

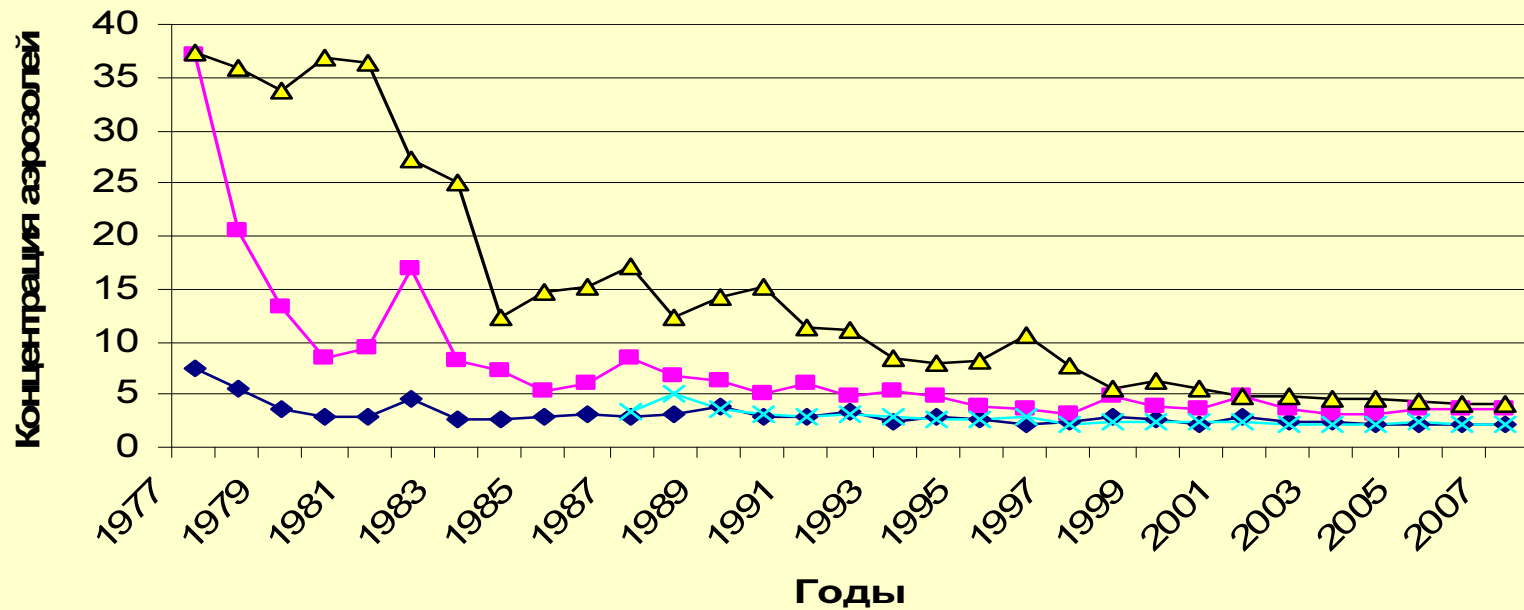
**Radiation risk estimation for “Mayak”
PA personnel engaged in SNF and RW
management**

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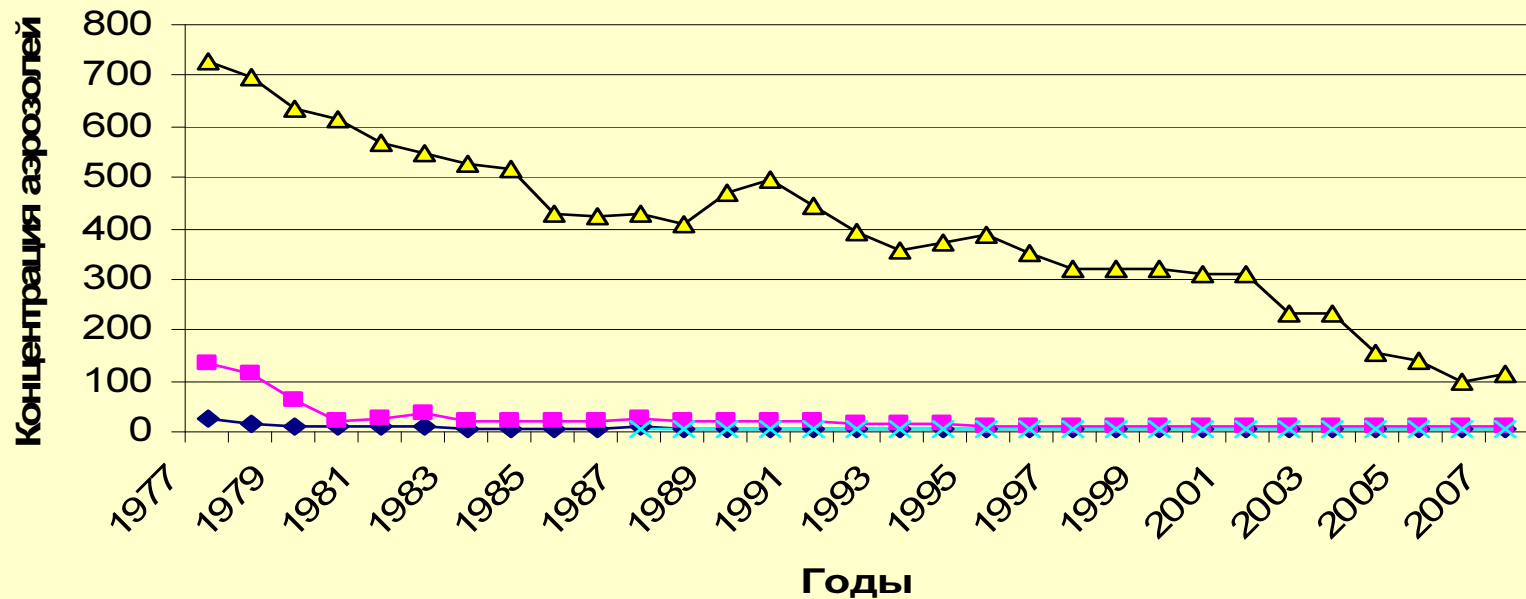
2009

