



Canadian Nuclear
Safety Commission

Commission canadienne
de sûreté nucléaire

Licensing Nuclear Reactors in Canada Recent Changes to the CNSC Approach

Presentation to Canadian Nuclear Society
November 2008

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Outline



- **Background – CNSC 101**
- **Motivators for change**
- **Changes to date**
 - Major Projects Management Office (MPMO)
 - “Regulatory Contracts”
 - EA Streamlining
 - Concurrent EA and Site Application Processes
 - Generic EA and Licensing Process
 - Licensing Framework
 - The RD suite (RD-360, RD-310, RD-337, RD-346)
 - Risk Informed Decision Making
 - Technology Reviews
- **Current and future efforts**
- **Summary**

CNSC – Meeting the Challenge

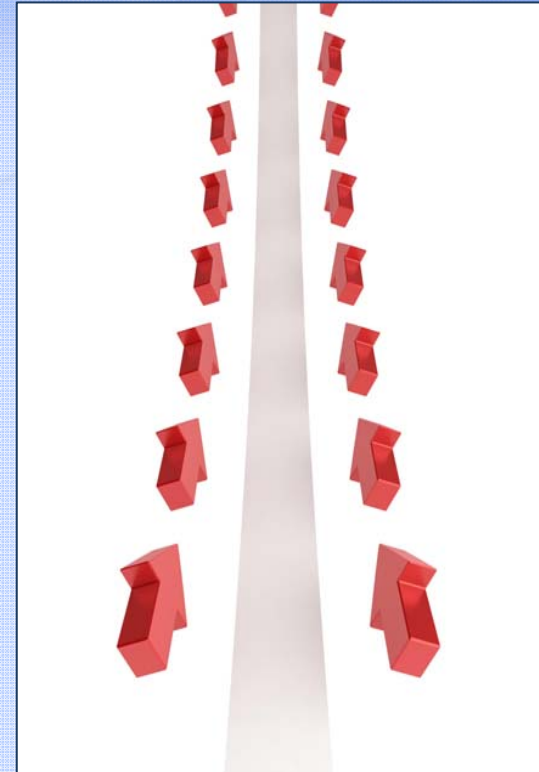
- Canadian Nuclear Safety Commission (CNSC)
 - Canada's nuclear watchdog
 - Quasi-judicial body
- Independent of, but not isolated from, government
- Regulates all nuclear facilities and activities in Canada to protect the **health, safety and security** of Canadians and their **environment**; as well as ensure that Canada meets its nuclear **international obligations**.





Meeting the Challenge – CNSC's Refocus

- Safety is number one
- Clear communication
- Simplification of processes
- Clarification of requirements and expectations
- Timeliness
- Transparency
- Tracking of commitments





