

**FIFTH COORDINATION MEETING OF WHO COLLABORATING  
CENTRES IN RADIATION EMERGENCY MEDICAL PREPAREDNESS  
AND ASSISTANCE, (REMPAN)**

**Paris, France , 5-8 December 1994**

**Contents**

		<b>Page</b>
1.	<b>CRERMA - Collaborating Centre for Radiation Emergency Response and Medical Assistance (Buenos Aires, Argentina) .....</b>	<b>26</b>
2.	<b>CRPREMA - Collaborating Centre for Radiation Protection and Radiation Emergency Medical Assistance (Yallambie, Australia) ....</b>	<b>29</b>
3.	<b>CRPMPRA - Collaborating Centre on Radiation Protection and Medical Preparedness for Radiation Accidents (Rio de Janeiro, Brazil) .....</b>	<b>33</b>
4.	<b>CREMPA - Collaborating Centre for Radiation Emergency Medical Preparedness and Assistance (Ulm, Germany) .....</b>	<b>39</b>
5.	<b>CREH - Collaborating Centre for Radiation Effects on Humans (Hiroshima, Japan) .....</b>	<b>52</b>
6.	<b>CREA - Collaborating Centre for Radiation Emergency Assistance (Oak Ridge, USA) .....</b>	<b>57</b>
7.	<b>ICCR - International Collaborating Centre for Radiopathology (Le Vésinet, France) .....</b>	<b>67</b>
8.	<b>CCMRP - Collaborating Centre for Medical Radiation Pathology (St. Petersburg, Russia) .....</b>	<b>109</b>

**1. CRERMA - Collaborating Centre for Radiation Emergency Response and Medical Assistance (Buenos Aires, Argentina, Director - Chief Eng. J. Skvarca)**

In March 1990 the Department of Radiation Physics of the Ministry of Health of Argentina was officially designated as the WHO Collaboration Centre for Radiation Emergencies, Medical Preparedness and Assistance (REMPAN).

The point of contact for this Centre is the Department of Radiation Health Physics, Department of Medical and Sanitary Equipment.

The Centre is based on the existing structures of two institutions responsible by law for ionizing radiation in Argentina, and the hospital facilities in Buenos Aires.

- a) Ministry of Health which, through its Radiation Health Physics Department on the national level Federal Systems and its similar divisions in the provinces, as responsible for X-ray sources and linear accelerators (protection, training, licensing etc.

This Department functions at a national level by supporting a permanent advisory committee (CTARI) on ionizing radiation.

- b) National Atomic Energy Commission (CNEA) which is responsible for nuclear plants and all radioactive materials (protection, training, licensing etc.).

At the end of this year (Oct. 1994) CNEA splits in three new institutions. One of them, the National Regulatory Nuclear Committee - ENREN, ENTE NACIONAL REGULADOR NUCLEAR is today responsible at the national level on regulations, safety, protection and licensing as before CNEA.

These two organizations work very closely together. In 1984 both institutions together with the Municipality of the City of Buenos Aires which coordinates the Civil Defense for the entire country, agreed by a special convention to establish a system called SAMARI (System for Medical Preparedness and Assistance to persons overexposed from ionizing radiation). This agreement covers three important items:

- a) Distribution of duties in response to a radiation accident, including assignment for radiological emergency facilities and equipment;
- b) Elaboration of emergency plans for a radiation accident, which should describe its typical features and measurements to be taken;
- c) Identification of the experts and hospital facilities for preparedness and response.

The National Atomic Energy Commission (now National Regulatory Nuclear Committee) has the capability to provide physical reconstruction of the accident, means of decontamination, instrumentation including whole-body counter units, stationary and mobile laboratories for environmental measurements and biological dosimetry.

The Health Ministry will coordinate the hospital facilities. There are two general hospitals in Buenos Aires having special sterile rooms and other facilities such as a unit for treatment of burns. The Ministry also provides the National Emergency Communication and Transportation Network (DINES) which has representatives in all provinces.

At the international level, particularly for countries in Latin America, we have a strong and fast contact in coordination and cooperation in this field through the Programme of HSD of PAHO from Washington (Regional Adviser in Radiological Health).

