ANALYSIS OF OCCUPATIONAL EXPOSURE INDICTORS AT DIFFERENT TYPES OF RUSSIAN NUCLEAR POWER PLANTS

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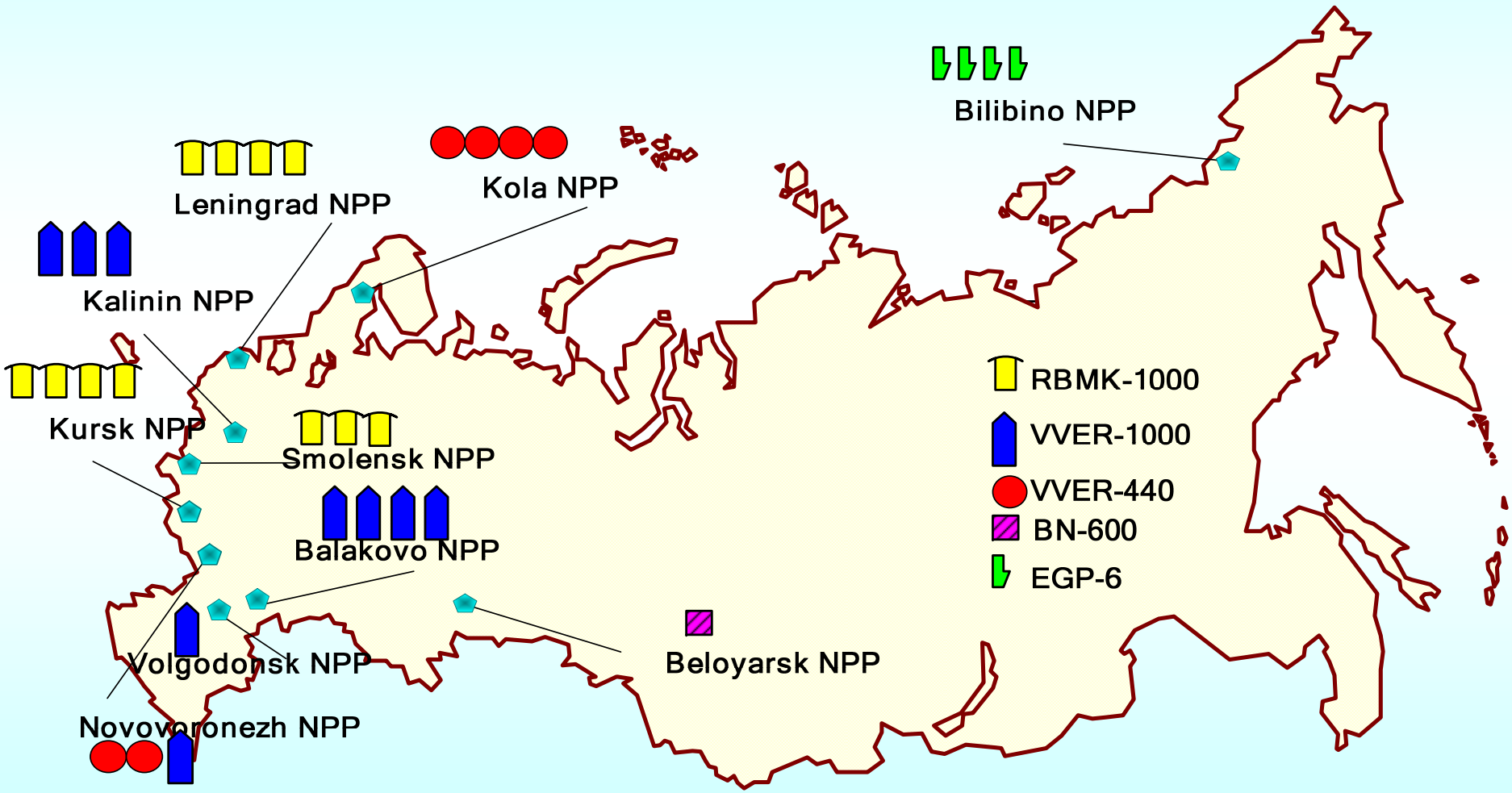
Russian operating reactors

