

its meeting last week its appreciation of Beverton's service to NERC and its hope that the Civil Service would find a worthwhile job for him to do in the next few years. The council was especially at pains to emphasize that Beverton's sudden departure betokened no misconduct of NERC's affairs.

For the British research council as a whole, the incident has been a somewhat chilling reminder that their jealously guarded autonomy is, in the last resort, in the gift of the Department of Education and Science. In the week in which another government department (Energy) precipitated the resignation of the financial managing director of the British National Oil Corporation by the unwelcome appointment of a new chairman (without consultation with the board), that should not be a surprise.

Radiation

ICRP rules row

Washington

Fitting round pegs into square holes must seem child's play compared to the political difficulties of bringing US radiation exposure regulations in line with the current state of scientific knowledge.

In an unusual reversal of roles, officials of the US Nuclear Regulatory Commission have expressed reservations about new occupational exposure guidelines being prepared by the Environmental Protection Agency, claiming that they would result in an unnecessary relaxation of certain existing restrictions.

The dispute centres on recommenda-

tions for revising occupational exposure to radiation proposed three years ago by the International Commission on Radiological Protection. These have been accepted as the basis for regulation by the Commission of the European Economic Community, but remain the centre of fierce controversy in the United States.

The method for calculating maximum exposure levels proposed by the ICRP in its report known as ICRP 26 is widely accepted as a major advance and as reflecting the best 'state of the art'. For example, it allows for joint consideration of the effects of internal and external doses of radiation, previously considered separately.

Furthermore it shifts the basis for calculating maximum exposure levels from consideration of 'critical organ' doses — using the maximum acceptable exposure to organs most susceptible to a particular radionuclide — to a method which calculates a general level of risk by integrating the weighted risks posed to various parts of the body.

The advantage of this approach is that it includes the risks to organs other than those considered the most critical. The difficulty, however, comes from the need to adjust the specific figures placed on exposure limits.

Controversy has in particular focused on the ICRP's suggestion that the maximum integrated risk should be equivalent to that represented by the existing maximum whole body exposure of 5 rems a year.

The EPA, which is responsible for setting exposure guidelines to be followed by other agencies, has yet to issue formal proposals on revised exposure levels. But it has in-

formally sounded out the agencies on the use of the ICRP aggregated-risk methodology, based on a maximum organ dose of 30 rems a year.

Even this reduced exposure guide, however, has not been acceptable to some NRC officials. While supporting the ICRP methodology in principle, they argue that the result of meeting the overall risk requirement would be to permit an increase in permitted air concentrations for many radionuclides, in some cases by an order of magnitude.

The NRC officials, who say their arguments have been accepted as an interim position by the NRC commissioners, agree that such increased limits would not necessarily be harmful. But they argue that they would inevitably reduce the protection afforded to workers at licensed power plants and uranium mines — and that the nuclear industry apparently has little difficulty in meeting current standards.

EPA officials agree that adoption of these proposals would permit increased exposure to some radionuclides (as well as reducing exposure to others). But they insist that assessments should be based primarily on consideration of the overall risk, rather than merely the risks to separate organs.

"If someone gets cancer, it does not really make much difference to them which part of the body they get it in. We are trying to limit the amount of harm to people. That is not the same as limiting the dose in an abstract sense", Dr David Rosenbaum, director of EPA's Office of Radiation Programmes, said last week.

NRC officials have proposed a hybrid scheme under which exposure limits for individual radionuclides would be calculated both by the ICRP methodology and by the 'critical organ' technique using the same methodology but old dose limits, accepting whichever is the lower. But EPA is unenthusiastic about this approach.

The situation is complicated by each agency's desire to respond to outside arguments. The EPA, for example already faces challenges by nuclear companies on its proposal that public exposure outside a nuclear facility should not exceed 25 millirem.

At the same time various public interest groups are using the uncertainties in the scientific evidence to petition the NRC to reduce the present 5 rem occupational exposure limit by an order of magnitude. Several trade unions are also planning to press the EPA not to introduce the ICRP 26 scheme without major modifications.

Given all this activity, publication of the proposed guidelines is now unlikely before the autumn, with a period for public comment to be followed by a series of public hearings next year. These promise to be lively; particularly if the Administration changes to one more concerned to minimise regulatory restraints on the growth of nuclear power. **David Dickson**

Soviet heavy neutrinos

BARELY a month after a 'Science Day' speech in which Anatolii Aleksandrov, President of the Soviet Academy of Sciences, suggested that the Soviet Union should make itself as independent as possible of western scientific results, a team of physicists led by Academician Valentin Lyubimov, has repeated the claim of Dr F. W. Reines to have established that neutrinos have mass. This has now been announced by the Russian news agency Tass. Reines, from the University of California at Irvine, described to the Spring Meeting of the American Physical Society last month the latest in a series of experiments at the Savannah River reactor in which the relative importance of the charged and neutral currents in the interaction of reactor neutrinos with deuterons was measured. The neutrino mass deduced is the equivalent to a few electron-volts.

The Russian work now referred to is based on a different method. The team concerned, from the Moscow Institute of Theoretical and Experimental

Physics, is said to have analysed the spectrum of electrons in tritium decay, deducing the mass of the neutrino from the shape of the spectrum. The discovery was announced in a report delivered to the Presidium of the Soviet Academy of Sciences.

Commenting on it, Academician Yakov Zel'dovich observed that the result could produce major changes in current cosmological concepts and possibly raise once again the question of the existence of a cosmological constant, first mooted by Einstein in 1917.

Reporting the discovery, the Tass agency said that the existence of 'heavy' neutrinos solves a number of existing paradoxes, including the question of the missing mass of galaxies and the measured deficiency of solar neutrinos from the sun. Tass claimed that it also appeared to confirm the model of solar neutrino flux proposed by Academician Bruno Pontecorvo involving the inter-conversion of different neutrino types.

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