The work in recent years has been directed to the following aims:

- 1) To consolidate activities among the different components of the Collaborating Centre (CNEA, MCBA, Ministerio de Salud).
- 2) To establish technical and administrative contacts with relevant institutions in Latin America. (IPEN-PERU, CIN-URUGUAY, DPR-PARAGUAY).
- 3) To support with expertise international training courses in radiation emergency preparedness and management (Toluca, Mexico - January 1990; Buenos Aires, Argentina - August 1991 and 1992, Asuncion, Paraguay 1991).
- 4) To provide technical assistance to Spanish-speaking countries in Latin America (elaboration and improvement of the national legislation on radiation protection including preparedness for radiation emergencies).
- 5) To exchange technical documentation with other collaborating centres.
- 6) To render assistance in radiation accidents such as in San Salvador (San Salvador) and in Santa Cruz (Bolivia).
- 7) To participate in international coordination meetings of WHO Collaborating Centres on radiation emergency.
- 8) To carry out a research project on the correlation of physical dosimetry with biological indicators of radiation sickness in primates (rhesus).

The biological indicators considered in the above-mentioned project are cytological indices (peripheral blood and bone marrow), free radical induction in bone and teeth measures by electron spin resonance techniques, biochemical changes (aurine concentration in serum and amilase activity in saliva), immunological tests (T and B lymphocyte count, immunoglobulin and antibody production in vitro). The full description is available in Spanish.

There were two major radiation accidents in Argentina. One occurred in 1968 at a  $^{137}\text{Cs}$  industrial source. The other one took place in 1983 at a small nuclear research reactor and the exposed worker died after 48 hours. A minor accident happened over 10 year ago with a  $^{60}\text{Co}$  unit when the physician lost some of his fingers.

In improving the medical preparedness for radiation emergencies an important step has been the establishment of a regional network, based usually on Regional Hospitals of different Provinces in Argentina to involve all the country in coordination with the National Collaborating Centre. Special

questionnaires were developed for hospitals to facilitate the triage. At the international level (South America), the Centre is officially in touch with health authorities from Paraguay-Departamento Proteccion Radiologica-DPR, Uruguay-Centro Investigaciones Nucleares-CIN and Peru-Institute Peruano de Energia Nuclear-IPEN in order to establish liaison institutions in REMPAN with these countries in conjunction with PAHO-Washington DC. We have officially requested from Peru and Paraguay.

SAMARI also plans to develop educational and training programmes for our regional centres (Provinces) in 1995, including exercises of emergency preparedness plans.

Particular attention is paid to personal contacts among the responsible persons of the centres belonging to REMPAN. This contributes to the spirit of cooperation which is so important in emergency situations.

The points of contact and correspondence:

Skvarca, J  
Director, Department of Health Physics  
Department of Medical and Sanitary Equipment  
P.O.Box 3268 C. Central 1000  
Buenos Aires, Argentina

Tel: 54 (1) 381 0971  
Tlx: 25064 COOPRE AR  
Fax: 54 (1) 381 0971 or 382 5680

## 2. CRPREMA - Collaborating Centre for Radiation Protection and Radiation Emergency Medical Assistance (Yallambie, Australia)

### 2.1 Terms of reference of the Centre:

- help in developing radioactivity environmental monitoring in the Region;
- help in developing radiation protection standards and codes of practice for the safe and effective use of radiation;
- provide technical advice and to organize personnel training in radiation health when needed;
- disseminate on a regional basis information on radiation health;
- participate in the regional dosimetry intercomparison programme;
- help Member states in elaborating their plans for medical preparedness and first aid;
- promote training of personnel in developing countries in medical preparedness and first aid;
- define optimal methods for diagnosis and treatment for overexposure; and
- provide medical assistance to exposed persons, both on site and in specialized clinics (through the Peter MacCallum Cancer Institute) subject to bilateral agreement between Australia and the country(s) involved.

### 2.2 Work performed in relation to the terms of reference

- *help in developing radioactivity environmental monitoring in the Region*

ARL continues as the Asia/Pacific Regional Centre for the Global Environmental Radiation Monitoring (GERMON) programme.

