



**РОССИЙСКАЯ АКАДЕМИЯ НАУК
Институт проблем безопасного развития атомной энергетики**

**RUSSIAN ACADEMY OF SCIENCES
Nuclear Safety Institute (IBRAE)**

Remediation Plans for Areas Contaminated as a Result of Mayak Facility's Activity. International Cooperation

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Mayak Facility and Remediation Issues

- 1951-1986** **Issues of public/ environmental protection with regard to the Mayak problems were addressed using a vigorous scientific potential**
- 1986** **Use of the accumulated experience in Chernobyl**
- 1988–1992** **Raising the curtain**
- 1992** **Development of the first Federal Target Program (FTP)**
- 1994** **Start-up of active international cooperation**

State Involvement in Solving the Mayak Issues

1993	Development of the first FTP for radiation remediation of the Urals Region and measures of assistance for the public affected
1996	The FTP for social and radiation rehabilitation of the affected public and the Urals areas
Since 2002 till nowadays	The FTP “On Mitigation of Radiation Accidents for the Period Until 2010” covering the Urals and Chernobyl subject matter has been under way

Key Points:

- **Insufficient funding**
(5.7% for the first program and 34% for the second one);
- **Ineffective safety criteria;**
- **Reorientation towards social items.**

1998–2002: In-depth Analysis of Remediation Approaches

- ❖ **IIASA project “Remedial and Protective Activities for Contamination Due to Releases of Radioactive Materials at PA “Mayak” (Chelyabinsk-65) into the Techa-river (compared to those of ORNL into the Clinch River);**
- ❖ **Minatom’s Board for the remediation of contaminated areas**

**When remediating large areas,
the most effective are the following measures:**

- **Autoremediation processes; and**
- **Recommendations/ alerts/ restrictions based on monitoring data and tailored safety criteria.**

Experience in Implementation of Water Protection Actions in Chernobyl

Action

- Build the system of filter and fixed dams;
- Create river-bed pits for the retention of radionuclides sorbed on suspended particles and bottom sediments;
- Prevent radionuclide migration from a cooling pond by way of its isolation; and
- Filter curtains. Active measures to fix radionuclides by way of using sorbent mixtures.

