

FROM REGULATIONS TOWARDS RADIATION PROTECTION CULTURE

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INTRODUCTION

Compliance with the technical standards and specifications is a necessary but not sufficient condition for quality in radiation protection. Reaching this quality objective is not a matter of forcing improvements by a regulatory policy of reducing dose limits, but of promoting a real radiation protection culture. The spread of such a radiological protection culture encourages the deliberate adoption in everyday practice of behaviour likely to reduce exposure to ionising radiation as low as reasonably achievable.

The aim of this paper is to demonstrate that the need to diffuse a radiological protection culture is inspired by the philosophy behind the system recommended by ICPR Publication 60 (1) on the management of residual radiological risk and, in particular by the behavioural and incentive approach implied by the optimisation principle. Special attention will be given to the fundamentals likely to contribute in a definition of radiation protection culture.

THE PHILOSOPHY BEHIND THE RESIDUAL RADIOLOGICAL RISK MANAGEMENT SYSTEM RECOMMENDED BY ICPR PUBLICATION 60

The changes to the place and functions of the concepts of dose limits and optimisation of radiological protection as set out in ICPR Publication 60 are contributing to the promotion of a dynamic action based on a behavioural approach, and this should no longer be based simply on the strict regulatory application of individual dose limits.

The system of prevention based on the threshold concept has given way to a system of radiological risk management system based on the "prudent avoidance" principle associated with the recognition in the 1950s of stochastic effects and the later adoption of the hypothesis of a linear relationship with no "safe" threshold in terms of low doses.

The adoption of this hypothesis, which is not the result of a scientific knowledge but of an intellectual approach aimed at encouraging action in radiological protection, has had the following consequences: limits are now considered to be the lowest boundaries of unacceptable doses. Values above this limit should be very strictly controlled, and doses under the limit should only be considered to be acceptable in so far as residual exposure levels are optimised.

According to this approach, we should implement a management approach to radiological protection in terms of individual and collective doses, based on the establishment of optimised dosimetry objectives, in addition to controlled radiological protection based on compliance with individual dose limits. The implementation of the principle of optimisation in no way does away with the need for conventional radiological protection monitoring, which it should complement.

Quite simply, compliance with dose limits no longer ensures high quality protection. As ICPR Publication 60 recalls, dose limits can no longer be seen as the boundary between that which is safe and that which is dangerous nor as the simplest and most effective way of maintaining exposure at sufficiently low levels and of encouraging improvements.

It is the principle of optimisation which initiates action in the area of residual radiological risk management and which motivates operators to try to reduce doses within an optimal allocation of resources. The approach recommended by the principle of optimisation is to encourage initiative and innovation rather than "imposing" a limit to be complied with. Thanks to the specific nature of the principle of optimisation, we are able to go further than a merely legal perception of standards represented by given quantitative data. The principle of optimisation can be compared to a behavioural requirement which encourages operators to on-going efforts in achieving a given result. The operator may therefore be held responsible not for not having achieved a specific result which corresponds to an optimised dose, but rather for not having implemented reasonable actions to reduce doses (2).

In so far as optimisation is inciting and qualitative, regulations may only involve optimisation as a general requirement, since flexibility is required in its application within the regulatory framework together with the use of guidelines. This is the type of approach which the European Commission recommended in its Communication

of 31 December 1985 (3) and which was adopted for example when drawing up the French regulations concerning the principle of optimisation.

Radiological protection regulations should therefore have two qualities. They should not only be restrictive in terms of compliance with dose limits within the framework of a posteriori radiological protection monitoring but above all, they should encourage the promotion of the optimisation and improvement of behaviour in terms of a real management of radiological protection. Compliance with this principle is as essential as compliance with individual doses, in accordance with the logical sequence which French regulations represent in transposing the basic principles of radiological protection: "Equipment, procedures and the organisation of work should be designed so that occupational individual and collective exposure is kept as low as reasonably achievable below the limits which have been laid down (4)."

TRIAL CONTRIBUTION TO THE DEFINITION OF RADIOLOGICAL PROTECTION CULTURE

This quest for the "best" in the on-going effort to improve the quality of action required by the principle of optimisation is behind the "culture of radiological protection". If we use the definition of safety culture given in INSAG Document 4 published by the IAEA, we could define the culture of radiological protection as follows: "the radiological protection culture represents a state of mind in terms of radiological protection, that is, the view of radiological protection held by individuals and organisations, the value given to it and the interest shown in it. This state of mind influences occupational attitudes and practices" (5).

In practice, the dissemination of this radiological protection culture should involve a dynamic review when necessary of methods of thinking and working, so that radiological protection is given the place it deserves.

The key factors for the dissemination of this culture, which is based on individuals' awareness of the importance of radiological protection based on the assumption of prudence in the management of residual risk, are as follows:

- the commitment of the management to a policy of radiological protection and the adoption of the concept of optimisation within the management structure of the company (6-7);
- the definition of responsibilities, particularly through the clear allocation of tasks to those concerned;
- the motivation of the personnel, which takes the form of the establishment of objectives, personal responsibility and self-discipline in terms of radiological protection, knowledge and skills in the field of radiological protection as provided by theoretical and practical training, through good distribution of information and by extensive experience feedback at both international and national level.

Commitment of the management and adoption of the concept of optimisation within the management structure

Such a commitment may only exist and last if the management has the desire to encourage a culture of radiological protection because it considers it to be in the interests of the company and two main reasons for this can be put forward.