Dynamics of average annual volume concentration of alpha-active aerosols in work places of personnel permanent stay, $n \cdot 10^{-6}$ Bq/l



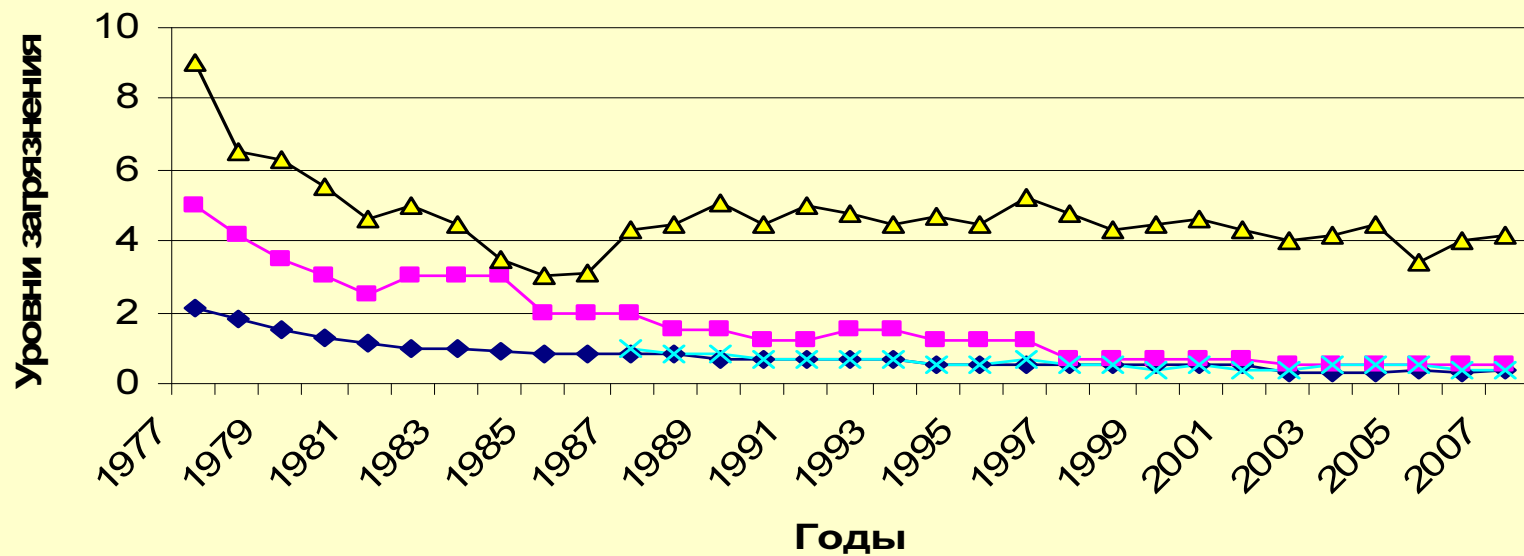
- ◆ Workshop for Mechanical reprocessing of SNF rods
- Workshop for extraction reprocessing of solutions
- ▲ Section of affiniation and ready products
- × Workshop for vitirification of HLW

Dynamics of average annual volume concentration of alpha-active aerosols in semiserviced rooms, $n \cdot 10^{-6}$ Bq/l



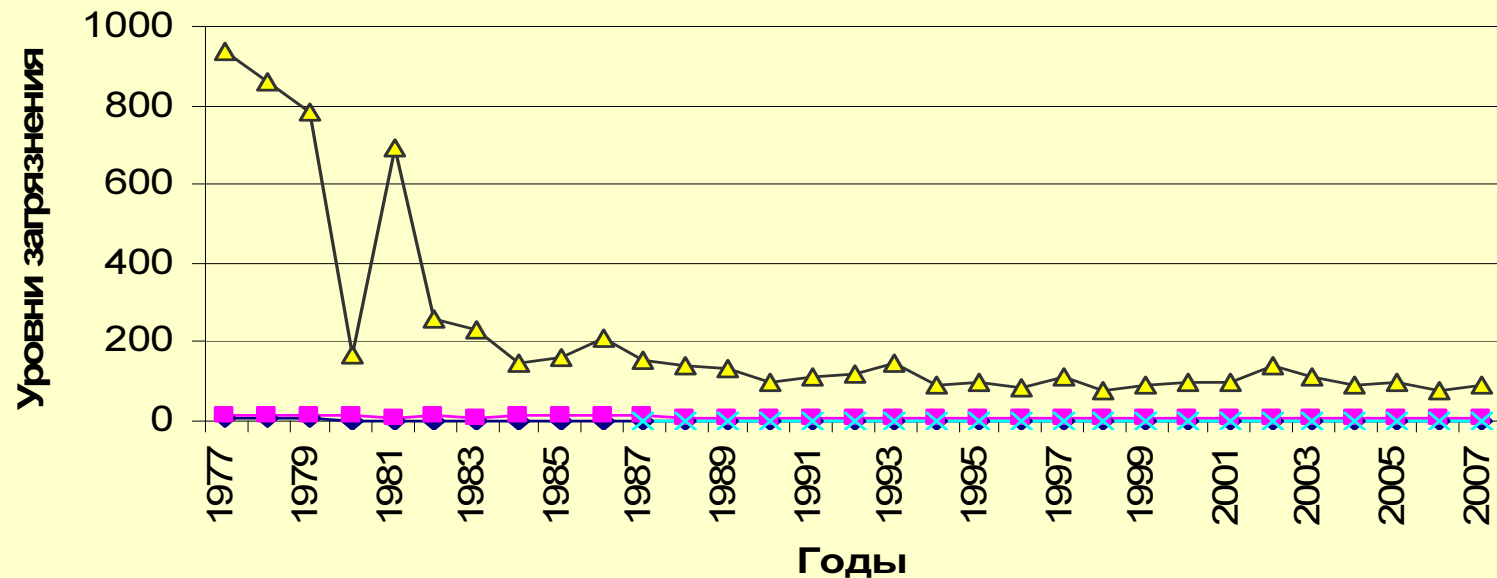
- ◆— Workshop for Mechanical reprocessing of SNF rods
- Workshop for extraction reprocessing of solutions
- ▲— Section of affiniation and ready products
- ×— Workshop for vitirification of HLW

