

Minutes of the Thirty Sixth IRMF Meeting

Wednesday 26th November 2008
National Physical Laboratory

Present

Chairman: Clare Lee National Physical Laboratory

Secretary: Lawrence Jones National Physical Laboratory

Duncan	Aston	High Technology Sources
Fiona	Auty	NPL
Reg	Bosley	Nukem
Pete	Burgess	Nuvia
Oliver	Caunt	John Caunt Scientific
Ludovic	Chevallereau	Serco
Robin	Crosse	Thermo Fisher Scientific
Bill	Croydon	
Colin	Cunningham	Tracerco
Tim	Daniels	HPA
Paul	Deacon-Smith	Guys & St.Thomas' Foundation Trust
Denise	Delahunty	Regional Rad. Physics & Protection Service
John	Foote	BAE
J	Forde-Johnston	Canberra UK Ltd
Andrew	French	DSTL
David	Gallacher	Guys & St.Thomas' Foundation Trust
Andy	Galpin	Nukem
Adam	Golightly	Tracerco
Darrell	Green	Tracerco
Eileen	Hayden	Radiological Protection Institute of Ireland
Ed	Holden	Berthold Technologies (UK) Ltd
Michael	Iwatschenko	Thermo Fisher
Richard	Jenkins	BAE Systems Ltd
Martin	Kelly	NPL
Alfred	Klett	Berthold Technologies (UK) Ltd
Geraint	Lethbridge	Defence Equipment & Support
John	Lillington	Serco
Chris	Llewellyn	Tracerco
Bob	Major	Amec
Shaun	Marriott	BAE Systems Ltd
Jan	McClure	HPA
Duncan	McClure	HPA
Ray	McConnell	BIL Solutions
Kyle	Millar	Defence Equipment and Support
Ross	Morgan	Thermo Fisher Scientific
Robert	Newiss	Nukem
Steve	Newton	VT Nuclear Services
Trevor	Nicholls	Lab Impex Systems Ltd.
Mairin	O'Colmain	Radiological Protection Institute of Ireland
James	Parkin	Lab Impex Systems Ltd
Max	Pottinger	Thermo Fisher Scientific
Mike	Renouf	British Nuclear Group Sellafield Ltd
Tony	Richards	Consultant
Geraint	Roberts	HPA

Arnold	Rust	Velindre Hospital
Jon	Silvie	BAE Systems Ltd
Keith	Simmons	Defence Equipment and Support
John	Simpson	James Fisher IMS Ltd
Bill	Snooks	Pycko Scientific Ltd
Sinclair	Tait	Nuvia
Graeme	Taylor	NPL
Simon	Treadingham	DSTL
Russell	Truman	DSTL
Glenn	Tyrrell	Applied Scintillation Technologies Ltd
Mike	Walker	James Fisher IMS Ltd
Jonathan	Wardle	AWE
Graham	Whish	East Anglian Regional Radiation Protection Service
David	Williams	Magnox South Sites
Mike	Woods	IRMC

On behalf of NPL, Clare Lee welcomed delegates to the thirty-sixth meeting of the IRMF. Rick Tanner from HPA sent his apologies for not being able to present at the meeting; his update will be rescheduled for May '09.

36.1 Neutron Monitoring Comparison

Graeme Taylor reported on the ongoing neutron monitoring comparison, a timetable for the outstanding measurements to be completed had been drawn up. AWE would make their measurements in Dec - Jan, HPA in Feb – Mar and Nuvia in Apr – May. Measurements were to be made at 5 different dose rates using $^{241}\text{Am-Be}$ and ^{252}Cf neutron sources. The deadline is the next meeting of the IRMF.

