Environmental Health Criteria 23

LASERS AND OPTICAL RADIATION

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World Health Organization

INTERNATIONAL PROGRAMME ON CHEMICAL SAFETY

ENVIRONMENT HEALTH CRITERIA 23

LASERS AND OPTICAL RADIATION

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CONTENTS

WHO/IRPA TASK GROUP ON ENVIRONMENTAL HEALTH CRITERIA FOR LASERS

Members

Dr B. Bosnjakovic[a], Ministry of Health and Environment, Rijswijk, Netherlands

Dr L. Court, Commissariat à l'Energie Atomique, Département de Protection, Fontenay-aux-Roses, France

Dr P. Czerski[a], Bureau of Radiological Health, Food and

Drug Administration, Rockville, MD, USA

Dr M. Faber[a], The Finsen Laboratory, Finsen Institute, Copenhagen, Denmark *(Chairman)*

Dr M. Garavaglia, Centre of Optical Investigations CIOp, La Plata, Argentina

Dr F. Hillenkamp, Institute of Biophysics, Frankfurt University, Frankfurt am Main, Federal Republic of Germany

Dr H. Jammet[a], Département de Protection, Commissariat à l'Energie Atomique, Fontenay-aux-Roses, France

Mr R. Landry, Bureau of Radiological Health, Food and Drug Administration, Rockville, MD, USA

Dr J. van der Leun, State University of Utrecht, Institute of Dermatology, Utrecht, Netherlands

Dr J. Marshall[a], Department of Visual Science, Institute of Ophthalmology, London, United Kingdom *(Co-Rapporteur)*

Dr Z. Naprstek, Department of Surgery, Institute for Clinical and Experimental Medicine, Research Department of Surgery, Prague, Czechoslovakia *(Vice-Chairman)*

Dr Qin Jianan, Department of Biophysics, Second Shanghai Medical School, Shanghai, China

Dr M. Repacholi[a], Radiation Protection Bureau, Environmental Health Centre, Health and Welfare Canada, Ottawa, Ontario, Canada

Dr Y. Skorapad, Institute of Medical Radiology of the Academy of Medical Sciences of the USSR, Moscow - Obninsk, USSR

Mr D. Sliney[a], Laser Microwave Division, US Army Environmental Hygiene Agency, Aberdeen Proving Ground, MD, USA *(Co-Rapporteur)*

Dr B. Tengroth, Department of Ophthalmology; Director, Karolinska Hospital (FACK), Stockholm, Sweden

---

[a] From IRPA/International NIR-Committee

Members (contd.)

Professor A. Tsyb, Institute of Medical Radiology of the Academy of Medical Sciences of the USSR, Moscow - Obninsk, USSR

Observers

Dr S. Charschan, Western Electric Engineering Research Laboratory, Princeton, NJ, USA

Secretariat

Dr E. Komarov, Environmental Hazards and Food Protection, World Health Organization, Geneva, Switzerland *(Secretary)*

IRPA Secretariat

Mrs A. Duchêne, Commissariat à l'Energie Atomique,
Département de Protection, Fontenay-aux Roses, France

NOTE TO READERS OF THE CRITERIA DOCUMENTS

While every effort has been made to present information in the criteria documents as accurately as possible without unduly delaying their publication, mistakes might have occurred and are likely to occur in the future. In the interest of all users of the environmental health criteria documents, readers are kindly requested to communicate any errors found to the Division of Environmental Health, World Health Organization, Geneva, Switzerland, in order that they may be included in corrigenda which will appear in subsequent volumes.

In addition, experts in any particular field dealt with in the criteria documents are kindly requested to make available to the WHO Secretariat any important published information that may have inadvertently been omitted and which may change the evaluation of health risks from exposure to the environmental agent under examination, so that the information may be considered in the event of updating and re-evaluation of the conclusions in the criteria documents.