Dr M.B. Cooper has continued to work as a committee member of the South Pacific Environmental Radioactivity Association (SPERA).

ARL is now the designated Pacific Region Reference Laboratory of the International Radon Metrology Programme (IRMP) for the IAEA Coordinated Research Programme for Radon in the Human Environment. It is also the Coordinating Laboratory for the Pacific Region for the same programme.

- *help in developing radiation protection standards and codes of practice for the safe and effective use of radiation*

ARL has managed the preparation of revised Australian radiation protection standards on behalf of Australia's National Health and Medical Research Council and National Occupational Health and Safety Commission. The new recommendations, which are based on ICRP Publication 60, are expected to be adopted towards the end of 1994, following a period of public comment during which radiation protection experts from several Pacific Region countries were invited to comment on the draft.

Dr G.C. Mason of the Radiation Health Section was co-presented of an IAEA Regional Workshop on the implementation of ICRP Publication 60 held in Kuala Lumpur in August 1993. Dr Mason has also represented Australia in the development of the revised Basic Safety Standards published by the IAEA, WHO, ILO, FAO, PAHO and NEA and which are expected to be adopted by the governing bodies during 1994.

Dr K.H. Lokan, Director, has been appointed to Committee 4 of the ICRP and continues to serve as Australia's delegate to UNSCEAR.

- ***provide technical advice and to organize personnel training in radiation health when needed***

A number of IAEA Fellows and other trainees from countries in the Region have made short-term visits to the Laboratory and there have been several longer-term attachments of up to six months, particularly from Chinese radiation protection specialists. The laboratory is receiving an increasing number of application for such placements.

In November 1992, the Laboratory co-hosted an IAEA Regional Training Course on Dosimetric Assessment of Internal Contamination and provided several of the lecturers.

Dr S.B. Solomon of the Airborne Radioactivity Group lectured at an IAEA Regional Workshop on Radon Monitoring held at Hengyang in China in October 1993.

Mr N.J. Hargrave of the Ionizing Radiation Standards Group was a WHO consultant for a two-week training programme for staff at the Philippine Radiation Health Service on matters related to the calibration of instruments and the use of absorbed dose protocols.

In December 1992, the Laboratory ran a two-week GERMON course for participants from Mongolia, Thailand and Indonesia. The course was designed to equip the participants with the practical skills required for effective environmental monitoring of radioactivity.

- ***disseminate on a regional basis information on radiation health***
- ***participate in the regional dosimetry intercomparison programme***

The Intercomparison of Personal Radiation Monitoring Services in the Asia/Pacific Region has been published as ARL Technical Report TR110 (Young and Hargrave) and in the journal *Radiation Protection Dosimetry*.

The results of the Asian/Australian Regional Radon Intercomparison have also been published as ARL Technical Report TR104 (SoLomon and Peggie).

- ***help Member states in elaborating their plans for medical preparedness and first aid***

Plans are in hand to host, in conjunction with the Australian Nuclear Science and Technology Organization, an IAEA Regional Workshop on Off-site Planning and Countermeasures for Radiological Emergencies in September 1994.

- ***promote training of personnel in developing countries in medical preparedness and first aid***

- *define optimal methods for diagnosis and treatment for overexposure*
- *provide medical assistance to exposed persons, both on site and in specialized clinics (through the Peter MacCallum Cancer Institute) subject to bilateral agreement between Australia and the country(s) involved.*

### 2.3 Collaboration with other WHO Collaborating Centres

Provision of quarterly air monitoring data to the WHO Collaborating Centre of SCPRI, le Vésinet has continued, as has participation in the WHO intercomparison programme carried out by the International Reference Centre at Le Vésinet.

The Laboratory has participated in the WHO/UNEP/GERMON environmental radiation network as a Regional Coordinating Laboratory.

### 2.4 Evaluation

The Laboratory is finding itself more and more involved in Regional collaboration and training, partly through bilateral arrangements such as with China, but importantly also through the Regional Cooperation Agreement of the IAEA. This trend is expected to continue.

