



HEALTH PHYSICS SOCIETY

Specialists in Radiation Safety

Background Information on

“Ionizing Radiation Safety Standards for the General Public”

Position Statement of the Health Physics Society*

Adopted: September 1992, Revised: June 2003, Reaffirmed: February 2009

Approved by the Scientific and Public Issues Committee
Drafted with the assistance of the Legislation and Regulation Committee

Introduction

The Rules of the Health Physics Society (HPS) assign the responsibility “. . . for the preparation of impartial scientific and technical statements as it deems necessary” to the Society’s Scientific and Public Issues Committee (S&PIC). In this capacity, the S&PIC and the Society president carry out the duties as Society spokesman in accordance with the Society Bylaws. The S&PIC is comprised of the president, president-elect, and the three most recent past presidents. The S&PIC has issued its “impartial scientific and technical statements” in various formats, but the most common method has been by means of formal “Position Statements.” Position Statements of the Health Physics Society are intended to address fundamental issues of radiation safety with the expectation they will be enduring in their nature.

In March 1993, the S&PIC issued a position statement titled “Radiation Dose Limits for the General Public” (hereafter referred to as the March 1993 position statement). During the July 1999–June 2000 Society year, the S&PIC reviewed the March 1993 statement and decided it needed revision. The Society’s Legislation and Regulation Committee was requested to assist in the drafting of a revision to the March 1993 statement. The committee provided a draft revision, which was discussed at a meeting of the S&PIC held during the 45th annual meeting of the Society in Denver, Colorado. The S&PIC approved the revised position statement in August 2000, including a title change to “Ionizing Radiation Safety Standards for the General Public” (hereafter referred to as the August 2000 position statement). This was revised again in June 2003 to add recommendation 6 recognizing an “acceptable level” of a dose of radiation above the annual natural background radiation.

In addition to revising the position statement, the S&PIC adopted a new format. The March 1993 position statement was seven pages in length and included a detailed discussion along with the primary recommendations of the statement. The S&PIC decided in Denver the format was cumbersome for use by policy makers and members of the general public due to the length and detail of the statement. However, the committee agreed the thoughts and discussion that provide the background to the primary recommendations should be captured in an S&PIC-approved document to provide amplification and clarification of the position statement for those desiring further background and supporting information.

This document provides background information on the revised position statement issued in August 2000. It should be considered as an adjunct to the position statement and not as a “stand alone” document.

Reason for Revising the March 1993 Position Statement

The S&PIC identified a number of reasons for revising the March 1993 position statement. In March 1993, the International Commission on Radiological Protection (ICRP) had issued a report providing new recommendations for radiation protection, including recommendations for protection of the general public (ICRP 1991), but the National Council on Radiation Protection and Measurements (NCRP) had not yet issued a report adopting the new ICRP recommendations for the United States. However, some significant activities related to radiation safety standards for the general public were in progress in the United States. Most notably, the Nuclear Regulatory Commission (NRC) and Environmental Protection Agency (EPA) were beginning a process for rulemaking to establish radiological criteria for cleanup of decommissioned or previously used radiological sites. Therefore, the Society identified a need to provide an impartial and scientific statement on appropriate dose limits for the general public in the United States, giving consideration to the newly issued recommendations of the ICRP.

In the intervening seven years, the NCRP issued a report adopting the new recommendations of the ICRP (NCRP 1993), and the NRC issued a rulemaking for site cleanup (NRC 1997). However, the EPA has not endorsed the NRC rule for site cleanup and has issued its own conflicting guidance. More importantly, the EPA and NRC have adopted different approaches to setting radiation safety standards for the general public resulting in conflicting standards.

Therefore, the S&PIC felt the March 1993 statement was in need of revision to address the primary issue related to radiation safety standards for the general public, i.e., the conflict between the EPA and NRC.

Major Changes

Major changes from the March 1993 to the August 2000 position statement are:

1. The August 2000 position statement clearly supports adoption of the ICRP and NCRP recommendations for radiation safety standards for the general public, with which the NRC approach is consistent.
2. The use of the principle of "As Low as Reasonably Achievable" (ALARA) has been restated with some changes, principally related to quantification of ALARA.
3. Discussions of "Assessment Threshold Screening Levels," "Negligible Individual Dose," *de minimis* regulatory levels, etc., have been eliminated.
4. Discussions of collective dose have been eliminated.
5. Discussions of intervention levels for elevated doses from natural radiation sources and potential doses have been eliminated.

Principal Recommendations and the NRC and EPA Approaches to Setting Standards

The August 2000 statement has five principal recommendations. Recommendations 1, 2, 4, and 5 directly endorse the principles of the ICRP and NCRP recommendations for *Justification*, *Optimization*, *Dose Limitation*, and *Dose Constraint*, respectively.

