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(b)(3)

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CONTENTS

NUCLEAR POLITICSBRAZIL'S NUCLEAR PROGRAM: DYNAMICS AND PROSPECTS

1

(b)(3)

In the seven years since Brasilia and Bonn signed the broad bilateral agreement establishing the foundations and directions for Brazil's nuclear development program through the early 1990s, mounting domestic problems have forced the Brazilians to make major modifications in their original nuclear development plans.

(b)(3)

ARMS CONTROLREGIONAL ARMS CONTROL: REGIONAL STATE RESPONSES TO MAJOR POWER ACTIONS

12

(b)(3)

Recent experience indicates that the military and diplomatic activity of major powers is of only limited importance in affecting the willingness of regional states to commit themselves to regional arms control arrangements. Regional security and related concerns are considerably more important.

(b)(3)

INTERNATIONAL TERRORISMCOMBATING TERRORISM: EXTRADITION AS A STUMBLING BLOCK

19

(b)(3)

Disagreements over the political motivations of terrorist suspects have led to tensions among West European states, in US relations with several Middle Eastern countries, and within the UN regarding the draft Convention Against the Taking of Hostages. Language allowing several interpretations of the convention has, however, permitted antiterrorist cooperation among otherwise like-minded governments.

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(b)(6)Brazil's Nuclear Program: Dynamics and Prospects

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The comprehensive character of Brazil's nuclear development program, especially the Brazilians' intention to build uranium enrichment and spent fuel reprocessing facilities, has been a matter of continuing concern to the United States primarily because of the increased risk of nuclear proliferation that is inherent in the acquisition of such technology. The fact that Brasilia refuses to sign the Non-Proliferation Treaty, on nationalistic grounds, adds to this concern. Mounting problems indigenous to Brazil, however, have forced the Brazilians to make major modifications in their original nuclear development plans.

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This article analyzes the scope, causes, and implications of these changes. It is based on a much longer assessment

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by the International Issues and Latin America Divisions of the Office of Political Analysis.

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The Policy Setting

Four years have passed since Brasilia and Bonn signed the broad bilateral agreement establishing the foundations and directions for Brazil's nuclear program through the early 1990s. For the record both governments still maintain that the accord--which envisages construction of eight pressurized-water power reactors (PWR) and a complete nuclear fuel cycle complex--will be fulfilled in its entirety. It is now virtually certain, however, that parts of the original agreement will be scaled down or left unimplemented as Brazil reassesses its position in the light of experience and changing political and economic circumstances. Implementation

28 September 1979

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~~SECRET~~**The Brazilian Nuclear Plan****Power Reactor**

Original Target Date	Earliest Estimated Completion Date	Type	Power (MWe)	Status
1978	1980 (Angra I)	PWR	626	Under construction ¹
1983	1986 (Angra II)	PWR	1,245	Under construction
1984	1987 (Angra III)	PWR	1,245	Contracted, delayed
1986	1989	PWR	1,245	Planned
1987	1991-92	PWR	1,245	Planned
1988	Indefinite	PWR	1,245	Proposed ²
1989	Indefinite	PWR	2x1245	Proposed ²
1990	Indefinite	PWR	1,245	Proposed ²

Nuclear Fuel Cycle

Original Target Date	Revised Target Date	Facility	Capacity
1979	1980	Uranium concentration	500 metric tons per year
1980	1980	Pilot fuel fabrication	100 metric tons per year
NA ³	1982-83	Pilot uranium enrichment	NA ⁴
1983	1983	Commercial-scale fuel fabrication	250 metric tons per year
1981	1983	Conversion plant (UF ₆)	500 metric tons per year
1984	1985	Pilot fuel reprocessing	3 metric tons per year (25 kg of plutonium per year)
1982	1988-89	Demonstration-scale uranium enrichment	200,000 Separative Work Units (SWU) per year
NA ³	Probably mid-1990s	Commercial-scale reprocessing	150 metric tons per year

¹ Westinghouse-supplied.² These four reactors probably will not be constructed.³ This facility was not originally planned.⁴ This plant will produce no usable enriched product.⁵ To be supplied by France.~~SECRET~~

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has already run into trouble on several fronts. Planning and construction of the nuclear facilities involved are proceeding slowly and somewhat haphazardly and the agreement is coming under increasing criticism within the Brazilian scientific community. [REDACTED]

