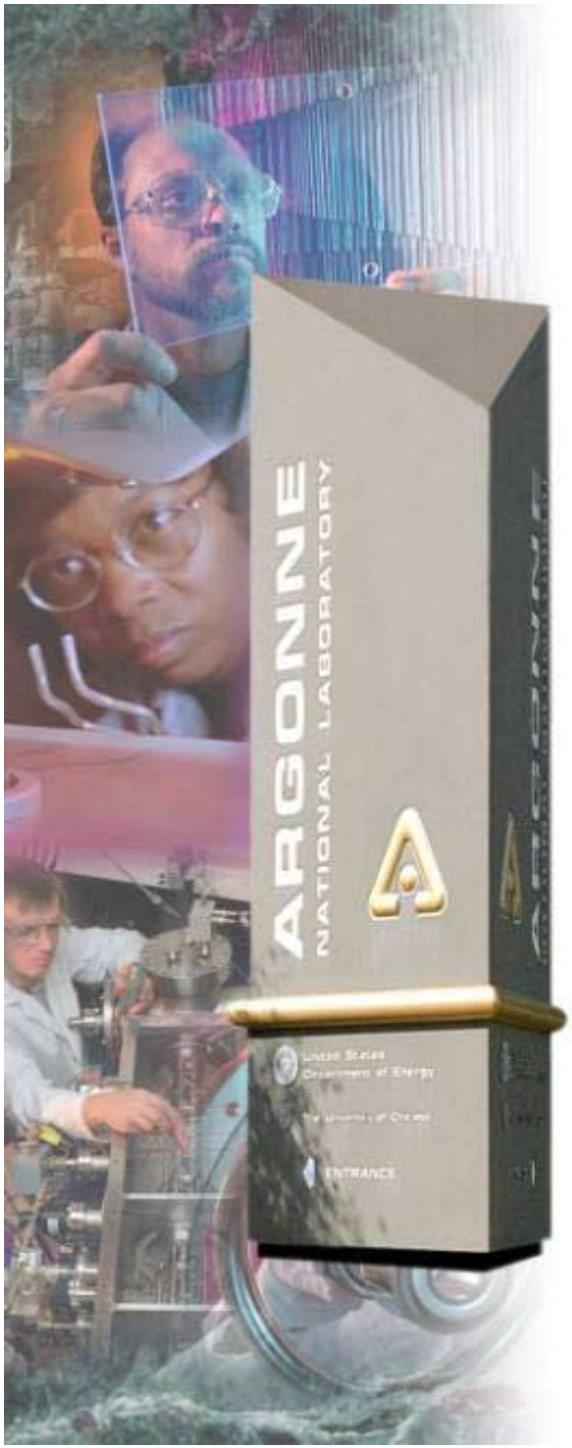

Workshop on Application of the Code of Conduct on the Safety of Research Reactors

Module 3 – The Role of the State in RR Safety

L.3.1.E - Legal and Governmental Infrastructure for Research Reactors: Periodic Review of Safety

L.3.1.F - Legal and Governmental Infrastructure for Research Reactors: Cross-Border Notification

Argonne National Laboratory

Office of Science
U.S. Department of Energy

A U.S. Department of Energy
Office of Science Laboratory
Operated by The University of Chicago

- **If the Safety Analysis Report (SAR) of the original research reactor facility is done thoroughly, and each modification undergoes a safety evaluation, why is it necessary to do a periodic review of safety?**
  - **Changes external to the facility**
  - **Changes internal to the facility**

- **Typical Changes External to the RR that could effect the SAR**

  - Changes in the site characterization
    - *Population distribution and density*
    - *New seismic findings*
    - *Changes in hydrology*

  - Changes in potential accidents to consider
    - *New industries near the facility*
    - *Hazardous shipments near the facility*
    - *New schools or hospitals that impact emergency planning*

  - Changes in regulations and standards

- **Typical Changes Internal to the RR facility that could effect the SAR**

  - Ageing structures, systems or components (SSCs)
  - Operational experience
  - Modifications not properly analyzed and documented at the time of implementation
  - Synergistic effects of multiple modifications (not considered in the safety evaluations of individual modifications)
  - Cumulative effects of many small changes, each considered insignificant by itself
  - New analytical tools and methods
  - New technical information

- **Periodic Safety Reviews at Power Reactors**

  - Glossary definition:

    "Periodic Safety Review - A periodic assessment of the safety of an operational facility or activity carried out at regular intervals to deal with the cumulative effects of ageing, modifications, operating experience and technical developments, and aimed at ensuring a high level of safety throughout the operating lifetime of the facility or activity."

