NEWS AND INFORMATION

Perceptions of the health impact of Chernobyl
UNSCEAR turns fifty
Committee on Radioactive Waste Management needs stronger scientific input
CoRWM completes technical assessment of nuclear waste options
Power frequency EMFs, melatonin and the risk of breast cancer
New reports on the HPA web-site

To cite this article: 2006 J. Radiol. Prot. 26 111

View the article online for updates and enhancements.

Related content
- The social responsibilities of the scientist
  L R G Treloar
- Diagnosis of CNC machine tools in terms of circular interpolation's accuracy figure
  R M Khusainov, S F Belov and O V Chukhontseva
- Rehabilitation of the former nuclear test sites in Australia. Report by the Technical Assessment Group
  H Smith
News and information

Perceptions of the health impact of Chernobyl

I write a weekly science column in The Irish Times. My column on 1st December 2005 summarised the main health implications of the Chernobyl accident as reported in the Chernobyl Forum report, ‘Chernobyl’s Legacy: Health, Environmental and Socio-economic Impacts and Recommendations to the Governments of Belarus, the Russian Federation and Ukraine’ (September 2005). The reaction to my column was illustrative of how public opinion is formed in this area.

I explained the expert and comprehensive nature of the Chernobyl Forum investigations and summarised the local health effects of exposure to Chernobyl radiation. Fifty-six deaths have been directly attributed to the accident to-date. This figure comprises 47 emergency workers, most of whom died early on from acute radiation syndrome, and 9 deaths among about 4,000 children who developed thyroid cancer after drinking milk contaminated with radioactive iodine. Over 99 per cent of these thyroid cancer cases were successfully treated.

About 1,000 on-site reactor staff and emergency workers were exposed to high levels of radiation on the day of the accident and over 200,000 emergency and recovery operation workers were exposed during 1986–1987. About 2,200 radiation-caused deaths can be expected over the lifetime of these people. This figure rises to 4,000 when residents (270,000) of the most contaminated local areas and evacuees (116,000) are taken into account. These figures qualify Chernobyl as a serious accident, but not a disaster.

Most people living in contaminated areas received relatively low whole-body doses, comparable to natural background levels of radiation. No evidence of decreased fertility among the affected population has been found. There is no evidence of radiation effects on number of stillbirths, delivery complications or overall health of babies. A modest increase in reported congenital malformations in both contaminated and uncontaminated areas of Belarus appears to be related to better reporting and not to radiation.

This picture of the impact of the Chernobyl accident is considerably more benign than the popular worldwide and local perception. Confusion over the impact of the accident arises because thousands of people in the affected areas have since died of natural causes unrelated to radiation, but a widespread expectation of ill-health and a tendency to attribute all ill-health problems to radiation have led local residents, and many observers from afar, to assume that Chernobyl related fatalities were much higher than they were in reality.

The report concludes that the largest public health problem resulting from the accident is ‘the mental health impact’. Residents in the region, who were victims of a tragedy they poorly understand, continue to suffer grave anxiety and this has prevented them from restarting their lives. This ‘paralysing fatalism’ has led to an increase in drug and alcohol use, unprotected sex

Items for inclusion in this section are welcomed and should be sent to the Deputy Editor, Jim Gray, at the address given at the front of this issue.
and unemployment. The report recommends that a first priority now should be to encourage these people to normalise their lives by providing them with realistic information about the minimal risks they face.

However the report acknowledges that up to 200,000 people continue to be severely affected by the disaster in a very real way. These include poor people who live in the few severely contaminated areas, people with thyroid cancer and people resettled after the accident who never found a new home or employment in their new communities. These people ‘need substantial material assistance to rebuild their lives’.

Soon after my December 1st column, letters appeared in The Irish Times from voluntary charitable groups that provide assistance to children from Chernobyl, accusing me of playing down the impact of the Chernobyl accident, citing personal impressions of greatly increased incidence of cancers and congenital deformities around Chernobyl since the accident, drawing attention to the 21,000 deaths amongst the 200,000 Chernobyl liquidators since 1986, and hinting that the IAEA had manipulated the Forum report to minimise the perceived consequences.

