

# Control and safety of nuclear reactors

*INTERVIEW WITH CARLEY MARTINS*

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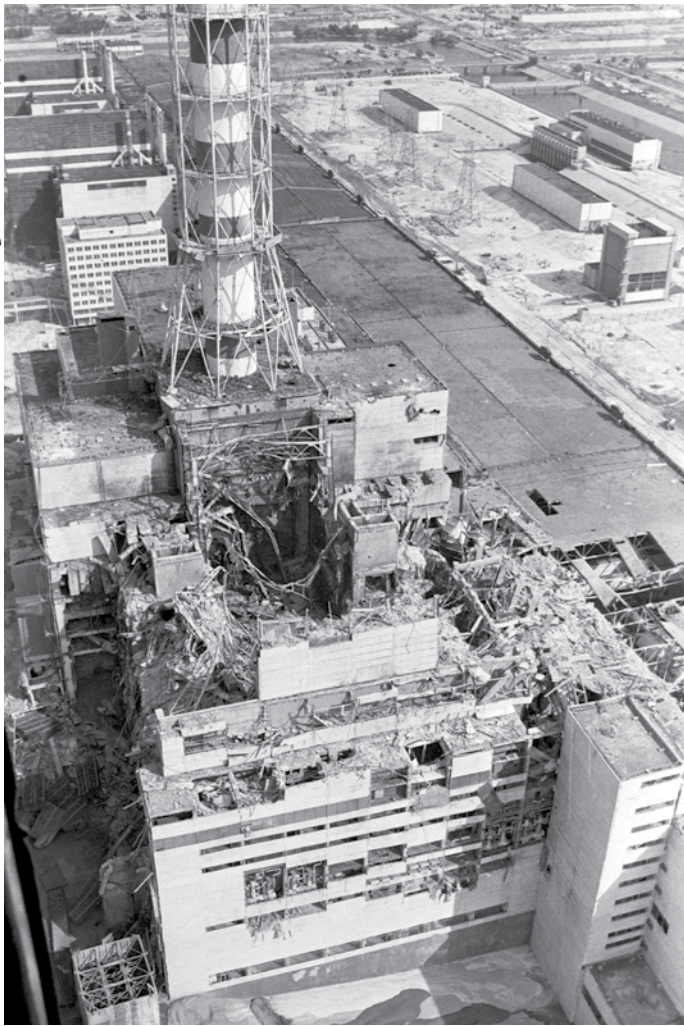


*Almirante Álvaro Alberto Nuclear Center, in the surroundings of Angra dos Reis, Rio de Janeiro.*

Because there is now intense controversy regarding the construction of Angra III nuclear power plant and also because there are elements within the federal government that advocate the building of several thermoelectric plants using nuclear energy, *Estudos Avançados* put together some questions for scientist Carley Martins, associate professor of the Department of Nuclear and High Energy Physics of Rio de Janeiro State University (UERJ).

*ESTUDOS AVANÇADOS:* *Have the latest advances in science and technology eliminated the risks faced by the population of Angra dos Reis from the new nuclear power plant being built on the seaboard of the state of Rio de Janeiro?*

*Carley Martins:* Yes, in my view, there are no significant risks to the population of Angra dos Reis from the construction of a new power plant in Almirante Álvaro Alberto Nuclear Complex. Current technology allows us

