



Canadian Nuclear  
Safety Commission

Commission canadienne  
de sûreté nucléaire



# *The Canadian Nuclear Safety Commission Use of Codes and Standards*

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ACE – Canada Workshop  
November 22, 2017  
Jakarta, Indonesia

# Outline



- Basics of codes and standards
- International Atomic Energy Agency (IAEA) standard
- Standard making In Canada
- CSA Group standards
- Enforceability of standards and codes in the Canadian model

# Codes and Standards



## What are they?

- a set of technical definitions and guidelines, “how to” instructions for designers, manufacturers and users.

## What are they used for?

- to promote safety, reliability, productivity and efficiency in almost every industry that relies on engineering components or equipment.

## What is their format?

- from a few paragraphs to hundreds of pages
- are written by experts with knowledge and expertise in a particular field
- include details such as design formulas, table of materials, references to other codes, etc.

# *Why are Standards Effective?*



## **Standards are a vehicle of communication for producers and users**

- serve as a common language, defining quality and establishing safety criteria
- costs are lower if products are standardized
- training is simplified
- allow interchangeable products and parts

# *Process for Standard Development*



## **Consistent among all standard development organizations, national and international:**

- Identification of the need for new or revised standard
- Preliminary study and preparation of a draft outline
- Establishment of a committee (pre-existing or new)
  - determine number and composition
  - usually technical experts
- Committee meetings and consensus building on the draft
- Voting on the draft standard
- Publication of final standard

# *International Atomic Energy Agency (IAEA) Standards*



- Canada participates in development of IAEA documents such as:
  - Safety Fundamentals, Safety Requirements, Safety Standards, Safety Guides and Safety Reports
- Canada participates in the approval process for specific IAEA documents such as
  - Commission on Safety Standards (CSS)
  - Nuclear Safety Standards Committee (NUSSC)
  - Radiation Safety Standards Committee (RASSC)
  - Transportation Safety Standards Committee (TRANSSC)
  - Waste Safety Standards Committee (WASSC)
  - Nuclear Security Guidance Committee (NSGC)
- Canada benefits from international knowledge in the development of its own regulatory framework

# IAEA Standards in the CNSC's Regulatory Framework



## Canada considers IAEA documents in developing its regulatory framework:

- As additional guidance on how to meet existing requirements
- By direct reference in regulation (i.e., *CNSC Packaging and Transport of Nuclear Substances Regulations*)
- As references when developing CNSC regulatory documents
- As references in the development of CSA Group nuclear standards
- As best practice when revising/updating existing documents

# *IAEA Standards - Benefits*



## **Key benefits to this approach**

- Documents reflect current international best practices
- Documents reflect the most recent international operational experience
- IAEA requirements are already familiar to Canadian licensees
- Requirements are technology-neutral



# Examples of Other International Standards used by the CNSC



## American Society Of Mechanical Engineers (ASME)

- Promotes the art, science and practice of mechanical and multidisciplinary engineering and allied sciences throughout the world
- Publishes nearly 600 codes and standards, involving the committee participation of over 4,000 volunteers and staff
- ASME codes and standards are used in over 90 countries, often as the means for satisfying government regulations
- Primarily used by the CNSC for pressure vessels, tubing, valves

## Institute of Electrical and Electronics Engineers (IEEE)

- World's largest association of technical professionals with more than 420,000 members in over 160 countries
- Objectives are the educational and technical advancement of electrical and electronic engineering, telecommunications, computer engineering and allied disciplines
- Primarily used by the CNSC for instrumentation and control systems, cyber security systems

# National Standards System in Canada



- The National Standards System (NSS) is Canada's network of people and organizations involved in the development, promotion and implementation of standards.
- The Standards Council of Canada's (SCC)
  - oversees the National Standards System
  - accredits standardization organizations, verifying that they have the resources, structures and expertise to deliver trustworthy services
  - approves National Standards of Canada
  - represents Canada in key regional and international standardization forums



**Standards Council of Canada**  
**Conseil canadien des normes**



## **Key criteria for designation as a National Standard of Canada include**

- Developed by consensus of a balanced committee
- Subjected to public scrutiny
- Consistent with or incorporates existing international and standards
- Does not act as a barrier to trade