Parliament has Provided the CNSC with Modern Legislation

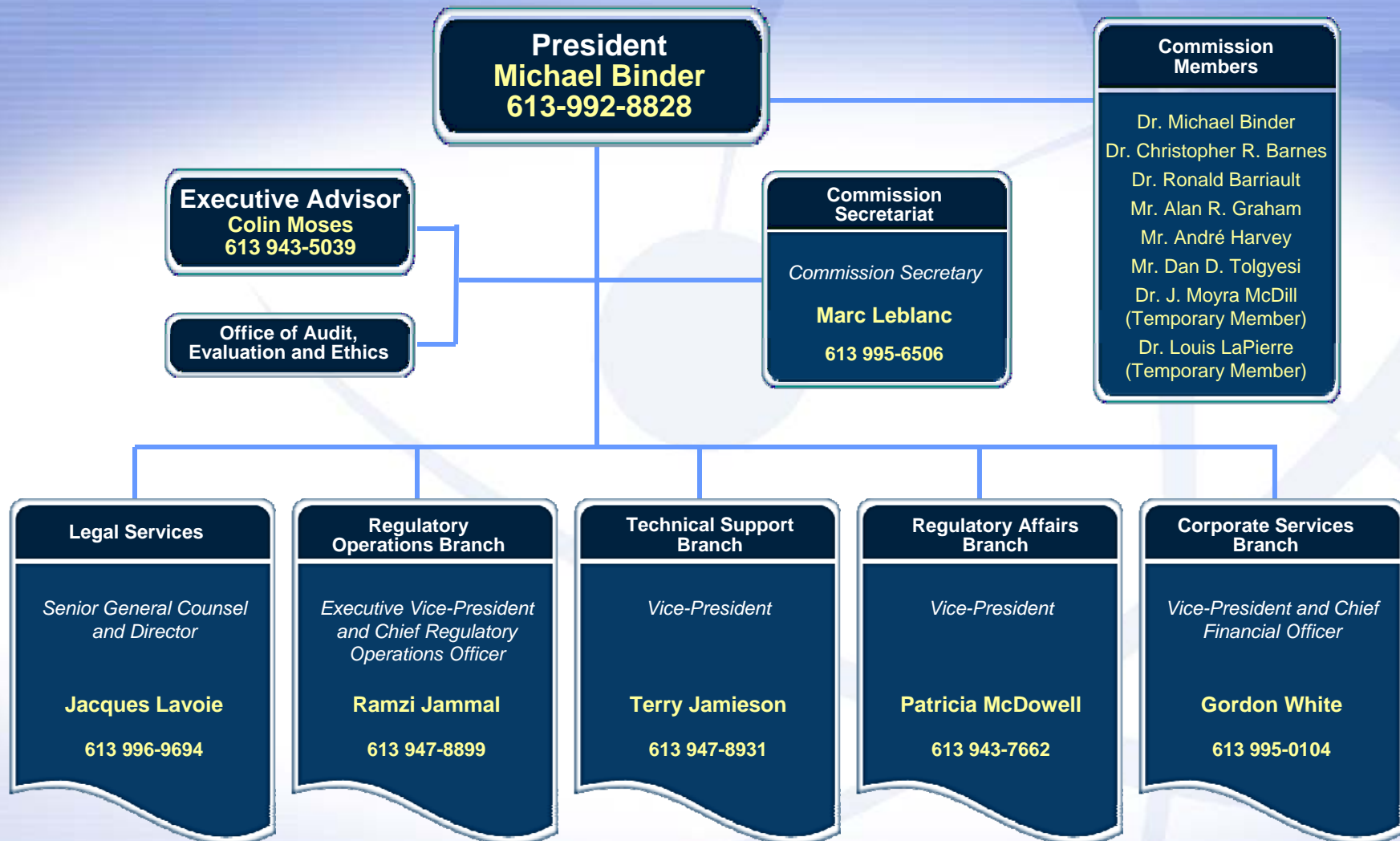
- *Nuclear Safety and Control Act (2000)*
- *Canadian Environmental Assessment Act (1992)*
- *Nuclear Liability Act (1985)*
 - Soon to be Nuclear Liability and Compensation Act?
- **Governed by up to seven permanent commissioners appointed by the Governor-In-Council**
- **Members are renowned Canadians and experts in own fields**

“... shall take into account the health of Canadians who, for medical purposes, depend on nuclear substances produced by nuclear reactors.”

Directive on Health of Canadians
(December 10, 2007)



Governance: Structure





Priorities for the CNSC

- Ensure baseline compliance on existing facilities while regulating new major facilities (power plants and uranium mines)
- All sectors of Canadian nuclear industry regulated by the CNSC are growing:
 - Nuclear power plants
 - Uranium mining
 - Nuclear medicine



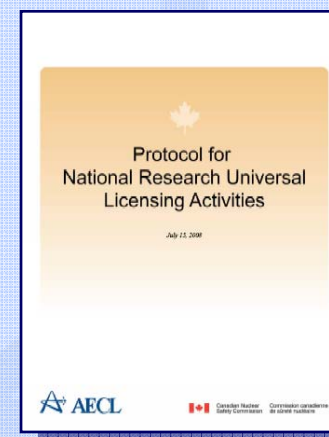
The Challenge - Lessons Learned

Issue:

- NRU status and lessons learned

Actions:

- Talisman “Lessons Learned” Report released on July 28, 2008
 - Improved communications
 - Tracking systems
 - Clarification of licensing requirements
- CNSC – AECL Protocol for NRU Licensing Activities signed July 15, 2008
 - Requirements for NRU licence renewal Oct 2011
- Future Supply / Contingency plan
- Other audits and self assessments



