Minutes of the Airborne Radioactivity Monitoring Users’ Group

16 November 2010

1. Actions arising from 2009 meeting

A9.1: Chairman and Secretary to review information-gathering method to replace ARMUG questionnaire. The questionnaire will be replaced by an e-mail enquiry from NPL for information about the site facilities and / or establishment capabilities of the membership. Details supplied will then be uploaded to the group web page on the NPL website. **This action is ongoing**

A9.2: Chairman to arrange meeting of a working group to produce guidance on interpretation of air-filter data. Meeting held – subject of presentation at this meeting.

A9.3: Secretary to arrange for list of current standards to be put onto the ARMUG web page. **This action is ongoing**.

A9.4: Enquiry received from AWE for information on any intercomparisons for total beta or $^{137}$Cs on filters, as participation in an exercise had been requested by their auditors. **Chairman to investigate**.

The Chairman reported that he had been unable to find any open exercises. The CTBTO and also the IAEA (ALMERA scheme) ran some exercises. Discussion of group interest in an exercise would be discussed under AOB.

A9.5: Enquiry received for information on the use of charcoal / glass fibre filters. **Chairman to forward to David Ryden**.

David had responded to this enquiry

A9.6: Visit to LIS and Dstl to discuss the requirement for a UK facility for the exposure of instrumentation to radioactive aerosol. **Chairman to arrange**.

Visit to Dstl has taken place.

A9.6: NPL facility for the calibration of PET stack instrumentation. Secretary and Chairman to consider the possible future development of this facility to enable the calibration of other PET monitor types. **This action is ongoing**.

2. ARMUG Working Group meeting at Sellafield Centre 19-20 July 2010 report (Julian Dean, NPL)

The Chairman summarised the July meeting. The minutes are given below.
Following the presentation, Debra Rook kindly agreed to review ‘Radioactive Air Sampling Methods’ (Maiello and Hoover eds., CRC Press 2010) for its suitability as guidance on the positioning of monitors in the workplace. **Action 10.**

**Delegates:** Mike Renouf, Debra Rook and Eliot Williams (Sellafield), Jeff Rivers and James Parkin (Lab Impex), Raj Bhanot (Springfields Fuels Ltd), Hilary Phillips and Julian Dean (NPL)

**Purpose:** To discuss how to progress with guidance on the interpretation of air filter data and on the positioning of workplace air monitors.

**Proceedings:**

There were three agenda items.

1. To discuss ANSI (American National Standards Institute) draft standard M13.1 and decide if it meets the needs for UK guidance on the positioning of air (particulate) monitors in the workplace (as identified at a recent ARMUG meeting).

The group felt that the ANSI standard would be suitable as UK guidance but that comments should be sought from the wider ARMUG membership. NPL will therefore circulate the draft to ARMUG members prior to the November meeting and it will be included as an agenda item. This led to a wider discussion on the importance of ARMUG input to draft standards. JR (who attends ANSI meetings) agreed to forward draft standards to NPL as soon as available for circulation to the ARMUG membership to promote UK involvement whilst standards are in the revision process. Clive Dray and Tony Richards could also be asked (re: ISO, IEC, etc.).

2. To define guidance in the measurement of activity on air filters. This need arose from a recent ARMUG meeting.

JD presented the results of the recent NPL air filter study and also feedback from that study. Briefly, NPL had found that actual alpha activities on filters were 1 – 5 times the value obtained from monitors. In a few cases, the factor was around 20. Other studies had contradicted this (e.g. a US study suggested values in the range 0.1 – 1.4). The feeling of the group was that the NPL study was indicative of the need for more detailed studies (e.g. to identify unsuitable filter types) but should not be used as the basis for recommending a ‘correction factor’ for filter measurements. Further analysis of the results would be beneficial to investigate the possibility that some of the underestimation of activity present stemmed from a particular filter type or instrument setting.

Other factors affecting air filter measurements (e.g. filter type, aerosol size, aerosol penetration and dust loading) were listed and discussed. Little is known regarding the effects of some of these factors and all that can usefully be offered given current knowledge is an ARMUG presentation to ‘flag up’ the importance of these factors and report the result of additional data analysis for filter type, and comment on the chemical dissolution process in the NPL study and in similar studies. In the NPL study, one filter failed to dissolve, possibly because loaded with a ceramic material.
3. Feedback for NPL programme.

In the discussion on the NPL air filter study, Sellafield delegates had given a list of areas where further research into radioactive aerosol collection and measurement would enable a better estimation of the collected activity on filters for use in the generation of a correction factor for radiation protection purposes. This is urgently needed if the results of the NPL report on aerosol filter activity reports large variations between true and apparent activity on filters and cannot resolve the apparent differences. If an aerosol facility were set up at NPL or elsewhere it would provide a vital research tool to address these problems.

Sellafield might require suppliers to perform additional testing to demonstrate that instrumentation would meet the measurement requirements of specific plant locations if a UK testing facility existed and was economically priced (~£3000 a test?).

**Summary and actions**

The group had found the meeting very useful, being more interactive and ‘focused’ than the annual ARMUG meetings. NPL should consider hosting future meetings of this type, perhaps at other sites as ARMUG working groups to enable focused discussion of important topics and enable dissemination of different site practices. Also, NPL should consider making future ARMUG meetings more interactive.