Recommendation 3 directly addresses the issues that separate the NRC and EPA approach, i.e., dose-based, all-pathway standards and not estimated-risk based, separate pathway standards. Radiation protection

standards for the public based on ICRP and NCRP recommendations have been criticized by the EPA on the grounds that they are not adequately protective of public health and the environment (Browner 1997; Trovato 1997; Phillips 1997). The EPA especially has disputed standards of the NRC for remediation of radioactively contaminated sites and disposal of radioactive waste that include a source constraint of 0.25 mSv (25 mrem) in any year (NRC 1997, 1999). The EPA prefers a source constraint of 0.15 mSv (15 mrem) in any year and an additional provision that concentrations of radionuclides in potential sources of drinking water (e.g., groundwater) should not exceed standards applicable to public drinking water supplies (EPA 1993, 1999; Luftig and Weinstock 1997).

The constraint preferred by the EPA is based on an approach to health protection of the public embodied in various environmental laws addressing chemical agents and, in many cases, radionuclides.¹ This approach incorporates goals for acceptable risk for specific exposure situations and an allowance for an increase (relaxation) in risks above the goals based, for example, on technical feasibility and cost. (This approach differs from the approach embodied in ICRP and NCRP recommendations of specifying a limit on allowable dose from all controlled sources combined, establishing a constraint on individual sources of exposure, and requiring reductions in dose based on the ALARA principle.) The EPA source constraint of 0.15 mSv in any year is based on a policy that lifetime cancer risks should not normally exceed a goal of about 10^{-4} . The additional provision concerning water resource protection is based, in part, on the EPA's groundwater protection strategy (EPA 1991).

Regarding the EPA approach to radiation safety standard setting:

1. We do not support the use of hypothetically calculated risk coefficients at the level of environmental radiation exposures, as is done by the EPA in its conversion of a risk goal to a dose constraint value (HPS 1995, 1996). This is reaffirmed in recommendation 3 of the August 2000 statement, which recommends a dose-based limit and not a hypothetical risk-based limit. This position is expanded in the testimony of the Society president at a hearing of the House Science Subcommittee on Energy and Environment on 18 July 2000 (HPS 2000a).
2. We support the finding by the National Academy of Science's National Research Council (NAS/NRC 1999) that the EPA's dispute with the NRC over standards for remediation of radioactively contaminated sites has no scientific or technical basis but is strictly a matter of differences of opinion about policies for risk management. We are concerned that criticisms of established standards based only on matters of policy may serve to erode public confidence in radiation protection programs.
3. We object to the statement that a source constraint of 0.25 mSv (25 mrem) in any year does not adequately protect public health and the environment or that risks above legal or regulatory goals (e.g., a lifetime cancer risk of 10^{-4}) are "unacceptable." The difference between 0.25 mSv and the constraint of 0.15 mSv preferred by the EPA cannot be regarded as significant and often cannot be distinguished reliably in a dose assessment. The risks, if any, associated with these doses are too small to be quantified or measured. Limiting the annual effective dose to 0.25 mSv and applying the ALARA principle to further dose reduction would not allow substantial increases in risks from consumption of drinking water. Risks to the public deemed "unacceptable" are situation-specific; many EPA standards and guidance for limiting public exposures to radionuclides and chemical carcinogens correspond to risks substantially above 10^{-4} .

4. We object to a practice of establishing regulatory policy for protection of water resources, or any other public health or environmental concern, by means of agency guidance. We believe that standards for protection of public health and the environment should be established in accordance with the normal public rulemaking process.

Restatement of ALARA

The March 1993 position statement includes an extensive discussion regarding the application of the ALARA principle to dose limits for the general public. This discussion included recommendations for placing a monetary value on dose avoided including a recommended calculation of this value. The statement also opposed “. . . the incorporation of the ALARA principle, directly or by implication, into a regulation or regulatory guidance that would imply that it is a legal requirement.”

The Society recently established a position on the use of ALARA in relation to occupational radiation safety standards (HPS 2000b). Although developed in the context of occupational standards, the principles expressed in this position statement also apply to the use of the ALARA principle in general public radiation safety standards. The August 2000 position statement reflects the adoption of the more recent position on ALARA.

The August 2000 position statement recognizes the importance of the principle of ALARA as one aspect of the approach to setting radiation safety standards. It does not oppose inclusion of the principle of ALARA in regulations but does oppose quantification of ALARA with respect to dose goals or monetary value of dose avoided. Experience has shown the quantification of ALARA can detract from the understanding and implementation of ALARA as “. . . a philosophy of striving for excellence in the practice of health physics” (HPS 2000b).

Elimination of Assessment Threshold Screening Levels, etc.

The March 1993 position statement included a recommendation for a threshold screening level of 0.05 mSv (5 mrem) below which “. . . no additional assessment or management should be required,” and a discussion of the use of an individual negligible dose and the use of a *de minimis* level for regulatory exemption of a practice.

