



HEALTH PHYSICS SOCIETY

Specialists in Radiation Safety

CONTROLLABLE DOSE

A WHITE PAPER ISSUED BY THE SCIENTIFIC & PUBLIC ISSUES COMMITTEE

April 2000

INTRODUCTION

Professor Roger H. Clarke is proposing changes in some fundamental principles in the system for radiation protection. Professor Clarke is seeking a broad input to his proposal for consideration by the International Commission on Radiological Protection (ICRP). His original proposal, which was distributed internationally to radiation protection societies and associations, has continued to evolve as he has received input and comments. The Health Physics Society (HPS) is pleased to be part of this dialogue. Professor Clarke's proposal will be discussed further by the international radiation-protection community at the 10th Conference of the International Radiological Protection Association (IRPA) in Hiroshima, Japan. The Scientific and Public Issues Committee of the HPS has developed this White Paper in accordance with its responsibility to prepare impartial scientific and technical statements representing the Society's position. This paper is specifically intended for use by the Society delegation to the IRPA Conference.

POINTS RELATED TO THE PRINCIPLES OF A RADIATION-PROTECTION SYSTEM ADDRESSED IN PROFESSOR CLARKE'S PROPOSAL

The HPS has chosen to provide comments on what appear to be several underlying points incorporated in Professor Clarke's proposal which are related to a radiation-protection system. These points are:

1. Reason for Change
2. Individual dose criterion
3. Combining all "controllable" sources of exposure
4. Differentiation between practices and intervention
5. Controllable Dose Levels and Terminology

REASON FOR CHANGE

The HPS believes that proposals for changes in the system of radiation protection must have a clearly identified reason for the change. Professor Clarke's reason for making his proposal is to improve public understanding of radiation protection standards.

We believe the problem of public understanding is related to unwarranted fears and perceived risks at low radiation doses. The HPS believes there is a way to address this problem without introducing an entirely new dose term. We believe improved public understanding and acceptance of radiation-protection standards will be accomplished by: (1) controlling individual dose, irrespective of how many people are exposed, combined with; (2) not associating quantitative risk estimates with individual doses below 50 mSv in one year or a lifetime dose of 100 mSv above background radiation. (See the HPS Position Statement "Radiation Risk in Perspective" January 1996).

In the context of Professor Clarke's proposal, we support his statement of the principle for the protection philosophy for controllable dose, but we believe his use of "Fatal Risk" on his Controllable Dose Chart is inappropriate.

INDIVIDUAL DOSE CRITERION

The HPS supports a radiation-protection system that is based on protection of the individual and opposes the use of collective dose in setting radiation safety standards.

This is consistent with some aspects of Professor Clarke's proposal.

COMBINING ALL "CONTROLLABLE" SOURCES OF EXPOSURE

The HPS agrees there is some potential benefit in linking exposures from all sources for simplifying the public's understanding of radiation-protection systems. Linking exposure limits, or upper bounds, to background radiation levels may be simple for the public to understand if presented properly since everyone is exposed to background radiation. With the disassociation of risk-based terminology from occupational and environmental levels of exposure, as discussed above, comparison to variations in background could be very useful in putting radiation-protection quantities in perspective. Proper linkage may also get us out of the often indefensible position of controlling public doses from nuclear technologies while seemingly ignoring larger doses from natural and medical sources.

However, the HPS believes there is a need to differentiate between occupational, public, and medical exposures in a radiation-protection system that sets upper bounds on these exposures. The potential risk and potential benefit must be considered and these are different in the case of occupational, public, and medical exposures, even if they can not be accurately quantified. The HPS believes occupational, public, and medical exposures should be evaluated and controlled separately. Furthermore, all medical exposures should be excluded from any system that would set, or imply an upper bound to the exposure an individual receives from prescribed medical procedures.

DIFFERENTIATION BETWEEN PRACTICES AND INTERVENTION

Professor Clarke states that with his proposal “There would be considerable scope for a simplification of the system of protection and remove confusion by not distinguishing between practices and intervention.” Professor Clarke uses these terms like the ICRP in which a practice is the introduction of a radiation source of exposure and an intervention is the initiation of a protective action for an existing source of exposure.

The HPS does not believe that the differentiation of radiation protection actions as related to practices or interventions makes any difference in the public’s understanding of these actions, at least in the United States, and is not, therefore, an important consideration for accomplishing the purpose of the proposed changes.

CONTROLLABLE DOSE LEVELS AND TERMINOLOGY

Professor Clarke proposes working “toward a single maximum level of controllable dose. Doses significantly above this level would only occur in uncontrolled accident situations or in life-saving medical procedures. It may be that rather than referring to this value as a limit, the term ‘action level’ should be used.”

Although the HPS agrees with Professor Clarke that a “limit” can be, and often is, misunderstood, the reality of implementing a radiation-safety program within a formal regulatory framework requires there be a value that is singular, and unequivocal that represents a dose which should be prevented by responsible control and one above which responsible control has been exceeded.

The HPS supports a system of radiation protection that has; 1) “an upper bound of acceptable risk,” such as a “Regulatory Limit” (i.e., a term that does not imply a boundary between safe and unsafe conditions), and 2) “Investigation Levels” below this upper bound that identify when radiation-protection actions should be taken (i.e., ALARA investigation levels).

The HPS believes that the proposed “Trivial Risk” level of a few tens of micro-Sieverts is so low that it carries no concern for adverse health effects and should not, therefore, be incorporated into a radiation-protection system. Furthermore, the HPS believes the lowest ALARA investigation level should be 1 mSv per year.

CONCLUSION

The HPS appreciates the initiation of an international discussion on the current fundamental principles of our radiation-protection system with an interest in developing a system that is both understandable by, and protective of, members of the public and occupational radiation workers. We believe the most important aspect in achieving this goal is a risk-informed, dose-based system with elimination of quantified risk estimates and risk-based terminology at occupational and environmental dose levels.