Consequences

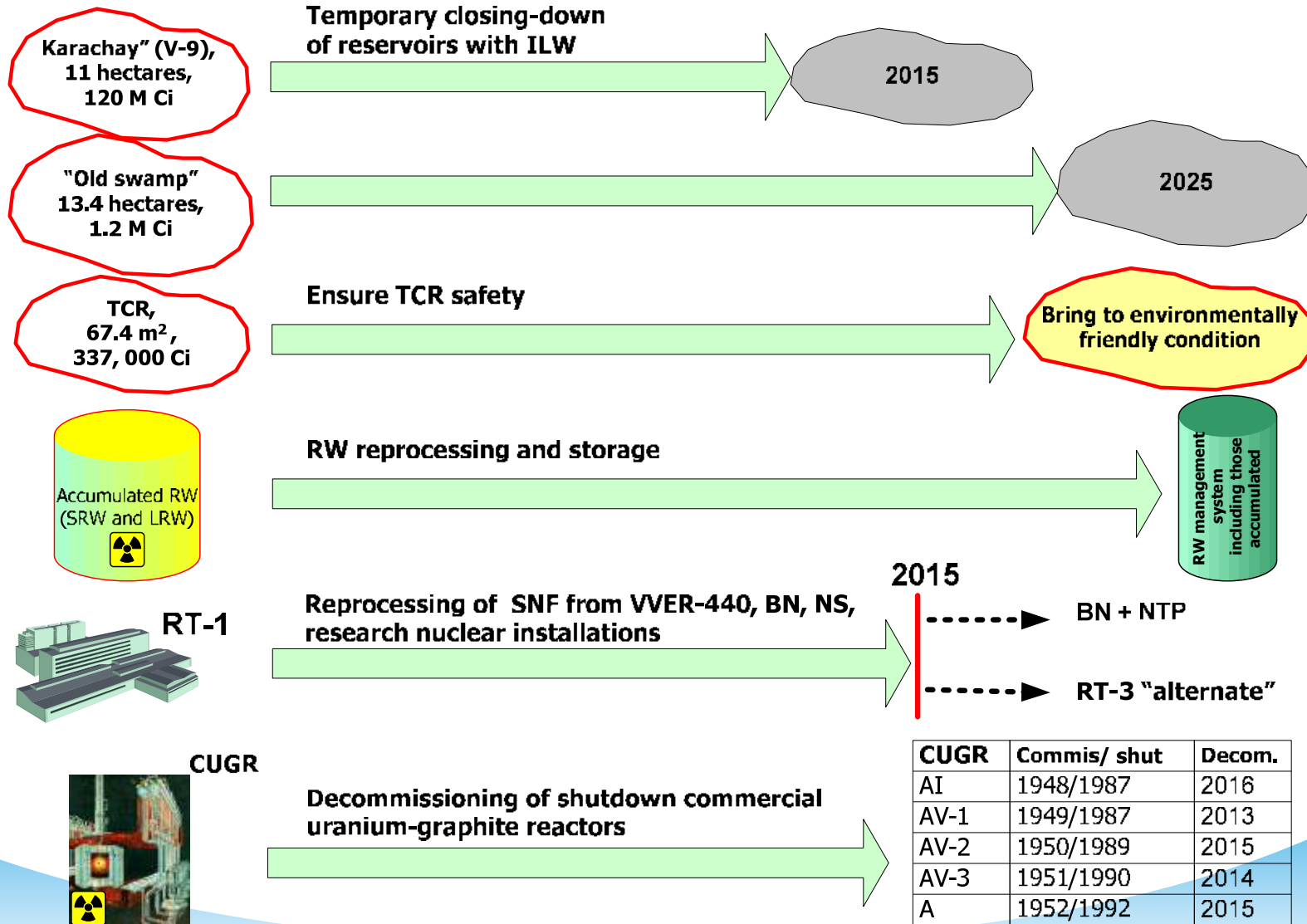
- Underflooding of the forests on 4,000 hectare area;
- Catchment of 4,5 mln. cubic meters of sand that could bury slimy sediments in the Kiev reservoir;
- Increase in the level of underground waters at the site of the Chernobyl NPP; and
- Protective efficiency is less than 2 %.

It is necessary to take into account negative experience in the implementation of water protection actions after the Chernobyl accident