For information, the Laboratory reports that it has signed a Memorandum of Understanding with the Laboratory of Industrial Hygiene within the Chinese Ministry of Public Health in Beijing. The Memorandum provides for cooperation between the two agencies, including interchange of information and exchange of staff on temporary attachments.

### 2.5 WHO Collaborating Centre for Radiation Protection and Radiation Emergency Preparedness and Assistance

The Australian Radiation Laboratory (ARL) and the Peter MacCallum Cancer Institute are jointly designated as a REMPAN centre within the Asia-Pacific region. ARL fulfils the programme management function and provides health physics services, the Peter MacCallum Cancer Institute provides specialist medical services for the treatment of irradiated patients.

Since the last REMPAN meeting in Ulm, ARL has continued to develop its capacity to respond to a radiation emergency. It has built up a suite of portable equipment for the purpose:

- 6 'health physics' kits, each packaged in an aluminium suitcase containing:
  - high and low dose rate survey meters;
  - ratemeter/scaler with contamination probe and NaI(Tl) gamma-ray probes;
  - personal dosimeters, etc.  
(there are additional cases containing respirators, protective clothing, gloves, etc.)
- 15 'survey' kits, each packed in a small metal toolbox containing:
  - ratemeter/scaler with NaI(Tl) probe and 'wand';
  - contamination probe.

- 2 portable germanium gamma-ray spectrometers.

ARL is prepared to respond within hours to most foreseeable radiation emergencies in Australia and plans to be in a similar position, in due course, with regard to other countries in the region. The purpose of the initial response is to determine the scope of the emergency and to identify any life-threatening or potentially injurious circumstances and then, in conjunction with the local emergency response agencies, to take whatever urgent actions are necessary in the first few days; specialist medical teams would assist, as necessary. The emergency plans are being integrated with the well-developed emergency response planning of Emergency Management Australia, the national emergency agency, which covers the re-entry to the atmosphere of nuclear-powered satellites, accidents involving visiting nuclear-powered warships, and other, non-radiation accidents. Emergency Management Australia has an existing infrastructure for a regional emergency response capability which it is hoped to build upon to cater for radiation emergencies outside Australia.

ARL continues to augment this function through related training and development activities. In September 1994, the Laboratory, in conjunction with the Australian Nuclear Science and Technological Organization, hosted a 2-week IAEA Regional Workshop on Off-Site Planning and Countermeasures for Radiological Emergencies for senior radiation protection specialists from countries in the Asia-Pacific region. There were 25 delegates from 12 countries, in addition to several Australian participants. The Workshop involved lectures, discussion sessions and exercises, and covered basic principles of radiation protection and of intervention in radiation accidents, emergency response planning, environmental modelling of radionuclide transport, dose assessment, handling of contaminated patients, accident recovery and accident plan maintenance. One whole day was devoted to a live exercise built around a containment failure at a research reactor. ARL is planning to develop a training package, in conjunction with medical advisers from the Peter MacCallum Cancer Institute and the Australian Defence Force, which it will then offer in state capital cities around the country. Subsequently, it is intended to offer training workshops in other countries in the region.

The points of contact:

Dr Keith Lokan  
Director  
Australian Radiation Laboratory  
Lower Plenty Road  
Yallambie, Victoria 3085  
Australia

Tel: ++61 3 433 2211  
Fax: ++61 3 432 1835

Dr G.C. Mason  
Head, Radiation Health Section  
Australian Radiation Laboratory  
Lower Plenty Road  
Yallambie, Victoria 3085  
Australia

Tel: ++ 61 3 433 2211  
Fax: ++61 3 432 1835

### **3. CRPMPRA - Collaborating Centre on Radiation Protection and Medical Preparedness for Radiation Accidents (Rio de Janeiro, Brazil, Coordinator - Dr Eliana Amoral)**

#### **3.1 The terms of reference of the Centre are:**

to act as a focal point in Brazil for expert advice on radiation protection under normal conditions and on remedial actions in the case of overexposure and radioactive contamination;

- to take part in coordinated WHO programmes on general aspects of radiation protection, radioactivity monitoring and medical preparedness for radiation accidents;
- to promote the operation of laboratories, medical equipment, development of techniques and the training of personnel;
- to participate in the preparation of relevant national and WHO documents and guidelines;
- to exchange information with WHO on developments in radiation protection;
- to assist in the elaboration of radiation emergency plans for Brazilian installations or together with similar Collaborating Centres in neighbouring countries;
- in the case of a radiation accident, to take necessary measures to mitigate the consequences of the accident and to cooperate, if necessary, with other WHO Collaborating Centres.