Contamination levels of surfaces of personnel permanent stay work places with alpha-active substances, $\text{part}\cdot\text{sm}^{-2}\cdot\text{min}^{-1}$



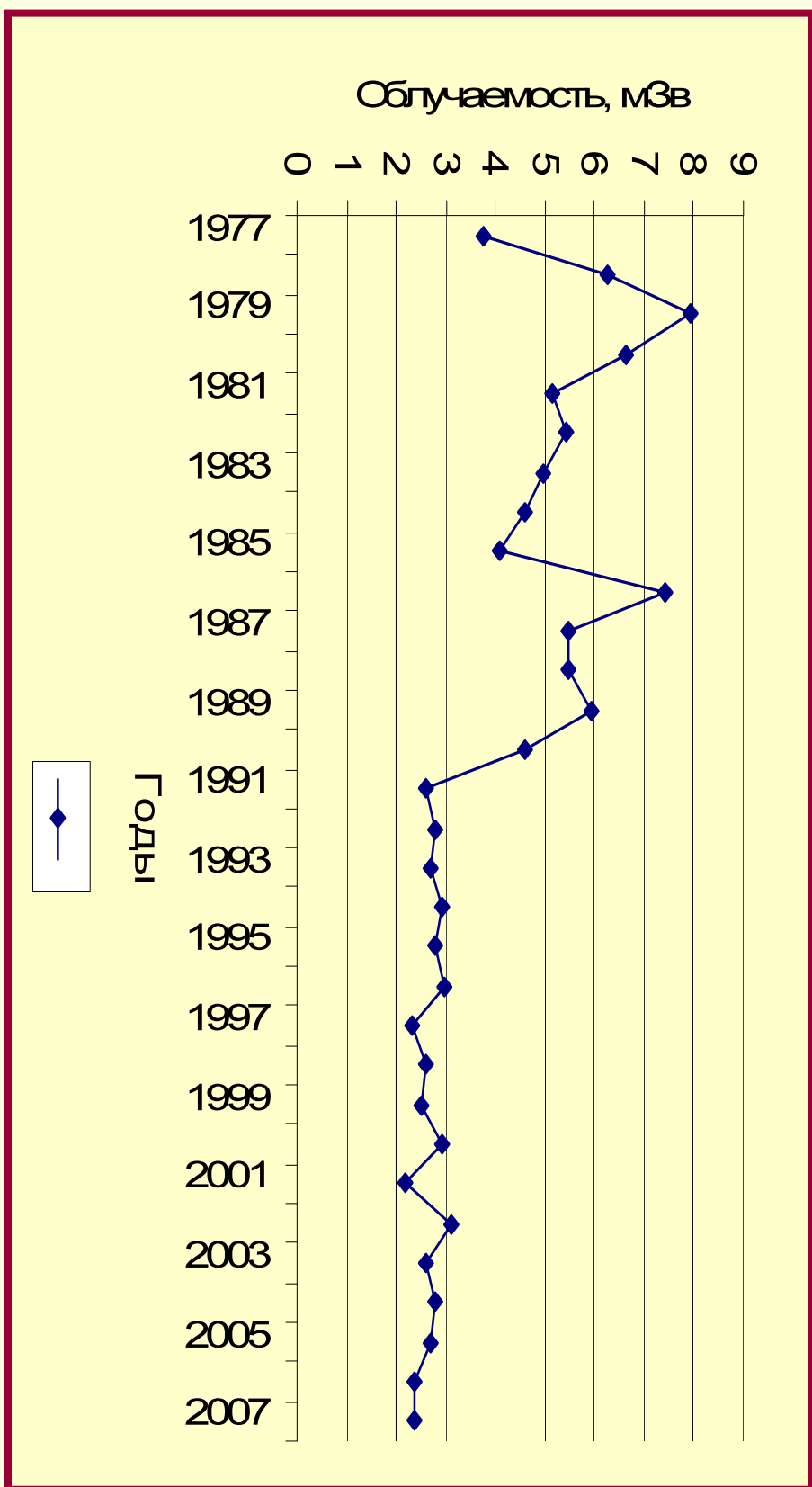
- ◆ Workshop for Mechanical reprocessing of SNF rods
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- ▲ Section of affiniation and ready products
- × Workshop for vitirification of HLW

Contamination levels of surfaces of 2nd area work places with alpha-active substances, $\text{part}\cdot\text{sm}^{-2}\cdot\text{min}$



- Workshop for Mechanical reprocessing of SNF rods
- Workshop for extraction reprocessing of solutions
- Section of affiniation and ready products
- Workshop for vitirification of HLW

