OPEN

THE UNIVERSITY OF MELBOURNE

Electromagnetic Radiation Safety Committee
2013/04

MINUTES

Electromagnetic Radiation Committee Meeting occurred on Wednesday 11th December 2013, at 1.00pm on the Ground Floor, Meeting Room G11, Old Geology (Building 155).

Meeting opened at 1.10pm | Chaired by David Keizer | Minuted by Verity Fisher

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1 Attendance/Apologies

David Keizer thanked Verity for organising catering for the final meeting of 2013.

1.1 Attendees

David Chan (DC)
David Keizer (DK)
Ian Bouch (IB)
Ira Tedja (IT)
Jill Williams (JW)
Julie McNeice (JM)
Matthew Bennett (MB)
Petronella Nel (PN)
Sam Montalto (SM)
Steve Guggenheimer (SG)
Susan Butler (SB)

Verity Fisher (Minute Secretary)

1.2 Apologies

Malka Halgamuge (MH) – Malka was awarded a short-term Fellowship at the Department of Epidemiology within the School of Public Health at University of California, Los Angeles. Malka will return in the new year to take up her position on the committee.

2 Minutes of the previous meeting

Minutes from 2013/03 meeting accepted as accurate.

Amendment to 2013/03 minutes made by DK regarding 5.8 – although the minutes accurately reflect what was discussed in the meeting, the information was incorrect. Although Christian Rantzau has taken on some additional responsibilities regarding TLD badges, ongoing management is still the sole responsibility of DK.

3 Review of incidents

3.1 TLD badges

Veterinary Science (Werribee) badge which returned an exposure to high energy result has been followed up by MB.
See Attachment 1 – email from MB regarding investigation and results.
Action: Closed out.

SG highlighted issues relating to tomography and PET units which can cause large dose readings. Nuclear medicine is one particular area where it is hard to keep people below the 1mcv, the level of a general population dose. Finger badges have returned results as high as 10mcv, however this is not a whole body dose (150mcv is allowable).

3.2 New Incidents

An incident at St. Vincent's involving Tc-99 and a UoM staff member was reported to the University as a courtesy. The St. Vincent's Tc-99 is covered by their management licence, not the University licence.
Action: No action required.

Helium cooled super conductor magnet in Botany quenched (lost super conductivity) two months ago. Field expanses and then collapses. All helium gas vented into the room instead of venting to the environment, this resulted in the entire volume of oxygen in the room being displaced with helium. Looked like fog. Oxygen monitor triggered successfully.
Action: Closed out.

4 Action items from previous meeting

4.1 CT Scanner protocols at Vet Science, Werribee

Protocols and associated paperwork is being updated, currently awaiting approval from the Head of Department to make them official. Although the protocols were already in place at Werribee, they had never been officially recorded.
Action: Closed out.

4.2 Laboratory Certification

Good outcomes from initial laboratory inspections. Documentation available has been a vast improvement on previous years. On track with schedule created by VF.
Action: Closed out.

4.3 Laser Cutters and 3D Printer guidance material

Use of laser cutters can produce high temperatures. Uncertainty surrounds what else (fumes, CO_2 etc) is being created when using laser cutters. Environmental monitoring required before guidance material can be produced.

See Attachment 2 - Potential OHS issues associated with 3D Printers
See Attachment 3 – OHS issues associated with Class 4 laser cutters
Action: DC and SG to create a sub-committee to monitor effects of laser cutters and produce guidance material.

4.4 Training

Radiation training attendance numbers are similar to previous years. Approximately 600 participants in total, 400 ionising, 200 laser and a dozen iodine-131 attendees. Competency questionnaires are being handed in more regularly than in previous years. More training may be offered in future regarding different types of radiation related subjects.
VF thanked for extensive administration assistance that has been critical in the smooth running of radiation training and record keeping.
Action: Closed out.

5 Other Business

5.1 Membership

Ability to discuss if ERSC member is to be removed from committee (ie, a specific number of meetings have been missed). Onus is on members. Discussion on whether a minimum number of meetings need to be attended per year – expectation of attendance.
Action: SB to draft sentence to present at next meeting.

5.2 Agenda and Terms of Reference

The ERSC Agenda and Terms of Reference will be reviewed in December. Prompts will be sent and feedback is due before the next meeting. The current Terms of Reference can be found at: http://safety.unimelb.edu.au/docs/ERSC_Terms_of_Reference.pdf
Action: Ongoing.