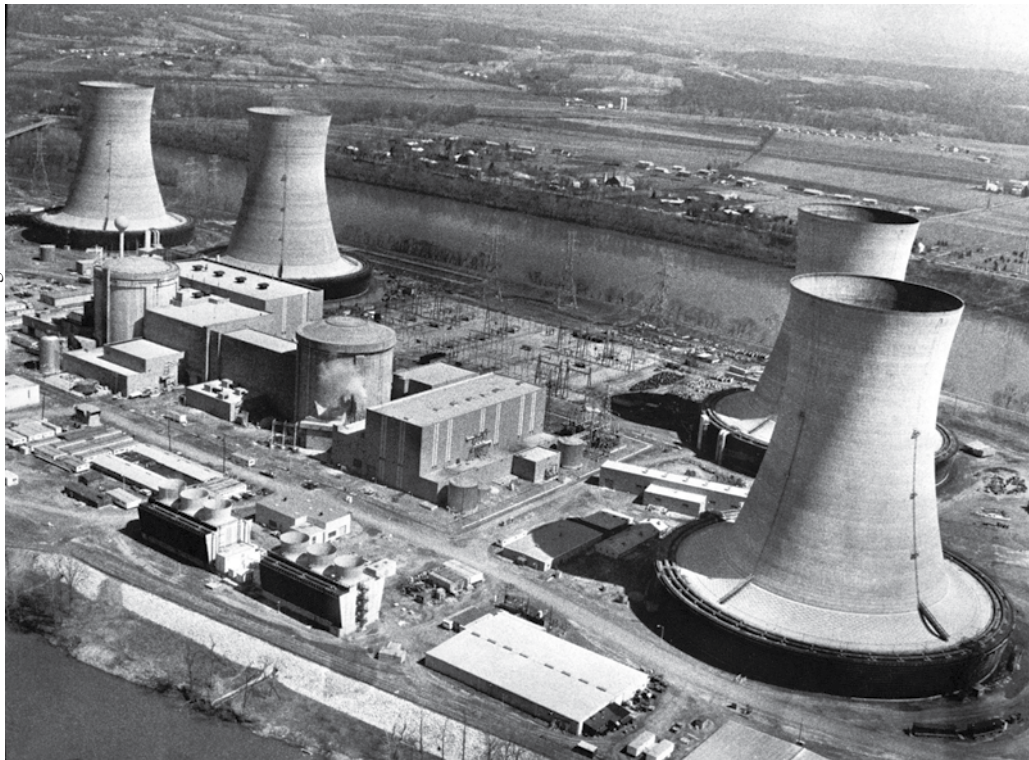


*The Chernobyl nuclear disaster.*

to reduce to negligible numbers the probability of a serious episode in the core, in the control systems and in the operation of the reactors. Safety and control systems of nuclear reactors are developed with every technological resource available at the time they are conceived and obey strict manufacturing and certification norms established by international agencies. Even in older reactors, these devices are almost “fail-safe”. For instance, Angra I reactor in Álvaro Alberto Nuclear Complex, built with technology from the 1970’s, had a turbulent beginning with problems that

interrupted the generation of energy on several occasions; yet, none of these were related to the core – the most critical, and therefore most protected region of the reactor. In addition to being technologically advanced, the safety devices for reactor cores comprise redundant systems, that is, they include more than one protection circuit for the same component of the reactor. Should one circuit fail, another comes immediately into action, reducing the probability that a nuclear malfunction progresses over time. A quick overview of the history of nuclear energy shows that the most significant accidents with nuclear reactors were due to operational failure, to misguided or mistaken interventions in the reactor’s test procedures. That is what happened at Three Mile Island, in the US in 1979, and at Chernobyl, in Russia in 1986. In the former, operators mistakenly turned off a protection system of the reactor, which led to the excursion of the core’s temperature. In the latter, specific safety devices were turned off during the profiling of an accident and the operators were unable to identify the proper time to intervene in the system;





*Three Mile Island Nuclear Generating Station, in Pennsylvania, USA: partial meltdown of the reactor.*

after a sequence of errors, they lost control over the reactor. It must be stressed that the reactor at the Chernobyl nuclear complex where the accident occurred used technology that was totally outdated and should no longer be operational at the time. Therefore, considering that more than 400 nuclear reactors are in operation around the world and that the number of significant accidents over the years is quite modest, we may conclude that the history of generating energy through the fission of the atomic nucleus is very satisfactory. Atomic experts have a profound technical and scientific grasp of their technology. I restate my initial point of view, namely, that the Angra III plant is very welcome and its megawatts will contribute to the growth of our country, with no significant increase in risk to the population of Angra dos Reis region.

*ESTUDOS AVANÇADOS – In view of the possibility of accidents or malfunctioning of nuclear power plants, international norms determine preventive measures that should be strictly followed to protect the people that live near such plants. In the case of Angra I and II, are the preventive measures and plans adequate to assure the safety of the population of the state of Rio de Janeiro?*

*Carley Martins –* That, in my view, is the great nightmare for those who live in the region, even taking into account the extremely low probability of a serious event in Angra's reactors. This matter is being discussed and negotiated with Angra dos Reis' city officials since Angra I began operating

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*“Land access to the plant is by the BR-101 highway, where in times of intense rainfall there is great risk of falling debris. Access by sea would be the only alternative should this road be blocked.”*

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in the mid-1980's, but no safe evacuation plan for the environing population has ever been established. Land access to the plant is by the BR-101 highway, where in times of intense rainfall there is great risk of falling debris. Access by sea would be the only alternative should this road be blocked. But no organized plan has been conceived for this eventuality. Indeed, in this aspect, Angra dos Reis Nuclear Power Plant is in debt with the surrounding population.

*ESTUDOS AVANÇADOS – Isn't it wrong for the same company that is responsible for operating the nuclear power plant to be at the same time in charge of assuring compliance with the plant's safety norms, as happens with Angra I and II?*

*Carley Martins* – The operator of the reactors at Angra's nuclear plants is Eletronuclear, a company that reports to the Ministry of Mines and Energy. The agency that licenses, regulates and inspects all nuclear activity in Brazil is the National Nuclear Energy Commission, which reports to the Ministry of Science and Technology. Each company reports to a different Ministry and, therefore, can be understood as an independent company. Regarding nuclear safeguards, that is, the compliance with measures aimed at protecting and controlling nuclear material that exist in any plant or premises of the so-called nuclear fuel cycle and were established by international agreements, our plants are inspected by the Brazilian-Argentinean Agency for Accountability and Control of Nuclear Material (ABACC: Agência Brasileiro-Argentina de Contabilidade e Controle de Material Nuclear) and by the International Atomic Energy Agency (IAEA). Therefore, the latitude of freedom granted to the operator of the Angra plants are determined by these regulatory agencies/commissions;

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This interview has been translated by Carlos Malferrari. The original in Portuguese – “Controle e segurança dos reatores nucleares” – is available at [http://www.scielo.br/scielo.php?script=sci\\_issuetoc&pid=0103-401420070001&lng=pt&nrm=iso](http://www.scielo.br/scielo.php?script=sci_issuetoc&pid=0103-401420070001&lng=pt&nrm=iso).