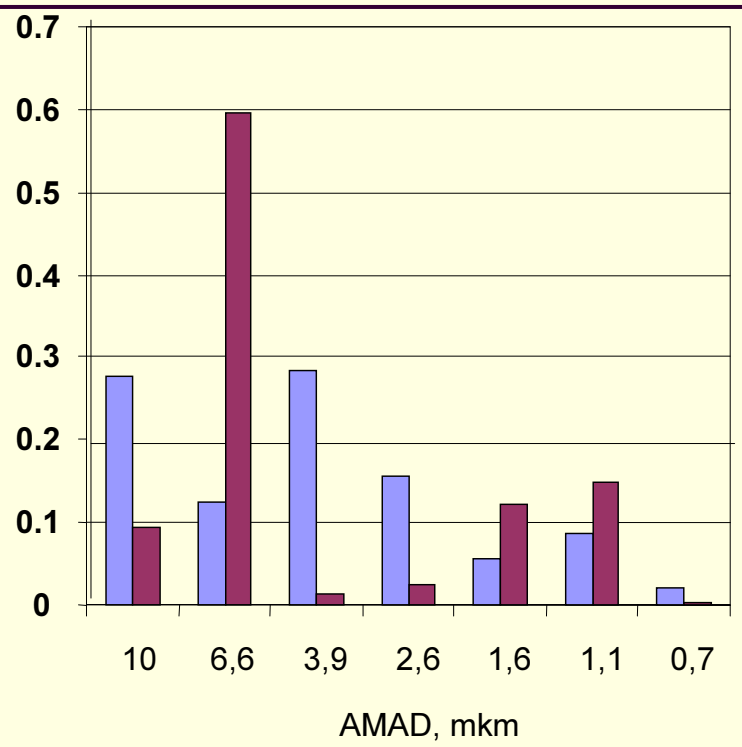
Dynamics of annual average exposure for RT plant personnel



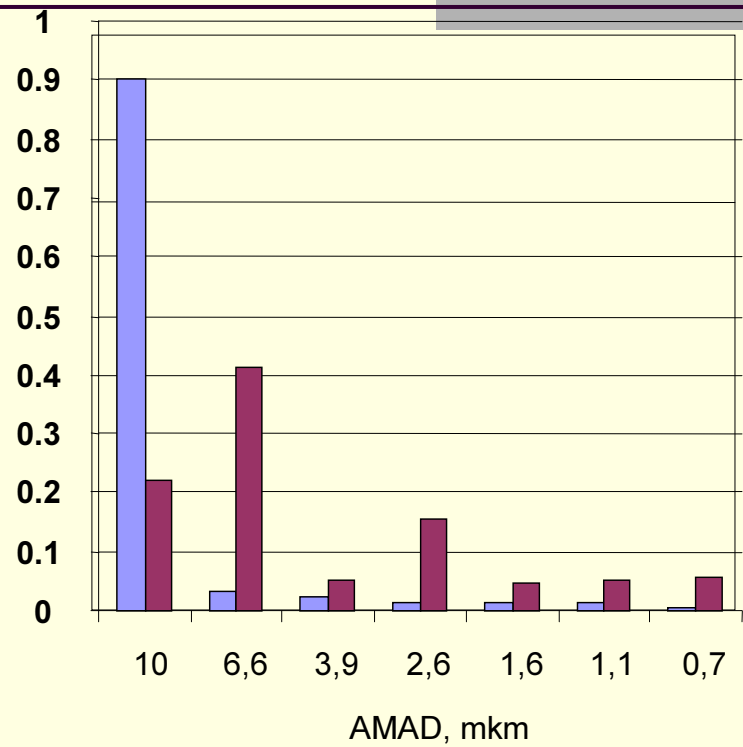
Internal dosimetry

- **Purpose of researches**
- **Studies of industrial aerosols physical-chemical properties were carried out by radiometric, alpha-radiometric and gamma-radiometric methods**
- **Personnel exposure levels due to $^{239+240}\text{Pu}$ incorporation were estimated based on bioassay measurements and WBC measuring results.**

^{241}Am activity distribution in impactor cascades. Ventilation air samples by gamma-spectrometry results (in fraction of total activity for all cascades)