5.3 ARPS Post-Conference Update

Best conference in regards to understanding, not as technical as previous years, more practical application and learning. DK and MB gave presentations. Offered opportunities to connect with other people from a number of universities for networking and discussing how different universities deal with various issues, both common and unexpected.
Action: Close out.

5.4 Legislation and Storage

Toxfree waste contractor contacted UoM asking for confirmation waste they collect is not radioactive. Toxfree want clarification on previously radioactive materials. Written proposal from Toxfree requesting that UoM doesn't dispose of radioactive materials. Staff disposing of previously radioactive waste must confirm waste is fit for transport. Radioactivity should never be on waste disposal manifest. All radioactive waste is kept at the University as per government requirements.
Action: DK and SG to create guidelines for staff disposing of previously radioactive waste.

5.5 Information Session for DRSO's

More practical guidance required regarding DRSO role. DK suggested a 2hr session offered to DRSO's each year, involving DK discussing role and background and SB covering legislation. Some departments have two separate DRSO's, one responsible for ionising and one focusing on lasers. SB sent out an email survey 18 months ago regarding training requirements, only half a dozen DRSO's responded. Ideas for DRSO guidance requested from the committee.

PN - minimum annual catch up for DRSO's, including induction and training.
SM - 6 monthly contact/newsletter covering key points.
JW - networking and face-to-face contact, special interest groups, annual seminars and quarterly updates.
SG - DRSO requires baseline knowledge.
DK - Duty statement required, expectation and skills required.

Action: DK to create DRSO guidance material (including duty statement, expectations and skills required).

5.6 Laser Pointers

All laser points are weapons under Australian Law. Legislation of laser pointers differs between states and territories. Current labelling is unreliable. All universities are grappling with similar issues relation to laser pointers.
Action: DK and SG to send out information that highlights areas of interest.

5.7 Infrastructure funding announced

New equipment reported and an increase in knowledge of what is being purchased. New nuclear medicine spectrometer increases the magnetic fields again – installation expected at Bio21 in mid-2014. MBC has acquired an MRI (7 tesla) machine which is at the higher end of magnetic spectrum.

Action: No action required.

5.8 Procurement

Business Improvement Plan (BIP) has released its interim report. A number of items refer to procurement, which could in turn affect purchasing. BIP plans to form three central procurement hubs to cover all purchasing by the University. This streamlining of purchasing could make tracking easier.

Action: No action required.

Meeting closed at 2.10pm

ERSC Meeting Scheduled for 2014

Wednesday 5th March
Wednesday 4th June
Wednesday 3rd September
Wednesday 3rd December

Distribution List:

Electromagnetic Radiation Committee Members: David Chan, David Keizer, Ian Bouch, Ira Tedja, Jill Williams, Julie McNiece, Malka Halgamuge, Matthew Bennett, Petronella Nel, Sam Montalto, Steve Guggenheimer, Susan Butler.