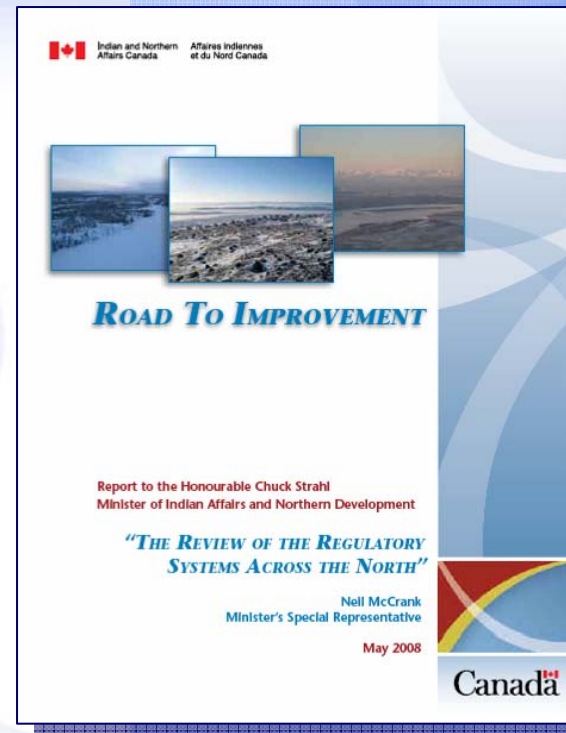


Motivators for change

1. *Understandable*
2. *Neutral*
3. *Clear Mandate*
4. *Open and Transparent Process*
5. *Fair Process*
6. *Timelines*
7. *Consistent and Predictable*
8. *Accountable*
9. *Capacity*
10. *Coordinated*
11. *Establish Rules*

Road To Improvement

Neil McCrank, Minister's Special Representative, May 2008
Report to the Honourable Chuck Strahl,
Minister of Indian Affairs and Northern Development





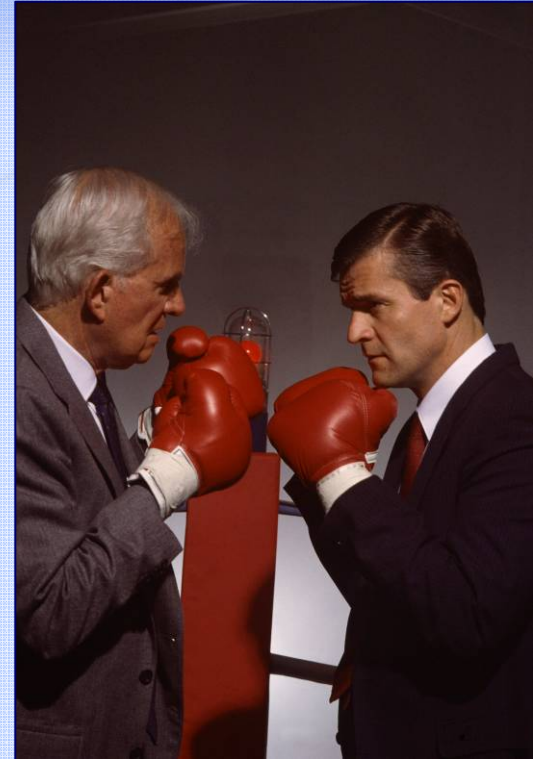
Changes to date

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Partner in the Major Projects Management Office (MPMO)

- CNSC signatory to MOU with MPMO
- Membership on Deputy Ministers' Committee
- Committed to working collaboratively with MPMO
- Nuclear projects are priorities:
 - Bruce New Build in Ontario
 - OPG New Build in Ontario
 - Deep Geologic Repository in Ontario
- Committed to implementation of the *Cabinet Directive on Streamlining Regulation*.