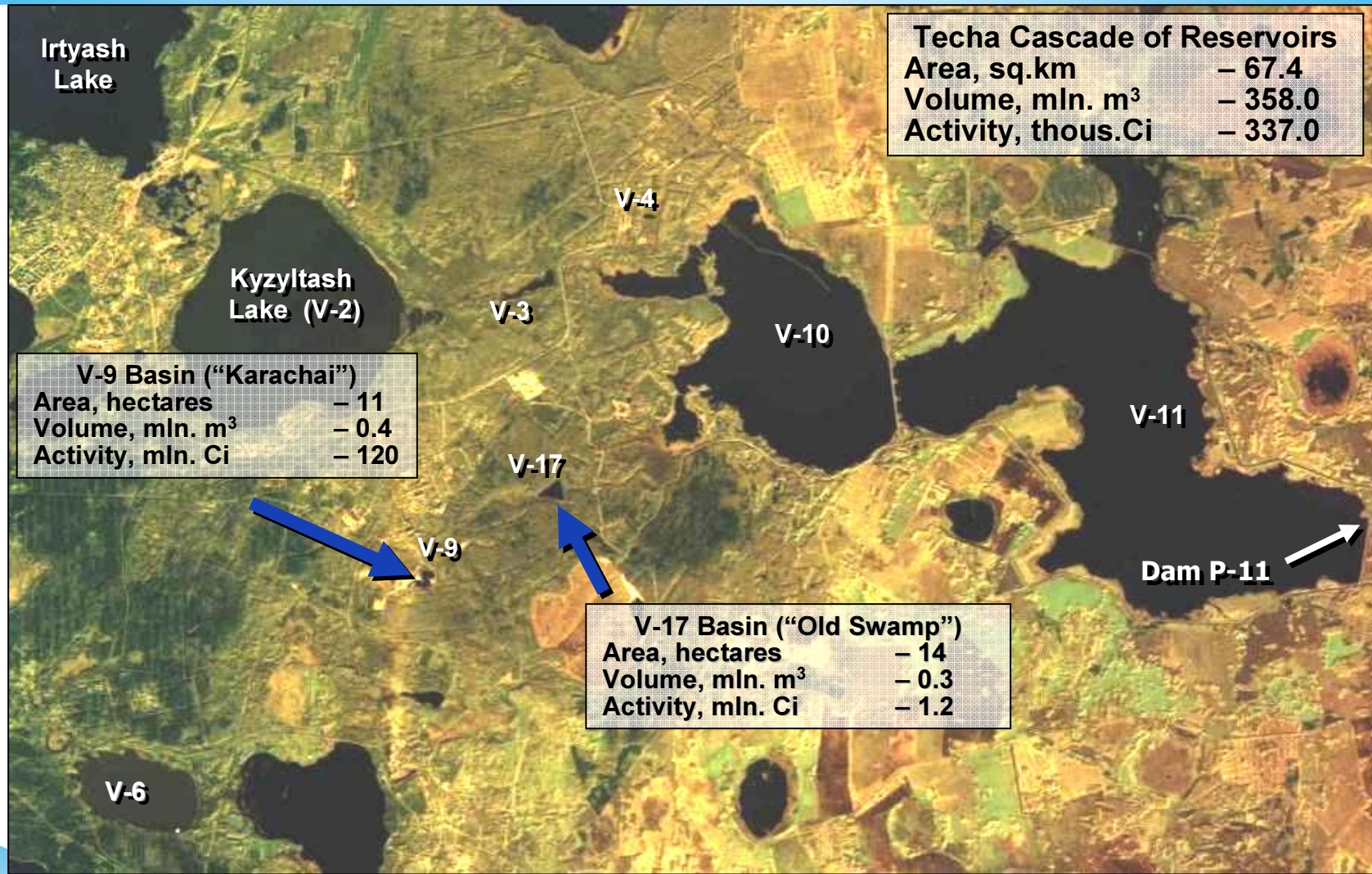
Development of Action Plans with regard to Sites

- 2003** Comprehensive action plan to solve environmental issues associated with current/ past activity of the Mayak facility
- 2007** List of actions to provide nuclear/ radiation/ environmental safety;
and
- 2008** FTP “Nuclear and Radiation Safety Provision for the Year 2008 and for the Period until 2015”

Measures in respect of the Mayak Facility (Chelyabinsk Region) (RUR 14.1 bn)



Mayak's Industrial Basins



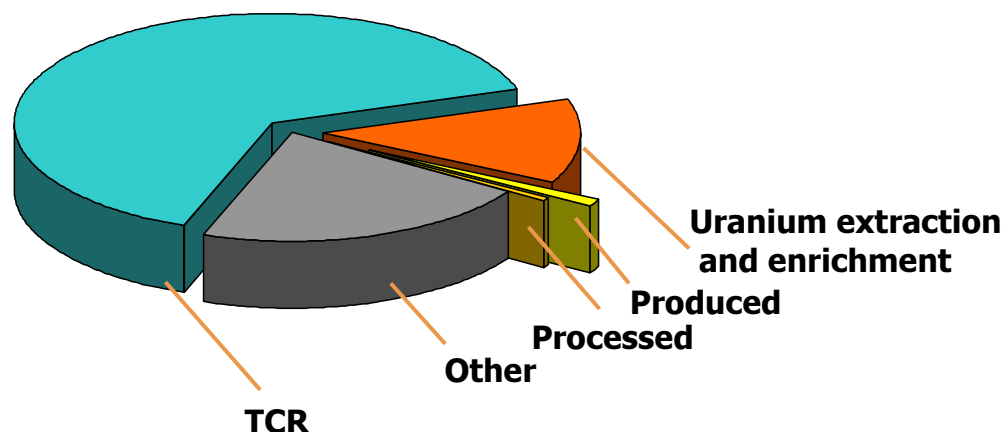
Objectives: To cease effluent discharges into the Techa cascade of reservoirs and increase the safety level of dam facilities

