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The Effective Application of the International Atomic Energy Agency's "Code of Conduct on the Safety of Research Reactors" in Regulating Research Reactors at the U.S. Nuclear Regulatory Commission

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NRC Mission Statement

The NRC licenses and regulates the Nation's civilian use of radioactive materials to provide reasonable assurance of adequate protection of public health and safety and to promote the common defense and security and to protect the environment.

U.S. Research Reactors and Testing Facilities

- 31 operating reactors
- 3 shutdown
- Power range 5 watts to 20 MW
  - Five are 2 MW or greater
- Reactor types
  - 16 TRIGA
  - 9 plate-type fuel
  - 3 AGNs
  - 3 one-of-a-kind (PULSTAR, Argonaut, critical assembly)

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IAEA Code of Conduct on the Safety of Research Reactors

- Developed by legal and technical experts in response to concerns about safety
- Adopted by IAEA Board of Governors and endorsed in 2004 by the General Conference
- Guidance on development and harmonization of laws, regulations and policies on safety
- Provides “best practice” guidance to the State, regulatory body and operating organization
- Periodic meetings are held to assess progress on application of the Code

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NRC Regulation of Research Reactors and Testing Facilities

- Atomic Energy Act is the law passed by Congress
- NRC has the authority to develop its own regulations
- Guidance assists licensees with methods to meet the requirements of the regulations
- A graded approach is applied to the regulatory process and technical requirements

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NRC Applies Minimum Regulation

The **Atomic Energy Act** (Section 104c) requires minimum regulation for noncommercial research reactors and testing facilities

*The Commission is directed to **impose** only such **minimum amount of regulation** of the licensee as the Commission finds will permit the **Commission to fulfill its obligations under this Act to promote the common defense and security and to protect the health and safety of the public** and will **permit the conduct of widespread and diverse research and development.***

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United States and the Code of Conduct

U.S. regulation of research reactors and testing facilities is in harmony with the Code of Conduct

- Role of the State carried out by Congress with authority given to NRC by law
- NRC implements the regulatory body role
- Licensees carry out role of the operating organization by following regulations and license requirements

NRC Self-Assessments

2014 self-assessment showed substantial harmony with the Code of Conduct

- Maintenance of safety analysis reports identified as an area for possible enhancement - updates only required for renewal (20b)

- Draft final rule to require 5-year updates is with Commission for consideration

NRC Self-Assessments

The need for the regulating body and operating organization to take human factors into account identified as an area for possible enhancement

- Update issued to NUREG-1537, format and content guide and standard review plan, with additional guidance on human factors and human-machine interface (20g)

Role of the State

- Legislative framework passed by Congress (9)
- NRC is the regulatory body charged with regulatory control of research reactors (10)

- NRC is an independent regulator - makes the safe use of nuclear technology possible (10)
- Atomic Energy Act provides NRC with the authority to regulate (11)
- Congress provides funding to NRC to carry out its responsibilities (11)

Role of the State

- The public is involved in the regulatory process by law - openness a basic principle of NRC (12)

- Regulations require demonstration of possession, or reasonable assurance of obtaining, funds for construction, operation (including extended shut down) and fuel cycle costs (13)

- Regulations require reasonable assurance of funds for decommissioning (13)

- The U.S. Government has an interagency response plan for emergencies (14)

Role of the State

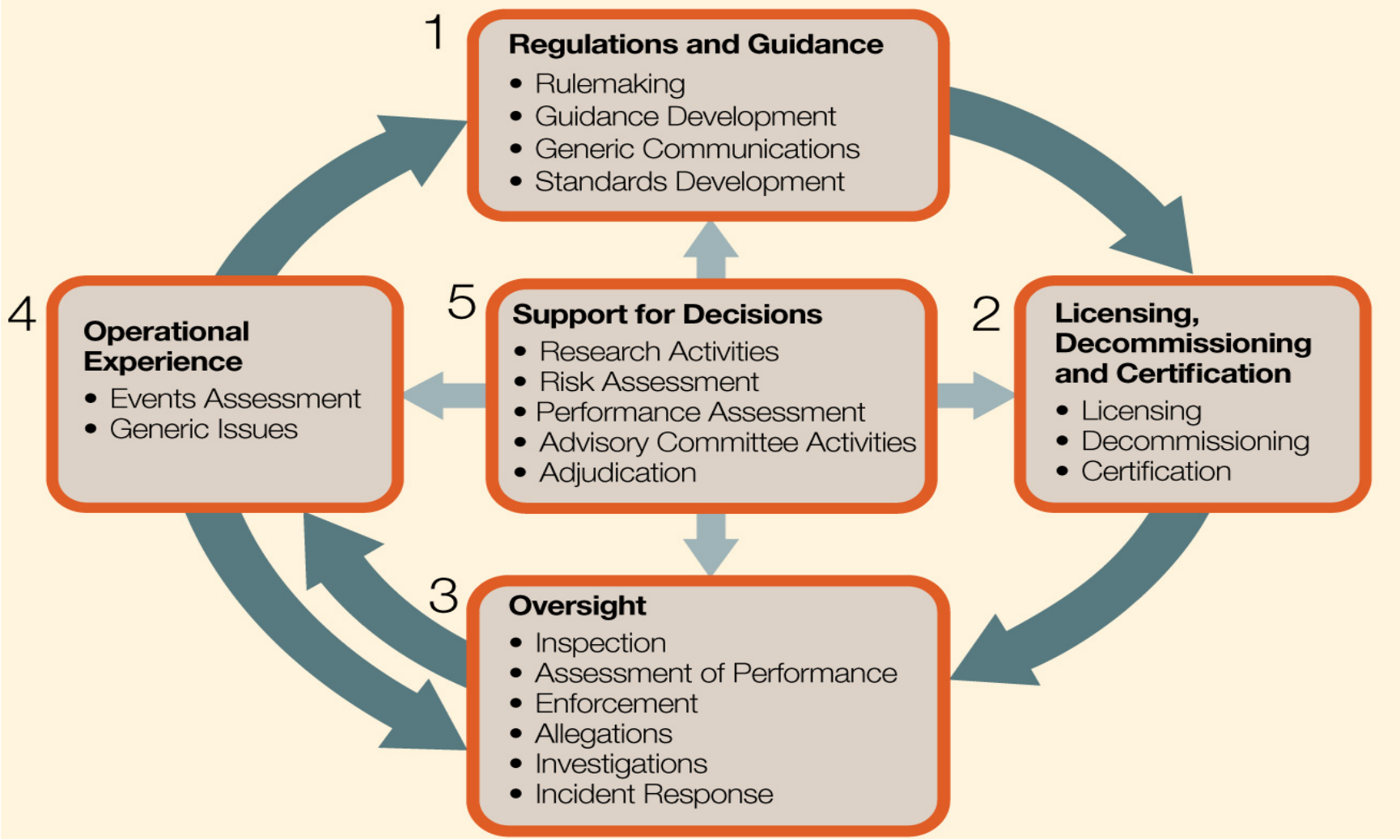
- The regulations contain legal and infrastructure arrangements for decommissioning – facilities must decommission without significant delay after permanent shutdown (15)