But, what impressed me even more was the verbal reaction I received personally. I spoke to many people, with varied backgrounds, who read my article on the Chernobyl Report—accountants, civil engineers, bankers, social workers, technicians and scientists familiar with radiation. With the exception of the latter group, nobody believed the Chernobyl Report. People assume, informed by ongoing media releases from amateur voluntary anti-nuclear groups, that radiation from Chernobyl has caused hundreds of thousands of deaths and they interpret the report as a ‘whitewash’ on behalf of the nuclear industry. It is not unlikely that my personal ‘opinion poll’ results would be replicated in a nationwide survey of public opinion.

Alarmed by the fact that amateur opinion in the specialised area of health and radiation would take such strong precedence in the public mind over the considered study of hundreds of scientists, I wrote another column on Chernobyl on January 19th making the following points. If the amateur voluntary groups are right and the Chernobyl Report has been deliberately distorted, the integrity of science has been destroyed. But, of course, the integrity of science is intact. Few harmful agents are as well understood scientifically as radiation. The Chernobyl Report authoritatively confirms that the health effects of Chernobyl are far less than originally feared. Is this not good news, I asked in my January 19th column? Should this not encourage the people of Chernobyl to face the future with hope and optimism? Who does it serve to encourage people to believe they are seriously radiation-damaged, when in fact they are not? I also pointed out that the 21,000 deaths amongst the liquidators since 1986 are attributable to natural causes and would have occurred had the Chernobyl accident never happened.

I went on to say that economic and social help to the people of Chernobyl is of limited use when so many people believe their health is irreparably damaged. Telling the truth would lift this awful gloom.

Since my column of January 19th, 2006, and since several strong letters appeared in The Irish Times in support of the Chernobyl Forum from people knowledgeable about radiation and its effects, particularly a letter from Burton G Bennett, Chairman of The Chernobyl Forum on January 16th, 2006, public reaction here has become much more positive towards the Forum Report.

I think the lesson here is that good science in controversial areas, when contradicted by self-appointed amateur groups, can win the public mind, but only if the scientific results are patiently and vigorously re-presented as often as necessary.

William J Reville
University College Cork, Ireland
**UNSCEAR turns fifty**

Over fifty years ago, purportedly with the intention to deflect a proposal calling for an immediate end to all nuclear explosions, it was proposed to the General Assembly of the United Nations that it establish a Committee to collect and evaluate information on the levels and effects of ionising radiation. Subsequently on 3 December 1955 the General Assembly unanimously approved resolution 913(X), which established the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR). The original Committee was composed of senior scientists from 15 designated UN Member States, namely Argentina, Australia, Belgium, Brazil, Canada, Czechoslovakia, Egypt, France, India, Japan, Mexico, Sweden, the UK, the USA and the USSR.

UN Secretary General Dag Hammarskjöld appointed Dr Ray Appleyard of Canada as Secretary of the Committee, whose first session was held from 14 to 23 March 1956 in New York. The first two substantive reports submitted to the General Assembly, in 1958 and 1962, presented comprehensive evaluations of the state of knowledge about the levels of ionising radiation to which human beings were exposed and of the possible effects of such exposures. Those reports laid the scientific grounds on which the Partial Test Ban Treaty on the prohibition of nuclear weapon testing in the atmosphere was negotiated and signed in 1963.

Over the decades that followed this important first achievement, UNSCEAR became the official international authority on the levels and effects of ionising radiation, used for peaceful as well as military purposes and derived from natural as well as man-made sources. In the first UNSCEAR report of 1955 it had been recognised that medical diagnostic and therapeutic exposures were a major component of artificial radiation exposure globally, a fact that remains true today. The Committee has systematically reviewed and evaluated global and regional levels and trends of medical exposure, as well as exposure of the public and workers. These reviews continue to influence the programmes of international bodies such as the IAEA, ILO, WHO and ICRP.

