

Near-Term Approach for High Burnup FFRD – White Paper

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Agenda

Objectives

Policy

Background

Risk Informed

Supplemental Analysis

Next Steps

Schedule Driver



Objective

- Postulated FFRD (the dispersal of significant quantities of finely fragmented high burnup (HBU) fuel particles) introduces regulatory uncertainty and analytical complexities.
- Regulatory uncertainty and predictability is a major hurdle for achieving the nuclear industry's initiative to provide more economical, carbon-free energy to the grid.
- Framatome's near-term approach provides a means for licensees to demonstrate continued safe operation and no undue risk to public health and safety.
 - Reduces analytical complexity
 - Eliminates compliance demonstration uncertainty

Objective is to manage regulatory uncertainty and instill predictability for the review of Framatome's High Burnup Topical Report

Framatome Request

Framatome is requesting feedback and concurrence on the following conceptual items of its plan:

1. It is acceptable to employ a risk-informed supplemental analysis to demonstrate that Final Safety Analysis Report (FSAR) safety analyses remain applicable, and
2. The key attributes of our risk-informed approach outlined in the attachment are acceptable for this supplemental analysis.

Policy

- Dispersal of HBU fuel fragments could challenge how licensees have historically demonstrated compliance to many regulatory requirements.
- Commission has not provided direction or guidance to address regulatory uncertainty with respect to demonstrating compliance in the presence of HBU fuel dispersal.
- Framatome's near-term approach fills this gap by providing a means to avoid HBU fuel dispersal and the complicating factors associated with it.

White Paper – Table of Contents

- Section 1 – Introduction
 - Relationship of the near-term FFRD approach to Framatome’s overall approach for increased burnup and the upcoming Topical Report
- Section 2 - Justification for Risk-Informed Approach
 - Distinct from Probabilistic Risk Assessment (PRA), using risk-insights to support safety analyses
 - Presentation of the regulatory background for a risk-informed approach
- Section 3 - Risk-Informed Supplemental FFRD Assessment
 - Summary of the key characteristics of Framatome’s risk-informed supplemental analysis

Section 1 - Introduction

- Scope of Risk-Informed Supplemental Analysis
- Near-Term Approach's Holistic Treatment of Licensing Basis
 - Fuel Management Restrictions
 - FFRD During Design Basis Accidents
 - Compliance with Existing Regulations
 - Ongoing Confirmation of Continued Safe Operation
 - Range of Applicability
- Long-Term Approach

*This section provides Background –
Framatome is not requesting NRC feedback or concurrence on Section 1*

Section 2 - Justification for Risk-Informed Approach

- Recent Risk-Informed Approaches
- Extremely Low Frequency of Occurrence Event
- Defense-in-Depth
- Public Exposure to Radiation

Section 2 - Justification for Risk-Informed Approach

- Risk-informed approach
 - Risk insights are used to establish analysis detail
 - Balance the level of conservatism for adequate protection or reasonable assurance of public health and safety by considering the risk associated with an event
- Numerous NRC publications promote the use of a risk informed approach and risk insights. Examples are included in the white paper, such as:
 - SRM-SECY-21-0109
 - SECY-18-0600

Section 2 - Justification for Risk-Informed Approach

SRM-SECY-21-0109 – Increased Enrichment Rulemaking

Fuel fragmentation, relocation, and dispersal issues relevant to fuels of higher enrichment and burnup levels should be appropriately addressed and analyzed in the regulatory basis for this rulemaking.

The staff should take a risk-informed approach when developing this rule and the associated regulatory basis and guidance.

The staff should work expeditiously with stakeholders to identify and develop necessary regulatory guidance and technical bases to support effective and efficient licensing of increased enrichment applications.

Section 2 - Justification for Risk-Informed Approach

SECY-18-0600 – Achieving Modern Risk-Informed Regulation

An overarching theme that emerged from internal and external stakeholder outreach is the need for systematic and expanded use of risk and safety insights in decision making.

... focuses staff effort on reaching a “reasonable assurance” conclusion based on the entire system performance rather than an individual component; and ...

The NRC has extensively supported the use of Risk-Informed Approaches

Section 3 - Risk-Informed Supplemental FFRD Assessment

- Consistent with the recent NRC directive to employ a risk-informed approach for addressing FFRD, Framatome's near-term approach includes risk-informed components

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Next Steps



Acronyms

EM –	Evaluation Model
FFRD –	Fuel Fragmentation, Relocation, and Dispersal
FSAR -	Final Safety Analysis Report
HBU –	High Burnup
LAR –	License Amendment Request
LOCA –	Loss of Coolant Accident
NRC –	U.S. Nuclear Regulatory Commission
PRA –	Probabilistic Risk Assessment
RLBLOCA –	Realistic Large Break Loss of Coolant Accident
W –	Westinghouse

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