Newsletter of the HPA Personal Dosimetry Service

Monitor

November 2012 Issue 42

Dosemeter Change Intervals – *What's Best for Me?*

We are sometimes asked for advice on how often workers should change their dosemeters. Of course, the decision on this should be made with the advice of your Radiation Protection Adviser (RPA), so it is not possible for us to provide absolute rules. However, the following guidance should be useful.

Classified workers

Normally, classified workers should change their dosemeters every month or so. This ensures that the employer receives frequent updates on workers' doses, so that any unexpected trends are detected at an early stage. It also means that any high doses become apparent sooner. Where classified workers use supplementary electronic dosimetry that provides an alarm capability, some customers have chosen to use longer change intervals. In these cases, the employer needs to be sure that the supplementary dosemeters are always used.

Non-classified workers

In the main, non-classified workers can use longer change intervals. Here, the risk of unexpected doses or unexpected trends is lower, so results need not be collected as frequently. Three-monthly change intervals are appropriate for workers who are at the lowest level of risk, while two-monthly intervals would be preferred for non-classified workers at intermediate levels of risk, eg where their non-classified status needs to be kept under review.

As an indication, here are examples of applications where the various change intervals are popular:

1 month/4 weeks	non-destructive testing with mobile sources, nuclear site contractors
2 months/8 weeks	general non-destructive testing, veterinary workers with heavy workloads
3 months/13 weeks	most dental practices.

Some applications do not fall neatly into these categories. For example, where a veterinary practitioner takes large-animal X-rays (ie not in a shielded enclosure), the decision on the change interval will depend on the workload: a heavy workload might indicate a one-month change interval.

As always, your RPA should be consulted.

... Coming Soon (1)

Public Health England

The HPA is one of the bodies that will become part of a new organisation, Public Health England (PHE), from April 2013. Plans for the change are already well advanced and the Chief Executive Designate of PHE is in post. The re-organisation is part of the government's plan, proposed in the white paper *Healthy Lives, Healthy People,* to improve the way in which public health is promoted.

As far as the Personal Dosimetry Service – and indeed, all of the radiation protection functions of the HPA – are concerned, the only change our customers will see is a change to corporate identity: a new logo, etc. The radiation protection work of the HPA is to be transferred entirely to PHE. The other good news is that HPA accounting services will provide the basis of those functions for PHE, so there will be little or no change in arrangements for invoicing, etc.

We will, of course, keep you informed of developments.

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Co-operation Between Employers

Regulation 15 of the Ionising Radiations Regulations 1999 (IRR99) requires employers to co-operate in situations where the work done by one employer can cause exposures to the workers of another.

Co-operation must be sufficient to ensure that both can comply with all the other requirements of IRR99, and should typically cover (but not be limited to):

- information about hazards
- information about doses
- arrangements for outside workers.

Arrangements should be made and agreed in writing. Situations where co-operation could be needed include:

- the case of outside workers (classified workers of one employer who work in a controlled area operated by another employer)
- where workers are self-employed, or where they hold multiple part-time employments, eg a consultant cardiologist working for both an NHS trust and a private hospital.

It is imperative that there is continuity of monitoring and proper training for such individuals. It is not sufficient for each employer to assume that the other has trained the individual, or to assume that the only doses that matter are the ones received when the employee is working for them.

As an example, an obvious problem could occur if the worker is getting around 1 mSv a month from each employment. In this case the cumulative dose will exceed the annual dose limit but, if there is no co-operation, neither employer will be aware of it.

So – again, taking advice from their RPAs – employers should make doubly sure that, where the protection of workers is concerned, they co-operate as a matter of course.

See also:

- Work with Ionising Radiation: Ionising Radiations Regulations 1999 – Approved Code of Practice and Guidance (available at www.hse.gov.uk/pubns/priced/l121.pdf)
- The medical sector, dosimetry and co-operation between employers. *Radiation Protection News* (available at www.hse.gov.uk/radiation/rpnews/rpnews010211.htm#dosimetry)
- for our customers, the information pages of HPA Dosimetry Online.

Eye Dosimetry

At time of writing, we are still waiting for the HSE to add our headband dosemeter (see *Monitor* Nos 40 and 41) to the scope of our approval under regulation 35 of IRR99. However, we expect a positive response soon.