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A detailed data profile and a legal file can be obtained from the International Register of Potentially Toxic Chemicals, Palais des Nations, 1211 Geneva 10, Switzerland (Telephone no., 988400 - 985850)

ENVIRONMENTAL HEALTH CRITERIA FOR LASERS AND OPTICAL RADIATION

Further to the recommendations of the Stockholm United Nations Conference on the Human Environment in 1972, and in response to a number of World Health Assembly resolutions (WHA23.60, WHA24.47, WHA25.58, WHA26.68) and the recommendation of the Governing Council of the United Nations Environment Programme, (UNEP/GC/10, 3 July 1973), a programme on the integrated assessment of the health effects of environmental pollution was initiated in 1973. The programme, known as the WHO Environmental Health Criteria Programme, has been implemented with the support of the Environment Fund of the United Nations Environment Programme.

A joint WHO/IRPA Task Group on Environmental Health Criteria for Lasers and Optical Radiation met in Paris from 1-5 June 1982. Dr E.I. Komarov, Division of Environmental Health, WHO, opened the meeting on behalf of the Director-General, and Dr H. Jammet, Chairman of IRPA/INIRC made some introductory comments. The Task Group reviewed and revised the draft criteria document, made an evaluation of the health risks of exposure to lasers and optical radiation, and considered rationales for the development of exposure limits.

In November 1971, the WHO Regional Office for Europe convened a Working Group meeting in The Hague which recommended, *inter alia,* that protection of man from laser radiation hazards should be considered a priority activity in the field of non-ionizing radiation protection. To implement these recommendations, the Regional Office has prepared a publication on "Nonionizing radiation protection", which includes a chapter on laser radiation (Suess, ed., 1982). In October 1974, the Regional Office convened

a Working Group in Dublin, hosted by the Government of Ireland, to discuss laser radiation hazards. This provided one of the first opportunities for the exchange of information on the biological effects of laser radiation and threshold data, at an international level.

The International Radiation Protection Association (IRPA) became responsible for NIR activities in 1974 by forming a Working Group on Non-Ionizing Radiation which became the International Non-Ionizing Radiation Committee (IRPA/INIRC) at the IRPA meeting in Paris in 1977 (IRPA, 1977). Dr M. Faber, Dr J. Marshall, Mr D. Sliney (members of IRPA/INIRC) and Dr L. Court, all acting as WHO temporary advisers, prepared the draft criteria document on lasers and optical radiation during 1980-81, and revised it after receiving comments from the national focal points for the Environmental Health Criteria Programme and individual experts. Dr Marshall and Mr Sliney were responsible for the final scientific editing. The Secretariat gratefully acknowledges the work of these experts without whose help the document could not have been completed.

The document is based primarily on original publications listed in the reference section. Additional information was obtained from a number of general reviews, monographs, and proceedings of symposia including: Urbach, ed. (1969), Goldman & Rockwell (1971), Wolbarsht (1971, 1974, 1977), Sliney & Freasier (1973), Fitzpatrick (1974), Magnus (1976), Rubin (1977), Parrish et al. (1978), Lerman (1980a), Pratesi & Sacchi, ed. (1980), Sliney & Wolbarsht (1980), Williams & Baker, ed. (1980), Goldman, ed. (1981), and Goldman et al. (1982). Radiometric terms, units, and spectral band designations used in this criteria document are in accordance with the SI recommendations (Lowe, 1975) and those recommended by the Commission Internationale de l'Eclairage (CIE, 1970).

Modern advances in science and technology have changed man's environment, introducing new factors which, besides their intended beneficial uses, may also have untoward side effects. Both the general public and health authorities are aware of the dangers of pollution by chemicals, ionizing radiation, and noise, and of the need to take appropriate steps for effective control. The rapid growth of electro-optics and laser technology and the increasing use of electro-optical devices and lasers, including optical scanning equipment, high-intensity lamps, welding arcs, and UV photo-curing equipment, alignment lasers, and medical lasers have increased the possibility of human exposure to optical radiation and, at the same time, concern about health effects.

This document provides information on the physical aspects of