Regulatory Contracts

- New approach to ensure regulatory clarity
- Outlines regulatory requirements and roles and responsibilities
- Clear understanding of deliverables and deadlines
- Progress reported on CNSC web-site
- Approach being used for major projects, e.g., new NPPs, NRU re-licensing





EA Streamlining

Issue:

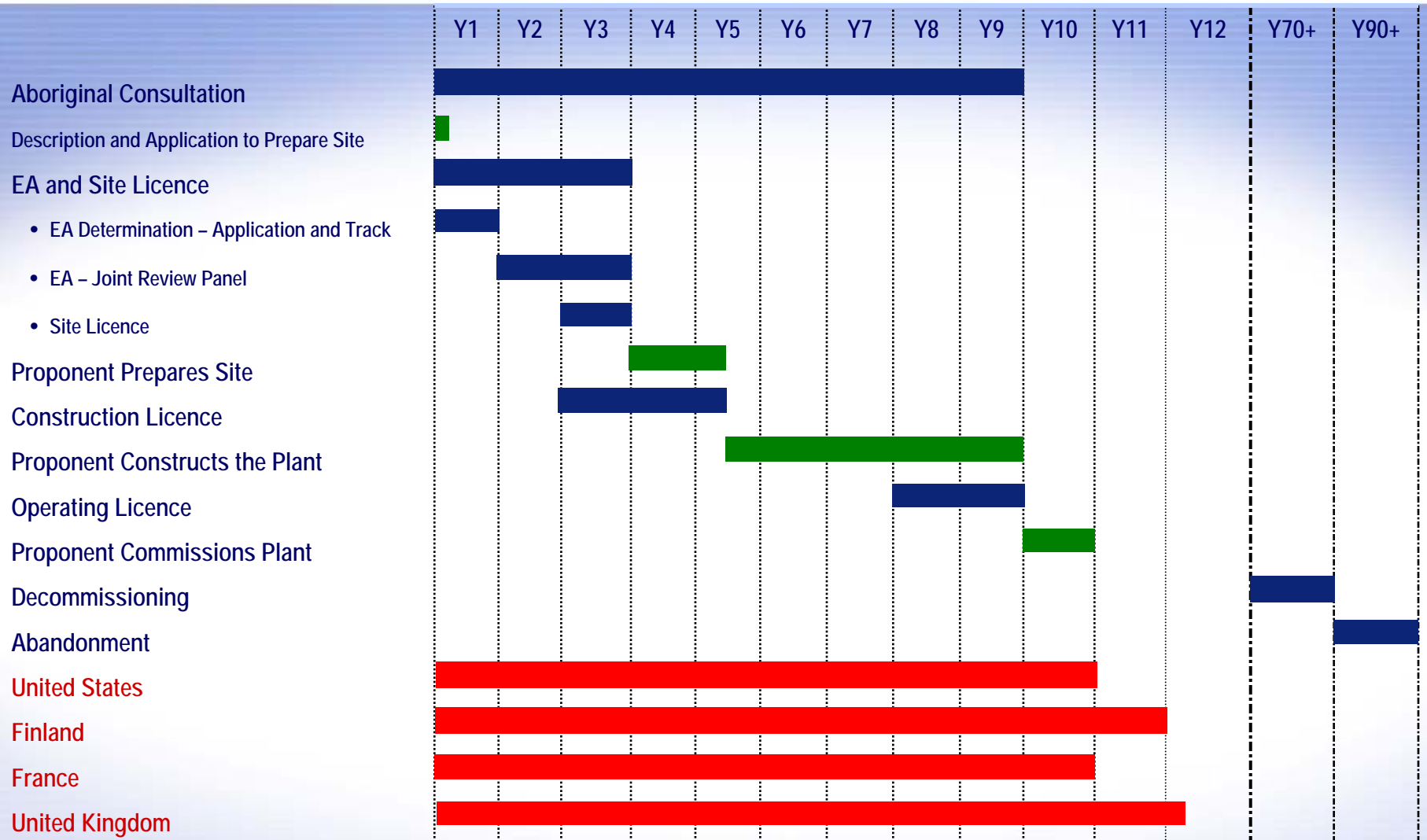
- Integration of EA and licensing processes

Comments:

- *Nuclear Safety and Control Act (NSCA)* requires decisions (EA, siting, construction, operation) in sequence but does not prohibit parallel processes
- Objective of joint review panel agreement, with CNSC lead, is to integrate the EA and site licence decisions
- Parallel processes for EA and licensing may proceed simultaneously depending on project risk by proponent



