Brazil's Nuclear History

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Over the last 60 years, political and military rivalry with Argentina colored Brazilian politics and national identity. In the nuclear arena, mastery of all applications of the atom was equated with political mastery of the Southern Cone and beyond.

In August 2005, former Brazilian President José Sarney confirmed that more than two decades ago the Brazilian military had sought to develop nuclear weapons to counter political and military competition from Argentina. More surprisingly, a former president of the Brazilian atomic energy agency recently claimed that the military allegedly continued to develop a nuclear bomb after the program had been terminated by Brazilian President Fernando Collor de Mello. He said the military had even obtained sufficient enriched uranium from an unspecified source, a claim vehemently denied by the current Brazilian government.[1]

Brazilian scientists began experimenting with nuclear fission in the 1930s, but efforts began in earnest after Argentina’s president, Juan Perón, made the stunning and false claim in 1951 that his country’s scientists had mastered thermonuclear fusion in the laboratory.[2] In response, Brazil created a nuclear research program under Conselho Nacional de Pesquisas (CNP), its national research council.

Two years later, a CNP agent secretly persuaded several West German scientists to manufacture several centrifuge machines clandestinely, an operation reminiscent of the Abdul Qadeer Khan nuclear black-market network. Delivery of those centrifuges was thwarted by British occupation authorities acting in concert with the United States.[3] However, some sources report that Brazil acquired three German centrifuges in the 1950s.[4]

Brazil also reportedly sought but did not obtain uranium gaseous-diffusion assistance from the French.

Like Iran today, Brazil had an ambitious vision for developing nuclear energy. A 1955 nuclear cooperation agreement with the United States under the Atoms for Peace Program facilitated the purchase of several research reactors. In 1971, Brazil obtained its first power reactor, the 626-megawatt Angra-1, from Westinghouse, which began commercial operation in 1985.[5]

It was a 1975 agreement with West Germany for a complete nuclear fuel cycle, however, that stunned the world. The West German deal included two power reactors and plans for six more, as well as plants for uranium processing, conversion, enrichment, and reprocessing. Brazil’s determination to obtain a complete nuclear fuel cycle quickly can be traced to the oil shocks of 1973, military and technological competition for prestige with Argentina, and the Nixon administration’s announcement that it would soon shut the order books for future supply contracts for enriched fuel.

The West German deal, however, provoked a strong negative U.S. reaction, particularly in the wake of India’s 1974 “peaceful” nuclear test. Although the United States was unable to prevent the deal entirely, it persuaded West Germany to require bilateral safeguards on the technology it transferred. By 1978 the U.S. Congress passed the Nuclear Nonproliferation Act, which made full-scope safeguards a prerequisite for significant nuclear transfers, thus closing off U.S. supply.[6]

In the end, the Brazilian-West German deal produced modest results compared to its original scope. Construction of Angra-2 and -3 fell monstrously behind schedule and overbudget. The German
“Becker jet-nozzle” enrichment technology, experimental at best, proved unworkable in practice; and a pilot cascade at Resende was ultimately shut down before uranium was enriched. Only Angra-2 was completed, which began operating in 2000. By 2002, nuclear power provided just 4 percent of Brazil’s total electricity production.[7]

Brazil’s Parallel Program

Brazil’s increasing dependence on foreign equipment and material and the restrictions of international safeguards attached to the German transfers, as well as the suspicion that the jet-nozzle process would enrich little but German pockets, worried and frustrated the military leadership.[8]

In 1979 the military government created a secret and autonomous parallel program to develop the nuclear fuel cycle outside of international safeguards. Under the stewardship of Coordenadoria de Projetos Especiais (COPESP), the Brazilian navy’s special projects commission, the program initially focused on developing a small light-water reactor for submarine propulsion and an indigenous uranium-enrichment capability using centrifuges.

Soon, however, all three services had active nuclear research programs, including the Brazilian army’s large graphite-moderate reactor, which would have been well suited for production of weapons-grade plutonium, while the Brazilian air force investigated laser enrichment and breeder reactors. By 1982, Brazil had managed lab-scale enrichment. COPESP began construction of a pilot enrichment plant at Aramar in Ipero in 1987. At the inauguration of the plant, authorities said the facility would produce low-enriched uranium (5 percent enrichment) for existing power and research reactors and for nuclear submarine reactors.[9]

In 1989 they announced that the first module of the plant had produced small amounts of 20 percent U-235.

In From the Cold

With the return of civilian government in 1985, Brazil took significant steps to increase transparency in the activities of the parallel program and ultimately to terminate it. In 1988 the Brazilian Congress approved a new constitution, which mandated that all nuclear activities were to be conducted for peaceful purposes only. For example, in 1988 the Sarney government arranged for Argentine President Raúl Alfonsín to tour the sensitive Aramar pilot-scale enrichment facility, building on earlier efforts with Argentina to foster mutual nuclear cooperation and transparency. In September 1990, Collor dramatically exposed and closed a secretly prepared nuclear test site at an air force base in the Cachimbo Province in north-central Brazil, shoveling dirt into the test shaft. Under Collor, the parallel program lost its privileged funding status. The air force laser enrichment and the army’s graphite reactor programs became quick casualties of the government’s new spending priorities and then were terminated altogether.

In 1991, Brazil and Argentina signed a bilateral agreement in Guadalajara to use nuclear energy for peaceful uses only. Since then, full-scope safeguards have been applied in both countries by the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC) and the International Atomic Energy Agency (IAEA) under the Quadripartite Safeguards Agreement.[10] Brazil and Argentina sought to model ABACC after the European Atomic Energy Community, particularly with respect to its relationship with IAEA inspections. A key question was how to trade off the desire to avoid unnecessary duplication with the IAEA’s need to retain its ability to draw independent conclusions based on independent measurements and observations. The tension in this trade-off is evident in discussions of safeguards approaches for the Resende plant.

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ENDNOTES


3. Ibid. Three years later, several centrifuges were shipped to a research facility in Sao Paulo to be reverse-engineered. Jean Krasno, “Non-Proliferation: Brazil’s Secret Nuclear Program” ORBIS, Summer 1994.


5. Angra-1 has been, at best, an inconsistent producer of electricity, so much so it was dubbed “the Firefly” by environmentalists for its propensity to go offline.

6. Argentine officials stated that the 1978 Nuclear Nonproliferation Act (NNPA) contributed to Argentina’s decision to build the Pilcaniyeu gaseous-diffusion uranium-enrichment plant, which was completed in 1983. The NNPA (See Sec. 128 of the Atomic Energy Act) prevents the United States from exporting source or special nuclear material, production or utilization facilities, or any sensitive nuclear technology to states without International Atomic Energy Agency (IAEA) safeguards on all nuclear material used in peaceful nuclear activities.

7. Most of Brazil’s electricity is provided by hydropower. A drought in 2000 and 2001 caused shortages of electricity, leading some to urge the development of more nuclear power.


10. Argentina and Brazil signed a bilateral agreement in Guadalajara in July 1991 that established the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC). Argentina, Brazil, ABACC, and the IAEA then signed the Quadripartite Safeguards Agreement later that year, which entered into force in March 1994. See IAEA, INFCIRC/435, March 1994.

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