



The Nuclear Regulatory Body Excellence in Regulatory Oversight

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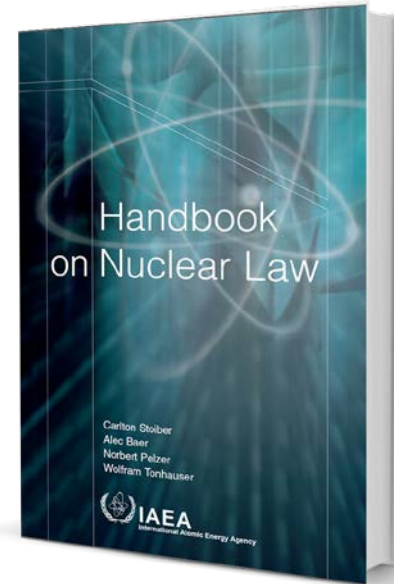
Learning Objectives

- Identifying the characteristics of a good national nuclear regulator
- Necessary regulatory powers and functions
- Understanding regulatory independence and its importance to safety
- Importance of international cooperation for regulators
- The Canadian example – how the Canadian Nuclear Safety Commission (CNSC) functions, some lessons learned
- Some concluding thoughts for further consideration and discussion



Principles of Nuclear Law

- Safety
- Security
- Responsibility
- Permission
- Continuous control
- Compensation
- Sustainable development
- Compliance
- Independence
- Transparency
- International cooperation





National Nuclear Regulatory Law

- Purpose
 - generally, to provide for the protection of workers and the public, to preserve the environment and maintain security
- Scope – depends on the State's nuclear activities
- Reflects the 11 principles of nuclear law, as well as:
 - the implementation of the State's international treaty commitments
 - key international instruments' standards
- Responsibility for safety
 - regulatory body sets standards, enforces them
 - operator is primarily responsible for safety



Important Characteristics of a Regulatory Body

- Independent of operators, promoters
- Technical competence and statutory authority:
 - licensing, setting standards, inspection, enforcement
- Financial resources to do its job
- Safety decisions are adequately insulated
- Role to coordinate with other bodies
- Role to involve public in decision making



Unique Challenges of Nuclear Regulation

- Fear of radiation
- Proliferation and terrorism
- An accident anywhere is an accident everywhere
 - international cooperation is key
- Managing radioactive waste
- Timespan of regulation is much longer than other sectors
 - from environmental assessments to nuclear waste management
- Lifecycle regulating calls for a long view



Different Regulatory Approaches

- Many different forms/structures for regulatory bodies – commission/board, single administrator, etc.
- Different funding models – government budget or recovery of fees from regulated entities
- Different decision-making structures – recommend or decide
- Different licensing – short- or long-term, lifecycle considerations
- Prescriptive or performance-based regulation
- Technical support – either within regulator or separately accessible



Basic Regulatory Functions

- To develop appropriate regulations
- To authorize activities – licensing regime
- To verify compliance with law, regulations, authorization
- To enforce requirements with legal powers
- To act transparently and inclusively – public involvement, dissemination of information
- To cooperate with other regulators – at home and elsewhere