Generic New Nuclear Power Plant Environmental Assessment and Licensing Process





Licensing Framework

Issue:

- Ambiguity of licensing framework

Comments:

- No new nuclear power plant in Canada in 25 years
- High level processes outlined in *Nuclear Safety and Control Act* and Information Document 0756
- Important regulatory documents approved by Commission in June 2008:
 - RD337 – Design of New Nuclear Power Plants
 - RD346 – Site Evaluation for New Nuclear Power Plants
- Focus turning to construction licence application processes and internal review / assessment guides

Regulatory Documents (RDs)

- Regulatory documents articulate the Commission's expectations of applicants, licensees and CNSC staff with respect to meeting legally-binding requirements
- RDs are administrative documents that are:
 - Published in accordance with 21(1)(e) of the NSCA
 - Not legally enforceable in their own right
 - To make them enforceable, in whole or in part, need to follow some existing legally recognized process
- Several significant RDs approved by Commission
- Other RDs in process (drafting, consultation)





RD-360: Life Extension of Nuclear Power Plants

- Purpose: **RD-360** was developed at the direction of the Commission to enhance stakeholders' understanding, and to improve openness and transparency in decision-making regarding life extension projects
- Principles outlined in **RD-360** have been followed by the Commission and CNSC staff in past and current regulatory activities, and in decisions with respect to NPP life extension projects and return-to-service
- Approved by the Commission in February 2008



RD-360: Contents

- Key regulatory objectives for life extension projects are:
 - To assess proposed modifications against modern standards and practices;
 - To ensure adequacy of the scope of refurbishment and safety upgrades proposed by the licensee; and
 - To verify the proper execution of work by the licensee, prior to unit's return-to-service.
- **RD-360** indicates that licensees should carry out, if necessary, an environmental assessment and an Integrated Safety Review to establish the scope of work required for life extension of an NPP;
- Based on the results of the environmental assessment and an Integrated Safety Review, licensees should develop an Integrated Implementation Plan for the necessary refurbishment, safety upgrades and compensatory measures;
- Integrated Safety Review is performed in accordance with the *Periodic Safety Review of Nuclear Power Plants* safety guide published by the International Atomic Energy Agency; and
- A one-time application of the Periodic Safety Review to the life extension project.



RD-360: Contents

RD-360 provides guidance on:

- Project Initiation;
- Establishing the Integrated Implementation Plan:
 - Environmental Assessment;
 - Integrated Safety Review;
 - Global Assessment and Integrated Implementation Plan; and
 - Confirmation of the Adequacy of the Integrated Implementation Plan.
- Project Execution:
 - Project Execution Planning;
 - Programs and Processes; and
 - Project Monitoring;
- Return to Service:
 - Commissioning Phases;
 - Milestones and Hold Points; and
 - Return to Normal Operation.



RD-310: Safety Analysis for Nuclear Power Plants

- Purpose: The objective of regulatory document **RD-310** is to help assure that the safety analysis in the safety analysis reports submitted in accordance with the *Class 1 Nuclear Facilities Regulations* is adequate
- **RD-310** establishes modern high-level expectations for all nuclear power plants
- Guidance is currently being developed to provide further clarity
- Approved by the Commission in February 2008



RD-310: Contents

- Licence applicants and licensees' responsibilities for safety analysis
- Identifying and classifying events to be analysed
- Acceptance criteria
- Analysis methodology and assumptions
- Documentation, review and updates of safety analysis
- QA for safety analysis



RD-310: Implementation

- Apply **RD-310** immediately to new builds
- For existing facilities, apply in a graduated, risk-informed, manner during a transition period:
 - Licensees will be expected to assess compliance and develop a plan to close gaps to the extent practicable.