  - Reference:
    - *IAEA Safety Requirements, Periodic Safety Review of Nuclear Power Plants, Safety Standard Series No. NS-G-2.10 (2003)*

- **Safety Fundamentals - Principles for the Verification of Safety**

(24) "*The operating organization shall verify by analysis, surveillance, testing and inspection that the physical status of the installation and its operation continue in accordance with operational limits and conditions, safety requirements and the safety analysis.*"

(25) "*Systematic safety reassessments of the installation in accordance with the regulatory requirement shall be performed throughout its operational lifetime, with account taken of operating experience and significant new safety information from all relevant sources.*"

- **Safety Requirements – Safety of Research Reactors, Draft NS-R-1**

7.110. The operating organization shall conduct safety assessments throughout the operational lifetime of the reactor. The scope of the assessments shall cover all safety related aspects of operation, including radiation protection, site re-evaluation, physical protection and emergency planning. In conducting the safety assessments, the operating organization shall give due consideration to information drawn from operating experience and other relevant sources. A program of comprehensive periodic review will fulfill this requirement for safety assessments. On the basis of the results of the safety assessments, the operating organization shall implement any necessary corrective actions and shall consider making justified modifications to enhance safety.

L.3.1.E - Legal and Governmental Infrastructure for Research Reactors: Periodic Review of Safety

- **Periodic Review of Safety per the Code of Conduct**

  - Role of the State

    10. The State should have a regulatory body charged with regulatory control of research reactors based on the national legal structure. The regulatory body should be able to conduct authorization, regulatory review and assessment, inspection and enforcement, and should establish safety principles, criteria, regulations and guides….

    16. The State should take the appropriate steps to ensure that the safety of all operating research reactors and research reactors in extended shutdown is reviewed. When necessary in the context of this Code, the State should ensure that all reasonably practicable improvements are made to upgrade the safety of the research reactors. If such upgrading cannot be achieved, appropriate provisions should be made to shut down and then decommission the research reactors. The timing of the shut-down of the research reactors, if safety allows it, may take into account the contributions of each research reactor's utilization programme to society and the possible alternatives as well as other social, environmental and economic impacts.

- **Periodic Review of Safety per the Code of Conduct**

  - Role of the Regulatory Body

    19. The regulatory body should:

    (d) review and assess submissions on safety from the operating organization both prior to authorization and periodically during the life of the research reactor as appropriate, including in relation to modifications, changes in utilization and experimental activities important to safety

    20. The regulations and guidance established by the State or the regulatory body according to national arrangements should:

    (c) require the operating organization to undertake periodic safety reviews at intervals determined by the regulatory body and to make proposals for upgrading and refurbishment arising from such reviews as necessary

    (q) require the operating organization to classify modifications according to their safety significance, establish suitable internal review procedures, and keep up to date records of modifications and changes to the research reactor, including temporary modifications arising from experiments

- **Periodic Review of Safety per the Code of Conduct**
  - **Role of the Operating Organization**

22. The operating organization should:

(a) carry out a comprehensive and systematic safety assessment and prepare a safety analysis report before the construction and commissioning of a research reactor, and carry out safety reviews at appropriate intervals throughout its life, including in relation to modifications, changes in utilization and significant experimental activities and the management of ageing. The safety assessments and periodic safety reviews should include all technical, operational, personnel and administrative aspects of safety related operations. The assessments and reviews should be well documented, subsequently updated in light of operating experience and significant new safety information and reviewed under the authority of the regulatory body

32. The operating organization should:

(g) assess appropriately modifications proposed to perform experiments

(h) establish a safety review committee, as part of the operating organization, but reporting independently from the reactor management, to advise it on safety matters

(i) subject each utilization project having safety significance, including any modification of the research reactor, new construction or experimental device, to an appropriate level of safety assessment and approval

- **Periodic Review of Safety per the Code of Conduct**

  - **Role of the Operating Organization**

33. If unusual and compelling circumstances make it necessary for a research reactor to enter into or to continue in a state of extended shutdown, the operating organization should, as appropriate, prepare and implement a technical preservation programme to maintain the safety of the reactor and the reactor fuel, to be approved by the regulatory body. The programme should include: (c) modifications of the safety analysis report and the operational limits and conditions

(e) regular surveillance and periodic inspection, testing and maintenance activities to ensure that the safety performance of structures, systems and components does not degrade

- **Periodic Review of Safety per the Code of Conduct**

  - **Role of the IAEA**

36. The IAEA Secretariat should:

(c) continue to collect and disseminate information relating to the safety of research reactors, provide safety review services, develop and establish relevant technical standards and provide for the application of these standards at the request of any State by advising and assisting on all aspects of the safe management of research reactors