The Committee has regularly evaluated the evidence for radiation-induced health effects from studies of the survivors of the atomic bombings in Japan in 1945 and other exposed groups. It has also reviewed advances in scientific understanding of the mechanisms by which radiation-induced health effects can occur. These assessments have provided the scientific foundation used by the ICRP in developing its recommendations on radiation protection and by the relevant agencies in the UN system in formulating international protection standards.

In 1973, the General Assembly invited a further five UN Member States to participate in the Committee, namely Germany, Indonesia, Peru, Poland and Sudan; China was invited in 1986. In 1974, the UNSCEAR Secretariat moved from New York to Vienna and was functionally linked with the United Nations Environment Programme (UNEP). The Chernobyl accident in 1986 was a tragic event for its victims and there has been major hardship for those most affected. From early on, UNSCEAR was involved in the assessment of radiation exposures and health effects. In 1988 it published a first account of acute radiation effects in emergency workers and of the global exposures. A more detailed assessment of radiation levels and effects from the accident was published in 2000. More recently the Committee has participated in the Chernobyl Forum, whose important mission covered many aspects of the accident, including the review of radiation health effects. The Committee will surely continue its work to provide the scientific basis for better understanding of the radiation health effects.

In the last decade, attention has been focused on the radiological legacy of the cold war, with assessments of the radioactive residues from weapons production and testing, and hereditary effects of radiation. The last major reports of UNSCEAR were issued in 2000 and 2001. More recently, occupational exposure from work with naturally occurring radioactive
material and exposure to radon have been receiving attention. Biological effects after low
doses of radiation and effects on non-human species are topics of interest.

UNSCEAR’s programme of work envisages issuing in the coming year authoritative
reviews of information on: the risks from radon; epidemiological studies of radiation and
its cancer and non-cancer effects; and cellular responses to radiation exposure. Reviews are
being prepared for consideration by the Committee in 2007 on medical, public and occupational
exposures; health effects of the Chernobyl accident; effects on the immune system; and effects
on non-human biota. There will also be a summary report to the General Assembly.

Since its inception, UNSCEAR has issued only 15 major publications, but these
authoritative reports are principal sources of information. Year after year, the General
Assembly has expressed its appreciation of the Committee’s functions and deliberations. With
the Russian Federation and Slovakia superseding the USSR and Czechoslovakia in the 1990s,
21 countries provide the present membership of the Committee, working on behalf of the
United Nations. More than 50 national organisations and several international organisations
provide considerable contributions in kind. The small Secretariat in Vienna organises and
services the annual sessions and manages the preparation of documents for the Committee’s
scrutiny.

It is a tribute to those who drafted the original mandate of UNSCEAR that it has remained
essentially unchanged. The mandate does not include protection related matters, these being
the prerogative of other international bodies. This helps to distinguish the Committee’s
responsibility for scientific matters from issues relating to policy development. In this regard
UNSCEAR prides itself on its independence and scientific objectivity.

The current Chairman of UNSCEAR is Dr Yasuhito Sasaki of Japan. As part of
the activities to mark the 50th anniversary, Japan has sponsored efforts to make available
electronically all 15 UNSCEAR publications, which can be downloaded from the new web-
site (www.unscear.org). The 54th session of UNSCEAR will be held at the Vienna International
Centre from 29 May to 2 June 2006, chaired by Peter Burns of Australia. The Mayor of Vienna
is to host a commemorative reception for high-level dignitaries, diplomats and scientists.

After 50 years, it is a time for reflection. Much has changed—with the end of the cold
war and the information technology revolution, the role of the Committee as the principal
focal point for international information exchange has diminished. However, with the flood
of information now available comes the vital need to review and synthesize it, and to build a
scientific consensus for use by policy makers, decision makers and other stakeholders. With
important decisions concerning new medical uses of radiation, environmental restoration, waste
disposal and the nuclear power option, the role of the Committee in providing authoritative
scientific information continues to be central and will be crucial in the future.