RD-337: Design of New Nuclear Power Plants

- Purpose: To set out CNSC expectations for the design of new water-cooled nuclear power plants
- To promote multiple levels of defence in the design
- To provide this information in a manner that provides the proponent with flexibility (i.e., as a guidance document)
- Approved by the Commission in June 2008

This document is technology-neutral with respect to water-cooled reactors



RD-337: Contents

- The NSCA and IAEA safety objectives provide the basis of RD-337
- RD-337 establishes a set of comprehensive design expectations that is risk-informed and aligns with accepted international practices
- IAEA Safety Standard NS-R-1, *Safety of Nuclear Power Plants: Design* is the underlying template
- Adherence to RD-337 should ensure that:
 - Radiological consequences are below prescribed limits, are as low as reasonably achievable, and are taken into account in the design of an NPP
 - Likelihood of accidents with serious radiological consequences is extremely low
- Safety objectives, including quantitative dose acceptance criteria and safety goals
- Key safety concepts and considerations, such as:
 - Defence-in-depth
 - Designing for reliability
- Expectations for:
 - Safety management
 - General design
 - Specific systems
 - Safety analysis
 - Environmental protection and mitigation



RD-337: Changes to Previous Canadian Practice

- A design envelope that includes comprehensive considerations of severe accidents
- Reliability expectations (versus setting unavailability targets for safety systems)
- Shutdown system expectations more aligned with international practice
- Sharing of safety system equipment
- Containment design to address severe accidents as far as reasonably practicable
- Consideration of malevolent acts in initial design



RD-346: Site Evaluation for New Nuclear Power Plants

- Purpose: **RD-346** sets out CNSC's expectations for the evaluation of sites for new NPPs prior to a proponent applying for a *Licence to Prepare Site* or initiating an environmental assessment (EA) determination.
- In addition, **RD-346** answers these questions:
 - What is site evaluation?
 - Where does site evaluation fit?
 - Why evaluate a site before applying?
- Approved by the Commission in June 2008



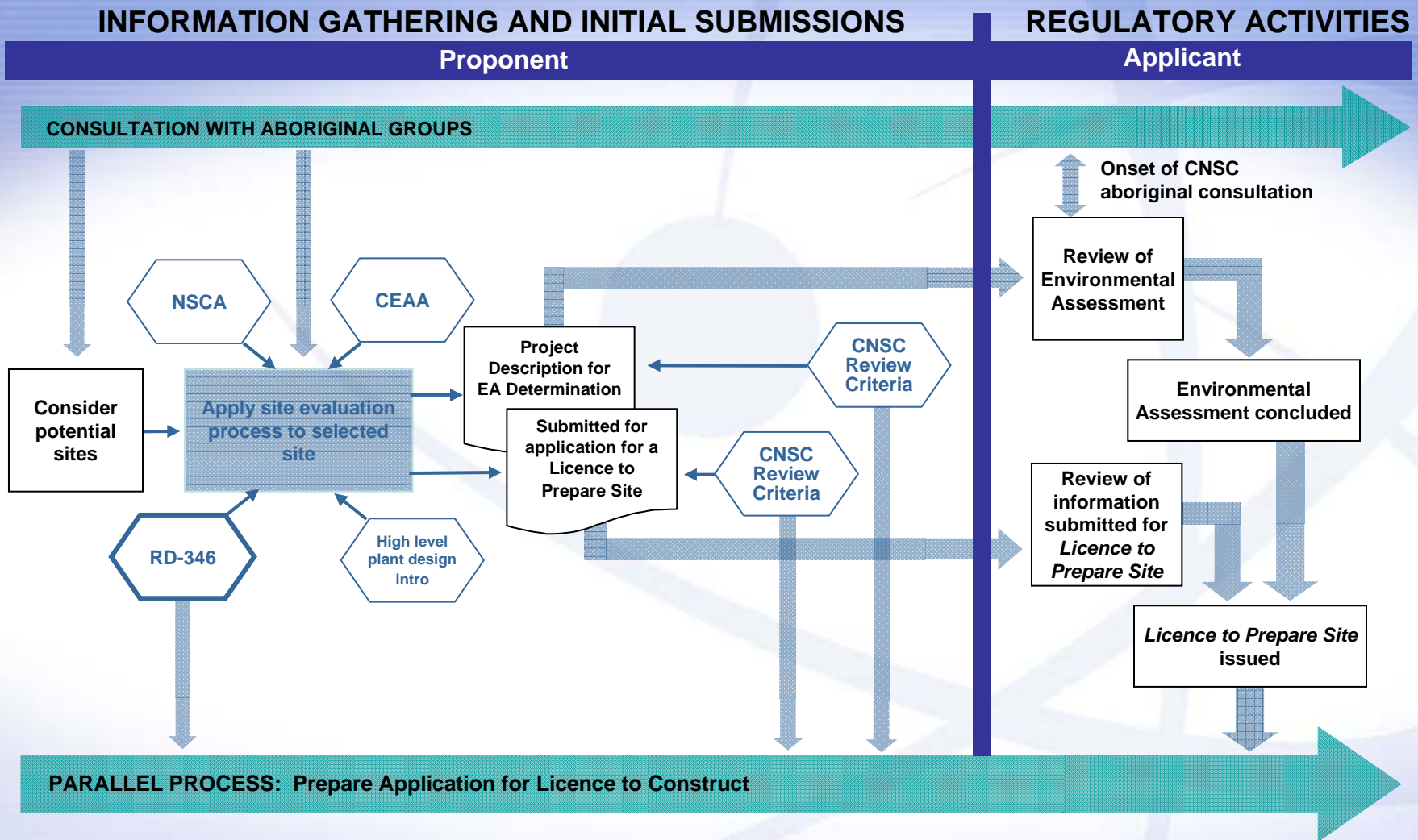
RD-346: What is site evaluation?