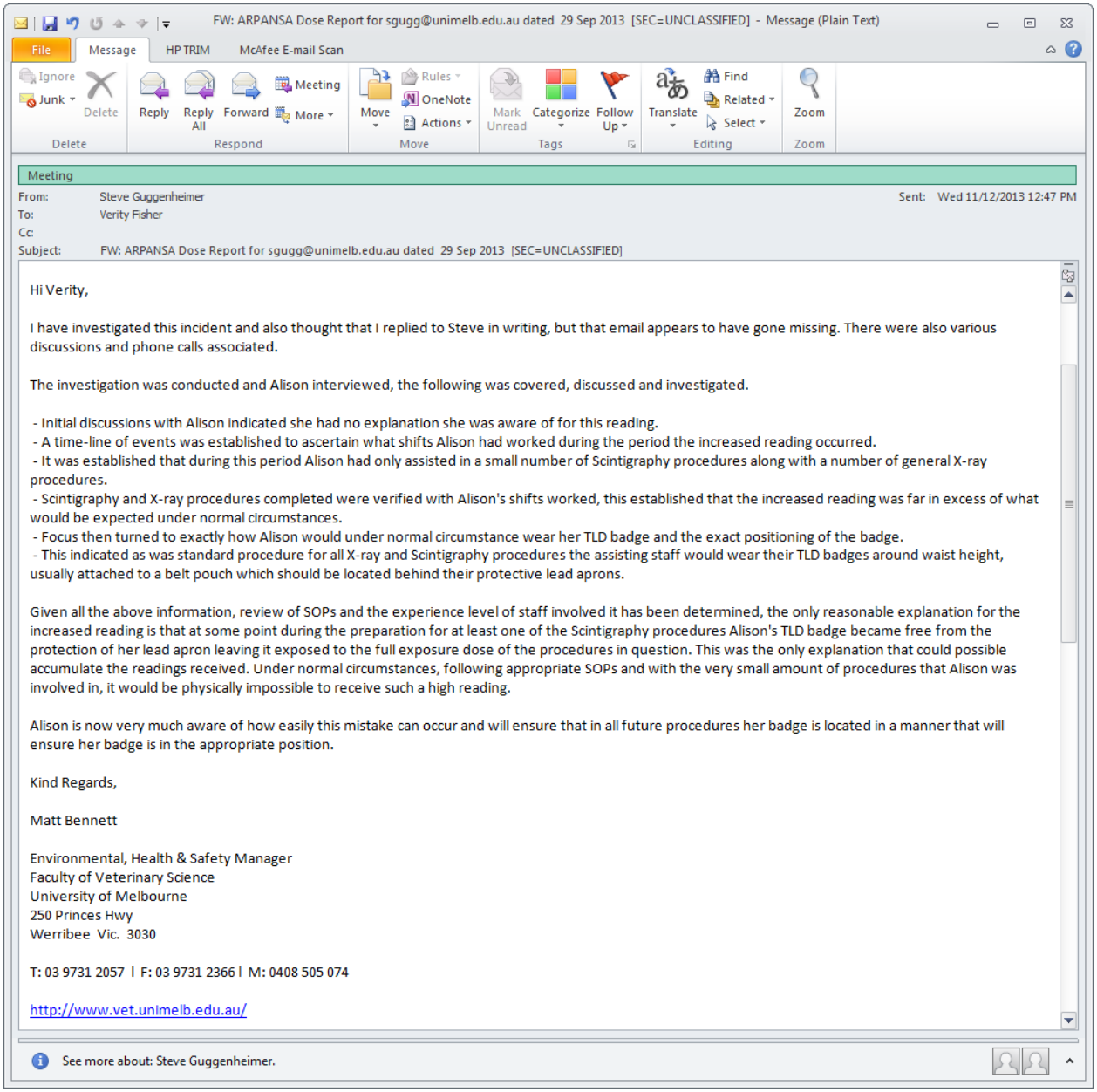
Minute Secretary: Verity Fisher

Director, Occupational Health & Safety and Injury Management: Stefan Delaney

Attendance Record 2013:

Member	Attendance
David Chan	4/4
David Keizer	3/4
Ian Bouch	4/4
Ira Tedja	3/4
Jill Williams	3/4
Julie McNiece	2/4
Matthew Bennett	4/4
Petronella Nel	3/4
Sam Montalto	4/4
Steve Guggenheimer	3/4
Susan Butler	4/4

Attachment 1:



FW: ARPANSA Dose Report for sgugg@unimelb.edu.au dated 29 Sep 2013 [SEC=UNCLASSIFIED] - Message (Plain Text)

File | Message | HP TRIM | McAfee E-mail Scan

Ignore | Junk | Delete | Reply | Reply All | Forward | Meeting | More | Move | Rules | OneNote | Actions | Mark Unread | Categorize | Follow Up | Translate | Find | Related | Select | Zoom

Delete | Respond | Move | Tags | Editing | Zoom

Meeting

From: Steve Guggenheimer
To: Verity Fisher
Cc:
Subject: FW: ARPANSA Dose Report for sgugg@unimelb.edu.au dated 29 Sep 2013 [SEC=UNCLASSIFIED]

Sent: Wed 11/12/2013 12:47 PM

Hi Verity,

I have investigated this incident and also thought that I replied to Steve in writing, but that email appears to have gone missing. There were also various discussions and phone calls associated.

The investigation was conducted and Alison interviewed, the following was covered, discussed and investigated.

- Initial discussions with Alison indicated she had no explanation she was aware of for this reading.
- A time-line of events was established to ascertain what shifts Alison had worked during the period the increased reading occurred.
- It was established that during this period Alison had only assisted in a small number of Scintigraphy procedures along with a number of general X-ray procedures.
- Scintigraphy and X-ray procedures completed were verified with Alison's shifts worked, this established that the increased reading was far in excess of what would be expected under normal circumstances.
- Focus then turned to exactly how Alison would under normal circumstance wear her TLD badge and the exact positioning of the badge.
- This indicated as was standard procedure for all X-ray and Scintigraphy procedures the assisting staff would wear their TLD badges around waist height, usually attached to a belt pouch which should be located behind their protective lead aprons.

