



DIRECTORY OF WHOLE-BODY RADIOACTIVITY MONITORS

1970 EDITION



INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA, 1970

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FOREWORD

The assessment of low-level radioactive body-burdens in man is a problem that is receiving increasing attention and a need has been recognized for physical surveillance of not only occupationally exposed persons but also of members of the public throughout the world. The measurements are made in 'whole-body radioactivity monitors', which, in the majority of cases, consist of a steel room acting as a radiation shield, a very sensitive detector system and a subject support that provides a constant monitoring geometry. Such steel rooms weigh around 60 tonnes and, together with the associated equipment, cost from US \$15 000 to \$500 000. The technical data on whole-body monitors and the results of body-burden measurements are scattered throughout the world literature under many different subject headings. Therefore, in an attempt to provide a single reference work containing technical information on whole-body counting throughout the world, the International Atomic Energy Agency initiated a survey in 1961, and published in 1964 the first 'Directory of Whole-Body Radioactivity Monitors'.

Since that time the number of monitors in use has doubled, and there has been a very great increase in the number used for medical diagnostic and therapeutic work with patients, and for metabolic studies involving very low doses of radioactive tracers. The costs that were mentioned above do not reflect the costs of the continuing research, which has had the aim of perfecting certain diagnostic techniques in medical radioisotope work and has resulted in interesting advances both in system design and instrumentation.

Particular attention should be drawn to the growing numbers of monitoring rooms in the developing countries, which can ill afford the high costs of the more sophisticated systems. Experts in these countries can, having decided the uses to which the device is to be put, determine from the data given in the Directory the most economical system that will achieve their aims.

The value of the first Directory has been evidenced by the number of references to it made in the scientific literature and at scientific meetings since its publication, and the amount of additional material collected since 1964 has prompted the Agency to publish this second and much enlarged edition. The volume contains a list of laboratories operating such monitors, technical data on the design and performance of the apparatus, an Intercomparison of Data, and a Bibliography of the relevant literature.

The survey for the 1970 Directory was initiated by Mr. S. Somasundaram of the Division of Health, Safety and Waste Management, who is also responsible for the Bibliography. The main text was largely prepared by Mr. E.R.A. Beck, of the Division of Publications, and edited by Mrs. Brigitte Kaufmann of the same Division. During the preparation of the Directory, Dr. J.G. Mehl, then of the Kernforschungszentrum Karlsruhe, served as consultant.

The Directory is intended to be used by the specialist in a loose-leaf form, and it has been provided with holes enabling the user to file it in his own binder after guillotining off the back. Supplementary editions will appear biennially in a similar binding: these will contain new information and changes to previous editions which may be inserted in the appropriate places.

Operators of whole-body radioactivity monitors capable of measuring the natural radioactive burden of the human body are asked to assist the Agency by forwarding their most up-to-date information to:

The Director,
Division of Health, Safety and Waste Management,
International Atomic Energy Agency,
Kärntner Ring 11,
P.O.Box 590,
A-1011 Vienna,
Austria

quoting the reference SC/411-1 and their monitor code (if known) on the letter.

EDITORIAL NOTE

The use in this Directory of particular designations of countries or territories does not imply any judgement by the Agency as to the legal status of such countries or territories, of their authorities and institutions or of the delimitation of their boundaries.

The mention of specific companies or of their products or brand-names does not imply any endorsement or recommendation on the part of the International Atomic Energy Agency.

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COVER: The cover shows a subject and a phantom seated in 'Miller-type' chairs, and an aluminium-canned NaI(Tl) crystal. These represent the technique and detector, respectively, most commonly used at the end of the 1960s.

INTRODUCTION

There is still an increasing demand for direct measurements of total body radioactivity at and below the maximum permissible body burdens. Whole-body radioactivity monitors capable of measuring such low activity levels are costly if they are to be used for radionuclides of high radiotoxicity (and consequently low maximum permissible body burden) or for radionuclides which emit high energy photon radiation with a low yield. A good deal of laboratory space and manpower are needed to operate such apparatus to full advantage. For these reasons it becomes obvious that such facilities cannot be readily available everywhere, even if there were good reasons to perform such measurements at many places.

It was therefore felt to be a useful project to prepare a world list of whole-body radioactivity monitors available for low-activity-level measurements, which could help to promote closer co-operation between the laboratories operating these and the establishments which, though concerned with problems of low-level body-radioactivity measurements, cannot afford to operate such apparatus on their own.

