Nuclear Free Local Authorities
briefing

Date: April 2005 No. 42

Subject: **Radiation Risks: The CERRIE Report, Published October 2004**

1. Background

1.1 CERRIE (Committee Examining the Radiation Risks of Internal Emitters) was established in December 2001 by the previous Environment Minister, Michael Meacher MP, to look into the risks posed by internal radiation. Implicit in the Committee's terms of reference was the need to examine a number of hypotheses including those that suggested the effects of low levels of radiation were hundreds of times greater than currently recognised by official bodies including the International Commission on Radiation Protection and the UK's National Radiological Protection Board. This resulted, according to two CERRIE members, in raised incidences of cancer in various coastal and estuarine sites around the UK due to radioactive discharges from various nuclear facilities.

1.2 The Committee's membership, personally agreed by Mr Meacher, reflected the wide spectrum of views on radiation matters, and included representatives from environmental NGOs, NRPB, BNFL, and a number of independent and critically-minded scientists, as follows:

Chairman: Professor Dudley Goodhead OBE, MRC Radiation and Genome Stability Unit, Oxford

Members:

Mr Richard Bramhall,	Low Level Radiation Campaign
Dr Chris Busby,	Green Audit & Low Level Radiation Campaign
Dr Roger Cox,	NRPB
Professor Sarah Darby,	University of Oxford
Dr Philip Day,	University of Manchester
Dr John D Harrison,	NRPB
Dr Colin Muirhead,	NRPB
Mr Peter Roche,	Greenpeace UK
Professor Jack Simmons,	formerly University of Westminster
Dr Richard Wakeford,	BNFL
Professor Eric Wright,	University of Dundee

1.3 The CERRIE final Report was published, amid much controversy in the media, on October 20 2004. The Report may be downloaded at www.cerrie.org (2 MB, 160 pages). Attached to this briefing is the CERRIE Press Release accompanying the Report and inserted is a two-page technical summary of the Report prepared by the CERRIE Committee.

2. Main Conclusions of the CERRIE Report

2.1 The main conclusion was that the radiation risks of many ingested or inhaled radionuclides were associated with substantial uncertainties. These large uncertainties required policy makers and regulators to **adopt a precautionary approach** when dealing with exposures to internal radiation.

2.2 The other main conclusion was that newly-discovered effects of radiation, including genomic instability (ongoing, long-term increase in mutations within cells and their offspring), bystander effects (healthy cells next to those irradiated can also be damaged), and minisatellite mutations (inherited germline DNA changes) were real biological events that could have a significant impact on radiation risks. These new effects needed further research.

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2.3 A third finding was that the various hypotheses put forward by two Committee members were not supported by the available scientific evidence. These theories included the 'second event theory' - SET - (whereby cells are assumed to be greatly more sensitive to pairs of coupled radiation hits in a specific time window), 'hot particle theory', 'biphasic dose responses', and the theory that differences existed between man-made and natural radionuclides. All of the Committee excepting the two Low Level Radiation Campaign members, were agreed on this finding.

2.4 The CERRIE Report stated that uncertainties in dose coefficients for internal radionuclides (e.g. Pu-239) could be very large, typically larger or smaller than a factor of ten. These uncertainties could operate both up and down i.e. both to increase or decrease possible risks.

2.5 Of course, the public pays more attention to the former than the latter possibility i.e. that the risks may be greater probably because:

a. The Precautionary Principle requires us to choose the option which results in less damage in case we get it wrong i.e. we need to be concerned with the possibility of higher risks.

b. The new biological evidence, especially of bystander effects, suggests that risks at low doses may be greater than those estimated by a linear extrapolation from high doses.

c. Ever since radioactivity and radiation were discovered over a century ago, our understanding of their risks has always increased and the public and worker dose limits have always been tightened. It would be unwise to presume this process has stopped.

d. Evidence exists (the leukaemia clusters near Sellafield and other nuclear sites) which suggests that the radiation risks of some radionuclides may be greater than currently acknowledged.

3. The Controversy

3.1 The two LLRC members on the Committee criticised the CERRIE Report in press and media interviews, articles and letters, prior to and during the Report's publication. They published their own 'minority' report maintaining their theories were valid, and that these minority views had been excluded from the final CERRIE Report, though this case is not supported by a reading of the CERRIE Report. The LLRC views are extensively discussed despite claims to the contrary.

3.2 The Report states that the Committee was initially disposed towards including an additional minority statement within their Report. However succeeding drafts of this statement contained misrepresentations of scientific facts and statements that the Committee considered potentially libelous and should not be published. The CERRIE Report states that Committee members offered help to the two LLRC members to correct their drafts but these offers were not accepted.