Given all the above information, review of SOPs and the experience level of staff involved it has been determined, the only reasonable explanation for the increased reading is that at some point during the preparation for at least one of the Scintigraphy procedures Alison's TLD badge became free from the protection of her lead apron leaving it exposed to the full exposure dose of the procedures in question. This was the only explanation that could possible accumulate the readings received. Under normal circumstances, following appropriate SOPs and with the very small amount of procedures that Alison was involved in, it would be physically impossible to receive such a high reading.

Alison is now very much aware of how easily this mistake can occur and will ensure that in all future procedures her badge is located in a manner that will ensure her badge is in the appropriate position.

Kind Regards,

Matt Bennett

Environmental, Health & Safety Manager
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http://www.vet.unimelb.edu.au/

See more about: Steve Guggenheimer.

Attachment 2:

Potential OHS issues associated with 3D Printers

Introduction:

The first 3D Printers[i] were developed in the mid-1980s as a means to fabricate designs and are seen as an evolution from the computer-aided design/computer-aided manufacturing (CAD/CAM) of the 1970s,
A number of University Faculties use these devices as teaching tools in both undergraduate and post graduate areas. The low cost and ability to be integrated into existing system makes them an attractive addition to various laboratories.

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Types of 3D Printing Methods[ii]

Stereolithography (SLA)

A SLA printer works by concentrating a beam of ultraviolet light focused onto the surface of a vat filled with liquid photocurable resin. The UV laser beam draws out the 3D model one thin layer at a time, hardening that "slice" of the eventual 3D model as the light hits the resin. Slice after slice is created, with each one bonded to the other, and next thing you know you have a full, extremely high-resolution three dimensional model lifted out of the vat.

Electron Beam Melting (EBM)

An electron beam instead of a UV laser as in a SLA.

Fused Deposition Modeling (FDM) or Fused Filament Fabrication" (FFF)

These printers extrude a stream of melted thermoplastic material to form layers. Each layer stacks on top of and fuses with the previous layer as the material hardens almost immediately after leaving the extrusion nozzle. Most FDM printers print with ABS plastic or, PLA (Polylactic acid),

Selective Laser Sintering (SLS)

Uses powdered materials, such as polystyrene, ceramics, glass, nylon, and metals including steel, titanium, aluminium, and silver. When the laser hits the powder, the powder is fused at that point. All unfused powder remains as is, and becomes a support structure for the object. The lack of necessity for any support structure with SLS is an advantage over FDM/FFF and SLA — there's none to remove after the model is complete, and no extra waste was created.

PolyJet photopolymer

Is much like an inkjet printer deposits ink, a photopolymer liquid is precisely jetted out and then hardened with a UV light. The layers are stacked successively. The technology allows for various materials and colours to be incorporated into single prints, and at high resolutions.

Syringe Extrusion

Almost any material that has a creamy viscosity can be used. This includes materials like clay, cement, silicone, and Play-Doh. Including foods like chocolate etc.

Laminated Object Manufacturing (LOM),

Layers of adhesive-coated paper, plastic, or metal laminates are successively glued together and cut to shape with a knife or laser cutter.

Potential OHS Issues Associated With This Type Of Plant:

As with all new innovations there needs to be careful consideration of potential issues prior to purchase of these devices. Depending on the printing method various aspects need to be considered.

Controlling The Risks:

Most printers use heat to melt chemicals to a paste or liquid for building the model.

- This type of process will lead to ultrafine particle emissions from the printers[iii] including vapours and fumes. Therefore the printer should be positioned in an environment with appropriate ventilation.
- As chemicals are used to produce "the product" operators need to know the properties of the chemical at work in the printer (in some cases when heated) and the effect they may have on the environment. MSDSs or SDSs should be consulted and appropriate safeguards put in place.
- Printers that use a Laser to heat or melt materials are considered "Laser Plant". The laser doing the work will be a class 3B or 4 lasers and hence the "plant" needs to be registered on the faculty's laser inventory.