36.2 UKAS Surface contamination monitor calibration comparison

Mike Woods (IRMC) presented preliminary data from the monitor calibration comparison. The schedule had been reviewed and the participant UKAS labs had agreed on the probe area size. This comparison exercise also had access to historical data from DSTL and was using the last 10 data sets. Data had been recorded using the snap shot and eye averaging techniques, and this had produced significant differences. The latest results were presented and showed significant differences between the DSTL, UKAS labs and published website values for the Pu source measurement. Some labs showed a difference between results using the eye averaging and snap shot techniques, for data taken at low count rates, whilst other labs did not.

Jan McClure (HPA) suggested the measurement method was not important for the mean. Michael Iwatschenko (Thermo) asked what the source size had been. Mike did not know, but said the source was bigger than the surface area of the probe. Pete Burgess (Nuvia) suggested that a change of 0.1mm in the source-detector separation is too fine as some jigs have a 4mm source-detector distance. Pete also stated that it would be unusual to use a mini monitor for alpha detection, but Michael Iwatschenko mentioned some institutes might only have one detector. Duncan McClure (HPA) said in this case HPA might not issue a calibration certificate to the institution.

The snapshot technique gave the standard deviation and the standard deviation of the mean (the uncertainty in the calibration factor), and the eye averaging technique only gave the standard deviation. Michael Iwatschenko asked if NPL was working on this, the answer Clare Lee gave was no. Duncan McClure said the

differences between the eye averaging and snapshot techniques were instrument dependent, and that the eye averaging is operator dependent. John Simpson (James Fisher) said the cost of calibration would increase if more time was spent on calibrations, and also a surveyor would not want to spend a long time reading the instrument dial when out in the field. John also stated the need for a correlation between laboratory calibration and field use for monitor instruments. Jan McClure mentioned that using the eye averaging or snapshot technique only affects the uncertainty, and that other uncertainties are much bigger. Michael Iwatschenko stated that measurements made during laboratory calibrations must be more accurate than measurements made in the field. John Simpson said instrument surveyors use a maximum or minimum range in their readings rather than a percentage uncertainty. Russell Truman (DSTL) asked how many instruments are type-tested and that type testing should be pushed as a sales point for detectors. Michael Iwatschenko stated that Thermo Fisher performs two type tests on their instruments, and that a 40 - 50 page document was available for information. Clare Lee suggested people should not buy instruments without adequate type test data, and Pete Burgess added that if the efficiency is unknown the user is unable to obtain the right number when measuring. Russell Truman said it would be helpful if the type test data could be simplified. Duncan McClure suggested this was possible as type test data was customer driven and that he would provide a web link to a compilation of old NRPB type test data, but the current type test work being carried out at the moment was customer confidential. Duncan also said companies did not talk to each other, and Mike Woods then concluded this should be an agenda item for the next IRMF meeting. The difference in the means from the eye averaging and snapshot techniques is small, and the differences in the ^{14}C results were due to source variations. The results obtained from the UKAS laboratories were good results. Jan McClure asked if the company that recorded their result as being the same as the type test data, was indeed the manufacturer of the source? Mike Woods said that was correct. Pete Burgess said that variations in the detector window vary the detector response, and that traceable transmission of radiation through a standard window would be useful. Jan McClure suggested that type test data was currently measured using old sources in regard to ^{14}C , and that new measurements should be performed using new sources. Duncan McClure asked how frequently UKAS labs perform calibrations on sources and Mike Woods said calibrations were usually every 4 years, but if the source were used more frequently, then the calibrations would be every two years.