It was believed, furthermore, that a list of technical data in a form suitable for intercomparison of techniques applied, equipment used and sensitivity achieved would be useful to those interested in direct measurements of internal contamination and to those wishing to design and construct apparatus required for such measurements. The original edition was well received, and the interest in having more up-to-date information has resulted in the preparation of this 1970 edition of the Directory.

Since not all the relevant data are easily available in a form which permits intercomparison, the co-operation of all the laboratories operating, or having advanced plans for operating, whole-body monitors was requested. A blank data sheet and explanations to the data sheet specifying the information required were circulated. We wish to thank all those experts in the various institutes that co-operated with us by helping to bring our information up to date. It is in the nature of such surveys that they can never be complete. All those monitors which were known to be in operation at the end of 1967 have been included. Additional information is included on monitors which were scheduled to have become operational in 1968 or later.

In addition, use has been made of the open literature as far as possible. The bibliography which resulted from the search of publications pertaining to direct measurements of body radioactivity is intended to supplement the information compiled in this Directory.

The results of this survey have been summarized and are classified in a manner described in the following two sections.

GENERAL INFORMATION

Table A contains the full addresses of Institutes which operate low-level, whole-body radioactivity monitors, classified according to the States where these laboratories are located and reference numbers of the data sheets giving the technical details and diagrams for the individual monitors of each laboratory in the directory. The table lists all monitors known to the compilers. The year in which these monitors became operational is added in order to facilitate the search for publications from the individual laboratories in the bibliography (in Part IV) which is classified by years.

If no data sheet is included (i.e. if the monitor is no longer in operation, or if no data was made available) one or two asterisks, respectively, are placed against the monitor reference.

GENERAL INFORMATION

TABLE A. LABORATORIES OPERATING LOW-LEVEL,
WHOLE-BODY RADIOACTIVITY MONITORS

State	Institute	Data sheet code	Operating since
Australia	Anti-Cancer Committee of the University of Adelaide, Radiotherapy Department of the Royal Adelaide Hospital, North Terrace, Adelaide, S. Australia	AL 1.1. AL 1.2.	1959 1961
	Australian Atomic Energy Commission Research Establishment, Health Safety Division, New Illawara Road, Lucas Heights, Sutherland, N.S.W.	AL 2.1.	1962
	New South Wales State Cancer Council, Prince of Wales Hospital, Special Unit for Investigation and Treatment, Avoca Street, Randwick, N.S.W.	AL 3.1.	1963
Argentina	Comisión Nacional de Energía Atómica, Centro Atómico Ezeiza, Gerencia de Seguridad e Inspección, Avenida del Libertador 8250, Buenos Aires	AR 1.1.	1966
	Centro de Medicina Nuclear, Buenos Aires	*AR 2.1.	
Austria	International Atomic Energy Agency, Division of Research and Laboratories, Kärntner Ring 11-13, A-1011 Vienna	AU 1.1.	1962
	Allgemeine Unfallversicherungsanstalt, Arbeitsunfallkrankenhaus Meidling, Kundratstrasse 37, A-1120 Vienna	AU 2.1.	1968
Belgium	Centre d'Etudes Nucléaires (CEN), Département Mesures et Contrôle des Radiations, Mol-Donk	BE 1.1.	1959
	Université de Louvain, Institut du Cancer, Département Décontamination et Mesure, 37, Voer des Capucins, Louvain	BE 2.1. ^a	

* No data sheet available

^a This monitor and associated laboratory complex had been planned in detail, and was listed in the 1964 edition of the Directory: it was not built.

TABLE A (cont.)

State	Institute	Data sheet code	Operating since
Belgium (cont.)	Université de Liège, Laboratoire de Chimie Médicale, Toxicologie et Hygiène, 1, rue des Bonnes-Villes, Liège	BE 3.1.	1967
Brazil	Instituto de Física da Pontifícia Universidade Católica do Rio de Janeiro, Environmental Radioactivity Sector, Rua Marques de São Vicente 209, Rio de Janeiro	BZ 1.1.	1966
	Instituto de Energia Atômica, Cidade Universitária, C. P. 11049, Pinheiros, São Paulo	*BZ 2.1.	
	Instituto de Energia Atômica, Laboratório de Radioisótopos - la Clínica Médica, Hospital das Clínicas, Sala 8.139, São Paulo	*BZ 3.1.	
Canada	University of Toronto, Department of Physics, Toronto 5, Ont.	CA 1.1.	1958
	Atomic Energy of Canada Ltd., Medical Research Branch, Chalk River, Ont.	CA 2.1.	1959
	Radiation Protection Division, Department of National Health and Welfare, Whole-body monitor, Brookfield Road, Ottawa 8, Ont.	CA 3.1. CA 3.2.	1961 1965
	Atomic Energy of Canada Ltd., Whiteshell Nuclear Research Establishment, Medical Biophysics Laboratory, Health and Safety Branch, Pinawa, Man.	CA 4.1.	1967
	Toronto General Hospital, Toronto, Ont.	*CA 5.1.	
Congo (Dem. Rep.)	Centre Nucléaire TRICO, Faculté de Médecine, B.P. No. 247, Kinshasa XI	CG 1.1.	1966

* No data sheet available

GENERAL INFORMATION

TABLE A (cont.)

