



## Pre-Consultation for RD-308 and RD-367

# April 28, 2010 Public Webinar on Design and Safety Analysis for “Small Reactors”



## SECTION 3 Overview of RD-308 and RD-367 And the next steps in the regulatory document process

Presenter: C. Harwood / M. de Vos



Canadian Nuclear  
Safety Commission

Commission canadienne  
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# Overview of Draft RD-367 Design Requirements for Small Reactors

*Presenter: C. Harwood*

# Addresses Needs of Small Reactors without Compromising Safety



- RD-367 is a "twin" to RD-337 *Design of New Nuclear Power Plants* but allows for a graded approach.
- Considers criteria contained in IAEA Safety Standard NS-R-4, *Safety of Research Reactors*, 2005
- Covers safety objectives such as defence-in-depth, multiple physical barriers and system-specific requirements

# Introductory Sections of RD-367



- **1.0 Introduction**
  - Purpose
  - Scope
  - Relevant legislation
- **2.0 Safety objectives and concepts**
  - objectives and quantitative safety criteria
  - concepts - defence-in-depth, physical barriers, operational limits and conditions
- **3.0 Alternative and graded approaches**

# 4.0 *Safety Management During Design*



- Design authority
- Design management
- Quality Assurance Program
- Proven engineering practices
- Operational experience and safety research
- Safety assessment
- Design documentation

# Structure of RD-367 (3)



- 5.0 Safety Considerations
  - Application of defence-in-depth
  - Safety functions
  - Accident prevention and reactor safety characteristics
  - Radiation protection
  - Exclusion zone
  - Facility layout

# Structure of RD-367 (4)



- 6.0 General Design Considerations
  - Classification of systems, structures and components
  - Reactor facility design envelope
  - Reactor states
  - Designing for postulated initiating events
  - Design rules and limits
  - Design for reliability
  - Pressure retaining Structures Systems Components
  - Equipment environmental qualification

# Section 6, General Design Considerations Continued (2)



- Instrumentation and control
- Safety support systems
- Guaranteed shutdown state
- Fire safety
- Seismic qualification
- In-service testing, maintenance, repair, inspection, monitoring
- Civil structures
- Commissioning
- Ageing and wear

# Section 6, General Design Considerations Continued (3)



- Control of foreign material
- Transport and packaging for fuel and radioactive waste
- Escape routes and means of communication
- Human factors
- Robustness against malevolent events\*
- Safeguards
- Decommissioning

# Section 7: System-specific requirements



- Reactor core
- Reactor coolant system
- Steam supply system
- Means of shutdown
- Emergency core cooling
- Means of confinement
- Containment
- Ultimate heat sink
- Emergency heat removal system
- Control facilities
- Waste treatment and control
- Fuel handling and storage
- Radiation protection
- Buildings and structures
- Auxiliary systems

# *Sections 9 and 10*



- **Section 9.0 Safety Analysis**
  - requirements for:
    - Hazards analysis
    - Deterministic Safety Analysis and,
    - Probabilistic Safety Analysis
- **Section 10.0 Environmental Protection and Mitigation**
  - requirements for design and application of ALARA (As Low as Reasonably Achievable)



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# Questions and Answers about RD-367

(10 minutes)

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# Overview of Draft RD-308 Deterministic Safety Analysis for Small Reactors

*Presenter: M. de Vos*

# Addresses Needs of Small Reactors without Compromising Safety



- RD-308 is a "twin" to RD-310 *Safety Analysis for Nuclear Power Plants* but allows for a graded approach.
- Adapted from draft document S-308 Safety Analysis for Non-Power Reactors to include other small reactor types of higher power.
- Considers criteria contained in IAEA Safety Report No.55 *Safety Analysis for Research Reactors*
- Establishes the technical criteria against which the CNSC will review requirements for deterministic safety analysis

# Introductory Sections of RD-308



- **1.0 Introduction**
  - Purpose
  - Scope
  - Relevant legislation
- **2.0 Safety Analysis Objectives**
  - List of high level deterministic safety analysis requirements
  - E.g. safety analysis shall analyze and evaluate event sequences that result from failure of Structures Systems and Components.

# Section 3.0 Graded Approach



**3.0 Graded Approach** - discusses how the graded approach can be applied to Safety Analysis using factors such as:

- Reactor power;
- Reactor characteristics;
- Amount and enrichment of fissile and fissionable material;
- Fuel design;
- Type and mass of moderator, reflector and coolant;
- Utilization of the reactor;
- High pressure or high energy piping;
- Quality of containment or confinement structure;
- Source term; and
- Proximity to population groups.

# Section 4.0 *Safety Analysis Objectives*



Will state what the objectives are and sets the stage for more detailed requirements. Examples of objectives:

- Confirms that the design of a reactor meets the design and safety expectations,
- Demonstrates how safety requirements are met for a broad range of operating conditions and various initiating events,
- Confirms that operational limits and conditions are consistent with the design and safety expectations.

# Section 5.0 *Safety Analysis Requirements (1)*



- Requirements that the applicant or licensee will be required to meet. Section 5 will cover:
  - Safety analysis responsibilities (QA, capability, oversight of process)
  - Events to be analyzed (identification, scope and classification of events)
  - Acceptance Criteria

# Section 5.0 *Safety Analysis Requirements (2)*



- Safety Analysis Methods and Assumptions
- Safety Analysis Documentation
- Review of Safety Analysis Results by the licensee (licensee is responsible)
- Quality of Safety Analysis



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# Next Steps in the Regulatory Document Development Process

*Presenter: M. de Vos*

# *What We've Heard Today*



- Staff will consider feedback obtained today when writing consultation drafts of RD-308 and RD-367

# Public Consultation



Public Consultation - Opportunity for public, licensees and interested organizations to comment

- First Consultation 45-90 days
- 2<sup>nd</sup> Consultation comments from the first consultation are posted for more feedback (minimum 3 weeks)

The Notice of Consultation period is posted on [www.nuclearsafety.gc.ca](http://www.nuclearsafety.gc.ca) under Laws and Regulations, Regulatory Documents, Comment on a Draft Regulatory Document

# Public Consultation



- You can be notified of the start of the consultation period, if you are an CNSC email subscriber.
- To subscribe, go to [www.nuclearsafety.gc.ca](http://www.nuclearsafety.gc.ca), select Media Centre and “Subscribe to the CNSC mailing list”

# *Consultation Comments*



- Comments received from public consultations will be reviewed, assessed and considered by CNSC staff and the document revised if appropriate.
- Comment Table is prepared indicating comments received from public consultations and detailed responses by CNSC staff are inputted

# *Consultation Report*



- Consultation Report is prepared which summarizes the feedback received during the consultations
- Consultation Report and Comment Table made available to the Commission Tribunal when both draft regulatory documents (RD-308 and RD-367) are presented for approval to publish

# *Publishing RD-308 and RD-367*



- RD-308 and RD-367 published and posted on the CNSC Web site under Published Regulatory Documents



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End of Section 3:

Question and Answers for  
next 10 minutes.

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