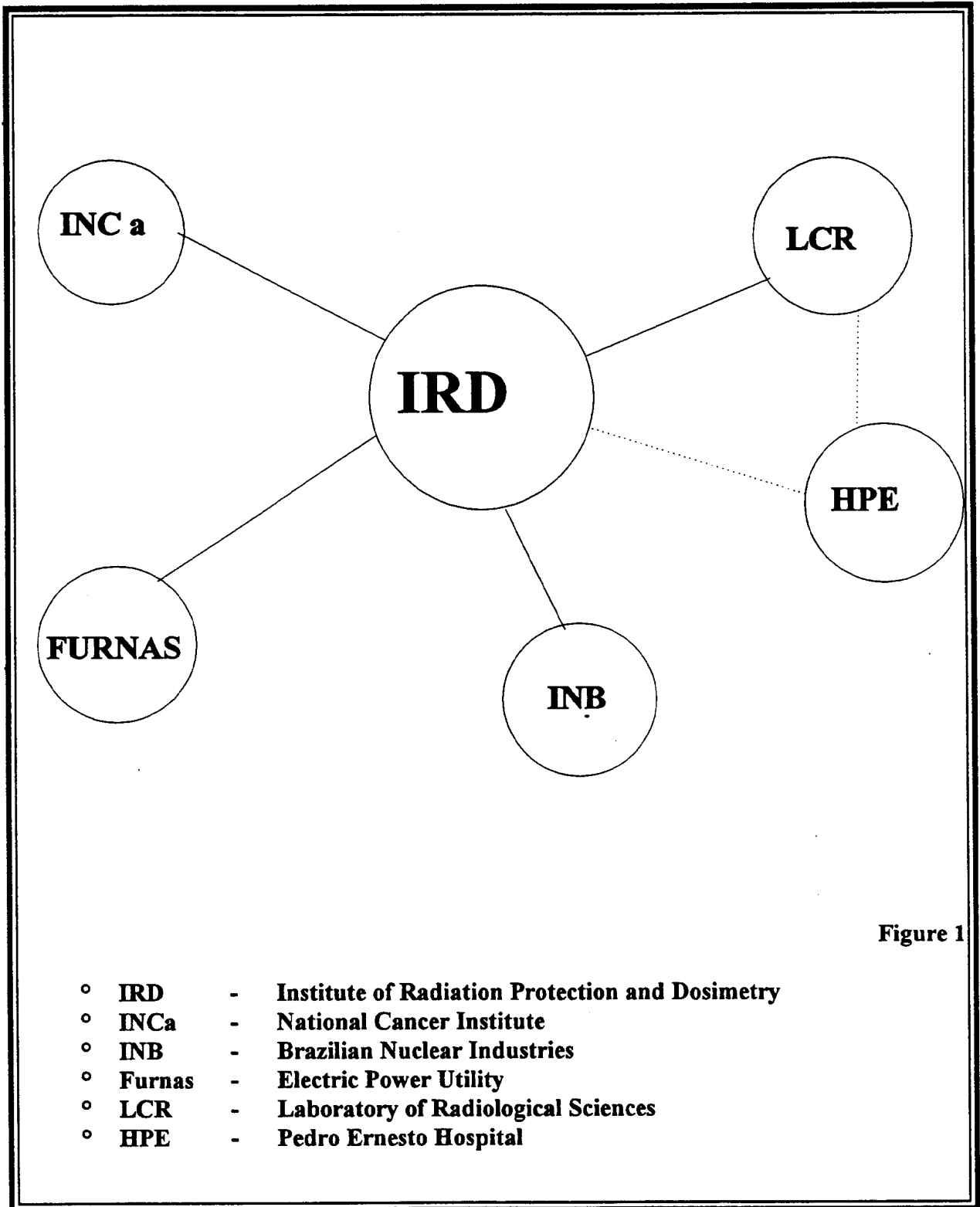
#### **3.2 Organization**

The Brazilian WHO Collaborating Centre on Radiation Protection and Medical Preparedness for Radiation Accidents, as shown in Figure 1, is based on the existing structure of the Institute of Radiation Protection and Dosimetry, IRD, from the National Nuclear Energy Commission, CNEN in collaboration with the National Cancer Institute, Furnas Centrais Elétricas (Electric Power Utility), Brazilian Nuclear Industry and the Laboratory of Radiological Sciences including the Pedro Ernesto Hospital.

Under nuclear accident conditions the National Nuclear Energy Commission (CNEN) and the Civil Defense are immediately informed and mobilized. In the case of a possible radiological emergency, the CNEN, the Civil Defense and the local State Regulatory Body are immediately informed. The emergency coordination and evaluation team of CNEN is actioned to confirm the emergency and to mobilize the IRD emergency team responsible for the radiation protection and dosimetry response.

To accomplish this task, the IRD has an emergency assistance service, SAER, responsible for the maintenance of the response system through the coordination of different groups with a total of 140 people. Each emergency worker is kept on call 24 hours a day for seven days per month, concurrently with his routine tasks.

## WHO COLLABORATING CENTRE ORGANIZATION



The response management of IRD has an operation room, a communication centre, a room for equipment storage and the following mobile units equipped with radiation measurements instruments:

- a mobile radiometry laboratory;
- a terrestrial survey unit;
- area monitoring units;
- occupational control unit; and
- multi means units.

The IRD response team also include a radiological assessment group with metabolic and dynamic environmental models running on computers to provide timely dose assessment information.

In addition the IRD has available the following laboratories:

- National Laboratory for Ionizing Radiation Meteorology;
- Cytogenetics Dosimetry Laboratory;
- Excreta Analysis Laboratory;
- Whole-Body Counter Unit;
- Radiometry and Radiochemistry Laboratory;
- Photographic and Thermoluminescent Dosimetry Laboratories.

In case of victims with potential individual exposure and/or contamination, medical doctors specialized in radiation medicine will also be called, starting the medical emergency response.

