BRAZILIAN EMERGENCY PLANNING FOR RADIOLOGICAL ACCIDENTS

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Brazilian emergency planning for radiological sccidents is organized to respond promptly to any emergency at nuclear power plants or other installations utilizing nuclear fuel. It consists of several committees (see Figure 1): a general coordination committee with representatives from several federal departments, with final decision with the Brazilian Nuclear Energy Commission (CNEN), and the Federal Environmental Protection Agency (SEMA). Some committees conduct support activities. For example, the Operational Coordination Committee supervises the tasks undertaken by the Army, Navy, and Air Force in response to the needs and decisions of the general coordination committee.

BRAZILIAN NUCLEAR ENERGY COMMISSION (CNEN)

The CNEN was created on October 10, 1956. Its main tasks are related to guidance, planning, supervision, and inspection of nuclear activities in Brazil to ensure the safety of the public and the environment. To reach its objectives, CNEN has the following specific tasks:

- Maintaining direct and continuous contact with each nuclear facility;
- Planning and performing off-site monitoring;
- Monitoring persons suspected of being contaminated;
- Evaluating the situation;
- Making suggestions for protective actions.

Additionally, CNEN carries out research and development programs in the field of nuclear energy in general that includes radiation protection and nuclear energy. To develop its technical and scientific activities, CNEN has the support of the its three research institutes: the Institute of Radiation Protection and Dosimetry (IRD), the Institute of Nuclear Engineering (IEN), and the Energy and Nuclear Energy Research Institute (IPEN).

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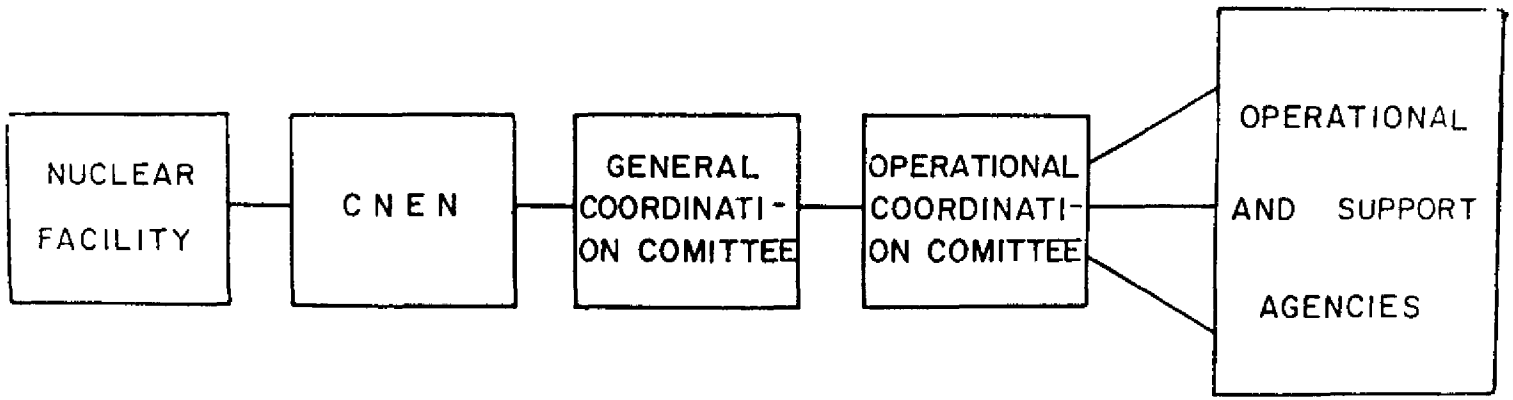

FIG. 1 - BRAZILIAN EMERGENCY PLANNING APPROACH.

