



EATF Status

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AGENDA

- Overview
- Schedule Update
- Design Review Process
- Lead Test Assembly Programs
- Licensing Approach
- Next Steps
- Summary

EATF Solution Cr-Coated Cladding / Chromia-doped Pellets

Base M5 Cladding

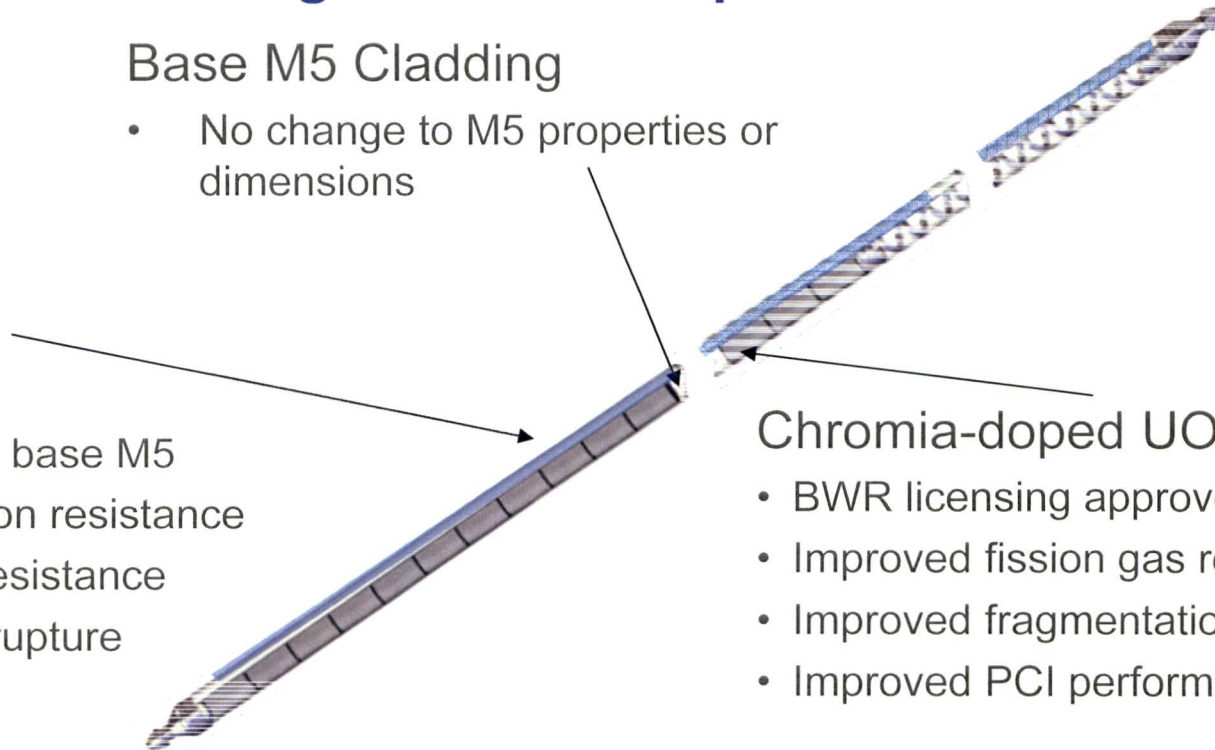
- No change to M5 properties or dimensions

Cr-coating

- 10-20 μm
- Does not change base M5
- Improved oxidation resistance
- Improved wear resistance
- Reduced LOCA rupture

Chromia-doped UO_2 pellets

- BWR licensing approved
- Improved fission gas retention
- Improved fragmentation behavior
- Improved PCI performance



Improvement Objectives

Objective for Framatome's Advanced Products and Methods: License advanced codes/methods/materials to achieve US Nuclear industry goals

- Improved accident behavior
- Improved PCI performance
- Improved load follow

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- Increased enrichment
 - Framatome will address increased enrichment separately

Overview of Plan

Base Topical Reports for Advanced Methods

- ANP-10323P Revision 1 “GALILEO Fuel Rod Thermal-Mechanical Methodology for Pressurized Water Reactors”
- ANP-10339P “ARITA - ARCADIA/RELAP Integrated Transient Analysis Methodology”
- BAW-10227P Revision 2 “Evaluation of Advanced Cladding and Structural Material (M5) in PWR Reactor Fuel”
- Topical report for implementation of GALILEO in W&CE LOCA methodologies (SBLOCA and RLBLOCA)

Extension to Advanced Products (Cr-Cr EATF Solution)

- Chromia-doped pellet topical report supplement (ANP-10340P) report to extend material properties to PWR methodologies
- BAW-10227 supplement to incorporate chromium-coated cladding (addressing base methods)

Advanced Products - EATF

Cr-Coated Cladding Topical Report

Purpose

- Implement Chromium coated cladding properties into PWR codes and methods
- Supplement to BAW-10227P Revision 2

Scope Detail

Chromium coated M5 cladding

- Define new properties / models for Cr-coated cladding
- Disposition M5 properties where applicable

Implementation of Cr-coated cladding in

- GALILEO
- LOCA Methodologies
- ARITA / AREA Methodologies

Address failure mechanisms and surveillance plans

Appropriate sample problems for Cr-coated cladding addressed

Advanced Products - EATF

Chromia-Doped Pellet Topical Report

Purpose

- Extend chromia-doped pellet properties provided in base report to PWR methodologies
- Supplement to ANP-10340P-A

Scope Details

- Will address application of chromia-doped pellet models into
 - GALILEO
 - SBLOCA
 - RLBLOCA
 - Non-LOCA (ARITA and AREA)
- PWR vs. BWR methodology differences may drive alternative treatment of some base material properties
- Appropriate sample problems addressed

Schedule Update

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Design Review process

Framatome Fuel Design Process

Design Review Tools

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Fuel Design Activities for Cr-coated cladding

Failure Mode Effects Analysis (FMEA)

Cr-Coated Cladding Preliminary Design Review Board

Cr-coated Cladding Design Review Board Agenda

Lead Test Assemblies

Vogtle LTA Program – Southern Nuclear

ANO Unit 1 - LTA Program - Entergy

CE Plant LTA Program

Gösgen - LTA Program - Gösgen-Däniken AG

Irradiation Roadmap

EATF

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EATF Licensing Approach

NRC Review

Requested review schedule – **one year**

- Current NRC review period for Framatome topical reports – greater than two year average
- A different approach is necessary to achieve a one year review period

Experience with audits has been **excellent**

- Issues identified early and resolved quickly

Conceptual approach

- **Focused review**
 - In-depth audit for understanding – 2 to 4 weeks
 - Hold audit 4 weeks after submittal
 - **Modify or replace acceptance reviews**
- **Outcome of audit – Draft SE with open items**

Reviewer Continuity



Next Steps

Pre-submittal meeting for chromium coated cladding

- Topical report content
- Test plan description

NRC Audit for chromium coated cladding test plan

- Design Activities
- Test plan

Pre-submittal Meeting for chromia-doped fuel

- Topical report content

- In Lynchburg
- []
- One or two days
- Document findings in NRC audit report

Summary

- GOAL – Batch readiness in 2023
- Framatome design process – PIRT for fuel design changes
- Cr-coated cladding – Robust testing & irradiation program
- Broad industry support
- Defined licensing plan

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