



Advanced Fuel Management – Increased Enrichment – Pre-submittal Meeting

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Conference Call, April 30, 2020

Agenda

- Objectives..... Jerry Holm
- Introduction and background Jerry Holm
- Increased enrichment topical report Michelle Guzzardo
 - Outline of topical report
 - Neutronics
 - Decay heat
 - Other topics
- Summary Michelle Guzzardo
- Next steps Jerry Holm

Objectives

- Discuss topical report to support increased enrichment for SRP Chapter 4 and Chapter 15 methods
- Provide an opportunity for NRC feedback

Introduction and Background

Jerry Holm

Introduction and Background

- Advanced Codes and Methods topical reports
- Range of applicability for increased enrichment
- Schedules

Background – Advanced Codes and Methods

Neutronics	ARCADIA (ANP-10297P-A and S1P-A)
Thermal–Hydraulic	COBRA-FLX (ANP-10311P-A Revision 1)
CHF	GAIA CHF (ANP-10341P-A)
Non-LOCA	ARITA (ANP-10339P) and AREA (ANP-10338P-A)
SB LOCA	S-RELAP5 (EMF-2328P-A and S1P-A)
LB LOCA	S-RELAP5 (EMF-2103P-A Revision 3)
SB and LB LOCA	with GALILEO (new topical report)
Fuel Performance Code	GALILEO (ANP-10323P Revision 1)
External Loads	ANP-10337PA and Supplement 1P
Fuel Design topical report	GAIA (ANP-10342P-A) with Q12 (ANP-10334P-A)
M5 _{Framatome}	BAW-10227P Revision 2
Liftoff	BAW-10243P-A (statistical holddown)
Cladding Collapse	BAW-10084P-A Revision 3 (CROV)
Bow	XN-75-32P-A

Range of Applicability

Schedule Overview – Codes and Methods

Increased Enrichment

Michelle Guzzardo

Outline of Topical Report

Introduction

Neutronics

Decay heat

Areas not impacted

Impact of Increased Enrichment

Increasing enrichment impacts:

- Fission ratio between uranium and plutonium materials
 - Difference in fissile inventory as U-235 depletes
 - More U-235, less U-238 → less Plutonium
 - Results in different mixture of fission products
- End of life burnup
 - Ability to obtain higher burnups

Neutronics

Neutronics

Initial Benchmark Results (1/3)

Initial Benchmark Results (2/3)

Initial Benchmark Results (3/3)

APOLLO2-A/ARTEMIS 4x1/4 Comparisons

Decay Heat

Topical Report Content – Increased Enrichment – Decay Heat

Current Range of Applicability for Decay Heat Models

Appendix K - SBLOCA – Description of Decay Heat Model

Appendix K – SBLOCA - Evaluation of Impact of Increased Enrichment

RLBLOCA – Description of Decay Heat Model

RLBLOCA – Evaluation of Impact of Increased Enrichment

ARITA Coupled – Description of Decay Heat Model

ARITA Coupled – Evaluation of Impact of Increased Enrichment

Illustration of Impact

Best Estimate Illustration

Other Disciplines

Methodologies / Models Not Dependent on Enrichment

Areas Already Applicable to Increased Enrichment

Summary

Next Steps

Jerry Holm

Next Steps – Increased Enrichment

Acronyms

2D – Two Dimensional

3D – Three Dimensional

AREA – ARCADIA Rod Ejection Accident

ARITA – ARTEMIS/RELAP Integrated Transient Analysis
Methodology

CE – Combustion Engineering

CHF – Critical Heat Flux

ECCS – Emergency Core Cooling System

ICSBEP – International Criticality Safety Benchmark
Evaluation Project

LBLOCA – Large Break Loss of Coolant Accident

LB - Large Break

LOCA – Loss of Coolant Accident

LCT – LEU-COMP-THERM

RLBLOCA – Realistic Large Break Loss of Coolant
Accident

SB – Small Break

SBLOCA – Small Break Loss of Coolant Accident

W - Westinghouse

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