Special Environmental Programs

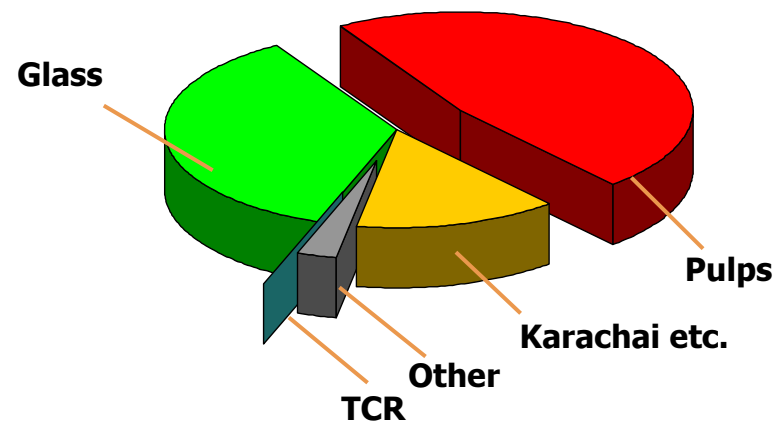
- ❖ **Transportation of SNF from research reactors from Uzbekistan/ Latvia/ Czech Republic/ Bulgaria/ Hungary;**
- ❖ **Special environmental programs:**
 - **Development of monitoring systems;**
 - **Radiation safety for activities run in Karachai;**
 - and
 - **Remediation of the Techa-river floodplain.**

Current Status of the Issue

**Radwaste amount – 2008
(540 million t)**



Radwaste activity – 2008



- ❖ The Mayak facility is the most difficult element of the Russian Federation's nuclear legacy
- ❖ The process of solving accumulated problems has only started. The ripened actions and those secured by the projects are under way
- ❖ Long-term strategic planning is essential right now

Strategic Approach to Mayak Problems Takes into Account as follows:

- ❖ Time-unlimited existence of large nuclear and radiation-hazard sites;
- ❖ The necessity to consider the interaction of natural and man-induced sites, that practically excluding the potential of implementing a separate or a final decision with regard to each of them;
- ❖ Separation of accumulated problems and the peculiarities of current activity;
- ❖ The necessity to solve environmental issues regardless of the fate of the facility;

and

- ❖ Acknowledgement of the potential and necessity to adapt the normative basis to the actualities of the facility.

Techa Cascade of Reservoirs is the Most Acute Item

Reasons:

- ❖ Accumulated volumes of liquid radioactive waste (LRW): above 360 mln. m³ ;
- ❖ What makes it difficult is the availability of several reservoirs and by-channels with water-discharge facilities, as well as belonging to a larger water system;
- ❖ Increased water content in the region during the period of 1980–2004 and available threat of overflowing;
- ❖ Legal/ political/ social unacceptability of contaminated water discharges into the Techa-river;