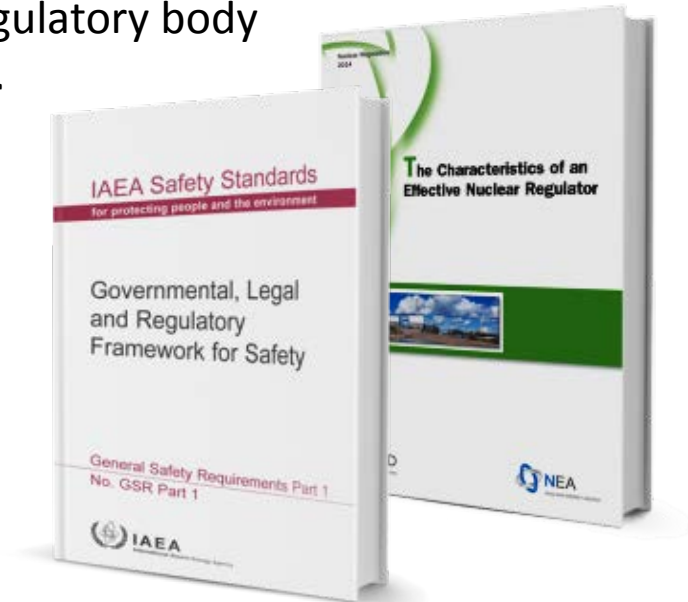


Effective Nuclear Regulation

International Atomic Energy Agency and Nuclear Energy Agency provide guidance, national law sets out structure for regulatory body

Some positive attributes of a nuclear regulator

- Openness, transparency, public involvement
- Safety focus for decisions
- Independence and neutrality
- Technical competence
- Regulatory safety oversight culture
- Science-based decision making
- Continuous improvement – peer review





Our Mandate

- Regulates the use of nuclear energy and substances to protect health, safety, security and the environment
- Implements Canada's international commitments on the peaceful uses of nuclear energy
- Disseminates objective scientific, technical and regulatory information to the public



Nuclear Safety and Control Act – clear, modern legislation



The CNSC Regulates All Nuclear Facilities And Activities in Canada from cradle to grave

Uranium mines and mills



Uranium fuel fabrication and processing



Nuclear power plants



Nuclear substance processing



Industrial and medical applications



Nuclear research and educational activities



Transportation of nuclear substances



Nuclear security and safeguards



Import and export controls



Waste management facilities



Commission Hearing Process





Canadian Nuclear Safety Commission

- Quasi-judicial administrative tribunal
- Up to seven permanent Commission members – experts with different areas of specialization
- Commission members are independent, appointed “on good behaviour” for fixed terms
- Commission Reports to Parliament *through* Minister of Natural Resources
- Commission holds public hearings, invites interventions, offers participant funding, webcasts
- Decisions are reviewable only by Federal Court of Canada

Transparent, science-based decision making



The CNSC's Regulatory Framework

Nuclear Safety and Control Act

- Enabling legislation

Regulations

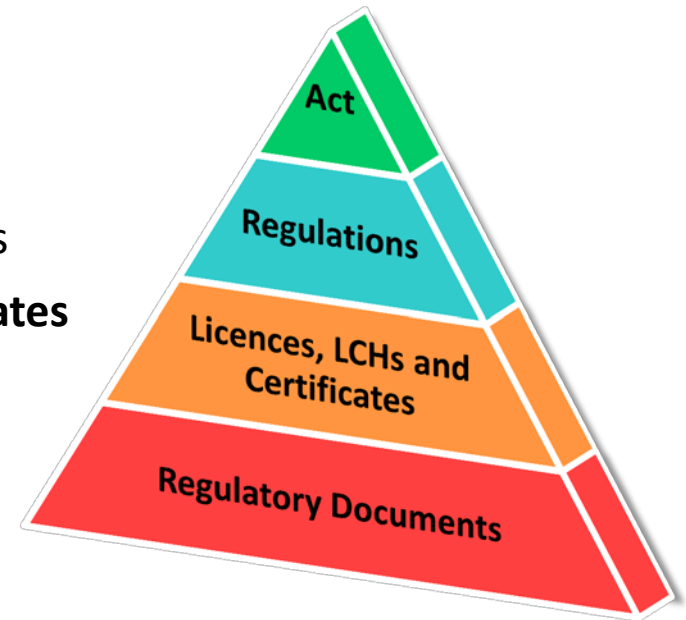
- Commission-made general legal requirements