Neither Pete Burgess nor David Ryden had been able to attend, which detracted from the usefulness of the meeting. They are to be consulted later for their views on the agenda items.

ARMUG membership to be contacted and feedback requested on meeting outcomes

JD to prepare meeting summary (similar to above) for delegates, PB and DR.
JD/HP to contact Tony Richards and Clive Dray about draft standards.
JD to complete air-filter study report (involving PB and DR if possible).
HP to finish aerosol feasibility study report (contact HPA and AWE).

**3. Aerosol transport and deposition modelling (Tim Foat, Dstl)**

The work of the Dstl team focuses on indoor dispersion, aerosol collection and fluid dynamics.

Tim outlined the use of modelling as a design tool for optimising the design of inlets for collecting aerosols and the prediction of aerosol deposition within an internal space. Although the setting up of a model may be time consuming it has the advantage of enabling the swift investigation of many options without the time and cost constraints of wind tunnel testing. Tim also gave an insight into the equipment that has been used to test the validity of modelled results.
4. Uncertainty considerations in radioactive air filter measurements (Bernhard Warr, GE Healthcare)

Bernhard gave an overview of the type of work carried out at the GE Healthcare Grove Centre at Amersham and the discharge and sampling regime performed by the Dosimetry and Environmental Assessments Laboratory. The uncertainties associated with the reporting of aerosol levels have recently been under scrutiny, particularly those from sample matrix, sample age and filter retention. This study has indicated that the overall uncertainty may be as high as ~50% of the measured activity on the filter. Other factors such as particle size or absorption rate may have a significant effect on the uncertainty.

5. ICARE: Presentation and new advances (Céline Monsanglant-Louvet – Saclay)

The Saclay laboratory (IRSN) is home to the ICARE facility which is unique in its ability to perform instrument testing to IEC standards. The facility generates aerosols of diameter 0.15-10μm labelled with Pu, radioactive Cs or Sr and is able to simultaneously expose instrumentation to aerosol and radon / thoron atmospheres.

Aerosol studies at the Saclay facility have indicated that there is an underestimation of ~50% of the true activity collected on filter media and that a correction factor is necessary to relate the activity measured to true activity. This correction factor is due to factors such as dust loading, clogging of filters over time and also the amount of penetration of the active particulate into the filter medium. Any of these can lead to a reduction in the recorded activity (typically 30% of activity is retained on the surface of the filter).

Monte Carlo modelling has been used (MCNPX) to investigate attenuation of the alpha energy deposited on filter and has given results comparable to those measured on real filters. German software has been used in studies on the penetration of aerosol particulate into filters. The affect of dust collection on filters has been investigated using salt particles produced by a nebuliser in addition to the active aerosol already generated in the ICARE bench.

Further studies are currently being undertaken to determine correction factors to enable better estimation of activity collected on air sampling filters.

6. Establishing a UK primary standard for radioactive aerosols. (Hilary Phillips, NPL)

NPL has been investigating the possibility of establishing a radioactive aerosol capability. Methods for the generation of active aerosol have been investigated and an initial design proposed for a prospective exposure system enabling potential costs to be evaluated. The ARMUG membership has been consulted for their input on aerosol
size and radioactive content. A NPL report is being drafted to document the results of this study.

7. The new AWE CAM (Morgan Jones, AWE)

AWE has been developing a new Continuous Air Monitor to replace existing instrumentation. The new instrument is of modular construction and must operate using existing cabling and have a user interface that resembles that of the existing instrumentation. Simplicity has been a by-word during the design stage to ensure that the new instrument can be maintained for the next 25 years by the easy exchange of its 4 modular components. It will be a dynamic system utilising 256 channels, with automatic curve fitting and a simple software programme. It is hoped that the new instrument will be able to detect small amounts of alpha emitters above the ambient radon background using a new concept in peak analysis patented by AWE. A prototype is currently being produced for field trials.

8. Dealing with radon daughter alarms (Pete Burgess, Nuvia)

The recurrent alarms from an installed iCAM at an unused building with a high radon background on the Harwell site led to an investigation into the activity that had triggered the alarm. Investigation revealed that with the standard setting of 2.5 DACH alpha the monitor was alarming at 0.65Bq Pu and a 0.1 DACH beta equivalent to 10.8Bq energetic beta. The building fingerprint was used in conjunction with knowledge of previous work performed within the building to justify the resetting of the alarms to higher levels so reducing the number of false radon alarms whilst maintaining integrity of the system.

9. AOB

James Forde-Johnston (Canberra UK Ltd) spoke about the concerns with the iSolo and iMatch battery charge circuits. These instruments are not subject to recall. UK customers with these instruments will be contacted shortly to arrange for an upgrade to be performed on the charge circuit and for battery exchange.

Helen Anthony the AIR Programme Manager spoke briefly on the NPL rolling programme formulation cycle and requested that the membership contact her with input for future projects for consideration.

Alfred Klett (Berthold GmbH & Co. KG) reported that the recent IEC TC45 Working Group 5 meeting had agreed that the IEC 6 series of standards would not need revision until 2015.

Debra Rook (Sellafield Ltd) requested that there be more interaction with the American Air Monitoring User Group.
The membership agreed that the next meeting would again be held adjacent to the IRMF meeting in November 2011.

**Actions**

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**A9.3:** Secretary to arrange for list of current standards to be put onto the ARMUG web page.

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**A10.2:** Actions from ARMUG Working Group meeting

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