



TESTING OF RAM ION DOSIMETER IN OPERATIONAL FIELDS



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Introduction

The new equivalent dose limits introduced by the International Atomic Energy Agency for the lens of the eye are 20 mSv per year averaged over five consecutive years (100 mSv in 5 years), and 50 mSv in any single year for the personnel of group A, for individuals from the population - left unchanged, 15 mSv per year. To ensure radiation safety of personnel in the new system of basic dose limits, it is necessary to implement a set of measures, including: providing personnel with personal dosimeters of soft photon and beta radiation, measuring the equivalent dose of irradiation of the lens of the eye; providing staff with personal eye protection to reduce the equivalent dose of irradiation of the lens of the eye. In conditions of lowering the dose limit to the eye lens of personnel, in the general case it will be necessary to establish the level of introduction of individual dose control and the attachment point of the individual dosimeter.

Testing of RAM ION dosimeter in the field of photon radiation

Table 1. The results of dosimeter testing in the field of ¹³⁷Cs and ²⁴¹Am photon radiation

Source	E _v , кэВ	H'(0,07,Ω) / H*(10)	H'(3,Ω) / H*(10)	H*(10) _{DKS} , μSv/h
Cs-137	662	0,95	0,95	106
		0,99	1,01	208
Am-241	59,5	0,95	1,02	2,8
		1,01	1,01	5,1

Testing of RAM ION dosimeter in the field of beta-radiation

Table 2. The results of RAM ION measurements and calculations of H'(0,07,Ω) и H'(3,Ω)

Distance, см	H'(0,07,Ω) _{meas} , μSv	H'(0,07,Ω) _{расч} , μSv	H'(0,07,W) _{изм} / H'(0,07,W) _{расч}	H'(3,W) _{изм} , МКЗВ	H'(3,W) _{расч} , МКЗВ	H'(3,W) _{изм} / H'(3,W) _{расч}
7	73,2	56,6	1,29	13,4	21,2	0,63
10	41,6	36,5	1,14	7,98	13,9	0,57
13	27,1	25,3	1,07	5,46	9,74	0,56
15	20,6	20,4	1,01	4,05	7,89	0,51

Investigation of ambient and directional dose equivalents at workplaces of Beloyarskaya NPP

Table 3. The results of ambient and directional dose equivalents at workplaces of Beloyarskaya NPP

№ п.п	Unit	System, equipment	H'(0,07,Ω) / H*(10)	H'(3,Ω) / H*(10)
1.	3	Rooms and equipment for the pool water treatment system	1,15	1,02 - 1,09
2.	3	Mine of washing equipment removed from the reactor	2,67	1,83
3.	3	Sockets of flashing for equipment removed from the reactor	2,18	1,05
4.	3	Floor water collection system	1,82	1,18
5.	3	The overload room of protective chamber	1,16	1,08
6.	3	Equipment of the protective chamber overload room	1,24 - 2,00	1,07 - 1,20
7.	1, 2	The room of delay pool	1,37 - 1,38	1,05 - 1,18
8.	1, 2	Manipulator in delay pool	5,32	1,15
9.	1, 2	Radioactive spent fuel in delay pool	3,05	1,15
10.	1, 2	Equipment in the central reactor room	8 - 10	2,80 - 3,55
11.	1, 2	Submersible water treatment pump of delay pool (in polyethylene film) on the stand in the central reactor room	3,05	1,50
12.	1, 2	Dismantled equipment (including parts of control rods)	1,25 - 1,62	1,00 - 1,14
13.	1, 2	Corridor (-7.50)	1,31 - 2,42	1,00 - 1,19
14.	1, 2	Exhaust ventilation filters	1,23 - 2,43	1,08 - 1,33
15.	1, 2	Rooms of special water treatment	1,06 - 1,26	1,00 - 1,14

Hardware for monitoring of the skin and lens of the eye exposure

Instruments for group monitoring



Instruments for individual monitoring



Results

- The discrepancy between the measurement results H*(10), H'(3) and H'(0,07) at photon radiation energies of 59.5 and 662 keV lies in the range of 5% and is not significant.
- The ratio N'(3) / H*(10) at the workplaces of the BNPP personnel varies from 1.0 to 3.55.
- The ratio N'(3) / H*(10) is equal to or greater than 1.5 observed at 3 points out of 15 measured (~ 20%).
- The presence of relations N'(3) / H*(10) exceeding 1.5 is related to the specifics of the work and may be due beta-emitting radionuclides, such as ²⁴Na, ⁹⁰Sr + ⁹⁰Y, ¹⁰⁶Ru + ¹⁰⁶Rh, ¹⁴⁴Ce + ¹⁴⁴Pr, etc. in process media and in sediments on equipment.