On the one hand, the cost of achieving the level of performance required in the field of radiological protection should not affect the attainment of the main objectives of the company. Since the principle of optimisation is a reference point for the company in that it underlines the necessity of improving the allocation of protection resources, thus avoiding waste, it is integrated in the management culture of the company.

On the other hand, the dissemination of such a culture, based on a policy of dose reduction can contribute to improving the image of the company in the eyes of the public and of its own personnel.

The expression of the will to encourage such a culture must be sufficiently clear as to convince the personnel that its performance in the field of radiological protection will be as important an assessment criterion as its performance in the area of production.

It is essential that the management confirms this movement by making a general policy statement and then goes on to demonstrate to the personnel, through its attitude, its total commitment to promoting the culture within the company. In practice, it should adopt a clear and effective approach by which the processes affecting radiological protection are reviewed on a regular basis and by taking a direct interest in the more important matters concerning radiological protection, whilst bearing in mind the basic message which is that exemplary dose management requires the implementation of the principle of optimisation.

Definition of responsibilities

The competent authority for radiological protection at national level should be able to oblige the company to promote a radiological protection culture by, in particular, holding the management responsible for allocating the necessary resources to comply with the principle of optimisation. In France, the regulations make the operator responsible for the organisation of work and, in addition he alone in practice can control dose rates, the operator bears the main responsibility for the optimisation within nuclear installations.

This review of the legal responsibilities of the management of the company should be combined with the practical delegation of responsibilities together with a clear definition of tasks and the corresponding resources. Such a definition is essential to avoid any ambiguity and problems of shared responsibility, which could lead to overlaps, omissions or the watering down of responsibilities. The necessity for a rigorous definition of the tasks of all and the corresponding delegation of responsibility should be seen, first and foremost, as a policy for prevention aimed at identifying the errors made in order to avoid any repetition and not as a means of punishing the shortcoming which led to such errors.

Attitude of personnel

Motivating the personnel both during the preparatory phase and during operation, increasing their awareness of personal and collective responsibility in the field of radiological protection is one of the essential conditions for the success of any dose management system. The aim should be to ensure that all accept the principle of optimisation as a "state of mind" rather than an additional workload imposed by the management.

Their cooperation should go beyond a specific commitment for a given operation and justifies an on-going effort, since experience feed-back shows that nothing can ever be taken for granted in the field of radiological protection. Those involved should systematically adopt a disciplined and prudent approach based on professionalism, communications and "time for thought" giving pride of place to a questioning approach.

The development of professionalism implies the implementation of an ALARA training programme and the integration of the ALARA approach within the personnel training structure, followed by regular retraining. The mobilisation of the personnel during operations requires on-going information as to objectives and results and a policy of motivation, which consists, for example, in taking into consideration commitment to the ALARA approach in the annual personal assessment. The stimulation provided by a questioning attitude can be seen in the ALARA check lists used during project reviews, before and after completion, which correspond rather to encouraging thought rather than the drawing up of restrictions.

CONCLUSION

The introduction of a culture of radiological protection based on the principle of optimisation within the management structure of the company, will modify both the philosophy of action and behaviour. In speaking of the ethics of radiological protection, experts are not referring to a phenomenon of fashion but rather to awareness, in that the analysis of radiological risk includes both behavioural and technological aspects. The development of a radiological protection culture, based on the principle of optimisation, responds to these ethical concerns through reasonable behaviour based on social, economic and health protection value judgements and through the responsibility for the actions this requires. The success of the optimised management of exposure levels, through the motivation of all those concerned, relies on a policy of information and transparency in so far as the residual risk of ionising radiation and the resources used to reduce such risks to levels as low as reasonably achievable are concerned. The dissemination of this culture of radiological protection will probably be a determining factor in the dynamic improvement of information concerning nuclear risk and the public's acceptance of it.

REFERENCES

1. International Commission on Radiation Protection, Recommendations of the International Commission on Radiological Protection, ICRP Publication 60, Pergamon Press, Oxford, (1991).
2. J. Lochard and M.C. Boehler, Optimising Radiation Protection - The Ethical and Legal Bases, *Nuclear Law Bulletin* n°52, NEA/OECD, 9-28 (1993).
3. Communication 85-C347603, Official Journal of the European Community C347-9, 31/12/85.
4. Décret n°75-306 du 28 avril 1975 relatif à la protection des travailleurs contre les rayonnements ionisants dans les installations nucléaires de base, JORF du 30/04/75, modifié par le décret n°88-662 du 6 mai 1988, JORF du 08/05/88 - Décret n°86-1103 du 2 octobre 1986 relatif à la protection des travailleurs contre les rayonnements ionisants hors des installations nucléaires de base, JORF du 12/10/86, modifié par le décret n°88-662 du 6 mai 1988, JORF du 08/05/88.
5. M.C. Boehler, Culture Radioprotection - Amélioration de la culture de radioprotection et comportement ALARA, *Rapport n°224 du Centre d'études sur l'Evaluation de la Protection dans le domaine Nucléaire (CEPN)*, Fontenay-aux-Roses, (1994).
6. L. Stricker, R. Dollo, La politique ALARA d'Electricité de France, Radioprotection n°1, Paris, 47-60, (1995).
7. Electricité de France/Comité de Radioprotection/Groupe de Coordination en Radioprotection, Livre Blanc de la Radioprotection. La radioprotection à EDF, Orientation et objectifs, Paris, (1993).