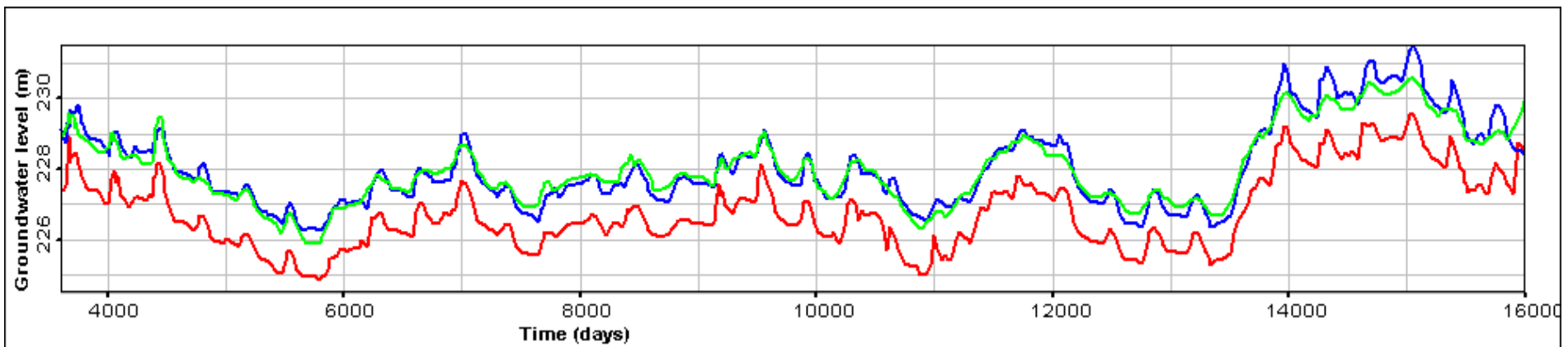
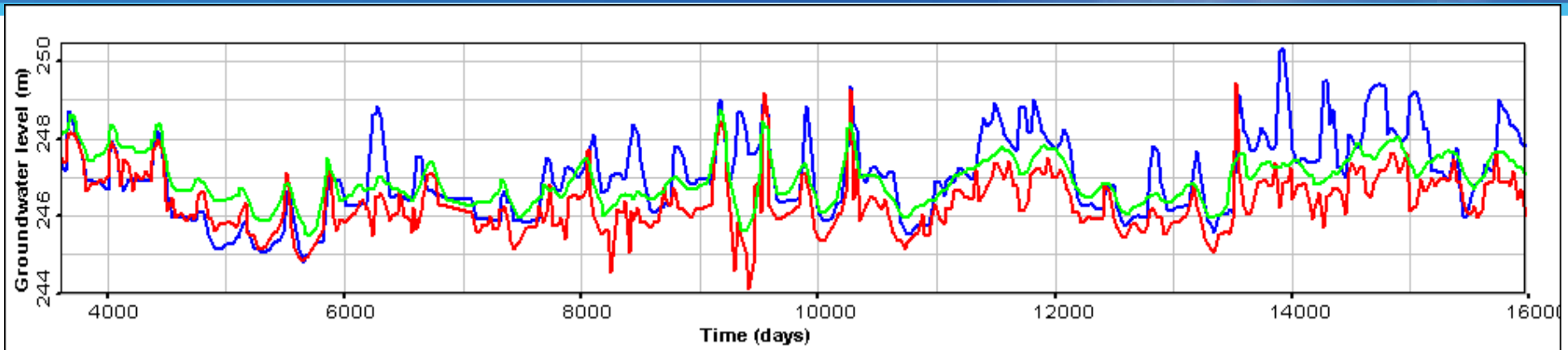
and

- ❖ Other opportunities of controlling the water level are limited.

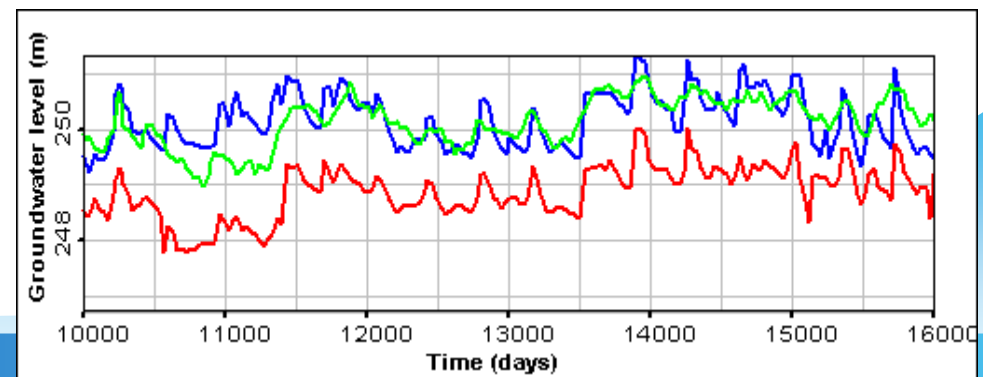
Peculiarity:

Insufficient contribution of the facility's current activity into radioenvironmental status.

