

# Monitor

Newsletter of the Personal Dosimetry Service

December 2021 Issue 60

## Welcome to *Monitor* Issue 60



**Nicky Gibbens**  
**Manager, Personal Dosimetry Services, UKHSA**

Welcome to Issue 60 of *Monitor*, the twice-yearly newsletter of Personal Dosimetry Services (PDS), a group which has now transitioned across to the new UK Health Security Agency (UKHSA).

Another six or so months have again flown by since the last issue of the newsletter was published. In that time, the rollout of the COVID vaccine program appears to have paid dividends, although we remain vigilant with our social distancing measures, and we continue to monitor the fine balance between having sufficient people in our Lab whilst some continue to work from home. As last time, we **do** look forward to a sense of normality in the future.

In this issue, you will find: -

- An update from Duncan Cox, Head of Dosimetry Services Department, covering the transition from Public Health England (PHE as was) to the new UK Health Security Agency (UKHSA).
- A short piece about new Terms & Conditions of business when dealing with PDS, now that we are in the UKHSA, but still very much “business as usual”, and an update on cheque payments.
- A discussion of mathematical modelling and Monte Carlo methods in particular, which are used in designing our TLDs, explained by Dr. Jon Eakins of our Radiation Metrology Group.
- A short obituary of Nick Harvey of Phoenix Dosimetry, a great friend to PDS and one of our longest-serving maintenance engineers, and still considered part of the wider PDS Team.
- A good news story about Paul Taylor, one of our Chilton colleagues who works in Business Development and who is raising money for charity in a rather unusual way.

As usual, I trust that you find the articles in this issue of interest, and please let me know if you would be interested in submitting a small piece for publication in a future issue of *Monitor* about **your** organisation.

## STOP PRESS!

### ***PHE to UKHSA Transition - New Terms & Conditions of Business and Cheque Payments***

With the transition from PHE into the new UKHSA, PDS will be adopting new Terms & Conditions of Business from 21st October, 2021 onward. This is nothing to worry about however, as the new Ts & Cs do little more than show our change of name from PHE to the UKHSA, and with a new validity date – so it is very much “business as usual”.

Because of this, PDS is **not** planning to send out these new Ts & Cs to all customers, but those wishing to receive a copy should, in the first instance, e-mail their request to the PDS Customer Services Manager, [hugh.schoenemann@ukhsa.gov.uk](mailto:hugh.schoenemann@ukhsa.gov.uk).

Also, during the transition period, there will be changes to our finance system, the major implication being that from October 2021, the UKHSA is **no longer accepting payments by cheque**. If this could cause your organisation a problem, please e-mail Hugh (as above).



**WE WISH YOU ALL A  
MERRY CHRISTMAS  
AND A HAPPY NEW YEAR**



## An Update on the Transition from Public Health England (PHE) to the UK Health Security Agency (UKHSA)



**Duncan Cox - Head of Dosimetry Services Department**

As PHE's radiation protection functions transition into the new UKHSA, it is very much "business as usual" for PDS. This is the start of our journey to grow the organisation's capability, and it is important that we take the opportunity to tell our customers a little bit about the new

organisation and what it means in delivering a personal dosimetry service to you.

All the radiation protection functions of PHE's Centre for Radiation, Chemical & Environmental Hazards (CRCE) move into the UKHSA's Chief Scientific Advisor Group within the Radiation, Chemical and Environmental Hazards Directorate (RCEHD). Under our new Chief Scientific Advisor, Isabel Oliver, we bring together our world-leading public health science expertise, and we will work across the new organisation to develop our capabilities in data analytics, genomic surveillance, at-scale testing, and contact tracing.

The service we deliver has a bedrock of scientific expertise in radiation dosimetry and its application in radiation-protection practices. This will very much continue under the new UKHSA Chief Scientific Advisor, facilitating innovation as well as iterative development through listening to our customers' needs and experiences.