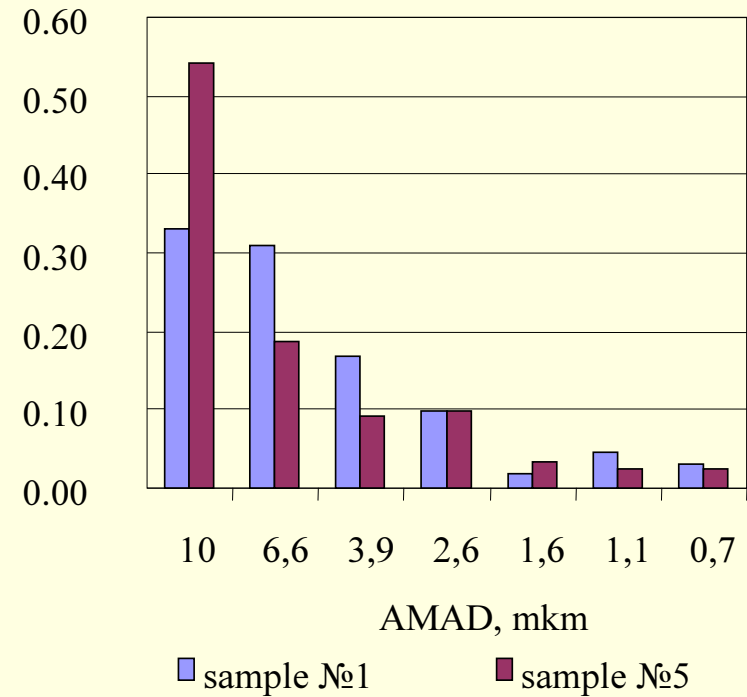
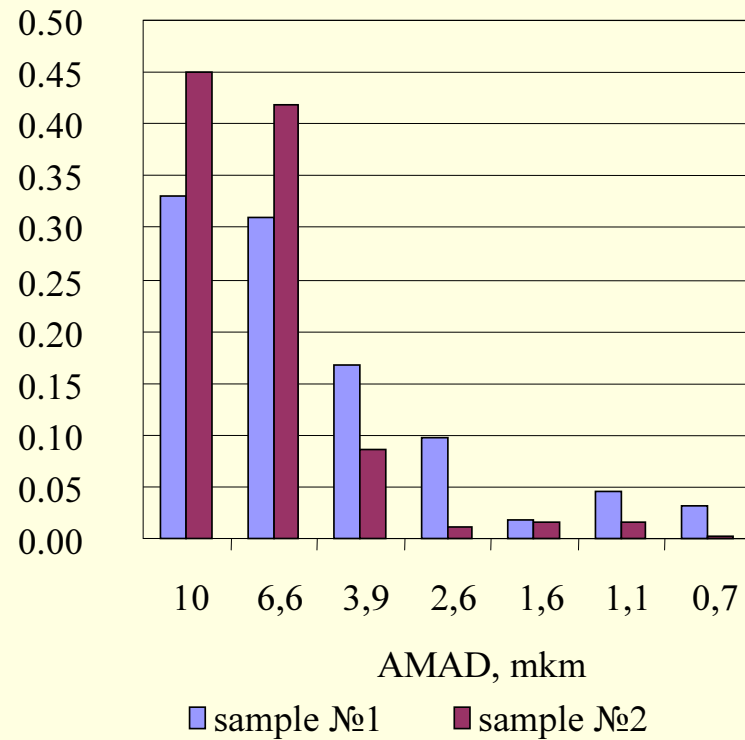


■ sample No7 ■ sample No9

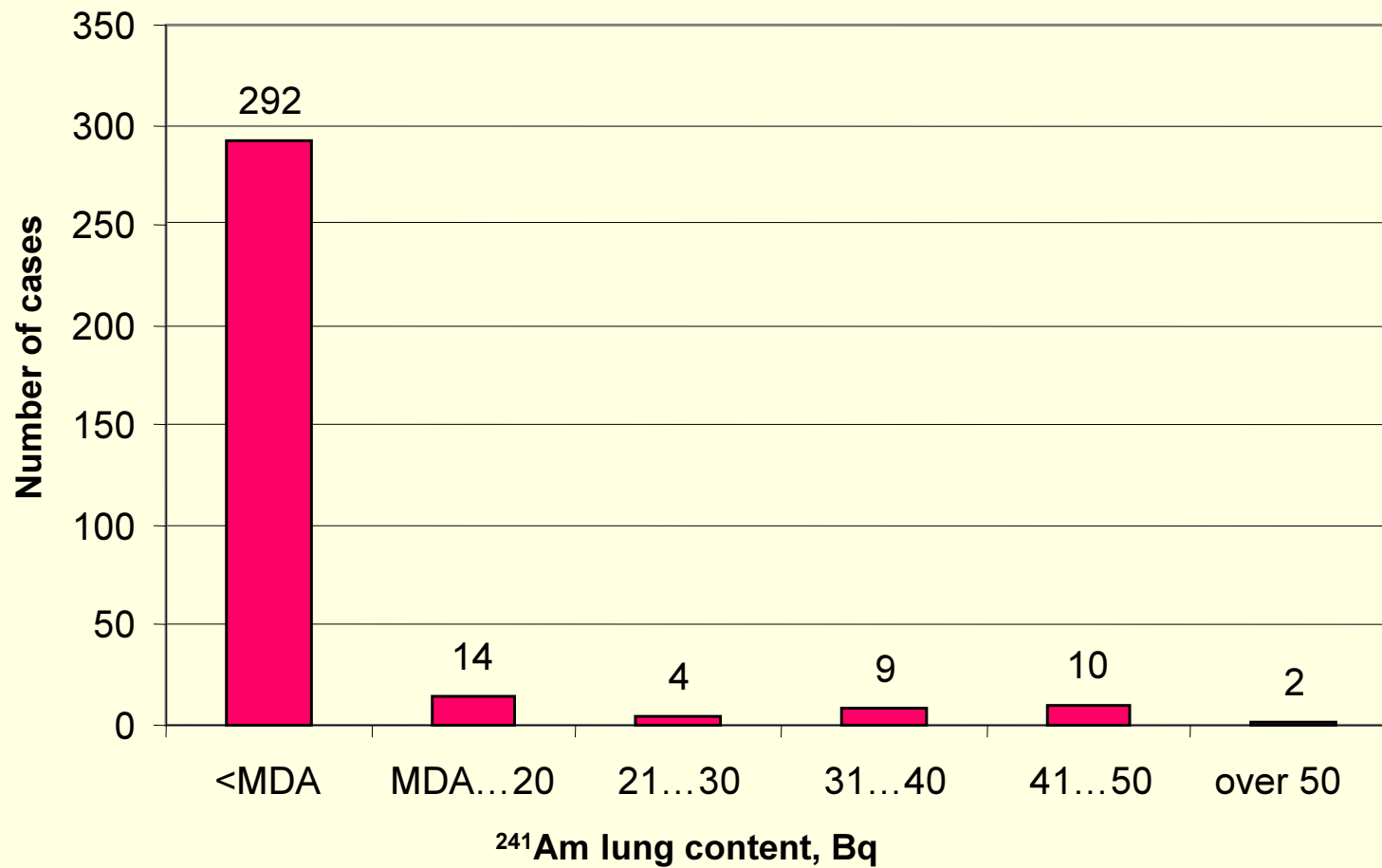


■ sample No10 * ■ sample No11

Pu activity distribution for impactor cascades in fraction of total cascades sum, by gamma-spectrometry results



