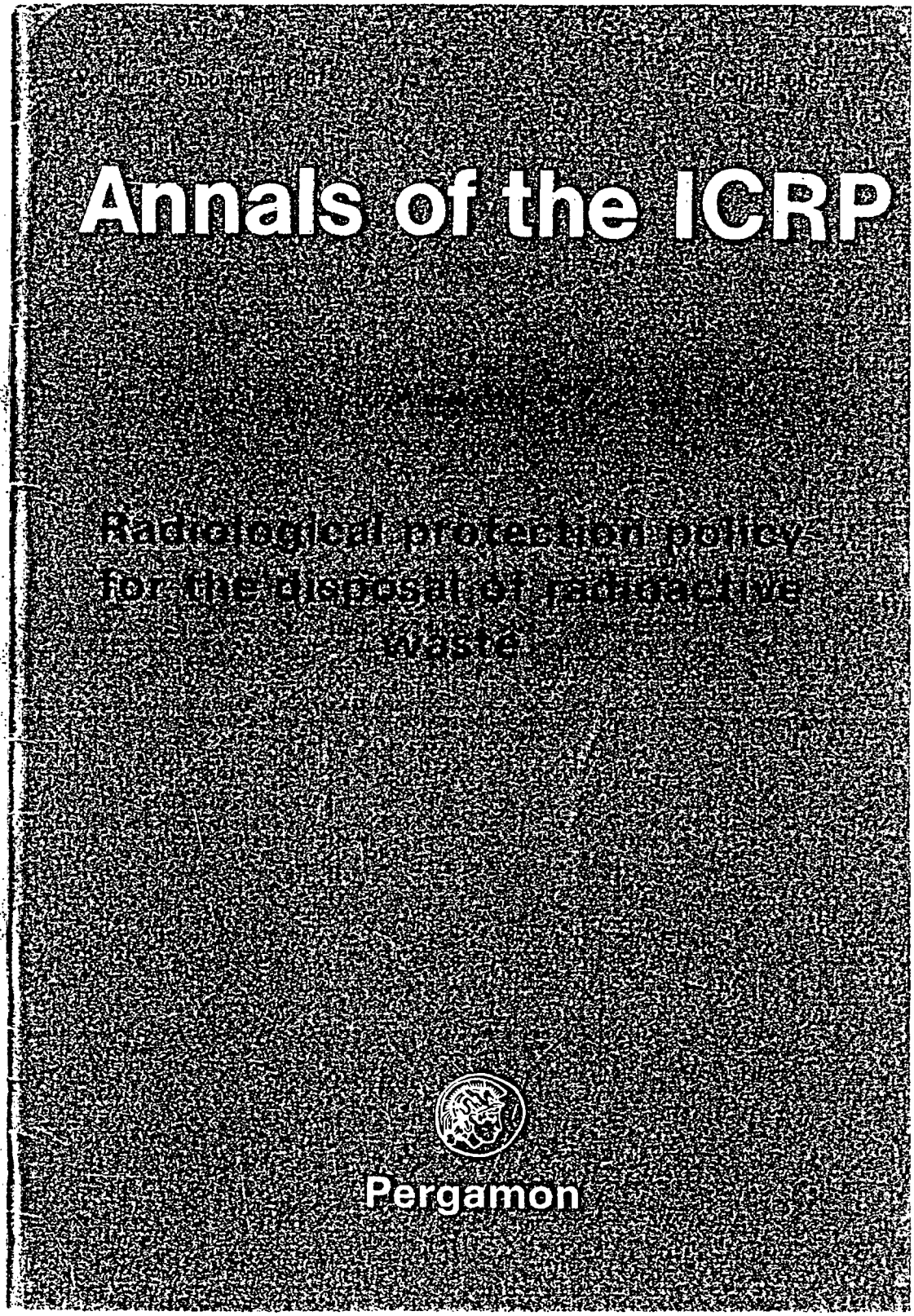

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Radiological protection policy for the disposal of radioactive waste

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CONTENTS

6. THE COMMISSION'S POLICY FOR WASTE DISPOSAL

(28) The Commission intends the restatement of policy in this section to resolve the difficulties identified in Section 5 by consolidating and clarifying, rather than changing, the present policy. It is expressed in a way that is intended to make it easier for the user to apply the policy in practice. This intention reflects the Commission's view that its recommendations should be stable, with significant policy changes being made at intervals of no less than 10–15 years.

(29) The Commission's policy for the disposal of radioactive waste is based on the sections of *Publication 60* (ICRP, 1991) that deal with the biological effects of radiation, with the general principles of protection, and with the control of public exposure. The key features of this material are summarised here.

6.1. The Framework of Radiological Protection

(30) In most situations arising from the disposal of radioactive waste, the disposals are deliberate and are under control. The disposals are then part of a practice. In some situations, the disposal results in a source of exposure that was not intended. Some of the exposures caused by such sources can be reduced by further restrictions on the current disposals, i.e. by modifying the practice. Often, however, they can be reduced only by remedial measures in the environment, i.e. by intervention.

(31) The basic components of the Commission's system of protection for practices have been set out in paragraph 112 of *Publication 60* (ICRP, 1991). They can be summarised as follows.

No practice involving exposures to radiation should be adopted unless it produces at least sufficient benefit to the exposed individuals or to society to offset the radiation detriment it causes (called the justification of a practice).

In relation to any particular source of radiation within a practice, all reasonable steps should be taken to adjust the protection so as to maximise the net benefit, economic and social factors being taken into account (called the optimisation of protection).

Finally, a limit should be applied to the dose (other than from medical exposures) received by any individual as the result of all the practices to which he is exposed (called the application of individual dose limits).

(32) In simple terms, this framework is derived from three principles that apply to many human activities.