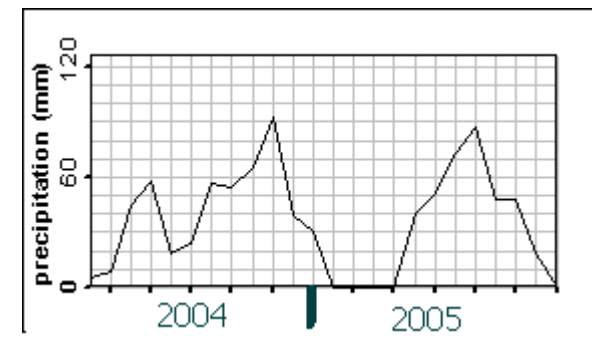
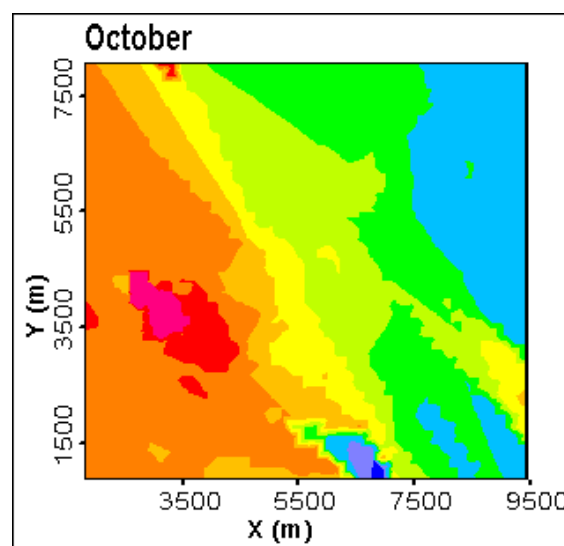
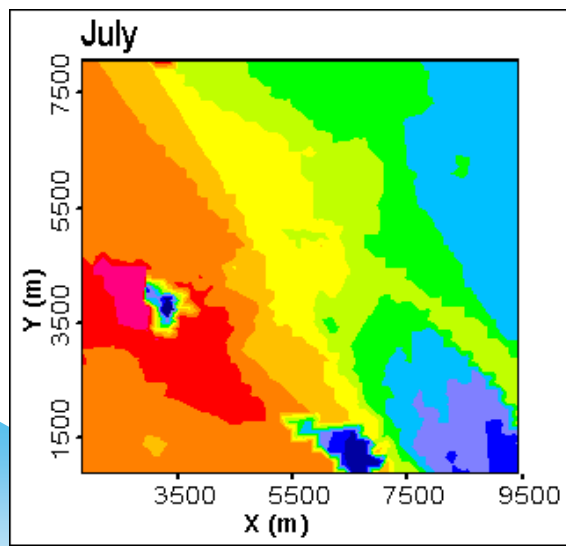
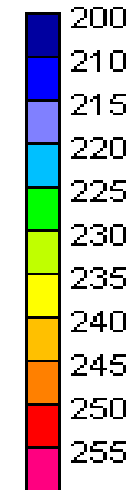
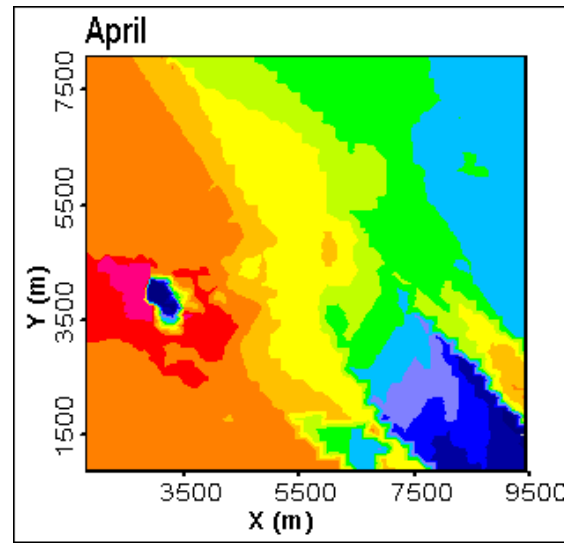
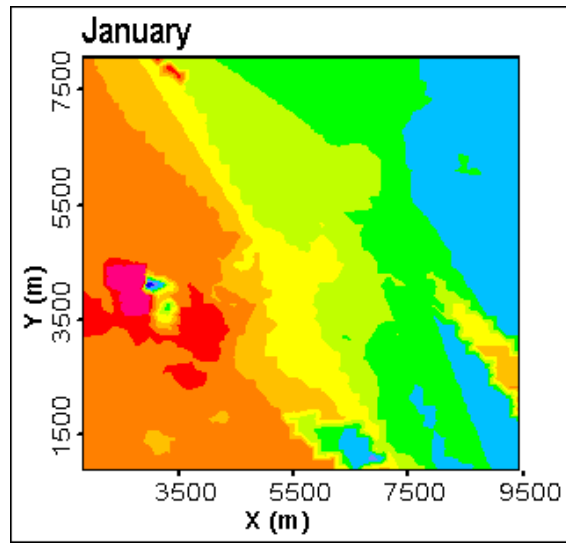
Water Level Dynamics in Wells



