

Radiation-related operator's dose distribution according to LLD(recording level)

Park, Jae-Duck

Iijin Radiation Engineering Co. Ltd., 19-13, Seoku-dong, Hwaseong-si, Gyeonggi-do, Korea

Author: rin1202@dreawiz.com

1. Preface

Recently, the area of radiation usage is being enlarged by the industry's advancement over the world.

And, the usage of radiation generator and radioisotope is increasing every year. So, they are researching actively how to protect operators from the radiation that causes direct or indirect harmfulness to radiation-related operators of the related institutions.

Therefore, in case of operator's dose, not only the main dosimeter's correctness but also the reasonable evaluation to the read values becomes the important factor.

From this view, LLD's application to the read dose value is being embossed more importantly than any other thing. So, this study tried to find out what change was generated in the personal dose and the group dose when LLD was applied based on the internal real operator's read value, for 3 years, 2005 ~ 2007, and find out the personal dose change after dividing them into the exposure group and the supervising group based on the common people's personal dose (1 mSv/y).

2. Main title

2.1 Applied object

The radiation-related operator's dose measured results by using Film in 2005, 2006, 2007

2.2 Measuring device: AGFA Film and Macbeth

table 1. Status of the dose measured results

measured year	total	NDT	industry	research institution	education institution
2005	5349	1294	3420	154	476
2006	4968	1443	2948	127	437
2007	4723	1569	2769	134	269
total	15040	4306	9137	415	1182

2.3. Applied LLD : 0.1 mSv

- all dose values less than 0.1 mSv are treated as "0"

2.2 Application method

The current data from the radiation-related operator's dose measured results in 2005, 2006, 2007 and the results of treating all dose value less than 0.1 mSv as "0" are applied as follows.

1. all personnel's annual exposure dose
2. group except the group less than 1 mSv/y

3. Applied contents

3.1 all personnel's annual exposure dose

3.1.1 personal annual dose in 2005

LLD applied result is like table 3-1, objecting 5349 operators in 2005. it can be known that the dose value decreased like table 3-1, when LLD(0.1 mSv) value was applied.

table 3-1, personal annual dose according to LLD application to 2005 year dose data

Fig. 2. Fraction of counts lost with voltage and charge sensitive preamplifiers as a function of the true count rate.

division	No. of operator	personal annual dose according to LLD application(mSv/y)		
		average dose	dose when LLD Applied	rate (%)
total	5349	2.17	1.11	-48.9
NDT	1443	4.48	3.64	-18.8
Industry	2974	1.47	0.36	-75.5
Research	127	1.22	0.025	-95.6
Education	436	1.20	0.01	-99.1

3.2 Personal annual average dose of group less than 1.2 mSv/y

3.2.1 Personal annual average dose in 2005

The analyzed data to group's personal annual average dose except the group having less than 1.2 mSv/y is like table 3-2, objecting operators in 2005.

radiation-related operators in industry, research institute, and education institute are distributed less than 0.1 mSv on the whole, and the dose of operators in NDT is 70%. Also, it is decided that closer attention should be paid to them, since over-dosed operators in institutes are occurring.

table 3-2 Personal annual dose in 2005
 (except group less than 1.2 mSv/y)

division	No. of operator	personal annual average dose according to LLD application (except group less than mSv/y)		
		average dose	dose when LLD applied	rate(%)
total	3937	2.51	1.51	- 39.8
NDT	1041	5.44	4.70	- 13.6
Industry	2656	1.57	0.46	- 75.5
Research	35	1.21	0.024	- 98.0
Education	213	1.21	0.019	- 98.4

References

- [1] Reading business registration criteria and regulations for inspection. Ministry of Education & Science Technology Notice 2008-48 (2008)
- [2] Regular inspection result to reading companies in 2007 and safety regulation plan in 2008 (KINS). the 9th Workshop on dose evaluation (2004)

4. Conclusion

Personal annual average dose except the group less than 1.2 mSv/y is like table 4-1.

table 4-1. Personal annual average dose

division	current		less than 1.2 mSv/y excepted	
	no. of operator	average dose	no. of operator	average dose
2005	5349	2.17	3937	1.51
2006	4968	2.27	2215	2.25
2007	4723	2.47	2154	2.1

It can be known that the corresponding operator's no. and dose was decreased when LLD was applied, like table 4-1. Namely, it can be known that the doses of