10 NPPs, 31 Units, P=23242 MWe



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Nowadays, 31 commercial reactors are operated in the Russian Federation:

- **9 units of VVER-1000 MWe reactors**
- **6 units of VVER-440 MWe reactors**
- **11 units of RBMK-1000 MWe reactors**
- **5 units of custom – build reactors**

  (1 unit of fast breeder 600 MWe and 4 units of EGP with output 12 MWe each)

+ 4 reactors are at the stage of decommissioning

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Centralized management of all Russian plants is executed by one operating utility – Concern Energoatom (till September 2008 – Concern Rosenergoatom)

Concern Energoatom is fully responsible for providing all aspects of operational safety at Russian NPPs

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The main task of All-Russian Research Institute for Nuclear Power Plants Operation (VNIIAES), which was established in 1979, is to provide scientific and technical support in the area of NPP operation, based on the development and implementation of the new instrumentation and methods for increasing the plants safety, reliability and economical efficiency

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In the Russian Federation, since 01 January 2000, effective dose 100 mSv per five successive years with the provision that it should not exceed 50 mSv in any single year was determined as the main dose limit in occupational exposure.

Until 01 January 2000 (since 1961), the main dose limit in occupational exposure was fixed 50 mSv of annual equivalent dose

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The 1996-1999 transient period of time was specially planned for development and practical implementation of the organizational and technical activities to meet the new more strict occupational radiation requirements

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Evaluation of occupational radiation protection indicators at Russian reactors in 1996 and 2008

Kind of indicator	Reactor type	1996	2008
Average annual individual dose of utilities employees and contractors, mSv	VVER	2.0	0.8
	RBMK	7.0	2.0
	Custom-build	3.9	1.7
	All reactors	4.8	1.5
Number of utilities employees and contractors exceeding 20 mSv individual dose, persons	VVER	68	0
	RBMK	861	0
	Custom-build	37	0
	All reactors	966	0
Average annual collective dose per unit, man Sv	VVER	1.7	0.7
	RBMK	9.4	3.2
	Custom-build	1.3	0.7
	All reactors	4.3	1.5