## **System participants**

- Governments, industry, standards development organizations
- Consumers and non-governmental organizations
- Conformity assessment bodies
  - calibration and testing laboratories, management systems certification bodies, product/service certification bodies

# Standards in Canadian Nuclear Industry



## CSA Group\* standards used in the Canadian nuclear industry

- CSA has a strong nuclear standards program
- Nuclear industry representatives form Nuclear Strategic Steering Committee
- Nuclear industry technical experts form the technical committees to develop standards in specific technical areas
- CSA standards reference international standards wherever possible
  - IAEA, ASME, IEEE
- Using Canadian domestic standards allows flexibility to adapt to Canadian technology and context while leveraging international standards where appropriate

\*Formerly known as the Canadian Standards Association

# CNSC and CSA Standards



- The CNSC is a member of the NUSSC – participates in governance and strategic planning
- CNSC technical experts participate on technical committees responsible for standards in specific technical committees
- The CNSC and CSA work together to ensure alignment of CSA nuclear standards program and CNSC regulatory document framework program
- The CNSC is a financial contributor
- The CNSC has arranged for CSA standards to be available to the public through its website

# CNSC's Regulatory Framework and CSA Standards



- The CNSC references standards in its regulatory documents
- Usually CSA standards that may reference other standards
- Sometimes other standards directly
- Standards are reflected in the safety and control areas:

## 2.0 Safety and control areas

- 2.1 Management system
- 2.2 Human performance management
- 2.3 Operating performance
- 2.4 Safety analysis
- 2.5 Physical design
- 2.6 Fitness for service
- 2.7 Radiation protection
- 2.8 Conventional health and safety
- 2.9 Environmental protection
- 2.10 Emergency management and fire protection
- 2.11 Waste management
- 2.12 Security
- 2.13 Safeguards and non-proliferation
- 2.14 Packaging and transport

# CSA Nuclear “N” Standards

*[examples where informed by standards shown]*



- **Management systems: N286** [CAN/CSA ISO9001, Z299]
- **Environmental management: REGDOC-2.9.1** [CAN/CSA ISO-14001]
- **Pressure boundary standards: N285** [CSA B51, ASME]
- **Periodic Inspection standards: N285.8** [COG Fitness for Service]
- **Fire protection: N293** [NFCC, NBCC, NFPA]
- **Structural standards: N287** [CSA A23 series]
- **Seismic qualification: N289** [NBCC]
- **Derived release limits: N288.1** [ICRP, Canada Food Guide]
- **Electrical safety: N290.5** [CSA Canadian Electrical Code/CEC]
- **Digital Hardware/software for I&C: N290.14** [CSA, IEC, ISA]
- **Environmental Qualification (EQ): N290.13** [IEEE]



## **State law**

- Clearly applicable within a state's territory
- Can include standards

## **International law**

- Generally regarded as the set of rules binding in relations between states
- Generally not applicable to individuals

## **Nuclear law**

- Should be part of state law, but can often arise owing to international treaties



# International Conventions and Treaties



- *Treaty on the Non-Proliferation of Nuclear Weapons (NPT)*
- *South Pacific Nuclear Free Zone Treaty (Rarotonga Treaty)*
- *Southeast Asia Nuclear Weapon-Free Zone Treaty (Treaty of Bangkok)*
- *Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention)*

# International Conventions and Treaties



- *International Convention for the Safety of Life at Sea (SOLAS)*
- *Convention Relating to Civil Liability in the Field of Maritime Carriage of Nuclear Material (NUCLEAR)*
- *Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space and Under Water*
- *Paris Convention on Third Party Liability in the Field of Nuclear Energy*

# International Conventions and Treaties



- *Brussels Convention Supplementary to the Paris Convention*
- *Convention on Nuclear Safety*
- *Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management*

# Ratification



- With ratification, a state is obligated to comply.
- State laws are typically amended or created to implement the obligations.
- In effect, this results in the standardization of much nuclear law around the world.

# Implications for ACE



- Standards are useful for technically complex industries
- Leverage international standards – best practices
- Adapt for domestic context
- Regulator can participate and influence standard setting
- Regulator is responsible for determining requirements
  - only reference the standard if it meets YOUR regulatory requirements



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