State	Institute	Data sheet code	Operating since
Czechoslovak Socialist Republic	Institute of Radiation Hygiene, Department of Nuclear Spectrometry, Šrobárova 48, Prague - Vinohrady	CS 1.1.	1962
Denmark	Finseninstitutet og Radiumstationen, Finsenlaboratory, Strandboulevard 49, Copenhagen	**DK 1.1. DK 1.2.	1953-1960 1960
	Danish Atomic Energy Commission, Research Establishment Risø, Health Physics Department, Risø, Roskilde	DK 2.1.	1963
	Glostrup Hospital, Department of Clinical Physiology, 2800 Glostrup, Copenhagen	DK 3.1.	1968
Finland	University of Helsinki, Department of Radiochemistry, Unioninkatu 35, Helsinki	FI 1.1. FI 1.2.	1962 1963
	Institute of Radiation Physics, Department for Low-Level Measurements, Unioninkatu 38B, P.O. Box 10268 Helsinki 10	FI 2.1.	1965
France	Commissariat à l'Energie Atomique, CEN Saclay, Service d'Electronique Industrielle, B.P. No.2, 91 Gif-sur-Yvette (Seine et Oise)	FR 1.1. *FR 1.2.	1958
	Commissariat à l'Energie Atomique, CEN Fontenay-aux-Roses, Département de la Protection Sanitaire, B.P. No.6, 92 Fontenay-aux-Roses (Seine)	FR 2.1. FR 2.2.	1959 1960
	Commissariat à l'Energie Atomique, Centre de Production de Plutonium de Marcoule, Laboratoire de Radiotoxicologie (Service Médical), B.P. No.106, 30 Bagnols-sur-Cèze	FR 3.1. FR 3.2.	1960 1966

* No data sheet available

** No longer in operation: no data sheet given

PART I

TABLE A (cont.)

State	Institute	Data sheet code	Operating since
France (cont.)	Ministère des Affaires Sociales, Service Central de Protection contre les Rayonnements Ionisants, B.P. No. 35, 78 Le Vésinet	FR 4.1. FR 4.2. FR 4.3.	1961 1961 1969
	Commissariat à l'Energie Atomique, CEN Saclay, Service Médical, B.P. No. 2, 91 Gif-sur-Yvette (Seine et Oise)	FR 5.1. FR 5.2. *FR 5.3.	1962 1963
	Commissariat à l'Energie Atomique, CEN Fontenay-aux-Roses, Laboratoire Médical, B.P. No. 6, 92 Fontenay-aux-Roses (Seine)	FR 6.1. FR 6.2.	1962 1965
	Commissariat à l'Energie Atomique, CEN Grenoble, Laboratoire de Toxicologie, Médico-Social, B.P. No. 269, Grenoble	FR 7.1.	1964
	Clinique des Maladies Métaboliques et Rénales, Laboratoire de Physique, Hôpital de Antiquaille, 69 Lyon 5	FR 8.1.	1968
Greece	University of Athens School of Medicine, Department of Clinical Therapeutics, Vass Sofias - K. Lourou Street, Athens	*GR 1.1.	
Germany (Fed. Rep.)	US Army Medical Research Unit in Europe, Landstuhl/Pfalz, Kirchberg, Bldg. 3809	GY 1.1.	1959
	Max-Planck Institut für Biophysik, Low-level laboratory, Kennedy Allee 70, 6 Frankfurt am Main	GY 2.1.	1960
	Kernreaktor Bau- und Betriebs GmbH., Abteilung für Strahlenschutz und Dekontamination, Strahlenmessdienst, Postfach 947, 75 Karlsruhe	GY 3.1. *GY 3.2. *GY 3.3.	1961

* No data sheet available

GENERAL INFORMATION

TABLE A (cont.)