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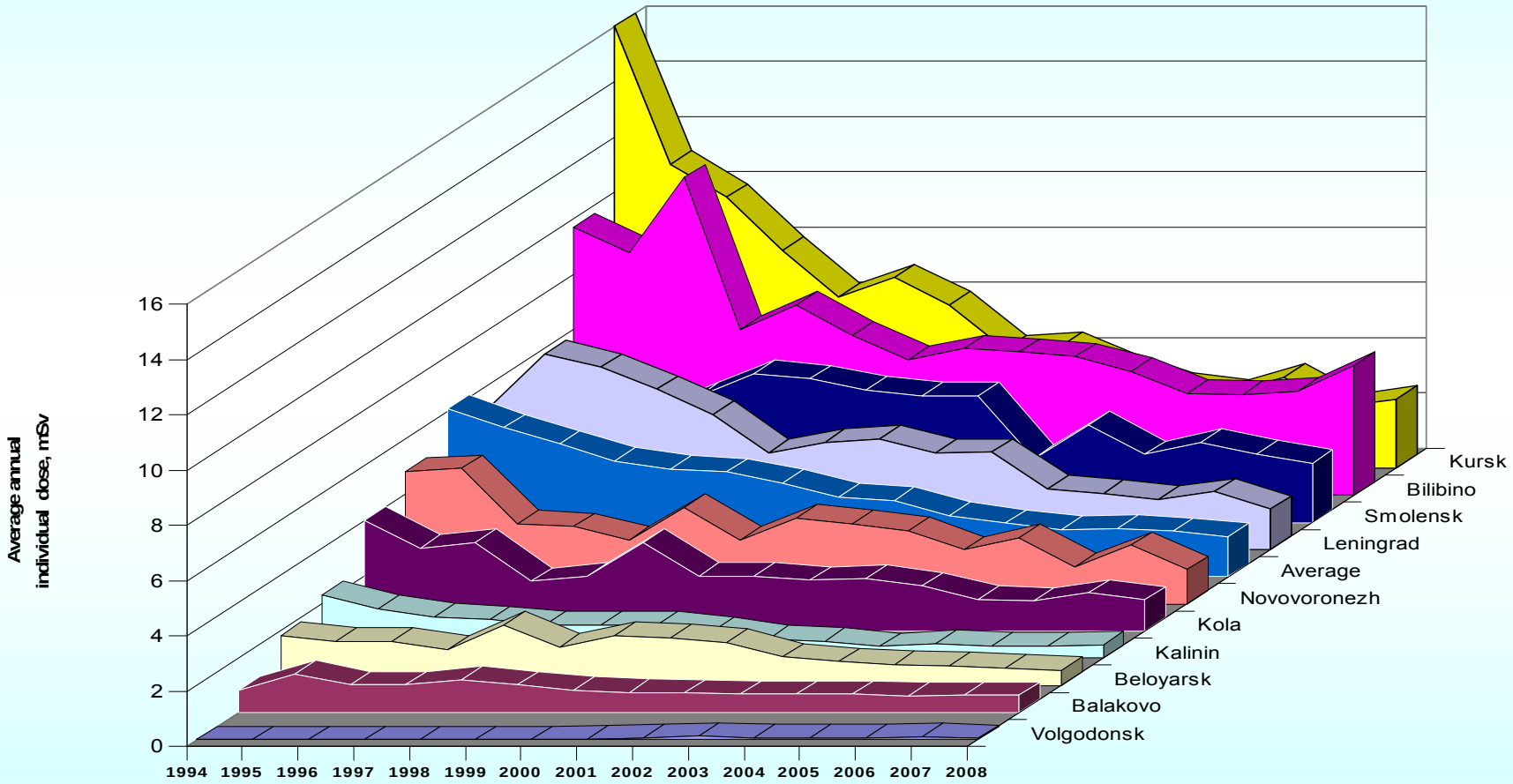
Average annual individual doses at Russian reactors for the years 1994-2008