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The Brazilians in fact have already had to stretch out their nuclear program and acknowledge unofficially that it will have to be curtailed. They have also altered the specifications of some facilities ordered from the Germans. While none of the changes made last December in Brasilia's nuclear plans reflect any loss of interest in obtaining uranium enrichment and spent fuel reprocessing facilities (and thus an autonomous complete fuel cycle capability), the chances of full implementation of the power reactor construction provisions of the Brazilian - West German accord are even more remote than before. [REDACTED]

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In particular, the Brazilians continue to be fully committed to the construction of a pilot nuclear reprocessing plant. Because of planning difficulties and delays in reactor construction, however, the development of a pilot reprocessing facility may be a decade away, and commercial reprocessing probably will not be justifiable before the late 1990s. [REDACTED]

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Highlights of Brazil's recently revised nuclear plan are presented in the table. [REDACTED]

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President Joao Figueiredo, who took office last May, is the first military president with a specific mandate to ease the political restrictions of the authoritarian system erected by the Brazilian armed forces some 15 years ago. Since his accession, the political climate in Brazil has continued to become more open and lively--although gradually and under the watchful eye of the military. [REDACTED]

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As a result of these political developments, Brazilians feel much freer than before to examine and criticize the whole spectrum of national policies. Brazil's nuclear program and its nuclear accord with West Germany have become fair game for debate in the Brazilian press, and thus public attitudes toward these issues are acquiring greater political significance. [REDACTED]

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28 September 1979

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Since early last year, various aspects of Brazil's nuclear effort have drawn public fire from a number of politicians, journalists, and scientists--some questioning whether the nuclear agreement with West Germany should have been made at all. This criticism should not, however, be construed as a flagging national commitment to the development of nuclear power. Acquisition of this sophisticated technology is still generally viewed as an important and tangible measure of Brazil's movement toward becoming a major nation and is thus directly tied to the achievement of great power status. Moreover, both Brasilia and Bonn have compelling reasons to implement as much of their sweeping 1975 nuclear accord as possible. [REDACTED]

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The Case for Going Ahead: Brazil's View

From Brasilia's vantage point, the development of nuclear power and the acquisition of a complete nuclear fuel cycle are seen as key national objectives for a wide variety of reasons--not the least of which is the Brazilian desire to secure independent and lasting sources of energy to support their top-priority economic development efforts. [REDACTED]

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The need to develop new power sources for Brazil's growing cities--especially Sao Paulo, Rio de Janeiro, and Belo Horizonte, which are South America's leading industrial centers--is becoming increasingly urgent. For the near term, at least, hydropower will remain substantially cheaper to develop in Brazil than nuclear energy. The cost of developing remote hydroelectric sites in the far north is higher, but available evidence suggests that the expense of exploiting Brazil's hydroelectric potential will not reach the cost of generating nuclear power until 60 percent of that power has been tapped. Indeed the policymakers have accelerated the development of Brazil's vast hydroelectric resources and intensified exploitation of indigenous coal reserves. Nonetheless they remain concerned that delays in bringing new capacity onstream could result in electrical energy shortages in the 1980s in the face of rapid urban growth. [REDACTED]

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28 September 1979

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The Brazilians clearly feel that there are other economic benefits to be derived from their ambitious nuclear program, including the expansion and diversification of foreign markets for their exports. Moreover, they believe that mastery of nuclear technology will greatly enhance their international image as an industrially sophisticated nation. In this spirit, Brazil has recently shown signs of interest in building new regional bonds through nuclear cooperation with neighboring Latin American states. This July, for example, Brazilian Foreign Minister Guerrero signed a bilateral memorandum of understanding on nuclear cooperation for peaceful purposes with Venezuela. So far, the Brazilians have only agreed to provide the Venezuelans with training and to exchange information on uranium prospecting and uranium concentration. [REDACTED]

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Under Brazil's well-established and elaborate defense doctrine, economic development is seen as essential for national security--which Brazilians define very broadly to include social, political, and economic stability. Hence, whatever contributes to national development enhances national security. [REDACTED]

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Classic military and defense preoccupations, on the other hand, do not now loom large in the calculations of Brazil's nuclear policy planners. Brazil is still largely isolated from the main currents of international tensions and has no fear of military attack from neighboring states. Even its longstanding and, at times, bitter rivalry for regional influence with Argentina--which has the most advanced nuclear program in Latin America--is not at present a major motivating factor behind Brazil's nuclear ambitions. On the contrary, the relationship between Brazil and Argentina has become increasingly cooperative with the rapid expansion of bilateral trade. [REDACTED]