The investigation of a geographical area over the projected lifespan of the facility in an effort to:

1. Minimize effects of the proposed NPP and support facilities on the environment;
2. Minimize effects of the environment on the ability of the NPP to operate within the defined safe operating envelope; and
3. Identify mitigation strategies to reduce risk to the plant, the public and the environment that may be required if the proposed NPP is sited there.



RD-346: Where does site evaluation fit?





RD-346: Why evaluate a site before applying?

- Reduces the risk of the site or project being found unsuitable during the EA or licensing
- Promotes submission of complete applications
- Promotes early Aboriginal consultation
- Leads to more efficient regulatory review



Risk Informed Decision-Making: Background

- Need for systematic process identified by Auditor General in 2000 report on federal health and safety regulatory programs
- Operations Management Committee in Jan 2005 further identified a need for guidance to reinforce a common understanding and practices among staff for risk informed decision-making
- Initiated project under Power Reactor Improvement Program
- Resulted in proposed process based on Canadian Standard and Transport Canada Civil Aviation



Risk Informed Decision-Making: Scope and Purpose

- Describes basic concepts of risk and risk management
- Highlights typical risk decision-making situations at the CNSC
- Outlines a decision-making process for managing risk
- Aligned with the objects of the Commission under the NSCA, government and CNSC policy