Blue Colour – Actual;
Red Colour – Model Forecast (1st option);
Green Colour – Model Forecast (2nd option). An extra temporary number of fall-outs was used and correlated with space-distributed data by the water level.



Level of Ground Waters in 2005



Main Issues

1. Normative and Legal Basis

**1950 –
early 1990s**

Maintenance of facilities in compliance with departmental documents developed under the USSR legislation.

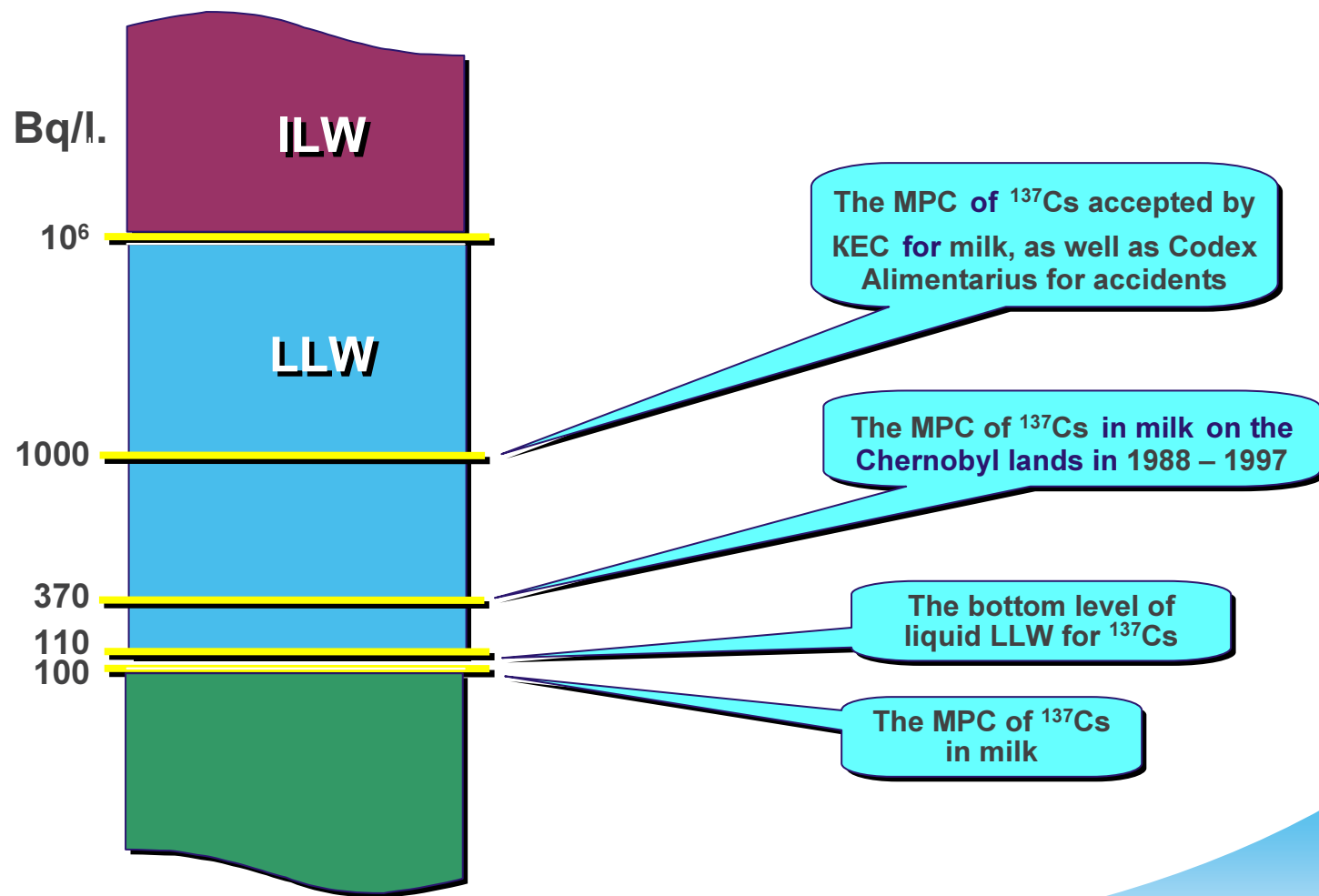
1991–2009

Development of the Russian Federation's normative and legal basis in the field of environmental safety/ protection and the lack of special safety requirements for the nuclear legacy sites.

2008

Acknowledgement of the necessity to regulate existing sites and territories contaminated by radioactive substances within the scope of a special federal law.

Contradictions between Hygienic Requirements and Those for the Technological Safety



Principles of the Draft Federal Law

Assignment of specially regulated territories and facilities:

- Industrial site with a facility using nuclear power, including sites for RW storage, infrastructure facilities, and “old” buildings/ constructions;
- Industrial reservoirs;
- Buffer area;
- The Techa-river and its floodplain; and
- Territories adjoining the buffer area. Running economic and other kinds of activities on these territories may lead to the increase in values established by safety criteria.

Establishment of safety criteria as a measure of interaction among regulated areas/ sites and the environment:

- Intensity of radionuclide discharges into industrial reservoirs;