36.3 Progress on good Practice Guides (GPGs 14, 29, 30, 34 & 49)

Clare Lee informed the delegates that funding had been secured for reviewing GPGs 29, 30, 34 & 49, so now prioritisation of these GPG was necessary. Mike Woods suggested it would be good if GPG49 contained more examples and also the addition of an appendix would be useful. Mike also stated that GPG30 would be involved in rewriting ISO7503, and that a reviewed GPG30 would come out of this review next year. However Clare Lee pointed out that GPG30 is one of the more urgent GPGs in need of revision, as part of it had been removed from the website. Pete Burgess suggested that the review of GPG30 could be performed in parallel with the review of ISO7503 with joint membership between the two groups. Pete queried who would review GPG34 as the original authors of GPG34 were no longer at NPL. Max Pottinger (Thermo) stated that a review of GPG29 was not urgent and also required the least amount of work. Mike Renouf said he uses GPG29 a lot in his work. Mike Woods suggested GPG30 should be held off until the next IRMF meeting, and that work would begin on the review after the ISO7503 meeting in April 2009. The priority of the reviews for the GPGs was thus: GPG29, GPG 49, GPG30 (to begin next year) and then GPG34. Clare suggested that UKNSF might take responsibility for GPG34. The review of GPG14 had been undertaken without funding. The last 6 months had produced a

final draft that had been reviewed by the working group, and the comments were being incorporated. There was now funding for GPG14 and the plan was for the document to be circulated, in pdf format, for a short consultation period. Pete Burgess would be responsible for reviewing the inserted comments and explaining the reasons for including / excluding comments submitted by delegates. The Pdf was to be circulated before Christmas and there would be 1 month for delegates to comment. The GPG29 working group would be made up of the following members: Pete Burgess, Max Pottinger, Mike Renouf and Dave Williams.

36.4 GPG on EPD's

Jan McClure gave a presentation on the progress of the GPG for the testing of EPDs. There was to be a working group meeting after the IRMF meeting. The technical details were nearly finished and the type testing of the EPDs had good documentation already available. Different tests had been made for the different types of EPDs. Test elements had been further refined and there had also been a combination of some tests with further guidance available in the documentation. A reduction of the number of tests would be valid if supported by the data or if some of the functions on the EPD were blocked out, such as β detection mode, but the decision must be justified. There had been changes to the background check test and the addition of the role of the RPA. There were limitations to be aware of when self-testing, and there were also potential problems with the digital display of the EPDs. An appendix of the phantom on/off ratios, which was featured in a presentation at the last IRMF meeting, had also been added. Tony Richards asked when the report was to be put into print, and Jan McClure replied that the document would be with NPL by the end of the week for their review. There was only a reference to neutron EPDs in this GPG. Russell Truman asked how to manage the display resolution and Jan McClure said this information was in the GPG.

36.5 Alpha-in-beta crosstalk in dual scintillator probes

Bob Major gave an interesting presentation focusing on the DP6 probe. Bob had used MCNPX to create a simple model in order to track α particles in phosphor scintillant materials. MCNPX literature stated the program could take photomultipliers into account when constructing the model. Clingfilm was used as the absorber and measuring the thickness of Clingfilm had been difficult. Typical α and β detector thresholds were set. Pete Burgess stated the α - β separation was good. Clingfilm reduced the α particle transmission slightly. The modelled results had good agreement, with and without Clingfilm, in the zinc sulphate of the detector. However, differences were recorded in the photomultiplier tally. Penetration of the zinc sulphate into the BC400 increased with increasing α energy. The plateau did not fall off to zero, as there seemed to be a residual count recorded. This could of been due to incomplete absorption in the zinc sulphate, though it could also have be due to γ 's emitted from the ^{241}Am source. Mike Renouf suggested the use of AP, DP6 and BP19 probes in repeat measurements. Russell Truman suggested air attenuation could be the cause of the difference. Mike Renouf stated that the zinc sulphate was thick enough to absorb the α particles. Pete Burgess suggested there was a difference in the efficiencies of the zinc sulphate and the BC400. Bob Major also presented results showing reasonable agreement using the ^{60}Co source, but there had been a difference of a factor of 2 in the tests using ^{14}C . Pete Burgess suggested the use of plastic file pockets as consistent thickness absorbers instead of using Clingfilm.

36.6 ISO WG17 Recent Changes to Standards under Development

Tony Richards gave a review of the changes to a number of ISO standards. The first standard reviewed was ISO 18589, which had been started in 2000 and consisted of six parts. ISO 18589 should be published by late 2009 or by February 2010 by the latest.