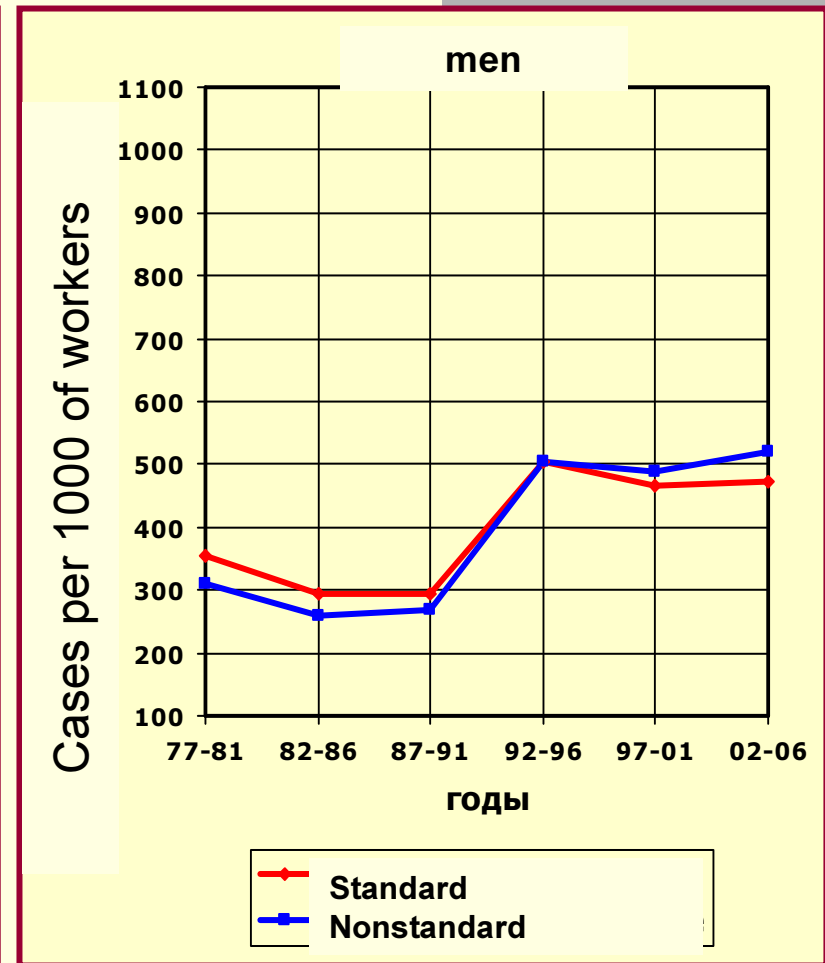
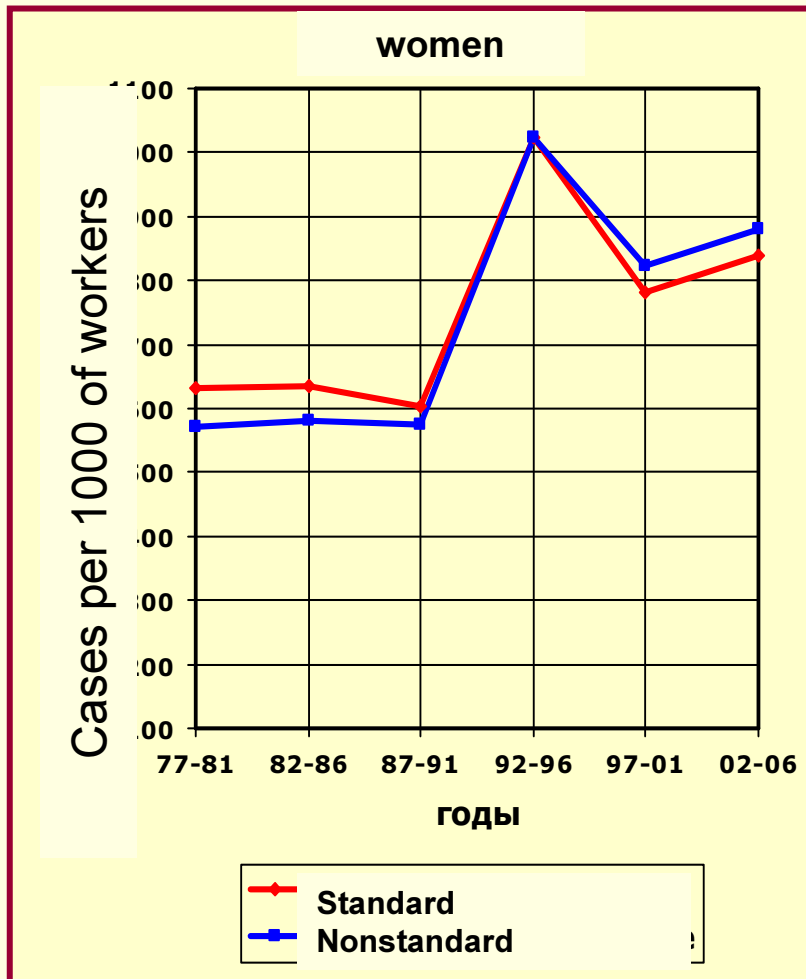
Distribution of number of workers by ^{241}Am lung distribution