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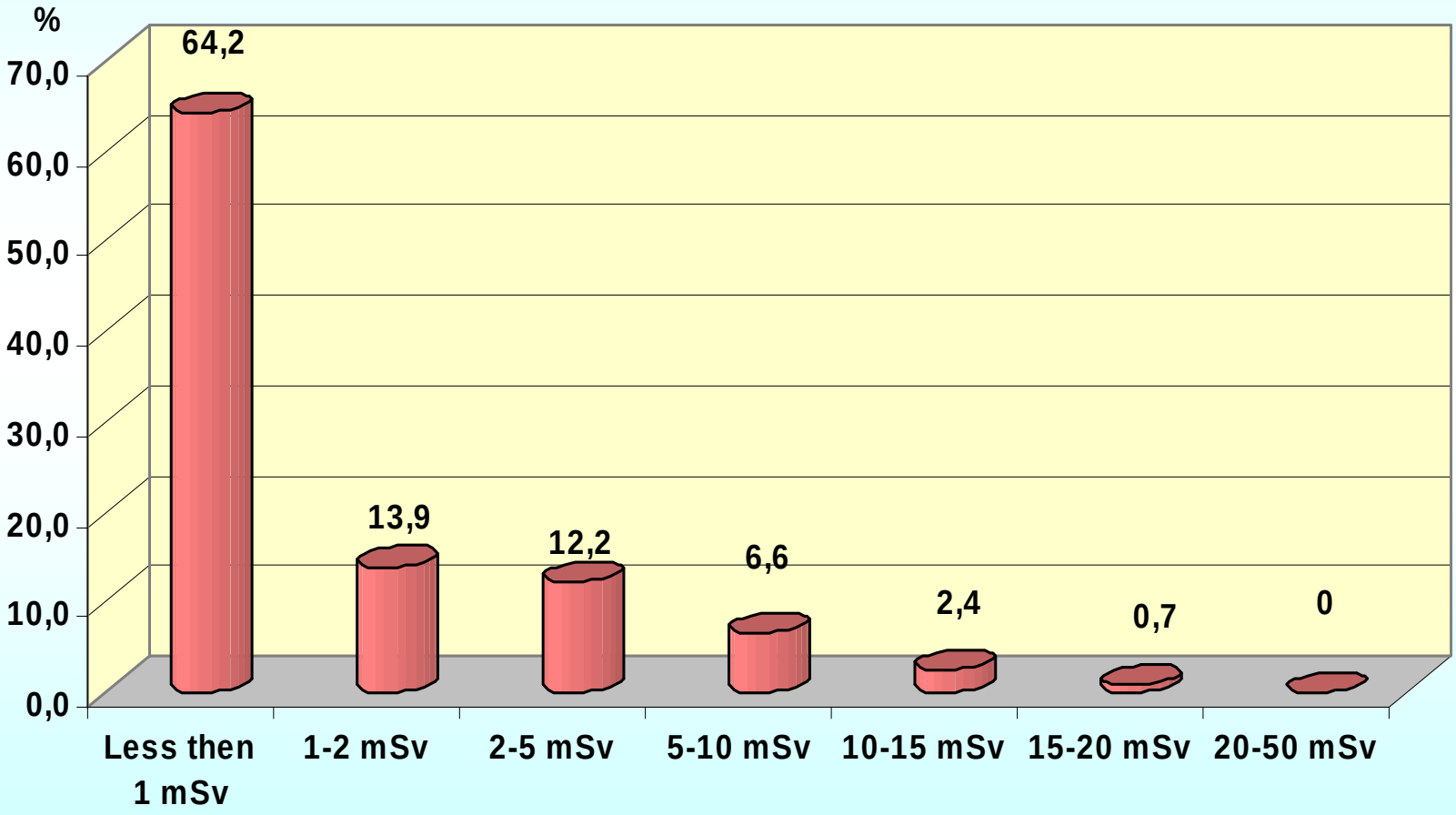