Licences, licence conditions handbooks, certificates

- Facility and/or activity specific requirements

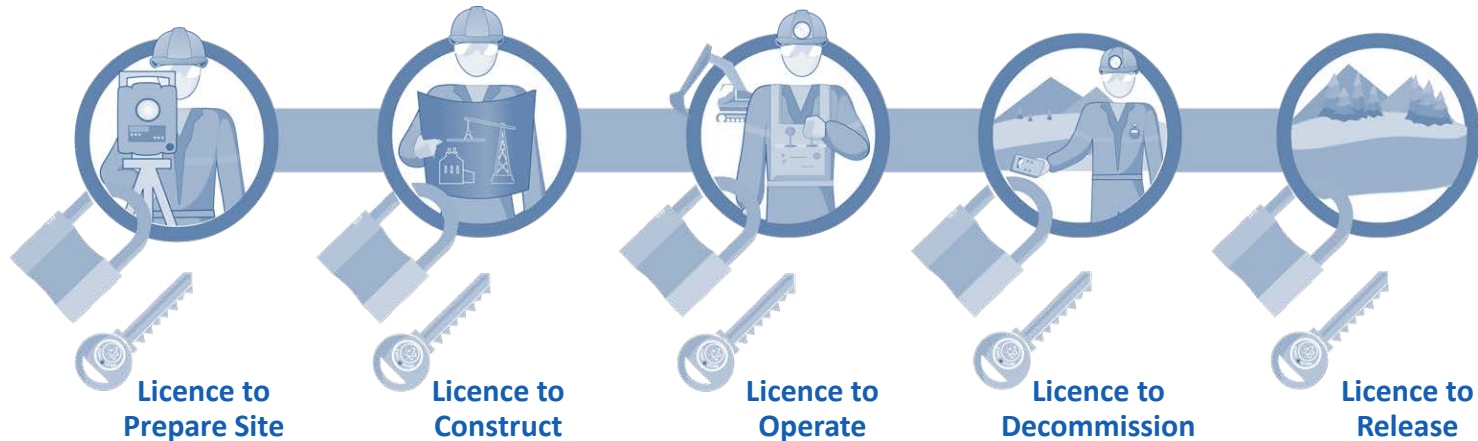
Regulatory documents

- Include requirements and guidance





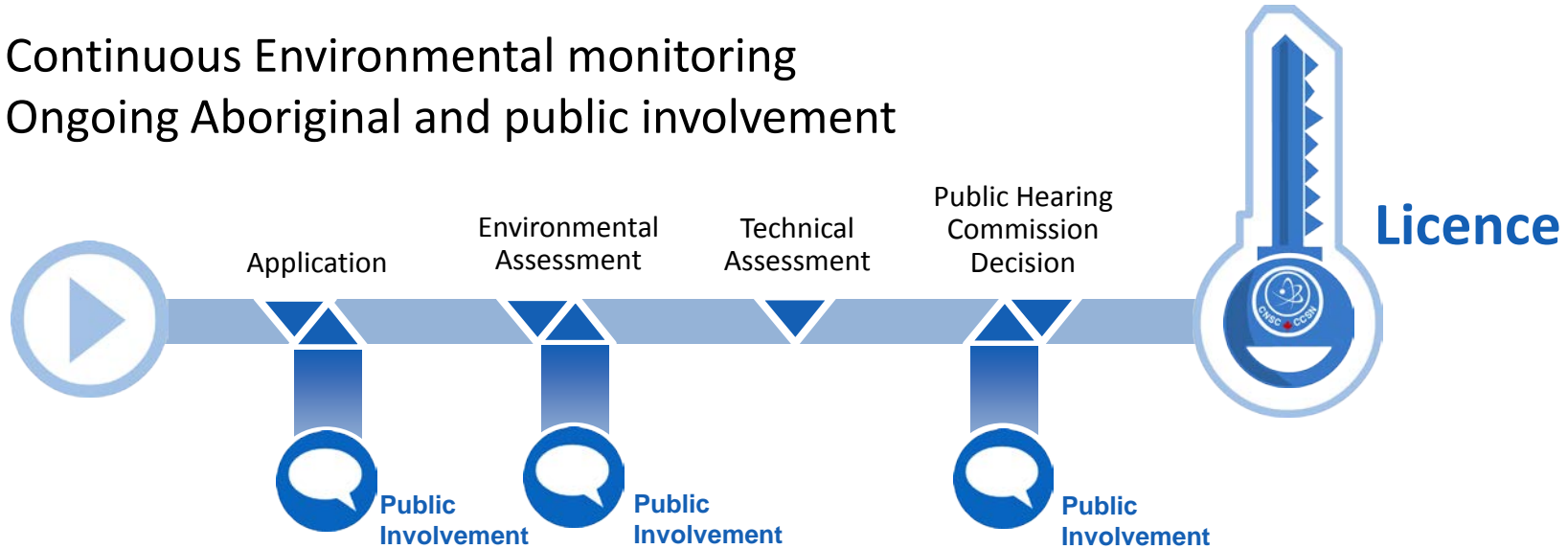
The CNSC's Regulatory Licensing Process





CNSC's Licensing Process

- Continuous Environmental monitoring
- Ongoing Aboriginal and public involvement



...ensures only qualified applicants are Licensed



Safety and Control Areas (SCAs)

Safety and control areas are the technical topics CNSC staff use across all regulated facilities and activities to assess, evaluate, review, verify and report on regulatory requirements and performance.



Ensuring the safe operation of Canada's nuclear sites

Management	Management System
	Human Performance Management
	Operating Performance
Facility and Equipment	Safety Analysis
	Physical Design
	Fitness for Service
Core Control Processes	Radiation Protection
	Conventional Health and Safety
	Environmental Protection
	Emergency Management and Fire Protection
	Waste Management
	Security
	Safeguards and Non-Proliferation
	Packaging and Transport



CNSC expert staff ensure...