ISO 11920 was at the last stage of voting and should be published by the end of 2009 or early 2010.

For ISO 7503 the working group had dropped all previous work due to previous objections. The draft would be sent to Vienna in April 2010 and progress was happening and the work was being completed along UK lines. The draft was to be supplied by the working group before publication.

The discussion document for ISO 8769 had been sent out, however the uncertainty on conformity was a problem. Manufacturers had said they could not meet the requirements for making class 1 sources. Mike Woods commented that manufacturers could produce uniform distribution sources, but there was resistance from the German and French manufacturers. Denise Delahunty (RRPPS) asked if it was possible include Lutetium in ISO 8769. Mike Woods replied that ISO 8769 only recommends sources. Alfred Klett (Berthold) replied that manufacturers were unable to attain the required $\pm 5\%$ uncertainty for class 1 sources and in order to do so sources would become more expensive.

ISO 116655 had all the information in the first part, and all the other 7 parts were measurement methods. This review had only just begun and was out for discussion. Delegates were to contact Tony Richards for further information. There would be no further progress on this review until after the next IRMF meeting. Mike Woods added that charcoal had been excluded from part 7 and that the UK must do the work for its inclusion.

36.7 Investigation into an EPD result on the Dounreay site

Sinclair Tait gave an interesting presentation on the investigation into a strange EPD result on the Dounreay site. The EPD Mark 2 had been introduced to replace existing dosimeters and it was used site wide. The strange result occurred in the ratio between hard and soft gammas, this was in spite of a convincing dose profile. When the EPD data had been downloaded and plotted the dose profile and dose rate plots looked convincing, except that the dose rate did not fall to zero when the site visit was finished, as would be expected. Background checks and other calculations confirmed the strange result was not due to radiation exposure. Extensive tests on the EPD also eliminated RF interference from the use of a saw as a possible cause of the problem. The problem was found to occur when the EPD was subjected to humidity testing, recreating the conditions caused when the EPD was used by a worker in an air tight suit. The faulty component of the EPD was found to be the soft gamma silicon diode, which appeared dimpled when removed from the EPD. It was recommended to use the EPDs in sealed bags when using them in humid environments.

36.8 NPL training measurement programme

Fiona Auty gave a presentation introducing the new NPL training measurement programme to the delegates of the IRMF. The program would be in dimensional metrology and a test must be passed at the end of the training to gain a certificate. The emphasis of the training would be on practicable, hands on training, and ISO accreditation was being sought. NPL would not deliver all the training, but would instead use delivery teams. It was foreseen that one module of training would last one day. Fiona asked the members if a similar training framework was required in ionising radiation measurement. Russell Truman said that DSTL ran the surface contamination academy, which was also measurement orientated. Pete Burgess stated that training would be useful in the decommissioning field for small contractors and surveyors working with loose contamination. Duncan McClure said that the HPA should also be involved and Jan McClure added that the HPA

ran a course in instrumentation lasting a week. Pete Burgess also said that the HPA were looking at starting a training course for a specialist in ionising radiation measurement, and he added that the City in Guilds course was struggling. Robin Crosse said that people at Thermo Fisher received lots of low-level questions about radiation measurements that could be address by better training. Tony Richards said that any training course would need to be worthwhile for those people travelling from the North. Fiona Auty replied that it was the intention of NPL to make this training course mobile, and to use external organisations such as those companies running in-house training courses. Duncan McClure said that, from reviewing HPA feedback, more customers want longer courses, and Pete Burgess said a problem is that companies are reluctant to let their workers attend training courses, making mobile training more important. Russell Truman added that HMS Sultan ran a good training course that lasts three weeks, but it was expensive to attend. Pete Burgess added that a further problem of the HMS Sultan course was that it only ran once a year and attendance was limited to around 5 and 8 people.

