Natural background radiation does not just arise from outer space (cosmic radiation), it also comes from the ground, from building materials such as concrete, from the food we eat and the air we breathe. Each of us is exposed to natural background radiation every day of our lives. In the UK radon gas seeping from the ground and accumulating in houses contributes approximately 52% of the dose received from background radiation. A medical X-ray gives a small additional dose above the natural background. This additional amount varies with the type of X-ray. The radiation doses used for X-ray examinations are many thousands of times too low to produce immediate harmful effects, such as skin burns or radiation sickness. The only effect on the patient that is known to be possible at these low doses is a very slight increase in the chance of cancer occurring many years or even decades after the exposure. An X-ray of chest, teeth or limbs is equivalent to a few days of natural background radiation and has less than 1 in 1 million chance of inducing cancer whereas a CT scan is equivalent to a few years of natural background radiation and has less than 1 in 1 thousand chance of inducing cancer. As we all have a 1 in 3 chance of getting cancer even if we never have an X-ray, these risk levels represent very small additions to the underlying risk of getting cancer.

The benefits from any X-ray examination should usually outweigh the small risk from additional radiation. It should be remembered that the higher dose examinations are normally used to diagnose more serious conditions when a greater benefit to the patient is to be expected. Everything we do in our daily lives carries some level of risk but we tend to regard activities as being “safe” when the risk of accident or injury falls below a certain level. The lower the level of risk, the safer we regard the activity so, for example, most people would regard activities involving a risk of below 1 in 1,000,000 as exceedingly safe.

ADDITIONAL RISK OF DEVELOPING A CANCER

NEGLIGIBLE RISK Chest, Teeth, Arms and legs, Hands and feet

Less than 1 in 1,000,000

MINIMAL RISK Skull, Head, Neck

1 in 1,000,000 to 1 in 100,000

VERY LOW RISK Breast [mammography], Hip, Spine, Abdomen, Pelvis, CT scan of head

1 in 100,000 to 1 in 10,000

LOW RISK Kidneys and bladder [IVU], Stomach – barium meal, Colon – barium enema, CT scan

1 in 10,000 to 1 in 1,000

A leaflet is available at http://www.liv.ac.uk/radiation/pdf/X_ray_Safety.pdf
Many Liquid Scintillation Counting Units and Gas Chromatographs contain a small sealed radioactive source. Whilst these sources are not inherently dangerous whilst housed within the equipment, the sources must not be disposed of as scrap when the equipment reaches the end of its useful life. The source must either be returned to the manufacturer with the equipment for disposal, in which case the manufacturer becomes responsible for its security, or the source must be removed for alternative authorised disposal prior to scrapping the shell of the equipment. Radiation Protection Office can assist in this process and will undertake to remove and store the source upon request.

**SEALSED SOURCES WITHIN COUNTING UNITS**

Many Liquid Scintillation Counting Units and Gas Chromatographs contain a small sealed radioactive source. Whilst these sources are not inherently dangerous whilst housed within the equipment, the sources must not be disposed of as scrap when the equipment reaches the end of its useful life. The source must either be returned to the manufacturer with the equipment for disposal, in which case the manufacturer becomes responsible for its security, or the source must be removed for alternative authorised disposal prior to scrapping the shell of the equipment. Radiation Protection Office can assist in this process and will undertake to remove and store the source upon request.

Even scatter radiation from the 'patient' can create a significant dose within 2 metres and the scatter dose can be reduced by the use of lead aprons or lead screens. Please note that aprons and some mobile screens will not shield operator from the primary beam.

Each area in which X-ray generators are used must have Local Rules. These must be noted and observed by all persons entering the x-ray area or using an x-ray generator.

Further information on the safety of individual X-ray generators is available by consultation with Radiation Protection Office.

**REDUNDANT OR USED LEAD POTS**

We have realised for some time that the suppliers of radioisotopes no longer accept the plastic and lead transport pots back for reuse. These pots have subsequently been stockpiling in departments with no prospective disposal or recycling route in mind.

The plastic pots can be checked for contamination then have any radioactive markings defaced after which they may be disposed of as ordinary plastic waste.

Obviously items containing lead may not merely be ‘dumped’ into the nearest waste bin. However RPO are now developing a plan by which the RPO will collect the pots containing lead and will dispose of them for recycling. Please let us know if this facility will be useful to you.
SUMMARY OF INSPECTION ON 3rd JULY 2009

SIGNS

All signs containing trefoil only are to be replaced by BS sign incorporating trefoil within black triangle.

All signs on doors and stores no longer in use are to be removed. DRS should arrange for surplus signage to be removed.

Radiation Protection Office have some templates for new signage. Templates will be circulated and/or signs produced by RPO. Assistance will be given to Departments.

DESIGNATION OF RADIATION AREAS

Rather than attempting to designate areas within a lab separately the Inspectors would rather see the whole lab designated as a Supervised Radiation Area, albeit with working area marked with tape as at present. Accordingly steps should be taken during replacing signage to label doors to labs appropriately.

PAPERWORK

The Inspectors felt that paperwork relevant to a lab should be kept together in a central file in the lab and the location of the file be made clear to all users. The paperwork should include Local Rules, copies of the Environment Agency Registration and Authorisation Risk Assessments, etc.

The Local Rules etc should be clearly marked with a version number to clearly indicate that they are the current version (in a couple of labs inspected they noted that there were two versions of Local Rules set out).

RADIATION PROTECTION SUPERVISORS

The HSE pointed out that they do not recognise the post of Deputy Radiation Supervisor.

It is likely that the appointments of Departmental Radiation Supervisors and their Deputies as they exist at present will have to be reviewed and titles renamed.

Many departments currently appoint deputies for a lab or group of labs. It is likely to be recommended that they be appointed Radiation Protection Supervisors and that a Departmental Radiation Coordinator be appointed to oversee them. In effect this is merely a change of titles in most cases but it should be recorded in the Local Rules.

INSPECTORS’ REPORTS

The three Inspectors will be collating their Reports into one and we await that Report.

We will advise departments if there is any further action to be taken once we receive it

Please send any comments on the work of Radiation Protection Office to rad.pro@liv.ac.uk
FLOOD IN OLIVER LODGE BASEMENT

Most of you will be aware by now that there was a major flood in the basement of the Oliver Lodge Building over the weekend of May 2nd to 4th. This resulted in a radiation store being immersed in approximately 1.2m of water.

Fortunately, after donning diving suits and wading through a depth of half a metre of oily smelly water in darkness illuminated only by two Fire and Rescue Authority torches, the RPA and his assistant were able to verify that there had been no release of radioactive material on this occasion.

Subsequently HSE Inspector issued a Prohibition Notice requiring that all radioactive material be removed from the basement store and moved to a secure store elsewhere within 10 working days despite access being prohibited due to the presence of asbestos.

A new storage area was prepared by Facilities Management staff to receive the material.

Then, despite the hazards from asbestos, 'Batman' and 'Robin' fearlessly ventured into the oily depths to remove all radioactive materials in accordance with the Notice.

In all approximately 150 radioactive sources (including orphaned materials and historical items) were shifted in extremely slippery conditions. "Radiation Protection On Ice" is a new reality TV show that we are now proposing to Simon Cowell !.

Also moved was a tonne of lead bricks. All transfer was done without the assistance of a lift as the hydraulic power system for the goods lift had been rendered inoperative due to the flood.

The material is now safely housed in a secure storage area and HSE, EA and CTSA have expressed their satisfaction.

What are these and for what were they used? 
All will be revealed in our next edition

Please send any comments on the work of Radiation Protection Office to rad.pro@liv.ac.uk