The CNSC will only issue a licence when the applicant:

- is deemed qualified to carry on the activity that the licence will authorize
- has demonstrated that they will protect the health and safety of persons and the environment
- has demonstrated that they will maintain national security
- has confirmed that they will adhere to international obligations to which Canada has agreed.



... that licensees will comply with regulatory requirements



Compliance Verification

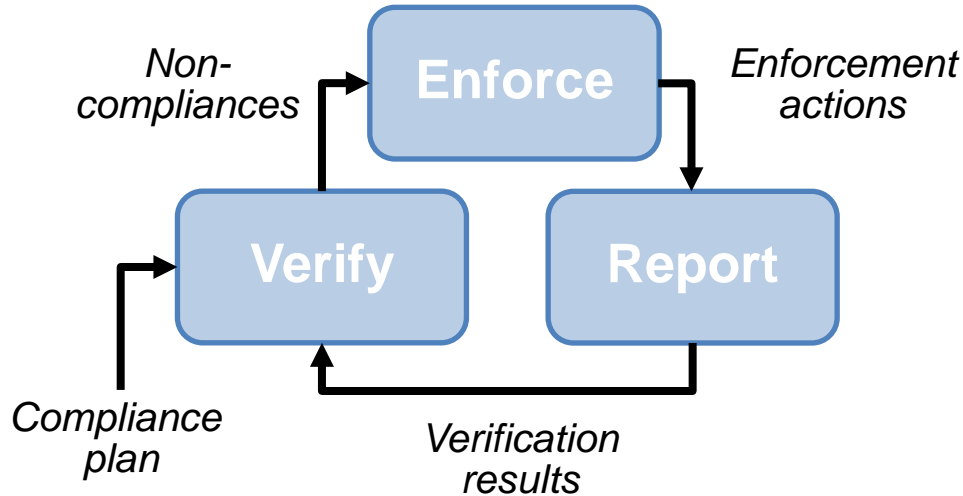
CNSC staff:

- Inspect and evaluate how licensees ensure compliance with the CNSC's regulatory requirements
- Have resident onsite inspectors at nuclear power plants every day
- Perform independent process evaluations and field inspections based on baseline compliance plans
- Review licensee self-reporting (requirements established by the CNSC in licensing basis)
- Follow up with licensees to ensure that corrective actions are implemented





The CNSC's role: Ongoing Compliance



A strong regulator is present and active in ensuring that operators and licensees are fulfilling their commitments and primary responsibility for safety.