Malcolm Crick
Secretary, UNSCEAR,
Vienna International Centre,
A-1400 Vienna, Austria

Committee on Radioactive Waste Management needs stronger scientific
input

It is vital that the Committee on Radioactive Waste Management (CoRWM) obtains stronger
scientific input as it moves into the final stages of its work in reviewing options for managing
the UK’s radioactive waste says a report published (9 January 2006) by the Royal Society, the
UK national academy of science.
The Royal Society report, ‘The long-term management of radioactive waste: the work of the Committee on Radioactive Waste Management’, recommends that scientific and technical organisations should be involved with the exercise to assess the ‘weight’ that should be given to different criteria being applied to CoRWM’s short list of options for the disposal of radioactive waste.

As part of CoRWM’s final phase, before it reports its findings to the Government in July 2006, citizens’ panels will assess the relative importance of various criteria such as public safety up to, and beyond, 300 years, worker safety, security, environmental safety and social and economic costs in relation to individual disposal options.

Professor Geoffrey Boulton, coordinator of the Royal Society report and independent member of the CoRWM Quality Assurance Group, said: ‘CoRWM has vital role to play in pointing a way forward for the serious and urgent issue of disposal of nuclear waste, and it is the Royal Society’s intention to offer constructive advice to aid this important task.

‘We are concerned that the hitherto relatively limited engagement with the scientific and engineering communities, apart from in small specialist groups, might result in a negative response to the final CoRWM proposals. We suggest the Committee seeks to avoid this by engaging now with the scientific and engineering learned societies to complement the public engagement work of CoRWM.

‘We support the crucial importance of the public consultation and engagement processes that are being managed by CoRWM. It is important that when CoRWM reports, it is credibly able to claim broad public support for the preferred options. Without this, the CoRWM process will have been yet another ineffectual stage in the history of the UK’s failure to develop policy for this vital issue.’

The report says that, ‘CoRWM will need to consider providing recommendations based upon one or more combinations of its options as alternative, integrated strategies not just a simple choice of one option or another,’ and ‘that are flexible enough to respond to changing circumstances over many decades.’ Experience from all international radioactive waste management programmes shows that an integrated strategy covering all wastes requires elements of each option at different stages of a programme’s life. This is particularly important for the UK, which has such a wide range of wastes to deal with. Moreover, international experience shows that such a strategy may take decades to develop and implement. And this will require stronger involvement of the science and technology community.

The Royal Society report also suggests that DEFRA should put in place an independent successor to CoRWM because the time scale for a final report in July 2006 is far too short to move from a series of discrete, favoured options to an integrated strategy based on those options. Such a body will need much greater scientific and technical capacity than CoRWM since accessing the knowledge of the science community and developing a consensus within it will be important in establishing a credible strategy. This body should maintain the CoRWM processes of societal and stakeholder engagement to ensure that emerging strategies and implementation processes are able to command broad public support. This will be particularly important as the process of site selection gets under way, when local communities in potential site areas will want to know about the longer term strategy in which their area is to play a part.

CoRWM completes technical assessment of nuclear waste options

Scientists and technical experts who have been advising the Committee on Radioactive Waste Management (CoRWM) have now completed their assessment of the various options short listed by the Committee. CoRWM is now inviting stakeholders to comment on their findings,
marking a major milestone in CoRWM’s work towards recommending a strategy for the long
term management of the UK’s radioactive waste.

Nearly 200 experts have been involved in advising CoRWM on various technical issues
associated with the short listed options, such as long-term interim storage (both local and
central) and deep geological disposal (including phased disposal). They have assessed how
each option performs against 11 headline criteria (and 27 sub-criteria) in a series of seven
workshops. The criteria include the impact on the environment, safety, security, cost, feasibility
and the burden on future generations. Panels of between five and ten experts have undertaken
each assessment.

The judgements provided by the specialists will now be examined by CoRWM and taken
forward to the next phase of its consultation with stakeholders. In addition, the views of the
public and stakeholders will be used to determine which of the criteria (used by the specialists)
are most important. This will help CoRWM to ‘weight’ each criteria.

The final stage of the process will be where CoRWM deliberates over the findings from
this process and a more holistic assessment before producing a final report in July 2006.

