Brazilian Multipurpose Reactor

introduction

The **Brazilian Multipurpose Reactor** (RMB) Project is an action of the Federal Government, through the Ministry of Science Technology and Innovation (MCTI) and has its execution under the responsibility of the Brazilian National Nuclear Energy Commission (CNEN). Within the CNEN, the project is coordinated by the Research and Development Directorate (DPD) and developed through research units of this board: Institute of Nuclear Energy Research (IPEN); Nuclear Engineering Institute (IEN); Centre for Development of Nuclear Technology (CDTN); Regional Center of Nuclear Sciences (CRCN-NE); and Institute of Radiation Protection and Dosimetry (IRD).

The Navy Technological Center in São Paulo (CTMSP) and also the participation of other research centers, universities, laboratories and companies in the nuclear sector are important and strategic partnerships.

The conceptual design and the safety analysis of the reactor and main facilities, related to nuclear and environmental licensing, are performed by technicians of the research units of DPD / CNEN. The basic design was contracted to engineering companies as INTERTHECNE from Brazil and INVAP from Argentine. The research units from DPD/CNEN are also responsible for the design verification on all engineering documents developed by the contracted companies. The construction and installation should be performed by specific national companies and international partnerships.

The Nuclear Reactor RMB will be a open pool type reactor with maximum power of 30 MW and have the OPAL nuclear reactor of 20 MW, built in Australia and designed by INVAP, as reference. The RMB reactor core will have a 5x5 configuration, consisting of 23 elements fuels (EC) of U_3Si_2 dispersion-type Al having a density of up to 3.5 gU/cm^3 and enrichment of 19.75% by weight of ^{235}U. Two positions will be available in the core for materials irradiation devices.

The main objectives of the RMB Reactor and the other nuclear and radioactive facilities are:

- Production of radioisotopes and radiopharmaceuticals in order to meet the entire domestic demand, including molybdenum-99 generator of technetium-99m, which is the most widely used radioisotope in nuclear medicine, and that is not produced in the country;

- Radiation and nuclear fuels and structural materials testing to evaluate the structural integrity of these when subjected to high doses of radiation, which does not exist in the country;

- Development of scientific and technological research using neutron beam.

All facilities and associated infrastructure to the RMB Project are located in an area of about 200 hectares at 580 meters above sea level, in the city of Iperó, state of São Paulo, distant about 125 km from the city center of Sao Paulo. This area is adjacent to the Aramar Experimental Center (CEA), where is developed part of the Nuclear Propulsion Development Program, operated by the Navy Technological Center in São Paulo (CTMSP). Although in the same place, the RMP Project has an exclusive access and full control of CNEN.

The conceptual design of nuclear and conventional RMB systems and associated facilities are being developed by the technical staff of the Research Institutes of the DPD / CNEN led by IPEN. IPEN brings national experience in nuclear project (Nuclear Reactor IPEN/MB-01), operation and renovation of research reactor (IEA-R1 nuclear reactor of 5 MW), development and manufacture of fuel elements (100% of the fuel to operate the IEA-R1 is manufactured at IPEN), and national leadership in the production of radioisotopes.

The company Intertechne Consultants SA has developed in partnership with the technical staff of IPEN the conceptual design of conventional (non-nuclear) systems Installations and also the basic design of the buildings and infrastructure of the overall RMB Project.

For the Environmental Impact Assessment (EIA) and the preparation of the Environmental Impact Report (RIMA), and other activities related to the process of environmental licensing with IBAMA, CNEN has contracted MRS Environmental Studies Ltda., which conducted the survey data and evaluation of physical site characteristics (geography, geology, water resources, meteorology, etc...), and also held data surveys of fauna, flora, archaeological and cultural traditions in the considered area of influence. IPEN has supported the EIA/RIMA development and also participated actively in the three public hearings done by the RMB project. IPEN also has led the development and presentation of the Site Survey Report to the Radioprotection and Safety Directorate (DRS) of CNEN to obtain the nuclear license of the site.

Figure 1. Lay-out of RMB site.

Figure 2. Lay-out of RMB reactor and other facilities.

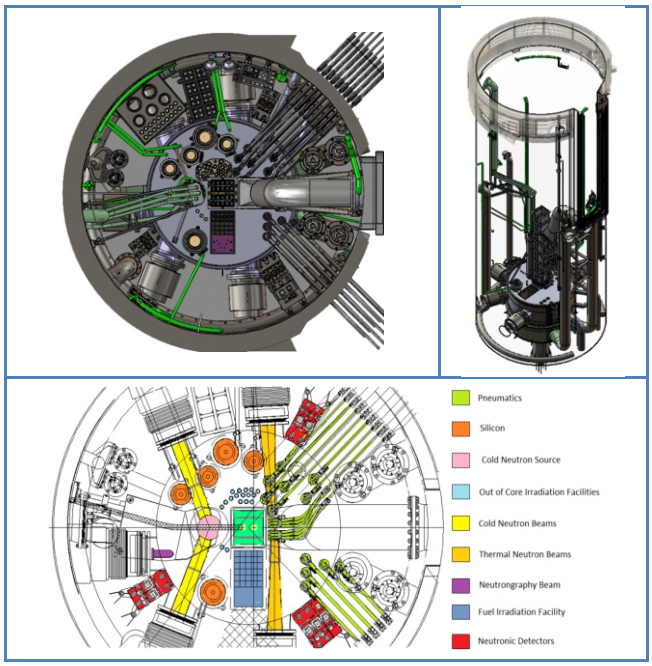

Figure 3. Lay-out of RMB reactor core.