Strong Regulatory Oversight Throughout Lifecycle



Compliance and Enforcement

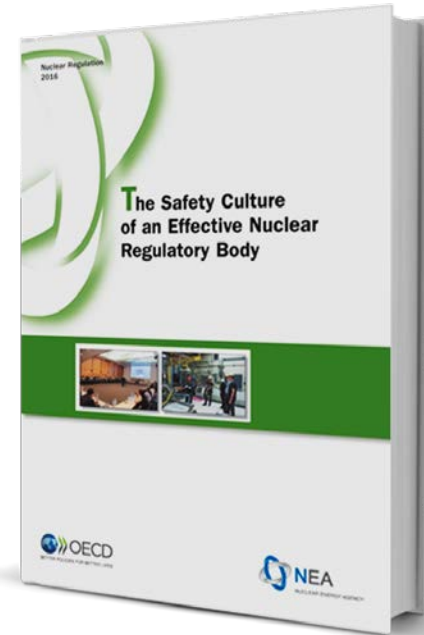
CNSC authorities are exercised on a graded approach

- Recommendation – Based on best practices
- Request – Regulations require a response
- Order – Any measure to serve the purposes of the statute
- Licensing action – Amendment, suspension, revocation
- Administrative monetary penalties (AMPs)
- Prosecution for regulatory offence – Includes whistleblower protection



Regulatory Safety Oversight Culture

- Leadership for safety is to be demonstrated at all levels in the regulatory body
- All staff of the regulatory body have individual responsibility and accountability for exhibiting behaviours that set the standard for safety
- The culture of the regulatory body promotes safety, and facilitates cooperation and open communication
- Implementing a holistic approach to safety is ensured by working in a systematic manner
- Continuous improvement, learning, and self-assessment are encouraged at all levels in the organization





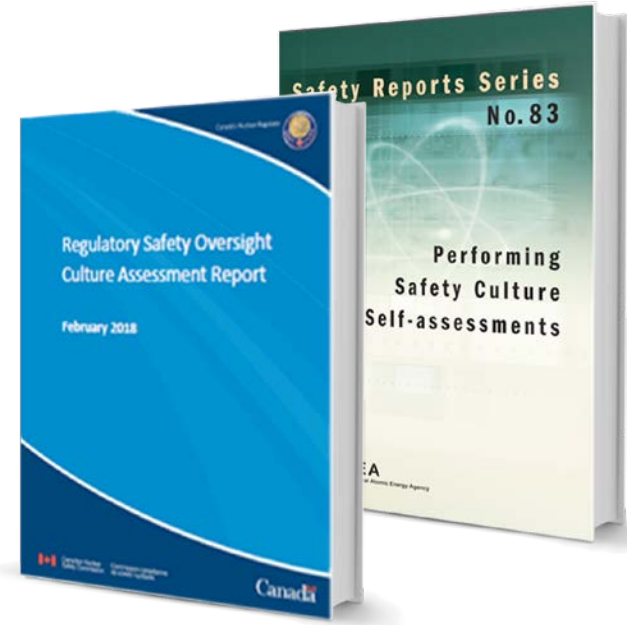
Potential Threats to Regulatory Safety Oversight Culture