The growing awareness of the State of Rio de Janeiro as to radiation protection and medical preparedness due to the location in this State of the Angra dos Reis Nuclear Power Plant, lead to the foundation of the Laboratory of Radiological Sciences at the State University and the proposal of a model for medical emergency response. Therefore, in accordance to a special agreement with the University of the State of Rio de Janeiro (UERJ) the coordination of the medical response to radiation accidents has been handed over to the Laboratory of Radiological Sciences (LCR), of that University. LCR is a facility whose main goals are to support state programmes on radiation protection and sanitary surveillance, post-graduation training in radiation related sciences and to assist state authorities in responding to radiation accidents.

Within the scope of the LCR, a Reference Centre for the Evaluation and Assistance of Radiation Victims (CRAAR) has been created. Besides training health personnel on the medical assistance of radiation victims, CRAAR has developed a three level response medical plan for radiation accidents that has not only been approved by Rio de Janeiro State authorities but also is under consideration by the Health Ministry for use on a nationwide basis. This plan will constitute the backbone of the National System for Medical Assistance for Radiation Emergencies (SNAER).

### 3.3 Activities

The main activities of the Collaborating Centre, shown in Figure 2, can be summarized as: emergency preparedness, external and internal individual monitoring, field survey, environmental monitoring, calibration of instruments, medical assistance and training of external support organizations.

In this context the responsibilities of the Institute of Radiation Protection and Dosimetry are:

- to make the preliminary evaluation and analysis of an event in the area of radiation protection;
- to perform radiation monitoring at the emergency site;
- to keep the source under control in the case of a radiological emergency;
- to perform the screening of individuals, foodstuffs, animals and potentially contaminated objects of common use;
- to make the external and internal dosimetry of contaminated and/or exposed people and suggest adequate countermeasures;
- to estimate the individual dose to be received by the public and suggest adequate countermeasures;
- to control doses received by the emergency workers; and
- to follow up the accident response consequences (victims and environment).