State	Institute	Data sheet code	Operating since
Germany (Fed. Rep.) (cont.)	Freie Universität, Strahleninstitut, Body Radioactivity Measurements Group, Soorstrasse 83, Berlin - Charlottenburg	GY 4.1.	1961
	University of Heidelberg, Czerny Krankenhaus für Strahlenbehandlung, Voss Strasse 4, 6900 Heidelberg	GY 5.1.	1962
	University of Hamburg, Department of Physiological Chemistry, Vitamin Division, Martinistrasse 52, 2 Hamburg 20	GY 6.1.	1962
	Kernforschungsanlage Jülich GmbH., Zentralabteilung Strahlenschutz, Postfach 365, 517 Jülich	**GY 7.1. GY 7.2.	1964-1965 1965
	Universitätsklinik, J.-Stelzm. Strasse 9 Köln	*GY 8.1.	
	Universität des Saarlandes, Institut für Biophysik, Landeskrankenhaus, 665 Homburg/Saar	GY 9.1.	1965
	Strahlenmessstelle der Gewerbeaufsicht des Landes Nordrhein-Westfalen, Haroldstrasse 17, 4 Düsseldorf	GY 10.1.	1963
	Städtische Krankenanstalten, Strahleninstitut, Radionuklid-Diagnostik, Flurstrasse 17, 85 Nürnberg	GY 11.1.	1968
	Bundesgesundheitsamt, Laboratorium für natürliche und künstliche Radioaktivität, Abteilung Strahlenschutz und Strahlenbelastung, 1 Berlin 33	GY 12.1.	1966
	Universitätskliniken im Landes-Krankenhaus, Kinderklinik, 665 Homburg/Saar	*GY 13.1.	

* No data sheet available

** No longer in operation; no data sheet given

PART I

TABLE A (cont.)

State	Institute	Data sheet code	Operating since
Germany (Fed. Rep.) (cont.)	Gesellschaft für Strahlenforschung mbH, Institut für Strahlenschutz, Ingolstädter Landstrasse 1, 8042 Neuherberg/München	GY 14.1. GY 14.2.	1968 1968
Hungary	National Institute of Oncology, Physics Department, Ráth György ut. 5, Budapest XII	HY 1.1.	1963
	Hungarian Academy of Sciences, Central Research Institute for Physics, Health Physics Department, Konkoly Thége ut., Budapest XII	HY 2.1.	1964
	Ore Mining Company of Mecsek, Low-level Counting Laboratory, Health Service, Hajnóczi ut. 35/c, Pécs III	HY 3.1.	1967
India	Bhabha Atomic Research Centre, Health Physics Division, Body-Burden Measurements Section, Chatrapathi Shivaji Maharaj Marg, Bombay 1	IN 1.1.	1962
	Bhabha Atomic Research Centre, Health Physics Division, Trombay, Bombay 74	IN 1.2.	1966
Israel	Israel Atomic Energy Commission, Nuclear Research Centre Negev, Radiobiology Department, P.O. Box 9001, Beer-Sheba	IS 1.1.	1967
Italy	Comitato Nazionale per l'Energia Nucleare, Laboratorio di Fisica Sanitaria, Centro di Calcolo, Via Mazzini 2, Bologna	IT 1.1.	1963

GENERAL INFORMATION

TABLE A (cont.)

State	Institute	Data sheet code	Operating since
Italy (cont.)	Comitato Nazionale per l'Energia Nucleare, Centro di Studi Nucleari della Casaccia, Divisione di Biologia e di Protezioni Sanitaria, Laboratorio per lo Studio della Radioattività Ambientale, CNEN-CSN Casaccia - C.P. 2400, I-00100, Rome	IT 2.1.	1966
	Euratom,	**IT 3.1.	1962-1963
	Health Physics Department, Ispra (Varese)	**IT 3.2.	1962-1966
		IT 3.3.	1966
Japan	Japan Atomic Energy Research Institute, Division of Health Physics and Safety, Tokai-mura, Naka-gun, Ibaraki-ken	JA 1.1.	1961
	National Institute of Radiological Sciences, Division of Physics and Engineering, 1-9, 4-chome, Anagawa, Chiba-shi	JA 2.1.	1961
		JA 2.2.	1961
	Kanazawa University, School of Medicine, Department of Radiology, 13-1 Takara-machi, Kanazawa-shi, Ishikawa-ken	*JA 3.1.	
	Kyoto University Medical School, Central Clinic of Radiology, Shogoin, Sakyo-ku, Kyoto-shi	JA 4.1.	1966
		*JA 4.2.	1966
	Kyoto University, Division of Radiation Control, Research Reactor Institute, Noda, Kumatori-cho, Sennan-gun, Osaka	JA 5.1.	1967
	University of Tokyo, Department of Radiological Health, Faculty of Medicine, Hongo, Bunkyo-ku, Tokyo	JA 6.1.	1965
Jamaica	Mitsubishi Atomic Power Industries, Engineering and Research Laboratory, 297 Kitafukuro-machi, 1-chome, Ohmiya City	*JA 7.1.	
	University of the West Indies, UK Medical Research Council, Tropical Metabolism Research Unit, Mona, Kingston 7	JM 1.1.	1964

* No data sheet available

** No longer in operation; no data sheet given

PART I

TABLE A (cont.)

