

**Replacing Nuclear Staff: The proactively work at IPEN/CNEN-SP.**

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In Brazil, young people do not learn nuclear science, nuclear engineering and related fields at College or Universities, because Brazilian Universities offers such specialized courses only as extension classes to normal curriculum. Another important aspect to be considered is that there are eighth Brazilian Universities or Research Institute that offers MSc and PhD degree offered on only four State/Region of Brazil, e.g.: in the State of São Paulo/SP, Region Southeast of Brazil, there is only one programme, at Energy and Nuclear Research Institute - IPEN, in association with the University of São Paulo - USP; in the State of Rio de Janeiro/RJ, Region Southeast of Brazil, there are four programmes: the Federal University of Rio de Janeiro – UFRJ, the Army Engineering Institute – IME, the Institute of Nuclear Engineering – IEN, the Institute of Radiation Protection and Dosimetry – IRD; in the State of Minas Gerais, Region Southeast of Brazil, there are the Center of Nuclear Technology Development – CDTN and the Federal University of Minas Gerais – UFMG; in the State of Pernambuco, Region Northeast of Brazil, there is Federal University of Pernambuco – UFPE. Those four institutes: IPEN, IEN, IRD and CDTN are institutes belonging to the National Nuclear Energy Commission – CNEN[1].

Table 1 present's the situation of those nuclear programmes (mentioned above), their level of post graduation and the grade attributed by Capes - the Higher Education Coordinating Office of the Federal Ministry of Education, done three-annually on all Brazilian Courses, undergraduate and postgraduate. This evaluation vary on a scale from 1 to 5, universities are allowed to conduct their programme only with grade up to 3, if not the course is disregarded. The acquirement of evaluation up to 5, i.e. 6 and 7 is given only to programme that has high academic level recognized internationally for expertise [2].

TABLE 1 - POST GRADUATION ON NUCLEAR FIELD IN BRAZIL (DATA 2003)

INSTITUTIONS	CITY/STATE/REGION IN BRAZIL	PROGRAMME	LEVEL	EVALUATION OF CAPES
IPEN/USP	São Paulo/SP/ Southeast	Nuclear Technology	MSc ; PhD	6
IEN	Rio de Janeiro/RJ/Southeast	Nuclear Engineering	Professional Master	3
IRD	Rio de Janeiro/RJ/Southeast	Radiation Protection and	MSc	3
IME	Rio de Janeiro/RJ/Southeast	Nuclear Engineering	MSc	3
UFRJ/COPPE	Rio de Janeiro/RJ/Southeast	Nuclear Engineering	MSc ; PhD	6
CDTN	Belo Horizonte/MG/Southeast	Radiation Technology	MSc	3
UFMG	Belo Horizonte/MG/Southeast	Science and Nuclear Techniques	MSc	4

UFPE	Recife/PE/Northeast	Nuclear Engineering Technology	on MSc ; PhD	5
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IPEN it is a traditional research and educational institution, recognized internationally for the high level of education provided. To give an idea of the importance and size of the Post Graduation Programme at IPEN, in 2003, the staff, students, disciplines and other numbers were officially registered as following [3]:

- 498 students for the MSc and PhD degrees;
- 166 thesis advisor's;
- 44 disciplines offered;
- 65 thesis and dissertation concluded;
- 147 scholarship given by the Brazilian Federal and State Governments for undergraduate and post graduate students;
- 400 students took entrance selection exams (about 50% were approved);
- Approximately 500 internship were provided and,
- Approximately 150 thesis advisors were invited to participate in the examining boards.

The Post Graduation Programme of IPEN in association with the University of São Paulo – USP (the largest institution of higher education and research in Brazil, and the third in size in Latin America) is organized in three areas of concentration:

- TNA- Nuclear Technology and its Applications;
- TNM- Nuclear Technology on Materials;
- TNR- Nuclear Technology for Reactors.

The replacement of nuclear personnel is shrinking is a fact and the problem requires immediate attention of the entire nuclear community (academia, government and industry). Aware to find ways to solve this problems, IPEN started to work more proactively by dealing closely with universities, industries, government and other relevant organizations. As result of this work, on 2001, IPEN in accordance with USP, started to offer graduation optional disciplines to all students at USP interested on nuclear field. This iniciative was very successful. On 2003, IPEN started the most important project in association with Physics Institue of USP, this project so called: *Programme of Graduation Course on Nuclear Science* is willing to graduate Human Resources for the Nuclear Sector. Our proposal with this Programme is that the IAEA and also Brazilian Government Agency could allocate financial support for brazilian fellowship in order to capture human resources for nuclear sector. With this action we believe that would produce a sizeable impact in the international nuclear scientific community.

[1] COMISSÃO NACIONAL DE ENERGIA NUCLEAR-CNEN. Units consulted: IPEN, IEN, IRD e CDTN. Available on: <<http://www2.cnem.gov.br>> Accessed on: 03/29/2004.

[2] COORDENAÇÃO DE APERFEIÇOAMENTO DE PESSOAL DE NÍVEL SUPERIOR-CAPES. Evaluation Criterium, period of 2001-2003, Engineering II. Available on: <<http://www.capes.gov.br>> Accessed on: 03/29/2004.

[3] ANNUAL REPORT TO: COORDENAÇÃO DE APERFEIÇOAMENTO DE PESSOAL DE NÍVEL SUPERIOR-CAPES, YEAR 2003. From Nuclear Technology Programme IPEN/USP. Data base of indicators.