- **Regulatory capture:** Concern for advancing the interests of the industry
- **Politicizing of the mission:** Concerned with optics of decisions, not continuous improvement
- **Punitive organizational culture:** Inhibits the vertical flow of information through hierarchy
- **“Siloed” culture:** Inhibits the horizontal flow of information across regulatory teams
- **Bureaucratic inertia and organizational complacency**
- **Toleration of inadequate capacity and competency**
- **Adoption of a compliance mentality:** Applying checklists instead of managing the dynamic nature of hazards and risks
- **Over-preoccupation with active failures:** Focus on individual non-compliance events, rather than on identifying and addressing the systemic root causes of failures



Regulatory Safety Oversight Culture – CNSC Self-Assessment

- CNSC is one of very few regulators to have conducted a safety culture self-assessment
- Designed with help from safety culture expert Dr. Mark Fleming; compared against the Nuclear Energy Agency's *The Safety Culture of an Effective Nuclear Regulatory Body*; assessment methodology aligned to IAEA SRS No.83
- Strengths, Areas for Improvement, Recommendations against the 5 Principles
- Management Action Plan includes a follow up assessment in 3 to 5 years





Case Studies

Regulatory Issues and Lessons Learned



NRU Reactor Shutdown 2007

- Disagreement over the status of an emergency pump
- Shutdown resulted in a 40% loss in supply of world's most used medical isotope
- Resulted in multiple CNSC appearances before Parliament, an Act of Parliament and a directive from the government
- Led to the establishment of the CNSC Administrative Monetary Penalty (AMP) Program

**Highlighted importance of communications,
clarity of processes and regulatory requirements**



Emergency Diesel Generator (June 2008).
Photo courtesy Chalk River Laboratories.



Waste Management: Steam Generators

- Application to transport 16 minimally radioactive decommissioned steam generators to Sweden for recycling
- CNSC found that the transport would be safe
- Good environmental stewardship
 - Three R's: Reduce, Reuse, Recycle
- Even though transport was approved, applicant decided to put project on hold in response to public opposition
 - Final decision rests with the licensee

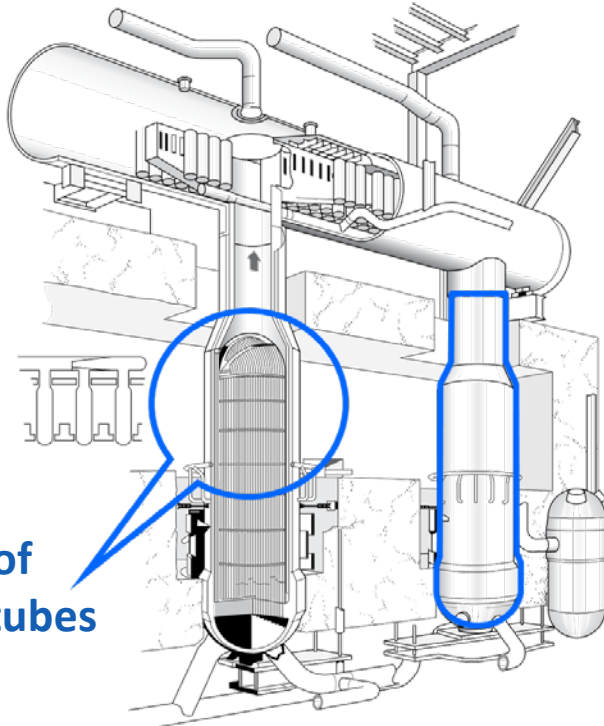
A good example of the result of misinformation and why it is important to communicate with stakeholders



Steam Generators in safe storage state.
Photo courtesy Bruce Power.