The experts found that most of the different waste streams (such as intermediate level
waste, or spent fuel) performed the same or very similarly across most of the different criteria.
They also found that none of the options performed consistently high or low against all the sub
criteria.

Gordon MacKerron, Chair of CoRWM said: ‘Ensuring that the options are rigorously
assessed by scientists, engineers, economists and other technical experts is a very important
part of our process. We have used some of the leading experts in their field to advise us.
However, this is not the end of the process. We now need to use this information in conjunction
with the views of the public and stakeholders on the importance of the different assessment
criteria.

‘We will take these views into account when we decide on the weighting to give to the
different criteria. It is important for us to understand public and stakeholder views on which of
the criteria should be weighted most strongly.’ For more information see: www.corwm.org.uk.

The four options:

- Interim storage is not permanent storage. It is a temporary management solution, though
  it could last for many decades or even centuries. Waste could be stored above the ground
  or just below the surface.
- Deep geological disposal is the process of permanently putting the waste at between 300 m
  and 2 km underground in an area of suitable geology where the rocks act as the protective
  chamber.
- Phased deep geological disposal is the same process as deep disposal except the waste
  will be monitored and retrievable for a period of up to several hundred years.
- Near surface disposal of reactor decommissioning wastes—waste with short-lived
  radioactivity is buried just below the surface within engineered barriers.

Power frequency EMFs, melatonin and the risk of breast cancer

The independent Advisory Group on Non-Ionising Radiation (AGNIR) recently published a
report¹ that examines whether electromagnetic fields (EMFs) associated with the supply and

¹ Power Frequency Electromagnetic Fields, Melatonin and the Risk of Breast Cancer Documents of the Health Protection
use of electricity can influence the risk of breast cancer. Following a thorough review of the published scientific literature, the report concludes that overall the evidence does not support the hypothesis that exposure to EMFs is associated with an increased risk of breast cancer. In addition, EMFs do not appear to affect the production or biological action of the hormone melatonin.

People are exposed to EMFs wherever electricity is supplied or used, both in the home and at work. Common sources of exposure include overhead power lines, electrical wiring and domestic appliances. The suggestion that exposure to EMFs may increase the risk of breast cancer, via a reduction in production of the hormone melatonin, was first made almost 20 years ago and has generated much research. Melatonin is produced mainly during the night as a secretion from the pineal gland in the brain, and it has many effects concerned with the timing of biological functions within the body.

The Advisory Group report considers whether exposure to EMFs can influence melatonin, and concludes that there is no consistent or convincing evidence to indicate that EMFs can affect the production or action of melatonin. However, the report acknowledges that there are some deficiencies in the existing research, particularly with regard to assessing the effects of long-term exposure to EMFs, which leave open the possibility of an effect.

The report also considers whether melatonin can affect the risk of breast cancer, and concludes that although there is evidence that melatonin can inhibit the growth of cancers in laboratory tests using animals and cell cultures, the situation in humans is unclear. The few studies that have investigated if melatonin levels are different in women who later develop breast cancer were considered to be inconclusive.

In addition, the report considers studies investigating the effect of light exposure (which affects levels of melatonin) on the risk of breast cancer. There is some evidence, but not conclusive, that the risk of breast cancer in shift workers and airline cabin staff is increased and that blindness may be associated with a decreased risk of breast cancer. It is not clear if these changes in risk are caused by changes in melatonin levels.

Lastly, the report considers whether exposure to EMFs can affect the risk of breast cancer, and concludes that there is no consistent evidence for such an effect, nor has any mechanism for such a response been demonstrated.

The report gives a number of recommendations for further research to fill the gaps in knowledge.

**New reports on the HPA web-site**

HPA-RPD-011
Statistical Methods for Biological Dosimetry

HPA-RPD-010
Definition, Epidemiology and Management of Electrical Sensitivity
Report for the Radiation Protection Division of the Health Protection Agency

HPA-RPD-009
Statistical Estimation and Characterisation Techniques for Use during Accident Response (SECTAR)