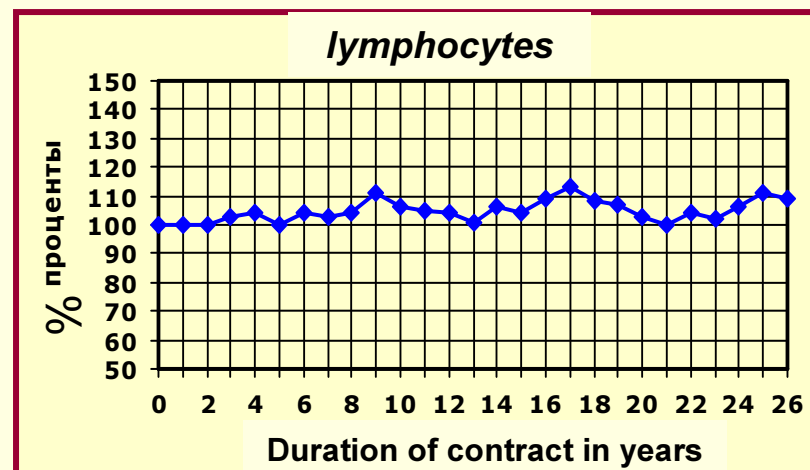
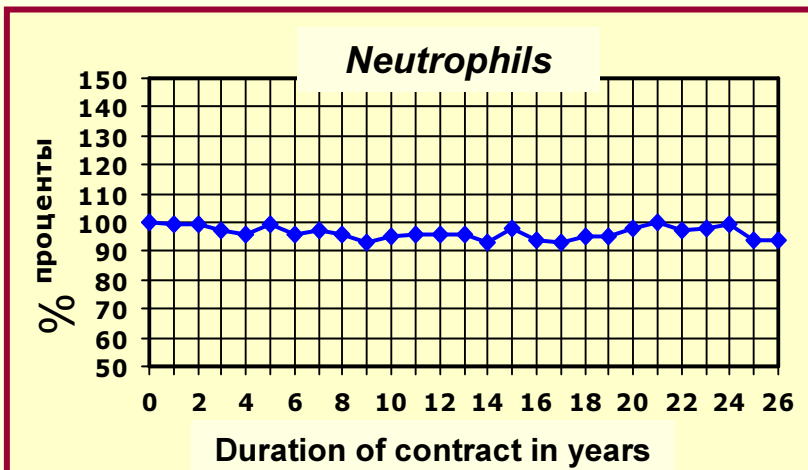
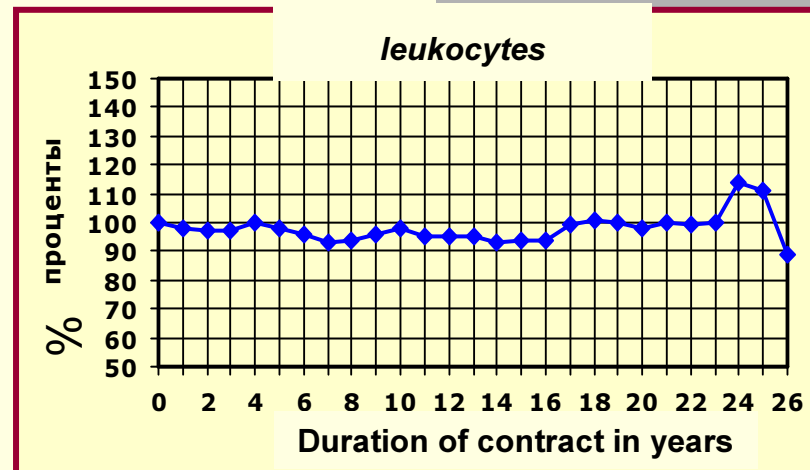
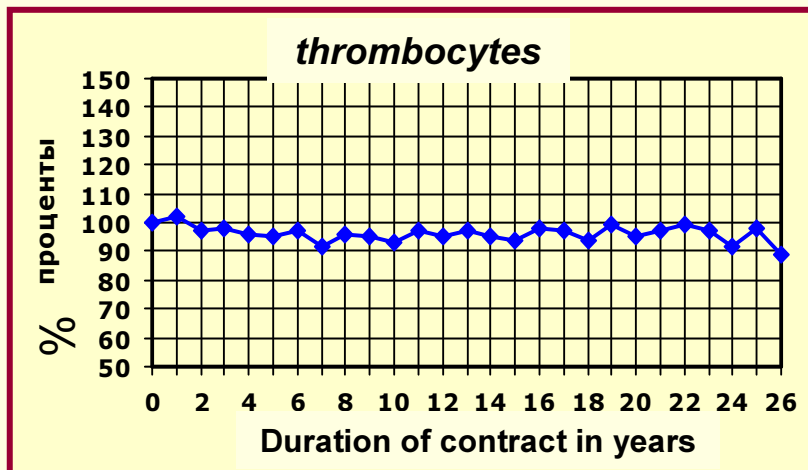
Bioassay results

Work place	Measuring result	Hire period			
		1977-1986	1987-1996	1997-2006	1977-2006
2	Total	55	22	44	121
	Over MDA	17 (31%)	1 (5%)	2 (5%)	20 (17%)
4	Total	54	22	40	116
	Over MDA	3 (6%)	1 (5%)	3 (8%)	7 (6%)
5	Total	44	20	30	94
	Over MDA	4 (9%)	2 (10%)	0 (0%)	6 (6%)

DYNAMICS OF CHRONIC INCIDENCE (ALL CLASSES IN GENERAL) IN GROUPS OF WORKERS ENGAGED IN SNF MANAGEMENT FOR 30 YEAR FOLLOW-UP PERIOD



PERIPHERAL BLOOD INDICES FOR WORKERS ENGAGED IN SNF MANAGEMENT DURING THE WHOLE FOLLOW-UP PERIOD



COMPARISON OF "PREDISPOSITION" GENOTYPES DISTRIBUTION IN "CASES" AND "CONTROL" GROUPS

Genotype	Availability	Genotype occurrence in groups		χ^2	P	OR
		«Cases»	«Controls»			
A	No	53	119	6,86	< 0,01	13,5
	Yes	6	1			
B	No	52	117	4,92	< 0,05	5,3
	Yes	7	3			
B	No	43	106	5,71	< 0,05	2,8
	Yes	16	14			