36.9 Update on the design and performance of a large area reference sources (110cm²) based on Lutetium oxide tiles

Michael Iwatschenko presented an update on the Lutetium oxide large area reference source. Michael reminded delegates of the advantages of using Lutetium as a check source instead of conventional radioactive sources, such as ¹³⁷Cs. Both thick and thin Lu₂O₃ sources had been tested since the last IRMF meeting, and it was found that the thicker source had more self-absorption. Lu₂O₃ was a γ reference source with multiple energies through a realistic energy range, and they could, in addition, be a γ or β only source with the application of the relevant backing. Lutetium ceramics had been tested in water at a temperature of 60°C, and they were found to be not hydroscopic. Radiography of Lu₂O₃ had shown the homogeneous emission of the source. Michael also stated that he would like NPL to take on the characterisation of Lu₂O₃.

Mike Woods said characterising large Lu₂O₃ would still present the same problems as for other large area sources, though he did add the uniformity of the source was good. Jan McClure asked about the price of the source, and Michael replied that Lutetium sources are of comparable price to that for existing sources. Alfred Klett asked if there were traceable certificates available for the sources, and Michael replied that while you can get the activity from the half-life and the weight of the source, he was looking to provide traceability.

36.10 Experience gained and lessons learnt from using radiation monitors while using a gas tight suit

Geraint Roberts (HPA) gave a presentation on the operation of radiation monitors whilst wearing a gas tight suit. The Fire and Rescue services attend non-fire related incidents and in light of the possibility of CBRN the fire and rescue services, as well as the police and ambulance services, would use new additional equipment. The suits used were one piece suits with integral boots and gloves, as well as vents for manual venting of CO₂. The tests in the suits had lasted 20 minutes during which time a reduction in the tactile senses such as hearing, vision and especially touch had been experienced. The thick gloves made it easy to accidentally switch off the instrument being used, so Geraint had asked if was possible to make the instruments live continuously during use, negating the need for an on/off switch. Other recommendations Geraint made following the tests were for larger switches and /or buttons, and maybe displays as well. The manufacturers of the suits were willing to send out gloves for use in the

development of improved instruments. Geraint was also planning to repeat the tests with other instruments. Pete Burgess asked if there were any recommendations for the button sizes, and Geraint replied with 25mm button size being recommended. Jan McClure said that as the suits filled up with CO₂, the gloves moved away from the hands. Pete Burgess also asked if there was any preference between using an analogue or digital instrument, and Jan McClure replied that the fire service preferred analogue instruments, as they were easier to read. Duncan McClure stated that the HPA were finishing off a report for recommendations for the detectors to be used in these circumstances.

36.11 Ionising Radiation Instrumentation Specialist (IRIS)

Jan McClure gave an informative presentation on the overview and current status of the IRIS certification scheme. The presentation gave details of why the scheme was developed and gave details of its structure. Jan then explained the technical areas of specialism that required 'detailed understanding' as well as those areas that required 'practical competence'. Russell Truman stated his hope that the role of the IRIS would become an evolutionary step from the role of the Qualified Person. He also said the portfolio trails the assessment ongoing at the moment. Pete Burgess said that most people working in the industry probably already had most of the skills listed in the 'detailed understanding' areas already. Mike Renouf stated that this scheme would attract more people into the industry as it showed a defined career path, and he added that the IRIS was a purely aspirational qualification rather than a required one. Russell Truman stated that the role of qualified person had no competency structure, and suggested using the framework for ticking boxes for IRIS and developing training. Jan McClure continued that the results from trial portfolios were to be presented to the next RPA2000 board in February 2010. Hopefully the scheme would become live in early summer 2009 for general applications. Jan was also waiting for feedback before a draft of the competencies was sent out.

36.12 Any other business

The date of the next meeting was agreed to be the 20th May 2009. Clare thanked speakers and the delegates for attending, and also Stuart Humphreys and Lawrence Jones for their efforts in organising the meeting.