Waste Management: Steam Generators



65km of
Inner tubes



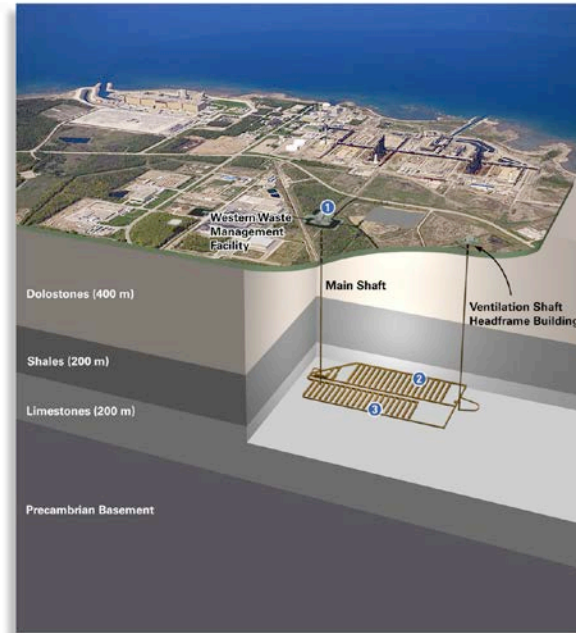
Total Radioactive
Material = 4 grams



Waste Management: Deep Geologic Repository

Long-term, safe solution for low- and intermediate-level radioactive waste

- Mop heads, rags, protective clothing, resins, filters, steam generators





Waste Management: Deep Geologic Repository

10 years of public participation, including consideration by a joint review panel

- 33 days of hearings, 246 participants, 20,000 pages of information reviewed
- Panel report submitted May 6, 2015

Vocal opposition in Canada and U.S. based on mistrust of the science

Still awaiting environmental assessment decision





Fukushima Daiichi Accident

CNSC took immediate action

- Directed operators to verify robustness of plants (in less than 48 hours after the accident)
- Source of information for Canadians and internationally
- CNSC Fukushima Task Force
- External Advisory Committee
- Public Hearings were not limited to NPPs only, they covered all major facilities

An accident anywhere is an accident everywhere



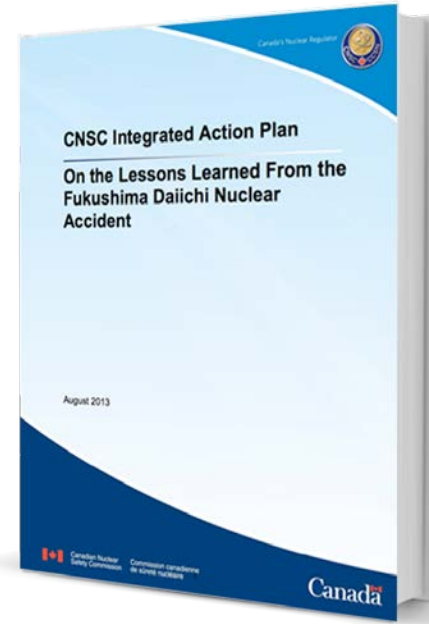
Fukushima Lessons Learned

The CNSC took immediate action

- Directed operators to verify robustness of plants
- Source of information for Canadians and internationally
- CNSC Fukushima Task Force, External Advisory Committee, International Regulatory Review Service (IRRS) mission

CNSC action plan

- Assess vulnerability and strengthen resiliency
- Not limited to nuclear power plants, but covered all major facilities
- Enhance emergency response
- Improve regulatory framework and processes
- Enhance international collaboration
- Enhance communications and public education





Fukushima Lessons Learned

CNSC played key role internationally

- IAEA Action Plan on Nuclear Safety
- Enhancing international peer review process
- IAEA Fukushima Report – DG lessons learned
- Enhanced accident prevention, improved mitigation of accident consequence, public protection



**Global safety is the responsibility of all stakeholders,
government, independent regulators and industry**



For Further Thought

- What kind of nuclear regulatory body should be cultivated, and how?
- Nuclear safety is a national matter, but a global concern – so how do we enhance and assure
 - improvements in nuclear safety worldwide – *Convention on Nuclear Safety* peer review
 - accountability and transparency of regulators – IAEA IRRS, regulatory cooperation and information sharing
 - International cooperation – industry, regulatory bodies, national governments, international organizations



Questions?

Thank You!



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