Regulating Safe Operation of Russian Research Reactors

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Russian-U.S. Symposium On Conversion Of the Research Reactors To LEU Fuel

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The Russian federation, U.S. and IAEA have been cooperating in several programs of the Global Threat Reduction Initiative:

• return of Russian-made highly enriched fuel to Russia from countries of Eastern Europe and Asia;

• reduction of fuel enrichment for research and test reactors;

• enhancement of physical protection of high risk radioactive sources.
Basic Functions of Nuclear and Radiation Safety Regulation

1. Development and putting in force codes and standards in the field of atomic energy uses (regulatory control)

2. Licensing of activities in the field of atomic energy uses (licensing)

3. Supervision of nuclear and radiation safety of atomic energy facilities, including supervision of nuclear material accounting & control and physical protection (supervision)
Structure of Russian Legislative and Regulatory Documents in Atomic Energy Uses

- Constitution
- International Agreements
- Federal Laws
- President’s Decrees
- Government’s Enactments
- Technical Regulations
- Federal Codes and Standards in Atomic Energy Uses
- Administrative Regulations
- Guidelines
- Safety Guides
- National Standards, In-house Standards, Codes of Rules
Structure of Federal Codes and Standards in Atomic Energy Uses

**Level 1**
General safety provisions for each atomic energy facility (NPPs, RR, icebreaker reactor, nuclear fuel cycle facilities, radiation sources)

**Level 2**
ACTIVITIES

For all types of atomic energy facilities

- Account for external impacts
- Radwaste management
- Accounting and control
- Physical protection

For each atomic energy facility, including RNIs

- Quality assurance
- Siting, Design, Safety demonstration
- Construction
- Operation
- Emergency preparedness
- Decommissioning
Composition of Federal Codes and Standards in Atomic Energy Uses

- NNPs (22)
- General reg. docs (21)
- RNIs (10)
- MRP (7)
- NFCFs (15)
- RW (7)
- RSs (4)

- General regulatory documents (21)
- Nuclear power plants (22)
- Research nuclear installations (10)
- Marine reactor plants (7)
- Nuclear fuel cycle facilities (15)
- Radioactive waste (7)
- Radiation sources (4)
Federal Environmental, Industrial and Nuclear Supervision Service

Basic Codes and Standards for Nuclear and Radiation Safety of Research Reactors

Safety in the Utilization and modification of research reactors. Safety series. IAEA, 1994, № 35-G2

Code on Safety of Nuclear Research Reactors: Design, IAEA, 1992. 35-S1
Code on Safety of Nuclear Research Reactors: Operation, IAEA, 1992. 35-S2


General Safety Assurance Provisions for RNIs, NP-033-01

Rules of Nuclear Safety for RRs, NP-009-04;
Rules of Nuclear Safety for Critical Benches, NP-008-04;
Rules of Nuclear Safety for Subcritical Benches, NP-059-04;
Rules of Nuclear Safety for Pulse Research Installations, NP-048-03)

Requirements to Content of RNI SAR, NP-049-03

Requirements to Content of Action Plan for Protection of Personnel in Case of Accident in RNI, NP-075-06

Requirements to RNI QAP, NP-042-02 (being revised)
The Code requirements below have not been fully implemented and are being developed:

- Legal and infrastructural arrangements for decommissioning of atomic energy facilities, financial and human resources (Code clauses 15, 23, 24);
- Information for neighbouring States, information sharing between agencies, including information sharing on emergency response (Code Clauses 9, 18, 20j, 29);
- Requirements to safe operation conditions and limits, to safe operation indicators of RNIs (Code Clauses 20o, 22, 32);
- Requirements to periodic safety reviews (Code Clauses 20c, 22, 25).
Enhancing State Safety Regulation for RRs

<table>
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<tr>
<th><strong>Enhancing the legislation:</strong></th>
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<tr>
<td>➢ Draft Federal Law “On State Regulation of Nuclear and Radiation Safety”</td>
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<th><strong>Enhancing regulatory framework for RR nuclear and radiation safety:</strong></th>
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<tr>
<td>➢ Modification of current regulatory documents,</td>
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<td>➢ Development of new regulatory documents:</td>
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<tr>
<td>▪ Periodic safety reviews for RRs,</td>
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<td>▪ Development of rules for withdrawing RRs from state supervision,</td>
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<tr>
<td>▪ Development of statement on procedure of modification of design, engineering and operating documentation for RRs based on assessment of their safety significance</td>
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| **Improving inspection programs and enforcement methods** |
Activities through RRs Lifecycle Licensed by Rostechnadzor

- CONSTRUCTION,
- OPERATION,
- DECOMMISSIONING,
- NUCLEAR MATERIAL MANAGEMENT,
- RADIOACTIVE SUBSTANCE MANAGEMENT,
- RADIOACTIVE WASTE MANAGEMENT,
- UTILIZATION OF NUCLEAR MATERIAL DURING R&D (PART OF OPERATION LICENSE),
- UTILIZATION OF RADIOACTIVE SUBSTANCE DURING R&D (PART OF OPERATION LICENSE),
- FACILITY DESIGN AND ENGINEERING,
- FACILITY EQUIPMENT DESIGN,
- FACILITY EQUIPMENT MANUFACTURE,
- REVIEWS OF SAFETY DEMONSTRATION DOCUMENTS.

Differentiated approach to completeness and content of package of documents describing current status of nuclear installations.

Differentiated approach is applied to determine amount of review of activities considering RNI potential risk.
Status of Nuclear Research Facilities

1991 - 2011

- **19 operating organizations**
- **RRs** 32
- **CBs** 30
- **SCBs** 12
- **No program**
- **Financial difficulties; Safety problems.**
- **Operation/age > 30 yrs**
  - RRs: 24/17
  - CBs: 28/12
  - SCBs: 11/5
- **Decommissioning**
  - RRs: 6
  - CBs: 2
  - SCBs: 0
- **Under construction**
  - RRs: 2
  - CBs: 0
  - SCBs: 1
Issues of RR Safety Demonstration to Be Licensed by State Regulation Authority when Converting from Highly Enriched Fuel to Low Enriched Fuel

- R&D for design and fabrication of new fuel, fuel tests, validation of its characteristics and operating conditions;
- safety demonstration of fabrication, transportation, storage and disposal of new fuel;
- analysis of flux kinetics and distribution in reactor core with new fuel;
- thermohydraulic analysis;
- safety analysis (certification of computer codes; justification of safe operation limits and conditions; accident initiators; modification of documents – SARs, plans of personnel and public protection, quality assurance programs, operational procedures);
- Design of RNI modification (reconstruction).
Conclusion


– Rostechnadzor is ready to view issues of RRs safety in light of planned conversion to low enriched fuel.

– Active international cooperation and collaboration are necessary conditions for achieving strategic objectives in responding to challenges of the Global Threat Reduction Initiative.
Thank you for your attention