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There has even been considerable talk--both public and private--about potential bilateral nuclear cooperation between the two countries. Fundamental differences in reactor design as well as issues of nationalist competition will probably continue to restrict the degree of cooperation, but it is possible that the two nations

28 September 1979

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might adopt a common strategy in opposition to supplier-imposed restrictions on the transfer of nuclear technology. Argentina and Brazil might also agree to extensive cooperation in the production of radioactive isotopes for medical and industrial purposes. [redacted]

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Nonetheless, Brazilian leaders are well aware that their regional security concerns could become more pressing over the next few years. They would see their interests threatened if any of the continent's simmering disputes--for example, the territorial disagreements between Chile and Argentina and between Chile and Peru--were to erupt in fighting. Moreover, no conscientious Brazilian planner would be willing to gamble on Argentina's ultimate intentions or, despite the currently peaceful nature of Brasilia's nuclear program, to argue that Brazil should unilaterally foreclose the nuclear weapons option.

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. . . and West Germany's View

The Schmidt government is dismayed at the complications that have delayed implementation of joint nuclear projects with Brazil. But there are several considerations that will strongly motivate the West Germans to follow through on the commitments they made in the 1975 agreement. In general they believe that the Federal Republic must protect its reputation as a reliable supplier of nuclear equipment and technology. [redacted]

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Perhaps the most important specific consideration for the West Germans is the huge economic stake they now have in the Brazilian deal. If the agreement flounders, the consequences would be catastrophic for the West German nuclear industry, which is already in serious financial difficulties. The prospect of government subsidies to save the nuclear industry--on top of the \$8 billion Bonn has already invested in that sector--could become a serious political problem for Chancellor Schmidt when he faces national elections in October 1980. [redacted]

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The West Germans have other important reasons for wishing to keep their nuclear cooperation agreement with Brazil alive. One of the factors that originally encouraged them to send advanced nuclear technology to

28 September 1979

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Brazil was the prospect of guaranteed access to Brazilian uranium. While the current freeze on new reactor construction in the Federal Republic strongly suggests that the uranium contracts already signed with the major supplier states might be adequate to meet West German requirements for the coming decade, Bonn still has a substantial political interest in diversifying its source of supply. As part of the original nuclear cooperation agreement, the West Germans were given the right to 20 percent of the uranium discovered and exploited by Nuclam, a Brazilian - West German company. During the past year, the Brazilians have raised the estimate of their commercially exploitable uranium reserves to more than 100,000 metric tons. [REDACTED]

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In addition to this vested interest in uranium exploration, the West Germans have a general interest in promoting economic relations with the Brazilians. While Brazil only accounts for a small share of West German exports, the West Germans have substantial nonnuclear investments in this country. The Schmidt government wants to nurture and expand this economic relationship as part of a general effort to penetrate the Latin American market. [REDACTED]

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Constraints on Brazil's Nuclear Aspirations

Limited political liberalization has made it more difficult for the Brazilian Government to keep the expense of the nuclear program from becoming a divisive political issue, particularly when Brazil is suffering from a sustained high rate of inflation and a relative decline in economic growth. At a time of growing preoccupation with socioeconomic problems, spending vast sums on projects with no short-term, highly visible payoff has not gone unchallenged. Nevertheless, the domestic debate over Brazil's nuclear program has remained moderate in tone. (It is worth noting that, for whatever reason, the reprocessing aspects of the nuclear program have been spared from public criticism.) [REDACTED]

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While the shift in the domestic political environment undoubtedly contributed to Brasilia's decision to stretch out and pare down its original nuclear plans, economic constraints were the determining factors. First, soaring costs are undermining Brazil's ability

28 September 1979

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to pay for the ambitious program. The original estimate of \$5 billion for reactors and associated facilities, for example, may quadruple. Moreover, expensive nuclear power plants have become increasingly difficult to justify in view of the slower-than-anticipated growth in consumption of electricity. [REDACTED]

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Other broad economic developments are also undercutting Brazil's ability to absorb the escalating costs of the nuclear program. Persistent inflation, combined with less rapid economic growth, is squeezing government funding allocations for infrastructure projects. Brazil's mounting foreign debt--presently over \$43 billion--is limiting its ability to import sophisticated foreign equipment in the amounts required for its nuclear program. Although Brazil's generally favorable credit rating would enable it to secure additional foreign financing for its nuclear imports, the cost would be high and the availability of foreign credits for more productive economic ventures would be reduced. [REDACTED]