State	Institute	Data sheet code	Operating since
Netherlands	National Health Research Organization TNO, Radiologische Werkgroep, Utrechtweg 310, Arnhem	NE 1.1.	1965
	Reactor Centrum Nederland, Health Protection Department, 's Gravenhage, Petten (N.H.)	NE 2.1.	1965
	Institute of Radiopathology and Radiation Protection, Radiological Physics Division, Wassenaarse Weg 52, Leiden	NE 3.1.	1969
	Academie Hospitaal, Leiden	*NE 4.1.	
Norway	Norsk Hydro Institute for Cancer Research, Norwegian Radium Hospital, Montebello, Oslo 3	NO 1.1.	1962
Poland	Institute of Occupational Medicine, Department of Radiological Protection, Łódź, Teresy 8	PO 1.1.	1962
	Institute of Nuclear Research, Health Physics Department, Świerk, Otwock	PO 2.1.	1963
		PO 2.2.	1967
Romania	Nuclear Medical Centre, Str SF Gheorghe Hou No.19 RA 1 T.V. Bucharest	*RM 1.1.	
South Africa	Atomic Energy Board, Division of Isotopes and Radiation, Private Bag 256, Pelindaba, Pretoria	SA 1.1.	1964
	South African Institute for Medical Research, Isotopes Department, Hospital Road, Johannesburg	SA 2.1.	1965
Sweden	National Institute of Radiation Protection, Low-activity laboratory, Karolinska Sjukhuset, Stockholm 60	**SN 1.1.	1949-1966
		SN 1.2.	1952
		**SN 1.3.	1952-1965
		SN 1.4.	1959
		SN 1.5.	1966
		SN 1.6. ^b	1965

* No data sheet available

** No longer in operation; no data sheet given

^b SN 1.3. in a new location

GENERAL INFORMATION

TABLE A (cont.)

State	Institute	Data sheet code	Operating since
Sweden (cont.)	A.B. Atomenergi, Department of Radiation Protection and Instrumentation, Drottning Kristinas Väg 47	**SN 2.1.	1958-1965
	A.B. Atomenergi, Health and Safety Section, Studsвик, Nyköping	SN 2.2.	1962
	University of Lund, Radiation Physics Department, Lasarettet, Lund	SN 3.1. **SN 3.2. SN 3.3.	1959 1961-1967 1962
	Gymnastika Centralinstitutet, Physiology Department, Stockholm	*SN 4.1.	
	Research Institute of National Defence, Department 4, Drottning Kristinas Väg 47 Stockholm Ö	SN 5.1.	1958
	University of Gotenburg, Faculty of Medicine, Gotenburg	*SN 6.1.	
Spain	Junta de Energía Nuclear, División de Medicina y Protección, Ciudad Universitaria, Madrid 3	SP 1.1.	1968
USSR	Institute of Radiation Hygiene of the Ministry of Public Health of the USSR, Division of Human Body Radioactivity Measurements, 8 Mira Street, Leningrad	SU 1.1. SU 1.2.	1961 1964
	Institute of Biophysics of the Ministry of Public Health of the USSR, Human Radiation Counting Laboratory, Zhivopisanaya 22, Moscow D-182	SU 2.1. SU 2.2. SU 2.3.	1960 1966 1967
	I. V. Kurchatov Atomic Energy Institute, 46 Ulitsa Kurchatova, P.O. Box 3402, Moscow	SU 2.4. SU 3.1.	1968 1961
	Institute of Medical Radiology of the Academy of Medical Sciences, Laboratory of Whole Men's and Animals' Body Counting, Obninsk, Kaluga Region	SU 4.1. SU 4.2.	1965 1966
Switzerland	Service Cantonal de Contrôle des Irradiations, 44, boulevard de la Cluse, 1211 Geneva	SW 1.1.	1962

* No data sheet available

** No longer in operation; no data sheet given