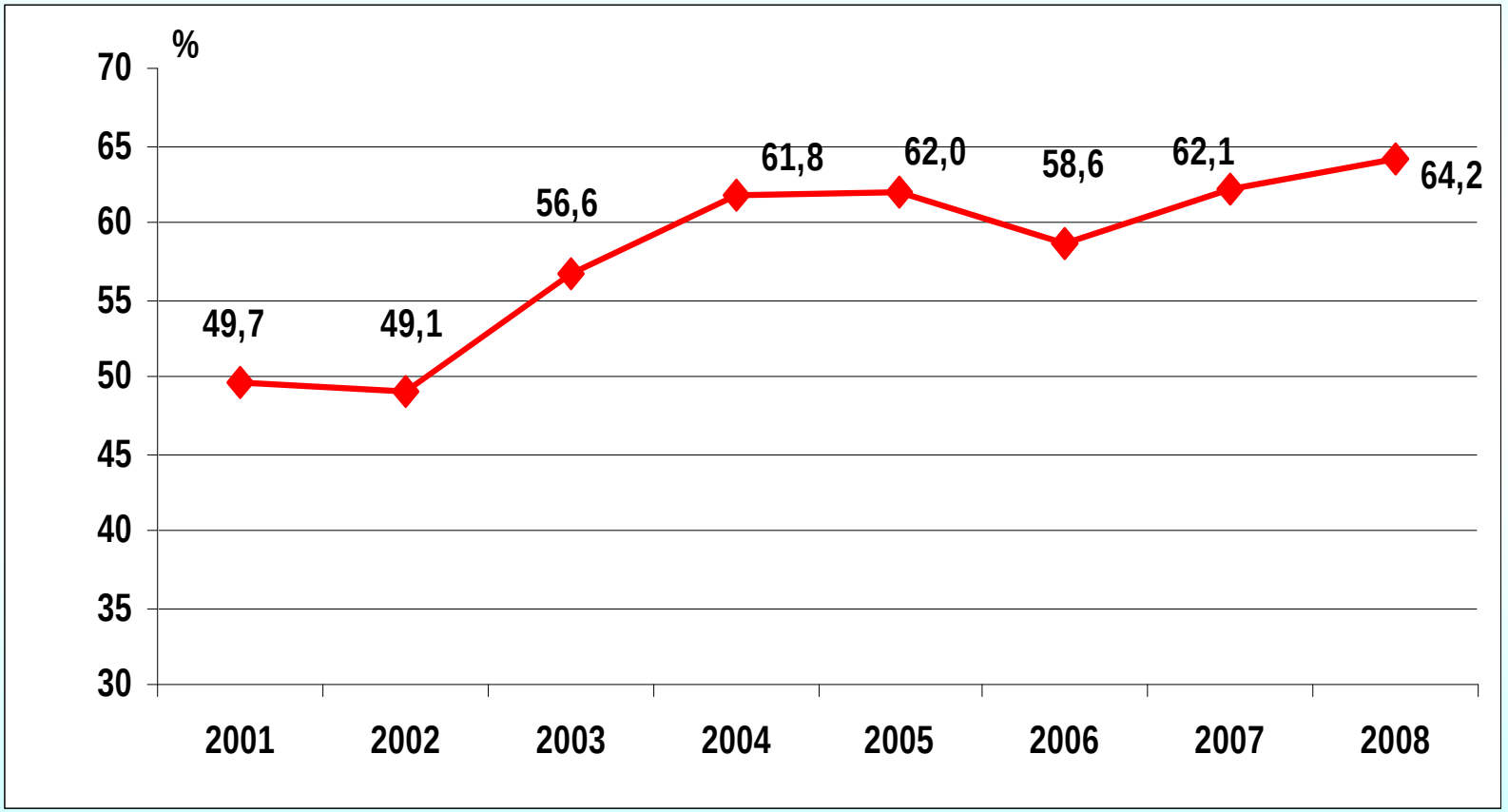
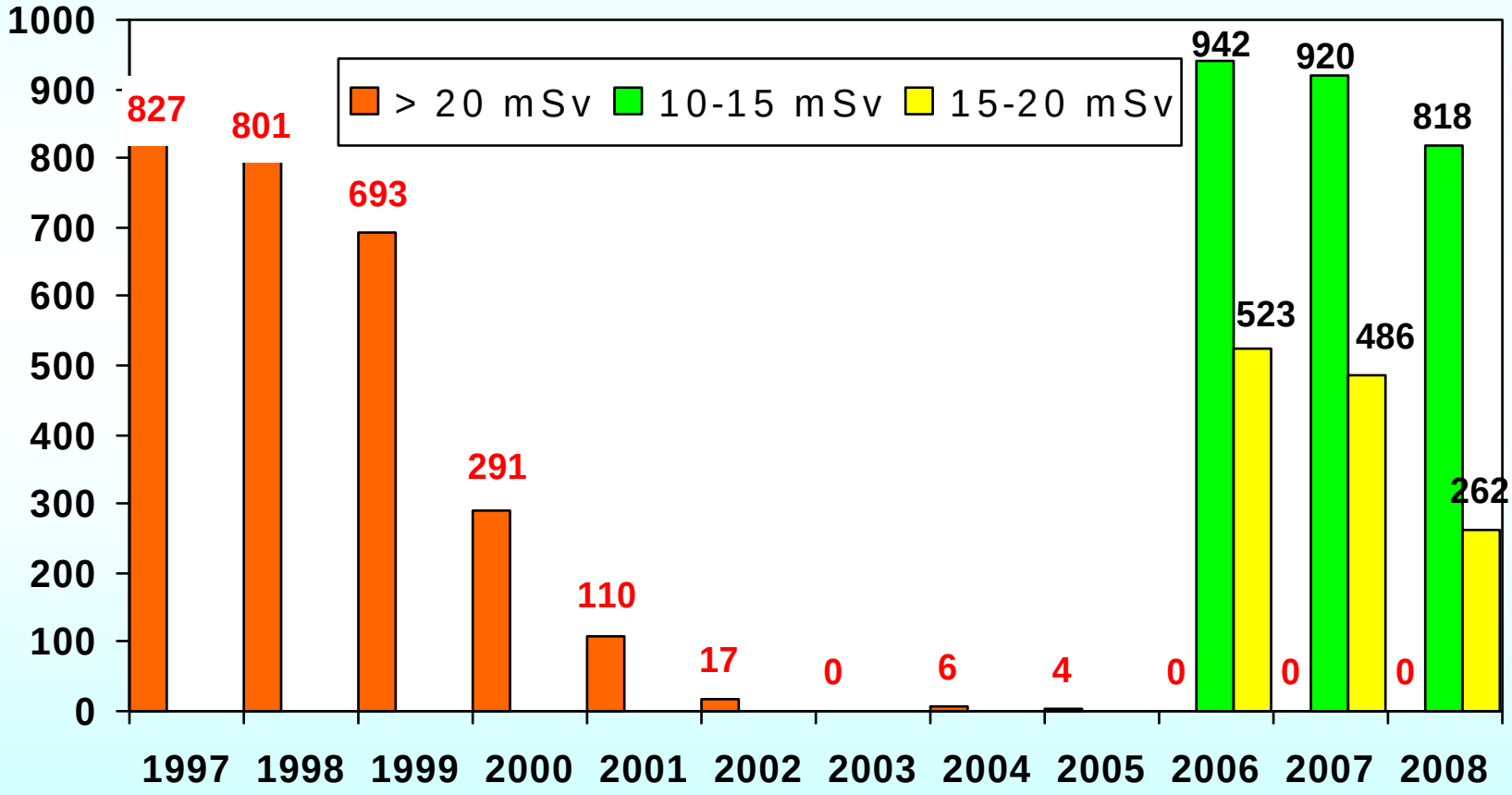
Distribution of the number of utilities employees and contractors in accordance with the intervals of the annual individual doses in 2008, in %