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Finally, Brazil's lack of an extensive high technology base has made it difficult to carry out its nuclear program. Although the infrastructure set up by Brazil and West Germany for the implementation of their accord (including the transfer of technology) is sound enough, the Brazilians remain severely hampered by a lack of trained personnel and, more generally, practical experience in nuclear and related matters. Indeed, the long time required to train the large number of personnel needed in both the technical and industrial fields has been responsible for much of the slippage in the implementation of Brazil's nuclear program so far. Inexperience and recourse to trial-and-error methods can also be blamed in part for the soaring costs in all sectors of the program--and in reactor construction in particular. [REDACTED]

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Thus far, foreign events and international pressures have had no discernible dampening effect on Brasilia's determination to implement its nuclear program. Indeed, a number of external developments and pressures--for example, the dramatic increase in the cost of oil due in large part to the pricing policies of the Organization of Petroleum Exporting Countries--have had precisely the opposite effect. [REDACTED]

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28 September 1979

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~~SECRET~~Looking Ahead

Predictions concerning the future of Brazilian - West German nuclear cooperation and of Brazil's nuclear program as a whole are difficult because Brasilia will continue to be pulled and pushed in opposite directions by a wide array of political, economic, technical, and security considerations. Soaring costs, economic slow-down, and technical difficulties will operate as in the past to delay and stunt the program. Expected further increases in the price of imported oil, the logic of Brazil's quest for energy independence, and the nation's aspirations to great power status will continue to reinforce Brazilian determination to preserve and implement as much of the nuclear program as possible. [REDACTED]

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For at least the next year or two these opposing factors seem likely to offset each other and thus allow Brazil's nuclear program to develop along the more modest lines that have been emerging in recent months. Whether this tendency persists will depend in part on the shifting political, economic, and technological environment, both regional and global. Nonetheless, Brazil will continue to be highly resistant to outside pressures to alter its plans in the interest of reducing the attendant proliferation risks. [REDACTED]

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Over the next several months, Figueiredo will probably not be under much domestic political pressure to make further changes in Brazil's nuclear program, partly because the changes already made have made it easier to defend the program. The worsening economic climate in Brazil will, however, create further problems with respect to developing nuclear power that could have a significant effect in the longer run. To cope with an annual inflation rate of 50 percent (and perhaps more), Brasilia has cut the budgets for government agency expenditures. In addition, the government's recent prohibitions on commercial bank loans to state entities--another feature of its anti-inflationary package--place financial restrictions on Nuclebras, the state-owned nuclear holding company, that will limit its ability to fund investments. [REDACTED]

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28 September 1979

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Imports of foreign equipment critical to Brazil's nuclear program will also be harder to manage this year because of a record current account deficit of \$8-9 billion. Moreover, the rising cost of servicing Brazil's Eurodollar debt will reduce the amount of foreign exchange available to Nuclebras for purchase of nuclear hardware. [REDACTED]

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Because of Brazil's worsening economic climate, it also seems likely that:

-- Brazil will buy no more than four--and possibly as few as three--of the eight German reactors originally provided for in the 1975 accord.

-- The Brazilians will eventually abandon, because of both cost and technological considerations, tentative plans to expand their projected demonstration-scale Becker nozzle uranium enrichment facility to a commercial-scale plant. [REDACTED]

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Barring serious problems with the commercially unproven Becker process or unforeseen political or economic difficulties of major proportions, however, we doubt that Brasilia will drop the demonstration-scale uranium enrichment project or otherwise fundamentally alter its current plans to acquire a complete nuclear fuel cycle from West Germany. Nor do we think it likely that Brazil will buy fewer than three power reactors from the Germans. [REDACTED]

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While Brasilia has watched the progress of other aspiring nuclear states (especially in Latin America) with keen interest--and while any notable successes achieved by those states might have some stimulating effect on its own nuclear efforts--it is unlikely to be greatly influenced by any of their specific nuclear policies or decisions unless those moves appear threatening. In particular, a decision--whether voluntary or involuntary--on the part of another state to forgo acquisition of a complete nuclear fuel cycle would probably not persuade the Brazilians to follow suit. [REDACTED]

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28 September 1979

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In sum, President Figueiredo, who enjoys the advantage of not being publicly indentified with the original 1975 nuclear accord, has quietly but effectively lowered his government's sights on the nuclear program because of major economic and technical problems. Further slippage and "adjustments" seem likely, especially in the longer run. Nonetheless, there is little reason to expect that Figueiredo--whose term expires in 1985--or any of his most plausible successors will abandon the essential elements of a program so closely tied to national pressure to push Brazil back into a stridently nationalistic defense of its nuclear plans.

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28 September 1979

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