- Limits for radionuclide entering into the environment; and
- Other qualitative/ quantitative criteria for independent or cumulative impact.

Federal Law Structure

- Article 1.** Main terms
- Article 2.** Fields of applicability of the current Federal Law
- Article 3.** Structure/ frontiers of specially regulated territories and facilities
- Article 4.** General requirements for the provision of safety/ protection for specially regulated territories
- Article 5.** General requirements for the use of industrial reservoirs
- Article 6.** Special legal status of the use of industrial reservoirs
- Article 7.** Safety requirements for industrial reservoirs
- Article 8.** Special legal status of the use and protection of the Techa-river
- Article 9.** Peculiarities of decommissioning of the facilities using nuclear power on regulated territories
- Article 10.** Special legal status of the lands within the boundaries of regulated territories
- Article 11.** State control over safety provision for regulated territories/ facilities
- Article 13.** On the Introduction of amendments into the Water Code of the Russian Federation due to adoption of the current Federal Law
- Article 14.** Final provisions

Main Issues

2. Support in the stabilization of public opinion is required

- ❖ **Methods to stabilize public opinion;**
 - ❖ **Development of monitoring systems;**
 - ❖ **Work with the public, including local/ regional/ foreign public (communication/ involvement, etc.);**
- and**
- ❖ **Participation of authoritative foreign experts/ organizations for the purpose of running independent expertise.**



**Thank you
for attention!**