Born out of the response to the coronavirus pandemic, the UKHSA has five core objectives: -

- **Prevent:** Anticipate threats to health and help build the nation's readiness, defences and health security
- **Detect:** Use cutting-edge environmental and biological surveillance to proactively detect and monitor infectious diseases and threats to health
- **Analyse:** Use world-class science and data analytics to assess and continually monitor threats to health, identifying how best to control and mitigate the risks
- **Respond:** Take rapid, collaborative and effective actions nationally and locally to mitigate threats to health when they materialise
- **Lead:** Lead strong and sustainable global, national, regional and local partnerships designed to save lives, protect the nation from public health threats, and reduce inequalities

PDS already has a role in each one of these and, by building capacity to respond to emergencies, we will maintain a greater level of resilience in the service, as well as the capacity to meet rapidly our customers' changing needs.

Our name may have changed but we remain committed to maintaining the very highest scientific standards and customer service levels that you have come to expect from us.

## Obituary: Nick Harvey



It was with great sadness that we all, as PDS, learnt recently of the death of Nick Harvey of Phoenix Dosimetry. Nick was a first-rate engineer whose history with us pre-dates Public Health England. Indeed, some of us remember Nick from when we were part of the National Radiological Protection Board and then the Health Protection Agency – over 30 years' dedicated service to PDS in all.

Nick had an 8-month fight with cancer but, despite this, and in true Nick fashion, he soldiered on regardless with his regular visits to us for preventative maintenance on and repairs to our equipment. In maintaining these important elements of our scientific infrastructure, Nick was a key part of the wider PDS team, helping us to deliver the high levels of service that our customers have come to expect of us.

We will miss greatly Nick's friendly face and his can-do attitude, and we offer our sympathy to his family, his friends and his colleagues at Phoenix.

# Monte Carlo Modelling: Radiation Exposures in a Virtual World



**Dr. Jon Eakins**  
**Radiation Metrology Group**

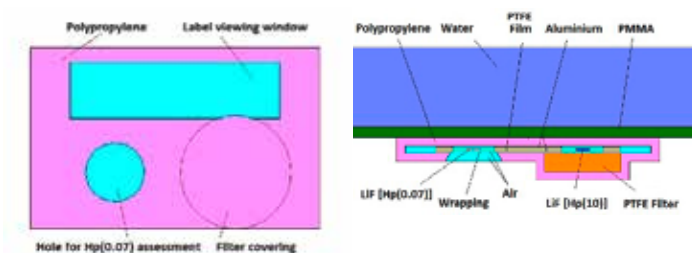
For the last 16 years I have worked in the Metrology Group at PHE (now the UKHSA, of course), most of my time being spent conducting radiation dosimetry research using Monte Carlo modelling techniques. The basic principle of Monte Carlo calculations is

to use random numbers to answer physical questions; often, those questions could not otherwise easily be solved.

Monte Carlo techniques in the PDS context are widely used to model the transport of ionising radiation through matter. When particles of radiation pass through a material, they typically undergo many interactions with the atoms that the material comprises. Physicists often need to determine the overall outcome of this - for example in terms of what might come out of the other side or how much energy is deposited along the way; Monte Carlo can help here. By considering each individual particle-atom collision as a random event, and then 'sampling' those events in sequence, the scattered path of a particle through the material can be simulated. By repeating this procedure many times, and analysing the many different paths produced, assessments of average particle behaviours can be achieved.

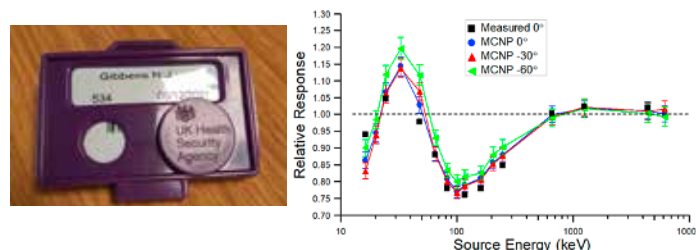
Numerous general-purpose Monte Carlo computer programs are available to rapidly perform such simulations, and these have been written so that they can reproduce radiations moving through almost any configuration of matter. Armed with such tools, the general approach of the Monte Carlo physicist is to build a 3D computer model that matches, as closely as possible, the conditions of the real exposure of interest. The real-world irradiation may then be simulated virtually within the computer program, and the paths of the particles both calculated and analysed.