The Laboratory of Radiological Sciences, LCR, and the Furnas Centrias Elétricas (Electric Power Utility) also have available facilities which can give support to the IRD in the area of radiation protection.

Regarding the medical assistance, under the coordination of the LCR/CRAAR, the medical response to a radiation accident in Brazil will be provided near of at the scenario by specially trained individuals, such as Civil Defense and occupational health personnel (1<sup>st</sup> level). If an exposed or contaminated patient needs hospital admission, mainly because of associated conventional injuries, this will take place at a local hospital that represents the 2<sup>nd</sup> level of assistance. The 3<sup>rd</sup> level of medical care refers the patient to specialized centres, cap of dealing with the acute radiation syndrome, severe local injuries and massive internal contamination.

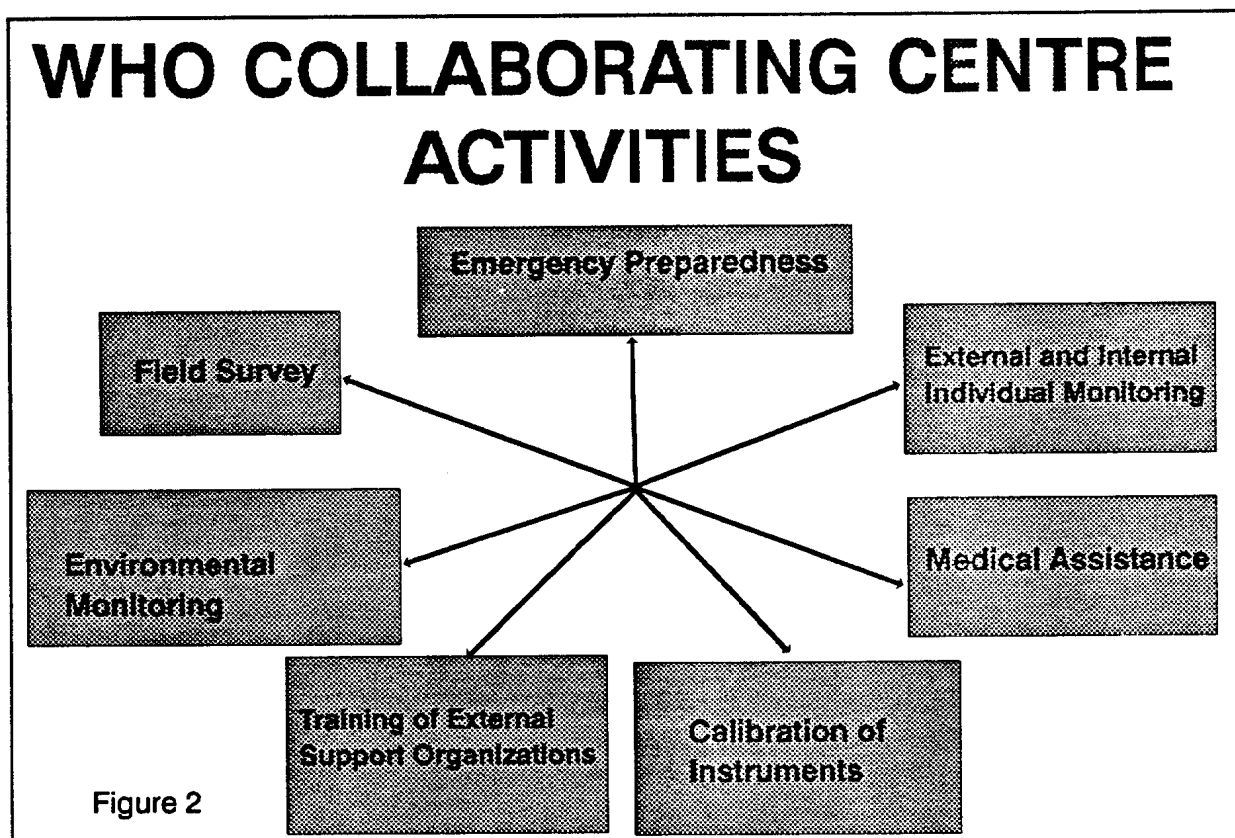
The reference centres contracted through the LCR/CRAAR are the National Cancer Institute it Bone Marrow Transplant Centre, and the Pedro Ernesto University Hospital, both in Rio de Janeiro. A specially designed facility near the Angra dos Reis Nuclear Power Plant, operated by Furnas - Centrias Elétricas S/A (Electric Power Utility) in Parati city, State of Rio de Janeiro, is also available to LCR/CRAAR to deal with either externally or internally contaminated persons.