Steve Guggenheimer
Radiation Safety Advisor,
OHS Consultant and Occ Hygienist.
Health Safety and Injury Management Department
The University of Melbourne

Attachment 3:

OHS issues associated with Class 4 laser cutters

A Brief History:

High power lasers have been used in scientific disciplines for a number of decades however; lasers of the same power and energy levels are now being used in the broader university environment. In 2010 The University's EHS Office (presently, Health Safety and Injury Management Department) was aware of one laser cutter being used in a facility for general student work. In 2013 the number has grown to at least six, with their power levels increasing as the technology becomes more common. Unfortunately for The University, dealing with the OHS issues has become a matter of catch-up, given the increasing hazards and levels of risk, The University collectively needs to take into account the growing risk to both people and infrastructure.

OHS Issues Associated With This Type Of Plant:

- The general lack of regulatory governance by either Worksafe or The Department of Health
- Under RDMI, there is no requirement for central oversight in the purchasing or the plant's application.
- There are no regulatory training requirements for the operator – licence or certificate of competency.
- Potential harmful emissions - depending on the material being cut or burnt the fly-ash and fumes could contain any amount of harmful substances – At present no monitoring of the workplace environment is being undertaken.

Based On Our Present Knowledge High Powered Laser Cutters Are Being Used In:

- Veterinary Science – where diode laser used in large animal surgery, there is the potential for both surgeon and theatre staff if appropriate safeguards are not implemented.
- Engineering – Lasers used for cutting materials including steels, MDF, Plastics, Aluminium and other nonferrous materials. At present the laser operation is conducted by staff only and although the plant is ventilated. Monitoring of the environment is not undertaken.
- Architecture, Building and Planning - Lasers are again used for cutting materials including MDF, Cardboard, Plastics and other nonferrous materials.

Controlling The Risks:

At present the OHS and Injury Management Department is unable to monitor Laser plant being brought on to University campuses, as there is no central oversight requirements within the various faculty structures. Likewise the regulatory authority (Dept of Health) does not see the need to regulate purchasing or competencies of this type of plant (even though the Commonwealth and State governments regulate or ban lasers with outputs 5 orders of magnitude below the output of these units!).

Centrally there are two avenues were the risks from this type of plant can be mitigated:

- Laboratory certification requirements for laboratories which house plant that emits hazardous electromagnetic radiation. This process is conducted via the **Electromagnetic Radiation Safety Committee**.
- The second is monitoring of the hazardous emissions, fly-ash and fumes that are generated in the laser cutting process.

Monitoring Of Hazardous Fly-Ash And Fumes:

From a brief literature survey* there appear to be three potential airborne hazards associated with laser cutting of common materials (metals, cardboard, timbers and plastics).

They are:

Release of formaldehyde[iv] present in

Paper products — formaldehyde is used to improve the water resistance, grease resistance, shrink resistance and other characteristics of paper and building materials — urea-formaldehyde glue or adhesive is used in pressed wood products such as particle board, plywood and MDF

Formaldehyde is released in the fly-ash from burning wood, coal, charcoal etc

Release of Dioxin[v] (PCDD/F's dioxins)

Most dioxins are formed from the carbon in fly ash during cooling of the off-gases

Release of Isocyanates[vi] (-NCO)**:**

Released during the thermal degradation of polyurethane products

isocyanates include painting, foam-blowing, and the manufacture Polyurethane products,

Monitoring Recommendations:

Due Diligence and Duty of Care are required in all work environments. It is essential for The University to confirm that the emissions from this type of plant are controlled and staff and students are not exposed to harmful or hazardous materials.

It is recommended that a “limited” monitoring of “identified plant” be undertaken. The monitoring would initially involve taking a extract from the filters associated with the plant, analysing the contents and then determining what was present in the filters and if this required, general monitoring of work environment. Cost of this type of monitoring would be a few thousand dollars and would involve the use of the Department of Chemistry’s gas chromatography and mass spectrometer. Timelines for this type of analysis is approximately a month or two.

Steve Guggenheimer
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[i] **3D printer, designed by Charles W. (Chuck) Hull of 3D Systems Corp**

[ii] http://www.3dprinter.net/reference/what-is-3d-printing

[iii] http://www.sciencedirect.com/science/article/pii/S1352231013005086

[iv] http://dermnetnz.org/dermatitis/formaldehyde-allergy.html

[v] (H. Huang and A. Buekens, Department of Chemical Engineering and Industrial Chemistry, Free University of Brussels, Belgium)

[vi] https://www.osha.gov/SLTC/isocyanates/