INSTITUTE OF RADIATION PROTECTION AND DOSIMETRY (IRD)

This institute, created in 1972, performs monitoring, calibration, and research activities to support CNEN policy. The main activities include:

- Preoperational and operational control of areas surrounding nuclear facilities;
- Control of nuclear facility effluents;
- Monitoring of occupationally exposed workers;
- Evaluation of dose and exposure conditions of occupationally exposed workers and the public;
- Analysis of projects and routine procedures related to radiodiagnosis, radiotherapy, and nuclear medicine;
- Evaluation of operational conditions and quality control of ionizing radiation generating equipment used in hospitals and industry;
- Development and implementation of clinical dosimetry and radiation protection techniques;
- Implementation and maintenance of ionizing radiation metrological standards through the Secondary Standard Dosimetry Laboratory according to IAEA/WHO criteria;
- Calibration of radioactive sources, clinical dosimeters, survey meters, and other radiation monitors;
- Research and development of nuclear instrumentation, data processing, and technical and scientific documentation;
- Answering emergency calls related to nuclear accidents;
- Planning and execution of national and international technical-scientific collaborative programs;
- Education in the nuclear energy field through courses, seminars, in-house training, and supervision of masters and doctoral students.

These activities are organized within four scientific and three support departments. The staff consists of 11 persons with Ph.D.s, 56 with M.Sc.s, 71 with bachelors' degrees, 117 technicians, and 47 clerks who work in the following laboratories:

- Radiochemical and radiometry laboratories to monitor low and intermediate radioactivity levels;

- o Whole body counting facility and bioassay laboratory;
- o Laboratories for photographic, thermoluminescent, and cytogenetic dosimetry techniques;
- o Laboratories for calibration of beta, gamma, x-ray, and neutron sources;
- o Secondary Standard Dosimeter Laboratory (SSDL);
- o Laboratory for metrology of radionuclides;
- o Laboratory for detector development.

IRD EMERGENCY PLANNING

The activities carried out by IRD at an accident site, that is, planning and performing off-site monitoring, monitoring of persons suspected of being contaminated, and supplying CNEN Headquarters with detailed informations about results, are among the primary tasks of CNEN.

To perform these tasks, the IRD has established an emergency group consisting of a Monitoring Control Center (CECOM) and a field monitoring team (Figure 2). CECOM indicates locations that require monitoring, determines what samples should be collected, and assesses dose and controls the time of the field monitoring team. CECOM also measures exposure rates and collects and analyzes environmental samples at specific sites.

The CECOM facility has a complete communications network, as well as maps of each facility with preselected monitoring points. The field monitoring team is provided with a mobile laboratory unit equipped with Geiger-Mueller probes for continuous monitoring of exposure rates, two plastic scintillators for beta counting (one of them with an automatic air sampler), a large-area proportional counter for alpha and beta gross measurements; and a thermal luminescent detector normally used for I-131 measurements. An auxiliary unit also is available with portable dose rate meters; gamma meter for low dose rates; pumps for gaseous iodine and particulate sampling; and self-contained air masks if high doses are expected.

The IRD Emergency Group responds to the different emergency situations described below:

Classification	IRD Status
unusual event	notified
alert	notified/activated
site emergency (H1)	activated
general emergency (H2,H3,H4)	activated