The August 2000 position statement does not recommend a lower level for dose constraints for several reasons. In the development of a white paper on a proposal by Professor Roger Clarke of the United Kingdom for adoption of a concept he referred to as “controllable dose,” the S&PIC realized that discussion of action levels at a few percent of natural background gave a sense of credibility to the notion that actual risks are known to exist at those levels (HPS 2000c). The Society stated in that paper, “The HPS believes that the proposed ‘Trivial Risk’ level of a few tens of micro-Sieverts [i.e., a few tenths of a milli-rem] is so low that it carries no concern for adverse health effects and should not, therefore, be incorporated into a radiation-protection system.” We believe that same position applies to doses in the range of a few tenths of a milli-Sieverts (i.e., a few milli-rem), which is the range of the March 1993 position statement recommendations for an assessment threshold screening level.

In addition, in September 1999 the Society adopted a position that recommended a constraint level of 0.01 mSv (1 mrem) per year be adopted for the clearance of materials from radiological controls (HPS 1999). Although this is considered to be a trivial dose, it is a recognition that constraint levels may be selected based on social and economic considerations rather than strictly radiological considerations. This is consistent with the

principle of ALARA and is, therefore, consistent with our recommendations in the August 2000 position statement.

Elimination of Collective Dose Statements

The March 1993 position statement includes several statements regarding the use and application of collective dose in setting general public radiation safety standards. These statements have been removed in the August 2000 position.

In its 1996 position statement the Society stated “. . . for a population in which all individuals receive lifetime doses of less than 10 rem above background, collective dose is a highly speculative and uncertain measure of risk and should not be quantified for the purposes of estimating population health risks” (HPS 1996). The Society continues to endorse that position and did not repeat it in the August 2000 position statement.

All recommendations relating to doses to members of the general public in the August 2000 position statement refer to doses to individuals, with no discussion of collective dose or its use in setting general public radiation safety standards. This is consistent with the Society’s position on collective dose.

Elimination of Discussion of Intervention Levels on Natural Radiation Sources and Potential Doses

The March 1993 position statement differentiated between actual or planned doses to real people, intervention where real people are already receiving elevated doses from natural sources of radiation, and potential doses to hypothetical individuals who someday may receive exposure. This differentiation is addressed in the March 1993 position statement because it was introduced in the then newly issued ICRP recommendations (ICRP 1991).

The S&PIC does not believe such differentiation is necessary and considers it complicates the system of radiation safety standard setting. This differentiation is not made in actual practice in the United States.

Regarding intervention to elevated natural radiation sources, the August 2000 position statement excludes natural radiation sources in the environment from the definition of a controllable source, and thus does not recommend regulatory action be taken to intervene or regulate such sources. The position statement does include in the definition of a controllable source technologically enhanced, naturally occurring radioactive material (TENORM) (i.e., radiation exposure from natural radiation sources that occurs due to man’s activities), making it subject to consideration for regulation. Although indoor radon can be considered a type of exposure from TENORM, it is separately identified as a controllable source for the following reason.

The recommendations for dose limitation and constraint exclude indoor radon, but not TENORM, because indoor radon is a unique source of public exposure. Indoor radon exposure is unique due to its extreme variations and its occurrence primarily in the privacy of an individual’s home. For this reason, the Society has a separate position statement regarding the approach to general public protection from radon in the home (HPS 1990) and indoor radon is not, therefore, included in the scope of the August 2000 position statement.

Reason for Revising the Position Statement in June 2003

The S&PIC added a sixth recommendation about radiation safety standards for the public to support the establishment of an acceptable dose of radiation of 1 mSv y⁻¹ (100 mrem y⁻¹) above the annual natural radiation background. As stated in the recommendation, at this dose, risks of radiation-induced health effects are either nonexistent or too small to be observed. The numerical value is in line with the public dose accepted by the U.S. Nuclear Regulatory Commission and with Recommendation #4 of the position statement, which recommends that the sum of effective dose(s) to individual members of the public from exposure to controllable sources with the exception of occupational exposure, accidental releases, and indoor radon, be limited to 1 mSv (100 mrem) in any year.

Endnote

¹These laws include, for example, the Safe Drinking Water Act, Clean Water Act, Clean Air Act, Comprehensive Environmental Response Compensation and Liability Act (CERCLA, or Superfund), Resource Conservation and Recovery Act (RCRA), and Toxic Substances Control Act (TSCA). The EPA is the responsible regulatory authority under each of these laws.

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*The Health Physics Society is a nonprofit scientific professional organization whose mission is excellence in the science and practice of radiation safety. Since its formation in 1956, the Society has represented the largest radiation safety society in the world, with a membership that includes scientists, safety professionals, physicists, engineers, attorneys, and other professionals from academia, industry, medical institutions, state and federal government, the national laboratories, the military, and other organizations. Society activities include encouraging research in radiation science, developing standards, and disseminating radiation safety information. Society members are involved in understanding, evaluating, and controlling the potential risks from radiation relative to the benefits. Official position statements are prepared and adopted in accordance with standard policies and procedures of the Society. The Society may be contacted at 1313 Dolley Madison Blvd., Suite 402, McLean, VA 22101; phone: 703-790-1745; fax: 703-790-2672; email: HPS@BurkInc.com.