The options we have for eye dosimetry are:

- whole-body dosemeter, worn on the collar: photons (X- and gamma rays only)
- headband dosemeter: photons and beta radiations.

The whole-body dosemeter can be used if the radiation field does not contain beta radiations and the photon field is known to be the same at the collar as at the eyes.

A technical data sheet on eye dosemeters is now available – please contact us for a copy (see the back page).

... Coming Soon (2)

Phone Number Changes

Watch out also for changes to HPA telephone numbers.

To deal with increasing demands on our telephone networks, we are planning to start using 'VOIP' (Voice Over Internet Protocol) telephony.

This may mean that some of the PDS telephone numbers will change, although we hope to keep such changes to a minimum. There will be a limited changeover period when old and new numbers are available at the same time.

At the moment, the switch is scheduled to take place in the next few months, although this may change.

Again, we will keep you informed of developments.

Reduced Dose Limit for the Lens of the Eye ... *Why?*

As readers will know from *Monitor* No. 40 (November 2011), the International Commission on Radiological Protection has recommended a large reduction in the occupational dose limit for the lens of the eye, from 150 mSv down to 20 mSv. In this article we will try to answer the question ... *Why?*

The eye dose limit aims to protect workers from cataract formation as a consequence of radiation exposure. Cataracts cause a cloudiness or opacification in the lens of the eye, leading to a decrease in vision and, in the very worst cases, blindness. In common with other health effects of radiation exposure, the most important quantitative evidence for cataract risk comes from epidemiological studies looking at cataract incidence in exposed populations.

Since 1999 there have been some 14 such studies reported and, amongst these, the most important concerned survivors of the Hiroshima and Nagasaki atomic bombings. These studies indicated increased cataract incidence in those exposed to doses well below the previously recognised threshold dose of 2 gray (Gy) – thresholds of between 0.1 and 0.6 Gy were indicated and even a non-threshold linear relationship between exposure and incidence was possible. The recognition of sensitivity at lower dose levels was likely to be mainly due to the longer periods of follow-up of exposed people, with the cataracts presenting many years after exposure.

Other important studies involved exposures spread over long periods of time to those in a range of occupational situations, including medical staff (such as radiologists, cardiologists and nursing staff), commercial airline pilots and astronauts. These studies indicated that protraction of exposure did not reduce risk appreciably, ie a radiation dose delivered over a long period of time had the same effect on cataract incidence as a similar acute dose. Some of these population studies have assessed lens opacification (a pre-clinical stage of cataract formation) as an early indicator of eye damage. These sources of evidence led to a revised consensus threshold for effects on the lens of the eye of 0.5 Gy, with no modification due to protraction.

The mechanisms of cataract formation are not fully understood. However, there are indications that DNA damage may be involved. Hints have also been found that suggest the mechanisms of cataract formation may bear some similarity to cancer formation. However, it remains unclear whether cataract formation is a 'stochastic' health effect (as is the case for cancer – late developing, severity not dose dependent and no radiation dose threshold) or a 'deterministic' (tissue) effect (caused by cell killing or malfunction and with a dose threshold).

Given a 0.5 Gy threshold and a working life of, say, up to 40 years, the current annual occupational dose limit of 150 mSv may be viewed as offering sub-optimal protection against radiation-associated cataract. Consequently, the ICRP has opted to recommend an eye dose limit in line with current occupational effective dose limits – ie 20 mSv per year average over five years, with no one year over 50 mSv. The HPA has recently issued a response statement that endorses the ICRP recommendation for reduction of the eye dose limit:

http://www.hpa.org.uk/Publications/Radiation/HPAResponseStatementsOnRadiationTopics/radresp_ICRPcataractstatement/

It seems likely that the revised dose limit for the eye lens will become incorporated into UK legislation in the future.

We will keep readers informed of further developments in eye dosimetry, cataract risk and relevant regulatory requirements as and when these occur. Those interested in further information on cataract risk and mechanisms may wish to consult the following:

- Ainsbury EA, Bouffler SD, Dörr W, Graw J, Muirhead CR, Edwards AA and Cooper J. Radiation cataractogenesis: a review of recent studies. *Radiation Research*, **172,** 1–9 (2009)
- ICRP. *Early and Late Effects of Radiation in Normal Tissues and Organs: Threshold Doses for Tissue Reactions and Other Non-cancer Effects of Radiation in a Radiation Protection Context.* Draft Report, available at www.icrp.org/page.asp?id=116.