- Facilities in extended shutdown must meet all regulations and license requirements (16)

- Decommissioning funding regulations account for the possibility of the loss of effectiveness of the operating organization (17)

- The U.S. Government has methodologies for communication with neighboring governmental jurisdictions(18)

Role of the Regulator



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Role of the Regulator

- NRC has processes for performing assessments and issuing authorizations throughout facility regulated life (19a and d)
- The NRC inspection program assesses all aspects of licensee performance (19b and d)
- NRC has enforcement authority (19c)
- NRC's regulatory requirements and decisions are public (19e)

Role of the Regulator

- Operational limits and conditions (OLCs) require clear responsibility for safety from management (20a)
- Regulations require the preparation of a safety analysis report (20b)
- OLCs contain requirements for adequate human resources (20d)
- Regulations require licensing and requalification of reactor operators (20e)

Role of the Regulator

NRC uses alternate arrangements to a periodic safety review (PSR) to assure adequate protection of public health and safety (20c)

- NRC reviews and evaluates operating experience on a regular basis to identify trends and safety issues
- OLCs require reporting of significant changes to transient or accident analysis
- OLCs require reporting of events
- OLCs require annual reports with significant amount of operating performance information
- Inspection program assesses performance on an ongoing bases
- NRC has authority to request information, perform additional inspections and order licensees to take actions

Role of the Regulator

- Regulations require quality assurance plans or OLCs (20f)
- Regulations contain national dose limits and requirement for doses to be ALARA (20h)
- OLCs require reporting of environmental monitoring results (20i)
- Regulations require licensees to follow NRC-approved emergency plans (20j)
- Regulations require evaluation of facility site with details given in guidance (20k)

Role of the Regulator

- Regulations address design, construction, and commissioning with details in guidance (20l, 20m, 20n)
- Regulations require OLCs (20o)
- OLCs require reporting of events (20p)
- Regulations contain a process for making modifications (20q)
- Regulations require that NRC inspectors have unfettered access to facilities (20r)

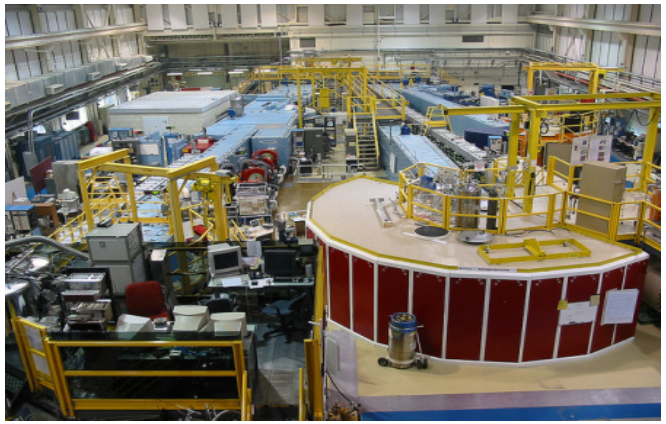
Role of the Regulator

- Regulations address radioactive waste and spent fuel (20s)
- Facilities in extended shutdown must continue to follow regulations and license conditions including OLCs (20t)
- Regulations contain requirements for release of facilities for restricted and unrestricted use (20u)

Role of the Licensee Operating Organization

- The operating organization is responsible for safety
- The recommendations of the Code of Conduct for the operating organization will be met by following NRC regulations, license requirements and OLCs, and plans for security, emergencies and operator requalification
- The NRC inspection program confirms compliance

Summary



- The Code of Conduct is one of the most important IAEA documents for strengthening international nuclear safety arrangements and has been supported by NRC

- The NRC regulation of research reactors and testing facilities, including enhancements being made, are in harmony with the Code of Conduct