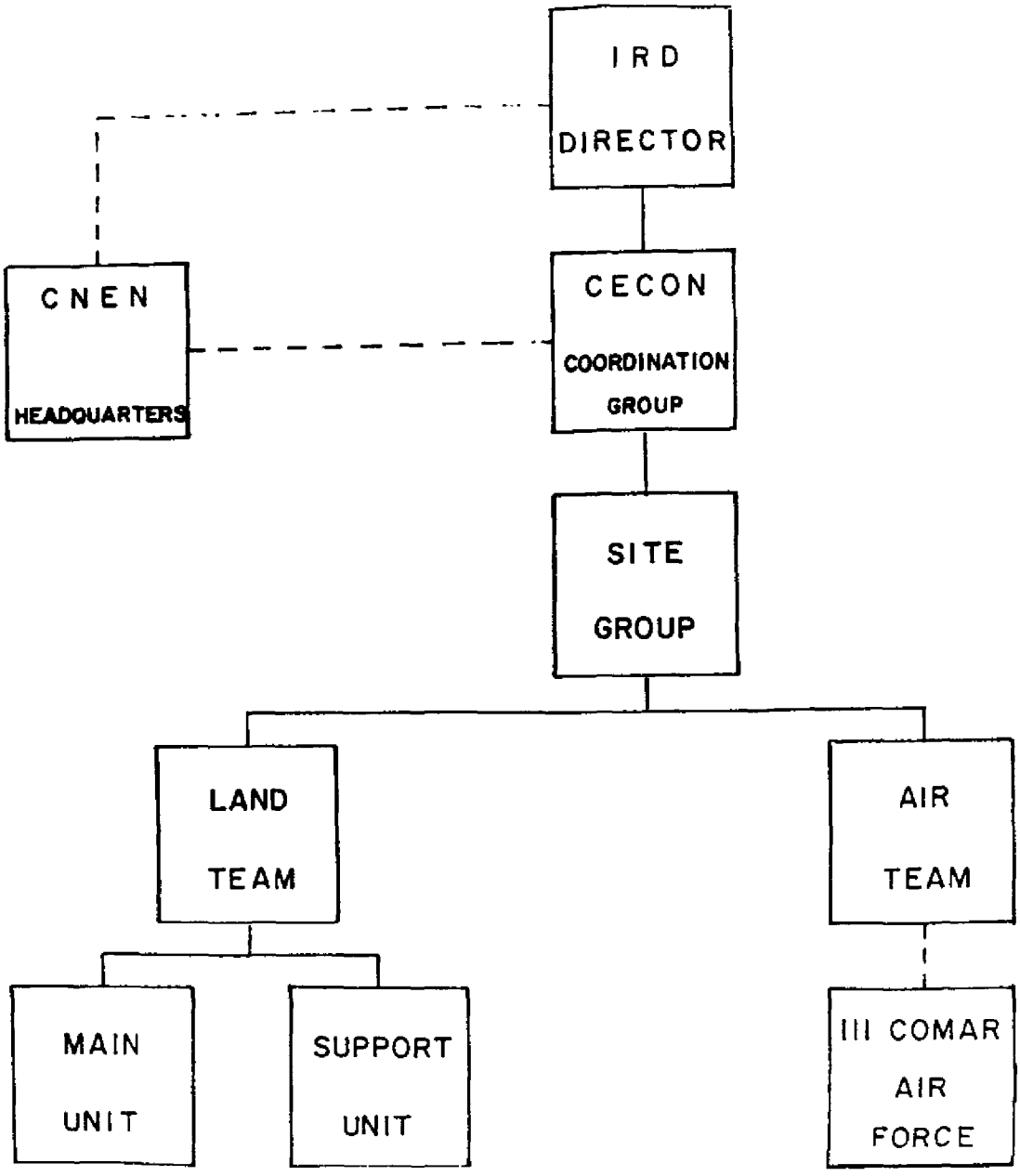

FIG. 2 - IRD EMERGENCY ORGANIZATION.

General emergencies are divided into three classes:

H2 = limited to 5 km Emergency Planning Zone (EPZ)
H3 = limited to 10 km EPZ
H4 = limited to 15 km EPZ

It is important to emphasize that carrying out on-site monitoring and protective actions are the responsibility of the nuclear facility personnel.

In other emergencies involving actual or potential overexposures of workers or the public, the IRD is provided with specific laboratories and techniques to carry out necessary actions. These activities are coordinated to evaluate the causes of the emergency, the responsibilities of the people involved, and the exposure risks. After an emergency has been evaluated, procedures are suggested. Additionally, short-, medium-, and long-term medical procedures are recommended for persons known or thought to have been exposed.