RADIOLOGICAL PROTECTION IN THE CEGB - THE CHANGING SCENE

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INTRODUCTION

The first two civil nuclear power stations in the U.K. were commissioned by the CEGB in 1962. There are now 12 operational stations (24 gas cooled reactors) and a further two Advanced Gas Cooled reactors being commissioned on another site. In the intervening years, improvements in designs and in operational practices backed up by sound health physics control and procedures, have led to a steady reduction in the mean annual dose to operators. During those years the statutory dose limits have only been exceeded on 4 occasions, and the maximum annual whole body dose equivalent was 57.4mSv (5.74 rem). Doses to members of the public have also been well controlled. Inevitably there have been minor incidents but on no occasion has it been necessary to declare an Emergency at any of our sites.

During the past decade a number of unconnected events have combined to put increased pressure on the nuclear establishments to effect ever greater improvements in radiological protection. ICRP 26 was a catalyst for a major re-think in this field. The accident at Three Mile Island and the subseqent disaster at Chernobyl focussed the attention and increased the concerns of the public and the media on the safety of nuclear power. A further event which was of relevance in the U.K. was the Public Inquiry held to consider the CEGB's application to build its first PWR. That Inquiry lasted over 2 years and guaranteed the spotlight remained on the subject.

Subsequent to the publication of ICRP 26, regulatory bodies re-considered their existing requirements and guidance. As a result the relevant European Economic Community Directive was revised. The U.K. nuclear regulations were subsequently re-vamped and published in 1985.

This paper briefly outlines changes which are being consolidated or introduced into radiological protection in the CEGB nuclear establishments.

OCCUPATIONAL EXPOSURE

In order to conform with the new U.K. nuclear Regulations, the CEGB Safety Rules (Radiological) were completely re-written and an extensive programme of re-training had to be implemented. ALARA formally became an integral

part of radiological protection. Procedures now require that should an individual reach a dose of 15mSv in a calender year an investigation shall be carried out to ascertain whether the control measures exercised during the time the exposures occurred were justifiable and in line with the ALARA principle. Further checks and inquiries must be made on any individuals reaching annual doses of up to 20,30 or 40mSv/y. In addition, if it is predicted that specific planned operations will lead to a collective dose in excess of 0.1 man Sv, an independant assessment of the planned radiological control measures must be undertaken. Particular care is necessary in controlling the doses to classified persons employed by contractors, and who carry out work for limited periods of time on a number of different sites within the U.K. Close collaboration between the employers and the Board is necessary in these circumstances. To assist in dose control a utility-wide computerised dose record/medical status system is being introduced to cover CEGB and Contractors employees. This record system and the dosimetry services used must meet the stringent requirements and gain the Approval of the Government's Health and Safety Executive.

EXPOSURE OF MEMBERS OF THE PUBLIC

All but one of the Boards nuclear sites are located on the coastline or on estuaries and in most instances doses resulting from discharges of low activity liquid discharges represent only a fraction of a percent of the ICRP dose limits. In these circumstances doses must be estimated, and increasing emphasis therefore has to be placed on the application of mathematical models using data from environmental samples taken for this purpose. Efforts are being made by the major relevant organisations in the U.K. to reach agreement on the models and parameter value data to be employed. Information on the estimated exposures of members of the public has been made publicly available for many years, but renewed efforts are being made to liaise on these matters with local authorities and organisations through Local Community Liaison Committees sponsored by individual site managements.

The Governments Authorising Departments continue to take and evaluate their own check samples from the environment. These confirm the validity of the Boards results. Nevertheless an increasing number of Local Authorities are carrying out their own independant surveys in order to inform them consituents. The Board collaborates with such bodies on these matters.

EMERGENCY PLANNING

In the period between the accident at Three Mile Island and the disaster at Chernobyl the CEGB introduced many significant changes into its emergency plans. It was therefore gratifying that after a preliminary consideration of the latter

event, H.M. Government felt able to state that the accident did not invalidate the principles on which emergency planning was based in the U.K. Detailed reviews of these plans have been undertaken by Government bodies and Agencies, but final recommendations are still awaited. Nevertheless it is clear that better and more rapid means of communication is needed between the Authorities and the Public.

In the overall response plan for any particular site, many separate organisations participate. Each such organisation acts in accordance with its own particular response plan. Action is being taken to ensure that the roles and responsibilities of these involved organisations are more clearly defined, that there is good communication between these bodies and that their efforts are co-ordinated.

The CEGB is taking the opportunity to harmonise the separate plans for its numerous sites. A "model" plan is well advanced in its preparation. A greater use of common procedures and terminology will lead to less confusion when staff from one site are required to assist those at another (affected) site.

Considerable debate has taken place on the scale of accident for which detailed pre-planning for emergency response should be developed. There may yet be some development in this position but there is increasing emphasis being placed on the ability to demonstrate that if necessary, emergency response actions can be extended out to any required distance.

RADIOLOGICAL PROTECTION - FUTURE DESIGNS

When a new station is to be built, the CEGB issue Design Safety Criteria (DSC) relevant to the project. These provide guidance for the designers. The criteria reflect the judgement at that time of the desirable and achievable standards of radiological protection and also incorporate judgement factors intended to anticipate possible changes in standards in future years. These DSC's are expanded and more fully interpreted in a companion document known as Design Safety Guidelines (DSG's). In addition to setting "targets" for doses to workers and to members of the public a criterion is also included for the annual collective dose. In 1984, a Public Inquiry began into the CEGB's application to build a PWR. During the course of that Inquiry many searching questions were directed at the criteria but from his report, it is clear that the Inspector was satisfied with the position.

In consideration of future designs, greater emphasis will be placed on formal cost benefit or other appropriate analysis to assist in determing whether design proposals are ALARA. It is hoped that in the not-too-distance future there will be agreement between industry and the regulatory bodies on the value of a man-sievert to be used in such considerations.

Currently it is particularly difficult to decide on future dose criteria. The ICRP has announced in its COMO Statement that they are reviewing all the data on risk estimates and consequently new recommendations can be anticipated, possibly in 1990. The CEGB has declared its intention of proceeding with a programme of PWR's. Application for one plant has already been made and this may be followd by 2 or 3 others at perhaps yearly intervals.Difficult decisions must therefore be taken on the radiological criteria to be issued for these plants as it is probable that some form of inquiry - perhaps limited - will be held for each one.

In a recent publication, the National Radiological Protection Board (which advises the Government on these matters) recently issued interim guidance that the revised Japanese bomb dose data was likely to lead to an increase in the radiation risk factor by a factor of 2 or 3. Nuclear operators are therefore urged to begin to work towards a "target" dose limit of 15mSv/y for workers and 0.5mSv/y for members of the public. This advice must be borne in mind also, in formulating design criteria.

THE FUTURE

The CEGB intends that nuclear power will play a significant role in the future production of power. The provision of an efficient radiological protection service is therefore paramount. There will be challenges in the coming years which will place demands on all practitioners in this field. From my own point of view, I look back at our past achievements with some satisfaction and am certain that ways of solving new difficulties will be found.