The ability to estimate results in this manner is extremely useful in radiation dosimetry. Monte Carlo modelling is frequently used to support physical measurements and can be applied to greatly extend (or even replace) experimental campaigns by simulating exposure conditions that, for whatever reasons, could not themselves be performed for real.



**Figure 1: Monte Carlo model of the PHE dosimeter (front and cross-section)**

Since working at PHE/UKHSA, I have used Monte Carlo modelling for a diverse variety of applications, not only for pure research and R&D purposes, but also under contract for external organisations. These projects have included: designing radiation shields and assessing their performances; characterising reference calibration fields; determining exposures to people in radiological emergency scenarios; estimating the radiation field within the International Space Station; evaluating the background radiation from a clinical LINAC; assessing risks to individuals from so-called 'hot particles'; characterising a virus irradiation chamber; and designing several radiation detection instruments and personal dosimeters.



**Figure 2: The final TLD design, and its modelled and measured responses**

As an example of the last of these, I helped design PHE's whole-body  $\beta/\gamma$  personal thermo-luminescent dosimeter (TLD). During that process, I used the Monte Carlo code MCNP to build computer models of prototype designs (Figure 1) and then simulated their responses to exposures across a range of energies and angles. Based on the results obtained, I was then able to make modifications to the prototype model, say to the thickness or compositions of key materials within it, and re-run the simulations to investigate the impacts that my changes had made on the performance. By iterating this process, the optimum design of TLD was converged upon. Lastly, I was able to support type-test measurements on that final version (Figure 2).

The advantages that computer modelling brings to this type of project are clear. Had we instead built real, physical prototypes of every single trial TLD design, and subjected each one to a full range of real test exposures in a calibration laboratory, the process would have cost much time and money. Instead, by utilising the power of my PC, the whole process was completed far more quickly and efficiently. In fact, I ran some of my computer simulations overnight, so I was even able to make virtual measurements whilst asleep!

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## Congratulations to Paul Taylor



Congratulations to our colleague Paul Taylor in Business Development here in Chilton, who has just completed a tour of rude placenames across the UK on a 50cc moped – all in aid of charity. Several of you may have seen or heard of Paul's efforts already on local and national TV and in the press, and his travels in aid of charity really are worth celebrating here too.

Paul's trip has so far raised almost £24,000 for the Institute of Cancer Research, all in memory of his friend Alexis Leventis, who died of cancer last year aged only 55. Paul wanted to do something to help beat this awful disease, and believed the trip was "a suitably ridiculous place to start".

Paul's journey began on 18th August and took him via such august places as Bedlam, Booze and Crackpot in the Yorkshire Dales, Brawl in the Highlands of Scotland, and Cockpole Green in Berkshire. Before it broke down in Scotland, Paul's moped, a Slovenian *Tomos XL45 Classic*, had a top speed of only 28mph!

Paul completed his challenge in Bell End, Worcestershire, in early September (*That's enough rude placenames for now – Ed.*) although, at the time of writing, Paul's *JustGiving* page is still open for donations. Those generous readers of *Monitor* who wish to contribute to Paul's worthy cause may wish to follow this link: <https://www.justgiving.com/fundraising/paul-taylor233>.

**Well done, Paul!**

## Stay connected with Personal Dosimetry Services (PDS)

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**Please note that old PHE e-mail addresses will continue to be used but will be migrated gradually into UKHSA over the coming months.**

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**A REMINDER THAT, IN KEEPING WITH ITS CONTINUED "GREEN AGENDA", PDS NOW SENDS OUT PAPERLESS REPORTS ONLY AS A MATTER OF ROUTINE. THE AIM IS TO HELP PRESERVE OUR ENVIRONMENT BOTH THROUGH REDUCTION IN PAPER USE AND THE ASSOCIATED REDUCTION IN TRANSPORTATION. FOR THOSE CLIENTS STILL WISHING TO RECEIVE REPORTS IN PAPER FORM, A FLAT FEE OF £100 PER ANNUM APPLIES.**