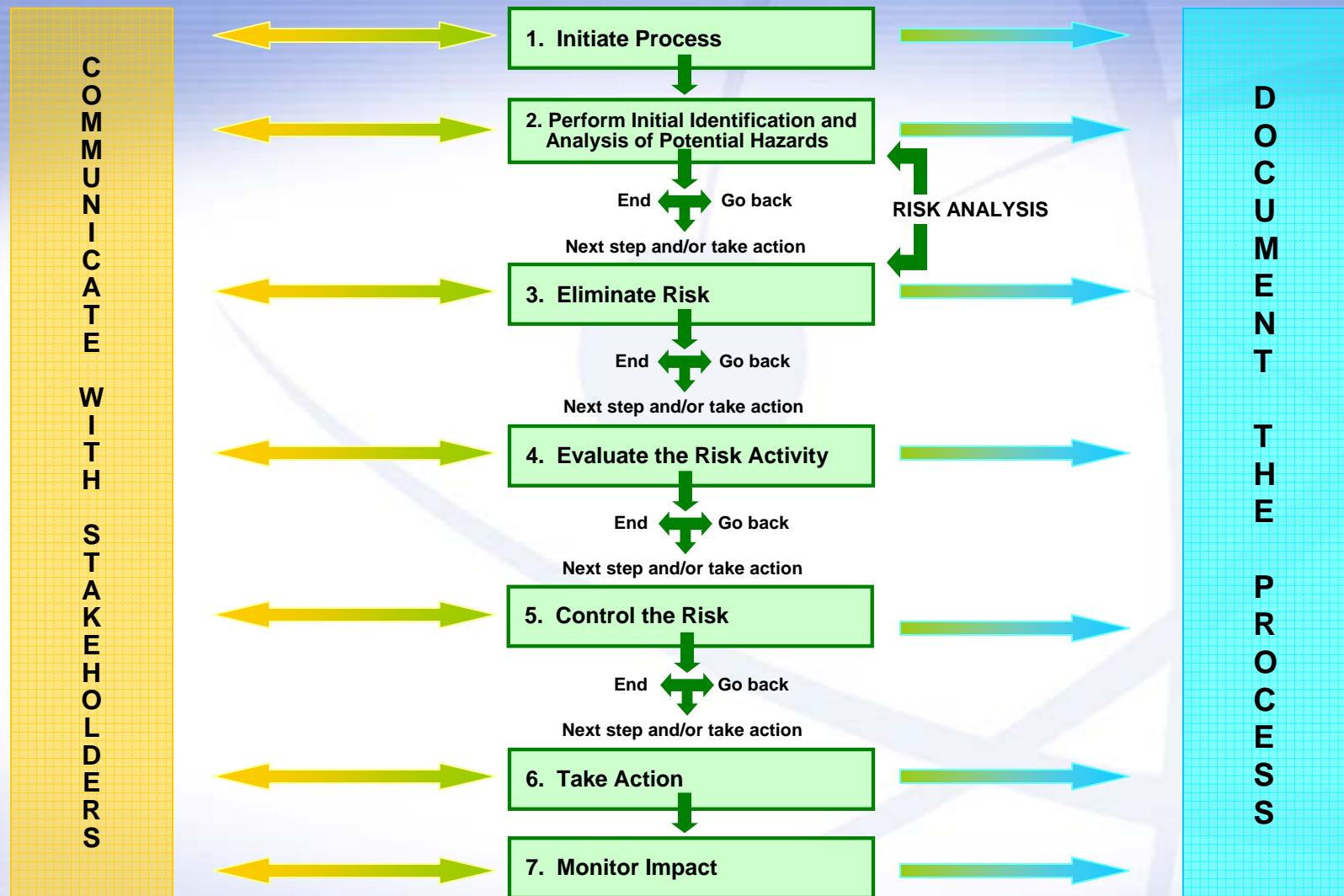


Risk Informed Decision-Making: Recent Use and Status

- Trial use in power reactor regulation includes:
 - Assign priorities to generic CANDU safety issues based on risk
 - Assessment of risk management options in Pickering Rod-Based GSS application
- Current Status
 - RIDM process incorporated in the CNSC Management System Manual



The CNSC Risk Informed Decision-Making (RIDM) Process





Strategic Issue: Nuclear Power Plants in Canada

Issue:

- Design reviews of new nuclear power plants

Comments:

- CNSC now reviewing designs of new nuclear power plants under consideration for Canada, starting with the ACR-1000
- CNSC - AECL MOU for design review of ACR-1000 signed on April 8, 2008
- Discussions on-going with Westinghouse (AP-1000) and AREVA (EPR)
- Projects will be 100% cost recovered from vendors
- Learning and working internationally

Current Efforts

- Existing fleet
- Refurbishments
- New build:
 - Review guides
 - Construction license applications and supporting material
 - Regulatory framework
 - ACR-1000, EPR and AP-1000 pre-licensing reviews
 - NRU licence renewal



Future Efforts

- High level:
 - Development of comprehensive “library” of regulations and supporting regulatory documents
- Working level:
 - Licence simplification
 - Periodic safety reviews





CNSC Will Not Compromise Safety...



... But We Won't be the Bottleneck



Recruitment and Retention Challenges

- **CNSC facing many of same issues as rest of the nuclear industry**
 - Competition
 - 10% annual turnover
 - 23% eligible to retire in next 5 years
- **Aggressive and innovative approaches to recruitment and retention**





Nevertheless we are growing

- The CNSC is a career choice in Canada's nuclear industry – 32% growth in the past 2 years
- Vacancies
 - Reactor Safety and Assessment
 - Environmental Programs
 - Human Factors
 - Project Officers
 - and many more

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