In all instances, LCR/CRAAR together with CNEN and Brazilian Nuclear Industry - INB, will be available to coordinate medical care and to assist on the particular aspects of Radiation medicine, including trained doctors, nurses and physicists for the management of radiation victims, and kits for external and internal decontamination.

### 3.4 Results

The following activities carried out in 1994 can be highlighted:

- ▶ training on radiation protection of personnel directly involved in an accident response: State Regulatory (1 course/25 People), Navy personnel (2 courses/25 participants each), Army personnel (4 courses/30 participants each), policemen/civil defense/firemen/doctors(/volunteers (2 courses/30 participants each);



- ▶ organization and coordination of the IAEA regional training course on radiation protection and medical physics held at IRD in August for 15 Latin American countries with a total of 30 participants;
- ▶ organization of the International Workshop on Scientific Bases for Decision Making after a Radioactive Contamination of an Urban Environment, held in Rio de Janeiro (IRD) and Goiania from August 29 to September 2, with 17 countries and a total of 90 participants;
- ▶ the start-up of extending the Global Radiation Monitoring Network (GERMON), to other CNEN institutions and Universities located at other States;
- ▶ the start-up of the establishment of the on-line dose rate network;
- ▶ the inclusion in the Collaborating Centre of the Reference Centre for Medical Assistance coordinated by LCR and provision of an official agreement with CNEN; and
- ▶ the Centre is represented in the technical and scientific advisor group on ionizing radiation of the Health Ministry.

### 3.5 Working plan for the future

- ▶ to improve the infrastructure of the emergency assistance service of the IRD;
- ▶ to optimize the technical structure of communication within the Centre for radiological and medical assistance;

- ▶ to extend the GERMON network to other states in Brazil;
- ▶ to establish the on-line dose rate network at the communities around the Nuclear Power Plant and if possible throughout Brazil (under the IAEA financial support);
- ▶ to contribute to WHO training activities in Brazil or elsewhere on radiological and medical response, including advice or assistance to other Member States;
- ▶ to contribute to the elaboration of a regional WHO system for radiation emergency preparedness together with the USA and Argentina under the auspices of PAHO;
- ▶ to participate in WHO and other meetings on emergency response related aspects.

The main contact for the Centre is the Instituto de Radioproteção e Dosimetria, IRD:

Dr Eliana Amoral, Director  
Av. Salvador Allende s/n  
CEP 22600, P.O. Box 37750  
Rio de Janeiro, Brazil

Tel: ++55 21 4421927  
Fax: ++55 21 4421950

### 3.6 Main needs/problems

- ▶ Better communication and cooperation between WHO Collaborating Centres
- ▶ Better participation in WHO programmes
- ▶ Few people in Brazil are specialized in the different areas, mainly considering the size of the country;
- ▶ Size of the country compared to the not adequate communication means and local capacity at some regions;
- ▶ Need of better infrastructure
- ▶ **Very important:** This Centre is not well known and recognized by the Brazilian Government. The WHO has an important role on it.

### 3.7 Main areas to offer training

Mainly regarding the Goiania                      such as:

- ▶ Medical treatment and handle of contaminated
- ▶ Internal dosimetry and decontamination
- ▶ Cytogenic dosimetry
- ▶ Urban assessment and decontamination
- ▶ Radiation protection as a whole.