Grays and sieverts ... and millisieverts

Two units of dose are used in this article: the gray, Gy, and the sievert, Sv (and the millisievert, mSv, where 1000 mSv = 1 Sv).

It is wrong to say that these units are interchangeable, but in most of the routine exposure situations where eye lens doses are important, they are roughly the same. So, for the purposes of this article, you can think of 1 Gy as *roughly* the same as 1 Sv.

In fact, the difference is as follows:

- the ***gray*** is the unit of 'absorbed dose', which is directly related to the energy deposited by the ionising radiation in tissue
- the ***sievert*** is the unit of 'effective dose', which is the absorbed dose at a given point in the body, *times a weighting factor* that takes into account the varying effectiveness of the type and energy of the radiation.

For beta, X- and gamma radiations, that weighting factor is close to (but not necessarily equal to) one.

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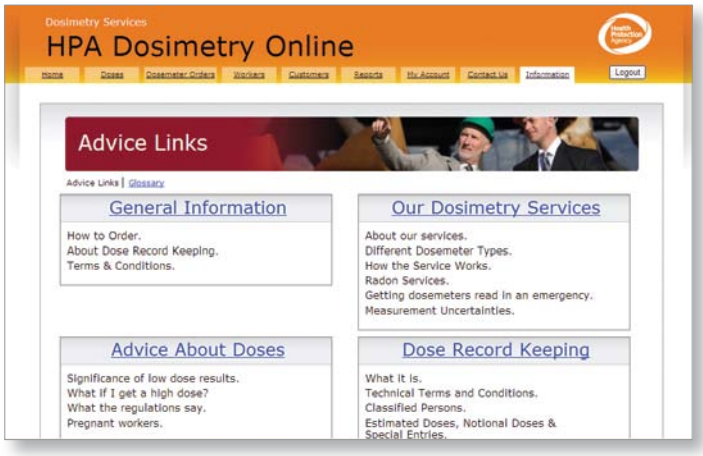
HPA Dosimetry Online

Information Pages

Don't forget that, as a customer of the HPA Personal Dosimetry Service, you have access to a range of information and advice that can supplement that given by your RPA.

On the information tab of HPA DOL, our customer extranet, you can find:

- information about the various services, and how they work
- help with ordering
- information about doses
- advice about dose records (eg if you need help with a Special Entry)
- helpful links.

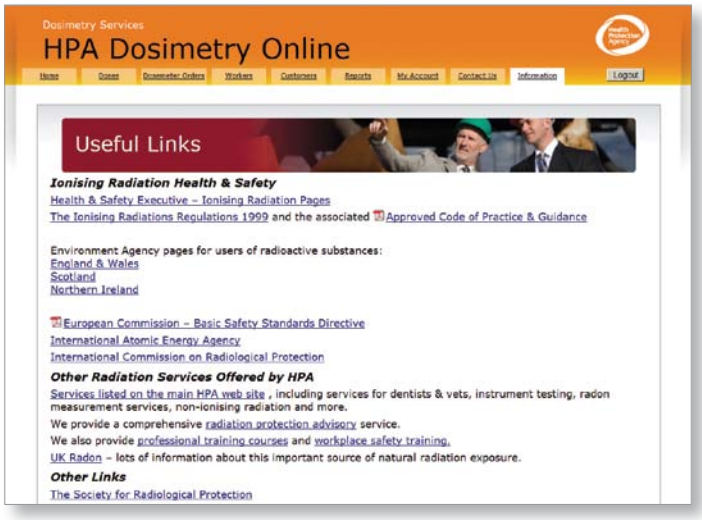


Customer Survey

Regular users of HPA DOL will have seen that we have launched a very short customer satisfaction survey.

We would really like to know how useful customers are finding the system, but at the same time we know that most people are very busy! So we have kept the survey as short as possible, and it should only take a minute to complete. We would be grateful if you could spare the time.

Otherwise, if you really don't have time, there's a 'go-away-and-don't-come-back' button!



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