The justification of a practice implies doing more good than harm.

The optimisation of protection implies maximising the margin of good over harm by reducing the harm.

The use of dose limits implies an adequate standard of protection even for the most highly exposed individuals.

More details are given in the following sections.

6.1.1. *The justification of a practice*

(33) The justification of a practice requires only that the net benefit of the practice, including the waste management of the practice, be positive. The selection of the most appropriate practice goes beyond the scope of the Commission's recommendations.

(34) Waste management and disposal operations are an integral part of the practice generating the waste. It is wrong to regard them as a free standing practice that needs its own justification. The waste management and disposal operations should therefore be included

in the assessment of the justification of the practice generating the waste. If the national waste disposal policy has changed and the practice is continuing, it may be necessary to reassess the justification of the practice. If the practice has ceased, intervention, rather than the practice, has to be considered for justification.

(35) To the extent that the justification of a practice involves collective dose, the Commission's policy requires an estimate of the total collective dose attributable to the practice, including the waste management and disposal operations. The differential comparisons used in the selection of options in the optimisation of protection are not sufficient for justification. The problems posed by this requirement are discussed in Section 5.3.

6.1.2. *The optimisation of protection, constraints, and dose limits*

(36) In paragraph 186 of *Publication 60* (ICRP, 1991), the Commission concluded that '... almost all public exposure is controlled by the procedures of constrained optimisation [of protection] and the use of prescriptive limits'. While recognising that dose limits for public exposure are rarely limiting in practice, the Commission has continued to recommend such limits to take account of the exposure to multiple sources and to limit the choice of constraints. Because of the close interrelationship of optimisation, constraints, and dose limits in public exposures, it is necessary to deal concurrently with these three aspects of protection.

The optimisation of protection

(37) Much of the Commission's emphasis has been on the qualitative specification of the optimisation of protection. This calls for the individual doses, the number of people exposed, and the likelihood of potential exposures all to be kept as low as reasonably achievable, economic and social factors being taken into account. This concept has been developed over the years. As early as 1971, the Commission decided to provide an explanation of this qualitative approach and, in *Publication 22* (ICRP, 1973), accepted a quantitative cost–benefit approach. This was restated in a less flexible form in *Publication 26*, the 1977 Recommendations of the Commission (ICRP, 1977). The quantitative aspects of the optimisation of protection were again emphasised in *Publication 37* (ICRP, 1983).

(38) In fact, the Commission's policy is more subtle and judgemental than is implied by differential cost–benefit analysis, which depends only on a comparison of the value attributed to reductions in collective dose and the incremental costs of protection.

(39) This broader view was expressed in paragraph 18 of *Publication 55* (ICRP, 1989) as is indicated by the following extract. 'The basic role of the concept of optimisation of protection is to engender a state of thinking in everyone responsible for control of radiation exposures such that they are continually asking themselves the question "Have I done all that I reasonably can to reduce these radiation doses?".'

(40) This view was confirmed in Paragraph 112 of *Publication 60* (ICRP, 1991), and again by the following sentence in Paragraph 117. 'If the next step of reducing the detriment can be achieved only with a deployment of resources that is seriously out of line with the consequent reduction, it is not in society's interest to take that step ...'.

Constraints

(41) An important component of the optimisation of protection is the constraint on individual dose delivered by the source for which protection is being optimised. This is defined in paragraph 121 of *Publication 60*. The Commission uses this word specifically to mean a source-related individual dose used exclusively in the optimisation of protection to exclude

from further consideration any protection options that would cause the dose of a critical group to exceed the constraint. The use of a constraint is thus constraint is not a form of dose limit to be used retrospectively. The retros that a constraint, as opposed to a dose limit, has been exceeded does not i to comply with the Recommendations of the Commission and should not an infringement of regulatory requirements. Rather, it should call for a r the optimisation of protection. This is an important point because the retro cement of constraints would result in pressure to set constraints unnecessaril

(42) The magnitude of the constraint is specific to the source and situa protection is being optimised. In waste management, the source should whole site giving rise to the waste or, in the case of a repository, the whole may give rise to public exposure. In practice, it may be possible to start by route of disposal or exposure separately, but it must be remembered that t ment and conditioning will transfer activity from one disposal route to anot fer calls for a final check of the optimisation of protection for the whole sit

(43) Occasionally in public exposures, the assessment of the dose to a cr lated to a primary source will indicate that the group will incur signific other, secondary, sources for which it is not critical. This situation influe cation of both constraints and dose limits.

Dose limits

(44) The present dose limits apply, by definition, only to the sum of the i from the primary and secondary sources in a practice and from other pr subject to the Recommendations of the Commission. Both medical exp posures to natural sources that are not subject to human control are specil This definition stems from the presumption that a significant fraction of may be received by the same individual from each of several sources or fr eral practices. This presumption is not borne out in practical situations. mation on the doses to critical groups involving more than one source i review of the doses to critical groups in England and Wales (Robinson *et* only one site where the dose to a critical group from secondary sources rea a year. The 1993 Report of the United Nations Scientific Committee on At (UNSCEAR, 1993) provides data that lead to the conclusion that widesp sources will contribute doses to critical groups that amount to only a few present dose limit. Nevertheless, there are a few rare situations in which t cant exposures to multiple sources within a practice. Some allowance shoul for exposure to these multiple sources.

6.1.3. *Potential exposure*

(45) The models used to assess doses are usually selected to cover a wid ation of environmental conditions. However, extreme conditions, e.g. those a frequency of less than about one in 100 years, and the occurrence of ac ruptive events will be outside the scope of the models used to assess norm they occur, these events may cause exposures that are larger than normal. should be treated as potential exposures. Their magnitude and probability into account in reaching waste management decisions.