3.3 The essential matter is that, over a period of three years, the LLRC's views were carefully examined by the members of CERRIE, most of whom were scientific peers and many of whom were renowned for being independently-minded and critical of current radiation dose/risks models. These CERRIE members did not support the LLRC's theories and their report explains why.

3.4 For example, the Chairman of CERRIE was Professor Dudley Goodhead, Director of the Medical Research Council's Unit on Genomic Instability until his retirement in September 2003. Professor Goodhead has often given background help and advice to environmental and campaigning groups. His scientific work has drawn attention to the new effects of radiation and to interpreting microdosimetric information on low-range emitters. The CERRIE Secretariat was, for most of the Committee's work, staffed by Dr Ian Fairlie, who has worked for Greenpeace Canada as a nuclear campaigner and has published many articles critical of the dangers of nuclear discharges from reprocessing facilities and of the risks of low-level exposures to radiation. He continues to advise the Nuclear Free Local Authorities, the European Commission, and environmental NGOs on radiation issues.

4. Practical Implications of the CERRIE Report

4.1 The new scientific evidence in the CERRIE Report poses challenges to regulators and policy makers in radiation protection. Because the Committee's terms of reference were restricted to looking at the scientific evidence, the Report does not contain recommendations for policy makers, regulators and others, apart from those on future scientific research.

4.2 However the Government has stated on many occasions that its policies on radiation protection are based on the latest available scientific evidence. The significance of the CERRIE Report is that it recognises new scientific evidence that will eventually be reflected in future Government policies, guidance and regulatory practices. The most important aspect of the Report is that it reveals large uncertainties about

how internal radiation doses and their risks are estimated. In future, the Precautionary Principle will need to be used when dealing with internal radiation exposures, and it is very likely that new regulatory provisions will be needed. Indeed, the first sentence of the CERRIE Press Release stated: "Tougher action is needed to allow for new information about the risks from internal radiation."

5. Possible Future Regulatory Changes

5.1 At the outset, the following steps could be taken fairly quickly:

- A Government Statement should be issued recognising that doses and risks from intakes of radionuclides may be subject to large uncertainties (as happened following the publication of the Stewart Report on the large uncertainties in the possible health effects from non-ionising radiation from portable telephones – issued in December 2004).

- As recommended by COMARE in its response welcoming the CERRIE Report, a study of tritium should be established. (This might specifically examine the ICRP/NRPB refusal to recognise the large body of evidence of high relative biological effectiveness (RBE) values for tritium.)

- Medical practitioners using Auger radioisotopes for treatment and diagnosis should be informed of the scale of the uncertainties in their estimated doses.

- COMARE should immediately examine the many CERRIE research recommendations.

5.2 In addition, the following practical Government guidance might also be issued in the short term to help regulators

- External and internal radiation doses should be quoted and treated separately. (To some extent, this practice is already followed informally, although no official recommendation exists.)

- Internal doses should be accompanied by information about the source terms, exposure times, estimated tissue concentrations and half-lives in tissue for each radionuclide involved. This would allow practitioners to make better assessments of risks. (This also occurs informally.)

6. A Practical Recommendation by NFLA

6.1 The UK environment agencies, together with the Food Standards Agency and the Health Protection Agency are urged to convene a 3-day stakeholder residential workshop (like the Consultative Exercise on Dose Assessment Workshop in 2000) to discuss practical means of assisting regulators and policy makers in their response to the new scientific findings in the CERRIE Report. This workshop would specifically include the aim of assisting regulators move from single to plural values in estimating potential doses to critical groups and in applying the resulting doses to limits and constraints. The proposed workshop could consider other matters, including

- New tables of dose coefficients for radionuclides to be drawn up which include uncertainty ranges (say the 5th and 95th percentiles of a given probabilistic distribution)

- Three or four simple categories of nuclides to be drawn up in descending order of uncertainty in their estimated doses, and published for use by regulators etc

- Attention should be focussed on alpha, low-range beta and Auger emitters ie nuclides whose body distributions are important

- Regulators and operators to consider applying the higher (95th percentile) dose estimate to infant (<1 year olds) exposures when comparing them to limits

- Organ dose coefficients to be used for nuclides which concentrate in specific organs (eg I-131 should have a dose coefficient expressed as a dose equivalent to the thyroid, not as an effective dose to the whole body)

- The need to examine changes in dose limits to reflect the emerging evidence of a spectrum of genetic susceptibility to radiation across the population. There is a need to discuss whom should radiation limits and regulations be designed to protect i.e. those who are genetically the most sensitive to radiation exposures? At present, apart from a few rare genetic diseases, it is not possible to distinguish such persons in the population. Indeed, many would argue that we should not try to do so for ethical reasons.

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