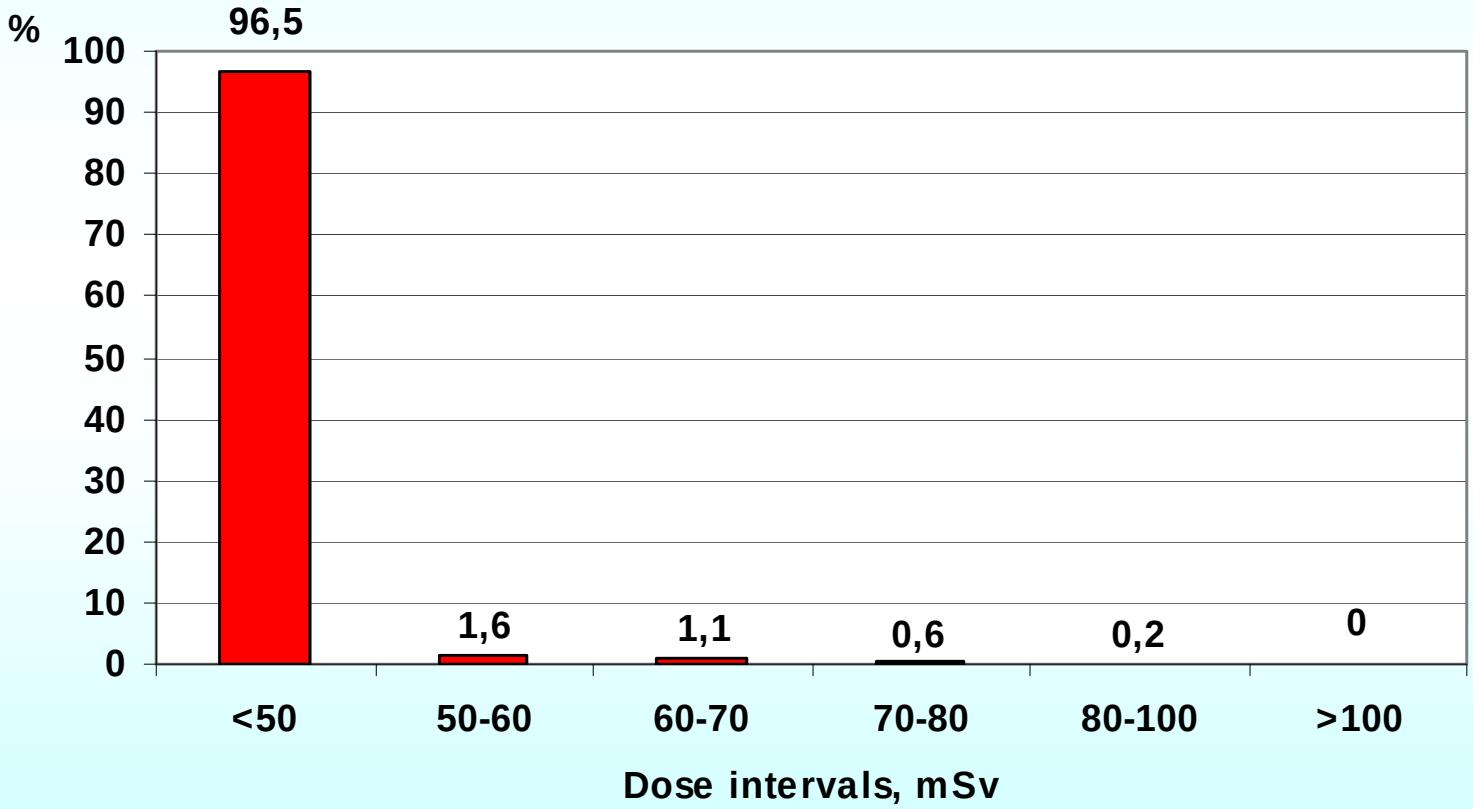
Evolution of the total number of utilities employees and contractors with the annual individual dose less than 1 mSv for the years 2001-2008, in % from total



