Radiation protection and public health of nuclear professionals and the public living in the vicinity of radiation hazardous facilities in Russia

Vladimir Romanov
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The main regulatory and legislative acts of FMBA activity

- Order of the RF President of 11 October 2004 №1304 “On the Federal Medical Biological Agency”

FMBA is responsible for especially hazardous industrial branches in areas of professional and public health and for health-care situation around radiation hazardous facilities
Total number of workers of the subordinated organizations is 154265 persons. The number of the contingence under medical service is 10 millions of persons.
FMBA’s service covers

- More than **190 thousands** of nuclear workers, including about **72 thousands** of persons under dose monitoring

- In **10 CTF** (close territorial formations) located in the areas of nuclear sites, more than **747000** persons are under medical service

- More than **40 thousands** of medical staff are involved in medical service
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## Demographic indications in close territorial formations

<table>
<thead>
<tr>
<th>Indication</th>
<th>FMBA of Russia</th>
<th>Russian Federation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Born rate (over 1 thousand of the members of the public)</td>
<td>10.1</td>
<td>12.6</td>
</tr>
<tr>
<td>Baby mortality (over 1 thousand of the members of the public)</td>
<td>4.8</td>
<td>7.5</td>
</tr>
<tr>
<td>Total mortality (over 1 thousand of the members of the public)</td>
<td>12.4</td>
<td>14.3</td>
</tr>
<tr>
<td>Incidence of malignant neoplasm (over 100 thousand of the members of the public)</td>
<td>412.1</td>
<td>365.4</td>
</tr>
<tr>
<td>Incidence of tuberculosis (over 100 thousand of the members of the public)</td>
<td>32.8</td>
<td>66.6</td>
</tr>
</tbody>
</table>
Occupational pathology
(over 10 thousand of the members of the public)

New cases of radiation induced diseases, such as acute and chronic radiation disease, local radiation injuries have not been registered over the recent 10 years.
Over many years, excessive radioactive effluents and discharges to the environment from nuclear facilities have not been registered.
Tasks to improve the health care

- Development and implementation of methods of early revelation of social significant diseases, which make the main contribution to the labor loses in nuclear industry

- Development of up-to-date requirements to prevent professional and occupational induced diseases for uranium mining and milling facilities

- Introducing of psycho-physiological selection in the practice of medical examination of workers at radiation hazardous plants
Specialized medical dosimetry registers

- **Scientific basis** - indexes of radiogenic risk (cancer risk)
- **Information basis:**
  - doses
  - non-radiological factors
  - health effects data
FMBA’s Registers

- Branch medical dose register of workers involved in mitigation of consequences of the accident at the Chernobyl NPP – “Rosatom’s” workers
- Regional medical dose register of workers of the production association “Mayak” (Ozersk city)
- Regional medical dose register of workers of the Siberian Chemical Combine (Seversk)
- Regional medical dose register of workers of the Mine Chemical Combine (Zheleznogorsk)
- Register of acute radiation injuries of the human
- Branch register of persons with professional diseases

Joint cohort of the personnel – about 57 thousands workers
## Radiological accidents

<table>
<thead>
<tr>
<th>Types of incidents</th>
<th>Number of victims</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Acute radiation syndrome</td>
<td>Died</td>
</tr>
<tr>
<td>1. Radioisotope plant incidents</td>
<td>170</td>
<td>51</td>
<td>16</td>
</tr>
<tr>
<td>2. Roentgen plant incidents</td>
<td>50</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>3. Reactor incidents</td>
<td>82</td>
<td>73</td>
<td>13</td>
</tr>
<tr>
<td>5. Nuclear submarine</td>
<td>133</td>
<td>85</td>
<td>12</td>
</tr>
<tr>
<td>6. Other accidents</td>
<td>17</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>7. Chernobyl accident</td>
<td>134</td>
<td>134</td>
<td>28</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>754</strong></td>
<td><strong>350</strong></td>
<td><strong>71</strong></td>
</tr>
</tbody>
</table>
Emergency response under FMBA of Russia
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Radiation Protection & Safety Regulation

ESTABLISHING OF REGULATIONS
- Factors of the work environment
- Limits of exposure to workers and the public
- The quality of the technological products
- Radiation factors of the residence environment

DEVELOPMENT OF GUIDE DOCUMENTS
- Health rules and regulations
- Health care regulations
- Guidelines
- Methodical recommendations
- Guidance
- Methods of measurement implementation (procedures of measurement)

REVIEW OF THE DESIGN DOCUMENTATION
- Construction designs of the nuclear energy using facilities
- Draft radiation safety regulatory documents
- Draft legislative and regulatory acts of the RF Government in the competence of FMBA
Normative and methodical documents

Over the recent 10 years, more than 70 health care regulations, 150 methodical documents have been developed, including 19 health rules, among which:

- Radiation safety standards
- Main rules for radioactive waste management
- Rules to NPP design and operation, including floating NPP
- Regulations to control the radiation safety assurance during the overall dismantlement of nuclear submarines
Doses to the Russian population

Normal operation of manmade sources
0.14%

Manmade background
0.66%

Natural sources
70%

Medical exposure
29%

Public doses due to activities of facilities in nuclear power engineering – below 0.01 mSv/year
(under regulation – 1 mSv/year)
Publications
Challenges in the radiation safety in Russia