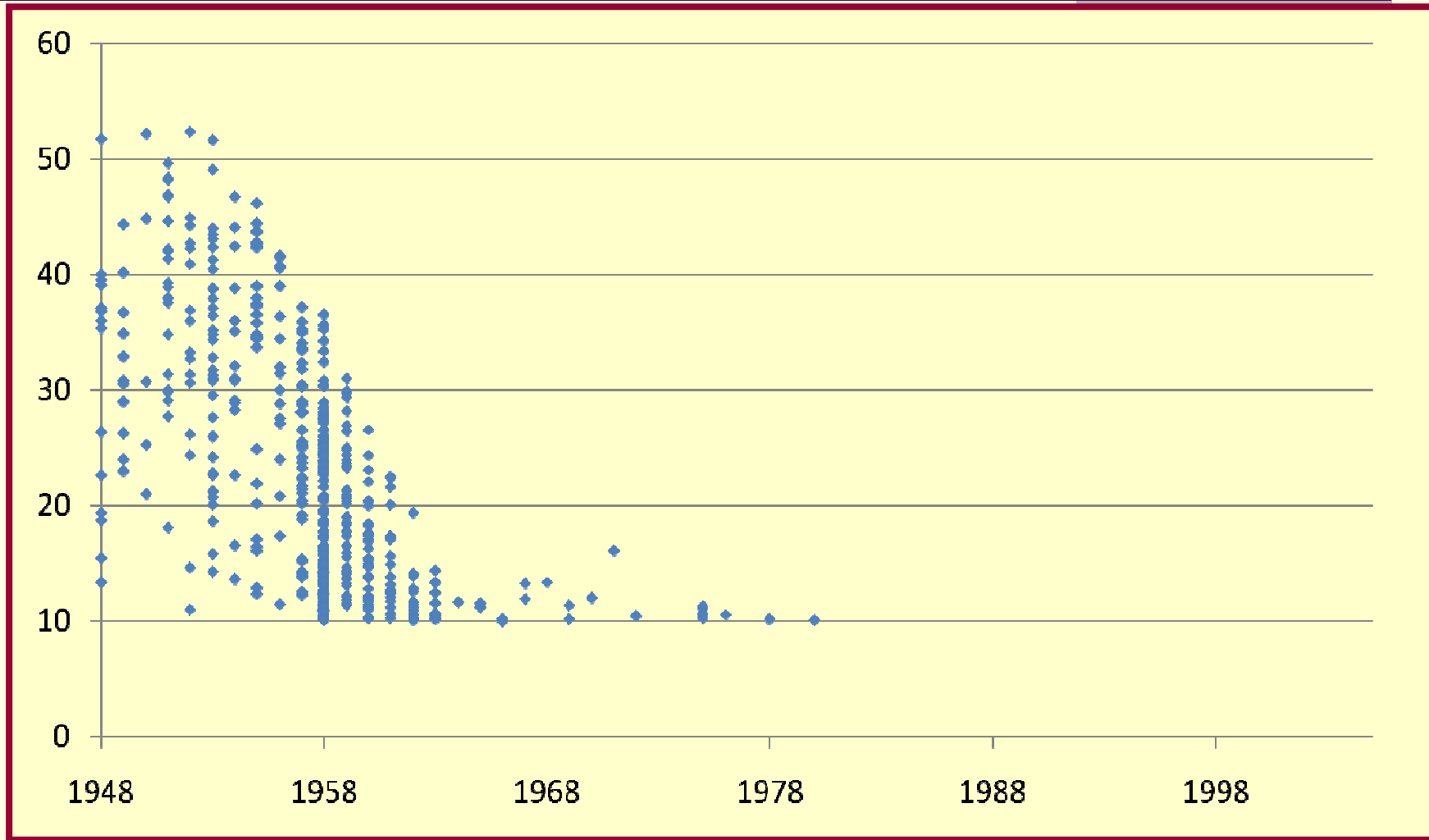
MOLECULAR-GENETIC ANALYSIS RESULTS

- Studied genes frequency of genotypes (*GSTM1*, *GSTT1*, *CYP1A1*, *CYP2E1*, *mEPOX*, *NAT2*, *p53*) and their polymorphisms was generally similar to observed frequencies of relevant genotypes in adult populations of Western Europe and North America;
- People with lung cancer exhibited discrepancy with genotypes normal distribution by 3 genes (*CYP1A1**2C, *NAT2* 481C>T, *p53* Arg72Pro);
- Specific genes were revealed, their polymorphisms defining genetic predisposition tendency for lung cancer development (zero deletion in gene *GSTM*, polymorphism *His139Arg* of *mEPOX* gene);
- Associations of genotypes predisposing lung cancer development were revealed;
- Group of lung cancer elevated risk was determined to perform individual monitoring of health state

RT plant workers distribution by groups of risk of radiation-induced malignant neoplasms

Groups	“No risk” group	Potential risk group	High potential risk group
«First» group	432 – 100%	0	0
«Second» group	1278 – 73%	206 – 12%	254 – 15%

Attributive risk (year of employment –attributive risk of solid cancers)



Risk groups characteristics by medical observation availability level

	Males	Females	Total
Number of persons included into risk groups	437	23	460
Living (as for 2008)	213 – 49%	11 – 49%	224 – 49%
Living and residents of the city (as for 2008)	201 – 46%	11 – 49%	212 – 46%
Working at “Mayak” PA (as for 2006)	69 – 16%	1 – 4%	70 – 15%