Number of utilities employees and contractors with annual individual doses more than 10 mSv and 20 mSv for the years 1997-2008



Distribution of the number of utilities employees and contractors according to accumulated individual doses for the years 2004-2008



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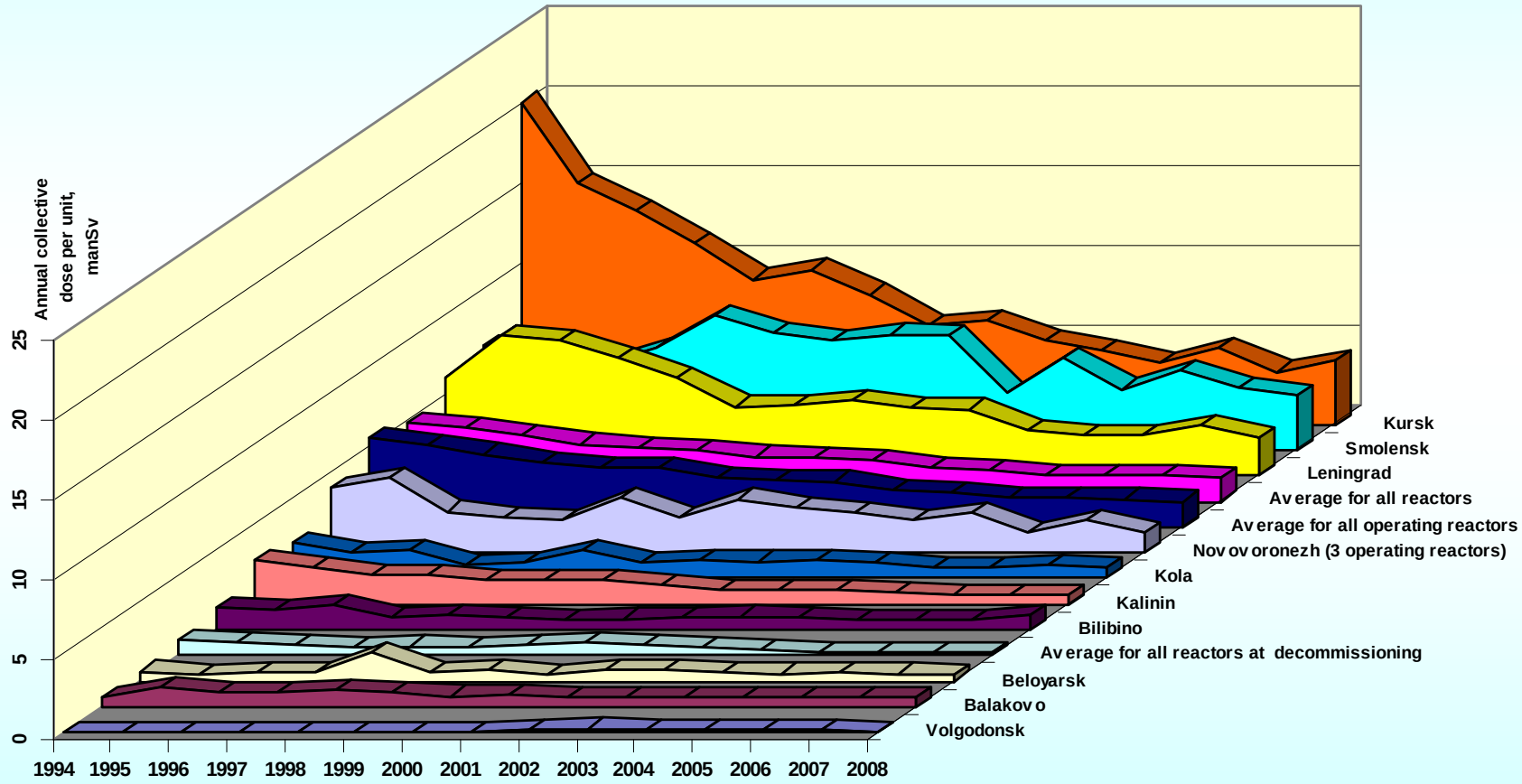
Average annual collective doses per unit at Russian reactors for the years 1994 - 2008



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In the year 2008, the special 2005-2008 Programme for Optimization of Occupational Radiation Protection at RBMK type reactors was finished.

The final measures, performed in the frames of this Programme in 2008, included:

- implementation of the procedure of annual collective dose estimation for all Russian plants;
- development of the standard programme for occupational exposure optimization at the stage of preparation to the planned outage at RBMK type reactors;
- development of the standard programme occupational exposure analysis following the planned outage at RBMK type reactors;
- development of the standard programme aimed at providing occupational radiation protection during the specially radiation dangerous works;
- implementation of the computer based system for providing of periodical monitoring of radiation situation

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The new Programme, aimed at the further optimization of occupational exposure at Russian plants over the period 2010-2014, was developed by Concern Energoatom in the end 2008 - beginning 2009.

According to this new Programme, the main planned activities can be distinguished:

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- improvement of organizational performance of radiation dangerous works;
- reducing of radiation levels in general areas and plant equipment;
- time saving procedures for utilities employees and contractors;
- improvement of technical methods and instrumentation for radiation monitoring performance

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The main expected results from realization of the new Programme include the following:

- **increase the level of occupational radiological protection at NPPs;**
- **individual doses optimization;**
- **optimization the number of irradiated workers**

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In the years 1996-2008, as a result of the implementation the considerable organizational and technical activities organized by Russian operating utility Concern ENERGOATOM, the levels of occupational exposure at different type of reactors were substantially decreased.

In 2008, the main occupational radiation protection indicators are fully correspond with the requirements of the national and international radiation protection regulations

Thank You for Attention!

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