- Ageing of the key resources
- Insufficient isolation from the environment of some near-plant radioactive waste storage facilities
- Large multi-million amounts of liquid waste
- A lack of reserve amounts in storage facilities at NPP’s and more than hundreds of nuclear submarines
Legacy of the nuclear submarine fleet

Environmental remediation of radiation hazardous sites – sites for SNF and RW temporary storage in the Northwest Russia
Uranium legacy

Octyabrsky village

Distribution (%) of radon-222 concentration in dwellings of Octyabrsky village, Bq/m³

Norm is 100-200 Bq/m³
Regulatory decisions and practice

Resettlement of Octyabrsky

2007

2010

2012
Uranium legacy

Participation in the Inter-state target programme EurAsES 2013 - 2018

Reclamation of areas of the EurAsEC member-states affected by the activities of uranium mining and milling facilities

Kadji-Sai  Min-Kush  Taboshar
In the preparation phase of the EurAsEC Programme

- Development of some target indicators and indexes together with parameters for their evaluation

- Development of the Method for the impact assessment of mines on the public health and risk assessment of radiation induced diseases

- Development of the Method and radiation monitoring performance at areas of facilities under restoration
Work Arrangement
It’s already made in 2013-2014

- Four expeditions
- Identification of inspected and control regions with maximum lose quality of medical and social service
- Radiation monitoring
  - System of the comprehensive and dynamic surveillance including the long-term continuous control of radiation parameters and doses of residents. Specialized rules include the types of environmental objects, scope and periodicity of sampling, methodological and technical requirements, etc.
- Population health monitoring
  - Accumulation of necessary copies of the national state medical statistic reports
- Database arrangement
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Conclusions (1)

1. The results achieved over almost 70 years the Agency's activities as an integral part of national health care, projected on the health-care professionals to support workers of the defense sectors of our country and the people living in the vicinity of the appropriate facilities fully justified it. This statement is confirmed, in particular, on the above mentioned levels both of the public health and radiation safety and protection.

2. Within the further improvement of health care support of nuclear workers and the public living in the areas of nuclear facilities impact, FMBA of Russia considers the following scientific and practical priorities:
Conclusions (2)

- Improvement and development of new and updated health care technologies aimed at radiation safety and protection assurance in the course of work at nuclear facilities and in the areas of so-called “nuclear military legacy”, in the vicinity of NPP (study of “zero” background)

- Completion of development of the a single system of radiation-hygienic response and medical aspects of protection in the case of radiological accidents at north, south, west and east of Russia, where nuclear facilities are and will be built and located

- Further search for and development of methods and means of prevention and treatment of individual radiation pathology, including newly innovative biomedical technologies (cell therapy etc.)

- Enhancing methods of study of long-term health effects of radiation exposure to workers of radiation hazardous facilities and to the public
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WG No 1
“Enhancing the Regulatory Infrastructure”

Participation of FMBA in IAEA International Forum on regulatory supervision of nuclear legacy
Objective

- To study and summarize experience of the regulatory bodies when planning and implementing the process of the regulatory supervision of nuclear legacy sites, and to develop recommendations on enhancing regulatory infrastructure.
Work organization (2011-2014)

- Development of the questionnaire to assess the state of the national legacy regulation
- Analysis and summary of materials provided by the RSLS member-states in their filled questionnaires
- Development of the resume on the national strategy of the legacy regulation taking into account the questionnaire-based information
- Generalization of the experience in the regulatory supervision of legacy sites using development of the normative-and-methodical framework in the Russian Federation and some other countries as an example
- Development working materials of our Working Group to be included in IAEA TECDOC
3 main areas to be analyzed:

1. The state of the legislative and governmental framework to regulate radiation safety of legacy sites and facilities

2. The infrastructure and responsibilities of the regulatory body

3. The governmental programmes on remediation of legacy sites and facilities
Conclusion

- Reviewed and analyzed the legislative framework of legacy regulation
- Review and summarize of the experience accumulated by the regulators of countries having nuclear and uranium legacy, when planning the such legacy management
- Analyzed the experience of the regulatory supervision and monitoring of the nuclear legacy
- Recommendations on enhancing the regulatory infrastructure and normative and legislative framework of the legacy management
IAEA Expert Meeting - July 2014

- Objective: to revise and update RSLS TECDOC, which will describe case-studies and additional informational materials received by the Forum Chair
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2. GENERAL LEGACY SITE CONSIDERATIONS
3. REGULATORY PROCESSES FOR LICENSING, DECOMMISSIONING AND REMEDIATION OF LEGACY SITES: discuss laws, regulations, guides, licensing, inspections, remediation plans; SPECIFIC (Discuss country specific examples); CONCLUDING SUMMARY
4. SUCCESSFUL PRACTICES FOR MANAGING AND PREVENTING URANIUM LEGACY SITES: MANAGING EXISTING LEGACY SITES; PREVENTING FUTURE LEGACY SITES
5. WORKING GROUP SUMMARIES
6. SUMMARY AND CONCLUSIONS: REGULATORY STRUCTURE, SAFETY ANALYSIS AND ENVIRONMENTAL IMPACT ASSESSMENTS, PROFESSIONAL QUALIFICATIONS
Thank you for attention