
 - As a result, the burnup comparisons will not be extended

FRM Verification

- The ARTEMIS-B FRM is developed to be consistent with the RODEX4
- Any changes to RODEX4 will be incorporated into ARTEMIS-B
- Steady state results are not very sensitive to the FRM
 - Sensitivities as a function of enrichment are shown in the TR
 - Sensitivities as a function of assembly configuration are shown in the TR
 - Sensitivities as a function of gadolinium will be shown in the RAI's
- Changes to the enrichment and burnup limit will be evaluated against RODEX4
 - This verification will be performed internally at Framatome
 - The change management process in Section 14.4 of the TR will be used for internal evaluation
 - No further changes to ANP-10350 will be needed for the FRM

AFM Extension for ANP-10350

- The proposed updates to ANP-10350 will be submitted to the NRC Q4 of 2023
- The proposed updates to ANP-10350 will include:
 - APOLLO2-A / SERPENT BOL comparisons with increased enrichment
 - APOLLO2-A / ARTEMIS-B colorset comparisons with increased enrichment

Any reproduction, alteration, transmission to any third party or publication in whole or in part of this document and/or its content is prohibited unless Framatome has provided its prior and written consent.

This document and any information it contains shall not be used for any other purpose than the one for which they were provided. Legal action may be taken against any infringer and/or any person breaching the aforementioned obligations

framatome

